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THE STATE MUSEUM AND STATE PROGRESS[1]

It has been the good fortune of the people of this Commonwealth to have elected those men to preside over its interests who were positively instrumental in promoting science and learning, and who were especially active in promoting Agriculture, and the branches allied thereto. Your own recommendations and influence, touching these great interests, are highly appreciated by the people, as is evident from their united movements in establishing institutions which are designed to bear directly upon those objects, and which are specially designed to place them upon a scientific basis. (Ebenezer Emmons to His Excellency Hamilton Fish, Governor, Albany, December 25, 1851.)[2]

THE citizens of New York and their representatives in the legislature are those especially addressed on this historic occasion rather than the distinguished company of scientific men gathered here for this celebration. While the present is a critical period in the moral and economic welfare of our people we predict that the twentieth century, which is still in its youth, is destined to reach its maturity with a far more general distribution of human happiness than the nineteenth. The unequal distribution of the good things of life is the underlying cause of all present social agitation, and by the good things of life we do not mean riches, but family health, food, sunshine, pure air, labor, the beauty of nature, the creative works of man. A redistribution will come about, not through politics which seems to

[1] Address delivered on October 15, 1912, to the citizens and legislature of New York State on the occasion of the opening of the new State Museum at Albany.

[2] "Natural History of New York, Part V. Agriculture," 4to. New York, Boston, Albany, 1851.

produce little except rivalry and bad feeling, nor through socialism which is essentially unnatural, but through the application to human welfare of all of nature's resources, known and still to be discovered. These resources are those of the Creator and therefore administer to our spiritual, intellectual and moral as well as to our bodily welfare. The great pathway to state progress is knowledge, obedience and unselfish utilization of the happiness which nature puts in our hands.

Our theme to-day is the part which the museum has exerted and is destined to exert toward this millennium of the twentieth century.

The rise of the museum as a new force in town, city, state and nation is the latest phase of educational evolution. The school, the college, and the university have gone in advance; the museum follows and is winning its own place and influence because it supplies a demand which none of its sister institutions fills. The very fact of this independent development is a proof that the museum is not one of the luxuries of civilization but an essential and vital force in the enlightenment of the people. Every community, small or large, needs its museum as it needs its schools and its churches. This rise, which is especially remarkable in certain cities of Germany and Austria, throughout England, and above all in the United States during the past quarter century, is largely due to what may be called the new museum idea, namely, that the museum is not a conservative but a progressive educational force, that it has a teaching quality or value peculiar to itself, that the museum succeeds if it teaches, fails partially if it merely amuses or interests people and fails entirely if it simply mystifies. The old museum idea was that of a sanctuary or refuge, a safe deposit vault for curious, rare, or beautiful objects which might be lost or destroyed; the ignorant visitor was tolerated rather than attracted, the curator was a keeper, not a teacher. The new spirit within the natural history museum is the educational spirit, and this is animated by what may be called its ethical sense, its sense of public duty, its realization that the general welfare of the people is the prime reason for its existence, that exploration, research, exhibition and publication should all contribute to this, that to serve a community the museum must reach out to all parts of nature and must master what nature has to show and to teach. The museum will flourish if the high educational service of the state is inscribed over its portals and instilled in the minds of every member of the staff from the highest to the lowest.

What renders this celebration a great one is that the ideal just sketched is largely exemplified in the New York State Museum, in the historic fact that the noble men of science and the wise rulers of our state have long been leaders in one of the great principles of museum development, namely, that the foundation of a state museum is mastery of the natural history of the state itself. In this regard since 1836 New York has been holding the torch for all the other states of the union. There has already evolved here that intimate union between a natural history survey, pure scientific research, a museum and the public welfare which the most enlightened communities in the civilized world have either attained or are striving to attain.

There remains to be developed by the Education Department through the museum the great work of spreading the beneficent products of this union throughout the public educational institutions of the state. This celebration is auspicious because it prepares the way for this new

educational function of connecting the museum with the schools; this commodious building renders it possible for the first time in the history of the institution to expand along all the other lines of the new museum spirit, and directly and by extension touch the entire educational system of the state.

Thus we celebrate not the birth but the opportunity for renewed growth of an institution of which all the citizens of the state should be proud. Like the nautilus the museum moves into a new and beautiful chamber with its fine heritage, its ideals and its purposes unchanged: the shell is not the vital part, but it is highly favorable to the prolonged and expanding existence of the organism within.

In looking for the causes of the origin of this institution we find they are three-fold: first, the natural grandeur and interest of the territory of the state itself as a source of scientific inquiry and inspiration; second, the assemblage of an unusual number of scientific observers of the first order whom New York found among her own sons or attracted to her borders; third, a wise and liberal exercise of the powers of government on the part of the rulers of the state. It follows that our chief concern today should also be three-fold, namely: the preservation of this natural beauty as a continual source of inspiration and happiness to posterity, the birth and training of men and women capable and worthy of observing the laws of nature and spreading knowledge of them, the maintenance of standards of government equal to those of Secretary Dix who first outlined the survey, and of Governors Marcy, Seward, Bouck and Fish who promoted it.

As illustrative of the close union between science and good government two ancient episodes in the state's history may be recalled. One is that Samuel Latham Mitchell, the pioneer of natural science in this state, delivered an evening address before the state legislature, was elected to a seat in the legislature of 1790 and in 1807 took the first steam-propelled voyage up the Hudson with Fulton. Another is that in 1818, on invitation of Governor Clinton, Amos Eaton, the pioneer geologist of the state, delivered a course of lectures before the legislature and interested many of the leading men of the state in geology and its application to agriculture by means of surveys, thus planting the idea which eventuated in the great work, "Natural History of New York."

Is New York state to-day seeking among her votaries of science some of her representatives at Albany to counsel her in matters of state welfare? We may not answer the question but may put another: is the vast free educational system of the state, on which fifty-four millions of dollars are being expended annually, with a total attendance of one and one half million pupils, turning out its due proportion of men of science for the future service of the state? Whatever the answers to these questions, it is certainly well even on a jubilee occasion such as this for the members of a great democratic commonwealth like ours, full of confidence and pride in its institutions, dazzled perhaps by stupendous expenditures and vast numbers of students, to pause and consider which direction our social evolution is taking through education and democracy—progressive or retrogressive.

As regards the birth and education of men of science, the honor roll of geology in this state, the product of old educational methods, is a long one. We are impressed with what the state, the nation and more than this, the world owes to the generation born between 1764 and 1860 within our own state borders. Among the pioneers of

science in this country were the following: Mitchell (1764–1831), born in Hempstead, L. I., whose political services have been alluded to above and who published in 1796 "A Report of the Geology and Mineralogy of the Hudson," the first work of its kind in the United States; Stephen van Rensselaer (1765–1839), born in New York City, founder of the Polytechnic of Troy, patron of the first serious geological work in the state; David Hosack (1769–1835), born in New York City, closely associated with De Witt Clinton in the leadership of civic life, promoter of botany and mineralogy, master of John Torrey; Amos Eaton (1776–1842), born at Chatham, turned toward science by Mitchell and Hosack, whose survey of Albany and Rensselaer counties marked an era in the progress of geology in this country, the master of James Hall; Henry Rowe Schoolcraft (1793–1864), born in Albany county, pioneer explorer of the geology and the mineral wealth beyond the Alleghanies and discoverer of the source of the Mississippi; John Torrey (1796–1873), born in New York City, pupil of Hosack, founder of American botany, master of Asa Gray; Joseph Henry (1799–1878), born in Albany, discoverer of the magneto-electric telegraph, which has put the whole world into communication; William Williams Mather (1804–1859), born in Brooklyn, one of the four geologists of the Survey, pioneer geologist of Ohio and Kentucky; James Dwight Dana (1813–1895), born in Utica, geologist of the Wilkes Exploring Expedition, the foremost geologist of his time in America; Alexander Winchell (1824–1891), born in the Northeast, geologist of Michigan; Othniel Charles Marsh (1831–1899), born in Lockport, famous vertebrate paleontologist, one of the leaders in the exploration of the western states; Robert Parr Whitfield (1828–1910), born in New Hartford, invertebrate paleontologist of distinction; Edward Orton (1829–1899), born in Delaware county, state geologist of Ohio; John Wesley Powell (1824–1902), born in Mount Morris, explorer of the Grand Cañon, famous ethnologist, director of the United States Geological Survey; Israel Cook Russell (1852–1906), born at Garrettsville, geologist, explorer and eminent writer.

We trust space may be found within the new museum, in bust or tablet, to memorialize the services of these great men as well as of those who, like Hall, came from other states. In this matter the state may well follow France, which leads the world in appreciation of its men of science and erects more statues to its savants and litterateurs than to its military leaders.

Among the living natives of the state who have rendered or are rendering distinguished service are Raphael Pumpelly (1837), geologist and explorer; John James Stevenson (1841), geologist of the Wheeler and Pennsylvania Surveys; Grove Karl Gilbert (1843), geologist of two state and two of the national surveys; Charles Doolittle Walcott (1853), leading invertebrate paleontologist and administrator of the United States Geological Survey and of the Smithsonian Institution; last but not least, John Mason Clarke (1857), pupil of James Hall, invertebrate paleontologist, distinguished in geology and paleontology.

From this number the nation has chosen two of the directors of the United States Geological Survey, Powell and Walcott, and two of the secretaries of the Smithsonian Institution, Henry and Walcott.

Our early political governors and men of science found their inspiration in the state itself, in its splendid area equal to that of all New England, in its scenery—including the Palisades, the Hudson, the Catskills, the Adirondacks, the Mohawk,

Niagara, the lake and great western plains district—and in its diversity second only to that of California. Beautiful as the surface is with its flora and fauna, its interest, significance and utility have been vastly enhanced for man by the thorough understanding of its natural history and its prehistory, from the birth of the Adirondacks and Highlands to the final sculpturing of the state by the glaciers, with all the grand procession of life from the time of the interior paleozoic seas to the plants and animals of our day. For all this deeper knowledge we are indebted to the natural history survey of the state, begun in 1836 and practically continuing to the present time.

The Survey[3] was by far the most important scientific event in the history of our state and one of the most important in the history of the nation.[4] It attracted five of the most able geologists and naturalists of the country to its service, Lardner Vanuxem (1792–1848) from Pennsylvania, Ebenezer Emmons (1799–1843) from Massachusetts, from our state Mather, the geologist, and Torrey, the botanist, James Hall (1811–1898) from Massachusetts. The survey set a high standard not only for the state but for the country; it exemplified the ideal development, side by side, of pure and applied science. Emmons observed:

> The Survey of New York was indebted for its projection and execution to a movement in science —a movement which pervaded the entire thinking community. It was one of those natural results which mark the progress of truth; and itself was an evidence of the progressive intelligence of the human mind.

[3] It was the essay of John A. Dix as Secretary of State (1835) on the Natural Resources of the State that was the efficient final act before legislation was effected, a report prepared at the request of the legislature with reference to the organization of the Natural History Survey.

[4] See Merrill's "Contributions to the History of American Geology," p. 344.

Hall observed:

> The enlightened spirit in which this Survey was directed, and the munificence with which it has been sustained, have afforded every means required for its completion. The state of New York, which has hitherto established her claim to the dignity of the Empire State, has now added another wreath to her laurels, in becoming the first in the patronage of science, and in the benefits thereby bestowed on her citizens, as she is first in resources, in commerce and public improvements.[5]

Mather observed:

> The State of New York is the first that fully carried out the principle of division of labor in the execution of a survey on the Natural History of the State, under the name of a geological survey. By this arrangement each head of a department of the survey has been enabled to devote his whole time and attention to his own specific duties, without having the entire range of natural science to distract his attention. . . . The survey of New York, unlike that of some of the other states, has been uninfluenced by party and political considerations, and the chief magistrates, during its execution, have been actuated by high and ennobling motives.[6]

Merrill observes:

> This led to an organization which has left a more lasting impression upon American geology than any that has followed or had preceded it. As fate ordained, the locality was one of the most favorable that could have been selected for working out the fundamental principles of stratigraphic geology; moreover, those appointed to do the work proved equal to the occasion. The New York survey gave to American geology a nomenclature largely its own; it demonstrated above everything else the value of fossils for purposes of correlation, and incidentally it brought into prominence one man, James Hall, who was destined to become America's greatest paleontologist.[7]

[5] Hall, James, "Natural History of New York," Part IV., 4to, New York, Boston, Albany, 1843, p. ix.

[6] Mather, Wm. M., "Natural History of New York," Pt. IV., 4to, New York, Boston, Albany, 1843, p. x.

[7] Merrill, George P., "Contributions to the History of American Geology." Rept. U. S. National Mus. for 1904, pp. 189–734 (p. 344).

What was discovered by the original Survey fills thirty great volumes, stately and beautiful in form, epoch-making in content. The data in these works and the new series of thirteen "Memoirs of the State Museum," published between 1889 and 1910, are the units out of which, together with our present knowledge, the wonderful geologic history of the state with all its natural mineral wealth and other resources, its botany and zoology, can be written.

An outline of this history may serve the practical man as a brilliant instance of the union between pure and applied science, between theory and practice, but more than this it may show the lover of nature the new fascination and glamor which a knowledge of the past lends to the present.

Geology has shown that there are in New York state two great mountain uplifts or granitic sentinels surviving from the very beginning which are still centers of greatest beauty: to the north, as an outpost of the Canadian nucleus of the North American continent, lies the rugged mass of the Adirondacks, to be imagined as an island of ancient crystalline rocks, which has been above the ocean since the geologic dawn, its ancient mountains now worn down to their roots by erosion in succeeding ages and still flanked around the base by the old shore formations of the Cambrian and later periods. To the south lie the equally ancient Hudson Highlands and the rugged ridges of Westchester county, stretching southwestward from New England, the vestige of an eastern land mass of early geologic times which is now in large part sunk beneath the waters of the ocean or covered by more recent formations, the débris of struggles with the encroaching Atlantic. In this old pre-Cambrian continent, whose crystalline schists have been the special study of Kemp, are found our building granites, our magnetic iron, our rich deposits of talc and soapstone, sources of industry and welfare.

There were also two historic seas: the interior sea, or American Mediterranean, which bounded these granitic sentinels on the west, and the ancient Atlantic, which bounded them on the east. Our Atlantic coast line during the Paleozoic Period stretched far to the east, perhaps as far as the continental shelf, one hundred miles east of Long Island, where the depth then, as now, rapidly increased to the abyssal ocean.

There were also two great inclines or drainage systems, the first emptying into the interior sea which stretched from the south and west over a large part of the continent. During these early epochs central and western New York formed a battle ground between this inland sea and the granitic lands to the north and east; the shore lines advanced and receded, spreading the gravel beds and sands or the silt and calcareous ooze of the deeper waters in alternating succession over the broad plains of central and western New York. To the receptive basins of these shore lines of Silurian and Devonian age our builders largely owe their sandstones and limestones, their limes and cements. To the plant life imbedded in Silurian and Devonian times we owe our natural gas and our petroleum. Of Silurian age are our hematite iron ores. Great coastal evaporating basins of Silurian times have bequeathed to us our gypsum and our salt.

In the prolonged struggle the forces of uplift were finally victorious; the inland sea retreated step by step to the south and west until in the era of the great coal forest of Carboniferous times, the border line of permanent land has passed beyond the limits of what is now the state of New York. This is the reason the state has no

coal. Throughout the central and western portion the rock formations still lie relatively flat and undisturbed; from the line of the Mohawk valley and the southern shore of Lake Ontario the successive strata rise tier above tier until they culminate in the Catskills to the east and the Pennsylvania border.

In 1836 James Hall was assigned this level and supposedly uninteresting portion of the state, the fourth district, which he was told "was good enough for a young man of twenty-five." The region was regarded as of little promise and was willingly relinquished to him, and this proved to be one of the happy accidents of geology, for Hall's genius revealed the fact that nowhere in the world does there exist so complete a series of the older fossiliferous rocks, such continuous records of the life of the ancient inland sea; in wonderful perfection the animals that lived in the shallow waters and along our inland coast have yielded the data for the paleontologic researches of the master and his pupils Merrill, Whitfield, Clarke, and others.

The second great drainage system, now represented by the vestigial Hudson river, is that which flowed from northwest and southeast between the northern and southern granitic masses of the Adirondacks and the Hudson. This broad trough, or valley, was developed east of the Appalachian uplift and included the Shawangunk[8] mountains. In it were accumulated the sediments washed down from the adjoining mountains during Triassic and early Jurassic times, to form the red sandstones and shales of the "Newark System," extending across the New Jersey border into Rockland county, and recently yielding at Fort Lee one saurian of Triassic age. The great red sandstone delta was in turn tilted and heavily faulted, and along the fault lines and between the strata of shale and sandstone welled up the great outpourings of basaltic lava which formed the trap rocks of the Palisades and parallel ridges to the westward.

Toward the close of the Age of Reptiles the littoral strip began subsiding beneath the Atlantic ocean, converting the shore line into a coastal swamp over Long Island; but the greatest factor in Long Island's history was the Glacial Epoch at the close of the Age of Mammals, when the ice cap extended downward from eastern Canada over almost the whole of New York state and left as its terminal moraine the long, irregular line of hills of boulder, clay and sand stretching along the northern shore of Long Island across Staten Island, New Jersey, Pennsylvania, and westward. To this we owe our building clays. This great ice sheet, as studied by Fairchild, Woodworth, and others, gave the final touch to our landscape and to our agricultural lands, gouging out valleys, blocking rivers, piling heaps of detritus across valleys during its slow retreat to the north, profoundly modifying the topography of the state, shaping the basins of many of our lakes, the courses of our rivers, and the character of our soil. At the beginning of the ice retreat the cap so blocked the St. Lawrence river valley that Lake Ontario found its outlet along the Mohawk river into the Hudson. All the life records of the

[8] The Shawangunk Mountains belong to the Appalachian uplift which succeeded the Carboniferous, hence very much more ancient than the later disturbances of the Highlands. The Catskill uplift belongs to the same age of general elevation as the close of the Carboniferous. It escaped the general reduction of the rest of the Alleghany Plateau for reasons not at present evident except in the hard nature of its rocks. The Hudson Highlands region has gone through its oscillations quite completely since the origin of the mountains referred to. The Highlands have gone far down after having been raised high, and are now apparently on their way up again. This statement relates to the relation of the Highlands to the cutting down of the Hudson River. (J. M. C.)

later geologic periods in New York state were swept away by erosion or buried beneath the débris of the Ice Age. Only from the swamps and peat bogs formed since the retreat of the ice have been disinterred the skeletons of mastodons[9] and other extinct forms.

Science, like charity, begins at home. Our Education Department could not do a wiser thing than to popularize the technical geology of the state in a school book and put such a volume into the hands of every scholar; it would exert a vast influence.

The animal and plant life of the state formed the second great branch of the Survey. As a result New York state has taken a leading part in the encouragement and development of the study of birds in this country, from 1844, when the state issued a quarto volume of 380 pages and 141 colored plates by James E. De Kay, "On the Birds of New York," to 1910, when it published the first of two superb quartos by Eaton with colored plates by Fuertes; and here again the Survey has been more or less directly the means of bringing out the latent ability of sons of the state. Among the ornithologists, all natives of New York, who have been developed during this period, are Giraud, Mearns, whose researches have extended all over the union and to Africa, Merriam, head of the U. S. Biological Survey, and our leading field naturalists, Bicknell, Ralph, Bagg and many others.[10]

The Survey also produced in 1842 De Kay's four volumes devoted to the mammals, reptiles, and amphibians, also the extinct mammals of the state as they were known in 1842. Later contributions to the mammalian life independent of the survey were Merriam's "Mammals of the Adirondacks," 1882 and 1884, Miller's "Preliminary List of the Mammals of New York" in 1889, and Mearns's "Mammals of the Hudson Highlands" and "Mammals of the Catskill Mountains."

The practical results growing out of the State Survey are no less significant than the theoretical, affording the strongest proofs that discovering and spreading knowledge of nature is the best investment a state can make, because all wealth and all health flow from such knowledge. When state funds are used for the forces which make for production the payment of interest is retarded, perhaps beyond the lifetime of the individual who makes the discovery and when returns do come the discoverer is often forgotten; only in rare instances does he benefit from them. The chief applications of the results of research have been to agriculture and mining; in fact, the science of agriculture was one of the original motives in the organization of the Survey, and the four volumes which Ebenezer Emmons devoted to the agriculture of New York and to its fruit culture between 1846 and 1854 led to the organization of the State Agricultural Society and finally to the State Agricultural Department.

The increase in the value of the mineral product[11] of the state since the organization

[9] Mastodons and mammoth remains are found in swamps and beaches of the same age, though the occurrence of the latter is comparatively rare; they are contemporaneous, but it is probable that the mastodons survived the mammoths within our area. (J. M. C.)

[10] C. Hart Merriam, New York City, 1855; Edgar A. Mearns, Highlands Falls, 1856; E. H. Eaton, Springville, 1866; E. P. Bicknell, Woodmere, L. I.

[11] Mineral productions of the state—

	1837	1911
Iron ores from within the state	1,000,000	3,184,054
Clay materials	150,000	9,734,744
Building stones	500,000	5,520,800
Salt	625,000	2,191,485
Gypsum	15,000	1,092,598
Cement	150,000	3,065,334
Materials not produced in 1837		6,784,093

of the Survey has been approximately 3,000 per cent. The fact speaks for itself without claiming for the geological organization all the credit for this tremendous development. The approximate output of minerals of all kinds for the year 1837, the first year in which the Survey did actual work, was two and one half millions; the total mineral production for the year 1911 for materials within the state was thirty-one and a half millions; but including the ores brought in from outside the production is seventy-four and one half millions, ranking New York state as the sixth state of the union in the value of its total output. The preeminence of Pennsylvania, Illinois, Alabama, and West Virginia is due to their coal, that of California to its oil. As a result of the careful surveys made within the last few years the volumetric totals of the iron ores still available for commerce are shown to reach nearly one billion tons, interesting as indices of the potential natural wealth of a state which has no coal and comparatively little oil. The scientific foundation of this development is the volume "Mineralogy of New York," by Lewis C. Beck, published in 1842.

The most recent instance of the interrelations between pure science and progress is that developed by the need of the City of New York for an increased water supply, involving the second greatest engineering task of modern times. When work on the new aqueduct was actively undertaken ten years ago, the chief engineer, J. Waldo Smith, one of the broadest minded men of his profession, realized that the geological structure and the present and past history of the region to be traversed entered in a fundamental way into the problem. The region embraces the Triassic and Archean formations of the state from the Upper Devonian downward, formations to which the survey has devoted pure research since 1836, formations folded, faulted, and metamorphosed in a most complicated manner. The surface features are concealed everywhere with drift of the Glacial Epoch, which at places like a thick mantle covers buried channels or pre-glacial systems of drainage which cut the bed rock to depths much below the present level. At the Storm King crossing of the Hudson the rock bottom is 800 feet or more below the surface of the river. With their thorough understanding of these facts, the consulting geologists Kemp, Crosby and Berkey aided the engineers in selecting the best locations and in forecasting the underground geology for the preparation of specifications for the contractors. Conversely the great tunnels and sections of the engineer have laid bare new matters of great value to the geologist; matters of inference have become the recorded facts of observation; estimates have given way to precise measurement in feet and inches. All this experience, embracing so much of human, scientific, and technical value, is to be brought together in a volume by Berkey and published with abundant profiles and illustrations in a bulletin of the State Museum.

The scientific growth of New York state is the past, the present, and a forecast of the future of our State Museum. The offspring has become the parent; the museum now conducts the geological and other surveys of the state. From its slow birth under the Natural History Survey between 1836 and 1843, under vicissitudes of name, of scope, of direction, and of dwelling place, the State Museum is now the titular head of the survey and of the entire science division under the New York State Education Department. The paleontologic, geologic, mineralogic, and botanic departments, independent offshoots of the survey, were brought under the regents of the uni-

versity in 1883, and in 1889 the museum was made an integral part of the University of the State of New York. A further concentration took place in 1894 when the university was fused with the New York State Education Department, under which a division of science was created. This division was charged with the broad powers of administration of the museum and with the geology, paleontology, botany, entomology, zoology, and archeology; in brief, it is the scientific scope of the old Natural History Survey of 1836 with the added custodianship of all the materials brought in. As compared with our central government, it is the United States Geological Survey, a part of the Agricultural Department and the National Museum swept into one under a bureau of education. Such unification is, so far as we know, unique; it is certainly logical in the sense that all state-supported scientific work should be *educational* in the very broadest sense as well as in the interests of pure research; as an administrative system it is an experiment which is well worth trying by our state, for it may be of value in Washington, where concentration of all the scientific bureaus of the government has long been under consideration.

Under the directors Hall, Smock, and Merrill in the years that have passed since 1904, the date of the appointment of John Mason Clarke as head of the museum and of the survey, the historic lines of geology and paleontology have been ably sustained, lines which are among the most honored traditions of the institution, together with greater activity along lines which had not been especially developed in its previous history. Thus while the study of plant and insect life has followed the earlier lines of economic service to the state, there has been continued advance in the study of mammal and bird life, of the past and present life of the Indian. Every effort is being made to represent in full in the museum the fauna of this state and to exhibit it as effectively as practicable. In archeology the unique field is the study and portrayal of the culture of the Iroquois, which brings the museum in touch with the 6,000 Indians of the state, their history, ambitions, and ideals, and it is fortunate that the preservation of the traditions and the folklore of this declining race is entrusted to the State Museum. Following up the work of Lewis H. Morgan, who probably contributed more to initiating and advancing anthropological work among the Indians of the state than any other person, there were the writings of Beauchamp and the studies of Converse, while among the younger contributors may be mentioned Parker, the present state archeologist, and Skinner.[12]

The law also provides that the State Museum shall cover the field of history, and the initiation of this problem is large because it has hitherto been entirely neglected by the state and important because of its educational bearings.

The original function of the museum as a depository of all the scientific materials brought in by the survey should be extended along lines similar to those followed by the National Museum of Washington, so that the new Conservation Commission with its interests in the forests, the fisheries, and the game of the state shall find the rooms of the State Museum equipped for the scientific materials which come to the commission. Similarly the department of the state engineer, the departments of agriculture, of health, and highways, should regard the halls of the museum as the place where the people are to find the visible educational materials developed with the growth of these several departments. This cooperation is in keeping with the unifica-

[12] Harriet Maxwell Converse, Arthur C. Parker, Alanson Skinner.

tion of the advance of pure and applied science in the progress of the state.

We may well ask what are the distinctive features of an ideal state museum as contrasted with great civic museums like the American Museum of Natural History of New York, the Field Museum of Natural History of Chicago, the Carnegie Museum of Pittsburgh, or a great national museum like that in Washington? Why should a state have its own museum, apart from the historical and political reasons which have located this institution at Albany? The answer is largely given in the preceding portions of this address. The museum is the natural scientific center of the state government; it is the natural depository of all the material brought together by the state surveys, it is the natural custodian of all purely scientific state records; it is the natural center of the study of the resources of the state as a political unit; it must maintain its capacity for productiveness in pure scientific research—pure science has been the justification of the state museum from the beginning of its history. For example, it is justified in issuing a monograph on the birds of New York state, as it is now doing, because this kind of publication belongs to the museum historically, because the education of the people of the state in the important matter of the economic value of bird life must be accompanied by the preservation and exhibition of the materials on which the volume is based. In brief, the distinctive sphere and scope of the state museum corresponds with the scientific interests and welfare of the people within the geographic boundaries of the state.

Yet in no relation is the function of the state museum more full of promise than in its relation to state education, a relation which it already maintains but which should be greatly extended in the future. The peculiar teaching quality of a museum is that it teaches in the way nature teaches, by speaking to the mind direct and not through the medium of another mind. This principle of natural instruction is being carried out in the development of the exhibits of the museum, and through photography these exhibitions may well be extended to the schools of the state. The museum should be the center from which the visual and practical instruction of the children of the state in science should emanate. The pulse of the new museum should be felt in every country school in the state and in the schools of every one of its cities which has not developed its own museum center. The museum should supply the schools with collections of scientific materials; it should distribute traveling demonstrative collections in natural history. In brief, it should supply the State Education Department with all materials for the visual instruction in the scientific features of the state for distribution among the schools. Our school children should receive their first inspiration in science not from abroad but from the things about them. There is every reason why the state museum should do for the resources of the state what the Commercial Museum of Philadelphia is doing for the people of Pennsylvania.

The execution of these ideals requires a combination of scientific and administrative ability with a strong sense of public duty, which I dwelt upon in the opening paragraphs of this address. Our great commonwealth is to be congratulated on having at the head of its educational system a man of the breadth of view of Dr. Andrew S. Draper, and at the head of this institution a man of such thorough preparation, wide sympathies and executive ability as its present director. In assuming the centralized control both of the Geolog-

ical Survey and the State Museum in 1904 Dr. John Mason Clarke inherited positions rich in traditions and undertook no light task. Long years of experience as an assistant to James Hall had given him a wide and thorough knowledge of the state's geology and paleontology, and, quite as important, of its legislators. Although a paleontologist and stratigrapher himself, all the other lines centering in his office have received his support. While the great monographs on the faunas of the Devonian, the graptolites, the ancient sponges and the eurypterids have seen the light, the areal geology has had its full recognition, the ancient crystallines have received no less attention than the fossiliferous beds and the mineral resources. Botany, zoology and archeology have had their due and are well represented in the publications of the state museum. The geologic map of the state has progressed on the topographic scale of one mile to the inch, so far that almost one half of the area of the state has been plotted in minute detail. The museum has kept in touch with and published the geological results obtained in connection with the development of the aqueduct. It has availed itself of the cooperation of many of the most able specialists in the state.

It is now the great opportunity of our state not only to maintain liberally a museum the purpose of which is to present in fulness the character of its natural resources, but to furnish the State Department of Education with the means of spreading the work of the museum in popularized form throughout the schools of the state. The appropriations have doubled in recent years, now amounting approximately to $40,000, but they are insufficient to develop a museum worthy of the dignity of the state of New York either along the lines of exhibition or those of public education.

The truest measure of civilization and of intelligence in the government of a state is the support of its institutions of science, for the science of our time in its truest sense is not the opinions or prejudices, the strength or weakness of its votaries, it is the sum of our knowledge of nature with its infinite applications to state welfare, to state progress and to the distribution of human happiness.

Henry Fairfield Osborn
American Museum of Natural History

Address of President Taft at the Fifteenth International Congress on Hygiene and Demography[1]

It is my pleasant and honorable duty, on behalf of the people and the government of the United States, to welcome this great congress to Washington.

"Prevention is better than cure." The science of medicine and surgery has made wonderful growths in the last forty years, but in that time it would seem as if the science of sanitation, of hygiene and of preventive medicine had come into being from nothing. And now the two, prevention and cure, through the intense energy, industry, application, keen discrimination and high and enthusiastic aims of the benefactors of human kind, who are now devoting their lives to research, and the investigation of the cause of disease, its transmission and its antidotes, are proceeding, *pari passu,* with such rapidity and success that in the next century we may almost expect to find the equivalent of that fountain of youth and perpetual life which was sought for in this country by some of the early discoverers.

It is easy to make an error with reference to the beginning of a great forward movement by dating it from the time when the

[1] Official report of the address given at Continental Memorial Hall, Washington, D. C., September 23, 1912.