SCIENCE

FRIDAY, JANUARY 5, 1912

CONTENTS

MSS. intended for publication and books, etc., intended for review should be sent to the Editor of SCIENCE, Garrison-on-Hudson, N. Y

THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

THE WASHINGTON MEETING

THE sixty-third meeting of the American Association for the Advancement of Science was held at Washington, D. C., December 27 to December 30, 1911, under the presidency of Dr. Charles E. Bessey, of the University of Nebraska. The meeting was the most successful in the history of the association, both from the point of attendance and from the enthusiasm shown. Beautiful weather prevailed throughout and the people of Washington, including the many scientific men connected with the various governmental bureaus, did everything in their power to make the stay of the visitors pleasant and profitable. The total registration of members of the association was 1,306, whereas the largest previous registration was that at the third Boston meeting, when the total was 1,140. A conservative estimate of the actual number of members of the association present in Washington would place the number at 1,800 and there were doubtless as many as a thousand more present who are members of affiliated societies and not members of the association itself. The following is a list of affiliated and other scientific societies which met in Washington at the same time.

Astronomical and Astrophysical Society of America.
American Physical Society.
American Society of Biological Chemists.
American Chemical Society.
Association of American Geographers.
Geological Society of America.
Paleontological Society of America.
American Association of Economic Entomologists.
Entomological Society of America.
American Breeders' Association.

American Psychological Association.
Southern Society for Philosophy and Psychology.
Botanical Society of America.
American Fern Society.
Society for Horticultural Science.
American Microscopical Society.
American Nature-Study Society.
American Phytopathological Society.
Sullivant Moss Society.
American Anthropological Association.
American Folk-Lore Society.
American Civic Alliance.
American Economic Association.
American Association for Labor Legislation.
American Sociological Society.
American Statistical Association.
American Home Economic Association.
American Physiological Association.
Society of American Bacteriologists.
American Federation of Teachers of the Mathematical and Natural Sciences.
Sigma Xi.

The opening reception to members of the association and affiliated and visiting societies was given at the new National Museum from 8 to 9 P. M. of December 27. At the close of the reception, the association held its first general meeting in the assembly hall of the new National Museum. The meeting was called to order by the retiring president, Dr. A. A. Michelson, who introduced the president-elect, Dr. Charles E. Bessey, who in turn introduced the President of the United States, William H. Taft, who delivered the following address of welcome:

I had a Christmas present a day or two ago. It was a new Encyclopædia Britannica. On the first page of it—I suppose that was the reason why I got it—there was a dedication to King George V. and William Howard Taft, president of the United States. Standing as I do in the presence of this live encyclopedia of all knowledge, I have the same feeling of awe now that I had when I saw that name before all the knowledge of the world. At first I thought somebody else ought to speak before me, but I am glad to come first, because as a welcomer it is not necessary for me to advance a single scientific proposition. I am here only as the Mayor of Washington to advise you that you have the freedom of the city and that it is a beautiful city which you can not stay too long in. Indeed the longer you stay, the longer you want to stay.

We have centers of science here. We have the Carnegie Foundation for Scientific Research, and one of these days I am going to read the things that come from that research, when I have plenty of time. Then, we have a number of bureaus that I presume would be called bureaus of applied science. I don't refer to the science of government—that is altogether too inexact a science for an assembly like this—but I mean there are certain bureaus connected with this government that I hope present matters of interest to so learned and scientific a body as this. There are some of them that I would like to get my hands on and change, but there are limitations upon the power of the president of the United States and he can not do everything he would like. If I could change the Naval Observatory into a bureau, with a scientific professor at the head of it, I would do it to-morrow, but there are conservative gentlemen connected with the coordinate branches of the government that prevent.

Then, we have the Geological Survey and the Bureau of Chemistry and the Bureau of Entomology and the Bureau of Standards. I have no doubt there is a much longer list, which if I had only committed it to memory, I would give here for your studious consideration. But it is enough of a congeries of scientific nerves to justify a meeting of all the scientific bodies of the country here, and I hope that as the government goes on and as congress becomes more liberal, those centers of scientific research, as many of them ought to be, will be improved so as to commend them to those of you who have theories as to what they ought to be under the auspices and with the necessary money which the United States can devote, if it will, to useful scientific research.

There is only one other remark which I wish to make to-night. In thinking over what there was between this audience and me, of any possible common knowledge, it occurred to me it was some experience in the exercise of the judicial faculty —that is in your lives and in your branches of study and action, the search for truth without regard to the result you reach. That is what makes the administration of justice, what makes the work upon the bench so delightful—the absolute indifference to a result, with the weighing of the reasons pro and con and the final solution in accordance with eternal justice. The scientific man in his search for the truth of nature, in

which he could wrest a rule from nature—a law—and in which he studies each individual instance to find that law, or, if he thinks he has found it, to make the instance square with the law, exercises the judicial faculty in a different branch, but with the same necessity for absolute adherence to truth in order that a useful result may be reached—no forcing of a theory, no construction of individual instances in order to make a theory, if those instances really don't fit into it; and if I know the weakness of the scientist or the temptation of a scientist, it is in reference to just such cases as that. Just as the judge upon the bench, with a weakness for deciding a case in advance, because he has heard one or two things in it, and then tries to square everything else that comes along to his original theory, so, too, with you. I have no doubt that what you have to struggle against is too quick recognition of something that leads you to discover a law. Subsequent study changes your mind about it and then you have to go back and build up a new theory or law, slowly, deliberately, but with strict adherence to truth and a desire to find the truth until you finally conquer and reach a conclusion that will bear the test of every instance.

Dr. Walcott, Secretary of the Smithsonian Institution, who was to have given the second address of welcome, was absent through illness.

President Bessey responded to the address of welcome, as follows:

Mr. President:

The members of the American Association for the Advancement of Science feel it to be a great honor to be welcomed to the capital of the country by its foremost citizen, the president of the United States.

In theory at least scientific men are like the men who frequent this city. They are here for a particular purpose. They work for the good of the community. They are not working for their own advancement. They are servants of the people. In all these things we are like the men who occupy legislative, judicial or executive positions in this capital city.

But, Mr. President, you will permit me to suggest, without unseemly egotism, that in the coming of this body of scientific men to the capital, we represent more than an invasion of an equal number of congressmen, judges and executive officers. If I may be allowed to say it, the latter represent present problems and needs, and deal only with the things of immediate importance. *They* are time servers often, or may be mostly in the better sense, but still servers of the present time. And no one will question the usefulness of the man who honestly and conscientiously serves his day and generation—his time.

To the man of science the past, the present, the future, are spread out as the great panorama of nature on which are sketched the successive pictures of an eternity of change and evolution, whose beginning we do not know, and of whose end we have no conception. The politician works wholly in the present and for the present: the scientist's work carries him back through eons of duration to the dawn of eternity, and forward through countless millenniums to a possible twilight time of the universe.

I am not saying that all scientists live in the eternities in this high fashion, nor am I denying that there are great minded statesmen who live in a present which is illumined by the past, and beckoned by the future. No, I would not dare to claim so much for all who enroll in the ranks of science, and certainly we know of some men in public life whose breadth of view on the political questions of the day entitles them to the distinguished name of statesmen.

So I stand here representing a body of men, in some respects like those who are visibly engaged in conducting the government of the country, but in other respects constituting a very different body, and it is on their behalf that I thank you sincerely for the cordial welcome you have extended to us.

But while I speak I am reminded that in these later years you have taken into the service of the government many hundreds of trained scientific men, and that these men by their labors are helping you to solve some of the most difficult problems that the government has had to face. With these men we who assemble here to-day have close ties and cordial sympathies. We remember that although in government service they are still scientific men, and that the problems you have placed before them are scientific problems. And we are anxious, Mr. President, that these brothers of ours shall have full opportunity for doing well the work put before them. We are glad that by the establishment of an enlightened system of laws controlling the civil service this body of scientists has been lifted out of the reach of petty personal politics. That has made it possible for

the government to secure the services of so many men of the highest scientific attainments. It now remains for you, Mr. President, as the executive head over all the scientific bureaus to see that the proper atmosphere is maintained in every bureau, and in every division where scientific men work. It has been hinted sometimes that with all that has been done so well to keep the outside politician away from the scientist's laboratory, we have not wholly succeeded in keeping the inside politician from creating an atmosphere quite inimical to scientific work. For it must be remembered that scientific work is not all a digging out of facts as is so often supposed, but that the best of it calls for comparison, and reflection, and the careful drawing of conclusions, and this takes much time, and mental leisure, and a freedom from petty irritations.

If the men who have to solve the scientific problems of the government are to discharge their duties with the highest efficiency, they must have good appliances in the way of laboratories, experimental stations, apparatus, reference libraries and such other material necessities as pertain to the particular work they have in hand, but more than these, far more I may say, is the necessity for a congenial and sympathetic environment. And rumor has it that this helpful environment is not always present in the splendidly equipped divisions, where it may be that the expert scientist is hampered and distracted by the necessity of making preliminary plans, and preliminary projects, and final plans and final projects, and reports of progress, and preliminary reports, and final reports, and supplementary reports, to officials who neither understand the nature of the problems nor the scientific methods of their study.

We shall agree that these things ought not to be, and I am assured by the interest you have shown in the scientific work of the country at large, and especially by what you have done here in the capital that you will gladly help to free the government scientists from such trammels as may have sometimes hedged them in. In these days when we are applying "scientific management" to business and the industries certainly we ought to have a scientific management of our bureaus of science.

Mr. President, I regard it as a great honor to have had the privilege of responding to the welcome extended to this Association, and doubly so when that welcome has been given by you, whom we all delight to honor, as the president of this good country of ours.

The annual address was then delivered by the retiring president Dr. A. A. Michelson, on "Recent Progress in Spectroscopic Methods," after which the meeting was adjourned.

The addresses by retiring vice-presidents of sections were made as follows:

WEDNESDAY AFTERNOON

Vice-president Frankforter before the Section of Chemistry. Title: The Resins and their Chemical Relations to the Terpenes.

Vice-president Harper before the Section of Botany. Title: Some Current Conceptions of the Germ Plasm.

THURSDAY AFTERNOON

Vice-president Rosa before the Section of Physics. Title: Work of the Electrical Division of the Bureau of Standards.

Vice-president Rotch before the Section of Mechanical Science and Engineering. Title: Aerial Engineering.

Vice-president Hill before the Section of Education. Title: The Teaching of General Courses in Science.

FRIDAY MORNING

Vice-president Moore before the Section of Mathematics and Astronomy. Title: On the Foundation of the Theory of Linear Integral Equations.

FRIDAY AFTERNOON

Vice-president Dixon before the Section of Anthropology and Psychology. Title: The Independence of the Culture of the American Indian.

Vice-president Novy before the Section of Physiology and Experimental Medicine. Title: Carriers of Disease.

Vice-president Burton before the Section of Social and Economic Science. Title: The Cause of High Prices.

Among other addresses which were given and meetings for general discussion which were held, the following may be mentioned:

On Thursday morning, there was a symposium on "The Ether" before the American Physical Society, which was led by Professor A. A. Michelson, who was followed by Professor A. G. Webster and others.

Dr. H. B. Talbot, chairman of the Division of Physical and Inorganic Chemistry, delivered an address on Wednesday afternoon, on the "Privileges and Responsibilities of the Chemical Analyst."

On Thursday evening, the president of the American Chemical Society, Dr. Alexander Smith, addressed the society on the subject, "An Early Physical Chemist." The address was followed by a lecture by Frank B. Kenrick and H. E. Howe, on "Lantern Experiments on Reactions in Heterogeneous Systems."

A symposium on "Drug Assay" was held on Friday morning by the Division of Pharmaceutical Chemistry, and one on "Mineral Wastes and Conservations" was held by the Division of Industrial Chemists and Chemical Engineers.

President R. S. Tarr, of the Association of American Geographers, gave his presidential address on Friday morning, on "The Glaciers and Glaciation of Alaska."

The Paleontological Society of America held a symposium Friday morning, on "Ten Years Progress in Vertebrate Paleontology."

A symposium on " Instinct and Intelligence" was held on Wednesday morning by the American Psychological Association.

The subject of the address of President Franz of the Southern Society for Philosophy and Psychology, given on Thursday afternoon, was "New Phrenology" and that of President Seashore, of the American Psychological Association, given on Thursday evening, was "The Measure of a Singer."

Professor J. H. Comstock addressed the Entomological Society of America on Wednesday evening on "Some Biological Features of Spiders."

The Section of Botany held a symposium on "Soils" on Wednesday afternoon, and the Botanical Society of America held a symposium on Thursday afternoon on "Modern Aspects of Paleobotany" after the retiring president, Dr. E. F. Smith, had delivered his presidential address on "Some Aspects of the Relationship of the Crowngall Disease to Human Cancer."

Dr. H. M. Beldon gave his presidential address, on "Folk Poetry in America," on Thursday morning, before a joint session of Section H and the American Folk-Lore Society. In the afternoon, the joint session was in charge of the American Anthropological Association and a symposium was held on "Environment and Culture."

Presidential addresses by Dr. F. H. Giddings, president of the American Sociological Society, on the "Quality of Civilization" and by Dr. H. W. Farnum, president of the American Economic Association, on "The Economic Utilization of History," were given before a joint meeting of the two societies, on Wednesday evening.

On Friday afternoon at a joint meeting of Section K with the American Physiological Society and the Society of American Bacteriologists a symposium was held on "Acapina and Shock."

The council of the American Association met daily and the following are the chief items of business transacted:

Eighty-seven new members were elected into the association, and the following were elected fellows of the association: Frank H. Bailey, Fred Asa Barnes, John Fritz, A. A. Hammerslog, Truman Michelson, F. Paul Anderson, Gardner Chace Anthony, Henry Sturgis Drinker, Louis Doremus Huntoon, William Christian Hood, Clement Ross Jones, John Price Jackson, James W. Lawrence, Edwin Hoyt Lockwood, Chas. E. Suche, Francis C. Shenehon, Frederick W. Sperr, James T. Beard, Wm. J. Sharwood, Lula Pace, Pliny E. Goddard, George Byron Gordon, Guy M. Whipple, Milo B. Hillegas, Frederick E. Farrington, Harold

A. Wilson, Frank Wenner, F. C. Brown, E. A. Harrington, W. J. Fisher.

The report of the treasurer for 1910 was presented by the permanent secretary and was accepted and ordered placed on file. The financial report of the permanent secretary was presented, accepted and ordered published.

Dr. H. E. Summers was elected secretary *pro tem* of the council.

The following resolutions were adopted:

1. WHEREAS, the will of the late Jane M. Smith, of Pittsburgh, Pa., a former life member of the American Association for the Advancement of Science, contains the following bequest, namely:

"Seventeenth: I give and bequeath to the National Geographic Society of Washington, D. C., the sum of five thousand dollars ($5,000); to the American Forestry Association of Washington, D. C., the sum of five thousand dollars ($5,000); and to the American Association for the Advancement of Science of Washington, D. C., the sum of five thousand dollars ($5,000). I hereby direct that each of said sums be invested and the net income thereof be used for the purpose of creating life members of said three organizations in cases where worthy and competent persons are not able to pay for such memberships."

Be it therefore *Resolved,* That the permanent secretary of the association be and hereby is authorized to accept from the executors of Jane M. Smith, deceased, the legacy of five thousand dollars ($5,000) bequeathed by her to the American Association for the Advancement of Science as a fund whose income may be used in the payment of life-membership commutations in the association.

Resolved, That this fund be designated as the Jane M. Smith Fund of the American Association for the Advancement of Science.

Resolved, That said sum of five thousand dollars ($5,000) or any instalments thereof as they may be received, be turned over to the treasurer of the association for investment in such manner as the council of the association may direct.

Resolved, That the application of the income of the Jane M. Smith Fund in conformity with the wishes of the testatrix be determined by the council of the association after reference to and recommendations from the committee on policy.

2. WHEREAS, more than fifty per cent. of the injurious insects and plant diseases of first-class importance in the United States have been imported accidentally or in the course of commerce from other countries; and

WHEREAS, the United States of America is the only country among the great nations of the world which has no national quarantine or inspection service looking towards the prevention of such introductions:

Therefore be it *Resolved,* That in the opinion of the American Association for the Advancement of Science the passage of a national quarantine and inspection law directed against the introduction and establishment of injurious insects and plant diseases from other parts of the world is a great desideratum at the present time.

The permanent secretary was directed to transmit copies of this resolution to the president of the United States, the president of the senate, the speaker of the house and the chairman of the committee on agriculture of the house of representatives.

3. *Resolved,* That the permanent secretary be instructed to present for nomination to fellowship the names of those members who are members of affiliated societies, which have already been designated as having qualifications for membership equivalent to fellowship in the association.

4. *Resolved,* That the council of the American Association for the Advancement of Science approves the creation of a Bureau of Astronomy with a scientific chief, which shall have charge of the Naval Observatory and of the Nautical Almanac, and respectfully requests that every endeavor be made to put into operation this plan in the interests of astronomy in the United States.

The permanent secretary is requested to forward a copy of this resolution to the president of the United States, to the president of the senate and to the speaker of the house of representatives.

5. *Resolved,* That Section I be given permission to meet at times and places different from those of the general association, whenever the sectional committee and the committee on policy so agree.

6. *Resolved,* That the treasurer of the association be authorized to invest $20,000 of the permanent funds of the association in such interest-bearing securities as the committee on policy of the association may approve.

The council instructed the permanent secretary to publish in February or March next a list of officers and members of the

association. The resignations of N. L. Britton and W. H. Welch from the Committee on Policy were accepted and D. T. MacDougal and W. J. Humphreys were appointed to fill the vacancies.

The council authorized an increase in compensation of the present assistant to the permanent secretary from $100 per month to $125 per month.

A resolution was adopted recommending that future delegates from the association to international conferences and other delegate bodies be requested to submit brief reports to the council.

A report from Dr. Hutton Webster, delegate to the First Races Contest, was read and ordered filed, and the report of Dr. B. Shimek, delegate to the Third National Conservation Congress, was presented and placed on file.

The council resolved that the American Association for the Advancement of Science reaffirms its approval of the establishment of a National Department of Public Health.

Senator Theodore E. Burton, Dr. Wm. Trelease and Dr. Henry B. Ward were elected to fill vacancies in the council.

The following grants were allowed for the ensuing year:

To the Concilium Bibliographicum $200
To Mr. Frank C. Gates, A.B., for an investigation of the relation of transpiration to plant structure in bog plants, in collaboration with Professor T. C. Newcombe $100

The following amendments to the constitution were read as a formal notification in order that they may be acted upon next year under the provisions of the constitution:

Article 31. Substitute for existing article the following:

"The permanent secretary shall publish from time to time a list of officers and members of the association together with such other matter as the council may direct.

Article 3. In closing line omit the word "annual."

Article 6. Omit final sentence.

Article 19. Omit "in the annual volume of Proceedings."

Same article, omit "to the printing and distribution of the annual volume of Proceedings and all other."

Article 22. After "Education" add

"M, Agriculture," or

"M, Agriculture and Forestry," or

"M, Forestry,"

and

"And the council shall have power to create additional sections from time to time when deemed desirable."

Article 22. Lines 4 and 5, change from "H, Anthropology and Psychology" to "H, Anthropology."

Article 22. Abolish Section I.

At a meeting of the general committee held Friday evening, December 29, it was resolved to hold the next meeting at Cleveland, Ohio, the meeting to begin on the Monday of the week in which January first, 1913, falls. It was further resolved to recommend to the next general committee that the meeting for 1913 be held in Atlanta, Georgia. It was further resolved that the committee looks with favor on the plan of holding a summer meeting on the Pacific coast in 1915.

The following officers were elected for the coming year:

President—Dr. Edward C. Pickering, director of the Harvard Astronomical Observatory.

Vice-presidents:

Sec. A—E. B. Van Vleck, University of Wisconsin.

Sec. B—Arthur Gordon Webster, Clark University.

Sec. C—W. Lash Miller, Toronto.

Sec. D—J. A. Holmes, Washington, D. C.

Sec. E—James E. Todd, University of Kansas.

Sec. F—William A. Locy, Northwestern University.

Sec. G—D. S. Johnson, Johns Hopkins University.

Sec. H—J. Walter Fewkes, Washington, D. C.

Sec. I—John Hays Hammond, New York.

Sec. K—J. J. McCleod, Cleveland, Ohio.
Sec. L—J. McKeen Cattell, Columbia University.

Secretaries of Sections:
Sec. B—W. J. Humphreys, Mount Weather, Va.
Sec. E—Geo. F. Kay, University of Iowa.
Sec. K—Waldemar Koch, Chicago University.

General Secretary—H. E. Summers, Iowa State College.

Secretary of the Council—H. W. Springsteen, Western Reserve University.

JOHN ZELENY,
General Secretary

THE WORK OF THE ELECTRICAL DIVISION OF THE BUREAU OF STANDARDS[1]

1. INTRODUCTION

THE Bureau of Standards has grown considerably, both in equipment and personnel, since its inception in 1901. The original staff of fourteen has increased to nearly three hundred, and the material equipment has been augmented in a similar ratio. Its functions also have developed, although authority for all its manifold activities is contained in the brief act of Congress of March 3, 1901, which established the Bureau, and its growth has been closely along the lines laid down by the director in his first announcements of the policy of the new bureau.

The name Bureau of Standards does not signify to the average person the wide scope of the work of the bureau, which is really a national physical, chemical and engineering laboratory. In Germany there are three similar national institutions, and the establishment of a fourth has been proposed; these four combined would cover the field occupied in this country by the Bureau of Standards. The German institutions referred to are the Physikalisch-Technische Reichsanstalt, for physics; the Normal Eichungs-Kommission, for weights and measures, and the Material Prufungs Amt, for engineering and the testing of materials. In addition to these three institutions, which have been in active operation for many years, a royal chemical institute for chemistry has been for some time under consideration. In England the National Physical Laboratory occupies a field more nearly like that of the Bureau of Standards, but the Board of Trade divides with it some of these functions.

The work of the Bureau of Standards is distributed among seven divisions, as follows:

I. Electricity and photometry.
II. Weights and measures.
III. Heat and thermometry.
IV. Optics.
V. Chemistry.
VI. and VII. Engineering and the testing of materials.

Thus, it will be seen that the work of Divisions I., III. and IV. correspond to that of the Reichsanstalt of Germany, and the remaining four divisions to the other three German institutions mentioned above.

The work of the bureau may be broadly divided into two parts, research and testing, although much time is devoted to the preparation of specifications, the standardization of practise and the diffusion of information that does not fall under either of these heads. To undertake to describe the work of research, testing and standardization carried on in all the divisions of the bureau would be a task requiring more time than is at present available. I shall, therefore, limit myself to the work of Division I., and if I succeed in bringing to your minds a full appreciation of the character and importance of the work we are trying to do in electricity, magnetism and photometry, you may take this when

[1] Address of the vice-president and chairman of Section B, Washington, 1911.