

# SCIENCE

---

FRIDAY, MARCH 30, 1888.

---

THE ANNUAL INQUIRY into the management of the Government Printing-Office by a committee of the National House of Representatives is now in progress. It matters little what conclusions this committee may reach, if, like its predecessors, it does not devise some method of hastening not only the printing of Congress, but also that of the departments. Nowhere is this delay more keenly felt than in the scientific bureaus. Much of the material gathered in these with great labor and expense loses value with delay in publication. Take the work of the United States Geological Survey, for instance. Although the manuscript for the eighth annual report has been completed, the seventh has not yet been printed. The eighth report contains, among other things, an able discussion of the Trenton limestone as a source of petroleum and natural gas, by Professor Orton, State geologist of Ohio. This is a subject upon which information is most eagerly sought in many parts of the country, and it should be published immediately. But there is no probability that it will appear for a year or more, and in the mean time no one can tell what new discoveries or developments may be made. A large number of bulletins issued by the Geological Survey are also in the hands of the printer, with no immediate prospect of their being finished. The cost of printing these reports is very small in comparison with that of their preparation, and some means ought to be devised for their speedy appearance after the 'copy' goes to the printer.

THERE ARE SEVERAL BRANCHES of scientific work pursued in Washington, at the expense of the government, which are still in need of proper, systematic, scientific direction. This is not true of the Coast Survey, Naval Observatory, the Geological Survey, the Fish Commission, or the Smithsonian Institution and the National Museum. In each of these there is a general purpose which is intelligently pursued. But in some other departments, notably in the Agricultural Department, while there is much valuable original investigation going on, there is also much that is desultory and misdirected. This is not so much attributable to the workers themselves as to the lack of intelligent scientific direction. This trouble is aggravated, also, by the fact that in this and some other departments the annual appropriations are made for specific purposes; and it becomes necessary every year for the scientific worker to convince a new committee of the utility of his labors in order to secure the money to keep him employed until the next appropriation bill is passed. This leads not only to jealousies, but acts as a continuous temptation to do showy work rather than that of permanent value, and to the exaggeration of the importance of some branches of inquiry and the neglect of others of greater moment. It has also resulted in the pursuance of some investigations far beyond the limit of economical or useful inquiry, and the publication of very expensive books, which are of no value whatever to the farmers of the country, and of very little to science. What is needed is that the heads of all such departments shall be selected both for their scientific attainments and for their executive ability, and that they shall not be considered as political officers, to be changed with each new administration. They should be men capable of passing an intelligent judgment upon the scientific work performed by their subordinates, and of giving to it proper direction. As it is, the heads of the several scientific bureaus of the Agricultural Department seem all to be working independently, some wisely and to useful purpose, and some otherwise.

THE ANNUAL REPORT of the New York State Reformatory deserves a word of notice, and that word must always be one of hearty commendation. This institution, that embodies so many of the wisest and advanced views upon the true end in view in the treatment of the prisoner, and the ways that science teaches leads to such ends, is rapidly coming to be regarded as the pattern for reformatory institutions everywhere. The report for the year 1887 gives evidence that the work is going on, ever developing further improvements, and increasing the efficiency of those that have been adopted. The statistical tables showing the career of all those who have 'graduated' from the institution tell their own tale: in brief, they tell us that the public have a guaranty of protection from 90%, and of reformation from 83.3%, of all released,—certainly astounding figures. The portion of the reformatory process that strikes the average observer as most remarkable is the literary instruction. That classes in English literature, in ethics, in psychology, should be attended with a deep interest by these men, seems surprising indeed; and, when one learns the high character of this instruction, the surprise is doubled. Yet the facts are unmistakable; and the statement of the literature instructor, that the beauties of literary production can readily arouse a sympathetic chord in the minds of those whom we regard as outcasts of society, strongly suggests the remark, that, were the educational institutions outside the reformatory conducted upon equally scientific principles, there would be less need of reformatories. The managers subscribe to this statement: "The success which has attended the methods practised in the reformatory for the reclamation of first offenders is sufficiently assured and recognized among penologists and humanitarians generally, to warrant its more extended adoption in place of ordinary prison administration, which for so long a period has been in operation in the State of New York. Without attempting to disparage that system, the attention of the Legislature is respectfully called to the reports of the general superintendent, the school secretary, and the physician of the reformatory, for more detailed information in support of this recommendation."

THE ANTHROPOMETRICAL METHOD of identifying criminals, originating from Paris, has been adopted in the prison at Joliet, Ill. In addition to the photograph of the prisoner, accurate measurements of his height, the length and width of his head, the length of the left middle and little finger, of the foot, the fore-arm, the ear, the stretch of the arms, description of scars, color of the eyes, and so on, are recorded; and it is thus possible to identify prisoners assuming false names with far greater ease than was before possible. It is asserted, that, in the two years that the system has been in operation in Paris, 826 habitual criminals arrested under assumed names have been identified. Besides the practical utility of the system, it amasses very valuable statistical data contributing towards the natural history of the criminal classes.

SUPERINTENDENT MACALISTER of Philadelphia has arranged for a representative exhibit of the school-work of that city from May 9 to May 12 next. The exhibit will be placed in Horticultural Hall, and will undoubtedly attract a large number of visitors from other cities. Under Mr. MacAlister, Philadelphia's schools have become the most progressive in the country, and many other superintendents and principals will be glad to get the benefit of their methods and results. The exhibit will include all kinds of school-work that can be represented graphically or objectively; viz., manual-training,

industrial-art work, sewing, kindergarten work, drawing, map-drawing, penmanship, clay-modelling, and manual work of every kind produced in the schools. The pupils' work will form the most important part of the exhibit, and will be a full and fair exhibit of the regular work done in the schools since September last. An interesting feature will be the historical exhibit. This will consist of two schoolrooms so fitted up as to represent and contrast the arrangement and conveniences for public-school education furnished by Philadelphia to-day and half a century ago. This exhibit will unquestionably prove a strong stimulus to progress and improvement to the teachers and pupils of the Philadelphia schools, as well as an attractive object of interest to those in other cities.

ADDRESS OF HON. GARDINER G. HUBBARD, PRESIDENT OF THE NATIONAL GEOGRAPHIC SOCIETY, AT ITS FIRST MEETING, MARCH, 1888.

I AM not a scientific man, nor can I lay claim to any special knowledge that would entitle me to be called a 'geographer.' I owe the honor of my election as president of the National Geographic Society simply to the fact that I am one of those who desire to further the prosecution of geographic research. I possess only the same general interest in the subject of geography that should be felt by every educated man.

By my election you notify the public that the membership of our society will not be confined to professional geographers, but will include that large number who, like myself, desire to promote special researches by others, and to diffuse the knowledge so gained among men, so that we may all know more of the world upon which we live.

By the establishment of this society, we hope to bring together (1) the scattered workers of our country, and (2) the persons who desire to promote their researches. In union there is strength, and through the medium of a national organization we may hope to promote geographic research in a manner that could not be accomplished by scattered individuals or by local societies; we may also hope (through the same agency) to diffuse the results of geographic research over a wider area than would otherwise be possible.

The position to which I have been called has compelled me to become a student. Since my election I have been trying to learn the meaning of the word 'geography,' and something of the history of the science to which it relates. The Greek origin of the word (*γῆ γῆ*, 'the earth;' and *γράφω*, 'I write') betrays the source from which we derived the science, and shows that it relates to a description of the earth. But the 'earth' known to the Greeks was a very different thing from the earth with which we are acquainted.

To the ancient Greek it meant land; not all land, but only a limited territory, in the centre of which he lived. His earth comprised simply the Persian Empire, Italy, Egypt, and the borders of the Black and Mediterranean Seas, besides his own country. Beyond these limits the land extended indefinitely to an unknown distance, till it reached the borders of the great ocean which completely surrounded it.

To the members of this society the word 'earth' suggests a very different idea. The term arouses in our minds the conception of an enormous globe suspended in empty space, one side in shadow, and the other bathed in the rays of the sun. The outer surface of this globe consists of a uniform, unbroken ocean of air, enclosing another, more solid surface (composed partly of land, and partly of water), which fairly teems with countless forms of animal and vegetable life. This is the earth of which geography gives us a description.

To the ancients the earth was a flat plain, solid and immovable, and surrounded by water, out of which the sun rose in the east, and into which it set in the west. To them 'geography' meant simply a description of the lands with which they were acquainted.

Herodotus, who lived about the year 450 B.C., transmitted to posterity an account of the world as it was known in his day. We look upon him as the father of geography as well as of history. He visited the known regions of the earth, and described accurately what he saw, thus laying the foundations of *comparative geography*.

About 300 years B.C., Alexander the Great penetrated into hitherto unknown regions, conquered India and Russia, and founded the Macedonian Empire. He sent a naval expedition to explore the coasts of India, accompanied by philosophers or learned men, who described the new countries discovered and the character of their inhabitants. This voyage may be considered as originating the science of political geography, or the *geography of man*.

About the year 200 B.C., Eratosthenes of Cyrene, the keeper of the Royal Library at Alexandria, became convinced, from experiments, that the idea of the rotundity of the earth, which had been advanced by some of his predecessors, was correct, and attempted to determine upon correct principle the magnitude of the world. The town of Cyrene, on the river Nile, was situated exactly under the tropic, for he knew that on the day of the summer solstice the sun's rays illuminated at noon the bottom of a deep well in that city. At Alexandria, however, on the day of the summer solstice, Eratosthenes observed that the vertical finger of a sun-dial cast a shadow at noon, showing that the sun was not there exactly overhead. From the length of the shadow he ascertained the sun's distance from the zenith to be  $7^{\circ}12'$ , or one-fiftieth part of the circumference of the heavens; from which he calculated, that, if the world was round, the distance between Alexandria and Cyrene should be one-fiftieth part of the circumference of the world. The distance between these cities was 5,000 stadia, from which he calculated that the circumference of the world was fifty times this amount, or 250,000 stadia. Unfortunately we are ignorant of the exact length of a stadium, so we have no means of testing the accuracy of his deduction. He was the founder of *mathematical geography*.

It became possible through the labors of Eratosthenes to determine the location of places on the surface of the earth by means of lines corresponding to our lines of latitude and longitude. Claudius Ptolemy, in the second century of the Christian era, made a catalogue of the positions of places as determined by Eratosthenes and his successors, and, with this as his basis, he made a series of twenty-six maps, thus exhibiting at a glance, in geographical form, the results of the labors of all who preceded him. To him we owe the art of map-making, — the *origination of geographic art*.

We thus see that when Rome began to rule the world, the Greeks had made great progress in geography. They already possessed comparative, political, and mathematical geography, and geographic art, or the art of making maps. Then came a pause in the progress of geography.

The Romans were so constantly occupied with the practical affairs of life, that they paid little attention to any other kind of geography than that which facilitated the administration of their empire. They were great road-builders, and laid out highways from Rome to the farthest limits of their possessions. Maps of their military roads were made, but little else. These exhibited with accuracy the less and greater stations on the route from Rome to India, and from Rome to the farther end of Britain.

Then came the decline and fall of Rome, and with it the complete collapse of geographical knowledge. In the dark ages, geography practically ceased to exist. In the typical map of the middle ages, Jerusalem lay in the centre, with Paradise on the east, and Europe on the west. It was not until the close of the dark ages that the spirit of discovery was re-awakened. Then the adventurous Northmen from Norway and Sweden crossed the ocean to Iceland.

From Iceland they proceeded to Greenland, and even visited the mainland of North America about the year 1000 A.D., coasting as far north as New England; but these voyages led to no practical results, and were forgotten, or looked upon as myths, until within a few years. For hundreds of years geography made but little advance, and the discoveries of five centuries were less than those now made in five years. In the fourteenth or fifteenth century the mariner's compass was introduced into Europe from China, and it then became possible to venture upon the ocean far out of sight of land. Columbus, instead of coasting from shore to shore like the ancient Northmen, boldly set sail across the Atlantic. To many of his contemporaries it must have seemed madness to seek the east by thus sailing towards the west, and we need hardly wonder at the opposition experienced from his crew. The rotun-