

# SCIENCE.

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## COMMENT AND CRITICISM.

DURING THE CENTENNIAL YEAR some of our leading geologists in the United States and Canada conceived the happy thought of calling an international congress of geologists for the purpose of agreeing upon such important though subsidiary matters as the colors by means of which the different geological formations should be expressed, the terms that should be applied respectively to these formations, and also upon the far more important problem of the limits and values of these different formations. The first session of this congress was held in Paris in 1878, the second session in Bologna in 1881, and the third session in Berlin in 1884. The third session found the preliminary difficulties so far cleared away that some definite and tangible results could be attained; and it was decided to make an attempt to embody these provisional results in some work which should include as many as possible of the difficulties to be encountered by any plan of unification, and at the same time be one with which the largest possible number of geologists were familiar. This additional precaution was adopted in order that whatever steps might be taken should be well advised. This was the reason for the selection of the continent of Europe as an area upon which to test the proposed classification and coloration schemes. Not only are there more geologists and larger geological collections in Europe, but the fact that each of the countries of Europe supports its own geological survey, and employs its own methods independently of all the rest, has for its consequences that there are more differences of opinion among geologists on the continent of Europe, both in important matters and in matters of detail, than in all the rest of the world put together. If, then, a compromise could be effected which would satisfy the conflicting notions of European geologists, it was reasonably sure that a system of unification for the whole world could be arranged. It is true that there are some questions to be settled upon which European geology can shed but little light, but they are not numerous, and they can certainly

be adapted to the rest of the general plan when that has been decided upon.

The congress restricted to each of the 'large countries' of Europe—to wit, France, Spain, Austro-Hungary, Russia, Scandinavia, Germany, and Great Britain—the right to become a *subscriber* to the proposed geological map of Europe, to be issued under the direction of a specially appointed committee of the congress. The number of copies of the map to which each subscriber is entitled is one hundred, and the price one hundred francs per copy. The American committee of the congress, feeling that the questions involved were of universal and not of merely European interest, sent a request to the committee of direction, asking that the United States be included in the list of subscribers. The response of the executive committee to this request was favorable. The object of the American committee is to get the names of one hundred institutions or individuals as subscribers to the map, so that the United States can occupy the same position among the *grands états*, through these private subscriptions, that Germany, France, etc., occupy by reason of the direct subscription of their governments. For the purpose above indicated, a circular was mailed by the American committee to one hundred and fifty institutions of learning and original research six months ago. It was then thought that the one hundred copies would be entirely exhausted by such institutions at once. As this has not proved to be the case (largely owing to the time at which the circulars were sent out), the American committee, at its Philadelphia meeting last December, decided to send out another, and, in addition, to invite a few scientific men to take advantage of the same privilege. Up to the present date, but fifty subscribers have sent in their names. In case of failure to secure one hundred subscribers, the committee must either pay the cost of this number of copies (\$2,000) itself, or ask the comité directeur to withdraw the United States from its list of subscribers.

TWO HUMAN SKELETONS have been discovered in the lower quaternary deposits, in a cave on the banks of the Orneau, in the commune of Spy,

province of Namur. The remains have been examined by Professor Fraipont, who discusses the subject in the Bulletin of the Royal Belgian academy. As we have not seen a full account of the finding of the remains, we confine ourselves to giving the report in *Nature* by A. H. Keane, who says that they were found in undisturbed strata, together with remains of *Rhinoceros tichorhinus*, *Elephas primigenius*, *Ursus spelaeus*, *Hyaena spelaea*, *Felis spelaea*, the horse, wolf, sheep, and other now extinct and surviving pleistocene animals. This fauna, and the character of the coarse flints occurring in the same strata, would seem to indicate that these men must have lived during the early period of the mammoth, and long before the beginning of the reindeer age.

"M. Fraipont's study of these remains," says *Nature*, "makes it thus abundantly evident that they belong to the Neanderthal type. The two skulls even serve as a sort of missing link between the Neanderthal and the others usually referred to the same race. This race, whose presence in Europe during the early mammoth age has now been clearly traced from Staengenaes in Scandinavia to Olmo in Italy, seems in a way to have been resuscitated by the fortunate discovery in the limestone cave on the banks of the Orneau. Their dry bones again assume flesh and blood, and science is enabled confidently to describe the men of Spy as a short but far from 'feeble folk,' thick-set, robust, walking knees foremost, and with a figure somewhat analogous to that of the modern Lapps. Their broad shoulders supported a long, narrow, and depressed head (different, therefore, from that of the true Papuan, which is long, narrow, and high), with very prominent superciliary arches, enormous orbits, low and retreating brow, high and massive cheek-bones, and receding chin."

It will be remembered that B. Dawkins's critical researches on human remains of the lower quaternary resulted in the discovery of the fact that their exact age cannot be proved, and that they are probably of far younger origin. Besides this, we call to mind Virchow's researches on the famous Neanderthal man, whom he found to have been very old and crippled, probably unable to support himself, and therefore not a type of his race. For these reasons we defer a fuller report until the facts shall be better known. The existence of man in the lower quaternary cannot be doubted, as

numerous stone implements have been found in deposits of that period. The discovery of human skeletons belonging to this age would be a very important addition to our knowledge.

THE RE-ISSUING of the famous 'Vestiges of the natural history of creation' in Mr. Morley's universal library, makes one realize the enormous step that modern biology has taken. This work, it is hardly necessary to say, was published anonymously, but the authorship was afterwards acknowledged by Robert Chambers. It is a popular statement of evolution fifteen years before the 'Origin of species,' and is sometimes spoken of as a very remarkable anticipation of Darwinism. But it failed to show any proof of a motive power, and does little to lessen the originality of Darwin's work. Chambers is very deeply concerned in showing that his views are not opposed to religion, and devotes much space in this cause. Yet this book was received with a storm of denunciation which it is difficult now to appreciate. This the author bore very philosophically; for, as he explained, his design in not putting his name to the book was "not only to be personally removed from all praise or censure which it might evoke, but to write no more on the subject."

THE LATEST COPY of the 'Pilot chart,' a monthly publication for the guidance of mariners, shows that there are to-day eleven dangerous wrecks right in the path of vessels in the coasting trade along the eastern coast of the United States. In any other country on the civilized globe a man-of-war or a government vessel of some description would have been despatched to destroy these wrecks as soon as reported. There is nothing, not even an iceberg, more dangerous to navigation than a water-logged 'derelict.' Yet up to the present time there is no one in the United States with the necessary authority to order a vessel out to remove these dangers from the pathway of our merchant marine. Time after time the attention of congress has been called to this subject, and the officers in charge of the 'Pilot chart' have repeatedly urged that a small appropriation be made to enable the navy to maintain a small ship for the purpose of removing floating dangers as soon as they are reported. But there is no one so directly interested as to spend time and money in hanging about the doors of congress to see that this recommendation is considered. In

consequence, year follows year, and the very sensible recommendation is unheeded. It is estimated by a naval officer who has given a great deal of attention to this subject that the actual annual loss to the merchant marine of the United States from striking upon these unmarked obstructions is equal to at least ten per cent of the losses from all other causes combined. The cost of building and maintaining the necessary vessel to remove these obstructions would be more than saved in the first year by the prevention of losses to coasting-vessels and transatlantic steamers which are jeopardized by the failure of the government to do its duty in this respect.

#### EXPLOSIONS IN COAL-MINES.

'A REPORT by W. N. and J. B. Atkinson, inspectors of coal-mines for the north of England,' recently published, is a very valuable contribution to our knowledge of an intensely practical subject, viz., the causes of explosions in coal-mines; and it is simply wonderful, considering how much this question has been investigated during the last hundred years, that some of the most important facts should not have been correctly apprehended or fully appreciated until this late day.

The nature of one cause of explosions, fire-damp or coal-gas, was demonstrated long ago, and guarded against by the invention of the safety-lamp. But that there must be some other cause at least equally potent has long been evident to thoughtful minds, from the fact, that, where the safety-lamp is in general use, explosions are still distressingly frequent and fatal. Thus official statistics for the years 1850 to 1885 show, in the United Kingdom alone, an annual average of fifty-six fatal explosions, the annual loss of life for the same period averaging two hundred and thirty-seven.

The report of the Messrs. Atkinson shows that the dust in coal-mines is now the chief explosive substance, the explosions usually resembling those in the large flouring-mills of Minnesota. This is not a hasty or foregone conclusion on the part of the authors, but it has a broad basis of experience gained by the direct and careful investigation of many important explosions. The discussion is able and thoroughly scientific, for not only is every statement abundantly fortified with facts, but it is made very clear in every case that no other view is tenable.

In all the collieries of the north of England the coal-seams lie at a considerable depth below the surface, with which they are connected by at least two shafts, — a *downcast* for the admission

of fresh air, and an *upcast* for the escape of the foul air from the workings. The circulation is usually maintained by a furnace at the bottom of the upcast shaft. The fresh air passes from the downcast by straight roads, from which lateral escape or leakage is prevented, to the working faces, and thence returns by other roads and through the abandoned parts of the colliery, where the coal has been removed and the roof allowed to fall in, to the upcast. The intake airways are usually the oldest parts of the workings, and are also the main avenues for hauling out the coal and for the ingress and egress of men and horses; while the return airways are rarely used for any other purpose than the passage of the foul air.

Fire-damp or light carburetted hydrogen exists in all the coal of this district, and issues constantly from the freshly exposed surfaces in the working places; but the ventilation is usually so efficient, that the gas cannot be detected even along the return airways, and it is very rarely observed on the main intake roads traversed by large volumes of fresh air, their surfaces having long exhausted themselves of gas. Naked lights are often used in the outer portions of the intake roads, and locked safety-lamps, as a rule, in all other parts of the colliery. Observations are cited which show, that, while one volume of fire-damp to fifteen volumes of air is required to make an explosive mixture, in the first half-mile of the intake roads the proportion cannot exceed one volume of fire-damp in fifteen hundred volumes of air. And yet it is exactly in this part of the colliery that the explosions are most frequent and violent.

The coal is largely of a tender or dusty nature; and, although the shafts are usually wet, the working planes are, for the most part, quite dry, and the air especially, although moistened by its passage down the wet shaft, becomes very dry through the rise of temperature due to the fact that the temperature of the ground increases downwards.

The return airways, where the fire-damp is most abundant, are usually quite free from dust, and at the working faces the dust is not often a serious evil. But the principal accumulations of dust are found along the roads through which the coal is hauled, i.e., the intake airways. It is especially abundant where the coal is hauled by engine-power, or at a high rate of speed. The dust is shaken and blown out of the cars by their rapid motion against strong currents of air, and flies as a cloud along the top of the train. The heavier particles fall to the bottom of the roadway, and the lighter particles form a deposit on the upper