FORMATION OF SILICIOUS ROCKS.

Mr. Sterry Hunt then spoke of sediments resulting from the desintegration and chemical decomposition of quartzose, feluspathic and pyroxenic rocks. In these the coarser portions consist of quartz and of feldspar containing potash, while the finer clays have less silica but more alumina, and besides alkalies lime, magnesia and iron, which are rare in the coarser sediments. These latter being more pervious to water, the small portions of soda, lime and magnesia still remaining are removed by lixiviation, while the clays retain these bases. When these different sediments are altered and crystallized we shall have on the one hand granitic or trachytic, and on the other pyroxenic rocks, the two great types recognized in igneous rocks, all of which Mr. H. regards as derived from the alteration and fusion of sedimentary strata. To the gases and vapors evolved by the fusion of deeply buried strata are to be referred the phenomena of earthquakes and volcanos. The latter although dependent on the heat of the earth's nucleus, are not directly connected with the central fire.

LITHOLOGY OF VERMONT.

Mr. C. H. Hitchcock read a paper upon the so-called talcose schists of Vermont. The geological surveys of the various states have made known the existence of a broad belt of rocks from Canada to Georgia, consisting of green schists denominated talcose, associated with gneiss. This implies the presence of the mineral talc, which contains a large per cent of magnesia. He would not affirm the conclusion at which he had arrived applied to the whole belt, but that probably the character of the whole was the same—aluminous instead of magnesian. Mr. Sterry Hunt of Montreal had analyzed some of these rocks in their northern extension into Canada, and decided that there was no magnesia present, and that talc was replaced by pyrophyllite or pholerite, and had proposed to call them *nacreous schists*, instead of talcose. The rock was originally clay slate. Mr. Hitchcock offered several analyses of these rocks in Vermont, which were made for him by Mr. G. G. Barker of Boston, whence he concluded that there was no magnesia present, but that they were hydrous silicates of alumina with feldspar. One of the specimens from Pownal, Vt., was interesting as affording the composition of dysyntribite and of parophite, a mineral found in certain rocks in Canada by Mr. Hunt.

An analysis of a sandstone belonging to the Oneida conglomerate was also given, which went to show that some of the talcose schists were formed from sandstone probably of that age.

THE FLORA OF JAPAN AND NORTHEASTERN AMERICA.

Prof. Asa Gray, gave a theoretical explanation of the identity or similarity existing between the flora of Japan and that of the northeastern part of North America. In the beginning, the speaker said that many plants supposed heretofore to be found only in the northeastern part of North Ameria had lately been found indigenous to Japan, and instanced the poison ivy, the fox grape, choke cherry, sweet cicely and ginseng as examples. Among shrubby plants our poison dog-wood has a prototype in the varnish tree of Japan. Closely allied species generally occur in the same, or contiguous localities, but here are identical species found on opposite sides of the globe, and the question naturally arises, what bearing have these facts on the theories of the original distribution of species? Three different views have been advanced to explain the distribution of the same plants on the globe. The first supposes them to have originated in many different localities where they now are found. This is the view entertained by Prof. Agassiz, and on this theory these peculiar plants must have originated in two distinct and widely separated districts. The second theory refers the origin of each species, to one place, but allows some of them to have been reproduced in other localities as exceptions to the general law. The third refers each species to one place only as its starting point, though not from one pair, necessarily, unless it be in the case of the higher plants. This was the theory adopted by the speaker, although the facts already given as to the plants found in Japan, at first seemed opposed to such an idea. In explanation of those facts, he said the similarity of climate between Japan and New England would not be sufficient. The plants of western Europe are not like those of Oregon and California, though the climate is. The idea that the seeds have been carried naturally from one country to the other is not satisfactory. He supposed the flora of this country to be older than the fauna; and that it dates back probably to the post-tertiary period. The evidence of this last he based principally on the alleged fact that fossilized specimens of our present flora have been found, and referred to about the time of the drift period; and he then explained at some length his views as to the effect produced on the vegetation by the changes in temperature during the glacial period. Whatever dispute there might be as to this last matter, the fact would not be denied that our present flora appeared soon after that period. In the diluvial epoch the temperature in this latitude must have been much warmer than it now is; the temperate flora of the present day, then also in existence, must have extended much further north, perhaps nearly up to the Arctic circle, and probably spread across from one continent to the other. Want of time prevented him from giving his views as to why he adopted the third theory of the origin and distribution of plants rather than the others; he simply wished to-day to give his views in explanation of facts seemingly opposed to it.

DEVONIAN AND CARBONIFEROUS FLORA OF BRITISH AMERICA.

Prof. Dawson of Montreal gave a summary of results which he had obtained from the study of the land plants preserved in the Devonian rocks of Gaspé,—the Gaspé sandstones of Sir W. E. Logan's survey. The most remarkable of these remains is a Lycopodiaceous plant, for which he had instituted the new genus *Psilophyton;* it is so preserved in the Gaspé sandstones as to exhibit all its parts in a remarkably perfect manner. Many so-called Devonian fucoids are merely fragments of this plant. The Devonian flora of Canada also includes a conifer named by Prof. D. *Prototaxites Logani*, a *Lepidodendron, Nœggerathia,* and *Knorria,* with some other plants not determined. In the collection of Dr. Jackson of Boston, and at Portland, Prof. D., had seen specimens indicating that a similar flora exists in rocks probably Devonian at Perry, Maine.

The remainder of the paper was occupied with the results of an extensive series of Microscopic observations on the Coal of Nova Scotia, prepared by new methods. A number of beautifully preserved vegetable tissues were described, and the following general conclusions stated. 1st. The mass of the coal is of gymnospermous or cryptogamous origin, principally from sigillaria and calamites, and accumulated by growth *in situ.* 2d. The rate of accumulation of coal must have been very slow. The sigillaria were allied in structure to cycads and conifers, and it is chiefly their bark and woody axes that occur in the coal. In a vertical foot of coal we may have the bark of a hundred successive generations of trees. The climate of the coal-producing eras was equable and moist as in the islands of the southern hemisphere at the present day. The coal forests were dense and covered large plains; as the trees fell they gradually decayed, and a dense vegetation soon covered the whole mass. The growth of sigillaria was more rapid than that of trees of the present day of like size, but their structure proves that they did not spring up in a month or two as some have supposed.

DEVONIAN GRANITES AND TACONIC ROCKS.

Prof. Hitchcock of Amherst then read a short paper giving an account of a deposit of fossiliferous limestone beneath granite and mica slate in Derby, Vt. He wished to call attention to this locality, as he had found something new to him, and leading to different conclusions than those commonly held. This deposit occurs near Lake Memphremagog. He showed by diagrams the granite overlying the limestone, and what was singular, the former dipped down into the latter in veins and there terminated. He called on Sir William Logan of Montreal for his views on the subject.

The latter said that on the Canada side of the boundary line this limestone had been traced from Memphremagog lake near Derby, to the Gulf of St. Lawrence in Gaspé, a distance of 500 miles. It was well stored with fossils at several places, and appeared to be partly Upper Silurian and partly Devonian. One of the localities of fossils was Memphremagog lake, when the fossils appeared to be allied to Devonian forms. In this neighbourhood there are masses of granite. Bebee's plain bordering on the lake presents an area of thirty-six square miles of granite from which emanate dykes cutting and dislocating the calcareous strata. From this it is evident the granite is newer than the limestone, and therefore may well be found occasionally to overlie it. The granite he considered to be of the same age as that so widely extended in New Hampshire and Maine: it had been traced to New Brunswick, and at Bathurst was found to underlie the coal formation. Its age would thus be Devonian. On the west side of the Green Mountain range there was a calcareous area related to the limestones of Rutland, which, from a section he had lately made eastward from Lake Champlain in the neighbourhood of Burlington, he considered to be of the same age as that at Memphremagog.

Mr. J. P. Lesley of Philadelphia, said that since Sir William Logan had informed them, that he had lately been making some investigations in Vermont, he would probably be able to state some opinion in regard to the Taconic rocks.