which could be heard forty or fifty miles away? Nay, why should it explode at all?

One answer is this. The aërolite comes into our atmosphere from regions in which the temperature, "the cold of space," may range as low as 140° below zero Centigrade; and though the mass, from the absorption of solar heat, would possess a temperature much above this, it would nevertheless be intensely cold, and consequently more brittle than at ordinary temperatures; and hence, on its entering our atmosphere, the heat it instantaneously acquires on its outer portion expands this, and tends to tear it away, so as to dissever the exterior from the interior, which continues to be relatively contracted by the intensity of the cold which the aërolite brings with it from space. The consequence is, first, that little bits of the stone spring out all over it, leaving those curious little holes or pit marks which are characteristic of a meteorite; and every now and then, as the heat penetrates, larger masses split away, of which interesting evidence is afforded by the meteorite, for instance, that fell at Butsura on May 12, 1861. Fragments of this stone were picked up three or four miles apart; and by supplementing them by a small piece modelled to fill up one lacuna, one is able to build up again with much certainty the original meteorite, or at least the portion of it represented by the fragments of it which were found. Important portions of this stone are in the British Museum, presented some years ago by the liberality of that invaluable institution, the Asiatic Society of Calcutta. Now, it is remarkable that these fragments, which in other respects fit perfectly together, are, even on the faces of junction, now coated with a black crust. On the other hand, another of these fragments not thus coated fits like the former to a part of the meteorite that was found some miles away from it, and is also not incrusted at the surface of fracture. Hence we can assert that this aërolite acquired after coming into our atmosphere a scoriated and blackened surface or incrustation. The first explosion drove the fragments first alluded to asunder, and these became at once incrusted on their broken surfaces; but others that were separated afterwards, probably on the last of the three explosions, had not sufficient velocity left to cause their incrustation in the same manner as was the case with the fragments previously severed. Now, this successive incrustation of the fragments of the meteorite confirms the idea that the disruption of the mass, and the explosions heard for so vast a distance as Goruckpore (some sixty miles), are parts of the same convulsion; and sixty miles is by no means an uncommon distance for the sound of such a meteoric explosion to be heard.

The late W. von Haidinger (to whom we are indebted for a collation of the facts and for valuable suggestions bearing on this subject) threw out the notion that what really produced the detonation was not the disruption of the mass (which he held not to be a sufficient cause for so loud a report) so much as the collapse of the air into a vacuum which, after following the meteorite as it pursued its rapid course, suddenly ceased to exist as the velocity of the meteorite became practically reduced to zero.

But it still would remain to be explained why at one time more than another this collapse of the vacuum should take place, or how it could be repeated; of this, however, a sufficient explanation would seem to be afforded by the actual bursting asunder of the meteorite from the cause before assigned, since this explosion, by disturbing the conditions on which the persistence of the vacuum depends, would permit the collapse of the air and consequent detonation.

(*To be continued.*)

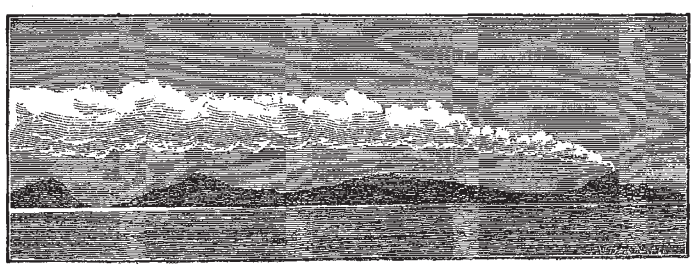
*OBSERVATIONS ON A REMARKABLE FORMATION OF CLOUD AT THE ISLE OF SKYE**

THE resistance offered by the earth's surface to the wind is known to reduce its velocity and to cause deviations in its direction both horizontal and vertical, as well as to retard the progress of the storm itself. This friction to which aërial currents are subjected is probably least for a surface of water such as the sea—greater for plains of loose sand, where, as in the Nubian deserts, lofty sand pillars are produced—and greater still where the surface is immoveable, as in the case of solid land; but the greatest resistance of all is due to the obstruction offered by rugged hills and lofty mountain-ranges.

In an account of the Morayshire easterly storm of September 1871; published in the *Scottish Meteorological Journal*, I suggested that the great amount of rainfall which fell on that occasion at and near the Morayshire coast, and on the sea-coasts of the counties of Fife and East Lothian which also fronted this storm, was due to the sudden increase of friction which the wind encountered when it reached the land. The in-shore stream of air being checked by the unyielding nature of the shore, even though it was, as in this case, of no great elevation, would form a pillow of obstructed or perhaps nearly stationary air, which would produce vertical deflection on the strong currents coming in from the sea. The stream of air thus projected upwards to a height where the temperature is lower would be condensed into vapour and rain.

This sudden change of resistance to in-shore winds is probably one of the causes of the well-known peculiarity of seaside climates.

On the 27th July last, about 11.30 A.M., when in the steamer of the Northern Lighthouses off the Sound of Harris, I saw a beautiful example of the genesis of clouds—due, however, not to



a low foreshore, but to hills of about 900 feet high. The sky was perfectly clear, with a steady but very slight breeze from the S.W., which came straight upon the south-western extremity of the Island of Skye, distant about twelve miles from the ship. A small portion of the most southerly projection of the island, which was considerably lower than the more inland parts, was perfectly free from vapour, but at a short distance inland from the shore, there was an abrupt face of hill, from the top of which there rose a very slender column of white vapour which gradually expanded as it ascended into the air, presenting exactly the appearance of the escape of steam from the spiracle of a volcano. The cloud thus formed not only extended as far as the northern extremity of Skye—itself a distance of twenty-eight miles—but was visible as a well-defined stratum of cloud for a long distance beyond Skye, so that its whole length must have considerably exceeded forty miles, beyond which distance it became more diffuse and attenuated. Had I not known to the contrary, I should undoubtedly have believed that what I saw was due to volcanic eruption.

The vapour caused by the lower temperature of the atmosphere at the level of the top of the bluff face was obviously carried away by the breeze gradually as it was formed, thus producing by a continuous process of generation the long extent of cloud which I have described. This fact shows that clouds may be due to deflections produced by irregularities on the earth's surface far remote from the place where we actually see them. I may mention, in proof of the steady nature of the breeze and of the entire absence of any vertical disturbance in

* By Thomas Stevenson, F.R.S.E.

the atmosphere, that later in the day we traced the smoke from the steamer's funnel for a distance of nearly fifteen miles.

The accompanying woodcut is from a sketch which I made on board the vessel at the time, and I doubt not will be interesting to your readers.

SCIENTIFIC SERIALS

Zeitschrift der Oesterreichischen Gesellschaft für Meteorologie, August 15.—This number contains a description, with diagrams, of Theorell's printing meteorograph, a very ingenious instrument, likely to be of much service in meteorology. It differs from other meteorographs in this, that instead of tracing curves, which have to be afterwards translated into figures, it prints the figures at once, thus saving much future trouble. One of the three already made has been in use at the Royal Observatory of Vienna since September 1874, and has been so adapted as to record, by electric communication, the state of the following instruments, placed in any situation: anemometer, vane, wet and dry thermometers, and barometer, once in every quarter of an hour. The moving force is a galvanic current connected with a clock. Dr. Theorell's account of the instrument referring to the plates will be continued in the next number of the *Zeitschrift*. In the "Kleinere Mittheilungen" Prof. Hoffmann, of Giessen, compares the sum of the daily maxima of solar radiation in several years with the time of the flowering of certain plants. His results in 1875 bear out his expectations derived from four previous years' observations, 1866-69, and in certain cases his forecast of the time of flowering was nearly correct.—There is besides a paper by Dr. Schreiber on a new registering air thermometer; also a letter from Mr. Ferrel on the theory of storms.

Jahrbuch der Kais.-kön. Geologischen Reichs-Anstalt, Band 24, heft iv.—Nearly all this part of the *Jahrbuch* is occupied by the second part of Dr. Guido Stache's elaborate memoir on the Palæozoic regions of the eastern Alps. In this part he summarises all that is known respecting the geology of the western slopes (Cadoric Alps) of the area embraced in his review.—The only other paper is one by M. V. Lipold—"Explanation of the geological map of the environs of Idria, in Carniola." A coloured map and plate of horizontal sections accompany the paper.—In Dr. Tschermak's "Mineralogische Mittheilungen" Dr. R. v. Drasche concludes his paper, entitled "Petrographic-geological Observations on the West Coast of Spitzbergen." The editor describes the *Labradorite* of Verespatak; and a notice of two other minerals, *Famatinite* and *Wapplerite*, is given by A. Frenzel.

THE *Boletin de la Academia Nacional de Ciencias exactas en la Universitad de Cordova* (*South America*), Entrega iii., 1874, contains some papers of interest. We note the following:—On the chemical composition of the water of the La Plata River, by Señor Kyle.—On the formation of saline deposits, by D. Fred. Schickendantz.—On the chemical and physical action which took place in the formation of the pampas of Cordova, by Dr. A. Doering.—Critical notices on some entomological publications, by Dr. D. C. Berg.

THE *Annali di Chimica applicata alla Medecina* (August) contain the following papers of note:—On salicylic acid, by Dr. D. Gibertini.—Note on chloral-santonine, by C. Pavesi.—On the health of smokers, by Dr. Bertherand.—On the substitution of iron shot for lead shot for the purpose of cleaning bottles in hospitals, barracks, &c., by Sig. Fordos.—On the comparison of human milk with cows' milk with regard to the nutrition of infants, by Ph. Biedert.—A number of papers of minor interest.

SOCIETIES AND ACADEMIES

VIENNA

Imperial Academy of Sciences, July 15.—On the solubility of calcic chloride in water, by H. Hammerle.—On the decrease in the temperature of the maximum of density of water through pressure, by C. Puschl.—On the system of vessels of the tube-bones, with notes on the structure and development of bones, by C. Langer.—Researches on the capacity of gas-mixtures for conducting heat, by J. Plank.—On the theory of the composite eyes and the seeing of motions, by Dr. S. Exner.—On the graduation of induction apparatus, by Dr. E. Fleischl.—Researches on the motion of the imbibition-water in wood and in the membrane of the vegetable cell, by Prof. Wiesner.—On the morphology and biology of Lenticellæ, by G. Haberlandt.—Meteorological observations made at Hohe Warte, near Vienna.

July 22.—(Last meeting before holidays).—Remarks on the variations in the velocity of light passing through quartz which is subjected to pressure, by J. Merten.—The Crustacea, Pygnogonida, and Tunicata of the Austro-Hungarian North Polar Expedition, by C. Heller.—On the finer structure of bone substance, by Prof. von Ebner.—On the construction of the reflection goniometer, by Prof. von Lang.—(The next meeting will take place on Oct. 14.)

K.K. Geologische Reichsanstalt, May 31.—Report from Dr. O. Lenz on his travels in Africa.—On the occurrence of marine petrefacts in the Ostrau layers, by D. Stur.——On the coal deposits of Drenovec, by Dr. R. Hörnes.

June 30.—On the Island of Kos, by Dr. M. Neumayer.—On fresh-water strata amongst the Sarmatic deposits near the Sea of Marmora, by Dr. R. Hörnes.—On the landslip near Unterstein, on the Salzburg-Tyrol Railway, by H. Wolf.

July 31.—On some fossil plants from India, by O. Feistmantel. On the formation of the terra rossa, by Th. Fuchs.—On mountain folds, by the same.—On secondary infiltrations of carbonate of lime into loose and porous formations, by the same.—Report by D. Stur on his travels in Silesia.—On the fauna of the Schliers of Ottnang, in Upper Austria, by R. Hörnes.

STOCKHOLM

Kongl. Vetenskaps Akademiens Förhandlingar, March 10.—The following papers were read:—Genera et species Lithobioidarium disposuit, by A. Stuxberg.—Review of all Lithobioidæ hitherto known in North America, by the same.—Report on the bryological researches in Norway during 1874, by C. Hartman.—On the moss flora of Lulea (Lappmark), by P. J. Hellbom.—On the observation of two crossing rainbows, by O. Gumaelius, with some remarks on the same, by R. Rubenson.

April 14.—On the marine Entomostraca collected during the Swedish Scientific Exhibition to Spitzbergen, by W. Lilljeborg.—On the formation of the smaller bays, of the river valleys, of lakes, and of sea banks, by A. Helland.

GÖTTINGEN

Nachrichten von der königl. Gesellschaft der Wissenschaften, Aug. 7.—The following papers were read:—On lens fibres, by Prof. J. Henle.—On the linear differential equations of the second order which possess algebraic integrals, and on a new application of the "invariant" theory, by Prof. L. Fuchs.

CONTENTS

ERRATA.—Vol. xii. p. 455, col. 1, line 8 from bottom, for "time t" read "very small time t." P. 463, col. 1, line 21 from bottom, for "$2n+2$" read "$2n+2$."