

of the Alps might be; one paradise of lovely pasture andavenued forest of chestnut and blossomed trees, with cascades docile and innocent as infants, laughing all summer long from crag to crag and pool to pool, and the Adige and the Po, the Dora and the Ticino, no more defiled, no more alternating between fierce flood and venomous languor, but in calm clear currents bearing ships to every city and health to every field of all that azure plain of Lombard Italy. . . . Without in the least urging my plans impatiently on any one else, I know thoroughly that this which I have said *should* be done, *can* be done, for the Italian rivers, and that no method of employment of our idle able-bodied labourers would be in the end more remunerative, or in the beginnings of it more healthful and every way more beneficial than, with the concurrence of the Italian and Swiss Governments, setting them to redeem the valleys of the Ticino and the Rhone. And I pray you to think of this; for I tell you truly—you who care for Italy, that both her passions and her mountain streams are noble; but that her happiness depends, not on the liberty, but the right government of both."

#### CAPTAIN FRED. BROME

WITH great regret we have to record the death of Captain Fred. Brome, formerly Governor of the Military Prison on Windmill Hill, Gibraltar, and well known to many of our geological and archæological readers as the able and indefatigable explorer of the ossiferous caves and fissures of the rock.

His explorations, an account of which, so far as they related to the human remains and relics, was published in the Transactions of the Congress of Prehistoric Archæology for 1858, were commenced in April, 1863, and unremittingly continued, often under considerable difficulties, to December, 1868, when he was most unaccountably removed from the post he had so long and so well occupied.

The amount of labour and responsibility thus voluntarily undertaken by Captain Brome, solely in the interest of science, and without any personal motive whatever, can scarcely be imagined, nor can the value of the results obtained by him be easily over-estimated.

A more striking instance of self-devotion to a purely scientific object can nowhere be found.

The results of Captain Brome's work may be said to have afforded all, or nearly all, the knowledge we possess of the priscan population of the Rock of Gibraltar, and have added enormously to our materials for determining the nature of its quaternary fauna, as disclosed in the ossiferous breccia and other contents of the rock fissures, from the examination of which Cuvier truly anticipated that the most important information would be derived.

Captain Brome's death occurred, we are sorry to say, under very melancholy circumstances. Having been removed from the post which he had so long and so usefully filled, and for which, from his great experience, extraordinary energy, and high sense of duty, he was so admirably qualified, he was appointed, on coming to England, Governor of the Military Prison at Weedon. Here he hoped to find an asylum for his family, and some compensation for the sacrifices he had been compelled to make in leaving Gibraltar.

But this was not to be. Amongst the numerous reductions of late effected in our military establishments, the disestablishment of the prison at Weedon was one. The notice that his services would be no longer required was received by Captain Brome a short time since, and it seems to have so affected him, from the apprehension that his family would thus be deprived of all support—and this after a public service of thirty years—that, although a strong and vigorous man, he gradually sank, from mental depression, as it would seem, and he may truly be said to

have died of a broken heart on the 4th March, leaving a widow and eight children, we fear wholly unprovided for.

A more melancholy case, and one more deserving of the sympathy of the scientific world, and, as we should venture to hope, of the consideration of the authorities at the War Office, it is impossible to conceive. G. BUSK

#### THE GEOLOGY OF THE HOLY LAND

IN the year 1866 the Duc de Luynes organised an expedition for investigating the physical geography and geology of the Holy Land and part of the surrounding territories. Narratives of some features of the explorations have already been given to the world, but it is only now that the first part of the geological report appears. M. Lartet, the geologist of the expedition, has chosen as the vehicle of publication for his memoir, the opening number of a new magazine—the *Annales des Sciences Géologiques*. Instead of confining himself to a record of what he personally accomplished, he has with much labour given a brief summary of the publications of previous writers, and has incorporated their results with his own, so as to present in a clear and connected form the sum of all that is at present known regarding the geology of the country between Lebanon and the Red Sea. Until the whole of the memoir is published it would be premature to pass judgment upon the position which it will ultimately take in the geological bibliography of Palestine. The present instalment, after its introductory and historical sections, passes on to describe the igneous and crystalline rocks, leaving the great limestone and later formations for a subsequent paper.

Viewed in the great scale, the geological structure of Palestine is remarkably simple. A long table-land or succession of table-lands, consisting for the most part of horizontal or gently inclined cretaceous and nummulitic limestones, is traversed by the valley of the Jordan, and cut through by transverse valleys, many of which are now quite dry. Stretching southwards into the peninsula of Sinai, these calcareous plateaux end against a mass of high rugged ground—the mountain-group of Sinai and Arabia—consisting of crystalline rocks. Here and there on the west side of the Jordan Valley, but much more markedly on the east side, the table-lands are roughened by rocks of volcanic origin. Everywhere there is evidence of vast denudation, whereby the plateaux have been cut into valleys and hills, and of a former climate when rain and river-water were much more developed than they are now.

M. Lartet describes at some length the crystalline rocks which enclose the upper end of the Red Sea, and enters into considerable detail regarding the mineral differences of these various rocks; but he touches with tantalising brevity upon their geological relations—a fault, however, which he shares with all other writers who have treated of the geology of these regions. We only learn from him that there is a central nucleus of granite round which are folded successive zones of gneiss and various schists and slates, and that all these rocks are pierced by intrusive masses of porphyry, dicrite, melaphyre, serpentine, &c. From the granites and old intrusive rocks he passes, by what seems an abrupt and awkward transition, to the basalts and lavas, which are among the most recent of the geological formations of the country; and he then takes up the schistose rocks. This arrangement is much more a petrographical than a geological one. We cannot but think that it interrupts the chronological sequence of events which it is the business of a geologist to decipher and describe. The volcanic rocks were not erupted until the cretaceous table-lands had been long exposed to denudation. It would surely have been better, therefore, to have deferred the history of the eruptions until some

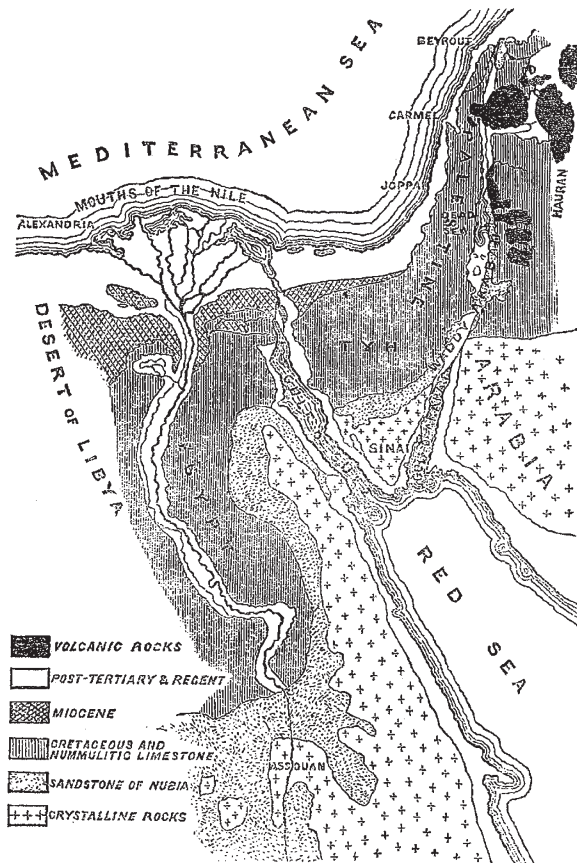
account had been given of the rocks over which they took place.

There can be no doubt that Palestine and the surrounding countries have been the scene of powerful volcanic activity from a time which, though in a geological sense recent, is yet immensely remote when measured by human standards. In the Holy Land itself that action has now ceased, though abundant hot springs still testify to its recentness, while along the shores of the Red Sea there are even at this day some still active craters. On the west side of the Jordan Valley, the fertile plain of Esdraelon is strewn over with basaltic débris, while a little farther to the north and east, true *coulées* of basalt are found on the flanks of Little Hermon. Near Tiberias another *coulée* comes down from the west to the margin of the Lake; while still farther north stands the basaltic

freshest traces of volcanic phenomena occur; some of the cinder cones still remaining with their enclosed craters like those of the Puys of Auvergne.

The long period during which volcanic action continued to manifest itself is well shown by the fact that the older basalts are found capping limestone plateaux which have since been cut through by valleys descending into the Jordan and the Dead Sea, while these valleys have served as moulds into which the later lava currents have, in numerous instances, been poured. Such a sequence of events is a repetition of the well-known structure of Auvergne. There is a further resemblance to the volcanic district of central France in the singular freshness of some of the cones.

But of all the geological features of Palestine, that which possesses, perhaps, the strongest interest is the



GEOLOGICAL MAP OF PALESTINE AND LOWER EGYPT

mass of Safed, which seems to have been the great volcanic centre of that district. But it is on the east side of the line of the Jordan and Dead Sea that the most remarkable display of volcanic rocks is to be found. The high grounds of Moab and Ammonitis are dotted with the sites of ancient volcanos, from which streams of lava have descended, sometimes even into the Dead Sea. The houses of Rabbath-Moab were built of these basalts. Farther north, from the heights of Ajlun, the eye travels over a vast basaltic plateau, which stretches north to the roots of Hermon and Anti-Lebanon, and eastward until it is crowned by the imposing volcanic mountain of Hauran. Some portions of these regions are dreary beyond expression—rough with dark rugged lava streams and scattered scoriæ, rendering the journey of a traveller slow and laborious. It is in this wild region that the

valley or depression which stretches from Lebanon along the line of the Jordan, the Dead Sea, and the Waddi Akabah to the head of the eastern arm of the Red Sea. Notwithstanding the yearly increase of travellers in the Holy Land and the rapid multiplication of descriptions of the country, it must be owned that no very satisfactory account has yet been given of the geographical structure and probable origin of this, the most remarkable depression upon the globe. In the present part of his report M. Lartet does not discuss this subject, nor does he enter into the existing contour of Syria or the causes which may have led to the drying up of the Waddys and the general desiccation of the climate. These questions he will probably discuss in the next portion of his valuable memoir, to which we hope to call attention when it appears.

ARCH. GEIKIE