

# SCIENCE

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NATURAL HISTORY MUSEUMS (I).\*

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In the prevailing scientific activity of the world the enduring vigor which we display in finding out all we can know about ourselves, this point in space we inhabit, what it contains, what it has contained, and what it may be made to contain, the Museum appears as perhaps the most significant emblem of our untiring industry.

If I may use my own language employed in another connection, the museums “appear like monoliths over a country which has become imbued with the scientific spirit, here raised to the memory of some local worker, there stately monuments of cosmopolitan learning, which in the centers of commercial activity preserve alive the genius and the zeal of original research. All are nurtured by the same love of the actual and its relations and laws, and all embody the incessant spirit of observation, comparison and knowledge.

“In the United States, favored by natural causes, the variety and wealth of our natural resources, by the adoption of scientific instruction in our schools, by the practical habits and cultivated instincts of observation of our people, the liberality of general and State governments in organizing surveys, and the helpful impulses of lyceums, lectures and societies, scientific museums increase rapidly.”

\* Read before the Gamma Chapter of the Phi Beta Kappa, April 26, 1898.

But when we consider the collecting instinct of man, something primordially allied to the gathering habits of a squirrel or a pack-rat, the chromatic eccentricity of an oriole or a bower-bird, or the vandalism of a shrike or a racoon, we may anticipate that, unregulated, it can produce the most fantastic and inane combinations of objects. And it does. The comment of a German writer, Wilhelm Bürger, on the misleading collections of the art museums of his own country should be profitably quoted. He says: "Our museums are the veritable graveyards of art, in which have been heaped up, with a tumulous-like promiscuousness, the remains of which have been carried thither. A Venus is placed side by side with a Madonna, a satyr next to a saint. Luther is in close proximity to a Pope, a painting of a lady's chamber next to that of a church. Pieces executed for churches, palaces, city halls, for a particular edifice, to teach some moral or historic truth, designed for some especial light, for some well studied surrounding, all are hung pellmell upon the walls of some non committal gallery—a kind of posthumous asylum, where a people no longer capable of producing works of art come to admire this magnificent gallery of *débris*."

But these mere failures of perception, these obvious incongruities of place, time and concept, are less detestable certainly than the ceaseless association of things which have no conceivable relations. To use a word thrown now into organized speech by the peculiarities of certain literary productions of our day, there is a latent 'yellowness' in men which can be insidiously evoked to some sort of response, and there is a phase of attention which emits, as it were, a reflected gleam of puerile pleasure, when a museum cabinet summons its notice to the skull of a murderer at rest along side of a brick from the Great Wall of China, the tooth of a shark

inoffensively placed in juxtaposition with the thighbone of the diver whose fate it determined, or the jaw of a gorilla by the side of William Tell's arrow, if not a wax model of the original pippin it so luckily transfixed.

These are not purely aggravatedly imagined cases, devised for your amusement. The provincial museums of England, for instance, were long a scandal. Poorly supported, absurdly arranged, without discriminating curators, they became mixtures of oddities, monstrosities and perversions. Listen to this well-informed and well-weighed recital from the lips of W. Boyd Dawkins: "In one instance which occurs to me you see a huge plaster cast of a heathen divinity surrounded by fossils, stuffed crocodiles, minerals and models of various articles, such as Chinese junks. In another a museum unit takes the form of a glass case containing a fragment of human skull and a piece of oatcake labeled 'fragment of human skull very much like a piece of oatcake.' In a third wax models are exhibited of a pound weight of veal, pork and mutton-chops, cod-fish, turnips, potatoes, carrots and parsnips, which must have cost the value of the originals many times over, with labels explaining their chemical constitution, and how much flesh and fat they will make. \* \* \* \* In very many museums art is not separated from natural history, nor from ethnology, and the eye of the beholder takes in at a glance the picture of a local worthy, a big fossil, a few cups and saucers, a piece of cloth from the South Seas, a war club or two, and very possibly a mummy." As an American analogue some of us may recall the Athenæum in Nantucket town with its museum of mingled odds and ends, models, whale jaws, implements, antiquities and dirt, though there our literary intuitions appreciate its extreme availability for the pen of Miss Wilkins or Sarah Orne Jewett.

But this state of affairs has sensibly vanished. Except in those horrifying aggregates of things in heaven, and on the earth, and in the waters under the earth, to which a commercial spirit has promptly affixed the name of dime museums, such disordered collections are only met with in juvenile clubs and country lyceums, where the bucolic appetite feeds rejoicingly on wonders. To-day enlightenment growing with each rising and setting sun, curiosity whetted by the unfailing experience and reading of every hour, delight animated by renewed accessions of pleasure at each new object of interest, each new principle of nature, each new sign of scientific conquest of the world—all these, enlightenment, curiosity, delight, demand that the Museum shall become a teacher, an expounder, a camera. They demand from it speech and learning and illustration, philosophy and order and a deepened willingness to lead the daily run of men and women into avenues of beauty, into avenues of knowledge, into avenues of stimulating suggestion. They ask that it be a *conspectus* of things, such as embodies the *consensus* of modern scholarship.

To the great multitude which from circumstances of life, from neglect, from penury, from the hard fulfillment of material tasks, from lethargy, from congenital deficiency, or from whatever other cause in the wide prospect of contingency which besets us all, have not received the gift of education—to this multitude the great Museum comes with some sort of recompense for its denial. Great indeed! above college or university or pulpit or cathedral if from the mind of that multitude, thankful and patient, it dispells darkness and by the mere spectacle of art or nature or science, in its luminous thought-giving halls, pours upon them the light of recognition and of knowledge.

Yet the functions of a museum are far from exhausted when it has expended all its

available power to instruct and cultivate the people. It must minister to the needs of the investigator, stimulate his efforts and publish his results. The Smithsonian Institution of Washington, so far as it held for years undeveloped and poorly materialized the germ of the present National Museum, began its most beneficent career as an instrumentality of research. Its beneficial relations to the public as a curator of collections which it arranges, labels and displays appeared long subsequent to its office as a means of scientific investigation. In fact, in the new idea assuming more large and ambitious proportions each day, the museum in its wide relation to the world around it embodies the character of the collector, expositor or lecturer and the original investigator.

In character museums can be as various as the diverse fields of interest society or nature present. Art museums, in a modern sense, began with that of Cosmo de Medici in Florence, at the beginning of the sixteenth century, the Museum of the Uffizi. These rapidly multiplied and with their multiplication underwent specific differentiation. Museums arose devoted to the work of one man, as the Thorwaldsen Museum in Copenhagen, the Wiertz Museum at Brussels, the Donatello and Michel Angelo Museums in Florence. Museums of art became cabinets of curiosities, rarities, gems, handicraft, as the Cluny Museum in Paris, the Green Vaults at Dresden, the collection in the Tower of London, the Museum of the Hohenzollerns in Berlin, and that of the city of Paris, of all of which Dr. Goode says: "Such collections cannot be created. They grow in obedience to the action of natural law, just as a tree or a sponge may grow." Historical museums attach themselves naturally to the foregoing, and of these the list is long and intricate. Groups represent the histories of cities or provinces, as that of the Mark of

Brandenburg in Berlin, those of Paris, Antwerp, Brussels, local museums of antiquities, devoted to a country or race, or era, as the Etruscan Museums at Florence and Bologna, the Cairo, the Constantinople and Athens museums; and yet others perpetuate the lives and achievements of great men, as the Dante Museum in Florence, the Goethe Museum in Weimar, the Beethoven Museum in Bonn, while picture galleries devoted to the works of artists, the ramifications of dynasty or family, the miscellanies and relics of governors, generals, statesmen, enmeshed within the historical associations of one period, form still other classes, as the collection in Old South Church, Boston, the Kunst historisches Museum in Vienna, illustrating the history of the Hapsburg, and the Musée Historique de Versailles.

The museum of science is that form of the museum which now engrossingly attracts notice, because this is the moment of its highest development, and because science, ceaselessly advancing with all the abetting impulses of exploration at its command, is penetrating everywhere, and before the solvent powers of its touch and its genius the world, the universe and even the life of man fall into orderly and necessary arrays of evolutionary stages. Science is the enduring sensation of our day. The scientific museum embodies, when perfectly realized, when meeting its ideal requirements, the incarnation of the scientific mind, that mind, at its best, inexorably calm and of almost incalculable vision.

The Scientific Museum, if I may venture an epigram, is the expression of the Aristotelian mind. To the Stagyrite, in his classifying instinct, his analytical sagacity, so prophetic of the modern spirit, the Museum was doubtless a distinct idea. It would seem, conscious as we are of the vivid insight of the Aristotelian brain and its wise

reliance on accumulation and comparison, that we might fix the rise of the scientific museum concept in his time, in his thought. It was, indeed, the triumphs of Alexander that awakened a profound movement of questioning in the culture of Athens. The new worlds, abounding in strange unheard of, unimagined phenomena, with their breadth of climate, novelty of scenery, peculiarities of race, plants and animals, which Alexander revealed, startled the innovating fancy of Greece with peculiar interest. Humboldt, in his colossal grasp of all the aspects of our planet, has written of these events: "The extension of the sphere of new ideas was owing to the magnitude of the space made known, and to the variety of climates manifested, from Cyropolis on the Jaxartes (in the latitude of Tiflis and Rome), to the eastern delta of the Indus at Tira, under the Tropic of Cancer. To these we may further add the wonderful diversity in the configuration of the country, which alternated in luxurious and fruitful districts, in arid plains and snow-crowned mountain ranges, the novelty and gigantic size of animal and vegetable forms, the aspect and geographical distribution of races of men of various color. \* \* \* In no age, excepting only the epoch of the discovery and opening of tropical America, eighteen centuries and a-half later, has there been revealed, at one time and to one race, a richer field of new views of nature or a greater mass of materials for laying the foundation of a physical knowledge of the earth and of comparative ethnological science." Again, this sublime philosopher designates some scientific results of Alexander's conquests in these words: "Besides the knowledge of products which soon became objects of universal commerce and many of which were transported by the Seleucidæ to Arabia, the aspect of a richly embellished tropical nature speedily yielded the Greeks enjoyments of another

kind. The gigantic forms of hitherto unknown animals and plants filled their imagination with the most exciting images. Writers, whose dry scientific style is usually devoid of all animation, became poetic when they described the characteristics of animals, as, for instance, elephants, or when they spoke of the height of trees whose summits cannot be reached by the arrow in its flight and whose leaves are larger than the shields of the infantry; of 'the bamboo, a light feathery tree-like grass,' 'each of whose jointed parts (internodia) may serve for a many-oared keel;' or of the Indian fig-tree that takes root by its branches and whose stem has a diameter of twenty-eight feet, and which, as Onesicritus remarked, with much truth to nature, forms 'a leafy canopy similar to a tent, supported by numerous pillars.' "

Those splendid accessions to the knowledge of Greek students, with their probable accompaniments of collections, might naturally have developed the museum idea in Alexander's friend Aristotle, the immortal type of the spirit of research. Professor Flower has alluded to the probable beginnings of museum collections in the "preservation of remarkable specimens, sometimes associated with superstitious veneration, sometimes with strange legendary stories, in the buildings devoted to religious worship. The skin of the gorillas brought by the navigator Hanno from the West Coast of Africa, and hung up in the temple at Carthage, affords a well-known instance."

When learning revived; when, to use the exquisite language of Pater, "the desire for a more liberal and comely way of conceiving life, make themselves felt, prompting those who experience this desire to seek first one and then another means of intellectual or imaginative enjoyment, and directing them not merely to the discovery of old and forgotten sources of this enjoyment, but to divine new sources of it, new

experiences, new subjects of poetry, new forms of art"—then sprang up, too, with the new evidences of mental regeneration the desire of keeping together beautiful and curious things.

Naturally, the first developments were in the nature of collections of art, the bringing together in groups sculpture and paintings and antiquities. Since the revival of learning began with the passionate devotion to classical literature the rich and learned turned with an appropriate ardor to all that could be obtained in that buried field of emotion, grace and eloquence. And since the art of the pagan, as Taine urges, brought the revivifying breath that made Christian art beautiful and manifold, creative and cosmopolitan, so the ancient things of Greece and Rome were enviously gathered. Books and libraries and statues in museums were rapidly accumulated. It was a liberal prince, a rich merchant, a trading monarch, a distinguished physician, or the egotism as well as the enlightenment of a noble, that started the first growth of museums. Stones, gems, shells, fish and animals quickly assumed places in museum collections, and the long hidden instinct of natural study hastened hither and thither on land and sea the zealous and wondering collectors. Once started, the flame of desire spread quickly, and, everywhere fed by the oil of rivalry, men and women in high or in influential stations collected and collected and collected, turning their homes into storehouses of curiosities and maddening arrays of impossible associations. This very incongruity stimulated further efforts at an extravagant amplitude of contents and only as time passed on was a separation effected by which the provinces of Natural History and Art proper secured mutual independence. We can clearly realize the effectual assertion of temperament in such collections; how one man or woman with an in-born and now indulged love of nature col-

lected the objects of nature alone, and another the beautiful or industrial products of man. So drawing apart by a mutual repulsion the Museums of Natural History became separated from those of Art, and the fantastic combinations of a statue sprouting from a galaxy of shells or paintings alternating with fish skeletons and minerals or a bronze medallion encircled with bird's feathers happily disappeared.

The earliest museums were all private affairs prepared with some relevancy to the owner's tastes or the prevailing fashion of collectors. It was much later that clusters of individuals organized as societies made the building up of a Museum a part of their duty. Samuel Quickelberg, of Amsterdam, a physician, published at Munich in 1565 one of the first printed catalogues of such a museum; also at the same time Conrad Gesner described the cabinet of Johann Kentmann, a physician of Torgau, in Saxony, which consisted of 'minerals, shells and marine animals.'

Amongst the whimsicalities connected with this subject, the following extract from Professor Flower's address before the British Association for the Advancement of Science in 1889 fully reveals their amusing character. Professor Flower has brought to light an entertaining specimen page of a catalogue compiled by the two Tradescants, father and son, in 1656 and entitled 'Museum Tradescantium; or a Collection of Rarities preserved at South Lambert near London;' item, 'Some Kindes of Birds their Egges, Beaks, Feathers, Clawes and Spurres; Divers sorts of Egges from Turkie, one given for a Dragon's Egge; Easter Egges of the Patriarch of Jerusalem; Two Feathers of the Phoenix Tayle; The Claw of the bird Rock, who, as Authors report, is able to trusse an Elephant; Dodar from the Island Mauritius; it is not able to fly being so big;' Again 'Garments, Vestures, Habits, and Ornaments,' again 'Mechanick,

Artificial Workes in Carvings, Turnings, Sowings, and Paintings,' wherein we find the 'Pohatan, King of Virginia's habit, all embroidered with shells or Roanoke,' and the 'Cherry-stone upon one side S. George and the Dragon perfectly cut, and on the other side 88 Emperours' faces,' and yet another 'cherry-stone, holding ten dozen tortoise-shell combs made by Edward Gibbons.'

To-day the Museum of Science stands or ought to stand as the representative expression of the progress of science. Its possible dimensions are difficult to overestimate, for its proportions should be correlated with, and reflective of, all that learning thinks and nature shows in the vast provinces of creation. It is, I think, with supreme justice that Professor Flower boldly asserts that "it has only been the difficulties, real or imaginary, in illustrating them which have excluded such subjects as astronomy, physics, chemistry and physiology from occupying departments in our National Natural History Museum; while allowing the introduction of their sister sciences, mineralogy, geology, botany and zoology."

But it can also be profitably remembered that the maintenance of any stupendous accumulation of material, and its associated activities in lectures, publications and keepers involves gigantic expenditures not to be always well distributed or wisely administered. Therefore for very practical reasons the experimental sciences are not represented in our museums, withdrawing by a natural refinement of sympathy to schools of science, colleges, and special institutes, and the museum of natural history more distinctively presents to the public the manifestations of life, even of mind, and the inorganic elements and their combinations.

I have said that the museum exercises three functions, that of the collector, the

lecturer or expounder and the investigator. These three present the rounded outline of its attitude to the visitor, the pupil and the scientist. Let us examine these aspects of its nature and economy.

#### THE MUSEUM AS A COLLECTOR.

The museum furnishes the most substantial guarantee against the loss or scattering of valuable specimens. It naturally induces the deposit of private collections. It becomes in a short time the refuge of all sorts of cabinets, and, from the mutations of circumstances in private fortunes, it stands in the field as a desirable purchaser of private treasures. So initially in the ordinary development of the museum the collections come first. The British Museum, which now stands preëminent as the most complete embodiment of the museum idea, began its career with such a nucleus in the Cottonian manuscripts, coins, medals and antiquities, the Arundel and Harleian manuscripts, and the Sloane collection of natural history, antiquities and books. The National Museum of the United States, which developed within the franchises and purposes of the Smithsonian Institution, came into material objectivity with the collections, mostly minerals, of Smithson himself, to which ensuing years brought large additions from the Pacific Exploring Expedition, Perry's Expedition to Japan, the Pacific Railroad Survey, the Mexican Boundary Survey, the Surveys of the Army Engineer Corps and the Centennial Exhibition of 1876.

The Field Museum of Chicago sprang into sudden prominence from its huge heritage or acquisition of the dismembered sections and débris of the Chicago Fair, and our own American Museum of Natural History virtually was born when it was welcomed to Central Park by Commissioner Green, and deposited its collections in the old arsenal at 64th Street and Fifth Avenue in 1869.

Those walls, which had reverberated to the martial grounding of arms in 1863, when riot held the throat of New York in its bloody fist, then witnessed a more peaceful invasion of birds and beasts, a silent procession, from whose mute forms, as named and classified, flow the tranquillizing influences of study.

The museum should also profitably invite to itself the numerous men who have, by accident or exploration, come into possession of beautiful or instructive objects. It centralizes the divergent impulses of discovery and brings into substantial importance the trader and dealer in natural productions. It is a sea of reception into which pour from all levels of observation the specimens which illustrate faunas and and floras and natural resources, mineral wonders and curiosities. The purchase of new objects, indeed the admission of new material, must be guided by the best professional advice, professional advice also that is known to be regulated by disinterested motives. No material should be secured which simply duplicates matter already on exhibition for the meretricious reason of its *slightly* greater elegance or splendor. Fundamentally museums as collectors are to instruct, though the æsthetic sense, of course, need not, on that account, be blunted or suppressed. Indeed, it is true that the most perfect things in nature are often the most instructive, and, at any rate, exhibits should challenge attention by their average superficial beauty. So much is to be bought and so much expended in all directions that money is wasted by buying what is already in evidence.

The line of development in a natural history museum cannot always be evenly maintained in all departments. When Zoology, Geology, Mineralogy, Ethnology and Botany are located under the same roof with interests enthusiastically defended by as many groups of curators there is inevi-

table collision, and the provident direction of all is a task demanding a wise sense of discrimination and responsibility, as well as a rather judicial indifference to special pleading and selfish aggrandizement.

But while the collection of specimens can be regulated by ordinary experience and skill, the exhibition of specimens demands an order of analytical sagacity and sympathetic insight not ordinarily possessed. Dr. Goode, in his famous epigram, declared that a museum was a collection of labels illustrated by specimens. This is not to be interpreted that a museum is to become a hall of signs. But it does mean that there shall be nothing left to surmise or guesses, but everything shall be named, and a further extension of its meaning implies that the combination of labels and objects shall be educational. The function of the museum as a collector encloses its function of so selecting and arranging objects as to educate. The selection of such objects as present a development or illustrate conditions, stages of growth, environment, supplementary associations, climate, position, form a visual lesson, become encyclopædic, and leave a deposit of impressions which express the science of the subject.

Let us take two concrete examples: A collection of shells can be minutely labelled and laboriously displayed, but how little does a scientific label, with the name of a genus and a species, tell the ordinary visitor! It supplies only an additional means of mental confusion. But let a group of shells be represented by a few well-selected and graded specimens showing stages of growth; let a general label explain their general characters, affinities and possibly uses; let a map show in colored areas their distribution, while a few prints, photographs or drawings represent the regions in which the shell lives, the appearance of the animal alive, with a possible dissection, and without going further the whole section be-

comes vitalized, and a living impression, measurably perfect and permanent, has been produced. Such a method of exhibition evokes the nascent properties of the young naturalist, while it holds the agreeable attention of the plainest visitor. James Whittaker, of Oldham, was 'a hand' in a cotton mill, who from hearing some one say, as he picked up a piece of coal shale, that there was a fish scale in it, was led to collect coal plants and reduce them to thin films by rubbing them down on the kitchen floor so as to reveal their minute structure. And this man's collection afterwards was used by Professor W. C. Williamson in his memoirs on coal plants published by the Royal Society. This story illustrates the supreme consequences of a suggestion. How wonderfully suggestive and stimulating may a museum collection become to congenial minds! Of course, in the case of Whittaker, as of Edwards, his Scotch analogue, the inborn tendency might have spontaneously, sooner or later, pushed their minds into such lines of study and research, but the dormant flame would have been in all cases more quickly kindled in the presence of a thoughtfully arranged exhibit. Such exhibits are mute pedagogics.

Again, a collection of minerals fails to express the ideas and lessons of mineralogy if it is a formally arranged succession of ticketed and labelled specimens. Mineralogy admits of a many-sided installation. It would be advantageous to display minerals in reference to their history, their crystallization and physical properties, their distribution and their specific multiplicity and characters. Usually the latter method alone is used, and then it frequently takes the form of a succession of specimens rather niggardly labelled. Primarily, it would seem that the object of a collection is to lay open the scientific aspects of the subject with some suggestions, introduced wisely



and with a proper sense of restraint, of the elaborations of the science.

Mineralogy offers a field of attractive experiment and has in some museums reached stages of taxonomic complexity. The history of minerals might very properly form the introductory stage with examples of ancient nomenclature: that followed by Theophrastus, Aristotle, Dioscorides and Pliny; then the later and mediæval period with reference to the lucubrations of Marbodus, Albertus Magnus and Agricola; and then the crystallographic systemic period of Jamitzer, Steno, Bergman, Rome de Lisle, Haüy, Bernhardt, Weiss, Mohs, Newman, Whewell, Miller. Following this as a logical pendent would come an exhibit of crystals with an anatomical analysis of their parts, somewhat as Professor Crosby has devised in the Museum of the Boston Society of Natural History. The physical properties, color, lustre, hardness, refraction, fluorescence, fusibility of minerals and illustrations of optical principles would be incorporated in this section. Finally, their distribution, which, under lithological and economic supervision, would show the occurrence of the silicates, crystalline schists, marbles, limestones, elastics, eruptives, and the zones and centers of deposit of the useful or valuable ores, all illuminated by diagrams, maps and photographs. Then would follow the mineral cabinet, a display of expressive and beautiful specimens, subordinated to a chemical system, in which the design so well illustrated by Professor Egleston, in the cabinet of the School of Mines, of showing the varieties of a mineral, often so extreme and perplexing, would receive complete vindication. It seems impossible that a conspectus of minerals, arranged upon so wide and exhaustive and illuminative a plan, would not leave the attentive mind notably strengthened and informed. Similarly, in the various departments of zoology the most at-

tractive and intelligent development of visual instruction could be followed with most fascinating and novel results. In geology, of which it has been lately remarked by Professor A. Geikie with relation to the extraordinary vitality of that science in the United States that "surveys, professorships, museums, societies, journals in almost every State are the outward embodiment of the geological zeal that appears to animate the whole community;" in geology the scheme of historical development might also be partially followed, while an elaboration in diagrams, photographs and descriptions of the morphology and significance of the groups of fossils should take precedence of an endless display of species. In large and capacious halls the systematic and the explanatory methods might both be utilized and combined. And, finally, in this connection, there seems a fascinating propriety in making a museum also a gallery of biography; the faces and some short sketch of their lives of the great investigators and systematists would seem appropriately placed amidst the teeming results and facts their genius and industry have produced and discovered.

The mechanical details of exhibition require all the charm, convenience, and even beauty, which the resources of the institution permit, and especially, should all architectural construction bend subserviently to the underlying necessity in every museum, the best illumination. Light, bathing everything with luminous clearness, is the very symbol of the museum purpose.

L. P. GRATACAP.

AMERICAN MUSEUM OF NATURAL HISTORY.

(To be Concluded.)

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ANTHROPOLOGICAL EXHIBIT OF THE U. S.  
NATIONAL MUSEUM AT THE  
OMAHA EXPOSITION.

THE frequency with which the National Museum has been called upon to prepare