

the Madras Government on the Cinchona Plantations of that Presidency" (1883); "Annual Reports of the Botanic Gardens, Ceylon" (1880-85).

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F.L.S. Fellow of Christ's College, Cambridge. Professor of Botany, Royal Indian Engineering College, Cooper's Hill (Forestry Branch.) Distinguished for his researches in Histological and Cryptogamic Botany. Appointed by the Secretary of State for the Colonies to visit Ceylon, 1879-81, to investigate the Coffee-Leaf Disease. Has published numerous researches, of which the following are the more important:—"On the Embryo-sac and Development of *Gymnodenia conopsea*" (*Quart. Journ. Micros. Sci.*, 1880, pls. 3); "A Contribution to our knowledge of the Embryo-sac in Angiosperms" (*Journ. Linn. Soc.*, 1880, pls. 9); First, second, and third Reports on the Coffee-Leaf Disease, Ceylon, 1880-81 (*ibid.*); "Researches on the Morphology and Life-history of a tropical Pyrenomycetous Fungus (*Asterina*)" (*Quart. Journ. Micros. Sci.*, 1882, pls. 2); "Observations on the genus *Pythium*" (*Quart. Journ. Micros. Sci.*, 1884, pls. 3); "On the Structure, Development, and Life-history of a tropical Epiphyllous Lichen (*Strigula complanata*)" (*Trans. Linn. Soc.*, 1883, pls. 4); "On the Morphology and the Development of the Perithecium of *Meliola*, a genus of tropical Epiphyllous Fungi" (*Phil. Trans.*, 1883, Pls. 3); "On the Structure and Life-history of *Etyloma Ranunculii*" (*Phil. Trans.* 1887, pls. 4); "On some points in the Histology and Physiology of the Fruits and Seeds of the genus *Rhamnus*" (*Annals of Botany*, 1887, pls. 2). Translator of "Lectures on the Physiology of Plants," by Julius von Sachs (Clarendon Press, 1887).

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Assistant Controller and Director of Naval Construction. Charged with principal responsibility for design and construction of all ships of the Royal Navy. Author of a "Manual of Naval Architecture," adopted as a Text-book in the Royal Naval College, issued to the Royal Navy, translated into German and Italian, and officially issued to both fleets. Author of numerous papers on the science and practice of Shipbuilding, most of these being published in the Transactions of the Inst. of Naval Architects, of which he is a Member of Council. In these papers there is a large amount of original scientific work, notably in "Calculations for the Stability of Ships," 1871 (written jointly with Mr. M. John); "The Geometry of Metacentric Diagrams," 1878; "The Rolling of Sailing Ships," 1881; "The Course of Study at the Roy. Nav. College," 1877. Engaged in extensive theoretical investigations and experiments on the Structural Strength of Ships, and the Strains to which they are subjected at sea. Many of the results published in the "Manual of Naval Architecture" and *Trans. Inst. Nav. Architects*. Has had much to do with the extension of systematic observations of rolling, pitching, and general behaviour of H.M. ships at sea, from which much good has resulted to Ship-design, and valuable additions have been made to trustworthy information on Ocean Waves. Has also been able to render good service to the general extension of scientific methods of observing and analyzing the steam trials and turning trials of H.M. ships. Was closely associated for some years with the late Mr. Froude, and with the practical development in the designs of H.M. ships of the principles deduced from model experiments originated and conducted by Mr. Froude, which experiments are now superintended by the late Mr. Froude's son, Mr. R. G. Froude. Is the designer of some of the swiftest ships afloat, both armoured and unarmoured, in which designs wide departures were made from previous practice. Is a member of the Inst. Civ. Eng.; of the Council of the Inst. Naval Architects; Hon. Mem. of the N.E. Coast Inst. of Engineers and Shipbuilders; Member of the Roy. Unit. Serv. Inst. Has diploma as Fellow of the Royal School of Naval Architecture (highest class). Professor of Naval Architecture at South Kensington, 1871-73, and at Royal Naval College, 1873-81.

THE ISLANDS OF VULCANO AND STROMBOLI.

IN the spring of last year, accompanied by my friend Signor Gaetano Platania, I passed a month in a geological ramble through the Æolian Islands. In con-

sequence of such a short stay, no observations were carried out with sufficient detail and accuracy to be worthy of publishing, especially after the many important observations that we already possess from Spallanzani to Judd. Unfortunately, the isolated position of the group, and the absence of any sufficiently qualified local observer, render it impossible to have continuous records of the vulcanological and seismological phenomena of the islands; in fact, what little is known has come from the few scientific travellers who from time to time visit this out-of-the-way locality. It is for that reason, therefore, that the following notes have been written, in the hope of saving a few of the links in the broken chain of the record of the two active volcanoes of Stromboli and Vulcano.

We arrived at Vulcano on May 24, 1887, and left the island on May 28. The eruption that had occurred during February and two following months of 1886 had drilled out the bottom of the crater, so that the lower half of the path (on the west side) leading down to the bottom of the crater had been removed, and its lower end terminated abruptly in a cliff sheer down to the crater bottom. In consequence we were unable to descend, but we could on two days get a good view of the crater bottom. Much hissing and blowing off of steam was going on from the fissures of the floor of the crater, which was covered by a layer of purplish-gray ash washed down from the sloping sides. The edges of the fissures in the bottom and lower part of the crater sides were covered by a yellow crust of what was no doubt sulphur, boric acid, &c.

On the somewhat flattened ridge forming the northern lip of the crater, and not very far from the head of the celebrated obsidian lava stream, was a very large fumarole emitting a strong and large jet of steam under pressure, having about the size and force of that of the *bocca grande* of the Solfatara. With our sticks we removed some of the stones choking the hole, which on their cooler parts were covered with deposits of sulphur and realgar. When this was exposed to the full jet of steam, the minerals were melted, and blown away or over the surface of the blocks, forming a kind of reddish varnish or patina, whilst a rain of drops was thrown into the air, so that our clothes and hats were bespattered with beads of a variable mixture of sulphur and realgar. To the east side, where are distinguishable three crater rings, a considerable number of fumaroles exist, depositing chiefly sulphur, but also boric acid where hottest. Mr. Narlian, a resident in the island, says that not since the 1886 eruption "has the crater entered into its former quiescent condition."

On the upper portion of the northern slopes of the cone, to the east of the obsidian stream, all the ground is fumarolic, and choked with sulphur, where that mineral is extensively quarried.

Vulcanello seems on the verge of extinction, it being possible to find only slightly warm exhalations of watery vapour in a few fissures.

During the days we were at Vulcano we noticed that the apparent quantity of vapour emitted had a very marked relationship to the moisture of the atmosphere, and therefore, indirectly, to the winds. The same we also observed to be the case at Vulcano as we saw it from time to time during our stay on the Island of Lipari.

June 1, 2, and 3 were spent at Stromboli. In ascending the volcano, we, on leaving the town, skirted the northern coast of the island, and after passing the Punta Labronzo commenced the ascent, gradually approaching the north-east limit of the Sciarra. It is a track that passes chiefly over hard rock, and to be strongly recommended in preference to any other paths, which are mostly over loose materials. Skirting the crater, one walks along the ridge of the mountain which overhangs and partly hides the crater; we commenced to descend a little on the south side of the volcanic mouth, until we arrived at a small pinnacle of rock, where a good view of the crater was

obtainable. Here, under very great difficulties, from the looseness of the ground of about two square metres upon which we stood, an attempt was made to take two instantaneous photographs of the crater as we looked down into it. Unfortunately, both of these were useless, as we foresaw, from the vapour blowing towards us.

The crater was very quiet, only throwing out a very few fragments of pasty lava cake, with about four or five explosions during the four hours we remained near by. There were other explosions, but too weak to eject anything. I descended to the crater edge, but could not remain long, on account of the heat of the ground and the acid fumes, which seemed to be in great part composed of HCl with a good dash of SO₂.

On returning from the crater edge and descending a little lower on the south-west of the Sciarra, a good view is obtainable of that slope and the crater. Here two successful photographs were taken, which show very well the crater with its relative position to the summit of the mountain and to the Sciarra. On the following day the tour of the island was made in a boat, and, as only a few stones were being ejected, we were able to land on the narrow ledge or beach at the foot of the Sciarra. Two successful photographs were taken from the Scoglio dei Cavassi, from which a fine view is obtainable of the Sciarra and the crater.

During our residence on the island, and our stay at Salina and Panaria, we always noticed that the amount of visible vapour issuing was in direct proportion to the humidity of the atmosphere. On account of the great quietness of the volcano, it was impossible to form any judgment as to whether there was any relation of increased or diminished activity to the barometric pressure, and so, indirectly, to the winds.

Since leaving the island, correspondence has been kept up between Signor Giuseppe Rende, the post and telegraph master, and myself. The following information I have been able to glean from that gentleman's letters. From June to November 1887 the volcano remained in its normal state. On November 18, a moderate eruption (*eruzione mediocre*), and the wind blowing from the west, a shower of scoria (? fragments) (*aride pietre*), fell amongst the vines near the village. This was accompanied by explosions (*botti*), which, it appears, considerably frightened the people. Later, the scoria (*ponice*) fell into the sea, which it covered as far as the eye could see. Unfortunately, Signor Rende did not preserve any of the *ejectamenta*, but, judging from what one sees composing recent deposits of the island, the material was a pumiceous scoria, or a light scoria, as it appears to have floated on the sea.

In answer to further inquiries, Signor G. Rende tells me that the floating scoria extended *eastwards* as far as the eye could reach. No lava appeared, but a small mouth opened at the edge of the crater, but in a very few days disappeared. He then goes on to say:—

"I draw your attention in this letter to a very remarkable fact. On the 25th of last February (*i.e.* 1888), at 4.21 p.m., occurred two little shocks of earthquake of *undulatory* character, followed by a *subsultory* one, so that we thought it would be the end of the world for us. Never had a *subsultory* earthquake been felt. It split various houses, overturned walls, and made earth-banks slip. Those who had their eyes fixed on the mountain seemed to see the summit of it fall over from south to north. People who were working amongst the vines fell on their faces. No victims. Neither Panaria, Lipari, nor the other islands noticed the shock. The volcano (*i.e.* Stromboli) was in no way affected (*non fece massa alcuna*)."

Prof. Mercalli has collected together what is known of the history of Vulcano and Stromboli. He also published accounts of the state of these volcanoes during the years 1882–86 inclusive ("Natura delle eruzione dello

Stromboli," *Atti della Soc. Ital. di Sc. Nat.*, vol. xxiv.; "Notizie sullo stato attuale dei vulcani attivi Italiani," *ibid.* vol. xxvii.; "La fossa di Vulcano e lo Stromboli dal 1884 al 1886," *ibid.* vol. xxix.).

The eruption of November 18, 1887, is curiously near the date of November 17, 1882, when one of the strongest modern eruptions of Stromboli occurred, and when five lateral mouths opened on the Sciarra about 100 metres below the crater edge, but without the ejection of a lava stream. As on one or two other occasions, the last eruption extensively covered the sea with scoria, a fact of no small importance when we take into consideration that Stromboli is a very basic volcano, in a unique state of chronic activity, and is yet able to produce scoria or pumiceous scoria, sufficiently vesicular to float on the sea, and so be transported to great distances.

With regard to the position of lateral eruptions of this mountain, the only situation in which dykes are visible is on the north-west side and near the Sciarra, where a considerable number are to be seen. One of these is visible in section near La Serra, showing it continuous with a lava flow that oozed from it only a few metres above sea-level, indicating that not very long since a lateral eruption gave rise to a lava stream; another, close to the crater, stands out as a great wall at right angles to the present eruptive axis of Stromboli, and certainly must have been formed when the crater was at a very much higher level. No less than three dykes at Stromboli are *hollow* ones, with their interspace filled in from above by loose materials, showing that they must also have been drained below present sea-level, as they reach—as hollow dykes—down to the beach. I believe I was the first to draw attention to this peculiar variety of dyke, in describing the eruption of Vesuvius of May 2, 1885, where it was possible to watch the process of formation ("L'Eruzione del Vesuvio nel 2 Maggio, 1885," *Ann. d. Accad. O. Costa d'Asp. Naturalisti*, Era 3, vol. i.; and "Lo Spettatore del Vesuvio," Napoli, 1887). These hollow dykes of Stromboli may be seen at La Serra, the northern limit of La Sciarra, and at Punta Labronzo. I expected them to be rare, as there is no mention of them made in any literature known to me; but as it is also well shown near the Punta del Corno, at Vulcano, it can hardly be the case.

In conclusion, I take this opportunity of thanking Signor Narlian, of Vulcano, and Signor Rende for their past kindness, and for the promise of further notes on these two isolated, neglected, but interesting volcanoes.

H. J. JOHNSTON LAVIS.

HEAD GROWTH IN STUDENTS AT THE UNIVERSITY OF CAMBRIDGE.¹

IN the memoir read by Dr. Venn, on April 24, at the Anthropological Institute, upon the measurements made, during the last three years, of the students of Cambridge, one column is assigned to what he terms "Head Products," and which may fairly be interpreted as "Relative Brain Volumes." The entries in it are obtained by multiplying together the maximum length and breadth of the head and its height above a specified plane. The product of the three determines the contents of a rectangular box that would just include the portion of the head referred to. The capacity of this box would be only rudely proportionate to that of the skull in individual cases, but ought to be closely proportionate in the average of many cases. The relation they bear to one another affords, as it seems to me, a trustworthy basis for the following discussion, especially as all the measurements were made not only on a uniform plan, but by the same operator.

¹ Read at the Anthropological Institute, on April 24, by Francis Galton, F.R.S.