Miscellaneous.

British Association for the Advancement of Science.

We will now proceed to give a condensed abstract of such proceedings of this Association, as we think will be of most interest to the majority of our readers. The Association held its meetings in Edinburgh, Scotland, (where it first originated), in the early part of last month. Sir David Brewster delivered the opening address. We are principally indebted to that able paper, "The Glasgow Daily Mail," for an excellent report of the proceedings. The whole of our extracts will be found to possess a value which, when bound up in the Scientific American, will be like golden coin well invested. Let every one read them, for in this country, where there are so many changes in business, in the course of a life, if it does not be of use to a subscriber now, it may be of use next year, and if not next year, it may at some other time.

ECONOMICAL USE OF THE GASEOUS ESCAPE FROM BLAST FURNACES AT IRON WORKS.

Mr. Budd stated that, since the meeting of the Association at Swansea, he had continued, and with increased success, to apply the waste gases that escaped from the top of blast furnaces to the manufacture of iron; and it was the result of his farther experience applied to the whole of his furnaces (nine in number) since that period, that he now wished to submit to the section. He considered that he could not have fallen on a better locality for this purpose than Scotland, where the iron trade has been developed with a rapidity that is quite surprising, and quite characteristic of the enterprise of Scotchmen. Twenty-five years ago, Scotland was of no importance in the iron trade, but, since then, the produce of iron in Scotland had increased to between six and seven hundred thousand tons a-year. In that short period Scotland had accomplished a production which Staffordshire and other places in England took two hundred years and South Wales a hundred years to accomplish—the make of iron in Scotland being now equal to that of either England or Wales. This great accession to the produce of iron has had a most sensible effect on its price; but as he believed that necessity was the mother of invention, and that nature had in store for us an immense reservoir of riches to be yet developed, he was of opinion that the tendency of all this cheapness was to teach us that nothing should be wasted, and that we should look forward to the time when the smoke that at present contaminated the atmosphere, and the filth that polluted our streets, would be regarded as too valuable to be wasted. When we considered the utility of iron, its low price, and its general distribution in the deposits of every age, we could not but look at it otherwise than as the great agent in modern civilization. Mr. Budd then referred to his mode of applying the gaseous escape, and said it was well known that there were two descriptions of furnaces used for metallurgic purposes. The one was the blast furnace into which air was injected, by mechanical means, at a great density, so as to penetrate upwards of forty feet of dense materials; and the other was the reverberatory furnace, where the fire was produced by means of a draft of a chimney stack. What he had accomplished was by combining these two, so that the gaseous products of the furnace, instead of escaping through the tunnel head, were drawn sideways by a high stack, and passing through the stoves and boilers, leave behind the necessary temperature of the blast and of the steam. In a blast furnace the ores are smelted before the tuyeres by the conversion of the solid carbon into carbonic acid, which, passing up through the middle region of the furnace into a bath of carbon, was re-converted into carbonic oxide, capable of combining with a farther dose of oxygen. It would be thus seen that the whole of the carbon of the fuel should be present at the top of the furnace in a gaseous form. When the British Association met a Swansea, he had not used the gaseous escape at any great distance from the furnace, his stoves and boilers being very closely contiguous. Further experience, however, had proved that by the aid of the stack at the end of the chain of sufficient dimensions, the gaseous escape from the furnace might be made to travel in the most tortuous directions, descending to the stove built for heating by the usual fire-places and traversing the boilers; the only condition absolutely necessary being that there should be an unbroken communication with the high stack at the end, into which the gaseous escape might at last pass, and by which it was drawn forward, instead of passing off wastefully at the tunnel-head. When, however, the draft was carried downward, and to long distances, he had found it necessary to drop into the top of the furnace a hopper or funnel, made of sheet-iron, which acted as a shield at the mouths of the horizontal flues, and prevented them from either being affected by high winds, or from being choked up by materials thrown into the furnace. The reason, no doubt, why this funnel was not applied before, was the great apparent temperature at the tunnel head. In practice, however, it was found that, until the gaseous escape mingled with the atmosphere, its heating power was not such as to injure sheet-iron, or even to make it red hot. In fact, so long as there was an escape upwards, the iron funnel would not be injured. The damage arose during and after stoppages of the furnace, when the blast was obstructed in its passage upwards by the settlement of the materials in the furnace, so that the atmosphere rushed down to meet the ascending gases, and of course caused a very high local temperature. His practice was to seclude the atmospheric air as much as possible. The affinity of the gases for oxygen was so great that the air leakage raised the temperature quite sufficient for safety, whilst the full combustion of the gaseous escape would melt down the bricks in the flues, and destroy the texture of the iron tube. It was not possible for him to say what combinations took place at high temperatures, where carbonic oxide, carbonic acid, hydrogen, and nitrogen, were mixed in such proportions. At any rate, he found a smothered combustion to be the most suitable and economical for the purposes in view. He was quite aware that, by the plan he had pursued, the utmost heat was not extracted from the gases: and that, by different means, a temperature might be obtained capable of performing all the operations of the forge; and if it be true that the solid carbon of the furnace in its escape, as carbonic oxide, would unite with another dose of oxygen for saturation, there could be little doubt that, with properly constituted gas furnaces, there was enough at present passing off to convert the pig iron into bar iron. He was happy to say that, at length, the application of the gaseous escape had been tried in Scotland; and that at Dundyvan and elsewhere it was now in successful operation. The peculiar quality of the furnace coal of Scotland being what was called in South Wales "free-burning," which, when put into the furnace raw, coked sufficiently in its descent, gave out an enormous escape, so much so that, upon a rough estimate, he calculated that the waste from one furnace in Scotland was sufficient to heat a blast, and to raise the steam for three. With anthracite coal, the minimum effect was obtained, and it was a dense fuel of nearly 95 per cent. of solid carbon; but in Scotland there would be an enormous surplus at the tunnel head. He expected from the well-known sagacity of the Scottish people, and when truly embarked in this mode of operation, the greatest possible use would be made of it; and he would not be surprised to see heat let out, like mill-power, for burning bricks and other similar purposes.

THE NUTRITIVE QUALITIES OF FOOD.

Professor Voelcker read a valuable paper "on the per centage of Nitrogen as an index to the nutritive Value of Food." The nutritive value, as determined in this way, he believed to have been considerably overrated, and referred to certain experiments which he had made on fungi, which were remarkable for the quantity of nitrogen, and understood to be highly nutritious. Dr. Christison thanked Professor Voelcker for his paper, and remarked that he had long suspected a fallacy in the method of determining the nutritive value of food as derived from the azote of nitrogen only.

[This is a subject which has caused a great deal of discussion among Professors of "Animal Chemistry." We confess that we are not satisfied with much that is said on the subject—there is a great deal of *darkness visible*,—who will remove the veil?

CHEMICAL ACTION OF SOLAR RADIATION—PHOTOGRAPHY.

Robert Hunt, Esq., read a "Report on the present state of our knowledge of the Chemical Action of Solar Radiations." It was listened to throughout with profound attention. Toward the conclusion of his address, Mr. Hunt referred to a report originating in one of the London prints that the plants in the magnificent new Conservatory at Kew had been scorched by the glass, and that he ought to have made an experiment on a smaller scale before subjecting the nation to so much expense. He begged to say, that after the experience of the summer of this year and the autumn of last year, there have not only been no scorching of the plants, no failure in the glass, but that Sir William Hooker had recommended the adoption of it to others. Mr. Hunt adverted to the interference of light with chemical action, and mentioned that, as we approach the equator from the temperate regions, this becomes most manifest. He had been assured by a gentleman who had resided in Mexico that in the bright season the Calotype and Daguerrotype processes were all but impracticable, but that when the rainy season commenced, and the sky was slightly shaded, the case was different. Under glass of a yellow colour, he remarked, plants would not germinate vigorously as they would when the light passed through a blue medium. He mentioned that in Paris there was a war at present raging, as to the party to whom the honour belonged of the production of an instantaneous photograph. He begged merely to say that a reference to a paper read by him six or seven years ago, on the flurotype, would, he believed, determine the matter. He was able at that time to produce good pictures in 20 seconds, with every ray distinctly impressed.

COAL FIELDS OF SCOTLAND.

Mr. James Bryce, jun., communicated the results of his research in regard to the Lesmahagow and Douglass coal fields, and illustrated his observations by a geological map, and sections and specimens of the fossil remains with which he had met. He gave a short outline of the distribution of coal in Scotland, and showed that, while other coal fields were separated from each other merely by erupted rocks, the field in question was cut off from connection with the rest by ridges of the older rocks rising up all around. The mineral contents of the basin were next described. These, Mr. Bryce said, consisted of very considerable thickness of workable coal, blackband, and clayeyband ironstones, potter's clay, freestone; and almost all of which are largely available for practical purposes.

BLACKBAND IRON STONE.

Dr. Frederick Penny, of the Glasgow Andersonian University, read a paper on a ready method for the determination of Iron in Clayband and Blackband Iron stone. In this process Professor Penny uses the bicromate of potash, which, as well as the neutral chromate, he finds gives very exact results. The chromic acid and protoxide of iron, by which the former becomes sesquioxide of chromium, and the latter sesquioxide of iron. In those cases in which the iron-stone contains peroxide of iron, Dr. Penny recommends the employment of sulphate of soda previous to the application of the bichromate liquor for the purpose of reducing the peroxide to the minimum state of oxidation. Dr. Penny gave the results of numerous experiments which he had performed on metallic iron and the sulphate of iron, with the view of ascertaining the exact proportion of bichromate of potash and metallic iron. As the mean of all his results he gave 88·75 of bichromate of potash to 100 of iron. This mode of analysis he remarked, in conclusion, might be applied to other ores of iron, as well as to the examination of alum and copper, as liquors and other products in the arts.

MAGNETO OPTIC PROPERTIES OF CRYSTALS.

John Tyndell, Esq., read a paper on the magneto-optic properties of crystals. The subject was connected with discoveries made four years ago by Dr. Farraday, regarding diamagnetism, showing that all material substances were divisible in two classes, one of which was attracted by the magnet, as iron, and which were termed magnetic, and the other repelled by it, as bismuth.

Mr. Tyndell was of opinion, from various experiments which he had made, that instead of the assumption of four new forces, an electropolar force was sufficient to account for the phenomena presented by crystals placed between the poles of the magnet.

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ADULTERATION OF VERMILLION.

Prof. Horsford read a paper on the Adulteration of Vermillion. By the examination of a number of specimens he found that they had been adulterated from one half to two-thirds, and some samples sold for vermillion did not contain a particle of mercury; he found three specimens pure—one from China, one from Trieste, and one American. The adulterations were the chromate of lead and red lead.

CRYSTALS OF OXIDE OF CHROMIUM.

Mr. W. P. Blake exhibited some crystals of great beauty, which had formed in a reverberatory furnace, long used to manufacture the chromate of potash from chrome ore; they were of a deep emerald green, and nearly as hard as the diamond. Mr. B. considered their formation due to the infiltration among the bricks of the fused chromate of potash, by long-continued and uniform heat, and thus the reduction of the chromic acid to the sesqui oxide of chromium.

[Will our able cotemporary, the Washington Globe, be pleased to put this along with the Despretz diamond?

MECHANICAL POWERS.

Prof. Henry, of the Smithsonian Institute, went into a dissertation on mechanical powers, which he divided into two classes—attraction and repulsion, which act independently of velocity. Machinery moved by weights, such as a clock, derives its power not from gravity, but extraneous aid. He divided the mechanical powers into two classes, the one derived from celestial disturbance, the other derived from vitality—water-power, tide-power, and wind-power, belong to the first; steam-power and animal-power to the latter. Animal power may be referred to vegetable power, vitality and vital power, however, were different.

Professors Mitchell, Pierce, Bond, Hackly, Bache and Walker, had considerable sharp-shooting about the instrument of Prof. Mitchell, in Cincinnati, for recording astronomical observations.

Mr. J. B. Bunce read an able paper on the amount of alkali and phosphates in coal ashes, and thought they might well be applied to agricultural purposes.

We have now closed our extracts of the proceedings of this respectable Association. We have given but a tithe of the proceedings, but we have given that which we have thought was most useful and interesting to the majority of our readers. A great deal of the proceedings were too speculative for our columns.

Prof. Agassiz was chosen President; we are glad to see this,—the pupil of Cuvier deserves to be honored every where, because he has no superior as a naturalist in the world. Among our scientific men there is more nobility of sentiment than among our politicians. Professor Baird, of the Smithsonian Institute, is permanent Secretary. The semi-annual meeting takes place in Cincinnati next May. The next annual meeting takes place in Albany, N. Y., on the 3rd Monday of August, 1851.

Coal.

It is stated that a vein of bituminous coal has been discovered at Brandon, Vt. We hope this is true, but have strong and well grounded fears that it is not. What has become of the coal mine *discovered* near Albany last year? Will any of our Albany friends explain? As coal is now very high, it would be a good time to open the mine.