SCIENCE

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FRIDAY, SEPTEMBER 13, 1895.

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MSS. intended for publication and books, etc., intended for review should be sent to the responsible editor, Prof. J. McKeen Cattell, Garrison on Hudson, N. Y.
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XLIV. MEETING OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, SPRINGFIELD, MASS., AUG. 28th–SEPT. 4th, 1895.

IN 1859 the American Association assembled for its thirteenth meeting in Springfield. After the lapse of thirty-six years the Association has again met in the metropolis of western Massachusetts, this time for its forty-fourth annual gathering, five meetings having been passed on account of the Civil War.

Geographically, Springfield is well located for a place of meeting, being within easy reach of a large proportion of the members of the Association. For some reason, perhaps, the unusually late date of holding the meeting, the hopes of officers and local committee as to attendance were not realized, it having been the smallest meeting held in the eastern section of the country since that of Saratoga in 1879, and having but slightly exceeded the meetings held in the West. The number of members registered was hardly double that of the earlier Springfield meeting, when 180 were present.

The uncertainty until a late date as to where the meeting would be held, it having been hoped that the railroads would make satisfactory rates to San Francisco, may also have contributed to the smallness of the meeting.

But if the attendance was not what might have been wished, the arrangements by the local committee have rarely been better made. Outside of a University town it is rarely possible to have all the audience rooms in one building, but at Springfield all were in such close proximity that little inconvenience was experienced in going from section to section and to the offices and reception rooms. Every convenience was provided for the members, and the courtesies of the citizens of the city are worthy of special mention. It is, however, unusual that the immediate vicinity of the place of meeting is so meagerly represented among

the members. Of the whole number registered, only 15 were from the city of Springfield and hardly more than half a hundred from the entire State of Massachusetts; more than half of these, too, were elected at the present meeting.

While these strictures must in fairness be passed upon the meeting, the work in the individual sections was probably above the average. The number of papers presented—over two hundred—was very large and many of them were of unusual value and interest. This was particularly true in the Sections of Chemistry and Anthropology, and members were heard to characterize the meeting as far as regarded these sections as the most helpful and best ever held. In the Chemical Section this was due to the labors of the Vice-President and Sectional Committee in preparing the program long in advance of the meeting. In this connection it may be said that of the 184 new members elected 40 belong to section C, and 21 out of 58 fellows elected at the Springfield meeting are members of the the same section. At the same time the American Chemical Society is by far the largest (over 900 members) and perhaps the most active of the Affiliated Societies. In this case it seems as if the Affiliated Society is directly conducive to the prosperity of the Section of the Association. The opening session of the Association was held in the Y. M. C. A. Hall on Thursday morning. In calling the meeting to order the Permanent Secretary, Prof. F. W. Putnam, read a letter from the President, Dr. D. G. Brinton, announcing that owing to the continued serious illness of his wife it was impossible for him to return from Europe in time for the meeting. In Dr. Brinton's absence, the Senior Vice-President, Prof. Wm. H. Brewer, of New Haven, was called to the chair, and referring in a few well-chosen words to the labors of the President-elect in his well-known determinations of the composition of water, introduced Prof. Edward W. Morley, of Cleveland, as President of the forty-fourth meeting of the Association. After an invocation by Rev. Bradley Gilbert addresses of welcome were delivered by ex-Lieutenant-Governor W. H. Haile, and Mayor Charles L. Long. This latter address, contrasting well the periods at which the two Springfield meetings were held, was as follows:

More than a third of a century has passed away since this Association last met in this city, on the 3d day of August, 1859, for the purpose of holding its 13th gathering. Prof. Stephen Alexander, that distinguished astronomer whose writings attracted the attention of scientific scholars of this country and of other lands, presided at the meeting. The political and scientific changes which have taken place during the period that has passed have been many, and they have been as remarkable as they have been numerous.

When that convention assembled, human slavery was a legalized institution in the Southern States, and the great question of its extension into the Territories and of their admission into the Union cursed with its blight agitated the people. Two months had scarcely passed after the Association adjourned, before the country was convulsed with excitement over the insurrection at Harper's Ferry, and within two years the storm which had for so long been gathering and which was to settle forever the great questions of State rights and of human slavery in this country broke with terrific fury upon our beloved land, drenching it in fraternal bloodshed and in a conflict unequal in its magnitude and unsurpassed in the importance of the results achieved.

No doubt the learned men who assembled at that gathering were proud of the success which had thus far drowned scientific investigation, and gloried in the great ad-

vance which had been made. But so great have been the discoveries which have followed, and so wonderful have been the changes which these discoveries have wrought, that we can hardly appreciate that many of the great scientific truths of to-day were but cautiously advanced theories at that time.

It was during the year preceding that meeting that the paper of Wallace 'on the tendency of varieties to depart indefinitely from the original type' and Darwin's paper 'on the tendency of species to form varieties' were read, simultaneously, before the Linnæan society. On the first of October following that meeting Darwin published his 'Origin of Species,' which more than a decade later caused the French Academy to reject him as a candidate for membership by a vote of more than two-thirds, one of its menbers declaring that the 'Origin of Species' was 'a mass of assertions and absolutely gratuitous hypotheses, often evidently fallacious.'

Truly, 'the stone which the builders refused is become the headstone of the corner,' for the doctrines of Darwin's work are now recognized and accepted by the learned and scientific of the civilized world; and evolution, which was for years scorned and rejected not only by the great majority of the scientific, but by pretty much everybody whose views upon the subject were entitled to weight, is now almost universally accepted.

During this period the doctrine of spontaneous generation received the aggressive attention of scientists. The views of the learned Pasteur, which were opposed to this doctrine, were contested, and were supposed to have been refuted by the experiments of Wyman. The theory of spontaneous generation is no longer accepted, but out of the agitation which it created, was born the new science of bacteriology.

Indeed, during the period of which I am speaking, the progress in geological, zoölogical, physiological and astronomical science, in chemistry and in physics, has been marvellous. The wonderful development and utilization of electric forces, which forms such a marked demonstration of the value of scientific research, was not then dreamed of. Even the Atlantic Cable had not been successfully laid, and the results of the wonderful inventions of Edison, of Bell and of many others of the great discoverers and inventors of the electrical world were not for a moment contemplated.

The doctrine of the antiquity of man, which sought to place and which now places his origin far back beyond the period of 6000 years, which was then zealously contested, is now not only adopted by scientists, but is accepted complacently by all the well-informed without any shock to their religious feelings.

These great advances, which have entertained, enlightened and improved the mind, and added greatly to the comfort, happiness and welfare of mankind, are the result of investigation and study by men such as those of you whose lives are devoted to scientific research and who are here assembled as an association under a constitution proclaiming its object to be: "By periodic and migratory meetings, to promote intercourse between those who are cultivating science in different parts of America, to give a stronger and more general impulse and more systematic direction to scientific research, and to procure for the labors of scientific men increased facilities and a wider usefulness."

You have assembled in a city which has sprung from one of the earliest settlements in this Commonwealth. Here, 260 years ago, the rude cabins of the first white settlers were erected. Here our Puritan ancestors found in large numbers, contented and happy in their savage freedom and ignorance, the American Indian, from whom

they obtained by purchase the land upon which our city is built and with whom, for a period of 40 years, they lived in interrupted peace.

Here, as declared in the first of the articles adopted for their future government, they laid the foundation of their future growth and prosperity on the principles of the Christian religion; and here, as a result of those principles, the industry and honesty of our predecessors and the aggressive qualities of our people, we have, to-day, a well-governed, a prosperous and beautiful city, surrounded by natural scenery which excites the admiration of all lovers of nature; a city which, in population, in trade and in its industries is deservedly recognized as the metropolis of western Massachusetts.

I am greatly honored in being the representative of such a city, and as its representative in extending to you a cordial welcome to our borders, to an association with our people, to an examination of our institutions and to such entertainment as we may be able to provide for you; and I assure you that by your presence our citizens appreciate that they are greatly honored by reason of your high standing as individuals, your professional attainments, and the reputation of your Association, whose illustrious work in the past will be, I am sure, excelled by the results which will crown its labors in the future.

Replying to ex-Lieutenant-Governor William H. Haile, President of the Local Committee, and His Honor the Mayor, Charles L. Long, who had welcomed the Association, Mr. Morley said:

Gentlemen: That which you say to us of the beauty of Springfield and of the scenery of this fertile valley commands our cordial assent. We listen with delight to the survey of the general progress of science since our last meeting in your city, which you state with so much fairness, and with so much justice and so much breadth of view. But best of all are the words of hearty and generous welcome which are so grateful to us, because they assure us of a profitable meeting and promise us delightful intercourse with your citizens.

Massachusetts is the last place on the face of the earth where this Association could possibly be made to feel like a stranger and an alien. It was an act of your Legislature which incorporated us. Of our forty-two Presidents, Massachusetts can fairly claim as her citizens not less than seven, or one-sixth of the whole number. Almost from time immemorial one Permanent Secretary after another has been elected from Massachusetts. We have met at Cambridge, at Springfield, at Salem, at Boston and again at Springfield.

Let me interrupt for a moment my reply to your welcome. Some of us, for whom the backward view covers the larger part of the visible heavens, would recall something of our meeting here in 1859. There are now on our list the names of twenty-one who were members of our Association at that time. Its President was that Professor Alexander, of whom the President of the Local Committee has already spoken. The Vice-President (there was but one), was a most distinguished citizen of Massachusetts, who was the first President of the Society which was the parent of our own, known all over the world for his masterly labors in geology, Dr. Edward Hitchcock, of Amherst. The General Secretary and the Permanent Secretary were Professors Joseph Lovering, of Cambridge, and William Chauvenet, of St. Louis.

Of those who became members of this Association at our Springfield meeting, eighteen have maintained their membership to the present time or to their decease. But four of these are living. Professor G. F. Barker is known to us all; some of us think his compendium of physics is the best

in the English lauguage. Dr. Samuel H. Scudder is known for his work on the bibliography of science, and for his many labors in entomology; this Association has published a memoir of his on fossil butterflies. Professor Henry A. Ward is again here making an exhibit of mineralogical and geological specimens, which is a source of much pleasure to many of our own number and of the public. Of those whom we have lost I may mention Henry B. Mason, of Troy; Lewis M. Rutherford, of New York, and James Craig Watson, of Ann Arbor.

The number of our members in attendance at that meeting was large; we may be sure that when such officers presided and such men became members, the meeting cannot but have been a successful and profitable one.

Your welcome was especially grateful to us, because it exhibited an appreciative interest in us and in our work. Such an appreciative interest has been exhibited in other ways. On eight dates during the summer I have been where I read a Springfield morning paper. Four of these papers contained articles, of at least a half a column, written with dignity, with adequate information, not without literary graces of style, which were devoted to this Association; therefore, in the judgment of a practiced editor, many of those who read your daily papers have some intelligent interest in our Association, its history, its object, its methods, in the history of our sister Associations in other countries.

Your words of welcome express the same appreciative interest; they confirm the same favorable impression we have received, and fill us with pleasurable anticipations.

We know something of Massachusetts, and of what sort of welcome we might reasonably expect. We know of Massachusetts, though not many of us are its citizens or its children. In the intention of its founders, our Association includes the whole of this continent; in accomplished fact our membership represents perhaps every State of this Union and every province of the great Dominion north of us, and a few from countries or islands to the south of us. Many of us have, therefore, grown up under other influences than those of Massachusetts. We come from other strains of colonization. We owe allegiance to other local institutions. We have learned to revere other local traditions.

But we all cordially agree in saying that, in all those things in which the citizens of a Commonwealth ought to feel the highest pride, Massachusetts is unsurpassed. No contributions to political thought have been greater or better than hers; no moulding of political or social institutions has been wiser than hers; nowhere on the continent has literature touched a higher level than on her shores or her western hills; nowhere has high thinking been better combined with living made subservient to the intellectual life.

We see these things; we admire, but we do not wonder, for we know the stock which first settled Massachusetts Bay. Putting religion in a place, some think, too high for mortal powers, they came from school and college in the old world, and brought to the new a profound sympathy with learning and scholarship and literature. These men, their spirit, their foundation of universities, their keen intellectual life have made this Commonwealth one whose guests we are proud to be, sure of welcome, sure of *appreciative* welcome, which receives us for what we are.

We are an association for the advancament of science. Some of us advance science chiefly by expressing our interest in it. Some of us, burdened with much teaching, find in that the limit of our opportunities. But some of us try to enlarge the borders of science and to add to the world's stock

of knowledge. These last ought to be considered as the more important part of our society and as the proper index to its character.

Now, the advancement of science ministers chiefly to purely intellectual wants. Science is not the apple tree nor the vine, bearing fruit for the body. It is the elm or the lily; carefully nurtured, highly prized, because it ministers to higher necessities, to intellectual or æsthetic wants. Of course, many purely scientific discoveries have become the basis of inventions which have conferred enormous material benefits; some value science chiefly or wholly because of the promise of further material advantages; they esteem the elm because sometime it may perhaps support the vine. But we, who love science and give to it much labor and weariness, value it chiefly because of the intellectual benefits which it confers on our race. And in this ancient Commonwealth we feel that you value every source of intellectual uplifting and intellectual inspiration. We think, and I am sure so do you, that this world is a better place for men to live, now that we know its size, even if we can make no material profit from the knowledge. We think, with you, that this continent is a better home for intellectual beings, now that the history of its formation has been made out by the combined labors of so many eminent geologists, and has been told with such a wealth of learning and such skill of exposition by one of our past Presidents, who has been taken from us since we last met, not till he had completed his work. The knowledge of the distance of the sun makes no one richer or warmer, but it makes some of us happier, by satisfying the ennobled and ennobling curiosity which seeks to learn all which is now unknown.

So we who are fascinated with science justify our devotion to it by the intellectual benefits which our devotion confers on our fellow men. So we ask you to receive us, not as engineers, promising new structures or flying ships; not as inventors, creating new sources of income and new comforts; not as ethical teachers, for science cannot change human natures or the social order; not even as those who would make two ears of corn grow where one grew before; but as those who would make two lilies grow for one in the garden of the Nation's intellectual life.

We wish we could make some return for your generous welcome, in kind, in any way; but we cannot. We can only thank you; we thank you again, and again.

On the afternoon of Thursday the addresses of the Vice-Presidents were delivered, and in the evening the Presidential address of Dr. D. G. Brinton, on the 'Aims of Anthropology,' was read in the Court Square Theater by the General Secretary. As these addresses are published in full in the columns of Science, no further reference is made to them.

Three public lectures, complimentary to the citizens of Springfield, were given during the week. On Friday evening Professor Wm. M. Davis, of Harvard University, lectured on 'The Geographical Development of the Connecticut Valley,' a large and evidently appreciative audience following with interest the story of the valley, and enjoyed the accompanying steriopticon views.

On Tuesday evening the City Hall was almost filled to hear Mr. Cornelius Van Brunt's lecture on 'The Wild-flowers of the Connecticut Valley,' and more especially to see the beautiful floral photographs, exquisitely colored by Mrs. Van Brunt, projected by the stereopticon. The flowers, which comprised our common favorites, had evidently been photographed against an absolutely black background, and then the positive lantern slide colored with great delicacy and fidelity to nature. The flowers

stood out upon the screen with a beauty that can hardly be exaggerated; they were most enthusiastically received by the audience.

On Wednesday afrernoon, Professor A. S. Bickmore lectured on the 'Illustrative Method of Teaching Geography and Zoölogy at the American Museum of Natural History, in New York City.' This lecture, like its predecessors, was illustrated by beautiful stereopticon views.

Evident emphasis was laid upon the social side of the Springfield meeting. While unquestionably many of the members attend almost exclusively on account of the papers and discussions of the meetings of the several sections, there is a large number who would lay equal stress on the value of the gathering in bringing together socially specialists in very varied fields of knowledge, and of giving them opportunities for interchange of ideas; the specialist needs more breadth and he gains it by contact with those outside of his immediate field. The importance of this as an aim of the Association is often overlooked, but should not be. On Wednesday evening the Association was invited to a reception at the new Art Museum, the doors of which were that night for the first time opened to the public. The building is a beautiful one and a fitting place for housing the collection which in a a number of departments is of great value. On Thursday evening, at the conclusion of the Presidential address, the Ladies' Reception Committee gave a reception to the Association at the City Hall. The hall was tastefully and appropriately decorated, the music by two orchestras well selected and rendered, the collation thoroughly appreciated, and the efforts of the committee in charge to make the occasion enjoyable to all present were eminently successful. On Monday, late in the afternoon, lawn receptions were given to the several sections by ladies of Springfield, which were largely attended and enjoyed.

The whole day on Saturday was as usual devoted to excursions in the vicinity of Springfield. The college party, which included most of the members present, left early in the morning for Amherst, a small number however leaving the party at Holyoke in order to visit Mt. Holyoke College at South Hadley. Most of the party kept on to Amherst, where they were taken in carriages to either Amherst College or the Agricultural College,as they wished. Several hours were spent in examining the buildings and collections. At Amherst College much attention was attracted by the new chemical and physical laboratory erected under the direction of Professors Hains and Kimball, and by the fossil footprints collected by President Edw. Hitchcock. At the Agricultural College the Insectary, one of the three in existence, was considered the most notable feature. From Amherst the party went to Northampton, where a collation was served at the town hall by the citizens of the place. Unfortunately at this time the rain which had threatened all the forenoon now began, and somewhat interfered with the enjoyment of the afternoon. The party visited Smith College in carriages and many of them went to the numerous places of interest in the suburbs of Northampton. In spite of the weather, the day was one of much pleasure and profit to the participants in the excursion. Sunday, though quietly spent, was not devoid of scientific interest to the members of the Association. Several pulpits were filled by visiting members and a number of sermons on subjects of scientific bearing were preached in various churches. In the evening a union meeting was addressed by a number of members of the Association, and in the afternoon the usual Association prayer meeting was held at the Y. M. C. A. rooms. Returning to the more direct work of the Association, each morning a general session was held at ten o'clock, and the

final session was held on Wednesday evening, September 4. At these general sessions all business transacted by the Council was announced and their recommendations were considered by the Association. The more important items of business should be enumerated. After a prolonged discussion on the recommendation of the Council to change the name of Section I from Economic Science and Statistics to Sociology, the Association voted that the Section should be called *Economic and Social Science*. The Association declined to form a Section of Geography, letting Section E remain *Geology and Geography*.

Grants were made from the Research Fund as follows: $100 to Professor William A. Rogers, of Colby University, for continuing the work of Professor Morley and himself on the measurement of the expansion of metals by means of the interferential comparator; $100 to support a table at the Marine Biological Laboratory at Wood's Holl, the same to be under the direction of Vice-Presidents of the sections of zoölogy and of biology ex-officio, and of Professor C. O. Whitman, of the University of Chicago; $250 towards the support of the International Bibliographical Bureau at Zurich, Switzerland. This bureau is the result of the work of an American zoölgist, Dr. H. H. Field, and aims to prepare a current subject index of the publications in zoölogy. Owing to a financial stringency in the treasury of the Association it was felt necessary to curtail grants and other expenditures, and in view of this a number of members and friends subscribed several hundred dollars for the needs of the Association, and the hope was expressed that others will make this sum up to at least one thousand dollars.

It was decided to deposit the Library, which consists of several thousand volumes, mostly exchanges, with the University of Cincinnati, where it will be available to the members and fellows for direct consultation, or by mail, or express. The University of Cincinnati has offered to keep it in their new building and to bind within the next five years all the volumes, nearly three-fourths, which are now unbound. A card catalogue of the Library will be made, and it is hoped that the members and fellows will utilize the valuable publications in the Library. Professor J. U. Lloyd, of Cincinnati, and his brother have also in this connection offered to make their Botanical and Pharmaceutical Library accessible to the Association. This Library is probably the most complete on the continent in these subjects and is being constantly added to.

Professor Benjamin Apthorp Gould, of Cambridge, and Professor Rudolph Leuckart, of Leipzig, were elected to Honorary Fellowship in the Association.

The Sectional Committees of each Section were instructed to make efforts to have the program for their respective sections for the next meeting prepared as far as possible in advance, and the provisional programs will be distributed to the members at least a month before the time of meeting. It was felt that the experience of the Section of Chemistry showed that this would add much to the interest and profit of the meeting.

The election of officers for the meeting of 1896 resulted as follows:

President, Edward D. Cope, of Philadelphia.

Vice-Presidents, A. Mathematics and Astronomy, Wm. E. Story, of Worcester, Mass. B. Physics, Carl Leo Mees, of Terre Haute, Ind. C. Chemistry, W. A. Noyes, of Terre Haute, Ind. D. Mechanical Science and Engineering, Frank O. Marvin, of Lawrence, Kans. E. Geology and Geography, Ben. K. Emerson, of Amherst, Mass. F. Zoölogy, Theodore N. Gill, of Washington, D. C. G. Botany, N. L. Britton, of New York City. H. Anthropology, Alice C. Fletcher, of Washington, D. C. I. Economic and Social Science, William R. Lazenby, of Columbus, O.

Permanent Secretary (for 5 years from 1894), F. W. Putman, Cambridge, Mass.

General Secretary, Charles R. Barnes, Madison, Wis.

Secretary of the Council, Asaph Hall, Jr., of Ann Arbor, Mich.

Secretaries of the sections, A. Mathematics and Astronomy, Edwin B. Frost, of Hanover, N. H. B. Physics, Frank P. Whitman, of Cleveland, O. C. Chemistry, Frank P. Venable, of Chapel Hill, N. C. D. Mechanical Science and Engineering, John Galbraith, of Toronto, Can. E. Geology and Geography, A. C. Gill, of Ithaca, N. Y. F. Zoölogy, D. S. Kellicott, of Columbus, O. G. Botany, George F. Atkinson, of Ithaca, N. Y. H. Anthropology, John G. Bourke, U. S. Army. I. Economic and Social Science, R. T. Colburn, of Elizabeth, N. J.

Treasurer, R. S. Woodward, New York, N. Y.

Invitations to hold the meeting of next year at St. Paul, Indianapolis, Colorado Springs and Buffalo were presented. Buffalo was selected, partly for the reason that there has come to be a sort of precedent for a meeting at Buffalo every ten years. The Association met at Buffalo first in 1866, the first meeting after the opening of the war; 1876 and 1886 saw the Association again there, and now in 1896 the visit to Buffalo will be repeated. It was also kept in mind that a strong effort is being made to have the British Association meet at Toronto in 1897, and that the west would furnish desirable places for a joint meeting of the two Associations.

Much more debate was occasioned in selecting the date for the next meeting. The meeting of this year, beginning as it did the fifth week in August, was felt to be too late, the early opening of the schools and some colleges preventing the attendance of many teachers. This year the meeting opened on Thursday; sections met on Friday; Saturday was devoted to excursions, and the Sections renewed their meetings on Monday. The break of two days was felt to be detrimental to the interests of the Association. The Council proposed that the first meeting and Vice-Presidential and Presidential addresses be on Monday, leaving four days of continual session for section work, and then at the close Saturday is left for excursions. Many of the members, however, felt that Tuesday would be the best day for opening, as travel on Sunday could be better so avoided. After prolonged argument the recommendation of the Council was adopted, and the meeting of 1896 will open at Buffalo at 10 A. M. on Monday, August 24th. It is hoped by this arrangement to avoid the considerable exodus of members which takes place under the present custom on Friday night. The subject is complicated by the Affiliated Societies, which now meet for the most part on Monday prior to the opening of the Association, and some of whose members desire to get away before it closes.

The relation of the Affiliated Societies has occasioned an increasing amount of discussion, some holding that they are very helpful to the Association, while others see in them a cause of diminishing interest in the Association. A committee was this year appointed to consider broadly the policy of the Association and its relation to the Affiliated Societies, and to suggest methods of improving the present state of affairs.

The close of the last session of the Association was marked by the presentation of a resolution of thanks, which was seconded with appropriate remarks by a number of members of the Association, and ably replied to by ex-Lt. Gov. W. H. Haile. Thus ended a meeting which, if small in number, was nevertheless one of the most successful and helpful meetings which the Association has known.

JAS. LEWIS HOWE,
General Secretary.

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*THE RELATION OF ENGINEERING TO ECONOMICS.**

IN the first page of Mr. J. R. McCullough's 'Introductory Discourse' (published

* Vice-Presidential Address delivered before Section D, Mechanical Science and Engineering, of the American Association for the Advancement of Science, at Springfield, Mass., Aug. 29, 1895.