the Council, establishing a section of Commerce and Manufactures, and giving the Council, under certain conditions, power to change the place and time of meeting.

At the last general session it was announced that the general committee had elected officers for next year as follows:

President.

Professor Charles Sedgwick Minot, Harvard Medical School.

Vice-Presidents.

Mathematics and Astronomy: Professor James McMahon, Cornell University.

Physics: Professor D. D. Brace, University of Nebraska.

Chemistry: Professor John H. Long, Northwestern University.

Mechanical Science and Engineering: Professor H. S. Jacoby, Cornell University.

Geology and Geography: Professor C. R. Van Hise, University of Wisconsin.

Zoology: President D. S. Jordan, Leland Stanford Jr. University.

Botany: B. T. Galloway, U. S. Department of Agriculture, Washington, D. C.

Anthropology: J. W. Fewkes, Bureau of Ethnology, Washington, D. C.

Economic Science and Statistics; John Hyde, Department of Agriculture, Washington, D. C.

Permanent Secretary.

L. O. Howard, U. S. Department of Agriculture, Washington, D. C.

General Secretary.

Professor William Hallock, Columbia University, New York.

Secretary of the Council.

D. T. McDougal, New York Botanical Gardens.

Secretaries of the Sections.

Mathematical and Astronomy: Professor H. C. Lord, Ohio State University.

Physics: J. O. Reed, University of Michigan.

Chemistry: Professor W. McPherson, Ohio State University.

Mechanical Science and Engineering: William H. Jacques, Boston, Mass.

Geology and Geography: Dr. R. A. F. Penrose, Pierce, Arizona.

Zoology: Professor H. B. Ward, University of Nebraska.

Botany: A. S. Hitchcock, Manhattan, Kansas.

Anthropology: G. G. McCurdy, Yale University.

Economic Science and Statistics: Miss C. A. Bennesson, Cambridge, Mass.

Treasurer.

Professor R. S. Woodward, Columbia University.

Denver was selected as the place of meeting for next year, and Pittsburg was recommended for 1892. The meeting next year will begin with the session of the council on Saturday, August 24th, and the scientific work will begin on Monday, August 26th.

CHARLES BASKERVILLE,
General Secretary.

ADDRESS OF WELCOME.

PRESIDENT LOW, of Columbia University, said: Mr. President and Members of the American Association for the Advancement of Science: It gives me very much pleasure to welcome this Association to the City of New York and to Columbia University. It is thirteen years since this Association met in the City of New York, although it met I believe in 1894 in the City of Brooklyn which has since become a part of this city. In that interval of thirteen years there has been a profound stirring of the scientific spirit in this vast community. Witness, if you please, the foundation of the Botanical Garden of New York by the co-operation of the City and of private organizations, after the pattern which has shown itself so effective in the case of the Metropolitan Museum of Art and of the American Museum of Natural History. Witness again, the formation of the New York Zoological Garden which is projected upon a scale entirely worthy of this great metropolis; witness the establishment by the City authorities of the Aquarium; witness the enlargement, until it is three-fold its size of thirteen years ago, of the American Museum of Natural History; all of these things being done either by the City itself as in the case of the Aquarium, or by the City in co-operation with private agencies as in all the other cases. The Universities of

the City have made immense strides in the direction of scientific equipment in the same interval. Our own University, New York University and the Medical Schools attached to these two universities and to Cornell University and to the Long Island Medical College, all of them only thirteen years ago practically without laboratory equipment, all of them to-day equipped in a way to compare favorably with medical schools in any part of the country and in some respects, perhaps, favorably with medical schools in any part of the world. The scientific societies of New York have also awakened to new life. All these things show that throughout the length and breadth of this vast community a remarkable stirring of the scientific spirit has occurred since your last meeting here. It may easily be that your meeting here at that time sowed the seeds, or some of the seeds at least, which have produced this valuable and welcome fruit. I congratulate you upon securing for the advancement of science such an ally as this metropolitan city. It has indeed the strength of a giant, and, once aroused, it brings to any cause to which it allies itself a giant's strength. Therefore, I congratulate you, as I have said, in obtaining for the cause which appeals to you so important an ally as the City of New York.

I think I may also say that this University, which to-day welcomes you as its guest, has had its fair share in the reawakening. In 1887, when you were here, my predecessor, the late Rev. Dr. Barnard, was president of this University; when he died, a year or two later, it was found that he had left his entire estate to the University, subject to a life interest on the part of his widow, with the provision that $10,000 should be set apart for the maintenance of a Barnard fellowship in science, to be awarded to some fellow who should pursue physical and chemical research. He provided also for the award, every five years, of the 'Barnard medal for meritorious service to science.' This medal is awarded by the Trustees of the University upon the recommendation of the National Academy of Sciences. It was given this month to Professor Roentgen for the discovery of the X-rays. The remainder of Dr. Barnard's estate, he provided, should be a fund for the increase of the Library, the income of which should be used especially for the purchase of scientific books, and more especially in the domain of physics and of chemistry. When Mrs. Barnard died, a year or two later, it was found that she had added her own estate to that of her husband and dedicated it to the same purposes. I think it is interesting to find that our late president should have had the cause of science so near at heart, for he was, as many of you know, a clergyman of the Episcopal Church; but he was one of those who saw no contradistinction between the Truth of God written in the manuscripts of Nature, and the Truth of God as revealed through the Scriptures. In that respect he was a worthy representative of the University whose motto has been, since its foundation in 1754, "In Thy light we shall see light." Therefore we anticipate new discoveries in science, because at the center of all things, we believe, is the Father of Light. In 1887 this University studied science and taught science. It had not, however, committed itself to the advancement of science, as in the interval it has done, by the establishment of its Faculty of Pure Science. I remember that when Professor Osborn was invited to the chair of biology, in this University, he told me that only a few years before he had wanted to study that science in the City of New York, and could find no opportunity. There was then no provision, either public or private, for the study of biology in this great metropolis. You know as well as I how great is the change to-day.

Any cause which is sufficiently great to attract delegates from all over the United States every one recognizes as a cause of importance. The fact that, from so wide a territory, men and women will come together to discuss that interest stamps it as an interest of unusual importance. This meeting lacks no element of importance in that regard. Not only does the Association for the Advancement of Science gather its representatives from all parts of the Union, but there are also meeting with you this week at least fifteen affiliated societies; and I believe all of them are national in their scope. But after all, this meeting interests me, less because of the wide range of territory from which it gathers its adherents than from the vast range covered by its interests. Here are men and women whose itnerests reach out through the entire universe. Occupied space, so far as its occupancy can be made known either by photography or by the spectroscope, is included naturally within the range of your interest. On the other hand, you deal with the little things of the universe as carefully as with the great things. Here are those who are interested in all life, whether human or of any other kind. Here are those who are interested in inanimate objects, whether great or small. The interests which you have come to serve are not national in their scope only, nor international, nor world-wide—they are universal; and it seems to me that this fact itself is an interesting illustration of the unity of Nature. No one can study any part of the natural universe without being drawn into the current with those who are studying the universe in some other part.

But I should fail, it seems to me, to do justice to your Association if I did not as President of this University, recognize the immense contributions of science to the cause of education. I suppose there is hardly a lecture room in this building in which preparation is not made for the use of the electric lamp, so that through the use of electricity and photography almost every branch of scientific research is being forwarded. The student can sit in his room, and see whatever the sun sees; he can see what the sun never saw, because the sun is blinded by the fullness of its own light; he can see what exists in the outer universe and also in the depths of the earth. But this is not the greatest contribution science has made to education. After all, it is, in all these things, the unseen rather than the seen that is the essential. I should say that science has contributed to education in the last half century two things vastly more important than all its contributions to the better equipment of the class room. It has given to us the evolutionary theory; which, being applied in almost every domain of study, has revolutionized it; and it has given to us, also, the scientific method. I stated to you that thirteen years ago there was hardly a laboratory in the City of New York in connection with an educational institution. There were chemical laboratories and assay laboratories, here and there, but almost no others. Even the public schools of the City are equipped with laboratories in several sciences at the present time. So that in those two gifts—the evolutionary theory and the scientific method, you have made contributions which certainly demand the most generous recognition on the part of educators. In making this statement I am sure that I speak, not only for this University, but for every university in the land.

I am especially glad to welcome you because you are an Association for the *Advancement* of Science. That, after all, is what ought to make you feel at home in the atmosphere of this University; for a university that does not assist the advancement of science has hardly a right to call itself by that great name. I heard Phillips Brooks

say, in a sermon that I heard him preach in Boston when this Association met there 20 years ago, that you can get no idea of eternity, by adding century to century or by piling æon upon æon; but that, if you will remember how little you knew when you sat at your mother's knee to learn the alphabet, and how with every acquisition of knowledge which has marked the intervening years you have come to feel, not how much more you know but how much more there is to be known, all can get some idea of how long eternity can be, because all can understand that there never can be time enough to enable any one to learn all that there is to know. There is so much to be known, that even the great advances of the last generation do not make us feel that everything is discovered, but they appeal to new aspirations and awaken renewed energy in order to make fresh discoveries in a region that teems with so much that is worthy of knowledge. I congratulate you upon your success, and I bid you welcome to Columbia.

ADDRESS OF THE PRESIDENT.

Professor Woodward said: Under the favorable auspices of this institution of learning, with its commodious quarters and its scientific atmosphere so generously placed at our disposal, we meet to-day to begin the forty-ninth session of the American Association for the Advancement of Science.

The life of this Association has been contemporaneous with an epoch of triumphant scientific progress; and in this last year of the century one is tempted to look back into the history of the achievements of our predecessors, in order to render them due homage, and in order to learn from their experience the wisdom essential for future guidance. One is prone especially to recall the noble lives and the indefatigable industry of the founders and early workers of this Association, who are no longer with us, but whose careers are sources of admiration and inspiration to the present generation of scientific men in America. There were Rogers and Henry and Bache, and Agassiz and Peirce and Dana, and Torrey and Hall and Lea, and Barnard and Gould and Gray, and Marsh and Dawson and Newton, and Brinton and Cope; and many others not less worthy, whose life work was intimately related to the work of this Association. The mere mention of a few of these honored names may suffice, however, on this occasion, to remind us of our indebtedness to them, and to assure us of the steady progress which has attended the Association in its growth from a single section of a half century ago to the nine different sections and twice as many affiliated societies of to-day. The fertility of the study of our planet in stimulating thought and in leading thought to action is at once apparent when we recall that out of the small beginnings of a few naturalists who styled themselves the American Geological Society have sprung the varied activities of this Association and the kindred societies which meet with us this week. Verily we may say, in the noble words inscribed over the entrance to Schermerhorn Hall on our right, "Speak to the earth and it shall teach thee."

But science knows no nationality, and the forward movement in which our Association is engaged is only a part of a world wide advance which is undoubtedly the most noteworthy characteristic of the civilization of the present half century. And wherein, we may fittingly ask ourselves, and still more fittingly may the general public ask us, does this advance consist? What, in common parlance, are the contributions which the science of our day has brought to the betterment of man's estate? In a summary way, disregarding material