FOREIGN CORRESPONDENCE.

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Formation of Prairies and their relation to Peat-bogs.

(*Continued from page* 248.)

The distinguished botanist, M. Alphonse De Candolle, has remarked, that these ideas of M. Lesquéreux are undoubtedly true as regards a great number of prairies, but they cannot be applied, he thinks, to every country, nor can he admit that they are applicable to all the prairies of North America. M. Desor, who has also visited the United States, and who was present at the reading of M. Lesquéreux's paper, says he cannot attribute to the above causes the formation of what are termed *prairies roulantes*, or undulating prairies, which are very frequent in North America. We might also object that in hot countries—for instance, in Louisiana, on the banks of the river Amazon, of the Oronocco, of the Ganges, &c.—we have examples of ligneous vegetation in the shape of trees belonging to the families of the *Anonaceæ*, *Rhizophoraceæ*, and even *Papilionaceæ* and *Avicenneæ*, which transform the marshy banks of these rivers into jungles—often into magnificent forests.

New observations on Silica—Its radical Silicium compared with Carbon and Boron—Composition of Carbonic, Boric, and Silicic Acids—The Archegosaurus—Sand-banks of the Pacific Ocean—Effects of Earthquakes upon Animals.

Silicic acid is found in nature in the form of sand, sandstone, silica, flint, quartz, amethyst, agate, opal, jaspar, silicified wood, &c. Combining with the different oxides, it forms salts called Silicates. Thus the emerald is a silicate of alumina and glucina; garnet, a silicate of alumina and iron; calamine, a silicate of zinc; clay, a silicate of alumina; talc, a silicate of magnesia, &c.

Silicic acid is, therefore, one of the most abundant of mineral substances, and, at the same time, one of the most universally diffused. Kœne says it is "the most abundant of all bodies," and that "it forms two-thirds of the earth's crust;" and this figure is far from exaggerated. The true nature of silicic acid, however, only began to be investigated about the year 1807, and its composition was not rendered evident until a few years later, when Berzelius extracted from it silicium, a simple element, which, on combining with a certain quantity of oxygen, produces the white powder known as silicic acid.

Up to the present time, the nature and properties of both silicium and its acid have been very incompletely known. We are told in books that silicic acid is composed of one atom of silicium and three atoms of oxygen; that silicium is a brown powder, and that its atomic weight is

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22. And with this knowledge, as a basis, have been analyzed and classed the innumerable varieties of silicates found in nature. We dare not mention here even the approximate number of these silicates considered as known. It will be almost needless, from what follows, to add that long ago the study of this group of minerals became incredibly difficult, their classification in many cases extremely doubtful, and the chemical formula assigned to a great number perfectly absurd. Thanks to the efforts of some very eminent men, this state of things seems to be approaching its end, and a more exact knowledge of the composition of silex, and of the nature of its radical silicium—attained only within the last few months—seems likely to throw a considerable light and quite a novel aspect on the group of silicates.

The great physical and chemical resemblance which silicic acid bears to stannic acid (oxide of tin, $Sn\,O^2$) and to titanic acid (oxide of titanium, $Ti\,O^2$) made us suppose, some time ago, that the former, instead of containing three atoms of oxygen ($Si\,O^3$) only contained two ($Si\,O^2$). This idea haunted us the more, when, reflecting upon the uncertainty which has hitherto prevailed as to the atomic weight* of silicium, and still more on perusing a recent memoir by M. Gaudin, in which, by an ingenious theory of his own, the author endeavours to explain the crystalline forms of bodies by a mathematical groupment of their atoms. M. Gaudin told us the other day that his theory of crystals had occupied, during thirty years, most of the leisure moments of his active and laborious life; and that it was impossible to explain, by its aid, the crystalline form of quartz, unless he supposed this substance to be $Si\,O^2$, and not $Si\,O^3$, as was, and is, generally supposed.

Wöhler and H. Saint Claire Deville observed lately that silicium could be dissolved in melted aluminium, which, on cooling, throws out the former in beautiful crystals. We must remark here that a most striking analogy exists between the three elements—carbon, silicium, and boron. This analogy has now become more apparent than ever, and is extremely interesting in a mineralogical point of view.

Carbon is known to exist in three distinct states—namely, 1, as diamond; 2, as graphite; and 3, as a black non-crystalline powder (coal, charcoal, lamp-black, &c.). Carbon combines with oxygen, and forms carbonic acid ($C\,O^2$) and carbonic oxide ($C\,O$.)

Silicium has just been obtained by Wöhler and Ste-Claire Deville—1, in transparent crystals as hard as the diamond, to which they bear a certain resemblance; 2, in metallic crystals, imitating graphite; and 3, as a black non-crystalline powder resembling coal. Silicium combines with oxygen, and forms silicic acid, which we shall show presently is $Si\,O^2$, and silicic oxide, discovered a few months ago by Wöhler and Buff, and which, in all probability, is $Si\,O$.†

Boron has just been obtained by Deville—1, in form of transparent

* The proportion in which one body combines with others is called in chemistry its "atomic weight" or "equivalent."—T. L. P.

† This new oxide of silicium is a white powder obtained from chloride of silicium; when it comes in contact with water, hydrogen gas is evolved, and silicic acid formed.—T. L. P.

crystals resembling the diamond, though generally of a reddish tint, and in this state it is the *hardest of all substances* yet known,* and scratches the diamond with ease; 2, in metallic crystals, resembling graphite; and 3, as a black amorphous powder. Boron combining with oxygen forms boric acid (a white crystalline powder much resembling silicic acid by its chemical properties), discovered in 1872 by Homberg, found in 1776 by Hœffer and Mascagni in the waters of the Lakes of Castel Nuovo, Monte-Cerboli, &c., in Tuscany, and hitherto regarded as $Bo\,O^3$; that is, formed with one atom of boron combined with three atoms of oxygen. But as boron is isomorphous† with tin, and as stannic acid, silicic acid, carbonic acid, and titanic acid contain only two atoms of oxygen, it is probable that boric acid will sooner or later turn out to be $Bo\,O^2$. No other oxide of boron has yet been discovered.

Many chemists have endeavoured to ascertain the atomic weight of silicium, which is generally thought to be 22. M. Marignac, the well-known and indefatigable chemist of Geneva, has just found that this number must be changed to 14; and that silicic acid is, consequently, composed of one atom of silicium and two of oxygen ($Si\,O^2$). When M. Dumas presented this result to the Academy of Science at Paris, a few days ago, it created, as may well be imagined, considerable sensation. The illustrious Berzelius himself had once remarked the probability of this formula, and Leopold Gmelin always looked upon quartz as composed of one of silicium and two of oxygen. Mr. Miller in his "Mineralogy" advocates the same opinion, which was even suspected to be the exact one thirty years ago by Dumas; and, finally, M. Gaudin, M. Marignac, and ourselves only waited for sufficient experimental proof to adopt it once for all. Indeed, we were on the point of again consulting our balance to investigate this question anew, when the results obtained by M. Marignac were laid before us.‡

M. Hermann von Meyer, the well-known palæontologist, whose name has already appeared in one of our former papers, has announced to the Academy of Sciences of Paris, that he is about to send to that Society a work which he describes in these words: "My work treats of the Archegosaurus, the most marvellous animal that ever existed. The creature belongs to the family of the Labyrinthodonts, which became extinct before the end of the Triassic epoch. I have been fortunate enough to determine the entire organization of the Archegosaurus§ at each period of its life. It was in studying this animal that I first discovered the persistence of the embryonic condition of the vertebral

* Until now the diamond has been considered the hardest substance in nature. —T. L. P.

† "Taking the same crystalline form."—T. L. P.

‡ Marignac's Paper, which is extremely interesting, has been published in the *Comptes Rendus* of the Paris Academy of Sciences for the 3rd of May, 1858. Its purely chemical nature prevents our laying the details of it before our readers.—T. L. P.

§ For some late observations on the Archegosaurus by Professor Owen, and an examination of some of M. von Meyer's views of its structure, see Annals Nat. Hist., 3rd Ser., vol. I., p. 320.—Ed. Geol.

column in certain fossil reptiles, analogous to that observed in many fish, both living and fossil. This discovery appears to me as important in a geological as in a physiological point of view."

M. Wencelides writes, from Hermannstadt (Transylvania), on the sand-banks of the Pacific Ocean. He thinks that many of them, especially those of the Indian Archipelago, ought to be explored. "It might be done," he says, "without difficulty, and would be useful to the arts, inasmuch as those sand-banks would, no doubt, be found to contain the same precious metallic ores that are now observed in the alluvial formations of the neighbouring coasts, of which the sand-banks in question appear to be a prolongation." In a letter upon some earthquakes at the Cape of Good Hope, to which we shall refer again shortly, M. de Castelnan, French Consul, says that during these phenomena, "the lower animals appeared as frightened as the men." This came to M. Boussingault's ears, who feels inclined, from his own observations, to uphold a contrary opinion. This distinguished naturalist and traveller tells us, that during the violent earthquakes he witnessed in South America, he observed that certain animals showed, with regard to this terrible phenomenon, the utmost indifference. As M. Boussingault was at that time living in a house constructed entirely of bamboo-stems and the leaves of palm-trees, he was not threatened with being crushed to death by the falling-in of his establishment, had such an event taken place. He was, therefore, perfectly at liberty to observe the most awful phenomena of this kind at his ease. The following lines, written during his stay in South America, are taken from one of his MS. note-books:—"At six o'clock in the evening I was sitting in my chamber, when I suddenly felt a violent shock; it appeared to me that some one was trying to force open the door of my habitation, but, as the shaking movement continued, I went out, and found my servants on their knees praying in the utmost consternation. The earth oscillated horizontally without ceasing, and in a north-west and south-east direction. This lasted for five or six minutes. . . . During the phenomena two goats that were in my field remained quietly reposing on the ground. Two mules which were standing at a little distance continued to graze, as if nothing remarkable were taking place, and as if the ground had been perfectly still. My cat, profiting by the disorder into which our kitchen was thrown, actually committed a theft by running off with a piece of meat. . . .When the earth had ceased moving, we heard sixteen detonations, at intervals of thirty seconds. The noise of each was instantaneous, or without rumbling, and resembled the report of distant cannon in a south-easterly direction."