state, they generally have a lively expectation. A squatter, M. De Becker, who lived many years at a remote station, where the blacks were in frequent communication with him, told me he had seen many of them die with a cheerful anticipation of being soon in a "better country." WILLIAM RIDLEY

Paddington, Sydney, Australia, July 11

Reported Discovery of Gold in Samoa

FROM a note in NATURE (vol. ix. p. 273) I am surprised to learn that Mr. Williams, H.M.'s Consul in these islands, has stated, in an official despatch to the Foreign Secretary, that gold in quartz has been found on Upolu, in a valley about three miles from the Port of Apia. The samples assayed are said to have yielded at the rate of 3,000 ozs. to the ton.

No geologist who knows Samoa will believe that gold in paying quantities has been found in this island. Still, I think it right to give the following explanation of what gave rise to the above report.

A few months ago gold was said to have been found, as reported by Mr. Williams. Most people here, however, disbelieved it, thinking the report had been raised by unprincipled men for the purpose of attracting settlers and promoting the sale of land. Some believed the pretended specimens of Samoan gold had not been found in Samoa, and felt quite certain they had not been procured in the particular valley specified.

The facts of the case have been lately disclosed, since Mr. Williams left the islands in ill health; he was therefore in ignorance of them when he wrote his despatch from Sydney in October 1873.

The specimens of gold assayed were brought from the Thames gold diggings in New Zealand, and two or three foreign settlers here, who own land in the valley where the gold is said to have been found, raised the report in order to sell their land at a high price. They appear to have imposed upon the credulity of the Consul, who took the specimens to Sydney and had them assayed there. S. J. WHITMEE

Upolu, Samoa, June 2

Photographic Irradiation

I SHALL be obliged if you will allow me space to state more specifically why I am not able to concur in the irradiation theory of Mr. Aitken (vol. x. p. 439). I understand from his last letter that he fully agrees with Lord Lindsay and myself as to the cause of the outer irradiation, and our only difference of opinion now lies in the amount of the inner irradiation that can be traced as due to what he has termed *molecular reflection* within the thickness of the collodion film. Mr. Aitken and Capt. Abney both appear to consider this as the chief cause of the inner irradiation fringe, while I am disposed to rank the irradiation arising from the optical imperfections of the instrument with which the photograph is taken; together with any irradiation that may arise in the wet plate processes from circulation in the film of fluid covering the plate—before—or as very much greater in amount than the irradiation due to dispersion within the collodion film.

We should expect that light dispersed within the thickness of the collodion film would produce its photographic effect in all directions round the illuminated point—and that the area of action would not be affected, or certainly would not be decreased, by covering the front surface of the portions of the collodion film adjacent to the directly illuminated area with an opaque object. Indeed, if the opaque object were a good reflector, such as a bright piece of platinum foil, we might expect slightly to increase the area of photographic action due to dispersion within the film; for the light dispersed towards the front surface of the film would be in great measure reflected back into the thickness of the collodion. But, as I have shown in former letters, placing a piece of platinum foil in immediate contact with the collodion film causes the photographic image of a bright image to be sharply cut off, and no perceptible irradiation can be traced under the edge of the foil.

Again, we should expect the action of dispersed light to extend further within a thick film of collodion than within a thin film; for there would be a greater thickness of illuminated collodion, and the angle through which light could be radiated directly upon the adjacent area without suffering reflection at either surface would be increased, but I have not been able to detect any perceptible difference in the amount of irradiation of similarly exposed plates coated with four thicknesses of collodion and in those coated with but one film.

I have felt myself therefore driven to look for the cause of irradiation either in some circulation taking place within the film of liquid covering the collodion at the time of exposure, which film would be interrupted and its tension greatly altered by the contact of a solid body; or else to seek its explanation in the optical imperfections of the photographic instrument. Possibly, in the wet-plate processes, circulation within the fluid film may produce a very sensible effect. Indeed, there are phenomena which make this more than probable. When a wet-plate picture of a strong light projected upon a dark background is taken with a decided over-exposure of say ten minutes or a quarter of an hour, the inner irradiation fringe is seen to be most opaque on its outer edge; and the phenomenon is so marked that it cannot be held to be an effect of contrast. This, of course, should not be the case if the irradiation edge were due merely to the optical imperfections of the instrument. Again, in the small negatives of the eclipse of December 1871, taken at Dodabetta and Baikul, there is a decided structure in the irradiation under the prominences: under the brightest of them it can be distinctly seen that the opacity of the irradiation fringe is greatest along lines radiating from the prominences—while along the outside, that is, furthest from the prominences, there is an arc of slightly greater intensity. The same structure is traceable in all the negatives, but it is most marked in the Baikul series, and especially in those negatives in which the prominences are most exposed, viz., on the east and west limbs, at the beginning and at the end of totality. This, of course, cannot be accounted for merely by the optical imperfection theory. Again, the little brushes mentioned in a former letter as extending under the edge of the platinum foil, cannot be accounted for without supposing that there is circulation within the liquid film. I hope on my return to England to carry out some further experiments for determining the amount of the inner irradiation which in the wet-plate processes may be due to such circulation. A. COWPER RANYARD

Florence

Curious Rainbow

THE unusual phenomena described by Mr. Swettenham as having been observed by him in a rainbow in the Kyles of Bute (NATURE, vol. x. p. 398), are due, I think, to interference. If I remember rightly, he will find an explanation of the matter in "Deschanel's Natural Philosophy," by Prof. Everett.

Clifton, Bristol, Oct. 19 G. J. THOMSON

Aurora

A BRIGHT display of aurora was seen here on Friday, Oct. 16, between eight and eleven o'clock. At ten o'clock, when I first saw it, the arch of the aurora stretched from Pollux to Arcturus, then both near the horizon, the apex of the arch being under Ursa Major. Deep fringes of light hung from the inner side of the arch and moved with a curtain-like motion to the north. The light was white. On Saturday night numerous streamers were seen darting upwards from the horizon; and many falling stars, two of them leaving trains of light for about a second.

JAMES S. ANDERSON

Castletown, Caithness, N.B.

Sneezing in Animals

I HAVE a rough-coated terrier dog which will sneeze when told to do so. I taught him this trick by repeatedly imitating sneezing in his presence.

When about to perform, he shakes his head obliquely once or twice, just as many people do, and then ends with a good sharp sneeze. J. F. M. H. S.

THE RECENT ERUPTION OF ETNA

PROF. ORAZIO SILVESTRI has published* his observations on the eruption of Etna which occurred on the 29th of August, and reminds us that two months previously he predicted not only the formation of the fissure on the Mongibello side, but likewise the eruption by which it was accompanied.

After an uninterrupted period of eruptive phenomena by which the central crater was considerably modified, at

* "Notizie sulla eruzione dell' Etna del 29 Agosto 1874." Catania, 1874.

4 A.M. August 29, subterranean rumblings were followed by two shocks, when a formidable column of black smoke and flaming materials rushed up into the air, and, carried by the wind, fell at great distances, in the form of small scoriæ and sand. Numerous other columns succeeded, with roaring, rumbling noises, lasting for seven hours with great intensity, dying away towards night. The noises ceased on the 30th of August, and vapour and smoke alone rose from the crater and along the line of disturbance.

When the volcanic tremors were most intense, at 4 A.M. 29th August, a fissure appeared on the north side of the great central crater, extending for five kilometers, with an axis running E. by 8° N. The centre of the impellant force was at an elevation of 2,450 metres, between two mountains of lava known as *Fratella Pii* and *Monte Grigio*, where the rent widened to its maximum width of fifty to sixty metres, whence it narrows very steadily towards the base, terminating after a course of three kilometres. And at this altitude, where the greatest thrust was manifested, may be noticed the formation of a new mountain, or crater, with an elliptical contour, coinciding with the fissure in the direction of the axis. It has a diameter of about 100 metres, and covers a superficial area of about 117,734 square metres. This crater, now appearing as a new mountain, is formed of doleritic lava and a pre-historic grey Labradorite, torn from the surface by the black lava of this eruption, in which they are enveloped. There are thus mingled two lavas of the most distant epochs in the history of Etna, the older forming the framework of the mountain. The crater shows internally the usual funnel shape; and near its base, over a width of fifty to sixty metres, there are ten eruptive mouths, open wide, which succeed each other like button-holes;—those nearest the crater are abysses twenty-five to thirty metres in diameter along the line of the fissure. There are also two other groups of small cones, in which the diameter of the mouths is not more than from one to three metres—eight in the second group, and four in the third; so that within a distance of half a kilometre from the crater there are twenty-two minor cones in linear extension. The crack is now continued down a declivity formed by the lava current of 1614, which slopes to the north at an angle of 13° or 14°. Although the rent traverses this lava, there are no more small cones for a distance of 600 metres, when a fourth group of five mouths, each two to three metres wide, is found at an altitude of 2,170 metres; these latter have poured out a torrent of lava descending in a stream 150 metres long, 60 metres wide, and two metres thick. A little lower, at a height of 2,150 metres, is a fifth group of three mouths, more active than the others, but situated like the last group on the great lava stream of 1614. The torrent of lava hurled from these mouths is 400 metres long, 80 wide, and two metres thick, and forms two short bifurcations. Finally, near the end of the crack, at an altitude of 2,030 metres, a sixth and last group of five mouths is formed, which have ejected large quantities of cinder and scoriæ. They are situated about twelve kilometres from the old crater of Mojo, towards which this great crack runs down the side of Etna from its central crater. Besides this principal rent there are an infinite number of smaller clefts, breaking up the soil and radiating from the centres, of great dynamic activity. In a few hours the new mountain and its system of about thirty-five subordinate cones were thrown up, and thus there was brought to the surface a total quantity of about 1,351,000 cubic metres of volcanic materials.

The mingling of the old and new lavas will form the subject of a subsequent memoir. The recent lava, like all modern lavas, is augitic, black, magnetic, and has a metallic lustre. Its specific gravity is 2·3636 at a temperature of 25° Cent. The superficial temperature of the lava was 70°, while at a depth of half a metre it was 90°, and a still higher temperature was recorded where fumeroles were active.

From the remarkably short duration of the eruption, Prof. Silvestri anticipates a more powerful outburst to come, which will be manifested along the rent in making which the present internal explosion has spent its force.

Concurrently with this disturbance the whole of volcanic Italy has been affected. The island of Volcano, after a century of quiescence, discharged cinders and flaming materials from its vast crater for nine months previous to the eruptive phenomena of Etna in the autumn of 1873. The eruption of Volcano continued decreasing in intensity through July 1874, and traces of it are still continually seen. Stromboli last June made a rare eruption, sending out small stones with great energy in place of its characteristic feeble incessant explosions.

Vesuvius has not been unsympathetic, and discharged an unusual volume of dense vapour at the end of August contemporaneously with the eruption of Etna.

THE SECOND AUSTRO-HUNGARIAN EXPEDITION TO THE NORTH POLE, UNDER WEYPRECHT AND PAYER, 1872—74.

ON the return of the Austrian North Polar Expedition we gave in NATURE, vol. x. p. 439, an outline of the discoveries made. From the original memoirs on the achievements of the voyage, by Dr. A. Petermann, Dr. Joseph Chavanne, and Dr. v. Littrow, which have been kindly forwarded to us by the first-named, along with the map, we are able to give still further details.

No general with his victorious army returning from battle could have been welcomed with greater enthusiasm and cordiality than this little band of twenty-two men. For though they only come home from a North Polar expedition, people instinctively feel that the accomplishment of the *Tegetthof's* voyage is a heroic deed. To gain a battle, hetacombs of precious human lives must be sacrificed; here all came safely back. A battle does not demand greater endurance and courage, for the battle of the *Tegetthof* lasted two years. We think of the times of Columbus and Vasco da Gama, of their discoveries and return to Palos and Lisbon. It is true the Austrian expedition did not find an America or an India; but Columbus, and other great discoverers, did not really discover more than Weyprecht and Payer. Before Columbus traversed it, men believed that the western ocean was not navigable, and similar ideas prevailed with more reason concerning the sea just explored. One of the first describers of polar regions, Scoresby, had, in the year 1820, in his famous work, drawn a line over the whole sea from Bear Island, in 74½° N. lat., to Novaya Zemlya, and said, with confidence, "Here is the icy barrier where navigation must end;" and the unknown regions beyond this line were regarded by mariners with pious dread. The Austrian expedition has torn away the veil up to 83° N. lat., and has narrowed the undiscovered parts of the earth by a space of 8° to the north.

They had to stay at Novaya Zemlya for four weeks, and work their way out of thick ice for at least 240 geographical miles before reaching Cape Nassau, which was the starting-point of the expedition. They then encountered the most terrific dangers which can befall a polar expedition, for they were hemmed in by an ice floe, and shut up for fourteen months in pack ice, and driven about in the Siberian icy ocean. Eventually a tolerably safe place in the open ice was found for the second wintering, when the crew heroically divided themselves, the better to explore the land they had discovered.

The comrades of the *Tegetthof* have shown themselves worthy to take rank with their prototypes, Ross, Parry,