Red Sandstone series. Such concession would not mean that their date of deposition, with reference to the burial of the *Stagonolepis* in the siliceous and aluminous muds of the estuary, was exactly coeval with the time when some few representatives of the *Pterichthys* family found their way down south, and lived in the shallow waters which washed the shores of certain islands, now known to us, geographically, as parts of England and Wales; to wit, Shropshire, Herefordshire, and Monmouthshire; for it is very doubtful whether any scheme exhibiting the contemporaneity of one deposit with another in time can be drawn. Indeed, it must be borne in mind that any one period in geological time studied for any scientific purpose must necessarily be regarded as a geographical study, and that the landscape which the mind of the student draws out of the materials at his disposal is one very liable to error; for, when stretched before his mental vision, it has to be tested by geographical conditions now existing on the surface, and not by any presumed state of affairs common to the whole physical and palæontological economy of the world. Dame Nature shifts the scenes in a very complex and elaborate manner, and 'rings in the next piece' with a complete knowledge of the varied and numberless interests involved in its construction.

IV. ON THE GEOLOGY AND PHYSICAL FEATURES OF THE VALLEY OF THE JORDAN, THE DEAD SEA, AND THE ADJACENT DISTRICTS.

By the Rev. H. B. TRISTRAM, M.A., F.L.S.

[Abstract of Paper read before the British Association, September 1865.]

MANY travellers have spoken of the numerous traces of volcanic action to be found in the neighbourhood of the Dead Sea; but the author states that he invariably found the 'lavacurrents' of M. de Saulcy to be nothing more than deposits of silica and nodules of oxide of iron, while his 'extinct craters' proved to be the flat summits of limestone-hills.

The two parallel ranges of hills which run nearly north and south, and form the eastern and western margins of the valley which includes the Ghor and the Dead Sea, and extends nearly to Akabah, consists chiefly of rocks apparently of the age of the Lower Chalk, and having a synclinal dip. Round the shores of the Dead Sea, there are abundant traces of a much more recent deposit, probably Post-tertiary; it is a saliferous marl, containing unfossilized Shells of the species that now exist in the Jordan.

Descending from Jericho to the Dead Sea (a fall of 600 feet), a good notion of the physical features of the country may be obtained. First, there is an old terrace-line, about 400 feet above the present level of the Jordan, formed of a very coarse and soft limestone; then the lower terrace-line, 55 feet above the present level of the plain, composed of friable earths strongly impregnated with various salts, and having a slight but hard saline crust at the top, besides many interstratified layers. This second terrace is scarped and furrowed in all directions by aqueous action, and where the plateau projects into the plain it forms the tops of a series of mamelous,

which could not be well illustrated except by photographs. This plain itself is a soapy marl, and at a slight depth below the surface presents the appearance of a rich loam; but the only plants existing were two species of *Salsola*.

This deposit of marl, extending all round the shores of the Dead Sea, and up the Wadys which open into it, forms the chief feature in the geology of the district. Above it, three water-worn terraces, corresponding on both sides of the Ghor, can be distinctly traced in the Cretaceous cliffs.

South of the Wady Dabur, at the north-west end of the Dead Sea, a mass of igneous rocks crops out of the hills like a dyke, in three ridges, cutting through the gravel at an angle of 70 or 80 degrees. The cliffs above the slopes generally consist of a sandy limestone, very variable in its texture, and frequently mixed with conglomerate, containing pebbles of all sizes. Near Feschkah a basaltic dyke runs NE. and SW. Four hot sulphurous springs occur between Ras Feschkah and the south-west end of the Dead Sea, at a short distance from the shore; the temperature of the water in some of them rises to 120° Fahr., and sensibly affects that of the sea at a distance of many yards.

Mr. Tristram then described the hill of Jebel Usdum, which is a huge ridge of salt, about a mile wide, and running NE. and SW. for a distance of three miles and a half, then due N. and S. for four miles further; it is situated near the southern extremity of the Dead Sea, and renders that end of it much more salt than the northern portion. Further, the author thinks that it is the proximate cause of the saltiness of the Dead Sea, the drainage to which has been dissolving away portions of the salt, and carrying it to the Dead Sea, ever since the elevation of the ridge of Akabah separated the latter from the Red Sea, or since the dessiccation of the ocean, which existed to the Eocene Period, presuming (which seems most probable) that the fissures of the Ghor were of submarine origin, and that the valley itself was during the Tertiary Period the northernmost of a series of African lakes, of which the Red Sea was the next. The volume of the Dead Sea from that time continually decreased, by the evaporation of its water, probably to the time of the Glacial Epoch, of which we find traces in the Lebanon and elsewhere, so that two causes have combined to increase the intensity of its saltiness, which is still becoming greater, though the volume of water has probably been in equilibrium since the termination of the Volcanic and Glacial Epoch. Sulphur and gypsum are associated with salt at the foot of Jebel Usdum; and there is an extensive deposit of sulphur and bitumen in the Mahawat Wady, two miles SW. of the Dead Sea.

The author then gave a general sketch of the geology of Palestine. The Lower Cretaceous period is the only one represented by sedimentary rocks; but in the north-east, in the Lejah district, volcanic rocks occur abundantly; and Mr. Tristram concluded his paper by describing the extinct volcanos, and the ancient lava-streams of the valley of the Hieromax, the shores of the Sea of Galilee, and other portions of the North of Palestine.