

DISCOURSE,  
ON  
THE OBJECTS AND IMPORTANCE  
OF  
THE NATIONAL INSTITUTION  
FOR THE  
PROMOTION OF SCIENCE,

ESTABLISHED AT WASHINGTON, 1840,

DELIVERED AT THE FIRST ANNIVERSARY.

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BY JOEL R. POINSETT,

SECRETARY OF WAR AND SENIOR DIRECTOR OF THE INSTITUTION.

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Washington:  
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1841.

## CORRESPONDENCE.

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WASHINGTON, *January 5, 1841.*

SIR: The undersigned Committee, appointed to make arrangements for the Annual Meeting of the National Institution for the Promotion of Science, and the delivery of an Address upon the occasion, in common with the large and highly respectable auditory who attended the delivery of your Discourse, on the 4th instant, have received the highest gratification from the able manner in which the duty assigned to you by the Society was performed.

Believing that no better mode of making known the objects of this Institution can be adopted than by the publication of your excellent Discourse, we pray that you will yield to our wish, by placing it at the disposal of the Institution for that purpose.

In expressing to you the highly intellectual gratification we derived from the delivery of your Address, we take the occasion to offer to you, in behalf of the Society and for ourselves, our warmest thanks for the service which, on this occasion, you have so ably rendered to the interests of the Institution.

We are, Sir, with great respect, your obedient servants,

ALEX. MACOMB,	ROBT LAWRENCE,
N. TOWSON,	JNO. M. WYSE,
W. W. SEATON,	JNO. T. COCHRANE.
PETER FORCE,	

To Hon. JOEL R. POINSETT.

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WASHINGTON, *January 6, 1841.*

GENTLEMEN: I have the honor to acknowledge the receipt of your communication of the 5th instant, requesting a copy of the Discourse delivered before the National Institution for the Promotion of Science, on its annual meeting.

In acceding to your request, which I do very cheerfully, I beg leave to express my grateful acknowledgments for the indulgent and very flattering terms in which it is conveyed, and to assure you, that it will be a source of great gratification to me to have, in any manner, contributed to the success of the National Institution for the Promotion of Science.

I have the honor to be, Gentlemen, respectfully, your obedient servant,  
J. R. POINSETT.

Gen. A. MACOMB,	ROBERT LAWRENCE,
Gen. N. TOWSON,	JOHN M. WYSE,
W. W. SEATON,	JOHN T. COCHRANE, Esqs.,
PETER FORCE,	<i>Committee.</i>

## DISCOURSE.

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THE duty assigned me on this occasion is of such a character that I regret it has not devolved on some one more capable of performing it. To do justice to the subject requires more knowledge than I possess, and more leisure than I now enjoy; and I feel constrained to solicit your indulgence, while I explain the origin of the Institution for the Promotion of Science and the Useful Arts, and attempt to describe, as plainly and briefly as the subject will permit, its objects and importance.

The lovers of science, literature, and the fine arts, residing in this District, felt sensibly the absence of those resources which are found elsewhere, and are necessary for the attainment of knowledge. They were mortified to perceive that the great advantages possessed by the public authorities at Washington were neglected, and that, at the seat of Government of this great nation, there existed fewer means than in any other city of the Union of prosecuting those studies, which, while they impart dignity and enjoyment to existence, lead to the most useful practical results. They believed it to be their duty to arouse the attention of Government to these deficiencies, and, at all events, to address them-



selves to the task of supplying them, as far as could be done by their individual and combined exertions. For these purposes they have formed an association, and applied themselves to collect specimens of geology and mineralogy, and other objects of natural history, and, for the short period of its existence, the efforts of the Institution have been eminently successful. They have entered into correspondence with other learned societies, and have been encouraged to proceed by their approbation, and have profited by their generous coöperation. They have invited the assistance of their fellow-citizens in the most distant States and Territories, and hope, by their aid, to collect documents and facts illustrative of the early history of our country, specimens of its geology and of its mineral and vegetable productions, and, if not to preserve the animals and plants themselves, which are passing away before the progress of settlement and cultivation, at least to perpetuate their forms, and the memory of their existence. They hope to be able to illustrate these subjects and others connected with them by a series of gratuitous lectures, and entertain a confident expectation that numbers, whose duties compel them annually to assemble here, will view with interest collections of the natural productions of America, drawn from every State and Territory in the Union, and, becoming sensible of their utility, will contribute on their return to swell their amount, and to spread throughout the country a taste for literary and scientific pursuits.

The Institution for the Promotion of Science and the Useful Arts, will, as its name indicates, embrace every branch of knowledge; and its members, believing such

a combination essential to its success, have divided themselves into eight scientific classes, namely: Astronomy, Geography, and Natural Philosophy; Natural History; Geology and Mineralogy; Chemistry; the application of Science to the useful Arts; Agriculture; American History and Antiquities; and Literature and the Fine Arts. It is of these branches of science, and of some of their most important divisions, that it is my intention to treat, and to endeavor to explain their effect upon the physical, moral, and social condition of mankind.

During a long period the sciences were independent of each other in their progress. It was essential that facts should be discovered, carefully studied, well considered, analyzed, and classed, in order to obtain a knowledge of their causes and first principles, and, by that means, advance each science to a certain degree before their points of contact, the mutual assistance they afford, and the influence they exercise upon each other, could be fully understood. It is especially since the end of the last century that the progress of the human mind, in the study of the sciences, has so wonderfully developed their reciprocal relations—advantages due altogether to the alliance of the synthetic and analytic methods followed by Gallileo and his disciples, and systematized by Bacon. Thus it is that chemistry and natural philosophy have made such rapid progress. They cannot move forward one without the other; and they shed their light on physiology, on the arts and manufactures, and on every branch of natural history.

Not only do the sciences mutually aid each other, but the arts and sciences do so likewise. Some of the arts depend for their execution upon an intimate ac-



quaintance with the higher branches of science, if not in the workman, at least in the person who directs his operations; and there are important branches of science which could make no progress, if the philosopher who studies them had not found the arts sufficiently advanced to supply him with the instruments and apparatus of which he stands in need. It is especially to those arts which are susceptible of great perfection and exactness in their execution, that the sciences are most indebted. The brilliant discoveries in modern times in electricity, magnetism, optics and astronomy, and in chemistry, physiology, and natural history, would still have been in their infancy, if the arts had not provided the necessary astronomical and mathematical instruments, and the thousand ingenious inventions which furnish the philosophical apparatus of the scientific investigator.

The rapid and extraordinary improvements which the world has experienced, during the last half century, in commercial intercourse, in manufactures, and in all that contributes to civilization and to the comforts and conveniences of life, are due altogether to the application of science to useful purposes, and of the useful arts to the progress of science. In this march of intellect, so far as it leads to practical results, our country has kept pace with the most enlightened nations of the world, and, in many instances, the application of scientific principles to the most beneficial uses, has been effected by the ingenuity and great powers of combination of our own fellow-citizens. Every river valley, the shores of every inland sea, and the coasts of every ocean, are largely indebted for the advantages they now enjoy, to

the success of Fulton, in applying a well-known principle to the great purposes of navigation. Whatever may be the advantages which other nations have derived from this use of steam, (and they are doubtless great,) our own vast territories, watered as they are by noble rivers and extensive inland seas, received from it an impulse which advanced them centuries on their road to wealth and power. Labor-saving machinery, invented by our countrymen, is not only profitably employed at home, but is to be found in almost all the manufactories in Europe. But while the merit of fertile invention is accorded to us by all, we are reproached for not cultivating the principles on which these inventions themselves are based, and for neglecting some of the most important branches of science. M. De Tocqueville, who has so ably depicted our institutions, affects to consider America as being still a province of England, in this particular; and the absence of original efforts in literature, philosophy, and the fine arts, in our country, has led to the assertion, by others, that democracy is fatal to them; and that where its spirit spreads, they will take flight. Although these charges and assertions are much exaggerated, they cannot be altogether denied. It is, however, incorrect to attribute this to democracy, which, so far from being inimical to science, renders the mind independent in thought and action—invigorating and fitting it for any pursuit. The causes are to be found in the circumstances of the country, which compel men to enter early on the theatre of life: there is little leisure in youth for the acquisition of the exact sciences, and for men of more advanced age, the opportunities and means are too rarely



presented for the successful prosecution of such studies. The disposition is not wanting, and if we are behind Europe in the practice and knowledge of astronomy, geography, chemistry, geology, mineralogy, and all the branches of natural history, it is owing to the condition of our country, which requires all her sons to labor, and does not admit of a class of learned men of leisure; and in some measure, also, to the want of such an Institution as ours. For the success of these pursuits, a central establishment is essential, where the student from any part of our vast country, after passing through the usual course at college, if destined for a learned profession, may resort to receive instruction in the higher branches of science, and where he will find instruments, collections, books, and instructors, provided for his use, by the munificence of individuals or the patronage of his Government. And here I would remark, that some of these branches of knowledge, and the highest among them, cannot be cultivated and rendered extensively useful without the aid of Government. Astronomical observations, to be relied upon by the navigator, must derive a character of authenticity from the Government itself. Individuals may acquire a knowledge of the science, and possess the best books and instruments, and occupy themselves with this delightful pursuit: they may become good observers and make accurate calculations, but without the stamp of authenticity, which a Government alone can give them, navigators will not repose confidence in their tables. An observatory to be useful must be national; and it is a reproach to a people, second to none in commercial enterprise, and inferior to one only in the extent of their trade, to be

altogether dependent upon the calculations of others for the requisite tables to determine their position, and to trace their path on the ocean—to be obliged to borrow that knowledge, without which our fleets and trading vessels could not venture to lose sight of their own shores.

This Institution attaches the greatest importance to Astronomy. It stands in the first rank among the sciences, and may, indeed, be termed the only perfect science. It has contributed more than any other to the development of human knowledge, carrying along in its progress the physical and mathematical sciences, as well as contributing to the advancement of the mechanic arts, and, in this respect, acting as the pioneer of civilization. The science of astronomy has swept from the human mind the prejudices and terrors which were formerly inspired by eclipses and the appearance of comets; it has determined, with extraordinary precision, the duration of the day as an unit of time, and, counting from thence, the duration of the seasons to that of the solar year, and of the different revolutions of the celestial bodies; it furnishes to history the periods to regulate its calendar, and positive rules to fix the epochs of its chronology. Possessing the most complete knowledge of the dimensions of the solar system, it has reached such accuracy that it can determine at pleasure, and with perfect exactness, what has been the state of the Heavens at a given period in past ages, and what it will be in time to come. By this wonderful knowledge, the celebrated astronomical ephemerides are annually produced, by which the navigator finds the movements of the celestial bodies calculated for him



in anticipation, and by means of which he traces his course in the heavens, and directs his bark with safety towards the ocean's vast and uniform horizon.

When we reflect on the high degree of perfection to which astronomy has attained, the admirable theories which direct its practice, the numerous methods of calculation and observation it possesses, and the marvellous coincidence which exists between the results of the actual observation of phenomena with those announced beforehand, by means of these theories and methods, we are tempted to believe that this noble science has reached the utmost limit to which the genius of man can elevate it. So far, however, is this from being true, that at no period has the science been more vigorously pursued; at none were astronomers more numerous or more actively employed; and never have they united, in a higher degree, the power of genius with a profound knowledge of physics and mathematics, combined with ability in the use of the powerful instruments which the mechanic arts have placed in their hands.

The perfection to which I have described astronomy as having reached, relates only to the solar system—to that restricted space in the heavens occupied by the sun, the planets with their satellites, and the comets which visit it at distant epochs. The solar system comprises the celestial universe peculiar to the inhabitants of this world, and is but a point in the infinite space filled with myriads of shining bodies, the desire to comprehend which is so much the more exciting and ardent, as it elevates the mind to the contemplation of the divine origin of all these wondrous works. Science is now occupied with persevering ardor in this sublime

study. It seeks to avail itself of the perfect astronomy of the solar system to comprehend that of the whole starry firmament, and, from the known dimensions of the one, to measure the unknown dimensions of the other, in the same manner as from the dimensions of the terrestrial globe those of the solar system were discovered. The researches on the parallax of the fixed stars, which leads to a knowledge of their distance with regard to us; the measure of their own movements, and especially that of the motions of the solar system; the system of double and groups of stars, the mutual relations of which would seem to afford evidence of the existence of other solar systems; the study of nebulae; the changes which certain stars experience in the quantity of light which emanates from them; why stars, perfectly known and described in the astronomical catalogues, have disappeared from their places and been no more seen, while others have appeared in other parts of the heavens, where, if they had existed before, they could not fail to have been discovered; finally, what is the physical constitution of the universe, and what the universal law which governs it, are the mighty subjects now undergoing investigation—investigations which can be rendered successful, only by constant and precise observation of the phenomena of the heavens by means of the most powerful and exact instruments, aided by and kept on a level with the general progress of science and the arts, so that astronomical observations, profiting by an enlightened theory, may reach the highest possible degree of exactness.

The least civilized Governments have understood the necessity of prosecuting these investigations. Observa-



tions are making in every part of the world where human knowledge extends; and astronomy is fostered every where with that liberality and even magnificence which the grandeur and importance of the purpose demand. The labors of the astronomers of the present age are not sufficiently appreciated, because they are not seen and generally understood. They work, in the silence of the night, to produce results for future ages. It is only by successive comparisons, made at far distant epochs, of the state of the heavens, well observed and described, that the laws which govern the celestial universe will appear, as the changes produced by those laws operate on time and space. These labors will form a basis, a term of comparison for the future, as the labors of the ancients, although much more imperfect and limited, have served as the means of comparison for the astronomy of modern times. Less eclat, therefore, is awarded to this pursuit, and the public, dazzled by the frequent and brilliant discoveries in other branches of natural philosophy, does not do equal justice to those of the astronomer. The reason is, that the time has not yet arrived to bring to full light the fruits of their long and patient vigils; but at no epoch of history has astronomy, both theoretical and practical, counted among its votaries so many illustrious men, as since the commencement of the present century; at no period has the vault of heaven been explored with so much genius, profound knowledge, ability, and physical means, as at this day; and never has been commenced a monument to the glory of science and human intellect more sublime than that of which astronomy is now laying the foundation. Shall we not add one stone to this structure? Will we

expose ourselves to be denied our just title of a moral, religious, intelligent, and enlightened people, by refusing to inscribe the United States of America among the names of the civilized nations of the earth which will be found engraved upon the columns of this magnificent temple? Are we not a navigating and commercial people? Does not our flag float on every sea, and visit every accessible region of the world? And shall we not have our national observatory, our astronomical archives, and our celestial ephemeris? Shall we any longer leave our navigators exposed to the disgrace of acknowledging that, without the astronomical ephemerides published in Europe, they could not with safety navigate distant seas? I hope not. I believe it to be only necessary to point out to the intelligent people of this country the usefulness, not to say the necessity of such an establishment, for them immediately to appreciate the object, and, so far as the powers of the Government extend, to furnish the means to carry it into effect. I am aware that this has already been ably done in a report on the proper application of the Smithsonian bequest, presented to Congress, at its last session, by a gentleman with whom I am happy to be associated in promoting the progress of science. His long continued efforts to establish a national observatory will, I trust, be finally crowned with success, and I shall always reflect with satisfaction on having, on the first occasion that presented itself, seconded, however feebly, his liberal and enlightened views.

Second to astronomy in its importance to the wants and interests of navigation, and essential to those of commerce, is Geography; a science which equally re-



quires the fostering care of Government. In this respect it has been more fortunate than astronomy. The expedition of Lewis and Clark, undertaken by direction of Mr. Jefferson, and destined to explore the route across the Rocky Mountains to the Pacific Ocean, that of the brave and gallant Pike, and those under that enterprising officer and accomplished observer Long, still further to examine that portion of our territory; the coast survey which is now in progress under the learned and accurate Hassler; the exploration of the country lying between the Missouri and Mississippi rivers by that indefatigable and scientific traveller Nicollet; and the expedition under the command of Lieut. Wilkes, intended to explore unknown seas, to discover new sources of commercial enterprise, and to point out the dangers which beset the path of the navigator, while it sweeps from the charts those islands and shoals which have no existence, save in the imagination of former hydrographers; have been fitted out and supported by the Government, and have attracted the favorable notice of scientific men throughout the world. The Geographical Society of France speaks, by its President, of that expedition in the following term: "In calling your attention to the voyages round the world, and to other maritime enterprises which have, in our time, so largely contributed to the establishment and progress of geography, I have to observe, that it is no longer from our old Europe alone that these great expeditions set forth. The new world now rivals the old. The Government of the United States of America—of that nation which, in less than half a century, has taken a prominent station among the maritime pow-

ers—sends out, in its turn, an exploring expedition towards the Antarctic pole." There is every reason to hope that the results of this expedition will prove as useful and honorable to the nation as its conception was creditable to its authors. It is a remarkable fact, that three national expeditions on voyages of discovery and for purposes of science, were traversing the same ocean at the same period; the American and French squadrons being in sight of each other, in a stormy sea, on an unknown and ice-bound coast, and striving with each other for the honorable distinction of priority of discovery. We await with impatience the rich harvest of new scientific observation and physical facts which the return of our exploring squadron will bring us. Much, however, remains to be done for the advancement of geography in our country. The vast inland seas which form our northern boundary, covered as they are with vessels, and teeming with commerce, have never been explored by the hydrographer. The navigator sails over them with dread, for there exists no chart to warn him of the dangers he may encounter; and the works erected by Government along their shores for refuge in times of storm, are too incomplete to answer the purpose. As to the interior of our country little is known scientifically and accurately. It may be said that it is the province of the States to construct maps of their several territories. It may be so, but without some common centre, from whence uniform plans and instructions issue, State maps will be laid down upon different projections, and be wanting in astronomical accuracy. A map of the United States, to be useful, ought to be constructed upon an uniform plan, and under the



immediate direction of the scientific officers of the United States. Such a work is required by the best interests of the country. Its completion would develop the vast resources of our extensive possessions, enable the Government to comprehend all their relative advantages, and to open new avenues of commerce. It would aid the emigrant in his search after advantageous settlements, direct the merchant to the readiest route for the transportation of goods, teach the farmer where to seek a market for his produce, point out to the soldier whence to draw his supplies, the shortest lines of communication, and the best sites for encampment, or for the erection of permanent works of defence. In short, such a work would be eminently useful to all classes of our fellow-citizens, and contribute largely to the commerce and security, and to the rapid settlement and improvement of our country. All the Governments of Europe have been sensible of the importance of geographical knowledge, and trigonometrical surveys of every empire and kingdom are completed or in progress there. In those countries geography was first cultivated for warlike objects; their maps were originally military, and many of them are constructed with such minute accuracy, that armies may march and encamp, and sentinels be posted, with no other knowledge of the country than such maps afford. With their aid alone positions are chosen, and all the chances of war calculated in the closet as on a chess-board. By their means the statesman can determine on the expediency of opening a canal or of constructing a road, and becomes possessed of a perfect knowledge of the climate, the structure, and the physical resources of the country, the

interests of which it is his duty to watch over and promote. We are without any of these advantages; our maps are so inaccurate, that large amounts are sometimes wasted in attempting to construct roads and canals which are found to be impracticable, or which lead to no beneficial results when executed. So important is this branch of science considered, that the Governments of Europe have depôts of maps from the earliest ages, and that of France, especially, possesses an extensive collection, beginning at the thirteenth century. Societies, too, exist in their principal cities, who aid the Government, by preparing instructions for expeditions, whether for purposes of science or exploration, themselves giving premiums for maps and charts, and fitting travellers out at their own expense, and sending them to explore unknown regions. In short, these institutions spare no pains to encourage and promote the ends of science, and their success has been equal to their zeal.

Intimately connected with geography, and, indeed, forming a part of it until it was lately erected into a separate science, is Ethnography. It consists of the knowledge of the habits, manners, and customs of the different nations of the earth. Their food, their dress, their festivals, marriages, and funerals; the education of their children; the rank their women hold in society, by which the degree of civilization is so clearly defined; the division of labor among them; their mode of living, whether by hunting, fishing, or agriculture; their traditions, laws and manufactures, and other analogous subjects, make up this important branch of science.



Philology, regarded in itself as a science, is likewise a branch of geography. Although its chief object is, from the variety of languages which exist on the surface of the earth, to trace the history of mankind, it tends greatly to facilitate the commercial intercourse of the world. It is only within the present century that the various idioms of nations, not possessed of the art of writing, have been seriously investigated; but great progress has been made in the acquisition of this knowledge within that period, and not only vocabularies, but dictionaries and grammars have been published, of languages hitherto unknown except by name. Formerly, missionaries and traders alone paid attention to the languages of savage nations. The former, having in view only their own laudable objects, kept their works in manuscript; the latter confined themselves to a few meagre vocabularies, dispersed through books of travels, and of little use to the philologist. At length "the comparative science of languages" was instituted, and the philologists and learned societies of the United States have contributed their share to the promotion of this science, by making known the forms and character of our Indian languages.

The student of geography requires likewise to be well acquainted with meteorology and terrestrial magnetism, the configuration of the earth, the distribution of heat, the movement of the waters of the ocean, the geological structure of the soil, and the geography of plants and animals, and to all these subjects the attention of the Institution ought to be directed.

It was proposed at the last session of Congress to establish magnetic stations, and to institute a series

of corresponding observations in the United States. Permanent stations for this end have been established by nearly all civilized nations; and not only have they been extended into Asia, Africa, and America, but expeditions have been undertaken to the Antarctic seas, for the purpose of pursuing these researches. Our exploring squadron was likewise furnished with the necessary instruments, and our officers instructed to avail themselves of every opportunity to make magnetic observations, while similar and corresponding observations were directed, and have been carried on, at Boston and at Washington.

We trust that the Government of the United States will not withhold its further coöperation, but will enable some of its officers to carry out the views of the learned societies throughout the world, and give its aid to the efforts now universally making to determine, with precision, the laws of terrestrial magnetism.

The enjoyment afforded by the study of Natural History is exhibited in the zeal with which the naturalist pursues his investigations. Poverty presents no obstacle, and distance sets no bounds to his pursuits. Pestilential climates and the savage wilderness amidst the glare of equatorial suns and the gloom of polar nights, are eagerly sought and explored as fields of new discovery. Toil, exposure, and physical ills in every form, are endured without a murmur, when engaged in examining the riches of nature, and when each step leads to a new and high enjoyment. The pure and intellectual gratification afforded by pursuits which tend to the progressive development of the wonders and beauties of the physical world, would seem to warrant the conclusion



that it is one of the purposes for which our faculties were imparted to us.

There are persons who entertain the opinion that the study of natural history is only an amusement, or the gratification of an useless curiosity. If they were to examine the subject more carefully, they would perceive that natural history is the basis of domestic and public economy, and that it contributes essentially to the prosperity of families and the wealth of nations, by the resources which its productions offer to agriculture, to commerce, to the arts, to manufactures, and to all the wants of life—that it is to the study of natural history that civilized man is indebted for the use and enjoyment of the best races of domestic animals, the abundance of his food, the variety of his drinks, the comfort and warmth of his clothing, the beauty and solidity of his furniture, the remedies which restore him to health, the metals which multiply his force and contribute to his defence, and for most of the luxuries and enjoyments of his existence. Cuvier, than whom no one was better able to give a correct opinion upon the advantages of this study, says: "The habit acquired in the study of natural history, of mental classification of a great number of ideas, is one of the greatest advantages of this science. It teaches method which may be applied to all other studies. He who has cultivated this science merely for amusement, is surprised at the facility it affords him in disentangling the most difficult affairs. It is," he goes on to say, "sufficiently extensive to satisfy the most powerful, and sufficiently varied and interesting to calm the most agitated mind. It sheds consolation in the bosom of the unhappy, and stills the angry waves of passion."

Natural history, agriculture, commerce, and the useful arts, go hand in hand; wherever the first is encouraged, the other branches, which depend much upon it for their support, will flourish; but wherever it is neglected or lightly regarded, the other branches languish and lose their value. How many substances of rare materials grow throughout this vast region which are unknown in the United States, but which might become articles of extended commerce, if every State in the Union would seriously set to work to explore its resources in the three great kingdoms of nature.

It is true that some of the States have set the example of geological surveys, and have made collections of mineral and geological specimens; but what, for the most part, has become of these collections? They are dispersed where neither the Government nor the people generally can make use of them. For the promotion of science and the useful arts, we require a central institution, in which all the natural productions of this vast territory may be exposed to public view, for the benefit of the people, and which may contribute to the advancement of the sciences, by affording the means of comparison with natural and analogous productions of other parts of the world.

Zoology presents a subject of more varied interest than any other branch of natural history. To be well acquainted with it, requires that the student should be versed in several other branches of science. He ought to possess a knowledge of human and comparative anatomy, and of chemistry, physiology, and geology, in order that he may understand the subject of fossil remains and the formations in which they are found.



In the early ages zoology was forced upon the consideration of man by his exposed condition and his wants. He was compelled to defend himself against ferocious beasts of prey; to domesticate the most docile and intelligent animals to aid him in his labors, and to hunt and destroy others for food and raiment. For these purposes he had to study the habits of beasts, birds, and fishes, and investigations, originating in necessity, gradually extended into a science. This study furnishes one of the most useful and instructive occupations for the mind.

Every branch of this science is of the highest interest, from the zoophytes, the lowest order of animated creation, to the vertebrated animals, including man, the highest of the works of the Creator. The study of the physical structure and moral development of man is most curious and instructive, whether we trace him from the simple child of the forest to the perfection of his species, which he has reached by the cultivation of the arts of life and by the light of religion; whether we regard the circumstances which, in some situations, confine him to the hunter, or to the pastoral state, while, in others, they permit the full development of all his faculties as an agriculturist; or whether we contemplate the varieties of the species, from the Caucasian, from which we claim descent, to the American, the Mongolian, or the African. The uses of these studies, independently of the enjoyment their pursuit affords, are to be found in ministering to the wants and pleasures of man, and in prolonging his existence; for it cannot be doubted that the investigation of the comparative anatomy of inferior animals has contributed to a more perfect know-

ledge of the human frame, and to essential improvements in the medical art.

It is to the study of the zoology of America that the efforts of the Institution ought to be chiefly directed. No other country presents greater or more interesting varieties in the animal creation, and none more abounds in fossil remains. Many of the former are fast fading away before the hunters and trappers, who pursue them for food or for furs; and their extinction will solve the important problem, whether the hunter tribes can become purely agricultural, and maintain themselves by the sweat of their brow. The red man of our forests and the hunter tribes of South America, are, as far as I have been able to observe, different from the agricultural Indians that inhabit Mexico, Peru and Chile. The former are the descendants of uncivilized men, hunters like themselves, and whether they are susceptible of the moral culture of the agricultural race, remains yet in doubt; the latter, on the contrary, have tilled the earth, and subsisted on the product of their labor from time immemorial. Physically and morally these two classes have always appeared to me widely different, and I have doubted their having a common origin. The aborigines of Mexico, Peru, and Chile, were found by their European conquerors in a high state of civilization. In their knowledge of the useful arts, except the art of war, they equalled their invaders, and their agriculture was carried to great perfection, for Indian remains of extensive works of irrigation are still to be found in those territories. There exists evidence, likewise, of their having been inhabited, for centuries before the conquest, by a race still more highly advanced



in the arts of life; and even within our own limits, the tumuli of the West denote the existence in that country, at one period, of a superior race to that which the first white settlers found there. These are subjects which it is expected will engage the attention of the Institution, the examination of which cannot fail to shed light on our early history.

Geology assumes in this country a greater interest than elsewhere, from the vastness of the region, from the great extent of its contiguous formation, and from its being a comparatively unexplored field for scientific investigation. It is important to ascertain whether this portion of the world has, like that already examined, been subjected in its creation to great general rules of construction, or, if that order has been departed from, to know in what particulars. Such investigations have already been carried to some extent, but the results are not universally known; and the geologist cannot ascertain, with any precision, the laws which govern the formations of this portion of the earth, and the relative order of their distribution, without some central place where specimens may be deposited, facts reported, and all necessary information obtained. Sensible of the advantages to be derived from conferring together to compare facts and mutually to correct theories, the geologists of the United States lately assembled at Philadelphia, and separated, it is understood, with the intention of meeting annually. Wherever such combinations exist, they have produced the most beneficial results; and the existence of a museum of natural history here, will render

Washington the most desirable place of meeting for the scientific associations of the Union.

The great importance of geology is derived from its usefulness. There is scarcely a vocation in life which will not feel the value of and derive benefit from a competent knowledge of the geological structure of the earth. It will teach the miner to distinguish between deposits which are rich and such as are sterile in ores; in what manner they vary in different formations, as well as the varieties and peculiarities of the metals each produces; which are the most easily worked, and which furnish their own fluxes; where, from certain indications, the mineral vein may be pursued with every probability of success, and where its farther pursuit would result in disappointment, and waste of labor and capital. In short, the study of geology opens, as it were, the interior of the earth to the miner, and enables him to predict with great probability, if not with absolute certainty, the existence or absence of valuable minerals beneath the surface. This knowledge is important in this country to all classes; for emigrants, whether farmers or mechanics, are interested in being able to select localities in the neighborhood of veins or fields of coal, which the geologist can ascertain by unfailing indications, and on the existence of which, in some situations, the comfort of our people so much depends. Fortunately for us, they are vast and accessible, beyond all precedent in the old world, and form an element of the wealth and power of the United States.

To the civil engineer this study is of the highest



importance. It will enable him to point out localities where the best building materials are to be sought; to direct lines of communication, so that they may run near the requisite materials, and avoid difficulties which might prove costly to overcome, as well as to bring these communications within a convenient distance of formations yielding materials of profitable trade, such as coal, iron, and other useful metals, and mineral manures.

The agriculturist will find, in a knowledge of geology, the means of ameliorating and increasing the products of the soil, by enabling him to discover the existence of accessible beds of the mineral manures which produce such lasting and beneficial effects when applied to the soil.

Indeed, the knowledge of geology contributes, in an essential degree, to all the useful arts; and it is obvious that collections of geological and mineralogical specimens, brought from every part of our country and rendered generally accessible to the people of the United States, being exhibited at the seat of Government, will tend to the advancement of knowledge, and its diffusion among our fellow-citizens.

The reciprocal relations which exist between the several branches of science are, perhaps, more strongly exemplified in that of geology than in any other. This science makes every day large exertions upon other branches, compensating them, however, by its discoveries within and its enlargement of their respective circles. It calls upon the comparative anatomist to give the domain, the habits, the

epoch of the nondescript skeleton. Did it inhabit the sea or the land? Was it carnivorous or herbivorous? It calls upon the botanist, in return for the trees and plants which it discovers and brings to the surface, to say what soil gave them root and nourishment, and in what climate they existed. It fills the cabinet of the conchologist with disinterred treasures, the models of extinct reigns, and calls upon him to give them date and sequence. Indeed, it can scarcely be described as one science, so numerous are the problems presented by it which demand the most minute knowledge of the tributary branches of conchology, zoology, botany, hydrography, mineralogy, and general physics.

Among the numerous sciences which geology puts under contribution, none bear a more intimate relation to it than Mineralogy. Geology deals with masses; but it is by the aid of mineralogy that the simple elements of these masses are unfolded, and their various constitutions identified. Geology teaches us that a certain mountain ridge is composed of granite; mineralogy informs us that granite is a compound of quartz, feldspar, and mica. When the geologist describes the strata forming the solid crust of the earth, the dykes by which they are fractured, and the mineral veins dispersed among them, he uses terms devised by the mineralogist to indicate their differences of character and condition. Geology extends its vision over almost illimitable space; mineralogy examines every substance with a microscopic eye. Geology tends to extensive generalization; mineralogy to minute specification. What the



geologist finds constituting the mountains, hills, valleys, and plains of the entire earth, the mineralogist has before him, within the narrow compass of his own cabinet. Thus, although apparently separate, these sciences have a close affinity to each other.

As sciences, mineralogy and geology are both of modern origin. They date from the latter half of the last century, and, although so young, have already assumed their position among the most exalted of older origin, and are deemed equally worthy to occupy the attention of the profoundest minds. From the days of Werner, (1773,) mineralogy has advanced rapidly, and is now generally and deservedly a popular study. In most of the leading institutions in this and other countries, it constitutes a portion of the regular course of instruction; collections are distributed over our own country, and many private citizens exhibit great zeal in this pursuit. To the arts and manufactures mineralogy contributes many necessary and useful materials. The painter owes to it many of his pigments; the dyer many of his colors; the jeweller looks to it for the discovery of his most precious gems; the chemist for many of his compounds; the mason for his cements. The smelter learns through it to detect his ores, the potter his clays, and the architect would often have saved himself the chagrin of seeing his finest works passing into premature and hopeless decay, had he been guided by it in the selection of his materials of construction.

There is still something wanting to give to the science of mineralogy that further practical useful-

ness for which it is so well adapted, and which, in this country, is so much needed. Within the territory of the United States, almost every variety of mineral, useful or necessary to the wants of man, is found in greater or less abundance. In our southern States, gold; in our western, copper, lead, and zinc; and almost in all, iron and coal, in inexhaustible quantities. Chrome, bismuth, antimony, manganese, cobalt, and many others, are known to exist, and perhaps further investigation will add platina, tin, and silver. But little has yet been done to avail ourselves of these productions. Mining, as a profession, is unknown to us. Educated as agriculturists, merchants, mechanics, or professional men, we pass almost unnoticed these sources of individual and national wealth. The time has surely arrived for turning our attention to them. If we are not to await their slow development under the pressing necessity of our wants, we must begin at once to induce persons to enter on this new pursuit, by educating them for it. Geology and mineralogy, thoroughly taught, will enable them to undertake the search after these hidden resources with every prospect of success. Geology will point out the places in which they are to be found; mineralogy will detect them amidst the useless materials by which they may be surrounded.

It is not to the practical miners of Europe, or of other countries, that we ought to look for improvement in the profession of mining. In so important a matter we must depend upon ourselves. We are capable of accomplishing it, and should not hesitate to set about it. Our people have no superstitious in-



fluences to overcome, and while they are free to receive and ready to embrace instruction in other matters, there is no reason why they should not be enlightened in this.

It is believed that the most powerful agent to effect this beneficial design will be the existence of an extensive cabinet, at the seat of Government, of specimens of geology and mineralogy, drawn from every portion of our territory, and so arranged as to present, at one view, all the mineral resources of each particular State, and where these important sciences may be taught by courses of lectures, which, together, will form a school of mining that cannot fail to be extensively useful, and lead to the early and full development of this great source of individual prosperity and national wealth.

Botany has undergone such great and important changes since the close of the last century, as to alter entirely the character of the science; changes which are due, in a great measure, to the improvements in the construction of the microscope, to the discoveries in vegetable chemistry, and to the exchange of artificial methods of arrangement for an extended system of natural affinities. The adoption of the philosophical views of Göthe, together with the recognition of an universal unity of design throughout the vegetable world, have likewise largely contributed to give to this science its present highly improved condition.

A certain degree of knowledge in botany is desirable to every one. It leads to a comprehension of the properties and uses of the trees of our forests, and teaches to distinguish wholesome from deleterious

plants, as well as to discover those that possess medicinal properties, which abound in our country. Although not enumerated among the principal departments of science into which the Institution is organized, the importance of it has not been overlooked. It will be one of the most cherished objects of the National Institution, to establish, at some future day, a botanic garden, where plants of every country and every clime may be introduced, and their properties studied.

In none other of the wonderful works of God are to be seen stronger evidences of beneficent design than in the propagation, growth, life, and death of plants; and the pursuits of the botanist are not only useful, pleasing, and healthful, but are calculated to elevate his thoughts "from nature up to nature's God."

It is difficult to understand any physical science or useful art without the aid of Chemistry; and the Institution has very properly devoted an entire section to this science. By its means, the component parts of all substances become known, whether mineral, vegetable, or animal, of air or of water. It teaches us to detect those which are deleterious, and to compound such as are healthful. It guides the manufacturer in the preparation of the various materials of his art, and the agriculturist in the application of manures which give fruitfulness to barren and worn out soils.

Chemistry, although it owes its origin to the labors of the ancient alchymists, is, as a separate science, of modern date. The great improvements and



discoveries which render it so important an auxiliary to kindred sciences, and to the useful arts, were made towards the close of the last century, since which period its advancement has been wonderfully rapid. It is intimately connected with geology and mineralogy, and without its aid those sciences would be incomplete. We owe to it some of the most useful and beneficial applications of science to the arts, and it may be considered as the foundation of technology.

With a view to promote the principal object of its creation, the Institution has devoted one section to the application of science to the useful arts. Technology, the name given to the science which teaches this application, is not found in the encyclopedias and works of a similar character published fifty years ago, and until that period the application of the principles and discoveries of science to the useful arts was not pursued in such a manner as to render it a constituent part of the operations of the manufacturer. The foundation of this science has, however, since then been solidly laid, and in the rapid progress of discovery within that period we have the promise of a noble superstructure. We are indebted to France for the first impulse given to this pursuit, and it appears, from the late able report of Professor Bache, that Prussia and other Germanic States have established institutions for teaching technology. The only college in the United States in which courses of lectures on this branch are given, is, I believe, that of Cambridge, in Massachusetts. These have been continued nearly twenty years under a bequest of the late Count Rumford. In the Franklin Institute,

also, valuable lectures have been delivered; still but little, comparatively, has been effected towards diffusing this knowledge among the working classes of this country.

In civil engineering, now become a branch of universal importance, scarcely a step can be taken without the guidance of mathematical and mechanical science. A Brindley may occasionally appear with intuitive genius, and accomplish wonders of art, but such an example stands only as an exception to the rule, if it really be one, for it might be shown that even his extraordinary genius was not a perfect substitute for those scientific principles which are the guide of the engineer. An individual who undertakes the construction of either civil or military works without a scientific knowledge of the laws of hydrostatics, hydraulics, and pneumatics, the stress, pressure, and other properties of the materials employed or operated upon by him, will probably fail in them, as is evinced by the experience of almost every day.

The invention of the steam engine, which has been justly denominated "a present from science to the arts," illustrates fully the importance of this knowledge. Had Watt been merely a handy and intelligent workman, those beautiful combinations which render this the most perfect of human devices, could never have been devised by him. It was, doubtless, to the combination of scientific knowledge with mechanical skill, that we are indebted for the fruits of his labors. Many improvements have been since made by others in the details of the steam engine, but its leading principles remain unchanged.



To the union of scientific knowledge and practical skill we are likewise indebted for that valuable instrument, the refracting telescope, which, for most purposes, has superseded the reflector. In the construction of this instrument, Dollond accomplished what even Newton had given up as unattainable; the result, not of mere ingenuity, but of that combination of science with art by which ends are attained to which we should never be led by any chance or accident.

As I had occasion before to observe, the progress made in astronomy, navigation, geography, and the kindred sciences, are due immediately to the perfection of the instruments prepared by the mechanician; but these instruments owe their perfection, if not their very existence, not to mechanical skill alone, but to mechanicians whose minds are deeply imbued with the principles of the science for the advancement of which those instruments were to be employed—men who fully comprehended the nature of the ends to be attained, and could themselves apply the instruments they had made, without which knowledge they could not, in many instances, have constructed them. It is to the philosophical and mathematical makers of philosophical and mathematical instruments, that the several national observatories are indebted, in a great measure, for the value of their observations.

The application of chemistry to the arts, before alluded to, would probably afford examples of the value of the alliance between science and the arts more numerous than those furnished by mechanical philoso-

phy. The minute accuracy of modern chemical analysis has made us intimately acquainted with the actual composition of most of the bodies upon which we have occasion to operate. Upon this accurate knowledge of the chemical constitution of bodies was founded the discovery of the uniform combination of the constituents of compounds in definite proportions, and the construction of the tables of *chemical equivalents*; a discovery which introduced a degree of certainty in carrying on the thousand arts dependent upon chemical action, which could not have been attained by experience and observation alone, however skilfully conducted. The chemical manufacturer who is ignorant of this discovery, or does not apply it in the prosecution of his art, is like a mariner at sea without compass or quadrant.

I cannot forbear to notice here three very recent and valuable discoveries in the application of science to the useful arts, each of which is of a very striking character. I mean the daguerrotype, the electrotype, and the electro-magnetic telegraph. By the former, we are supplied with pictures of the works of nature and of art, imprinted by the rays of light with a minute accuracy that cannot be attained by the best directed pencil in the hands of the artist. By the second, medals, engravings, sculptures, and many other works of art, may be multiplied to an indefinite extent, and with perfect faithfulness, by a process the most simple. To what extent this electric action upon metallic solutions may be carried, it is impossible to foresee; but it has been recently applied to the gilding of metals, and is likely to super-



secede all other processes of gilding hitherto in use. And by the last, a skilful combination of electricity and magnetism conveys intelligence from post to post, however distant, with perfect accuracy and with the speed of light.

This rapid view of the advantages of technology, although, from the limited nature of this address, necessarily imperfect, will show the importance of its being embraced in any system intended to diffuse useful knowledge among our fellow-citizens.

This Institution has allotted one entire division to Agriculture. This must be considered the most important, as it is the most necessary of the useful arts, as well as the most essential to our existence in a state of civilization. The hunter or the shepherd can do no more than supply himself and his children with food. Such a people have no surplus for those who follow other pursuits; whereas in an agricultural community a portion of the people only are engaged in raising grain and cattle to supply the remainder with food, who, in their turn, are employed in the useful or fine arts, or in the pursuits of literature and science; and it may be safely asserted that the degree of civilization in any country will be in proportion to the perfection of its agriculture. Cicero says, "there is no better pursuit in life, none more full of enjoyment, or more worthy a freeman," and surely there is none which contributes more largely to the wealth and independence of a country. Like all the useful arts, it is dependent upon science for its perfection. Sir Humphrey Davy's work upon agricultural chemistry shows its intimate connection

with that science, and we have already remarked the application of geology to its uses. One of the greatest improvements of farming in modern times, so fruitful in improvements of every kind, is the free use of mineral manures. Lime, in some form or other, must enter into the composition of every soil, to render it fertile; and where the chemist fails to detect it in the land, he supplies it artificially. A knowledge of the analysis of soils is therefore necessary to every good farmer. The use of mineral manures is beginning to be well understood, and to be generally practised in our country; but there are two things that appear either not to be fully comprehended, or not to be sufficiently brought into successful operation; the one is to make a given quantity of land yield, for a series of years, the maximum amount of produce it is capable of by high culture and a judicious rotation of crops, and the other is the art of irrigation. The great economy of making a small portion of land yield as much as a large one, must be too obvious to require explanation, and the manner of effecting this important object is to be learned by the application of scientific principles to husbandry. The wonderfully fertilizing effect of water has been understood for ages, and the art of irrigation has been practised from time immemorial. The scriptures are filled with beautiful poetical allusions to this art, which proves its antiquity, and it is still practised in every part of Asia, throughout the south of Europe, and in that portion of America settled by the Spaniards. In those countries are seen extensive works of irrigation, and where the depth of the bank



of the river and the low level will not allow canals being taken out for the purpose, the Persian wheel, an instrument of great power and antiquity, is used. Often, indeed, water is drawn by this means from deep wells, to irrigate the fields, while in our finely watered country this great advantage is neglected. I have traversed, in a period of drought, the rich and fertile valleys of Virginia, and seen the corn and grass perishing for want of moisture, while a bountiful stream ran gurgling along the side of the hill, wanting only to be tapped to restore the withering plants and scorched grass to new life and vigor. In the South, irrigation is practised in the cultivation of rice, but only in the low country, by means of the ebb and flow of the tide, and for that plant alone. With this exception, there, as elsewhere throughout our country, the farmers do not avail themselves of the great natural advantages they enjoy in having the means of irrigation within their reach, but trust altogether to the uncertain seasons. As a thorough knowledge of this art would more than double our agricultural products with the same labor, this Institution will confer a benefit on their fellow-citizens, by instructing them in the best methods of watering and draining their fields. In the south of Europe canals of irrigation have been constructed by the ablest engineers of the age, and I cannot but think that our own civil engineers would find their account in becoming acquainted with this art, while at the same time they might render an invaluable service to their country.

Entomology, which teaches the nature and habits

of insects, is an important branch of natural history to the planter and farmer. It will enable him to protect his fruit trees, his grain and cotton fields, from their ravages; and an acquaintance with ornithology will aid him to distinguish what birds serve as auxiliaries for this purpose.

It will be the duty of this Institution, likewise, to use its best endeavors to introduce into our country new varieties of wholesome, nutritious, and pleasant articles of food. With our extended commerce, this duty may be readily performed; and here let me remark, that agriculture has attained a high degree of perfection only among great commercial nations. The two arts depend mutually upon each other, and the cultivation of the one leads to the extension and advancement of the other.

In astronomy, geology, mineralogy, and the various other branches of natural history and sections into which our Institution is divided, our labors must bear a near resemblance to those of similar societies elsewhere. But the duties that devolve upon the department of American History and Antiquities are essentially different from those required in any other quarter of the globe. While in the early history of those nations, the historian, compelled to grope his way through a labyrinth of barbarism, ignorance, and fiction, is bewildered in his search after truth, the light of science, dawning upon the whole course of American history, points out to the careful investigator a safe and illumined path from the great new continent in the south back to the island of St. Salvador.

The discovery of our continent; its first settlements; the growth of the colonists in intelligence, wealth, and



love of freedom; the triumph over oppression; the establishment of a republican Government, and the subsequent proof of its happy adaptation to the wants of man, are all subjects peculiar to the history of our own nation, and are now being illustrated and treated with equal industry and ability, and by master hands. The documentary history of that revolution which secured to us and to our posterity the blessings of civil and religious liberty, now being published through the enlightened liberality of Congress, has been collected by Mr. Force, of this city, through whose zeal and untiring industry every document of a publick nature has been collected which tended to prepare and carry on that revolution, and he is gathering together every interesting material calculated to illustrate this great event; while the luminous pages of Mr. Bancroft contain already an admirable account of the early settlement and colonial history of our country, and give promise of a work far surpassing any other that has appeared, in profound research, in brilliancy and beauty of style, and in every quality which can interest and gratify the historian, and secure his confidence in its truth and faithfulness. Both of these gentlemen, I am happy to say, are members of our Institution.

It will be our province to aid the societies already formed in the United States in collecting and preserving such materials as may develop and substantiate the truth of the events of our history; and especially will it be our duty to inquire into that of the people we have dispossessed. We are only the settlers of this continent. Who are, and whence came its aborigines? The Indian race, now fading from the earth; their mounds and pyramids, and temples and ruined cities; their

various revolutions and states of society, have long been subjects of investigation, and to assist in tracing this mysterious people from their present degraded condition up, through days of glory, to their origin, is a duty that belongs to the department of American history and antiquities. Fortunately for our infant Institution this department is well composed and well organized. An association of individuals devoted to historical researches, with enlightened liberality, joined the Institution upon its formation, and transferred to it their books, and the valuable records of their transactions. They have since continued their labors under the auspices of this association, and from the industry and intelligence which have hitherto marked their investigations, there is reason to calculate upon results eminently useful to the public and honorable to the Institution. These investigations will be essentially aided by the historical researches now making by a very able and distinguished American writer, (if I am rightly informed,) into the records of our sister republic of Mexico. That portion of this continent was inhabited by an agricultural and civilized race at the period of its conquest by Cortez, and there exists some painted memorials that would seem to indicate their early immigration and settlement. The followers of the Spanish conqueror, and especially the Catholic clergy, who were indefatigable in their efforts to spread the light of Christianity throughout that country, had great opportunities of becoming acquainted with the traditionary lore of this simple people, and have doubtless left valuable records behind them. That the southern portion of Mexico, at least, was inhabited by a still superior race long prior to the conquest, is sufficiently shown by the ruins



of cities, of palaces and temples, in the most southern provinces bordering on Guatemala. Whether they were overpowered and destroyed by the red men, whose march is indicated by their rude devices as from north to south, and whether either had any connection with the aborigines we have displaced, are subjects of great interest to the American historian; and we congratulate ourselves that they will be investigated by one who has given such evidence of his industry and capacity as the accomplished author of "Ferdinand and Isabella."

The last section, that of Literature and the Fine Arts, cannot be treated worthily without exceeding very much the limits of this discourse. The importance of cultivating and using our utmost efforts to improve the literature of our country, must be apparent to all. It is the vehicle of science, and upon its character the dignity and reputation of a nation depend. It exercises a controlling influence on the public liberties. The patriotic citizen who would, either in the forum or through the press, warn his fellow-citizens of impending danger, or enlighten them on their interests—who would dissipate ignorance, correct error, or reform abuse—must borrow the tones and wield the energies of literature. Our freedom reposes on the guarantee of our political institutions; and who can wrest them from our posterity, with a competent literature to inculcate and vindicate its doctrines and principles, and to proclaim its rights?

Literature and the fine arts go hand in hand. The flourishing condition of the first is a sure prelude to the advancement of the latter; and their united influence add, in a high degree, to the enjoyment of human ex-

istence. Their progress has every where kept pace with that of the moral and social condition of mankind, and their history marks, with unerring truth, the rise and fall of nations. In tracing that history, it is gratifying to perceive that while literature and the arts contribute so largely to improve and refine mankind, they have flourished most in those countries where free institutions prevailed, and where liberty loved to dwell. In other countries, a taste for literature and the fine arts is confined to a favored few—the aristocracy of birth, of wealth, or of talent; and there such a distribution is natural and may be sufficient, because these classes alone govern those countries. *Here*, the people reign—all power is centred in them; and if we would have them not only maintain their ascendancy, but use their power discreetly, no expense or pains should be spared to inspire them with a love of literature, and a taste for the fine arts. To effect this, the effort must be made here. It must originate at the seat of Government, and spread from this place over the populous plains and fertile valleys of the land. Could a greater curse fall upon this country than that the sons of the intelligent, and enlightened, and virtuous men who achieved our independence and secured our freedom, should become less intelligent, less enlightened, and less virtuous than their sires? That these valleys and plains, instead of teeming with a race burning with the love of freedom, and ever ready and able to vindicate their rights, should be filled by a people supine and ignorant, the fitting tools of demagogues and tyrants?

In a free country, *literature* may and will flourish by the well-directed efforts of individuals; but *the arts* require the protecting hand of Government. They owe



their origin, their progress, and their present condition to that source and to religious enthusiasm. Their first object was to personify the god-like forms of heathen idolatry, and to hand down to posterity the image of the heroes to whom a nation owed its gratitude. They subsequently became the means of recording the miracles of the true faith, and of spreading the history of the Christian church over the world. In our favored land, they would commemorate the heroic deeds of our forefathers, their achievements and sacrifices in the cause of independence, their deep devotion to the freedom of their country. To a certain extent, this has been effected by the liberality of Government; statues have been erected, paintings executed, and medals struck by orders of Congress. Copies of such pictures, statues, and medals, should be spread far and wide over the land, that they may penetrate into every hamlet, and inspire the people universally with gratitude and emulation. From the advancement of the fine arts, we may promise ourselves great improvements in the architecture of our private and public buildings; in the former, a better adaptation of the arrangements to the comforts and conveniences of life; in the latter, more suitable forms and arrangements for the purposes of business. We are led away by the imposing appearance of massive colonnades and splendid porticos, and apply them equally to temples and to buildings intended altogether for the transaction of public business. This is a mistake which the more chastened taste will correct.

A collection of models and paintings at Washington could not fail to be highly useful. It would aid the cultivation of the art of design, which cannot be too strongly recommended. It multiplies the resources and

enjoyments of the professional man, and is an essential accomplishment to the architect, the machinist, the artisan, and the mechanic. It ought to be taught in our common schools; and every mechanic should be able to sketch with accuracy his own plans, and to copy those of others, so as to be able to profit by every improvement that comes under his observation.

The science of Music, although not so manifestly useful, exercises great influence over the moral and social condition of society. It is taught in the common schools in Germany, and there music constitutes the chief amusement of the people. Instead of hearing in their streets the indistinct roaring of senseless rhymes, out of time and tune, the Germans may be seen assembled in groups, after the labors of the day, singing in parts the delightful music of their inspired composers, elevating their voices in grateful adoration to their Maker, or chanting some of the spirited patriotic songs for which the father land of the Teutonic race is so celebrated. Whoever has witnessed this contrast—whoever has been startled with the discordant sounds of the one, and enraptured with the exquisite harmony of the other, will understand the advantages that are likely to accrue to the cause of temperance, of morality, and of religion, by cultivating the science of music, and making it a part of the education of the people.

I have thus endeavored to explain the objects and importance of the Institution we have established at Washington, so far as the limits of an address will permit, but have been necessarily compelled to omit many topics of nearly equal interest with those which have been treated. Enough, however, has been said, I trust, to impress upon you the important advantages which the



people of this country would derive from the existence of such an establishment at the seat of Government.

In every country in Europe, those who cultivate the arts and sciences enjoy the advantage of finding in each capital a central establishment, such as we propose.

In London, the Royal Museum, which was commenced by the enlightened liberality of an individual, and subsequently enriched by similar bequests, and now liberally patronized by Government, possesses all that is necessary to protect and encourage literature, science, and the arts.

The society for the promotion of science and the useful arts in Dublin, having an extensive museum of natural history, a botanic garden, and school of design, fulfils effectually the objects of its institution, and justifies the very liberal patronage of the British Government. There students in every branch of science find the means of improvement, and some of the most accomplished artists in England have been instructed in this school.

In this country, we are best acquainted with the museum, botanical and zoological gardens, and liberal course of instruction, at the *Jardin des Plantes*, in Paris, where strangers resort, from every quarter of the world, to consult the collections and listen to lectures, which are open to all who choose to attend them. These courses of lectures are delivered by the ablest and most eloquent men in France, on every branch of science. In the summer, botany is taught in a garden abounding in all the vegetable productions of the world; zoology in the midst of specimens of every known animal, and other branches of natural history, with the advantage of extensive collections, which are augmenting daily

by an enlightened and active system of exchanges; chemistry and technology are illustrated by well conducted experiments and admirably adapted apparatus, and every branch of natural philosophy taught with clearness and precision, and explained by the most ample means of illustration. These lectures are attended by students who have completed their academic course, and by men of science who seek to increase their knowledge.

There can be no doubt that a National Institution, such as we contemplate, having at its command an observatory, a museum containing collections of all the productions of nature, a botanic and zoological garden, and the necessary apparatus for illustrating every branch of physical science, would attract together men of learning and students from every part of our country, would open new avenues of intelligence throughout the whole of its vast extent, and would contribute largely to disseminate among the people the truths of nature and the light of science.

A fortunate concurrence of circumstances offers a favorable occasion to carry all these important objects into immediate effect. A liberal and enlightened Englishman, foreseeing the benefits which would result to science throughout the world, by its successful cultivation in the vast and extensive field offered by these States and Territories, with enlarged views and praiseworthy philanthropy, has bequeathed a fund to be employed for the sacred purposes of increasing and diffusing knowledge among men. This bequest will enable the Government to afford all necessary protection to the promotion of science and the useful arts, without the exercise of any doubtful power, by the application



of the annual interest of this fund to the establishment of an observatory, the erection of suitable buildings to contain the collections, and for lecture rooms, the purchase of books and instruments, and the salaries of professors and curators. Specimens of natural history are rapidly accumulating. The exploring expedition has already sent home a large collection, which remains packed away in boxes in a room belonging to the Philadelphia museum, generously loaned by the company for that purpose; and we may anticipate from the ability and well known zeal of the naturalists who accompanied it by order of Government, that the squadron itself, shortly expected, will return richly freighted with objects of natural history. I cannot believe that after all the labor, pains, and expense incurred in procuring them, these specimens are not to be brought to Washington, to be arranged and exhibited here. A geological survey of the Territory of Iowa was made a few months since, by order of the Government, and numerous valuable specimens collected by Mr. Owen. Mr. Nicolet has brought with him interesting collections made in the country he visited, and Doctor King, of Missouri, lately sent to the lead region on business connected with the ordnance office, while there collected specimens of minerals which are likewise destined for Washington. The ordnance officers who have lately returned from Europe, have brought with them numerous specimens of the iron ores used in the foundries there, and measures have been taken to procure, as objects of comparison, those of the United States.

Several individuals have transmitted donations to the Institution, while others have deposited their collections with us, from a desire to have them preserved, and, at

the same time, to benefit science. We have reason to believe that this will be extensively done as soon as the Institution is firmly established. There are many of our countrymen who, like Sir Hans Sloan, the founder of the British museum, look forward with regret to the sale and dispersion of their collections, made at great cost and pains, and desiring to have them preserved entire, would deposit them with an institution which will be as stable as the Government that protects it. For these purposes, and especially if it be intrusted, as we hope it will be, with the specimens of natural history collected by the exploring squadron, it will be necessary that measures should be early adopted to have erected on a suitable site, on the public ground, a plain fire proof building, to contain them, where the increasing and valuable collections may be displayed, and be examined by the scientific inquirer, and where he may resort for evidence to support his theories or to correct his views. We hope that this further contribution to science will not be withheld. The expeditions themselves have received the favorable notice of every civilized nation, and were fitted out in obedience to the will of the people, who would not desire to see the fruits of so much toil and danger perish for want of this trifling additional expense. We cherish the hope that they will form the foundation of a National Museum, and contribute to spread the light of science over our land.

My colleagues have already exhibited so much zeal and industry, that they require no exhortation from me to persevere in their efforts to promote the objects of our Institution, and in their contributions to the union and progress of the arts and sciences. Constituted as this Society is, few of its members can bestow their



whole time to the purposes of the Institution ; but all may devote some portion of it to this object. The mind requires relaxation from the labors of a trade, or profession, or the cares of state ; but, like the soil we cultivate, it need not be left for that period to grow up in noxious weeds. Relaxation from intense application to our important duties may be found in the pursuits of literature and science. It is an error to suppose that letters cannot be cultivated without neglecting the fulfilment of the obligations we owe to our families or to our country. On the contrary, the man who devotes his leisure to the acquisition of knowledge will invigorate his mind and better fit himself to fulfil his more important duties, than if he had passed those moments in frivolous amusements ; and the pursuit itself, by leading us to an intimate acquaintance with the works of nature, cannot fail to elevate our minds to the contemplation of that Being who "in wisdom has made them all," and to inspire us with devout gratitude to Him who has endued us with intelligence to comprehend his marvellous works.