per cent. nickel. This, with the uncommon appearance of the metal, which was perfectly free from rust, and had the peculiar silvery whiteness of meteoric iron, puts the source of the specimens alluded to out of all doubt. The one mass is probably entirely iron, and too hard and intractable for farther management; the other appears to be a meteoric stone, containing pieces of iron, which they succeeded in removing, and extending upon a stone anvil.—Quart. Journ. Sc., 1818, vol. vi., p. 369.

NOTICES OF MEMOIRS.

I.—The Fossil Flora of Great Britain.

THE Fossil Flora, by Lindley and Hutton, has been long known as the only general work containing figures and descriptions of the vegetable remains found in a fossil state in this country, and which must always be consulted by every scientific investigator of this subject. Since the completion of the third volume, more than thirty years ago, many important papers have been published on the Palæontological Botany of the British Islands, by Dr. Hooker, Bunbury, Prof. Haughton, Prof. Heer, Carruthers, and others, but no general work or continuation of the Fossil Flora has appeared, a desideratum very much needed, and which it is now proposed shall be supplied.

Mr. Quaritch having recently purchased the copper-plates and copyright of this standard work on the Fossil Plants of Britain, and knowing the extreme rarity of the book, has resolved to produce a fac-simile re-issue of the work, from the original copper-plates. To secure the accuracy of the re-issue, Mr. Quaritch has fortunately secured the aid of Mr. Wm. Carruthers, of the British Museum, to superintend it, whose valuable contributions to Fossil Botany are well known to the readers of the Geological Magazine. In addition to re-editing the original work, Mr. Carruthers will prepare a Supplementary Volume, containing figures (in not less than 40 plates) and descriptions of all the important additions made to the Fossil Flora of Britain since 1837; together with a critical examination of the species in Lindley and Hutton's classic work, and a synopsis of all the known Fossil Plants of Britain, which will bring the whole work up to the state of the science at the present day. The work will be issued in monthly parts, commencing in May next.

II.—Notes of a Visit to Dominica.

By R. J. Lechmere Guppy, F.L.S., F.G.S.

[Proceedings of the Scientific Association of Trinidad, December, 1869.]

HAVING spent a few weeks in Dominica, Mr. Guppy has given us a sketch of the physical structure of the island. His observations are the more interesting as it seems that its geological features have not previously been described. Situated between

Martinique and Guadeloupe, Dominica, like them, is a mass of mountains of volcanic structure. There is little that can be called level land, save the alluvial flats of the larger river valleys. The spurs of the mountains usually come down to the sea, often ending in high cliffs and precipitous headlands.

Immediately at the back of the town of Roseau, the capital of the island, there is a hill called Morne Bruce, composed of volcanic rocks, upon which lies a marine formation, which seems to have been part of an immense fringing reef, which existed when the island was at a lower level by some 300 feet. This coral formation is overlain by more recent volcanic accumulations.

Craters do not seem to occur on the higher mountains, but small volcanic cones, often very perfect, exist on the lower ridges. Most of the rocks are varieties of trachyte.

Sulphur springs are a common feature all over the island, having mostly a high temperature, approaching the boiling point.

The structure of Dominica seems to show that two distinct periods of great volcanic activity occurred, in the interval between which the land was much depressed, and coral reefs were formed upon the previous volcanic accumulations. The species of corals determined are: *Favia ananas*, *F. coarctata*, and *Eusmilia aspera*; there are, however, many others, whose specific names cannot be stated with confidence. Mr. Guppy gives also a list of twenty-two species of Mollusca from the same formation, which is stated to be of Pliocene age.

III.—The Geognosy of the Appalachians and the Origin of Crystalline Rocks.[1]

By T. Sterry Hunt, LL.D.

THE twentieth meeting of the American Association for the Advancement of Science was held at Indianapolis, on the 16th of August, 1871. On this occasion, the retiring President, Dr. Hunt, as is customary, delivered an address, of which the subject chosen was the history of the great Appalachian mountain chain. He remarks that nowhere else in the world has a mountain system of such geographical extent been studied by such a number of zealous and learned investigators, and no other has furnished such vast and important results to geological science.

Dr. Hunt first brings forward certain facts in the history of the physical structure, the mineralogy, and the palæontology of the Appalachians; and, in the second place, discusses the conditions which have presided over the formation of the ancient crystalline rocks that make up so large a portion of this great eastern mountain system.

A section across northern New York, from Ogdensburg, on the St. Lawrence, to Portland, in Maine, shows the existence of three distinct regions of different crystalline schists. These are—(1). The Adirondacks, to the west of Lake Champlain; (2). The Green Moun-

[1] Printed in advance from the Association number of the American Naturalist. 8vo. Salem, 1871.

tains of Vermont; and (3), The White Mountains of New Hampshire.

(1). The Adirondack series, to which the name of the Laurentian system has been given, is composed chiefly of granitic gneisses, which are frequently hornblendic, but seldom or never micaceous. It contains no argillites, which are found in the other two series. The quartzites, and the pyroxene and hornblendic rocks, associated with great formations of crystalline limestone, with graphite, and immense beds of magnetic iron ore, give a peculiar character to portions of the Laurentian system.

(2). The Green Mountain or Huronian series consists largely of a fine-grained petrosilex or eurite; true gneiss, which is ordinarily more micaceous than the typical Laurentian gneiss, also occurs. Massive stratified diorites, and epidotic and chloritic rocks, often more or less schistose, with steatite, dark coloured serpentines and ferriferous dolomites and magnesites, also characterize this gneissic series. These are intimately associated with beds of iron ore, generally a slaty hæmatite, but occasionally magnetite. Chrome, titanium, nickel, copper, antimony, and gold are frequently met with in this series. The gneisses often pass into schistose micaceous quartzites, and the argillites, which abound, frequently assume a soft, unctuous character, which has acquired for them the name of talcose or nacreous slates, though analysis shows them not to be magnesian, but to consist essentially of a hydrous micaceous mineral. They are sometimes black and graphitic.

(3). The White Mountain series is characterized by the predominance of well-defined mica-schists, interstratified with micaceous gneisses. There are also beds of micaceous quartzite. Hornblendic gneisses and schists occur, which pass occasionally into beds of dark hornblende-rock, sometimes holding garnets. Here and there beds of crystalline limestone are also found, and sometimes accompanied by pyroxene, garnet, idocrase, sphene, and graphite. They are intimately associated with highly micaceous schists containing staurolite, andalusite, cyanite, and garnet. To this third series belong the concretionary granitic veins abounding in beryl, tourmaline, and lepidolite, and occasionally containing tinstone and columbite.

Dr. Hunt traces out the geographical distribution of these three groups, and discusses the opinions of different observers in regard to their relative ages. His own conclusion is that the whole of the crystalline schists of eastern North America are Pre-Cambrian in age.

Referring to the evidences of similar rocks in other countries, he states his opinion that the crystalline rocks of Anglesea and the adjacent part of Caernarvon, mapped as Cambrian by the Geological Survey of England, are probably of Pre-Cambrian age, a view which he mentions is supported by the opinions of Sedgwick and Phillips.

These rocks appear to him to be identical with the rocks of the Green Mountain series.

In the Highlands of Scotland there exists a great volume of fine-grained, thin-bedded mica-schists, with andalusite, staurolite, and cyanite, which are met with in Argyleshire, Aberdeenshire, Banff-

shire, and the Shetland Isles; these Dr. Hunt is convinced will be found to belong to a period anterior to the deposition of the Cambrian sediments, and will correspond with the newer gneissic series of the Appalachians.

Rocks regarded by Harkness as identical with these of the Scottish Highlands also occur in Donegal and Mayo.

From an examination of a large collection of the crystalline rocks of this area Dr. Hunt is enabled to assert the existence in the north-west of Ireland, of the second and third series of crystalline schists. He also observes that micaceous schists, with andalusite (chiastolite) of the type of the White Mountain series, occur on Skiddaw, in Cumberland.

He states his conviction that in the study of the crystalline schists, the persistence of certain mineral characters must be relied upon as a guide, and that the language used by Delesse in 1847 will be found susceptible of a wide application to crystalline strata—"Rocks of the same age have most generally the same chemical and mineralogical composition, and that reciprocally, rocks having the same chemical composition and the same minerals, associated in the same manner, are of the same age."

Turning now to the genesis of the crystalline schists whose geological relations he has just discussed, Dr. Hunt observes that the gneisses, mica-schists, and argillites of various geological periods do not differ very greatly in chemical constitution from modern mechanical sediments, and are now very generally regarded as resulting from a molecular re-arrangement of similar sediments formed in earlier times by the disintegration of previously existing rocks not very unlike them in composition.

The whole history of these rocks shows that their various alternating strata were deposited under conditions of sedimentation very like those of more recent times. In the Laurentian system, great limestone formations are interstratified with gneisses, quartzites, and even with conglomerates. All analogy, moreover, leads us to conclude that even at this early period life existed at the surface of the planet, and such has indeed proved to be the case by the discovery of the *Eozoön Canadense*. Great accumulations of iron-oxyd, beds of metallic sulphides and of graphite, exist in these ancient strata, and we know of no other agency, says Dr. Hunt, than that of organic matter, capable of generating these products.

REVIEWS.

I.—The Student's Manual of Geology. By J. Beete Jukes, M.A., F.R.S. Third Edition, re-cast, and in great part re-written. Edited by Archibald Geikie, F.R.S. 8vo. pp. 778. (Edinburgh: A. & C. Black, 1872.)

THE value of any Manual in relation to the branch of Natural Science of which it treats—and especially a Manual of Geology—depends to a very large extent upon the antecedents of its author,