

## THE WEST INDIAN VOLCANIC ERUPTIONS.

A FEW additional notes referring to the recent volcanic eruptions in the West Indies have been received during the past week. Sir W. T. Thiselton-Dyer has sent us an extract from a letter written on May 29 by Dr. Nicholls, C.M.G., of Dominica, and as it contains testimony from one of the leading scientific men in the West Indies, the statements it contains are of exceptional value.

Dr. Nicholls remarks that the volcanic phenomena in both islands were somewhat similar, but in the ejecta from the volcanic vents there were differences. Thus the lava (and its products, viz. pumice, scoriæ, mud, ash and dust) thrown up from Mont Pelée was of an andesitic nature, whilst from the St. Vincent volcano a light basaltic lava was ejected.

Evidence of the hot blast which accompanied the eruption has already been given. One of Dr. Nicholls's friends was a passenger in the s.s. *Roddam*. "When the red-hot hurricane struck the ship he was enveloped in flames, as his clothes were set alight, and in his agony he jumped into the sea, which was almost boiling, and was not seen again." As to the cause of this extremely high temperature and the instantaneous destruction of life at St. Pierre, Dr. Nicholls says:—

The eruption came suddenly and unexpectedly, and probably in a few minutes the 35,000 persons in the city of St. Pierre were corpses. It would appear that a sudden fissure was opened on the side of the mountain overlooking the city, and near to the Etang Sec on this flank of the volcano a large vent belched out lava, superheated steam and acid gases downwards on to St. Pierre and the roadstead. The flashing off into steam of the water imprisoned in the incandescent lava converted that lava into sand and dust before it reached the city, and the radiation of heat from molten rock at a temperature of above 1000° C. caused an incredibly hot blast that would create a red-hot hurricane—if I may employ such a term—that would kill people and animals instantly and that would cause all inflammable matter to burst into flame. This, from what I gather, is what really happened, and I do not think that poisonous gases or electrical phenomena are accountable for the destruction of life. You can imagine what is the enormous heat right over the vent of an active volcano. Well, St. Pierre practically for a short time was in such a position, the vent being directed laterally towards the city until the fissure was closed and the volcanic ejecta were again directed vertically upwards. Many persons were actually burnt in places by hot scoriæ and mud, but the blast of heat from the volcanic vent appears to me to account in the only satisfactory way for the details I have obtained of the conditions found in the living and the dead.

In connection with the eruptions, it is of interest to learn from the Meteorological Office pilot chart of the North Atlantic and Mediterranean for June that a year ago a report was received from Mr. Francis Watts, of the Government Laboratory, Antigua, showing that on May 5, 1901, the schooner *Kate*, from Barbados to Antigua, ran into a violent commotion of the sea 32 miles eastward of the south end of Martinique. There was no wind, and it was concluded that the phenomenon, which lasted four hours, was caused by a submarine eruption. The report is recalled as possibly bearing upon an early indication of the activity which culminated in the recent disasters. At 6 p.m. on May 9 last, Captain Hernaman, of the Royal Mail Steamer *La Plata*, when 100 miles westward of St. Lucia, observed a green coloured sunset, and at midnight dust was falling on board. At 10.30 p.m. on the same date, the ship *Anaurus* experienced a severe submarine earthquake in 4° 38' N., 32° 28' W., the sea being violently agitated, the shock lasting 30 seconds.

The *Daily Mail* correspondent at St. Lucia says it is

NO. 1704, VOL. 66]

certain that there have been some changes on the sea floor in connection with the eruptions. He adds:—

The colonel commanding the Royal Artillery and the colonel commanding the Royal Engineers at St. Lucia both saw an eruption in the sea off that island, the water being shot up into the air, accompanied by rumblings. This occurred two days in succession, and was noted by independent eye-witnesses.

Also, at Grenada, in the little harbour, near the Botanical Gardens, the water bubbled up as in a cauldron and rumblings were heard, but at Dominica all was quiet.

I may mention that when the *Pallas* was at Chateau-Belair on May 21, with Sir Robert Llewelyn on board, I noticed a bubbling in the harbour just twenty yards astern of us, but it was so slight I thought it probably a vent in the bottom of the sea letting off steam, but I called the attention of others to it.

Prof. Bonney exhibited a mounted specimen of volcanic dust from Mont Pelée at the meeting of the Geological Society on June 11. Notwithstanding the risk of generalising from a single slide, he expressed the belief that the ejecta of the Soufrière and Mont Pelée are generally similar. Both, compared with specimens from Cotopaxi, are more uniform in size. The travelled dust from the Soufrière is a little smaller than that from the actual summit of the Andean volcano, but coarser than similar material from Chillo (more than 20 miles), Quito (35 miles), Ambato (45 miles), Riobamba (65 miles), and the summit of Chimborazo, about the same. All these vary much more in size and run distinctly smaller, especially the last. That from Mattakava, Hick's Bay, New Zealand (which fell on June 16, 1886), is rather coarser, more scoriaceous, with fewer mineral-fragments (especially of pyroxene), to which a dirty glass is often adherent. The dust from Barbados, ejected by the St. Vincent Soufrière in 1812, is very much finer-grained, but contains the same minerals, though pyroxene is less abundant.

The St. Lucia Weather Report for May states that, from the 15th to the 20th, the whole island was enveloped in a light hazy mist, the result of volcanic ash suspended in the air. Traces of this ash could be seen on all foliage, it being apparently deposited more freely at night.

The harbour master at Bridgetown, Barbados, has collected from captains of ships information relating to falls of volcanic dust encountered at sea, and the following reports thus obtained appear in the *Agricultural News* of June 7:—

May 7, 8 p.m., schooner *Violo*, from Demerara, met the dust 70 miles S. of Barbados. 10 p.m., the Norwegian steamer *Falisman*, from Demerara, 150 miles S.S.E.

May 8, 2.30 a.m., barque *Jupiter*, from Cape Town, 830 miles E.S.E. Hour not stated, barquentine *Fanny*, from Pernambuco, 250 miles E.

May 9 (?), 4 p.m., ship *Monrovia*, from Rio Janeiro, 240 miles S.E.

(Bearing and distance in each case from Barbados.)

It is to be hoped that all the captains collected samples of the dust, and that these will be available for analysis, as it is desirable to ascertain the characteristics of the ash according to the distance of its descent from the crater from which it was ejected, the coarser particles presumably descending at the shortest distances, the finer at the furthest.

Drs. Fleet and Anderson, the Royal Society's Scientific Commission to investigate the outbursts, were due at Barbados on June 9. The Secretary of State for the Colonies had cabled to Dr. Morris, the Imperial Commissioner, to meet them on their arrival.

Reports have been published of additional volcanic and seismic disturbances which have occurred during the past few days. A telegram from Martinique on June 19 states that a column of mud has been ejected by Mont Pelée and has fallen on Basse Pointe, destroying a number of houses and flooding the lower part of the village.

A message received at Calcutta on June 19 reports that an earthquake has shaken the whole ridge of the Himalayas from Simla to Chitral. The shock was not very violent, but nothing so extensive has been known before.

We have also to record that a violent earthquake occurred at Cassano Al Jonio (Calabria) in the morning of June 22, accompanied by subterranean rumblings. The population was terrified, but no damage was done.

### THE ROYAL SOCIETY SOIREE.

A BRILLIANT company of ladies and gentlemen was present at the Royal Society conversazione last week. Many of the exhibits were the same as on the occasion of the previous conversazione on May 14 (see p. 83), but there were some others in addition, and these are briefly mentioned below.

Dr. Morris W. Travers showed apparatus for liquefying hydrogen. Hydrogen, when compressed at the ordinary temperature and allowed to expand, becomes warmer, while air under the same conditions becomes colder; at temperatures below  $-80^{\circ}$  C., hydrogen becomes an imperfect gas, in the same sense as air, and undergoes cooling on free expansion (Joule-Kelvin effect). The gas, under a pressure of 120-150 atmospheres, passes through coils in the interior of the apparatus, which are cooled in solid carbonic acid and alcohol ( $-78^{\circ}\cdot 5$  C.), in liquid air ( $-185^{\circ}$  C.), and in liquid air boiling under reduced pressure ( $-200^{\circ}$  C.). It then enters a regenerator coil, and expanding at a valve at the bottom is partially liquefied. The liquid collects in a vacuum-vessel at the bottom of the apparatus; the unliquefied gas passes upwards through the regenerator coil, cooling the gas it contains, and returns to the compressor.

Apparatus for obtaining serial sections of fossils, and restorations of fossils in wax built up from serial sections, were shown by Prof. Sollas, F.R.S.

Prof. F. W. Oliver exhibited *Stephanospermum* and other fossil Gymnosperm seeds. All the seeds exhibited were from the permo-Carboniferous of Grand' Croix, near St. Étienne. They were preserved in silica, and showed remarkable preservation of detail. The majority of the sections were of *Stephanospermum akenioides*, the seed in which a pollen-chamber was first discovered by Brongniart in 1875.

Photographs of the Rocky Mountains of Canada, and objects collected, were shown by Mr. Edward Whympere.

The Silchester Excavation Fund Committee exhibited a series of objects illustrative of recent discoveries on the site of the Romano-British city of Silchester, near Reading.

Examples of telephotography in the Alps and Himalayas were exhibited by Prof. E. J. Garwood.

Dr. F. W. Gamble and Mr. Frederick Keeble had an exhibit designed to show the chromatophores and colour-changes of Crustacea.

Mr. W. Gowland showed Japanese pictures of Buddhist divinities and saints by old masters.

Mrs. E. Walter Maunders exhibited drawings from two photographs of the corona of 1901, May 18, taken at the Royal Alfred Observatory, Mauritius.

A series of photographs illustrative of old customs still extant in Hungerford, Knutsford and Corby was shown by Sir J. Benjamin Stone, M.P.

An attempt to reproduce an Aurora Borealis was shown by Prof. W. Ramsay, F.R.S. The spectrum of the Aurora Borealis has been shown to contain lines due to the pressure of krypton; the great majority of the lines, if not all, are coincident with those of the krypton spark spectrum. An electrode-less discharge in air gives a spectrum in which the leading green line of krypton,  $5570\cdot 5$ , is distinctly visible at low pressures. This discharge can be deflected by a magnet, sending out streamers in the lines of magnetic force. The main phenomena of the Aurora are thus reproduced.

A model of the exploring vessel *Discovery* was shown by the Joint Antarctic Committee of the Royal Society and Royal Geographical Society.

Prof. H. L. Callendar, F.R.S., had on view (1) simple apparatus for determining the mechanical equivalent of heat, and (2) vacuum-jacket calorimeters.

Mr. Edwin Edser and Mr. Edgar Senior showed an experiment illustrating a paradoxical consequence of the wave theory of light. Light enters a glass prism, of which the angles are equal to  $90^{\circ}$ ,  $45^{\circ}$  and  $45^{\circ}$ , by one of the mutually rectangular faces, the angle of incidence being equal to zero. It is then reflected from the hypotenuse face at an angle of  $45^{\circ}$ , which exceeds the critical angle. A photographic grating (3000 lines to the inch) is formed on the hypotenuse face, the rulings being parallel to the axis of the prism. The secondary wavelets which, according to the wave theory, are formed at the clear spaces, produce diffraction spectra, of which the first five or six are visible. If the grating were absent, no light could leave the hypotenuse face of the prism. Thus, light which cannot penetrate the face when the latter is clear is freely transmitted when parts of the face are rendered opaque.

The "Grubb" collimating telescope gun sight was shown by Sir Howard Grubb, F.R.S.

The West Indian Volcanoes Committee of the Royal Society exhibited specimens and photographs illustrating the fall of volcanic dust at Barbados on May 7 and 8. The principal constituents of the dust are magnetite, hypersthene, augite, plagioclase (anorthite-labradorite), small pellets of pumice, and fine powder composed of minute mineral particles and disintegrated pumice. On heating the dust to about  $1200^{\circ}$  C., the pumiceous constituent fuses, and the mass on cooling forms a vesicular rock allied to hypersthene-andesite, but exceptionally rich in crystals. (1) Microscopic slides are shown illustrating the composition of the dust:—(a) dust as it fell; (b) magnetite; (c) hypersthene and augite; (d) plagioclase; (e) pellets of pumice; (f) thin section of partially fused mass. (2) Photographs of vegetation covered by volcanic dust, taken at Barbados on May 8, by Mr. W. J. Freeman. The specimens were forwarded by Dr. Morris, of the Imperial Agricultural Department of the West Indies, to Prof. Judd, C.B., F.R.S. The charts were lent by the hydrographer of the Admiralty.

Specimens of volcanic dust from the West Indies were also shown by Mr. Henry Crookes.

Mr. E. J. Bles exhibited living tadpoles of the Cape clawed frog, *Xenopus laevis*, Daud. The remarkable transparency allows the course of the nerves, blood-vessels, muscles, &c., of the head to be easily studied in the living animal. A method of feeding, not hitherto described in the Amphibia, can be watched. Bred from specimens kept in Cambridge for more than five years.

A series of specimens illustrating the life-history of the *Trypanosoma Brucei* was shown by Mr. H. G. Plimmer. This organism is the cause of nagana, or the tsetse-fly disease in South Africa.

Colonel Bruce, F.R.S., and Mr. H. G. Plimmer, exhibited *Apiosoma bigeminum*, the parasite found in the blood of Texas fever of cattle.

New species of fairy flies (*Mymaridae*) were shown by Mr. F. Enock. The species are all ovivorous, some laying their eggs in those of the water demons (*Dytiscus*); as many as seventy-two larvae of one species have been found in one egg of *D. marginalis*. Living specimens, *in situ*, and possibly some emerging.

The Royal Society exhibited a bronze example of the newly founded David Edward Hughes medal, and a medallion of the reverse.

Dr. A. Dendy had on view specimens, sketches and photographs of Morioli workmanship from the Chatham Islands.

A series of otoliths, chiefly of living British fishes, both marine and freshwater, showing the various forms assumed in the different genera, was shown by Mr. E. T. Newton, F.R.S.

Prof. W. M. Flinders Petrie, F.R.S., exhibited a series of worked flints from Egypt.

Experiments exhibiting interference between portions of light from independent sources were shown by Dr. G. Johnstone Stoney, F.R.S.

During the evening, demonstrations, with the help of the electric lantern, were given by Prof. W. M. Flinders Petrie, F.R.S., on early civilisation in Egypt; Mr. J. Y. Buchanan, F.R.S., a series of lantern slides illustrating the performance of M. Santos Dumont's steerable balloon and the accident to it on February 14; and Prof. E. B. Poulton, F.R.S., on recent work upon protective resemblance and mimicry in insects, illustrated by three-colour slides.