

32 feet in the recent shafts) on shafts disused and neglected for centuries. And of course this expansion, when it became too great for stability, would ultimately produce subsidences at the surface such as were once visible at A and C.

It may perhaps seem disappointing, at first, that something approximating to the discovery at Eltham in 1878 was not the result of the course taken by the recent tunnel beneath the site of the subsidence at A. But at Eltham the chamber in the Chalk was preserved because the shaft leading to it was preserved. It had escaped destruction through the exceptional circumstances that it had been utilized, in some way or other, centuries after the purposes of its originators had been forgotten. But in the case of the disused and neglected pits at Blackheath, the surface subsidences implied the simultaneous destruction of all that had up to that time remained of shaft and chamber below. The evidence afforded by the recent tunnel therefore confirms, as strongly as circumstances allow, the hypothesis that these Blackheath subsidences mark the sites where once existed shafts with chambers in the Chalk below, like the pit at Eltham.

#### *Note.*

This seems to be a good place for the introduction of the following brief account of a Blackheath subsidence in the year 1798. It is from the *Gentleman's Magazine* for that year, p. 1078:—

"Nov. 19. A singular accident happened last week at Blackheath. As a farmer and his son were conversing together in a field where a horse was feeding, on a sudden the animal sunk into the earth (hind feet first) to the depth of 15 feet, out of which he was dug, crushed to death. The cavity was only just sufficient to admit his body, the surrounding soil remaining firm."

This certainly suggests a subsidence resembling those at A and C. But its scene must have been a little east, or north-east, of the common now known as Blackheath.

### VI.—PLANT REMAINS IN BASALT, MEXICO.

By Dr. M. M. SOLÓRZANO, of the Museo Michoacano, Morelia, Mexico, and  
BERNARD HOBSON, M.Sc., F.G.S., of the University of Manchester.

#### (PLATE XI.)

WHEN the members of the "Jorullo Excursion"<sup>1</sup> of the Tenth International Geological Congress were in the city of Morelia, in Mexico, they visited the College of St. Nicholas (founded in 1540), in the buildings of which is the Museo Michoacano. One of the most interesting objects in the Museum in question is a piece of basaltic lava containing remains of maize, which has been described by Dr. M. M. Solórzano, the Curator of the Museum, in an article entitled "Breve noticia acerca de algunos productos volcánicos de las inmediaciones de esta ciudad" in the "Boletín de la Sociedad Michoacana de Geografía y Estadística," Tomo ii, Núm. 8, Morelia, Julio 15 de 1906, pp. 59, 60.

<sup>1</sup> See *GEOL. MAG.*, 1907, p. 5.

The following is a translation of the last two paragraphs of the article: "To conclude these short notes, I will mention another volcanic product which, although it does not<sup>1</sup> occur in the environs of this city as do those previously described, is exceedingly interesting, since it proves not only the small conductivity of lavas in spite of their very high temperature, but also indicates, to a certain extent, the epoch in which volcanic phenomena were in full activity in the region where the rock I refer to was collected."

"This specimen, which is exhibited in the Museum before mentioned [Museo Michoacano], awakened the interest of that expert geologist and engineer, Mr. Ezequiel Ordóñez. It is a basaltic scoria which was collected [at the Hacienda de la Magdalena, distant only some  $4\frac{1}{2}$  leagues ( $11\frac{3}{4}$  English miles) from this city, and at a very short distance from the volcanic Pico de Quinceo],<sup>2</sup> and shows numerous and very distinct external impressions of female ears of maize and also entire grains and carbonized remains of the axis of the ear. (See Plate XI.) This seems to show that the inhabitants of the locality in question cultivated the plant just mentioned when a volcano [one of the extinct ones which exist between Quiroga and Patzcuaro]<sup>3</sup> made the eruption which ejected the rock above described."

It is of interest to recall other occurrences of plant-remains in basalt. J. Macculloch<sup>4</sup> described and figured an erect coniferous tree in basalt at Gribon, Isle of Mull, which has subsequently been referred to by Mr. J. Starkie Gardner,<sup>5</sup> and illustrated from a photograph in Sir A. Geikie's "Scenery of Scotland" (3rd ed., 1901, p. 142).

Mr. H. M. Cadell<sup>6</sup> has described the remains (12 inches long) of a Lycopod stem in basalt at Cowdenhill, Grange pans.

Mr. J. D. Dana, describing the Kilauea (Sandwich Islands) lava of the 1840 eruption, says:<sup>7</sup> "The rapidity with which lava cools is still more remarkably shown in the fact that it was found sometimes hanging in stalactites from the branches of trees; and although so fluid when thrown off from the stream as to clasp the branch, the heat had barely scorched the bark." Describing the Kilauea eruption of 1868, he remarks:<sup>8</sup> "As has happened in most Hawaiian eruptions, trees were enveloped by the lava-flood. Half-charred trunks were standing in 1887 with a rough cylindrical encasement of lava about the stumps."

Mr. J. S. Diller<sup>9</sup> has described a tree pushed over by the advancing lava stream of the Cinder Cone, 10 miles north-east of Lassen Peak, and gives a plate (No. xiv) showing the tree in the lava.

<sup>1</sup> In view of the correction mentioned below the "not" should be omitted.

<sup>2</sup> This is the correct locality according to a letter of November 3rd, 1906, from Dr. Solórzano to me. The printed account states "in the vicinity of Quiroga, District of Morelia."

<sup>3</sup> This is incorrect owing to the true locality being different.

<sup>4</sup> "A Description of the Western Islands of Scotland," etc.: vol. i (1819), p. 568.

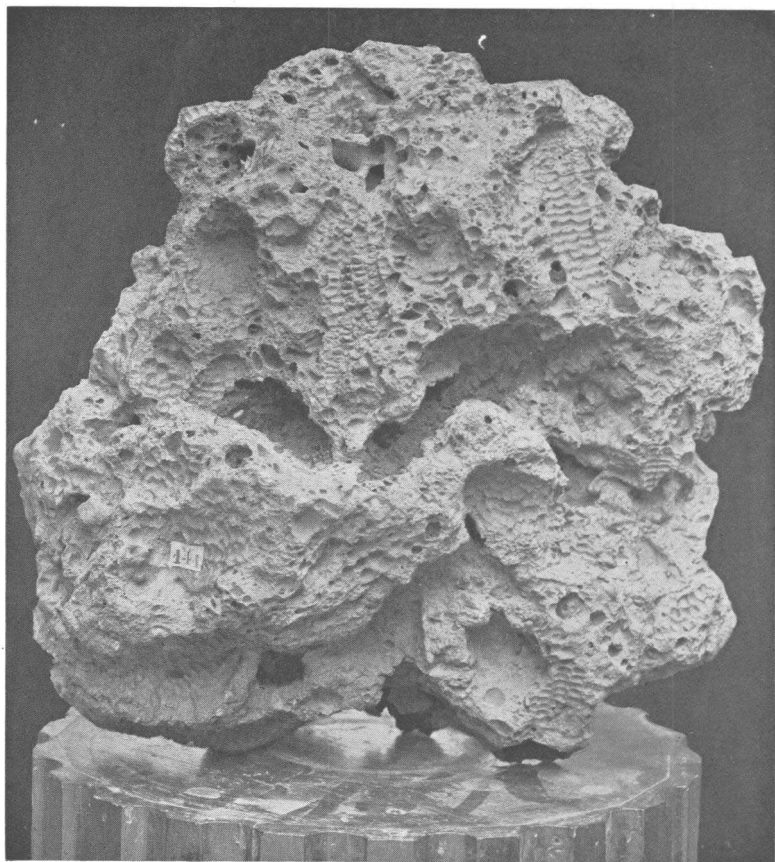
<sup>5</sup> Quart. Journ. Geol. Soc., 1887, p. 283.

<sup>6</sup> "The Occurrence of Plant Remains in Olivine Basalt in the Bonnes Coalfield": Trans. Geol. Soc. Edin., vol. vi (1892), pp. 191-193, pl. vi. (See *infra*, p. 219.)

<sup>7</sup> "Characteristics of Volcanoes," etc.: 1890, p. 64.

<sup>8</sup> *Loc. cit.*, p. 91.

<sup>9</sup> "A Late Volcanic Eruption in Northern California and its peculiar Lava": Bulletin No. 79, U.S. Geol. Survey, 1891, p. 20.



Remains and Impressions of Ears of Maize in Basalt, Morelia,  
Mexico.

Slightly less than one-third linear of the size of the original specimen.

The late Mr. F. A. Fouqué, describing some phenomena observed on Etna, says<sup>1</sup> (trans.): "The lava of the 1865 eruption flowed through the midst of a wood of lofty trees. . . . Many trees had been torn up or burnt. Nevertheless, a great number of them remained standing on each side of the fissure, in spite of the movements of the ground and in spite of the incandescent current which had for a moment surrounded them. The trees thus preserved were all, without exception, surrounded by a stony sheath formed of solidified lava. The interior surface of this sheath had moulded itself on the surface of the tree, of the bark of which it sometimes reproduced all the details with surprising fidelity."

Mr. R. H. Walcott<sup>2</sup> has described a pseudomorphous replacement by solid basalt of a tree 10 feet high with a branch and roots. The stem has an average circumference of 31 inches: "The surface bears a number of corrugations and has the identical appearance of bark." "The surrounding basalt comprising the mould in which the tree was formed, judging from the two available pieces, is to all appearances of the same nature as the cast." The cast was found in a quarry at Footscray (which appears to be close to Melbourne).

#### DESCRIPTION OF PLATE XI.

The photograph shows the piece of scoriaceous basalt preserved in the Michoacan Museum, Morelia, Mexico. The specimen measures 12·09 inches in height, 13·26 in width, and 7·60 in thickness (front to back). Impressions of ears of maize are shown on the right (*a*) just below the right upper corner, (*b*) towards centre of margin overhanging a cavity, (*c*) at the two right bottom corners; but the most striking example is just above the two converging central cavities, where an ear in a vertical position shows not only impressions but actual grains of maize. Several other impressions occur, but are indistinct in the plate. The figure is slightly less than  $\frac{1}{3}$  linear of the size of the original specimen.

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[In connection with the foregoing note on Plant-remains in Basalt from Mexico, the subjoined observation by Mr. H. M. Cadell, B.Sc., F.R.S.E., reprinted from the *Trans. Geol. Soc. Edinb.*, vol. vi (1892), pl. vi, pp. 191–193, deserves to be recorded here.—*EDIT. GEOL. MAG.*]

#### VII.—THE OCCURRENCE OF PLANT REMAINS IN OLIVINE BASALT IN THE BO'NESS COALFIELD.

By HENRY M. CADELL, B.Sc., F.R.S.E.

(PLATE XIV.<sup>3</sup>)

**I**N a paper which I read before the Edinburgh Geological Society on 26th January, 1880, and which appears in the *Transactions*, vol. iii, pp. 304–325, a general stratigraphical account is given of the extensive series of interbedded volcanic rocks of the Bo'ness Coalfield in Linlithgowshire.

<sup>1</sup> "Sur la non-altération des couches de houille en contact avec des roches éruptives": *Bull. Soc. géol. France*, ser. II, vol. xxiii (1866), pp. 190–193.

<sup>2</sup> "Note on a Basalt Tree Cast": *Proc. Roy. Soc. Victoria (Australia)*, new series, vol. xii, pt. 2 (1900), pp. 139–144, pl. xiii.

<sup>3</sup> The block for Plate XIV has been obligingly lent by the author, Mr. H. M. Cadell, F.R.S.E.