resembling lightning were seen darting. Whistling, rumbling, and rattling noises were also heard. The sound was thought, for the most part, to come from the west or south-west. It was not heard in Karlskoga, which lies to the south, but far to the north and north-west. At Falun it was supposed that a fall of rock had taken place in a mine, and at Grandgrufvan, at Ludvika, the sound was heard as of a peal of thunder at a depth of sixty metres underground. At other places a dynamite magazine was thought to have exploded, or it was taken for a loud clap of thunder.

In the neighbourhood of a workman who was cutting trees in a wood several branches of a tree were broken off by a stone weighing nearly a kilogram, in a way which clearly showed no great falling velocity, which was further confirmed by the stone making a hole in the ground only a decimetre in depth. Another person saw a stone fall close beside him, and immediately took it up. It was not at all warm. A girl saw a stone weighing two kilograms fall to the ground "so that the earth smoked." Several fell in the Lake Björken or were picked up in the neighbourhood soon after. One weighing 8½ kilograms fell in a rye-field. In falling it had gone in two pieces and made an eight-inch deep hole in the cultivated soil. The largest stone weighed 12½ kilograms.

The number of the stones that have been found, however, amounts only to eleven, with a total weight of thirty-four kilograms. They were scattered within an oval two kilometres broad, whose larger axis had a length of eight kilometres. The largest stone was found in the south-west end of the oval, in a meadow surrounded by wood. It is probable that larger stones have fallen farther into the wood, and thus escaped observation. The stones are of very irregular form, and on their surface are full of the depressions peculiar to meteorites. On the surface they are, as usual, covered with a blackish fused crust of very variable thickness, being so thick on some of the fractured surfaces as to completely conceal the colour and inequalities of the main mass, and on other similar surfaces so thin that the colour and crystalline structure of the main mass may be clearly distinguished. Sometimes the crust is completely wanting, so that the surface of the stone, with the exception of an inconsiderable blackening, resembles a fresh fracture. The stones are thus fragments which have been formed at different times, and exposed for different periods to the action of the glowing envelope. The largest stones are covered in many directions with black friction surfaces which are more clearly marked on these meteorites than on any I know. These too have probably been formed in our atmosphere, and show that with the great pressure produced by the resistance of the air, cracks have been formed in the meteorite along which its different parts before springing asunder rubbed against each other during the rotation of the irregularly-formed mass, whereby the uneven surfaces have been smoothened, and coloured black by the heat developed during friction, the projecting metallic particles flattened, &c. On breaking in pieces the meteorites in question, they are found to consist of a coarse breccia-like mixture of grey and of nearly black portions, little differing from each other in chemical composition. It is remarkable that the grey mass when heated becomes dark, and thereby in appearance quite like the black, which appears to show that some of the breccia-like pieces found in the stones had been heated, while this does not appear to have been the case with the other part. Different pieces of the Ställdalen meteorites thus appear to have been exposed to the action of very different temperatures before they were united into the mass, hard, tough, and difficult to break up, which formed the meteorite.

The stones that fell at Ställdalen have been carefully analysed by Mr. G. Lindström, assistant in the mineralogical department of the Riks Museum, who found them to consist of nickel-iron; a silicate decomposed by acids, chiefly olivine; a silicate indecomposable by acids, probably bronzite; magnetic pyrites, and inconsiderable quantities of phosphide of nickel-iron; of a phosphate, and of chloride of iron. The first-named substance, a metallic alloy of ninety per cent. iron and ten per cent. nickel, is not known (of terrestrial origin, but distinguishes most meteorites, and makes it possible to separate with certainty the meteorites which have fallen at Ställdalen from all other minerals occurring in the quarter. The two other main constituents again, olivine and bronzite, are also wanting in our granites, gneisses, and common slaty rocks, but are found commonly entering into the composition of a number of rocks which by most of the geologists and mineralogists of the present day are considered to be of plutonic origin. Many circumstances, however, indicate that these rocks, which in remarkably regular layers cover extensive regions of the earth's surface, *often, but not always*, consist of stratified tuff-like formations which during the enormous duration of geological periods have assumed a crystalline structure. The resemblance between them and various constituent parts of the meteorites is so striking that the question must be seriously and impartially discussed whether a part of the plutonic rocks are not of cosmic origin. By this I mean that it gradually fell to the earth even after its surface formed an abode for animals and plants, and that under favourable circumstances it collected so as to form proper stratified so-called plutonic rocks, in which, through subsequent chemical changes, so great a development of heat has sometimes taken place that volcanic and plutonic incandescent craters have arisen in the interior of the earth.

Many observed facts may be quoted in support of this view, if it for the present appears very strange on account of the great changes it would bring about in the prevailing ideas of the history of the formation of the heavenly body which we inhabit. We have perhaps here the true solution of the many disputed questions raised by the discovery of meteoric iron at Ovifak, in Greenland, a simple explanation of the abundant occurrence of magnesia in certain geological formations, and of many other geological phenomena difficult of explanation according to theories now prevalent.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE

CAMBRIDGE.—Mr. W. N. Shaw, B.A., Emmanuel College, 16th Wrangler, 1876, and 1st Class Natural Sciences Tripos (Distinguished in Physics), 1876, has been elected to a fellowship in his College.

LONDON.—The following have passed the recent examination for the degree of Doctor of Science in the branches specified:—

Branch IV.—Inorganic Chemistry.—J. M. H. Munro, Royal College of Science, Dublin.

Branch VI.—Electricity (treated experimentally).—O. J. Lodge, University College.

Branch VIII.—Physical Optics, Heat, Acoustics (treated mathematically).—J. F. Main, Trinity College, Cambridge.

Branch X.—Comparative Anatomy.—A. M. Marshall, B.A., St. John's, Cambridge, and St. Bartholomew's Hospital.

Branch XIV.—Geology.—W. Saise, Royal School of Mines.

SOCIETIES AND ACADEMIES

LONDON

Geological Society, June 20.—Prof. P. Martin Duncan, F.R.S., president, in the chair.—Messrs. George Alexander Gibson, Henry P. Gurney, John Higson, and Francis Stevenson, were elected fellows of the Society.—The following papers were read:—On a hitherto unnoticed circumstance affecting the piling up of volcanic cones, by R. Mallet, F.R.S.—The steppes of Southern Russia, by Thomas Belt, F.G.S.—The glacial period, by J. F. Campbell, F.G.S.—The action of coast-ice on an oscillating area, by Prof. John Milne, F.G.S., of the Imperial College of Engineering, Tokio, Japan.—On points of similarity between zeolitic and siliceous incrustations of recent formation by thermal springs and those observed in amygdaloid and other altered volcanic rocks, by Prof. A. Daubrée, F.M.G.S.—On the cretaceous Dentaliadæ, by J. S. Gardner, F.G.S.—On a number of new sections around the estuary of the Dee which exhibit phenomena having an important bearing on the origin of boulder-clay and the sequence of glacial events, by D. Mackintosh, F.G.S.—Discovery of silurian beds in Teesdale, by W. Gunn, F.G.S., and C. T. Clough, F.G.S., of H.M. Geological Survey.—On the superficial geology of British Columbia, by George Mercer Dawson, F.G.S., Assoc. R.S.M., of the Geological Survey of Canada.—The exploration of the ossiferous deposit at Windy Knoll, Castleton, Derbyshire, by Rooke Pennington, F.G.S., and Prof. W. Boyd Dawkins, by Prof. W. Boyd Dawkins, F.R.S.—Description of the fossil organic remains from Bendigo, by M. Carl August Zachariæ, communicated by the president.—Notes on some recent discoveries of copper ore in Nova Scotia, by Edwin Gilpin, F.G.S.—Glacial drift in the North-eastern Carpathians, by R. L. Jack, F.G.S., and John Horne, F.G.S., of the Geological Survey of

Scotland.—On terminal curvature in the south-western counties, by W. A. E. Ussher, F.G.S., of H.M. Geological Survey.—On the chronological classification of the granitic rocks of Ireland, by G. H. Kinahan, M.R.I.A., communicated by Prof. Ramsay, F.R.S.—The Cambrian rocks of South-east Ireland, by G. H. Kinahan, M.R.I.A., communicated by Prof. Ramsay, F.R.S.

PHILADELPHIA

Academy of Natural Sciences.—A valuable list of the fresh-water fishes of Northern Indiana, by Dr. D. S. Jordan, is published in the *Proceedings* for 1877, with remarks on many forms of novelty or interest. This is followed by a critical account of the genera of North American fresh-water fishes, by Dr. Jordan and Mr. C. H. Gilbert. One list gives the whole of the genera in the order of their original description, with full references.

VIENNA

Imperial Academy of Sciences, April 19.—Contributions to the cosmic theory of meteorites, I. Proof of identical meteorite paths, by M. Niessl. Two detonating meteorites, on April 10, 1874, in Bohemia, and April 9, 1876, in Hungary, had apparently the same point of emergence, and observations gave for both a velocity corresponding to a hyperbolic path.—On the action of alcoholic caustic potash solution on ether-like nitro-bodies, by MM. Hess and Schwab.—On the application of the microscope to quantitative determinations, by M. Jonstorff.—On the history of creation of our planetary system, &c., by M. Sedlitschka.—On some remarkable phenomena in Geissler tubes (fourth paper), by MM. Reitlinger and Urbanitzky. Seeking the causes and laws of the repulsions and attractions, they experimented with various gases rarefied in Wüllner's cylindrical tubes (without capillary part), noting simultaneously with a multiplier the changes in the induced current. They were led to the conviction that it is a case of reciprocal action between accumulation of static electricity on the approximated conductors and current electricity in the tubes, and that the chemical character of the gases has a great influence on the apparent progress of the phenomenon.

April 26.—On iron cyanide compounds, by M. Skraup. This relates to superferrid-cyanide of potassium.—On a new derivative of sulpho-urea, sulphydantoinic acid, by M. Maly.—Theory of circular polarisation, by M. V. Lang.—On *Phymatocarcinus speciosus*, Reuss, by M. Bittner.—A geological profile from Osmanich am-Arcer, on the Sveti Nikola-Balkan, to Ak-Palanka, on the Nisava, by M. Toula.

PARIS

Academy of Sciences, July 9.—M. Peligot in the chair.—The following papers were read:—On the alcoholate of chloral, by M. Wurtz. The dehydratation of crystallised oxalate of potash occurs in vapour of the alcoholate as easily as in air; not so in vapour of hydrate of chloral (proving that the latter contains water).—Reply to M. Roudaire's last note on the Algerian inland sea, by M. Naudin. He insists specially on the erosive force the current would have both in its primary state and in time of flooding. The troubled water of the coast, too, would enter and deposit much sediment.—On electric transmission through the ground by means of trees, by M. Du Moncel. Trees are all, more or less, conductors, their conductivity depending on the quantity of liquids in them. The roots act as electrodes. The resistance of a tree, commencing with its leaves, and supposing contact only with a few of them, varies from 200,000 to 400,000 kilometres of telegraph wire (in round numbers). That of the trunk, at a height of 7 to 8 m. hardly exceeds, in strong trees, 3,000 kil. in connection with the ground, and varies from 2,000 to 7,000 kil. between small metallic electrodes. Thus, contact of telegraph wires with leaves need not give much anxiety. The resistance of ordinary houses being about sixteen to twenty times that of trees, the latter, if not under the former in height, may be considered a protection, but as rain usually falls in thunderstorms and diminishes the difference of conductivity between trees and house, a protective effect of trees may only lie in their superior height.—Treatment by sulphocarbonates of vines of Orleans and Saint Jean-le-Blanc, by M. Gueyrand.—On the quasi-circular movements of a point subject to the attraction of a fixed centre, by M. Boussinesq.—On the diamagnetism of condensed hydrogen, by M. Blondlot. Palladium charged with hydrogen M. Blondlot finds to be *less* magnetic than palladium uncharged; which accords with the facts that palladium is weakly magnetic and hydrogen diamagnetic. Graham's opposite experience is thought due to some disturbing cause, probably impurity of the acid used in charging the palladium by means of electrolysis; the least trace of a ferruginous body gives a deposit on the palladium, which would explain Graham's results.—Photometric researches on coloured flames, by M. Gouy. If the quantity of salt introduced into the flame be doubled, the increase of brightness of each line is at most equal to what would be produced by doubling the thickness of the flame, and it is nearly always inferior.—On a new metal, *davyum*, by M. Kern (see p. 236).—On the oxidability of sulphide of manganese, by MM. De Clermont and Guiot.—On a new general method of synthesis of hydrocarbons, acetones, &c. Third note by MM. Friedel and Crafts.—Action of bromine on pyrotartaric acid; second memoir by M. Bourgoin.—On the determination of carbonic acid in blood serum, by M. Fredericq.—Researches on bitter almonds, by M. Portes. Young bitter almonds contain amygdaline; they have always a different composition from sweet almonds; the embryo alone contains emulsine, and it appears pretty late; the amygdaline is localised in the teguments of the seed; its origin is still unknown; by degrees it quits the teguments and penetrates into the cotyledons by the radicle.—On the nickelised iron of Santa Cattarina, by M. Lunay.—On some physiological facts observed in Drosera, by M. Ziegler. It has been observed that Drosera is sensible to the physical action of salts of quinine after excessive indirect animal contact. Many other bodies have this property, and among them is *urea*. Like quinine, urea does not cause any action in normal droseras, but on being united with certain other bodies, it produces contraction (*e.g.*, granules made of a mixture of urea and iron with white wax give contraction; but granules of wax with urea alone, or with iron alone, have no effect).—Comparative study of cupric preparations introduced into the stomach and the blood, by MM. Feltz and Ritter. Insoluble albuminate of copper ingested into the stomach in considerable quantity has hardly any effect; soluble albuminate causes disorders at least as grave as the ammoniacal sulphate in distilled water. Sulphate of copper dissolved in syrupy glycerine is much more poisonous than in aqueous glycerine.—Treatment of rheumatism, gout, and various nervous states, with salicylic acid and its derivatives, by M. Sée. It seems beneficial in some cases.—On testing for salicylic acid, by M. Marty.—On external use of salicylic acid, by M. Grellot.—The advantages of immediate and early trepanations, by M. Gross.

CONTENTS