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THE HISTORY OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE*

ORIGIN: EARLY EVENTS

THE American Association for the Advancement of Science had its inception in geology, and by the geologists of the New York Geological Survey. A bronze tablet on an old residence in Albany, New York, corner of Hudson Avenue and High Street, bears this inscription:[1]

> In this house, the home of
> Dr. Ebenezer Emmons,
> the first formal efforts were made, in
> 1838 and 1839, toward the organization of the
> Association of American Geologists
> the parent body of the
> American Association for the
> Advancement of Science
> by whose authority this tablet is erected
> 1901

The several narratives of the early history differ only with reference to the credit for first suggesting the conference of American geologists. In a memorial to Lardner Vanuxem (1, 1848, 91–2) James Hall gave the credit to Vanuxem, and indicated that the purpose of the conference was the harmonizing of the Paleozoic stratigraphic nomenclature. At the Albany meeting of the association in 1856, Hall again describes the circumstances of the conversations, in 1838, 1839, of the New York Board of Geologists (10: 231).

The report of the committee on the Emmons House memorial (50: 392) quotes a letter, of date November 9, 1838, from W. W. Mather to Emmons, suggesting a conference, but saying that he had received the idea from Edward Hitchcock. And Hitchcock also recounted the early events in his address at the inauguration of the Geological Hall in Albany, Au-

* Address at the Seventy-fifth Anniversary Meeting of Association, Cincinnati, December 29, 1923.

[1] The association is indebted to Dr. John M. Clarke, for the conception and execution of the memorial project. The proposal was made through Section E in June, 1900. (49: 383). The expense was borne by a member and friend of the association, Hon. T. Guilford Smith. The story of the memorial tablet is told in the New York State Museum Bulletin, No. 52, pages 452–456.

Numerals in parenthesis, unless otherwise noted, refer to volume and page of the Association Proceedings.

gust 27, 1856, and stated that his frequent suggestions of a meeting were "a sort of hobby in my correspondence."

The correspondence leading to the Philadelphia meeting was conducted by Vanuxem. In a personal letter Dr. Clarke writes, "Vanuxem was the gentle spirit in the Board of New York Geologists, who was used as an intermediary and propitiator in all their affairs."

As result of suggestions and correspondence, covering a period of two years, the gathering was held in Philadelphia, and the Association of American Geologists was organized in the Hall of the Franklin Institute, April 2, 1840. An account of this initial meeting in the *American Journal of Science* (39, 1840, 189–191) gives the names and residence of 18 men who participated in the meeting, of whom five represented the New York Survey. Edward Hitchcock was the chairman.

At the third meeting, in 1843, the geologists' association was widened in scope and the name changed to the Association of American Geologists and Naturalists. A report of the work of the three meetings gives a list of 77 names of persons who had "attended the meetings or presented communications." Sixteen of the names carry the prefix "Prof.," and four that of "Rev.," the latter including Edward Hitchcock, the first president. It appears that in those days geology included about 5 per cent. of theology. In England there was a greater intimacy between scientific and ecclesiastical interests when the British association was organized, for more than one fourth of the members of the scientific subcommittees were clergymen, including the eminent geologists Buckland and Sedgwick.

The geologists and naturalists held annual meetings, some accounts of which were published in the *American Journal.*[2]

In 1847 it was decided to further widen the membership, and the parent association was enlarged into our present association, at Philadelphia, September 20, 1848. The constitution ("Rules") then adopted had been drafted by a committee consisting of H. D. Rogers, Benjamin Peirce and Louis Agassiz, and was modeled after that of the British association, the latter having been organized in 1831. It is inferred that Agassiz, having worked in England and having attended the British association, arriving in America in 1846, was influential, if not dominant, in the organization of the broader association, and in the formulation of its "objects and rules."

William C. Redfield, the first president, whose special interest was in meteorology and physics, appears to have been interested in the expansion of the society. In his memoir of Redfield, 1887, Denison Olmsted says, "Redfield, who was the first to suggest the idea of the American association on its present comprehensive plan" (11: 9).

In an article in volume 40 of the Proceedings, pages 39–47, G. Brown Goode describes the National Institution for the Promotion of Science, which was established in Washington three weeks after the geologists' association was organized in Philadelphia. It was chiefly supported by government officials, and held a national scientific congress in Washington in April, 1844, a few weeks preceding the meeting of the geologists and naturalists in the same city. Goode gives the list of 43 papers at the congress in several branches of science. The institution was inactive after 1845, and passed out of existence in 1861. The author aimed to show that the Washington institution was one of the parents of the American association, by its example of wider scope. His argument is inconclusive and his statements regarding the name of the American association contains two errors. It may be suggested that the Washington institution and its congress were an effect instead of a cause.

It is quite certain that the name and the rules were borrowed from the British association. The Association of Geologists and Naturalists was the parent, and the British association was godfather of the American association. The parental relation was officially recognized in 1874 (23: 160), by ordering the inclusion in the volumes of proceedings of data relating to the eight meetings of the early society.

In his presidential address in 1851, A. D. Bache spoke in approval of the genesis of the association through geology, adding, "Thus, far deeper, morally, than the comparative depths which they explore, the geologists laid the foundation of the American Association" (6: XLVII).

The association was evolved from the earlier society without any recorded opposition from any quarter; although Bache in his address casually speaks of opposition. In this respect it was more fortunate than the British association. There were no national societies to be jealous, and the strong local societies of the time appear to have welcomed the new, comprehensive and peripatetic association.

In notices of its first meeting the *American Journal*

[2] Following are complete references in the *Am. Jour. Science* to the eight meetings of the early association: First meeting, Volume 39, 1840, pages 189–191; second meeting, Volume 41, 1841, pages 159–189; third meeting, Volume 43, 1842, pages 146–184; fourth meeting, Volume 45, 1843, pages 135–165, 310–353; fifth meeting, Volume 47, 1844, pages 94–160, 247–278; sixth meeting, Volume 49, 1845, pages 219; seventh meeting, Volume 2, 1846, pages 144, 441; eighth meeting, Volume 4, 1847, pages 146, 427–429; eighth meeting, Volume 5, 1848, pages 102–116, 243–250; first meeting of the American Association for the Advancement of Science, Volume 6, 1848, pp. 393–401.

referred to the association as the "Amer. Assoc. for the *Promotion* of Science." Some members will agree that such would have been the preferable title, for significance, euphony and originality. A statistical psychologist might calculate the time and energy that has been wasted in the writing of our long title many times a year, for 75 years, by several thousand people. The organizing committee, instead of imitating the British society, might have made the name "American Science Association." Even now if we could overcome our excess of reverence for usage and antiquity we might abbreviate the name for the convenience of posterity.

At the Baltimore meeting, 1858, a committee was appointed to make an abbreviation of the title. In 1860 the committee proposed (14: 247) that in the abbreviation the words "for the Advancement" be neglected, and the formula should read "Am. Asn. Sci." To the ear this is even less agreeable than to the eye, and it is not surprising that no later mention, or use, was made of it. Instead, the four initial letters have long been in common use.

Many personal and social incidents of the early meetings would be very interesting to us after the lapse of 75 years. But the records, archives and correspondence are not available, if in existence. The Proceedings volumes are properly formal, containing the personnel, business transactions and the scientific papers, but no incidental matter.

The year 1848 fell in a period of intellectual ferment and political unrest, with revolutionary movements in Europe and America, and many historical events are listed in that year. The Mexican War had just closed, and the treaty signed in February annexed a vast western territory. The discovery of gold in California and the postal convention between the United States and Great Britain were important economic events. Exploring expeditions gave geographic interest, while the completion of the High Bridge aqueduct in New York City was an engineering event. Two psycho-religious incidents were the first public demonstration of spiritualism, and the vitalizing of Mormonism by the persecution at Nauvoo, Illinois. An important sociological event was the initiation of the movement for the enfranchisement of women by the first woman's-rights' convention, in July.

ORGANIZATION; ADMINISTRATION

The "objects and rules of the association," with 20 divisions as adopted in 1848, were changed to "constitution" in 1851, with 21 items (6: X). In 1856, a new draft was adopted, with amendments in the later years. In early years, 1851–1873, some of the legislation was carried under a peculiar heading, "Resolutions of a permanent and prospective character," although some of the resolutions were of transient effect. In addition a compilation of all previous resolutions is found in some volumes. These two categories were necessary in the administration because of the lack of flexible by-laws.

A committee on revision of the constitution of 1872 reported adversely on certain points in question, but added, "But they also have to report that they find several violations of the constitution of common occurrence, and that they think a strict adherence to be of vital importance to the association" (21: 279). Signed, F. W. Putnam, G. C. Swallow, for the committee. This suggests that the "constitution between friends" was not an object of reverence even in the former days.

Apparently the administrative troubles were acute, for the next year another revision committee was appointed, which submitted in 1874 a new draft of 38 articles. In their analysis of the many changes the committee said, "The constitutional troubles, which for many years have often caused the meetings to assume the temporary character of a parliamentary body, have been finally disposed of . . ." (23: 150–151). This radical revision was debated several days, and on the fifth day, August 17, 1874, was adopted (23: 167). The former lists of resolutions were of course omitted. The annual dues were increased from two to three dollars.

At this meeting, 1874, a report was made of the incorporation of the association under laws of the Commonwealth of Massachusetts (23: 46–47).

From time to time the constitution of 1874 received changes, especially in 1881, 1886 and 1887 (36: 344). In the latter year, at the first New York meeting, the "standing committee" was changed to "council," and the office of secretary of the council was created. Minor changes were made occasionally, and several in 1899. In 1903, important amendments provided for five-year terms for the sectional officers, to give greater efficiency by longer official experience; also providing that three of the nine elective members of the council should be chosen each year for three-year terms, thus giving more stability to the council membership.

With the above changes, and some supplementary rules of the council, the 1874 form of constitution stood until 1920. The association worked under that draft for 46 years. As there were no by-laws for the details of administration, the constitution became burdened and complicated with items of procedure. Moreover, the changes in the character and work of the association, and its relations to the many new technical societies, made the constitution ineffective. It stands to the credit of the association and its governing body that its work was conducted so long, so successfully and smoothly, with rapidly changing con-

ditions of American science, under an archaic and outgrown set of rules.

In 1917, the committee on policy authorized a subcommittee, consisting of J. McK. Cattell, H. L. Fairchild and D. T. MacDougal, to make a radical revision of the rules. The new and greatly simplified constitution, of 11 articles instead of the former 39, was unanimously adopted at the St. Louis meeting, and went into effect January 3, 1920. This brief constitution, of fundamentals, is accompanied by a more detailed set of by-laws and rules of procedure, itemized under 11 sections. For comparison, the old and the new constitutions and the new by-laws are printed in the volume of Summarized Proceedings, 1921, pages 10–27. Future changes are made easy, by requiring for amendments to the constitution only unanimous consent at any general session of the association, or a majority vote at two successive annual meetings; while the by-laws and rules may be changed at any time by vote of the council.

While the plan of organization of the association and of its activities has not been greatly changed by the new rules, a few modifications are important and worth noting. The council is made more effective by omission from its membership of past-officers; and by the continued inclusion of representatives of the "affiliated" societies. The "general committee" is abolished. Under the former régime its function was merely to elect officers and to determine the places of meetings, while its personnel was identical with that of the council except for the addition of an extra representative from each section. The annual dues of three dollars since 1874 have been made the more convenient unit of five dollars, securing greater respect for the society and increased resources.

By 1890 the multiplication of special technical societies had become a recognized potential danger to the association, and in 1895, at the Springfied meeting, a committee was appointed to "enunciate the policy of the association" and to confer with the affiliated societies. This committee on the policy of the association, as first appointed, consisted of the president and permanent secretary and one representative from each of the sections. On account of its large and changing membership, and scanty attendance at the sessions, the work of the council has been in large degree passed over to the policy committee. As originally constituted the committee was too large for efficiency, and in 1897 it had only seven members, and a small membership in later years. Under the present régime the administrative function of the committee is officially recognized by naming it the executive committee of the council. The committee holds at least two meetings between the stated annual meetings, and because of the infrequent meetings of the council is compelled to act on imperative matters and to assume large responsibility. The efficiency of the committee has been partly due to its small membership and to its continuity of service.

Another important change in the organization of the association was necessitated by its vast territory. Two regional divisions of the association are established: the Pacific Division and the Southwestern Division. At the Cleveland meeting, 1912, a large committee was named to plan for a proposed meeting in San Francisco. This meeting was held in 1915, and brought into harmonious relation the 12 special societies then existing on the Pacific coast (SCIENCE, 41: 638). From this meeting has developed the Pacific division of the association, which held its first meeting in San Diego, in August, 1916, with 13 affiliated societies. This division covers territory, in addition to the Pacific coast states, of Alaska, British Columbia, Idaho, Nevada, Utah and Mexico (except Sonora and Chihuahua) and the Pacific islands belonging to the United States. The Southwestern Division, organized in April, 1920, at Tucson, Arizona, includes Arizona and New Mexico, the portion of Texas west of the Pecos River, and the Mexican states of Sonora and Chihuahua. The two divisions have their own rules, subject to ratification by the council, or by the executive committee, and are practically autonomous. (The rules of the two divisions are printed in the Summarized Proceedings, 1921, pp. 28–38.)

Local "branches" of the association were authorized in 1913 (65: 464), and are very desirable. One is now recognized, at Pennsylvania State College.

Until 1882 the scientific work in the meetings was conducted by two general sections, with vice-presidents, and a variable number of subdivisions, with chairmen. At the Montreal meeting in 1882 a plan of nine lettered sections went into effect. By 1915 the number of sections had increased to 12. At the present time 16 sections are recognized.

In the 75 years of the association two periods may be noted—the first extending from the date of organization to about 1898, the half century during which the association was the national representative of science in America. The second period is the last 25 years, during which the special societies are numerous and strong, and the technical work is carried by 93 "affiliated" or "associated" organizations, the association being the correlating and unifying body and the recognized representative and spokesman.

In 1891 seven societies met with the association. In 1899 the affiliated societies were recognized in the constitution, and in 1901 they were represented on the council. In later years the number of national societies in convocation has been: 30 in 1910, 43 in 1916 and 28 in 1920. At present 41 national societies and 12 state academies are listed as affiliated, and 40 societies as associated (Sum. Proc., 1921, 24–26). In

order to secure harmonious relation and cooperation between the sections and the societies the sections of the association are expected to suspend their technical programs when the corresponding societies meet in conjunction. Joint programs are frequent and very desirable.

If a biologic simile is permissible, it may be said that the association attained reproductive maturity at the age of 50 (1888), and gave birth to numerous progeny. But this fertility has not produced exhaustion and dissolution, for the association is vastly larger, stronger and more active and influential in later years. Perhaps some of the lusty offshoots are not always as deferential to their aged and honored parent as filial duty would imply; but as a whole the great family is quite harmonious.

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(To be continued)

THE THEORY OF NERVOUS ACTIVITY[1]

IT is my intention to present to you the result of work carried out in my institute dealing with the ionic theory of stimulation.

Every mathematical theory is important for science in so far as it is capable of correlating in a quantitative way a series of natural phenomena and in so far as it permits the predicting of existence of phenomena not yet observed. The latter requirement constitutes the test of a theory, and if the predictions are realized through experiments, then the correctness of the theory is established. From this viewpoint, the theory appears as a guide to the investigator and opens up to him new avenues for quantitative experimentation.

The ionic theory developed by us stood the mentioned test, and I should like to present in a simple form the physico-chemical facts, omitting all mathematical development. For lack of time, it is not possible to present all our investigations into the mode of action of all sense organs and, therefore, I shall present as an example that part of the work which has attained its fullest development, namely, that dealing with peripheral colorless vision (when color is not differentiated). In this field the predictions of the theory were most interesting. The theory developed by us is based on two observations made about 20 years ago, one by Jacques Loeb and the other by Nernst. Starting from entirely different premises, they arrived at a conclusion that in the nerve and in the muscle the change from the state of rest to that of excitation is brought about by changes in the ionic concentration of the medium.

These observations were made the basis of our investigation into the general principles of the theory of excitation. We were then able to demonstrate that in all organs, under all conditions, excitation is possible only as a consequence of changes in ionic concentration of the medium. Whenever these changes are not present, excitation is not possible.

Bearing in mind these conclusions, and adding only one assumption, namely, that in the tissues the concentration of ions is small, we formulated a general law of excitation for the threshold of irritability—a law which served as a generalization of the laws presented by Loeb and by Nernst. Calculating in every case the possible changes in ionic concentration, we were able to explain the laws of Pflüger, to develop further a theory of nervous excitation, to formulate a theory of muscular excitation, a theory of vision, a theory of hearing and of taste, and very recently, it was possible to go further and to develop laws of the function of the central nervous system (of the brain).

Passing to the question with which we are principally concerned to-day, namely, the question of the ionic theory of vision, I should like to point out that we shall discuss principally the problem of peripheral vision when the function is limited only to the rods in which the decomposition of the pigment takes place.

We can imagine the process in the following way. Decomposition of the pigment takes place in the rods. This is a purely physico-chemical reaction, which results in ionization. The ionized substances are removed partly through diffusion and partly through chemical reactions which are followed by restitution of the pigment. This restitution should proceed with different velocity, depending upon the presence or absence of light. In order to coordinate all these conditions in mathematical terms, it was necessary, first of all, to explain the connection existing between the velocity of the chemical reactions, the coefficient of absorption of light, the concentration of substances and the intensity of light. This was done by us in a series of investigations and it was demonstrated in 1907 that the photochemical effect does not depend on the wave lengths but is proportional to the quantity of the absorbed energy. The experiments showed also that in photochemical reactions the ionization is in direct proportion to the quantity of decomposed material. This applies alike to solid and liquid substances. Thus, it was realized that the visual pigment, in the process of decomposition, causes stimulation of the nerve endings and consequently creates excitation. If all these considerations are expressed mathematically and if a few very simple mathematical operations are performed, then, at a given time, t,

[1] Read at the Cincinnati meeting of the Zoological Society in conjunction with Section F of the American Association for the Advancement of Science and in association with other biological societies on December 28, 1923.