of those operations which have effected the marked changes between their actual and their original positions.

Then follow the various propositions: — 1st. "*That most of these beds must have descended very slowly after their formation, beneath the level at which they were deposited;*" and as an auxiliary to this proposition, "*That every area of long-continued deposition must have been an area of slow continuous depression. That by far the greater portion of the earth's surface which now constitutes dry land must have been raised above the level at which it was originally formed.*"

In many cases, such descending movement must demonstrably have preceded the ascending. For on reference to the preceding diagram (fig. 8) it is easily seen that the edges of the strata which are, in a geological sense, the lowest in the series, are actually found at the greatest height above the sea-level,—often as much as 8,000 to 10,000 feet, and even to 15,000, as in the Himalaya mountains; but these same strata, if they have a sufficient aggregate thickness of strata above them belonging to the higher part of the series, must, from what has been already proved, have gradually descended from their original position during the deposition of the superincumbent beds.

Mr. Hopkins anticipates the very natural question: "But what physical causes can be assigned of sufficient mechanical energy to produce these mighty movements?" and replies that modern volcanic eruptions indicate the former existence of adequate power in the intumescence of fluid lava produced by the expansion of elastic gases within it.

(*To be continued.*)

FOREIGN CORRESPONDENCE.

By Dr. T. L. Phipson, of Paris.

Pyritiferous lignite, and its applications—A Diamond which has turned out to be a Topaz—The metal Cerium and its compounds—Waters of the Bay of Vulcano at Santorino—Palæontology in Southern Russia—Errata.

At the last meeting of the *Société Impériale d'Horticulture*, at Paris, M. Millot-Brulé, an agriculturist, presented to the members of this institution a dark-coloured earth, which he had employed with success, he stated, against the attacks of grubs, snails, &c., in gardens or plantations. By scattering a small quantity of this earth around any plant, the approach of slugs, or the larva of insects, &c., was rendered impossible. This was proved by experiment before the meeting, by placing some slugs and larvæ of cockchafers upon a damp plate of glass and surrounding them with a circle of the black earth. Not a single one could make its escape, and pass out of the circle; and when the earth was sprinkled upon them, the animals soon died. Experiments were also tried, with similar success, upon the cryptogamic vegetation which constitutes the disease of the grape. Vines that had suffered remarkably from the ravages of the *Oidium Tuckeri* were restored to health when

besprinkled with this black earth, more effectually than if sulphur had been employed.

The members of the *Société Impériale d'Horticulture* seemed puzzled not a little as to the nature of this earth; M. Payen, the distinguished chemist, who was present at the meeting, insisted that sulphuric acid had been mixed with it, and that this was the cause of its insecticidal and fungus-destroying properties. M. Millot-Bruté denied having added any acid whatever. The next day the earth was sent to me to be examined.

It consists of a friable black lignite, intimately mixed, in its natural state, with white iron-pyrites (*Sperkise*). I have frequently had occasion to observe it in Picardy, in certain deposits belonging, I believe, to the Subapennine formation, or the *terrain de la Bresse* of Beudant,* and I know that it has been seen in the vicinity of Paris, where it contains a considerable quantity of pyrites. (The specimens of M. Millot-Bruté were taken near Rethel, in the Ardennes.) In the year 1856 the Count de la C——— brought to me a quantity of pyrites extracted from these lignite-beds, near Paris, inquiring whether anything could be done with them, as they existed in considerable quantities, he said, at the very gates of the capital. The pyrites is of that description called Sperkise, which, by contact with damp air, rapidly absorbs oxygen and becomes sulphate of iron. Earlier in the same year (1856) I had visited, with Professor Koene, of the Brussels University, the large manufactory of sulphuric acid belonging to M. Vander Elst, of Brussels. I observed that Sperkise was employed in this manufactory instead of sulphur.† This Sperkise is obtained from the tertiary clays of Boom, on the little river Ruppel, in Belgium, whence it is known as *la pyrite de Boom*. The pyrites of the lignite-deposits mentioned above is almost identical with the latter; I therefore endeavoured to ascertain if it would not be profitable to use the pyrites of the lignite in the manufacture of sulphuric acid at Paris, but M. de Sussex, director of the Javel manufactory, seems convinced that it is cheaper to buy sulphur. This may be the case at Paris, but it does not follow that it would be so for other localities.

In Picardy the organic deposits to which allusion is made in this paper are found, I have said, in some of the more recent alluvial formations, but a compact lignite, which is sometimes used as a combustible, exists in many parts of the province; for instance, at Albert, where it forms long black bands, or seams, in the white chalk, it is extracted, and burnt for the ashes which are employed in agriculture as manure, &c. In the alluvial beds the lignite is friable and pulverulent; it contains a considerable quantity of Sperkise, and is also employed by agriculturists, either in its natural state, when it is called *Cendres noires*, or after undergoing spontaneous combustion, or calcination (*Cendres rouges*). It is, doubtless, a valuable manure; for, as before stated, the pyrites it contains is easily transformed, by moisture and air, into sulphate of iron; and sulphate of iron will fix ammonia in the same manner as does sulphate of lime—a proverbially efficacious manure.

* Geologie, p. 249.

† This is often the case in countries where pyrites is common.—T. L. P.

Moreover, I am convinced that this formation of sulphate of iron by the pyrites in contact with the atmosphere determines also the production of a certain quantity of carbonic acid gas at the expense of the organic elements of the lignite. So that, besides the insecticidal properties recognised by M. Millot-Bruté, and its efficacy as a remedy for grape disease, this black earth will furnish to plants the two principal elements of their nutrition, namely, carbonic acid and ammonia.

We will add, in conclusion of this subject, that the friable, pulverulent lignite impregnated with pyrites, of which we have been speaking, has been applied with success by Dr. Apelt, under the name of *Schwefelkohl*, to preserve timber, more particularly that employed in railway-constructions.*

About a year and a half ago, a precious stone, supposed to be a diamond, weighing nearly 25 ounces, or 819 carats, and which was valued at some millions of francs, was brought from the Brazils to Europe. It was cut in the form of the "Regent;" its height is 43 millimetrès, its diameter being 53 millimetrès. A mineralogical consultation has been held on this stone at Vienna, and M. Haidinger, who formed part of the commission, has just published the result of this inquiry:—The pretended diamond turns out to be a topaz, having the double refraction, the specific gravity, the hardness of ordinary topazes, and being worth simply (as a curiosity) from 225 to 250 francs, or about £10. It appears also that M. Elie de Beaumont was of this opinion when he first saw the new Brazilian stone, about eighteen months ago. The following are the characters M. Haidinger assigns to it:—

It is perfectly transparent, having the dimensions and weight mentioned above, and possessing a slight blue tint. Being a transparent substance the phenomenon of simple refraction would have immediately indicated a diamond or an artificial stone—double refraction would have led to the supposition that the stone was quartz, white beryl, or topaz. M. Haidinger assured himself that the Brazilian stone possessed double refraction, and that its specific gravity was 3·57 (that of the topaz has been given by some authors 3·56); its hardness was also proved to be precisely that of the topaz, for the two minerals, when rubbed together, scratched one another. There exists, therefore, no doubt that this Brazilian stone is a fine topaz.

The salts of the metal called Cerium, which up to the present time has only been discovered in a few of the rarer species of minerals, have lately been found by Messrs. Damour and H. Ste-Claire Deville, to constitute a good and delicate test for recognizing the presence of phosphoric and arsenic acids. It was observed that an acid solution of any phosphate will produce a voluminous precipitate, of a white or yellowish colour, with acid solutions of either sulphate or nitrate of cerium. Arseniates act in the same way.

This is rather important to mineralogists, as it procures them an easy method of recognizing the presence of cerium in minerals. For, if acid salts of cerium can be employed with advantage to detect phosphoric and arsenic acids, the latter, or their acid salts, may naturally be used

* Dr. Apelt's process has been described in our Paris contemporary *Le Cosmos*, t. iii. p. 141 *et seq*, where it was inserted on the demand of Baron Alex. von Humboldt.—T. L. P.

to detect the compounds of cerium. It will, perhaps, be found, in course of time, that cerium, a metal which, by its chemical properties, resembles iron in many respects, is not so scarce in nature as we have hitherto been led to suppose.

A short time ago we read in the *Courier de Paris* something to this effect:—"For some time past the waters of the little bay of Vulcano, at Santorino, have been spoken of as having the property of cleaning the copper-sheathing of vessels; but this precious quality has not been made use of so much as we should have expected, and since the year 1821 the bay has been almost abandoned by ships. Lately, however, experiments have been made to prove the fact anew; the *Solon*, a screw-packet-boat, stationed in the Levant, received orders to go to Santorino and remain some hours in the Bay of Vulcano. Although coated with many layers of red-lead, the iron keel of the *Solon* had collected and fixed an endless number of shells, sea-weeds, zoophytes, &c., so that its course had been notably impeded. But after a short delay in the Bay of Vulcano these shells and seaweeds were detached with ease by the aid of a brush, and a knot an hour more was immediately gained in speed. Three other French ships and two English brigs followed the example of the *Solon*, and these had coppered keels. The effect was the same on all, and no less surprising than agreeable to the captains of the vessels."

The cause of this may be thus explained: In recent times a submarine island made its appearance within the crater of Santorino*. In 1810 it was still 15 fathoms below the surface of the sea, but in 1830 it had risen to within three or four. It rises steeply, like a great cone, from the bottom of the sea, and the continuous activity of the submarine crater impregnates the surrounding waters with sulphurous and sulphuric acids. The coppered bottoms of ships lying at anchor for a short time in the Bay of Vulcano are cleaned by the acid produced in this natural volcanic process.

M. de Nordmann, of Helsingford, in Finland, a naturalist distinguished by his scientific expeditions into Caucassia and the Crimea, has just terminated the first two parts of a great work upon the Pæleontology of Southern Russia (*Paléontologie de la Russie Méridionale*). The exploration of certain rich fossiliferous deposits that he found near Odessa and in Bessarabia has enabled M. de Nordmann to make some interesting and important discoveries. His first paper is really a treatise upon fossil bears. To those already known he adds a new variety, *Ursus spelæus Odessalus*. He proves, by many and varied considerations, that the fossil *Ursus spelæus* differs essentially—as Cuvier always affirmed, in spite of the contrary opinion upheld by De Blainville—from the existing bear, *Ursus ferox*. In the second memoir are described and figured (the drawings being made by the author himself) a great number of fossil quadrupeds belonging to the genera *Felis*, *Hyæna*, *Canis*, *Mustela*, *Equus*, *&c.* Among them *Canis meridionalis*, different *Solipedes*, and a certain number of Rodents are entirely new species. Judging from what the papers say, M. de Nordmann's

* For a figure of this remarkable island and some adjacent ones, see Beudant, *Geologie*, p. 31.—T. L. P.

journey to Russia seems to have opened to him a vast field of observation concerning living and fossil bears.

ERRATA.—The printer, who, in my article for July, made me say that boric acid was discovered in 1872 (instead of 1772) has, in composing the type of my last contribution to the GEOLOGIST (at page 396, 4th note), made me affirm that "Topaz contains mica," &c. The note should be, "Topaz, certain micas," &c., or better, "certain varieties of mica."

GEOLOGICAL MANIPULATIONS.

NOTES ON MAKING GUTTA-PERCHA MOULDS AND PLASTER OF PARIS CASTS.

BY T. RUPERT JONES, F.G.S.

(*To the Editor of the* GEOLOGIST.)

MY DEAR SIR—As something towards enabling amateur and other geologists to communicate some of the results of their researches to their fellow-inquirers, I beg to offer the enclosed directions for making a preparation of gutta-percha and bees-wax, much better adapted for taking casts and moulds of fossils than gutta-percha itself; and also some useful remarks for the preparation of plaster-casts. These directions have been chiefly drawn up, at my request, by my friend, Mr. John Wetherell, of Highgate. I have also to observe that the prepared gutta-percha is capable of being applied to the purposes of the museum in another way, which has been suggested to me by a friend lately. Thus, have some narrow slips of tin folded into squares, of convenient sizes, and into these press some of the composition, and use these as pedestals for such fossil shells, and other specimens, as will not stand steadily by themselves. By warming these pedestals in hot water, they are readily softened so as to receive the fossils when pressed into them, and the latter can be at any time raised for examination.

Of course this composition, or even gutta-percha itself, is unfit for use in hot climates, and for transmission, by post or otherwise, to the tropics.

1. *Preparation of the gutta-percha*—Procure a moderate-sized pipkin, into which put some bees-wax, place it on the fire, and allow it to melt (without boiling). Some fine cuttings of gutta-percha, which must be free from any foreign substance, are then to be thrown into the pipkin, in the proportion of about four of gutta-percha to one of wax. The melted mass is then stirred up with a large metal spoon, until it is thoroughly mixed, free from lumps, and of an even colour. It should then be taken off the fire, and poured into a basin of warm water, to prevent its cooling too rapidly. In a few minutes it may be made by hand into convenient lumps for keeping.

2. *Making a gutta-percha mould or cast*—The prepared gutta-percha, above alluded to, is put into a saucepan of hot water—not boiling, as that would make it too sticky. After remaining a short time, it may be taken out, and the softened part separated by the fingers, which should be kept moist to prevent the mass from sticking to them. This must be repeated until you have sufficient to cover the specimen which has to