

compound matter; but the extension of the doctrine to the genesis of the elements is a pure speculation, and bids fair at present to be incapable of absolute proof.

ON THE INTERNATIONAL GEOLOGICAL CONGRESS, AND OUR PART IN IT AS AMERICAN GEOLOGISTS.¹

THIS association, at the meeting in Buffalo in 1876, appointed a committee to consider the propriety of holding an international congress of geologists at Paris during the international exhibition of 1878, for the settling of obscure points relating to geological classification and nomenclature.

Through the efforts and influence of this committee a congress was held in Paris in 1878, at which representatives from this country and from almost all the countries of Europe were present, and the business of the congress as indicated above was fairly begun. A second meeting was held at Bologna, Italy, in 1881; a third at Berlin in 1885, at which some progress was made; a fourth meeting is to be held in London in September of this year, and it is to be presumed that further progress will be made in the two important subjects before it, — classification and nomenclature.

But a meeting of the congress must be held in this country, and American geology must be fully represented, before any conclusions can be reached which will be accepted by the scientific world. At the meeting in London an effort will be made to have the next meeting, that of 1891, held in this country. There is good reason to ask that a meeting be held here before the discussions on the important topics under consideration are closed. We think our field of observation an important one, better than that of any of the countries of Europe, and perhaps better than all combined. This was the opinion of the older geologists; and such, too, is the opinion of many active geologists of the present day. Therefore we may look for the geological congress here three years from this time.

With this early notice of what is expected of us, it becomes us to make our preparations to show what we have done in geography and geology, and to enforce their claims to acceptance, as part of the material to be used in providing for uniform classification and names. As a profitable way of beginning our work, we inquire what are the points in each of these sciences which are settled, and what still remain to be worked out.

The foundation of all geological work is a good, reliable map of the country. Our country has greatly suffered from an inaccurate knowledge and description of our boundaries, in the north-east as well as in the south. Similar difficulties were encountered by the inaccuracy of surveys of State boundaries and land grants. It is true, these are not the points of interest in our association; but they furnish most potent reasons for making accurate maps, and they cause the supplies to be granted for making such maps. Good work in this line has been done by the Coast and Geodetic Survey and several other institutions, and its prosecution should be urged as rapidly as possible. But attention must be paid also to the topographic features, which are of equal value to the engineer, the farmer, the business-man, and the geologist.

The United States Geological Survey began systematic topographic work several years since, and it is now in progress in different sections of the United States. The maps are being engraved in the best manner, and issued as fast as they are completed.

We are far behind the countries of Europe in respect to maps of the whole country; but it is believed that our later maps will not suffer in comparison with the best of those of foreign lands, and, from some experience in directing such surveys, I feel warranted in saying that no public expense incurred in carrying on scientific explorations meets with such hearty recognition and approval as that for making and publishing such information in regard to the topographic features of the country in which we reside or travel. To us, however, geography is of most interest, because the forms and features of the earth's surface furnish a guide to direct us in our geological studies, and a means of recording their results with accuracy and clearness.

¹ Abstract of an address before the Section of Geology and Geography of the American Association for the Advancement of Science, at Cleveland, O., Aug. 15-22, 1888, by George H. Cook, vice-president of the section.

Geology, which treats of the structure of the whole earth, and which includes in its domain facts ascertained and principles deduced from all its parts, was first systematized from a very limited portion of the globe. It is not surprising that a system arranged consistently with the facts in a single country should not be comprehensive enough to meet the circumstances of all others. American geologists began by transferring the German, English, and French systems to this country. It took little time to find they did not fit the circumstances here; but, with that reverence for authority which is due from the younger to the older, we have been trying to make our geology conform to theirs. The effort is only partially successful, and we have to admit that something larger and more far-reaching must be devised before the science can be called a general one, applicable in all places.

It was probably some clear perception of this want in the science which led our fellow-members to move for an international congress of geologists, and now it is our part to see where the deficiency lies, and to do what we can to make preparations for supplying it.

The time is very short since geology was first studied in any systematic way in this country, and the advances have been rapid and large. From the time of Maclure's 'Observations on the Geology of the United States of America,' begun in 1809, and the establishment of Silliman's *American Journal of Science and Arts*, the growth of American geology has been rapid and plainly marked. The *American Journal* itself continues to be a repository of the advances of geological science. The Academy of Natural Sciences began the publication of geological papers the same year. During the ensuing twenty-three years, numerous surveys and reports were made, and the progress of geology was rapid.

On April 2, 1840, a meeting was held in Philadelphia, and the American Association of Geologists and Naturalists was organized. Of the eighteen present, thirteen or fourteen were geologists fresh from the field. The proceedings of the meeting, which was continued through a second and third day, are of interest to us as showing the problems which occupied them, something of the questions then settled, and of those on which they sought information and advice. Professor Hitchcock exhibited specimens of 'fossil footmarks so called,' and the association appointed a committee to visit the localities, and to report at the next meeting. The subject of diluvial action was discussed at this and the subsequent meetings.

Meetings were held by the association in the successive years, 1841 to 1847 inclusive, and it was then resolved into the American Association for the Advancement of Science, the first meeting of which was in 1848. The Section of Geography and Geology, now Section E of the American Association, is the representative of the society organized by American geologists to collate the individual work of each other, and to bring them into harmony of succession and name. It has already done much, and has reached the position from which it is prepared to do much more.

Many and perplexing questions have arisen in the progress of geology, some of which have taxed the powers of our ablest men. By continued efforts they are being solved. The Taconic question, the triassic formation of New Jersey, Pennsylvania, and the States farther south, the place of the American trias in the geological column, and other problems, received due attention at the meetings of the association. Some of these vexed questions were solved; in others considerable progress was made.

In the International Geological Congress the two topics for examination, and, if possible, for agreement, are the general system of nomenclature, and the colors to be used in making geological maps. It is, however, perfectly obvious, that, before agreeing on names to be used, the objects to be named must first be agreed upon; and it is evidently from the lack of completeness in the geological column in any single country where the geology has been well studied and described that the first difficulty arises. The order of succession of the rocks has been published, and names have been given to them; and, now that these have been in use, it is difficult to so change them as to make them a part of a scheme that shall be of universal application. It was this end which our association aimed at in their resolution passed in 1876; and, while progress has been made in the work at each meeting since held by the congress, it is

still in a very mixed condition. Great difficulties arise from the different languages spoken by the representatives of the several nations represented. Another difficulty arises from unequal representation. The attendance is voluntary, the members pay their own expenses, and the time and money required must hinder many who are deeply interested from attending the meetings; and this hindrance is greater in proportion as the distance from the place of meeting increases. The attendance shows this: at the Paris meeting there were 194 Frenchmen and 110 foreigners; at the Bologna meeting there were 149 Italians and 75 foreigners; and at the Berlin meeting, 163 Germans and 92 foreigners. This, it will be seen, does not give general geology a fair representation when questions come up which are to be decided in favor of the majority voting on them. Such votes can only be tentative, and the decisions will hardly be acquiesced in until a more equitable representation is brought to act upon the unsettled questions, and many more countries have been fully represented. They do, however, bring out the questions upon which action is to be taken, and prepare the way for a right decision. The congress at Berlin aimed to embody the present condition of European geological science and cartography by preparing a map of Europe in which the legend gave all the larger known divisions of the geological column, and the colors on the map showed their locations.

As it stands now in the list of names drawn up by the congress, we are reminded of the remarks of Whewell, made more than fifty years ago, that the advancement of three of the main divisions of geological inquiry has during the last half-century been promoted successively by three different nations of Europe, — the Germans, the English, and the French. The study of mineralogical geology had its origin in Germany; the classification of the secondary formations, each marked by their peculiar fossils, belongs in a great measure to England; the foundation of the third branch, that relating to the tertiary formations, was laid in France.

With the great accessions which have been made to the general stock of geological knowledge by American geologists, and the general publication of it, it becomes necessary that this should be incorporated in a work which is designed to be comprehensive enough to take in the geology of the world. This list of names for the members of the series undoubtedly satisfied the Europeans who voted upon them; but they are too local, too geographic, too strange, to have a place in any general series. Names must be given in describing new kinds or occurrences of rocks; but they should be provisional, and dropped whenever some more characteristic or generally appropriate name can be found. For calling attention to the several divisions, these names will be very useful, and by their general publication they can be brought to the consideration of hundreds of working geologists, who by their contributions and suggestions can throw light on the subject, though they may never be able to attend an international geological congress. The advancement of science in modern time is brought about much more by the increased number of workers in the cause than it is by the greater attainments of a few men. With attention properly drawn to this position of geological science, with a great body of workers in the field, with an immense territory in which to work, and with a notice of three years in advance, we can prepare the case so as fairly to present the claims of American geology to a representation in a general system of geology. The congress went no farther in the lists of names: those of the fourth, fifth, and sixth order will be still more difficult to generalize, and it may be that it will be found expedient to leave the names of these orders to be given in the languages of the countries where they find their application.

It might tend to a more equitable representation of the views of members from different countries, if the number of votes to which each country should be entitled could be equitably settled, and the representation from each country should be in some way controlled by the whole body of geologists; but in a country like ours, where most geologists have active duties to discharge in the milder seasons when meetings are held, this cannot always be had. Besides, the work calls for an individual sacrifice of money and time, which many persons think they cannot properly make, either for the public good or for the benefit of science.

These are difficulties which attend the present arrangements for

work; and at present I can only bring them to your attention without offering any suggestions for their solution. The objects of the congress are worthy and useful ones, and they will be attained. To us they give direction and point to our investigations and studies, and they will be profitable by leading us to a fuller examination of the whole field of geological science as well as to a more careful and demonstrative study of special fields in which our individual work lies.

ALTRUISM CONSIDERED ECONOMICALLY.¹

THE primary motive of human action has always been the care of self, this being for man nature's first and greatest law. In his unthinking zeal he has often followed this to a degree unnecessary, and consequently harmful to others. In his savage state, and especially in his primeval condition, where he was subject, like all the lower forms of life, to the law of "the survival of the fittest," he could not consider others' interests, because they were so antagonistic to his own. Often one of two must starve, and each would let it be the other one. He did not even become conscious that he was so acting for a very long period of time. It was the progress from a being not human to the being called man when sufficient intelligence had accumulated to make him conscious that he could live and let live. That point was also marked by and synchronous with the acquirement of such weapons and such skill as enabled man to procure food enough to make the starvation of some unnecessary. Then the war for the survival of the fittest, as known to biology, ceased among men. Ever since, so far as there has been a struggle affecting the survival of the fittest (and that struggle continues to the present day in certain ways), it has been of a different sort, and one which must not be confounded with the biologic law of the survival of the fittest. Major Powell has admirably shown how the strictly biologic struggle has ceased in man; but he has not yet shown, as may be, the character of that struggle, largely intellectual, which still works out certain survivals of the fittest.

Having passed from the point where, if he survive, it must be at the expense of others, man began to recognize and to consider the desires of his fellows; and among others he counted not only his fellows, but mythical and supernatural beings. Thus appeared the greatest natural basis of religion. It is not strange, therefore, that religion should have existed from very early times, and that it should have taught its votaries especially to regard the needs of others. Its mission was to teach a race whose ancestors had been absorbed for untold ages in caring only for self, to adapt itself to a new environment by learning to care for the wants of others. In caring for others the more powerful soon received superior recognition, so it came to pass that supernatural demands took precedence of the rest. When that point had become clear, men were easily tempted to profess to represent the gods, in order that they might share the precedence. In this natural way became established the order of duty which was taught by every religion prior to Christianity; viz., 1. To the gods and their representatives, 2. To self, 3. To others.

Early Christianity must be credited with changing the order of duty to the following: 1. To its one supernatural being, 2. To all others equally with self.

Even under this improved system, many people are led to make great personal sacrifices, in the belief that thereby they are living the noblest life possible to man, when in reality, as it is the object of this paper to show, their sacrifices are either useless, or, what is worse, grossly injurious both to themselves and to the supposed beneficiaries.

During all the untold years in which it was a physical necessity to regard self even to the injury of others, our ancestors acquired a predisposition thereto which heredity has brought down the stream of time. As being no longer a necessity, its practice long since became one of the recognized evils of the world. We apply to it the opprobrious epithet of 'selfishness.' There is a better term, and one which does not imply a moral quality, for there may be devotion to one's own interests which should not be so characterized. Egoism is such devotion to one's own interests: it may be proper,

¹ Abstract of an address before the Section of Economic Science and Statistics of the American Association for the Advancement of Science, at Cleveland, O., Aug. 15-22, 1888, by Charles W. Smiley, vice-president of the section.