



XXIV. On an electrical phænomenon

Rev. J.B. Emmett

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substance. The wall opposite to that now mentioned (*g*, fig. 19), appears to be killas. The extreme steepness prevented us from reaching this wall itself. A great many old levels are to be seen in it, which appear to have been driven for the purpose of raising tin ore. The granite is below the killas in the cove (*h*, fig. 19). A layer, sometimes two inches thick, is found at the junction of both rocks (near *i*, fig. 20), consisting of very small but angular fragments of killas; large blocks of killas occur here imbedded in the granite. The granite inclines very much to become decomposed, only at (*k k*) it is fine-grained, harder, and partakes of the appearance of porphyry (elvan); these places are not of great extent.

The Beacon of St. Agnes consists of those varieties of killas which are commonly found in the immediate neighbourhood of the granite. On the west side of the beacon occurs a quartzose rock like that near Cligga Point; frequent pyramids of quartz cover the surface; clay is raised from a great many shallow pits; certainly the granite may not be far below this place. We do not know whether the cliffs on the north and west sides of the beacon exhibit any fact which may confirm or contradict this opinion.

[To be continued.]

XXIV. *On an Electrical Phenomenon.* By the Rev.
J. B. EMMETT*.

HAVING constructed an electrical machine of uncommon magnitude and power, an accidental circumstance led to the discovery of a singular development of electricity. The floor of the room in which the machine was placed being very dry, I had occasion to have a wire of considerable length attached to the cushion. My friend, Mr. Harwood of York, first noticed a particular crackling sound to be emitted from the wire, whenever a spark flew round the globe of the machine: on darkening the room, whenever a spark flew from the prime conductor to the cushion, the whole of the wire was found to be beautifully illuminated, throwing off, from points about $\frac{1}{8}$ th or $\frac{1}{10}$ th of an inch asunder, a number of distinct and separate pencils of electric light, to the distance of $\frac{3}{4}$ ths of an inch. The wire first used was of copper, and about $\frac{1}{20}$ th of an inch thick; but being desirous to ascertain to what distance the effect might be extended, I substituted fine silver wire, not more than $\frac{1}{80}$ th of an inch, and between 70 and 80 feet in

* Communicated by the Author.

length,

length, which was kept close to the floor of the room by weights, at the distance of 10 or 15 feet from each other. As before, the whole length was illuminated; and the streams of electric light were as long, but not quite so brilliant, as when the shorter wires were used.

Being fully satisfied as to the fact, I requested a number of my scientific friends to examine the phenomenon: in their presence, the following facts were ascertained. The cushion being insulated by a glass pillar two feet long, the wire attached thereto is illuminated at every spark which passes round the globe, when in contact with the floor of the room: the light is always white: it was extended along the whole of any length of fine silver wire which we could make use of, and which we used to the extent of about 80 feet. If a conducting substance be brought within about $\frac{1}{2}$ an inch of any part of the wire, whenever the wire is illuminated a very pungent and dense spark is obtained: if the wire be connected with the gold-leaf electrometer, at every illumination of the wire a dense spark passes from the leaves to the tin foil; the leaves are scarcely separated, nor are they violently agitated; a very trivial undulation alone being observed, although the spark emitted was at the least $\frac{1}{2}$ an inch long. Next, the wire was insulated by being attached to glass rods, placed at sufficient intervals from each other. The wire was always negatively electrified; and since a star of light appeared at the end of the wire, we were certain that the insulation was good; the wire being about 80 feet long: the illumination took place, as before, at every spark which flew round the globe. On presenting the finger towards any part of the wire, a stream of electric light was seen between them (the wire being highly negative); but, as before, at the moment of a spark, a very dense spark passed between the wire and the finger: the effect upon the electrometer could not be so well observed as when the uninsulated wire was used; for on bringing it sufficiently near to the wire, the leaves were permanently open and considerably agitated; yet at every spark, one passed from one of the leaves to the tin foil without injuring or agitating the leaf.

I do not hazard a conjecture respecting the cause of this phenomenon: however, the electricity seems to be in the same condition with that observed by Dr. Priestley, which he denominated the lateral explosion.

The machine with which these experiments were made, consists of a globe of what the workmen term black or common bottle glass; its diameter is about 18 inches: the conductor is 3 feet long, and 6 inches in diameter: the spark measures about 12 inches, when the machine is pretty well excited;

when the excitation is very good, the spark is much longer. This glass, as Dr. Priestley observed, is more powerfully excited than the finer sorts, and its power is but little affected by a moist atmosphere.

XXV. *On the Action of Steam and Quick-lime upon heated Galena.* By Mr. H. L. PATTINSON, Alston, Cumberland.

To the Editors of the Philosophical Magazine and Annals.

Gentlemen,

PERHAPS nothing has contributed more to the great advancement of knowledge within the last few years, than the rapid exchange and diffusion of information among scientific and practical men by means of periodical publications. Opportunities are offered of putting facts upon record without difficulty or delay; and although some communications may possess a greater degree of interest than others, yet there is probably no one in which well-ascertained facts are correctly stated, which remains without its use at some period or other. I am induced by these considerations to send you an account of two experiments which I lately made on the reduction of galena.

Experiment 1.—An earthen tube 18 inches long and $\frac{3}{4}$ ths of an inch internal diameter was properly coated, and made to traverse a furnace in which ten inches of the middle could be highly heated. To one end was attached a bent tube terminating in a pneumatic trough, and to the other a retort containing water made to boil by the flame of a lamp. One thousand grains of very pure cubical galena were wrapped up in a cylinder of paper, and pushed to the middle of the tube when very hot; and over this was transmitted a current of steam. A copious stream of sulphuretted hydrogen gas was emitted, and the water in the pneumatic trough became as white as milk, before the operation was concluded: no precipitate was deposited from this water after standing twenty-four hours, it was still milky and turbid. The process was continued an hour; and during the whole time gas of the same kind was given off, but slowly towards the conclusion.

On breaking the tube after cooling, it exhibited the following appearances.

a. A cake of fused and partly reduced galena, flat on the upper surface, and having the form of the tube below, occupied three inches of the tube nearest the retort from which the steam issued. This mass was brittle; it could be cut with a knife, but not a particle of metallic lead was observable. This substance was most probably a sub-sulphuret of lead.

b. Six