eous condition. Like Dewar's work at the low temperatures, it appears that a refinement of skill will secure all elements in a gaseous condition. Thus all matter, that is, elemental, may exist in the three physical states.

In the domain of physics, observation of the marvelous effects of the Röntgen rays, Becquerel rays, the characteristic property of certain old and some recently discovered elements, as barium, thorium, radium and polonium, show new things undreamt of. We cannot say that these discoveries, praise-deserving and wonder-creating as they are, will give us final proof of the truth of our premise as put forth, yet they do point in that direction.

All forms of energy are interchangeable, hence we have but one force, whether it exhibit itself as heat, electrical energy, chemical force, or what not. These new rays, active and specific in their demonstration, are but altered forms of the *one* force. Why not therefore a *one matter*? Having reached that point we may con within reason Ostwald's dictum, that all is force, there is no such thing as matter. We may well conclude by repeating the query of the elder Büchner, that *aberwitzig* youth: "Is it a duty to believe things that can not be proven?"

Charles Baskerville.

*FORMATIVE MUSEUM PERIOD.**

Scientific activity developed more slowly and was less encouraged in New York in the earlier years of this century than in its neighboring rivals Boston and Philadelphia The expression of a mercantile, or more harshly described as that of a money-making city was early acquired, and baffled or obscured the spirit of scientific research. In a measure this suggestion, applied to the miscellaneous avenues of enterprise and the accumulation of wealth, was sensibly deceptive. It would be quite impossible to stifle the incentives to the study of nature in a population of nearly one million people, and the limited consideration given to physical, chemical and geological science in the colleges, high-schools and seminaries, which aroused unfailingly increased interest in the objects of nature, led to their collection, and stimulated local societies in their study and record.

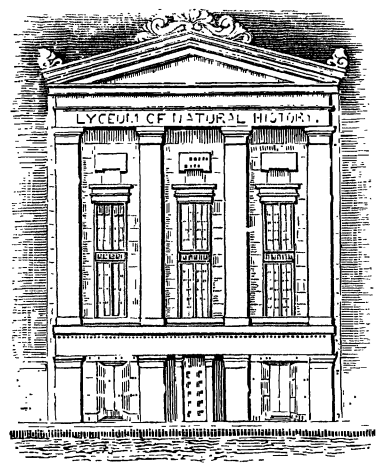
An examination of the decade immediately prior to the establishment of the American Museum of Natural History, and by implication a reference to the conditions somewhat earlier, show us the formative stages shaping public needs for its appearance and public appreciation of its value.

Philanthropic and social designs, historical research, theological learning, medical study and literary invention were significant in the more intellectual life of New York City from 1830 to the date of the foundation of the Museum in 1870; the active participation in education of three colleges, a normal school for women, two medical schools, and numerous lesser centers of learning, including the invaluable services of the Cooper Institute with two seminaries devoted to religious instruction, were distinctive evidence that New York was not oblivious to the claim of knowledge.* But science in its purer forms and especially the study of nature in its animal and vegetable life, received scant recognition in the curriculæ of instruction. Two societies, the New York Academy of Sciences, later (1876) the Lyceum of Natural History, and the Torrey Botanical Club (1870), were the guardians and shrines of the scientific life of the city, and collected in a compact coterie the separated enthusiasts

* Columbia University (King's College) dates from the last century (1754); the New York University was opened 1831; the College of the City of New York (Free Academy) in 1849; The Normal College in 1855; Union Theological Seminary in 1836; General in 1817.

in the study of nature. The Lyceum was in a precarious condition for many years, and, at least until 1836, led a shifting, and in some respects shiftless, life. In the latter year it occupied its own building at 563 Broadway, and here the elder Stillman began a series of lectures on geology, seven in all, which produced a moderate sensation in the controversies of the day. A museum was a part of the appropriate features of the society and these were increased by donations to such an extent that Mr. J. H. Redfield, a competent judge, alludes to them as 'large,' a term certainly of variable significance in the mouth of a collector. The exact nature and contents of these collections can be determined from the chapter on collections in Professor Fairchild's 'History.' In view of the many local features now introduced in the halls of the Museum and as a means of determining the advance made in the expectations and ambitions of a Museum, a glance at these collections is instructive. As early as 1817, Messrs. Torrey, Rafinesque and Knevels were made a committee 'to travel and explore the natural history and productions of the neighboring counties'; with them in this work were associated Drs. Mitchill and Townsend. Bones of a mastodon were found in Orange Co., later were added a right whale and a swordfish, from the Atlantic, while specimens of the Wallkill carp and pike, and 'white wild sheep' from the Rocky Mountains, formed the nuclei of an increasing cabinet. 'Measures for completing a catalogue of the vegetables growing within 100 miles of the city' were early instituted, a device now variously illustrated in the collections of plants, buds and insects made to-day. Minerals were added, and repeated additions of snakes and fishes, fossils, skeletons, plants and shells gave it a local reputation and naturally engendered some self-congratulation amongst its members. But when we learn that it was all accommodated in sixty-two boxes, the reader, familiar with existing needs, is recommended to realize how ideas and ideals advance.

It is not incumbent upon a historian of the American Museum to dwell upon the struggles of the Lyceum, but it would be an error in precision not to indicate the influence this and similar or affiliated movements had in determining its inception, and especially pointing out the critical relations in 1865 of the Lyceum to the projected

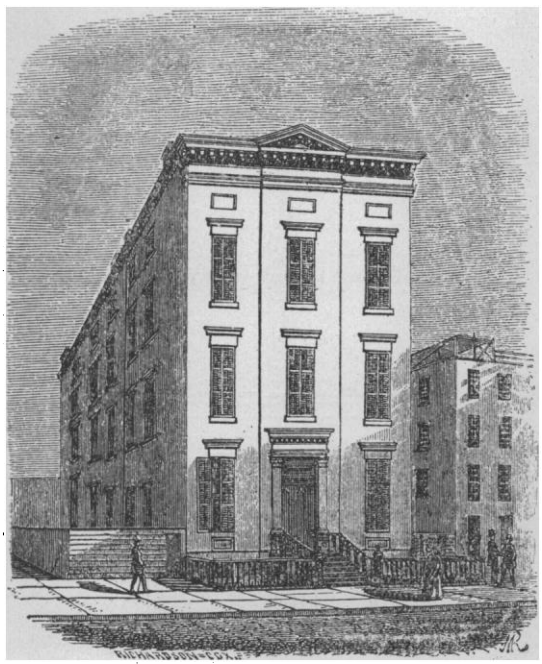


The Lyceum Building, No. 563 Broadway.*

American Museum. The Lyceum increased in its membership and the papers read at its meetings by Jno. J. Audubon, De Witt Clinton, James E. Dekay, Jno. LeCompte, Samuel L. Mitchill, Jno. Torrey, Asa Gray, G. Troost, Thos. Bland, James D. Dana, Theodore Gill, Gen. L. Lawrence, Jno. H. Redfield, Temple Prime, Alexander Agassiz, W. A. Dall, J. S. Newberry, William Stimpson, Benj. N. Martin, Augustus R. Grote, while listened to by a small audience, were contributions to the development of scientific feeling in New York. Dr. Jno. C. Jay, whose collections in conchology formed the nucleus of the present cabinet

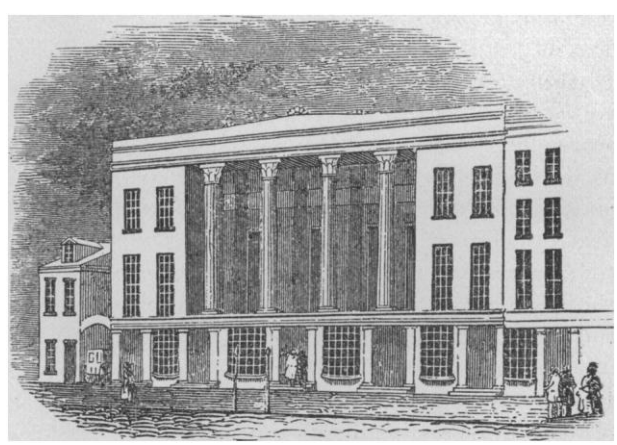
* This and other illustrations to this article are published by the courtesy of Professor H. L. Fairchild.

of shells in the American Museum, as his library was the foundation of its present



University Medical College, Fourteenth St.

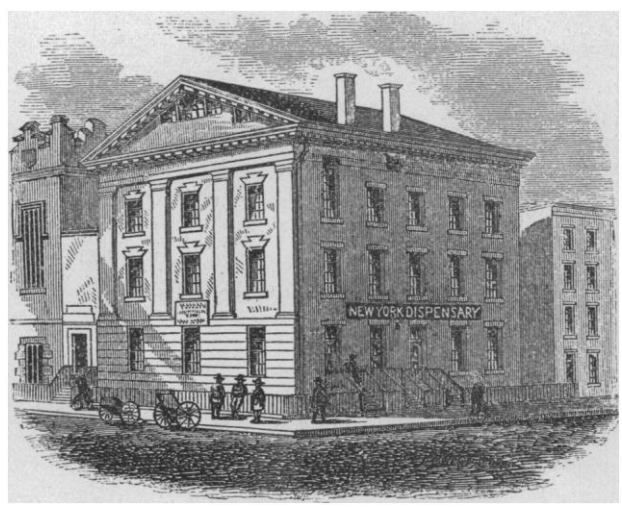
library, was one of the most enthusiastic and sedulous advocates of its interests while in its financial necessities the Lyceum leaned rather too heavily on his generous sympathy. Amongst the friends and officers of the New York Lyceum from 1860 to 1869 were names afterwards identified with the opening and even the later years of the American Museum. Amongst these were William A. Haines, Robert L. Stuart, George M. Lawrence, J. Carson Brevoort, D. Jackson Steward. These gentlemen were in several instances themselves collectors and possessed libraries and cabinets of commanding interest. They became interested in 1865 in a movement to secure moneys for the furtherance of the object of the Lyceum with a possible reference to a permanent home and a hall for its collections. Quoting from Professor Fairchild's 'History of the New York Academy of Sciences' (p. 49) we learn that "the circular letter explaining the plan had affixed to it the names of the active members of that time, which were these: William A. Haines, Robert L. Stuart, George N. Lawrence, J. Carson Brevoort, H. D. Van Nostrand, Chas. A. Jay, Dr. John W. Greene, D. Jackson Steward, Charles M. Wheatley, Temple Prime, with Livingston Satterlee as Chairman." This effort was unsuccessful and the disappointed hopes of its authors were later revived and the cooperation of the more influential embodied in the creation of the American Museum of Natural History. All expectation of securing in the rehabilitation of the Lyceum a permanent museum was destroyed, when, on May 21, 1866, the Medical College building, in which the collections of the Lyceum were placed, was burned. The collections were not insured and only its valuable library escaped de-



Stuyvesant Institute, University Medical College.

struction. For years before this the Lyceum had been engaged in a despairing

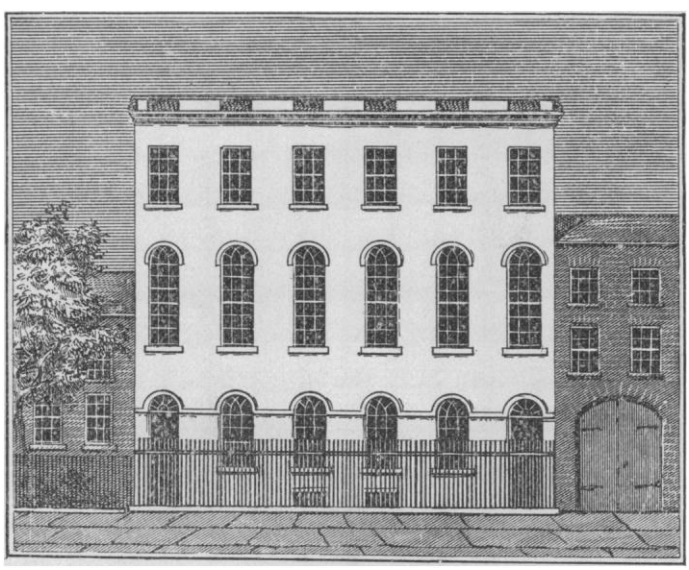
struggle to perpetuate itself and secure an autonomous existence. It had become after the foreclosure of its own building the guest of the University, moving from the Stuyvesant Institute on Broadway to the Medical College upon the site of the present Tammany Hall. With the disappearance of its collections, and the abrupt termination of plans of its growth into a substitute for a museum, its formative relations to the American Museum ceased. Its scientific work continued, and the spirit of research it fostered helped the objects of the Museum. Such addresses as that of Dr. Barnard at its Semi-Centennial on 'The relation of science to the advancement of civilization and the expediency of a public provision for the support and encouragement of scientific inquiry' were directly stimulating to the project of a museum, at that moment ready to take place. Besides the slender and perhaps almost imperceptible influence of the Lyceum in creating a demand for a great museum, a small measure of regard can be bestowed upon the effect, on the public-spirited citizens at least, of the Brooklyn Institute, which during all these years from 1845 onward had been engaged in the study of science, in developing scientific discussion, scientific education, and in stimulating the acquirement of scientific collections. A few details of the history of this institution can hardly be disregarded in any exhaustive sketch of the scientific tendencies then surrounding or immanent in New York City. The Brooklyn Institute originated in the Brooklyn Apprentices' Library Association in 1825. It expanded rapidly. Lectures under its auspices were amongst the first public expositions of natural science near New York. In 1843 it assumed the present name and function of the Brooklyn Institute, and was really an important factor in the educational life of Brooklyn. Here Agassiz, Dana, Gray, Henry, Morse, Mitchill, Torrey, Guyot and Cooke brought the treasures of their learning and thought during the conspicuously brilliant period of its activity from 1843 to 1867. Mr. Augustus Graham endowed it, and while for some time the interests of history and the claim of religion somewhat disabled the efforts of its scientific members, collections were made, notably that of coleoptera of Harvey G. Rich, and the interests of science through its remarkable educational work advanced. It served its useful purpose in preparing the ground, in cultivating public feeling for the erection and support of a great museum. A stream of influence, not very perceptible, perhaps, but of some importance as the years drew near to 1876, emanated from the School of Mines in Columbia College (1864), where from the exertions of Professor J. S. Newberry the study of botany and zoology was more technically pursued than anywhere else in New York, and from which groups of young students



New York Dispensary, White and Centre Streets.

in geology and mineralogy were annually issuing.

Apart from the gradually educated demands amongst the studious classes, the public-spirited citizens of New York were intelligently sensitive to the reputation of the city, and when they recalled the museums of foreign cities whose collections and arrangements had challenged their admiration, they regretted that New York was yet without its own museum. In the United States it was behind other cities.



College of Physicians and Surgeons, Barclay St.

The Academy of Natural Sciences, founded in Philadelphia in 1812, possessed some collections with which were associated the names of Morton, Conrad, Nuttall, Audubon, Lucian Charles Bonaparte, Harlan, Rafinesque and others, and had created a provisional museum. Thomas Say, the distinguished conchologist, was its first curator, and through the generosity of William Maclure, the geologist, a building was opened in 1840 to the public, abundantly stored with the objects of nature, later succeeded by the structure at Nineteenth and Race avenues; at Washington, the Smithsonian Institution, embracing the aims of the National Institute, was provided with a museum, apologetic, perchance, to the taste of an exacting critic, but still a dignified place for public instruction. Boston, from the exertions of the members of its Society of Natural History, had dedicated its museum on the 2d of June, 1864, when Professors Wyman and Wm. B. Rogers, with Mayor Lincoln, gave distinction to the ceremony. In Cambridge, as early as 1860, rapid progress had been made on the new Museum of Comparative Zoology through the enthusiasm of Agassiz, whose definite relations to the creation of the American Museum of Natural History are presented later in this history. Chicago had created a museum under the auspices of Major Robert Kennicutt and later through the stimulus of Stimpson, and although it was damaged by fire in June, 1866, it still survived, and furnished, long prior to the erection of the great Field Museum, entertainment and information to the public.

There had been indeed in New York, outside of the immediate limits and influence of the Lyceum, efforts at museum installation. But they were industrial or historical or artistic and but slightingly regarded the natural sciences. It must be remembered that the impulse which finally resulted in the Museum of Natural History was twofold, and enclosed the divergent tendencies towards nature and art, for the American and Metropolitan museums were simultaneous creations.

These preliminary efforts to give a mu-

seum to New York are significant in this connection. Perhaps the first museum in which a regard for scientific arrangement was shown in New York was that described in a rare and old pamphlet printed in 1804 entitled, 'Catalogue of the Natural Productions and Curiosities which Compose the Collections of the Cabinet of Natural History, opened for Public Exhibition at No. 33 William St., New York.'* This catalogue, apparently prepared by a Delacoste, in an introduction of four pages states that "there is scarce a city or town of any importance in Europe that is not possessed of a cabinet of that kind; but in the United States of America, the variety of whose productions and their dissimilarity from those of the Old World offer ample field for the researches of the naturalist, there is scarcely a collection deserving the name, except the one in Philadelphia belonging to Wm. Peale, whose indefatigable researches and laudable exertion to promote the knowledge of natural history entitle him to the gratitude of every friend of science." This collection was exhibited as the 'Delacoste Cabinet of Natural History,' at Federal Hall and apparently at No. 80 Greenwich Street. The collections, according to the examination instituted by Mr. Avery, appear to have been gathered on the coast of Guyana in South America, presumably by this Delacoste, and were made up of 'Quadrupeds, Birds, Fishes, Insects, Reptiles and Natural Productions of Cayenne.' The information is further elicited from the pages that "this above collection, which was originally put up for a Cabinet in St. Petersburg, would be sold here, if any purchaser should offer, and in case of the contrary will be forwarded next spring to its first destination." Delacoste inaugurated the plan of subscriptions now familiar under a different form to his successors, and we find amongst his subscribers the names of leading New York people of that early day, as the Clintons, Hamiltons, Depeysters, Hosacks, Livingstons, Pringles, Seymours, Rutherfords, VanDykes, etc. Amongst these is the name of Jerome Bonaparte. Delacoste wished to make his establishment "permanent in New York, to augment his collections in proportion to the encouragement which he will receive, * * * and binds himself, if enabled by an adequate support, to travel through the whole continent of North America for the purpose of securing a skeleton of that anonymous animal called the mastodon." The subscriptions ranged from $3.00 to $1.00.

Before this in 1790 the Tammany Society 'established a museum for the purpose of collecting and preserving everything relating to the history of the country.' (Manual of the Common Council of New York, 1865, D. T. Valentine.) This museum was subsequently relinquished to Gardiner Baker, whose expenditure of time and money upon it had been considerable. After the death of Baker it was sold to W. J. Waldron, and finally was merged in the Scudder Museum, of which it formed the foundation, in Chatham Street. This embryonic effort was called the American Museum.

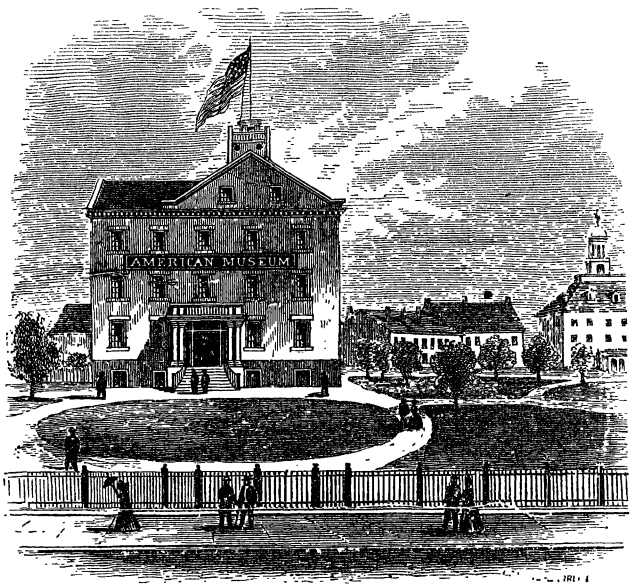
John Scudder, the predecessor of Barnum and Peale, established a pay museum of some merit in 1810. It was praised in very mellifluous English by a contemporary who rejoices that "it continues daily to improve, by extensive and valuable additions of the *works of nature* and artificial curiosities, from all parts of the world. Its immense collections are well arranged and beautifully displayed in four spacious saloons, each 100 feet in length; in addition

*We were indebted to the kindness of S. D. Avery, Esq., for the privilege of inspecting this interesting pamphlet, a notice of which was first printed in the New York *Times*, Saturday Review, July 1, 1899.

to which another department has recently been added of still larger dimension." This museum was on the ground now occupied by the St. Paul Building, opposite St. Paul's Church, Broadway. Fitz Green Halleck describes it as:

"Once the almshouse, now a school of wisdom,
Sacred to Scudder's shells and Dr. Griscom."

Peale's Museum and Gallery of Fine Arts stood on Broadway opposite to City Hall Park. It was founded in 1825. It is impossible to withhold at least a partial quotation depicting its attractions as given by the veracious Disturnell.* "It contains four spacious apartments, which are arranged in the following order: The 1st contains *specimens of natural history in all its branches*, and for beauty of arrangement, and the exquisite style in which the articles are mounted, render it one of the most interesting places of public amusement in the country. The 2d is a large and valuable collection of paintings, by eminent artists, amongst which may be particularly mentioned a portrait of Napoleon by Le Fevre; a Magdalen by Le Brun, together with portraits of at least 150 celebrated citizens and foreigners. The 3d contains a very superior Cosmorana, several wax figures of good workmanship, fossil shells, minerals and miscellaneous curiosities."



New York Institution. 'The Old Almshouse.' Western end facing Broadway.

As early as 1801 botany at least achieved in New York a notable recognition. It was then that Dr. David Hosack purchased the Elgin domain and created there a botanical garden. This property of twenty acres was between 5th and 6th avenues on 47th and 51st streets. Here, to quote the elegant Dr. Francis, "were associated in appropriate soil, exposed to the native elements or protected by the conservatory and hothouse, examples of vegetable life, and of variety of development — a collection that might have captivated a Linnæus or a Jussieu: and here indeed a Michaux and a Barton, a Mitchill, a Doughty, a Pursh, a Wilson or a Le Comte often repaired to solve the doubts of the cryptogamist or to confirm the nuptial theory of Valliant."

This effort of Dr. Hosack's was a natural, though distant, precursor of a scientific museum.

Associated with Gardiner Baker in the organization of the American Museum was John Pintard, who laid the foundation of the N. Y. Historical Society. This institution gathered strength rapidly, as might have been expected, and its museum of his-

* 'New York as it is in 1837 containing a general description of the City of New York, list of officers, public institutions, and other useful information. Including the public officers, etc., of the city of Brooklyn, accompanied by a correct map—published by J. Disturnell, 1837.'

torical treasures increased and expanded, and led a migratory life of more than 50 years, in which it wandered successively from the old City Hall, in Wall Street, to the Government House, in Bowling Green, to the N. Y. Institution, to the Remsen Building, on Broadway, to the Stuyvesant Institute, to the N. Y. University, until finally, in 1857, they rested permanently in the present home of the society at Eleventh Street and Second Avenue (History of N. Y. City, Benson J. Lossing). This society's collections assumed at this latter date the character of a museum in a popular sense, for at this time it secured the possession of Dr. Abbott's collection of Egyptian antiquities.

As early as 1854 Dr. Abbott's collection of Egyptian antiquities was brought to this country by its distinguished owner and an effort made to secure for it an appropriate home in America. Dr. Abbott, during a residence of more than twenty years in Egypt, where he had served as a physician in the army of Mehemet Ali during the Syrian war, had spared no pains and apparently little expense in the accumulation of a museum of Egyptian antiquities. The reception of his project was disappointing and hardly creditable to New York, where the collection it was expected would receive a proper reception. It did not, however, undergo the misfortune of being lost to the city. Several friends of Dr. Abbott and many gentlemen of influence and means, amongst whom was Peter Cooper, secured for it at least temporary security and it was placed in an apartment in the then New Institution, now the Cooper Union Hall, in Astor Place. The amount required was $60,000. The editor of *Harper's Magazine* urged its purchase on the grounds that it 'would be the nucleus of a generous and extensive historical, scientific and artistic museum, which would give New York an elevated rank as a real, and not a pretended and assumed, metropolis among the great cities of the world.' Such opinions, prevalent in the prints of the time, show how widely emphasized was the need of a great museum for the city. The Historical Society subsequently became the possessor of an immense art collection, numbering 1,000 examples of paintings and sculpture.

The project of a permanent crystal palace is familiar perhaps to the older men of our day, and the history of that elusive scheme, from the day when it opened as a World's Fair to its extraordinary half-ludicrous climax as a stock company, and a faint reflex of Sydenham Palace, under Barnum's direction, a well-remembered chapter in the events of half a century ago. In May, 1853, the approaching completion of the Crystal Palace was hailed by the New York public and by the large expectant population of its suburbs with delight and pride. It was at first a World's Fair, and in the sketches of the time we meet expressions of interest in which are mingled quite indiscriminately delight over its completion, and pleasure at the prospect of the Franconi hippodrome and a stupendous tower for panoramic views. The Crystal Palace was a wonderfully attractive building. It was modeled after the Crystal Palace of London, but was a really more admirable architectural work. It occupied the ground now known as Bryant Park, and covered five acres of ground. Its roof was supported on iron columns and the spaces between them were closed in by glass. It was a marvelous creation of Moorish and Byzantine composition. The annual fairs of the American Institute were held here, and it was perhaps the first seriously and generously conceived effort at the work and mission of a museum. It was known as the New York's Industrial Exhibition, and while it largely partook of the ephemeral bizarre and commercial character of a fair, it enlarged the

mind of the public by a display of both nature and art, and was a logical excitant of those desires in the scientific and artistic spirit of New York that led finally to the establishment of our art and scientific museums. During the season of the World's Fair the art and the products of Denmark, France, England, Germany, Belgium, Holland, were here superbly housed, and the illuminating effect upon our people cannot be overestimated. Its mention is essential for an appreciation of the conditions preliminary and formative to the erection of the present Museum of Natural History.

Those various enterprises and events so briefly epitomized would not of themselves have provided exactly the sort of stimulus required to bring to a procreant stage the undefined wishes of the leading citizens of New York for a great museum. This stimulus was provided, however. It arose from two separated centers of scientific activity, the organization of a Natural History Survey of New York State, and the persuasive influences emanating from Louis Agassiz at Cambridge.

Zoology in New York State received an early recognition in the labor of Samuel L. Mitchill, who in 1813 commenced an account of the fishes of the State, which, however, when published became a local review of the fishes near New York City. Contributions to the ornithology of the State were frequent, apart from the general works of Wilson, Bonaparte, Audubon, Cooper and DeKay, and William Cooper; Bachman, Le Conte, Barnes, Jay, Bailey, added fresh studies in herpetology, mammalogy, conchology and microscopy. As early as 1799 Mitchill had collected facts relative to the mineralogy of New York State, and he was succeeded by less-known names, until T. Romeyn Beck published in 1813 a more valuable review of this subject. The interest in the natural productions grew, and public attention and public funds became gradually involved in the examination. Stephen Van Rensselaer in 1820 authorized Amos Eaton and T. Romeyn Beck to make a survey of the county of Albany. This was later extended to Rensselaer County, and over the line of the Erie Canal, the latter exploration producing Eaton's famous geological nomenclature and scheme of New York geology. The realization amongst public officers that the time was ripe for a thoroughly organized survey was more and more strengthened. In 1835, upon the motion of Charles P. Clich, a representative from New York, the Assembly of this State passed a resolution directing the Secretary of State, John A. Dix, to report upon the most expedient plan for a complete geological and natural-history survey of the State. Secretary Dix made the report, and on the 15th of April, 1836, this great survey was sanctioned by the Legislature, its maintenance provided for, and James E. DeKay, John Torrey, Lewis C. Beck, William W. Mather, Ebenezer Simmons, Timothy A. Conrad, Lardner Vanuxem and later James Hall were organized into a scientific directorship of its interests. The immediate result of this survey was the erection of a museum in Albany, and a new conception given throughout its publications to the importance of natural science. In 1869, the year immediately preceding the foundation of the museum, the survey had been in operation some thirty years, and Professor James Hall had gathered together a private collection of remarkable dimensions, representing the paleontological history of the State. A lesson, if exhibited instructively to the public, in geological events was here concealed, and only the facilities and purposes of a great museum could properly present it. The entire range of facts embodied in the reports of the survey and those of the New York State Cabinet had sensibly deepened the growing impression and expectancy that a great city must

assume the responsibilities of such an institution. This collection of Professor Hall's was for sale and its possession would be of inestimable value to a new institution.

The second and presumptively more effective influence shaping the thought of our citizens in this direction was the enthusiasm over the work and lectures of the great Swiss naturalist, Louis Agassiz. Agassiz's own success in securing the cooperation of the Massachusetts State Legislature to create the Museum of Comparative Zoology at Cambridge was a pioneer effort along lines followed quite closely by the American Museum of Natural History. It was indeed upon the inauguration of the Museum of Comparative Zoology that the second group, as Marcou has observed, of Agassiz's pupils, was formed, a group that disseminated over the entire United States a new love for natural science, and formed in themselves a radiant center of genius and industry.

Louis Agassiz, the Swiss naturalist who had declined the flattering and profitable offers of the French government to fill a position of superintendence over the Museum of Natural History or Jardin des Plantes in Paris, also the chair of paleontology in the State University of Switzerland, had established himself in the affections of America. His lectures were revelations, and the public of New York, as of almost every other great city, had been awakened to a new sense of appreciation of the study of nature. A series of distinguished men had imbibed from his contagious enthusiasm for nature, and had elevated the fame and established the permanence of American science; amongst these were Allen, Scudder, Verrill, Putnam, St. John, Morse, Emerton, Hyatt, Shaler, Ordway, Stimpson, Niles, Lyman, Clark, Mills, Packard, Dall, Mann, Uhler.

Agassiz's association with Bache, Gray, Morton, Leidy, Baird, Wyman, Pourtales, Lesquereaux, Rogers, Conrad, Guyot, Marcou, in the higher scientific circles of America, and his intimacy with Emerson, Whittier, Longfellow, Felton, Lowell, Holmes, Binney, Hoar, Ticknor, Howe, Sumner, in the social regency of Boston, had created for him a personal preeminence quite unique in the United States. Certainly Agassiz's relations with all his pupils had not been invariably honorable to himself, but even the famous 'Salem Secession' with its resulting publication of *The American Naturalist* only served to give a wider prominence to his peculiar and fascinating enthusiasm.

And in 1860 Agassiz's long-cherished scheme of founding a great museum materialized in a conspicuous inauguration of the building of the Museum of Comparative Zoology in Cambridge. The Governor and his staff and a great concourse of people, with the faculty of Harvard College, were present, and the event, dwarfed indeed by the imminence of a terrible conflict, distinctly foreshadowed the development and expansion of the museum idea in the large cities of the Union.

Amongst those early engaged in the duties of this museum was Albert S. Bickmore, a young man then, who, in a succeeding year, entered the service, and being detailed to duty near the seashore, seized the occasion to revive his studies of sea-life by making a collection of the coast shells of North Carolina. Professor Bickmore had noted with interest Agassiz's supple combination of tact, eloquence and personal charm in securing the effective alliance of the Commonwealth of Massachusetts, and his adaptability to the methods of private importunity. Through these combined agencies the Legislature of Massachusetts had granted $100,000, the citizens of Boston raised $71,000, Mr. Francis C. Gray left $50,000, and a sentiment of generous appreciation for the purposes of the museum had

been created. Agassiz's success in this way was remarkable. He obtained under the most discouraging circumstances, even in the darkness of the war, large sums of money from the Legislature of Massachusetts, and his appeal to individuals was always irresistible.

It seems pertinent, in view of the analogous relations of the New York museum to the Legislature of the State and private benefactors, to quote Marcou's expressive description of Agassiz's methods. Agassiz's biographer writes: "The amount of scientific diplomacy he made use of is something astounding; for instance, he would detail with great clearness the working of the institution, and make it clear that the museum is an element of education even in the most elementary school of commonwealth, and that in the future generations there would not be a child who would not have the opportunity of understanding the scheme of creation as thoroughly as he understood his multiplication table. He had the tact to adapt his explanations and his description of the absolute poverty of the institution to the listener and his official position in the State. Then, after weeks of such preparatory work at the State House, came the annual visit of the whole legislative body, with the Governor at its head, to the museum. Everything was in readiness for the reception when the six or ten street cars, filled with legislators, arrived at the University grounds. Agassiz conducted them at once into the various exhibition halls, showing the treasures of each and briefly describing the departments. Afterwards in the lecture room, in an informal conversation, he detailed the methods and needs of the institution. He always succeeded in winning to his side farmers, tradesmen and politicians. After such a visit the Legislature always voted a new appropriation of public money; it was only necessary for the President of the Senate and the Speaker of the House to make speeches in its favor, and the resolution would easily pass the three readings without further debate."

Celebrated collections of the Old World, constant accessions from the new, were pouring into the museum at Cambridge. In 1869 Professor Agassiz reported that though the income of the British Museum and the Jardin des Plantes was more than ten times that of the Museum of Comparative Zoology, yet the last "in certain departments, such as corals and fishes, was superior to both, and that in activity of research and publication it yields to neither, while the increase of its collections since its existence, and the prominence it has attained among the museums, are such as no like establishment has reached in the same time and with the same means."

It was with anxious eyes that the naturalists of New York and those citizens of the great metropolis that were devoted to the advancement of its intellectual interests noted this rapid progress. The formative period closed, and the crystallization of an idea, so definitely recognized, quickly succeeded in those years, which included the incorporation of the American Museum of Natural History.

L. P. Gratacap.

American Museum
of Natural History.

SCIENTIFIC BOOKS.

Publications of the Japanese Earthquake Investigation Committee. Nos. 5 and 6. Tokyo. 1901.

These two volumes are continuations of the series of publications in foreign languages of the investigations of the Imperial Japanese Seismological Committee, the earlier numbers of which received a somewhat extended notice in the columns of this journal some time ago. They are written by Dr. Omori, a member of the Committee in immediate charge of the investigations, and they contain horizontal pen-