the state of civilization in Ethiopia, and after we had taken the most exact plans of the localities, we proceeded in six days, by the desert Gilif to Gebel Barkal, where we arrived on the 6th of May. Here was the more northern, the more ancient, and, to judge by the remains, also the more important capital of the state of Meroe. At the foot of this single mass of rock, which rises in an imposing manner, and is called there, in the hieroglyphical inscriptions, "The Sacred Mountain," is situated Napata. The history of this place, which we may still derive from its ruins, gives us at once a key to the relations which subsisted in general between Ethiopia and Egypt, as regards the history of their civilization. We find that the most ancient epoch of art in Ethiopia was purely Egyptian. It is as early as the period of the great Ramses, who, of all the Pharaohs, extended his power farthest, not only towards the north, but also towards the south, and testified this by monuments. At an early period he built a great temple here. The second epoch begins with King Tahraka, also known as the ruler of Egypt, the Thirhaka of the Bible. This spot was adorned with several magnificent monuments by him and his immediate successors, and though they were built in a style now employed by native kings, it is, nevertheless, only a faithful copy of the Egyptian style. Lastly, the third epoch is that of the kings of Meroe, whose dominion extended as far as Philæ, and was manifested also at Gebel Barkal by numerous monuments. On an intermediate journey into the Cataract country, situated farther up the river, which we had cut off by the desert journey, I found only middle-age, but no ancient Ethiopian remains of buildings.

(*To be continued.*)

## Atmospherical Electricity.

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If we allow ourselves to be instructed by the analogies of the friction electrical machine, the Leyden jar, or the voltaic battery, we shall find that the essential condition for maintaining a charge of electricity, is the existence of two bodies or portions of the same body (which are generally conductors) separated from each other by a non-conducting medium. An electrical charge implies the presence of two bodies in opposite electrical states; and the well-known attraction mutually exerted by two such bodies would lead soon to a discharge, if they were not separated by the insulating medium. There is no reason why the solid earth should not play the part of one of these bodies, while the other is represented by the upper regions of the atmosphere or by the clouds floating therein. As the surface of the solid earth is separated from the region of clouds by the non-conducting air, an electrical charge may be maintained by the earth on the one hand, and by the clouds on the other, and this charge will be limited in intensity only by the dryness of the intervening air. Thus the whole earth resembles a Leyden jar, or more exactly, on account of the large distance between the clouds and the earth, an electrical machine, in which the rubber is moved from the prime conductor by a larger space than that which separates the two coatings of the jar, and in which, therefore, the electricity is more free than in the jar.

Observation shows that this electrical charge which the planet is capable of sustaining, it generally does sustain to a greater or less degree. As every change in the condition of matter, whether mechanical, physical, or chemical, places it in the electrical state—as heat, both directly and by leading to combustion and evaporation, provokes this electrical state.—We are at no loss for exciting agents which shall give to the earth and clouds the whole or a part of the electricity which they are designed to hold.

I shall consider,—1. The ways in which the electrical state of the atmosphere is investigated. 2. The results to which this investigation conducts. 3. The probable causes of atmospherical electricity. And 4. The effects, or the phenomena occurring in meteorology or elsewhere which originate in electrical action.

One way in which the electrical state of the air is examined is by erecting a metallic rod, insulating it from its supports, pointing it at the top, and connecting the lower end with an electrometer. It was on such a rod, erected at Marly-la-Ville according to the directions of Franklin, that Coiffier, the servant of Dalibard, first obtained by a premeditated experiment sparks of atmospherical electricity such as were anticipated from Franklin's prediction. Sometimes the apparatus well known under the name of "the electrical chime of bells" is attached to rods, which have been elevated either for the purpose of studying or of guiding atmospherical electricity, and, by the peal which it sends forth when the electricity descends, this secret of nature is betrayed to all within hearing of the sound, and the attention of the observer is called to his duty. Murray speaks of seeing a set of these electrical bells attached to a lightning-rod near a gateway in Zug, the capital of the Canton, and another in a garden on the route from Zurich to Basle.

When it is desired to make experiments upon greater heights than can be reached by rods, Saussure proposed to throw a ball into the air by means of an arrow or otherwise. A fine wire was attached by one end to this ball, and was carried up with it. The other end was connected with an electrometer. A long wire suspended from a balloon may be used for the same purpose, as was done by Gay-Lussac and Biot, in their celebrated scientific excursions into the air. Becquerel and Breschet employed Saussure's method in their experiments made on the top of the Great St. Bernard. Having spread out upon the ground a piece of gummed sarcenet about eight feet square, upon which they enrolled two hundred and fifty feet of silk cord interlaced with fine wire, they sent it up on the tail of an arrow. The motion of the arrow through the air would not produce of itself any electricity, unless the air were moist. To be certain, however, that no electricity produced by the mode of making the experiment should come in to vitiate the results, these observers first sent the arrow in a horizontal direction, without being able to effect the electroscope.

Another method, at first so striking but now so trite, of making experiments upon atmospherical electricity, is by flying the kite. Here, indeed, was philosophy in sport made science in earnest. Franklin first made this bold experiment, of enticing down the lightning upon the kite-string, familiar to the world on the 15th of June, 1752. Science, poetry, patriotism, will repeat the thread-bare story of the strips of cedar united into a cross and covered with a silk handkerchief, of the key, of the silk ribbon by which he held the string, of his early anxiety and his first disappointment while the string was dry, and his final exultation when the rain wetted it, the hempen fibres began to fly apart, and he drew the first spark of lightning on his knuckles. Romas, for whom Martins has unaccountably claimed priority in the kite experiment attempted to repeat it on the 14th of May, 1753. The weather seemed propitious for the object, but he could get no spark. On the 17th of June he raised a kite with 780 feet of string 550 feet high in the air, and having taken the precaution to twist a fine wire into his kite string he succeeded in obtaining sparks three inches long and one quarter of an inch in thickness.