nourished, by smoke; the abode, however, it had relinquished, I visited and examined by the aid of the scalpel of the anatomist. What did I observe, you ask? It appeared to me that I was passing into the very house of Pluto himself; even the entrance-doors were tinged of a black colour, and the tongue, imbued, as it were, with the poisonous juice, was in a state of tumefaction. What as to the windpipe? It was like the inside of a chimney, coated completely with black grime. The lungs were dry, sapless, and scarcely at all friable. The liver, as if it, beyond all the other organs, had attracted the fire, was altogether inflamed; from the flames of this fire not even the bile in its receptacle had been safe, for its colour had changed from purple to green (*ex purpureo virescentem*). In the intestines, however, the drains of the body, the carbonaceous matters from the whole combustion had become concentred, for they were full of a black substance which exhaled no milder stench than that of Hell itself. Such, of this frequent suction, are the medicinal fruits!"

AT the meeting of the Geologists' Association, on Friday evening last, Mr. R. Etheridge read a paper on "The British Islands Past and Present, Physically considered." After making some remarks on the intense interest and importance of the subject, he proceeded to describe the distributi n of land and water at different geological epochs, and to show that England, Ireland, and the Continent, were once united, and that the many and great changes which have taken place have arisen from the elevation or depression of the land, not from alteration of the sea level. Mr. Etheridge then referred to the changes which have taken place in the relative positions of land and water during the historic period, giving instances of towns and cities that in the time of their prosperity stood some distance from the sea, but have been gradually submerged, and other places, whose importance arose from their contiguity to the ocean, now left high and dry inland. The paper was illustrated by a splendid collection of diagrams.

THE Seventh Annual Report of the Belfast Naturalists' Club shows that this useful Society is making good progress. By the kindness of the Council of the Natural History Society, members of the Club have been permitted to re-arrange the valuable local collections in the Museum; and a large sum has been granted by the Council for cases, &c., in which to exhibit a complete local collection. The local land, freshwater, and marine shells have been named and arranged; the Herbarium is in progress; and the Geological collection selected and named, ready for mounting. The Committee have also considered it desirable that the Club should prepare complete lists of the fauna, flora, geology, and archæology of Ulster, by publishing an annual contribution to such a work in addition to the ordinary report. The Appendix in the present issue consists of a list of the Irish Liassic Fossils, with notes on new and critical species, by Ralph Tate, Esq., F.G.S. The number of species enumerated is 189; of which the following are new to science:—*Chemnitzia punctata*, *Solarium thompsoni*, *Tornatella robinsoni*, *Pleurotomaria tectaria*, *Hinnites angularis*, *Avicula pattersoni*, *Leda v-scripta*, *L. quenstedti*, *Cucullæa graingeri*, *Mytilus subtulis Thracia æquata*, *Anatina myacina*, *Pollicipes alatus*. Figures of many of these are given in an accompanying plate, and the paper is a valuable contribution to local geology. We congratulate the Belfast Club on having successfully started a work which will give a permanent value to their annual reports, and trust that their example will be widely followed by other local societies.

IN the Chittagong district the Government of India has discontinued explorations for coal at present, as the samples found are of an inferior and unpromising quality.

## *BALLOON ASCENTS FOR MILITARY PURPOSES*

AS soon as the war broke out, balloons, which had been so long forgotten by statesmen, were recalled to their memory by hundreds of projectors. Some of the schemes suggested were of the wildest description; and scientific men took advantage of this circumstance to reject everything connected with aëronautics. But surprises and reverses became so frequent in the French army, that it became evident that any apparatus able to carry observers would be considered as a preserver from such disgraces. As soon as it was clear that the Prussians were intending to besiege Paris, the Minister of War issued orders for the construction of a captive balloon, intended to watch the movements of any besieging army moving round the capital; but instead of having recourse to Mr. Giffard, the constructor of so many magnificent balloons, it was resolved to employ MM. Godard and Nadar. Paris was divided into aërial districts, the first being given to Nadar and the other to Godard. Nadar then received orders to establish his balloon on the foot of Buttes Montmartre, and Godard close to the Montsouris Meteorological Observatory on the banks of the small streamlet Bièvre, where it crosses the fortifications. The balloons intended to be attached were not made on purpose, they merely used old ones which were worn out; the gas-pipes were also not sufficiently large, and the gas-pressure was very low, so that when the first attempts at inflating were made, the Godard balloon took more than three days to be filled; and, when filled, was tossed so heavily by the wind, that it was necessary to let the gas escape. Nadar was still more unfortunate, and could not arrive even at the inflating of his balloon, except after immense labour, by laying a pipe along the ground for a space of more than 300 yards. Moreover, when the first balloon was floated, it was as late as the 4th of September. I then ordered Godard to continue his inflating process. Many scientific bodies met, and deliberated upon the modes of improving captive balloon ascents; but none of the members had ever ascended, and hence their practical knowledge was so small as to amount practically to nothing.

I tried to improve in some respects the construction of captive balloons, by using the process of fixing to the rope invented and practised by the aëronauts of the First Republic, and offered to the State a balloon, which had been given to me by my friend, Mr. Giffard, and which had, unfortunately, only a capacity of 28,000 cubic feet. I had already used this balloon for an ascent, executed for the benefit of the Arène de la Rue Monge.

That balloon was fitted up in a more scientific manner, the appendix being also firmly attached with rope, so that the pressure of the wind could not let a single puff of gas escape. The equatorial ropes were attached together and connected by means of little pulleys, the pulleys being connected by ropes, and so on till the whole of the network ended in three large ropes. This machinery worked admirably well, but the material of the balloon was not fit for the purpose. After two or three weeks' standing, the company was dissolved, and the balloon was sent free into the air. Captive observations were not so useful as had been hoped; that partial failure was owing to the unfitness of officers entrusted with the duty of making observations, and of the men employed in the drawing of the ropes. Nothing of the kind would have happened if Government had accepted the offers made by Mr. Giffard before the beginning of the war. That great engineer had offered to spend 40,000*l.* in the construction of a large balloon of 15,000 cubic metres capacity, able to carry 40 persons to the height of a full kilometre, but the Government had refused this proposal because Mr. Giffard asked for a place in the Champs Elysées, where it would have been necessary to displace a few shrubs.

When the investment of Paris was completed, the question naturally arose of using balloons for carrying messages, the resolution having been taken by the minister, M. Rampont, Post-office Director, to summon to his office several aëronauts, Nadar, Artoise, myself, and a few gentlemen supposed to be acquainted with aërostatics; and the ascent was decided upon in a long discussion.

The first who ascended, was Durioff with his own balloon, famous from several ascents. Durioff started up into the air early in the morning, and employed an immense lifting power, the wind blowing strongly besides, and Durioff disappeared like a dream. He was alone in his car, carrying a bag of letters, with plenty of ballast; I protested in the most urgent manner against sending into the air a single man unassisted, but without any success. The advice was neglected in consequence of the success of the

first operations. Reverses were necessary to call postal authority to a better sense of the real state of things. M. Garnier Pagès, a member of the new Government, invented the carrying by balloons of aërial pigeons, and the second balloon ascent was the occasion of the first pigeon expedition.

One of the aëronauts known to our readers is Mangin, the proprietor of the unfortunate "Union," of which the wreck was fully described, who tried an ascent a few days after Durioff. He made a foolish agreement with the Post Office, to carry with his poor worn-out balloon a weight of 1,000lbs., but the balloon was unable to retain a single puff of gas, and the attempt was doomed to failure.

Two or three days afterwards, Mangin tried another ascent with the "City of Florence," a large balloon of 1,200lbs. capacity and belonging to Eugène Godard.

The "City of Florence" was inflated and fitted up by its proprietor, and left the ground on the morning of a clear day, with a light north-easterly wind. It carried with Mangin a medical man practising at Lyons, with a special mission from the Government for the eastern departments. The ascent succeeded very well, and Dr. Lutz was landed safely. But the landing of Lutz gave rise to a singular circumstance. A Prussian spy, having read in the papers that Lutz had come down from the heavens, presented himself at Dijon as the real Lutz, and acted in accordance with that suggestion. The fraud was not discovered without some delay and some trouble, but owing to some peculiar circumstances it was at last exposed, the false Lutz was seized, tried by a court-martial, condemned to death, and shot on the spot.

Amongst singular ascents one was executed two or three days afterwards by Louis Godard, carrying with him two merchants. Godard's balloon being too small for the purpose, he fixed one additional balloon to the end of a long narrow piece of wood, and in the middle of that long singular bridge there was a second balloon of no more than 100 cubic metres. The floating of this extraordinary trio created a great deal of amusement among our Belgian people, and is in itself an aërial aëronautical success; Godard landed near Nantes, where the Prussians had not yet set their feet.

Next to Godard's singular ascent, we must mention the one executed by Trignot for carrying Gambetta to his post at the head of the Government. An accident took place in the air while it was open, and the balloon emptied itself at an extraordinary rate, landing, against the will of the aëronauts, in Prussian territory. If sharpshooters had not come to the rescue, Gambetta would have been made a prisoner. Kératry was in the same manner sent in a balloon, and succeeded in escaping after some adventurous feats.

We must mention the ascent conducted by the elder Tissandier, as well as the one conducted by his younger brother. The first of these two ascents was remarkable for the firing at it by the Prussians when the balloon was passing over Versailles. Tissandier, as well as his brother, fell beyond Prussian territory, but not far from the enemy's force.

From the time of the landing up to the present moment, the brothers Tissandier have tried twice to return to Paris; but they ascended from Tours, which is a bad station for such a purpose. The first time their balloon was sent towards the south; the second time it ascended too high, and the brothers were conducted into a frozen cloud, which compelled them to come down. This second ascent was tried during the night, which is a decidedly awkward time, as an aërial traveller is unable to find his way to the land.

Returning to Paris will be tried, however, and is a great object to be attained, but for success to be secured requires more powerful means. I must not omit my own arrival in Belgium in a balloon. The "Egalité," which I employed on that occasion, had a younger brother called "Liberté." The "Liberté" was inflated with pure hydrogen, prepared specially for the purpose. It was the old captive of the Universal Exhibition, fitted up and carefully repaired for the purpose. "Liberté" was intended to carry ten persons, besides 3,000lb. weight of letters. It had two cars attached, the one fastened to the other by eight ropes. The upper car was intended for passengers, the lower one for letter-bags. Everything had been carefully prepared; bags of sand had been attached round the upper car, and a hole had been cut into the bottom to permit communication between the two cars. Unhappily, when the process of inflation was half finished, the wind began to blow with such violence that people holding the net let the ropes loose with so much force that the balloon escaped, turned round like a whirlwind, being lost in a minute in the clouds, and leaving thousands of spectators in consternation. "Liberté" was seen turning round two or three times again between different strata of clouds, and was finally observed turning no more, ascending no more, but falling straight like a meteoric stone. The fall took place within the Prussian lines, and it remained in the hands of the Prussians, who were enabled to repair and to use it for their purposes.

Seeing that I was unable to recover my balloon, I managed to get another constructed. The new balloon, though smaller than "Liberté," was larger than any other balloon in existence in Paris. It had a measurement of 3,000 tons instead of 2,000, the average. The ascent was delayed by an accident which happened during the process of inflating; a hole was discovered round the appendix, and the valve was open. For the three following days the weather was unfavourable, and the passengers were obliged to come back every morning, but the following morning several thousand people witnessed the ascent, which was very successful. After having landed in Belgium, I came to London on my way to Tours, and purpose shortly attempting to re-enter Paris by the same means.

W. DE FONVIELLE

## SCIENTIFIC SERIALS

*Annalen der Chemie und Pharmacie*, viii. Suppt. Bd. 1 Heft. This number opens with a paper "On the occurrence of Ammonio-Magnesic Sulphate in the lagoons of Tuscany," by Dr. O. Popp, who has observed that a double salt of ammonic and magnesic sulphates is of constant occurrence, together with ammonic sulphate and boric acid, in the lagoons. He also remarked that the relative amounts of boric acid and ammonic sulphates are inversely proportional, so that those containing large quantities of boric acid contain but little ammonic sulphate, and *vice versa*. The salt, which separates out either during the concentration of the water or in the crystallising vessels, is obtained pure by recrystallisation in forms belonging to the monoclinic system, and of the composition

$$Mg\,SO_4 + (NH_4)_2\,SO_4 + 6\,O\,H_2.$$

In the natural double sulphate Mg is often replaced by the isomorphous Mn and Fe. — "On the origin of the Boric Acid in the Fiumaroles of Tuscany" is by the same author. After a criticism of the theories of Dumas and Bolley on this subject, he quotes the observations of Woehler and St. Claire-Deville, that boric nitride heated in the presence of aqueous vapour is decomposed into boric acid and ammonia, and that at a high temperature boron and nitrogen combine directly; they remarked that the presence of ammonia salts together with boric acid in volcanic craters and the lagoons of Tuscany might be due to such a decomposition. This the author also considers to be the probable explanation, and assumes that boric nitride is present in these volcanic localities, which comes in contact with water at a high temperature, forming boric acid and ammonia; this latter combines with sulphuric acid, formed by a process of roasting from the layers of pyrites, or of coal containing pyrites, which would also account for the presence of marsh gas and free hydrogen in the lagoon gases.—"On Chloranil and Bromanil," by J. Stenhouse. A modification of Grœbe's method of preparing chloranilic acid is described. Chloranilic ether was obtained by the action of ethylic iodide on the silver salt. Nitric acid of sp. gr. 1·45 oxidises chloranilic acid to chlorpicrin and oxalic acid. By the action of bromine on chloranilic acid a compound of the formula $C_6\,Br_8\,Cl_3\,OH$ was obtained. Bromanil is readily obtained by the action of a mixture of one part iodine and two parts bromine on phenol. Bromanilic acid was prepared in a similar manner to chloranilic, and in all its reactions found to be analogous. A compound, $C_6\,Br_{11}\,O\,H$, was obtained by the action of bromine on it.—"On Coumarin, Hydrocoumarin, and Hydrocoumarinic Acid," by C. Zwenger. The author observes that the preparation of coumaric acid from coumarin is attended with considerable difficulty, inasmuch as the acid is first formed at a temperature at which the potash readily causes a further decomposition. A most characteristic and delicate reaction for coumaric acid is the fine pea-green colour of its solutions when viewed by reflected light, and which is perceptible when only traces even of the acid are present. As is well known, melilotic acid is obtained by the action of nascent hydrogen *in excess* on coumarin; the author finds, however, that if the coumarin be kept in excess a new acid, which he calls hydrocumarinic, is formed. This acid is derived