THE GLASSHOUSE MOUNTAINS.

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The Glasshouse Mountains were discovered by Captain Cook in May, 1770, during his first voyage to southern seas. They were so named from their resemblance, at a distance, to the glass furnaces or glass houses with which Cook was so familiar in Northern England. They were sighted by Flinders in July, 1802, and are mentioned in his "Voyage to Terra Australis in H.M.S. The Investigator."

Mr. Stutchbury, who visited the Caboolture district in August, 1854, gives the following description of these strange peaks:—The special forms and characteristics which the Glasshouse Mountains present are peculiarly interesting. At first sight, hand specimens might be taken for a fine grained granite; but on examining these *en masse* and carefully viewing all the attendant circumstances, there can be no doubt that they are metamorphic sandstones. It is evident that no granite masses could have been projected in the form they now assume; they must have been surrounded by some supporting material such as the continuation or extension of the same strata would give, now removed by denudation. Upon careful examination, lines of stratification can yet be traced. The largest of these mountains, "Beerwah," presents precipitous faces, especially on the northern and eastern faces, exhibiting semi-basaltic columns leaning from the base towards the centre." "We can easily imagine that at a period subsequent to the coal measures there were as many foci of heat as there are now mountains."

The last part of Mr. Stutchbury's statement should have given him the clue to the formation of these remarkable mountains. He tried to account for their formation as masses of plutonic rocks, as igneous rocks which had crystallized at depths, and failed. If he had tried to account for them as volcanic rocks, he would have been more successful. He recognized that "there were as many foci of heat as there are now mountains," but he went no farther. The simplest explanation of their origin is that each marks the site of a volcano, once standing as a truncated cone, its sides built up of alternate layers of tuff and lava, and having a crater at its blunt apex. Below the crater and piercing the central axis of the mountain was the pipe up which molten matter made its exit at each volcanic outburst. After the last explosion, this pipe was filled with a plug of solidified lava that formed the hardest rock of the mountain. By denudation through successive ages all the softer parts of these volcanoes have been swept away. The slopes of tuff, or volcanic ash, and lava have gone, the crater has gone; except in the case of Crookneck or Coonowrin nothing is left but the plug of volcanic rock which filled the volcanic vent. Even this is now suffering denudation in turn. Round the base of each mountain is a talus of blocks, detached from its surface by the action of frost, running water and the daily variations of temperature. With one exception, they rise baldly from the coast plain on which they stand. This exception is Crookneck, which has as its base a small collar of Trias-Jura rocks.

The continuous rains of the first quarter of 1893 brought about an immense landship on Crookneck, and the booming and rumbling of the rock slide caused some alarm in the neighbourhood; the fissure produced by the fall of this immense mass is plainly visible on its S.E. side.

In 1875, the late Sir Augustus Gregory, in his report on "The Geology of Parts of the Wide Bay and Burnett Districts," classes the Glasshouse Mountains with Mounts Cordeaux and Mitchell and Spicer's Peak in the Main Range; and with Mount Lindsay and Mount Barney in the Macpherson Range. He calls the rock in each case a porphyry, and says, "The porphyry consists of a pale brown paste with minute felspathic crystals, though it sometimes varies

so as to consist of very small grains of quartz with minute cavities, containing oxide of iron, resulting from the decomposition of pyrites. Occasionally, it is vesicular, and has the aspect of trachyte." In speaking of the rock as consisting of a brown paste, Mr. Gregory must have had rocks of the Beerburrum type in view, and he very nearly gave their true composition when stating that they had the aspect of a trachyte. As a matter of fact, all these mountains are built up of forms of columnar trachyte in six-sided prisms.

Leichhardt compared the Glasshouses to the Puys of Auvergne, a group of detached cones scattered over the centre of France, some of which still retain their cone-shaped slopes and central crater, while others have reached the state of denudation shown in our Glasshouses, and are reduced to the central plug of crystalline rock. The Puys are also columnar in structure, as may be seen in the illustration handed round.

A letter of Leichhardt's, dated September, 1843, says : Last Saturday I returned from a trip to the Glasshouses ; the highest, Beerwah, is about 1,000* feet high, and is composed of a rock entirely different from the surrounding mountains ; I have seen similar mountain features in Auvergne. Geologists have called this rock domite, because of its affecting the form of a dome. This domite belongs to the trachytic group.

The Rev. J. E. Tenison Wood believed the rocks of the Glasshouses to be basalt, and in his paper on the "Desert Sandstone of the interior of Queensland," published plates showing "Prismatic Basalt, Glass House Mountains."

Mr. Henry G. Stokes, formerly a member of this Society, was the first to show conclusively that the rocks of the Glasshouses belonged to the Trachyte class. Recently, Dr. H. I. Jensen, a Queenslander, and former resident of Caboolture, an ex-scholarship winner, and holder of a travelling science scholarship from Sydney University, has written two exhaustive papers for the Linnæan Society of New South Wales, in which the structure of the mountains, and the nature of their minerals have been fully discussed.

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* The true height is 1,760 feet.

Visitors to the mountains should stay at Bankfoot House kept by Mr. Grigor,* an old resident, who can supply horses and guides. The nearest railway station is Glass Mountain Station, distant about 45 miles north of Brisbane. Bankfoot House stands right in the centre of the Glasshouses. The mountains lie roughly on north and south lines in groups of three ; each group of three lies on a transverse axis, cutting the N. and S. axis almost at right angles. Taking the three lying immediately north of Grigor's—Ngungun, Coonowrin and Beerwah—it will be found on ascending Ngungun, an easy feat by climbing round its south-eastern face, that the points of the other two lie from Ngungun in one and the same straight line. North of these, Mount Mellum, Mt. Blanc and Candle Mountain lie along a parallel straight line, and to the south on a third parallel lie Barren Mountains, Tibrogargan and Mt. Ewan, while south again on an east and west line are Beerburrum and the twin peaks of Toonbubudla. The theory advanced by Mr. Lionel Ball, and by Mr. Jensen is that the north and south lines represent immense faults or fractures or lines of weakness in the rocks north of Caboolture, and that these fractures when formed along north and south folds cause smaller cross fractures. If we press with a straight piece of wood on the surface of a pie crust, the crust will not only break along the line of pressure, but also in numerous places at right angles to the main fissure. Mr. Stokes asserted that there were two or three main lines of fracture parallel to the coast, and that each extinct volcano was placed where the cross faults or fissures cut these.

The columnar structure of these mountains is evident from a distance, on each mountain the columns in the centre are vertical, but on the slopes are parallel to the angle of slope, and all converge towards the summit. The columns on Toonbubudla, the twin peaks, present a very curious structure. Where the end of a prism is exposed, it looks like a gigantic honeycomb, each column is again divided into many smaller prisms, which are similar in shape to the parent mass. The various peaks do not show the greatest effect of denudation on the side facing the sea,

* Since writing the above news of Mr. Grigor's death has been received.

and the prevailing winds. Ngungun is weathering most rapidly from the south, Coonowrin from the south-west, Beerwah from the north, and Toonbubudla from the north-west. Toonbubudla and Beerburrum seem to weather almost equally towards all points of the compass.

The columnar structure may best be studied in the caves at the foot of the column on Coonowrin. Though they are usually six-sided, there are exceptions to the rule in four and-five-sided prisms.

The most porphyritic rocks are those of Beerburrum and Ngungun. The formerly usually weathers a rich red-brown. Specimens from Beerwah and Beerburrum have been classified by Mr. Jensen as Trachyte ; those from Coonowrin, Tibrogargan and Ewan as Comendite ; and those from Ngungun as Pantellarite, a soda trachyte in which the percentage of silica ranges from 66.8 to 72.5, and alkalies, principally soda, amount to 10 p.c.

The heights of the principal peaks are :—Beerwah, 1760 feet ; Coonowrin, 1170 ; Toonbubudla, 1020 ; all the others are below 1000 feet.

The Glasshouses arise from Trias-Jura beds, while immediately to the west of them are rocks of Carboniferous age. With regard to the age in which they were formed, all that we can say is that they are more recent than the Trias-Jura, and older than the surrounding basalts.