

hardly fail to discover some important fact about the interior structure of a molecule." I think this statement remains as true now as it was thirty-two years ago. There can be no doubt, I think, that spectrum analysis, and especially the magnetisation of the spectral lines, will give us a clue to the inner structure of the atom. I hope that I have succeeded in imparting to you this, my conviction.

#### THE ERUPTION OF VESUVIUS IN APRIL, 1906.

THE most complete published account of the eruption of Vesuvius in April last is due to the enlightened liberality of the French Government, which commissioned Prof. Lacroix to study and report upon the eruption, and it is gratifying to find that this, as all other detailed accounts by qualified scientific observers of the eruption of Vesuvius, confirms in every respect the description which we were able to disentangle from contemporary newspaper reports and publish in our issues of April 12 and 19. As a result of Prof. Lacroix's researches he has, in addition to more detailed memoirs published or to come, communicated to the *Revue générale des Sciences* of October 30 and November 15 an interesting account of the result of his observations and deductions, some of which are sufficiently interesting to deserve notice, in extension of what we have already published.

The earlier stage of the eruption was of the Strombolian type, that is to say, the material ejected from the crater was formed by the breaking up of molten lava; it was consequently red hot, and Prof. Mercalli, who was watching the eruption from Torre Annunziata, noticed that the mountain became covered, for from 200 metres to 300 metres from its summit, with a continuous sheet of glowing material, from which blocks incessantly rolled down to lower levels. At oh. 31m. and again at 2h. 40m. a.m. on April 8 violent earthquakes were felt, corresponding to the most violent paroxysms of the eruption, accompanied by a lowering of the height of the cone and a change from the Strombolian to the Vulcanian type of eruption. From this time onward the ejected material was less and less composed of fresh lava, and less and less incandescent, being composed, in increasing degree, of the old solidified lavas and tuffs of the cone.

For several days after April 8 the summit was hidden by a thick cloud of ashes, and when this cleared away the mountain was found to have changed its form, from a pointed to a truncated cone, like that left after the eruption of 1822, though not so low or with so large a crater. When it became possible to ascend the cone it was found that the new crater was a true caldera, almost circular, of 640 metres to 650 metres in diameter, surrounded by walls almost vertical, except at the top, where a steep talus reached up to the crest, and at the bottom, where a funnel-shaped talus sloped down into a cloud of vapour escaping from the fumeroles. The rim was irregular in height and generally sharp-crested, but cut by a deep gap on the north-east, where, for some 80 metres, the crest was not only lower, but comparatively flat-topped; this gap faces the crest of Somma in the direction of Ottajano, where scoriæ and ashes fell in quantity sufficient to crush in the roofs of houses, while the observatory, less than half as far from the crater in the opposite direction, received but a very small quantity of these same ejections. Prof. Lacroix rejects the explanation that this difference was solely due to wind, and considers that he has established a case of oblique eruption, the average direction of projection being, not vertical, but inclined at a considerable angle towards the north-east.

The greater part of the material blown out from the crater fell on the slopes of the cone, which was covered many yards deep with a loose deposit of fine dust, ashes, and blocks of all sizes. Even before the eruption ceased the surface of this deposit began to be broken by dry avalanches, which crashed down on every side, leaving the cone deeply scored by a series of radiating valleys, separated by steep-sided, sharp-crested ridges. Later on, rain-water sinking into and saturating these loose deposits set them in motion as the well-known mud lavas, the

mode of flow of which resembles closely that of the molten lava, and still later the rain-water, flowing off the surface, formed torrents of more liquid mud, which cut through the earlier accumulations of the dry avalanches and mud lavas.

The eruption was accompanied by a change in level of the land, but this was confined to the immediate neighbourhood of the volcano, for the tide-gauge shows that there was no alteration in the relative level of land and sea at Naples, while Prof. Mercalli found an elevation of from 30 cm. to 48 cm. between Portici and Vico Equense. Of mineralogical interest is the new mineral, of which the first published description appeared in *NATURE* of May 31, and the discovery of galena as an addition to the list of Vesuvian minerals.

#### RUSSIAN OBSERVATIONS OF THE SOLAR ECLIPSE, AUGUST 30, 1905.

CONSIDERING the unfavourable weather conditions experienced by many of the eclipse parties last year, the members of the Russian expedition, in charge of M. A. Hansky, are to be congratulated on the results they obtained, which have been recently circulated as a publication of the Pulkowa Observatory. The observers were stationed at Alcocebre, on the Mediterranean coast near Valencia. The central line of totality passed almost exactly through the station, and various local conveniences combined to render the choice of site favourable to efficient observation. On August 15 all the instruments were received in good condition, and after observations had been made for determining the azimuth of the sun's rising point, the various pillars and stands for the apparatus were erected.

Photographs of the corona were taken on two scales:—small pictures with the Bredikhine double photographic telescope, furnished with a Zeiss objective of 170 mm. aperture and 800 mm. focal length, giving a field of  $12^{\circ}.4$  in R.A. and  $8^{\circ}.8$  in declination; large pictures, for the delineation of fine detail in the coronal streamers, with an objective of 5 inches aperture and 13.28 m. focal length, the light being supplied from a cœlostast 30 cm. in diameter. Spectroscopic observations of the corona and prominences were made with a direct-vision spectroscope without slit, and the polariscopic phenomena examined by the aid of a Savart polariscope. Measurements of the solar radiation were taken with an actinometer and actinograph of Crova's pattern.

Near the time of eclipse the sky became clouded over, but about a minute before totality the sun was seen in clear sky. The corona was seen five or six seconds before totality, and the last ray of sunlight was visible for some two seconds, probably through a deep valley in the moon's limb. This feature is also shown very clearly in the photograph of the chromosphere accompanying the report, which is divided up into a series of bead-like masses at that particular place. Visually the corona was seen of a brilliant, silver-white colour, its brightness increasing rapidly towards the moon's limb. The longest rays seen extended about one and a half lunar diameters, and were situated near the poles of the sun, one at the north and two very fine ones at the south pole. The sky had a green colour, similar to that often seen about half an hour before sunrise. Careful examination of the spectrum of the corona during one of the forty-seconds' exposures showed that the continuous spectrum was especially strong in the green, yellow, and red, the latter region being so brilliant that it suggested the possibility of photographing the corona in ordinary daylight by means of suitably prepared colour screens.

With the polariscope the coronal light was seen to be strongly polarised, and the conditions were such that the dark bands were not visible on the sky surrounding the corona. The bands were much stronger when tangential to the sun's limb than when radial. There appeared to be a rotation of about  $2\frac{1}{2}^{\circ}$  of the plane of polarisation, which may possibly be ascribed to the action of a magnetic field round the sun.

Eight photographs of the corona were obtained with the long-focus telescope, the exposures varying from 40-45