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"Nec aranearum sane textus ideo melior quia ex se fila gignunt, nec noster vilior quia ex alienis libamus ut apes." JUST. LIPS. *Polit.* lib. i. cap. 1. Not.

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sharow, in which the planes of even well-developed crystals have undergone an alteration in their relative position.

One crystal of this kind was found to be a twin, fig. 2. The two individuals crossed one another nearly at right angles, and the faces *a* and *v* both were in one plane. The twin face is therefore parallel to (0 1 1), as for this twin face the two individuals cross at angles of 94° 8′ and 85° 52′. The crystal was so small that it was impossible to measure angles formed by faces of the two individuals.

The crystals on which the prism (0 1 1) predominates are combinations of the faces *a b c n h u z* (figs. 3, 4); the face *c* being always more developed than *b*, and the face *z* occurring only very seldom. None of these faces are very brilliant, and the worst of it is that the face *u* is always curved, so that it was found impossible to get an angle of the prism for measurement except by a rough approximation.

I found

$$na = 26^\circ\ 16'$$
$$ha = 44 \quad \text{appr.}$$
$$zu = 35 \quad ,,$$

We see that the crystals of this kind are composed of faces which, with the exception of the face *a*, are new. As the angles could not be measured with great accuracy, it might be supposed that the face *h* is not a new face, but in fact identical with *m*. But this is contradicted by the results obtained from the optical properties exhibited by the crystal; for in the polarizing apparatus one finds that the axis of greatest optical elasticity must be parallel to the edge *ah*, and therefore this edge must be parallel to the axis *b*; for the observations of Descloizeaux give the following symbol as representing the optical orientation,

$$\underset{+}{\mathfrak{c}}\ \mathfrak{b}\ \mathfrak{a};$$

that is to say, the axis of smallest optical elasticity (which is at the same time the first mean line) is parallel to the greatest crystallographic parameter, the axis of greatest elasticity parallel to the mean, and the axis of mean elasticity parallel to the smallest parameter.

5. *Aërolitics.* *By* N. S. Maskelyne.

The branch of science that treats of Meteorites has acquired sufficient importance to justify our giving it a special name, and I therefore propose for it the denomination with which this article is headed. Many reasons conspire to render this study of "aërolitics" one of increasing interest, and to make it highly desirable that collections of meteorites should exist to illustrate it, as complete as possible, not only in the numbers of the different falls they represent, but also as regards the modes in which the specimens are prepared for exhibition. These remarkable bodies will always command a general interest, from the fact that in them we see matter foreign in its origin and history to our own world, and handle, in them, the only tangible substances that belong to the space beyond our atmosphere. But the special interest attaching to a collection of them arises from the fact that, while they exhibit features of marked similarity, they withal, both as regards their constituent minerals, and the manner in which those minerals are mixed with each other, possess almost every one of them a very distinct individuality. Moreover, every day that the collection of specimens representing the older meteoric falls is deferred, adds to the difficulty of forming a complete series of them. It was on these accounts that the small but valuable collection that three years ago existed in the British Museum, has since that period been very largely increased. Towards the furthering of this object most valuable assistance has been rendered by Governors of Colonies and Indian Presidencies, who have exerted their authority with a liberality that has been in one case indeed rivalled by the patriotism of a valuable and learned body, the Asiatic Society of Calcutta. The result of this and of the considerable acquisitions made by purchase, has been that the aërolitic collection, which is an appanage to the Mineral Department in the British Museum, has now risen in point of material into the foremost place among such collections in the world*.

To accumulate so great a material is, however, but one step towards the end which should be held in view in the formation of a scientific collection. The next step consists in making that material available for the uses of science, partly by a proper preparation and exhibition of the specimens, partly by a complete description of them. I propose in this and subsequent papers to contribute something towards the last of these objects.

Yet when one approaches the subject with a view to undertake

* Every great collection has its own characteristic merits. If I may speak of that in the British Museum as the richest in material, taking the mass of the specimens as well as their numbers into consideration, it is with cordial pleasure that I express the highest admiration and respect for what I will not call a rival collection at Vienna. That collection is a classical one. Its specimens have been gradually collected, well described, and admirably exhibited. That aërolitics exists at all as a scientific subject is probably due to the existence of, and the care bestowed on, that collection. In the cause of science it is to be hoped that persons in authority in Vienna may not feel any jealousy of the rising collection in London, but may be ready to exchange, to the mutual advantage of both collections, duplicate specimens of aërolites not common to the two.

investigations in it, one cannot help feeling some disappointment, as well at the incompleteness of the chemical results that have been hitherto obtained, as at the unsatisfactory position of our knowledge concerning the origin and the sources of meteorites. Aërolitical science has to deal with the circumstances that attend the fall of a meteorite, no less than with its mechanical condition and its chemical composition; and from the data thus acquired it has to arrive at conclusions regarding the origin, the motion, and the cosmical relations of the foreign matter that thus wanders as it were into the atmosphere of our earth.

The general literature of the subject is becoming very considerable. Besides the tables and researches published by Mr. Greg in our own country, and besides many papers of Baron Reichenbach in Poggendorff's *Annalen*, Hofrath Haidinger has, by his active pen and energetic mind, contributed, in Austria, perhaps more valuable notices on the fall of meteorites than all other living authors; and Dr. Laurence Smith, as well as Prof. Silliman, by their accurate collection of facts and by their own investigations as chemists, have done much for the subject in America, where also the vigilant activity of Prof. Shepard has been conspicuous in collecting and distributing the specimens themselves.

The more special and exact literature, that, namely, which details the work done on meteorites in the laboratory, carries the names of the best inorganic analysts of this century, including those of Rose, Wöhler, and Rammelsberg. But if the progress thus far made in either the general or the special parts of the subject is not very large, it is at any rate enough to convince us that we see with tolerable clearness the questions to which we have to seek answers, and what are the cardinal points of interest raised by the presence of a meteorite on our globe, and by the circumstances attending its advent to it.

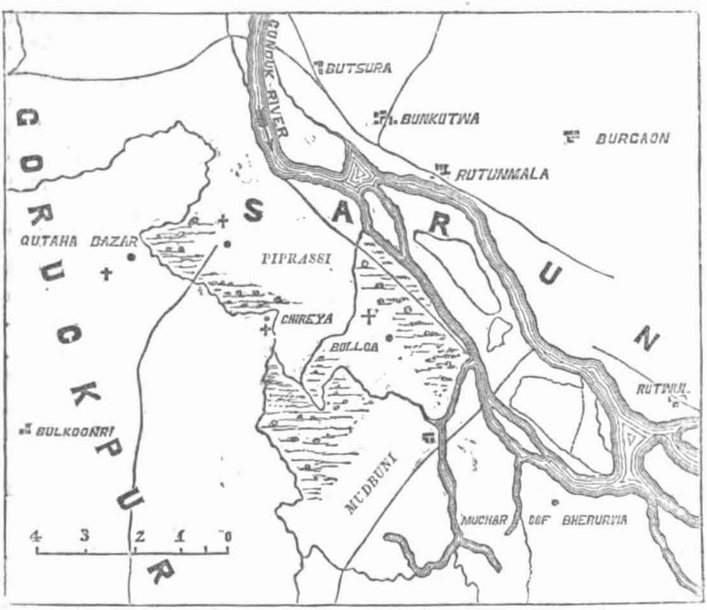
The chemical methods adopted for the analysis of a meteorite are probably unsatisfactory to every chemist who has employed them. The separation of the olivinoid and soluble felspathic from the insoluble felspathic, augitic, and other constituents, by the action of an acid, is necessarily incomplete; and the assignment of even empirical formulæ for the augitoid and felspathic ingredients is no less unsatisfactory. Yet in many meteorites it seems very difficult to conceive any better direct mode of operation. The intimate manner in which the different minerals are sometimes mingled, in what I may call a microscopic breccia, building the structure of the minute spherules in some of those belonging to the large group to which G. Rose has given the happy name of chondritic meteorites, and the excessive subdivision of the nickel-iron which in infinitesimal spangles is disseminated alike through homogeneous spherules and through those which present this brecciated character,—these facts, which the microscope alone reveals, seem to bar the chemist from any complete mechanical separation of the ingredients of many meteorites, whether by the agency of a magnet, or by that of the selection, by the eye and hand, of distinct homogeneous particles*. Still there are cases in which analysis is possible; in some meteorites, as in that of Parnallee, the minerals are tolerably isolated from each other; and the fact that the chemist in dealing with such meteorites as those of Chantonnay, Stannern, Luotolax, Bokkevelde, and Bishopville, is enabled to place each of them as the characteristic member of a group, may furnish ground for the hope that approximate methods may be found for at least determining the nature of the minerals contained in any given meteorite. One such method appears to be furnished by the microscope. A thin transparent section of an aërolite exhibits, under a low power, in a tolerably characteristic way the minerals of which the aërolite is composed. By comparing these minerals as thus seen and as observed *en masse* in the specimen with the minerals that predominate in certain well-investigated and, so to say, standard types of meteorite, one soon learns to discriminate between them, and to predicate of any given individual aërolite, with what others it presents mineralogical analogies, though the assignment to each of these minerals of its precise place as a mineral species is in some cases very difficult. Occasionally, however, as in the coarser-grained varieties, one is enabled to discriminate and to separate by mechanical selection for chemical analysis certain mineral ingredients in a state of considerable purity.

I have sought by these means to determine the lithological character, if I may so call it, of some of the undescribed meteorites in the British Museum. As a nomenclature is much wanted in our language to represent what is so completely expressed by the terms Meteorstein and Meteoreisen in the German, I propose calling the former (the meteoric stone) by the original term Aërolite, the meteoric iron by the term Aërosiderite, and the intermediate varieties (including the Pallasites of Rose), in which the iron is continuous and associated with silicate, by the term Aërosiderolites or Siderolites. The term meteorite would remain a generic expression for the whole.

* Probably it would be found practicable to determine the iron indirectly by the estimation of the hydrogen developed by the treatment of the aërolite with acids, under conditions convenient for collecting that gas. The sulphuretted hydrogen might be estimated at the same time; and even if it were all calculated as emanating from meteoric pyrites, the ultimate error in the analysis would be less than by a method in which the entire separation of the metallic iron is generally impossible, and the estimation of ferrous oxide therefore as often too high.

6. *The Fall of Butsura, May* 12, 1861.

The group of aërolites that fell on May 12, 1861, on the banks of the Gunduk, forty-two miles north-east of Goruckpur, presents features of a general interest that claim for it a prominent place among those to be described in these Notices. Five pieces of that group were sent to the Asiatic Society of Bengal, at Calcutta; and they have been thence forwarded to London, where they were exhibited during the period of the International Exhibition, at the British Museum. They have since been cut, in directions agreed upon by Mr. Oldham on the part of the Asiatic Society, and in accordance with a liberal and patriotic resolution of the Society to share with the National Museum in London their valuable acquisitions in Indian aërolites. These five stones fell at four distinct places south-west of the main stream of the Gunduk, near the village of Mudbuni and on the opposite side of the river to Butsura, which, as being the nearest place indicated on the Royal Atlas of Johnston, is perhaps the best to give its name to the fall (see Map). The four spots



where the aërolite fell are marked with a cross on the map, and form the angles of an irregular four-sided figure, one side of which runs nearly north-west and south-east, taking a direction parallel to the general course of this part of the Gunduk. The northern angle is very near to, and rather to the north of, a little place called Piprassi; the south-eastern angle is a little to the north-west of one called Bulloah. These points are some three miles apart. Two very small fragments, weighing about 5 and 7 ounces respectively, fell at the latter locality. A thin slab-like piece fell at the former. It weighed about 11 pounds. Of the other angles, one is formed by a spot called the Qutahar Bazar (described in one account as in the Thannah of Nimboah); this is the north-westerly angle. The southern angle is at a spot called Chireya. The stones that fell at these two points respectively weighed 13 lbs. and 8¾ lbs. These points, like the former, are some three miles apart; and whereas Chireya and Piprassi are only two miles, the northern point, Bulloah, and Qutahar Bazar are some three miles distant from each other.

For the narrative of the circumstances accompanying the fall of these aërolites, I am indebted partly to Mr. Atkinson, the Secretary of the Asiatic Society, partly to my friend Dr. Oldham, the Director of the Indian Geological Survey.

The fall of the Qutahar Bazar and Chireya specimens was heralded by a report from out of a cloudless sky with a sound like that of ordnance, succeeded by several successive peals of seeming thunder. An appearance as of smoke was seen above the ground where they fell. One stone penetrated the soil for a cubit (=18 inches); the other did so to half that depth.

The two small fragments from Bulloah were accompanied by phenomena well substantiated by a near eye-witness. A native was taking his cattle to the water, when he was startled by three very loud reports, and saw in the air on high "a light" (a luminous body), which fell to the ground within 200 yards of him. Here too the sky was serene, and the weather fiercely hot, but there was a very small cloud, out of which this witness stated the report and the luminous body to have come. "First," he adds, "there was the loud report, and about the same time I saw the light like a flame; then the stone fell, and in falling made a great noise, and after it fell the sand was taken up high into the air." He went to the spot whence the sand had been raised from the ground, and found there five pieces of stone. They were very hot, and so was the sand all round, which was thrown up to the height of a foot. Unfortunately only two of these five fragments were preserved. Dr. Oldham further mentions that the incandescent fragments in falling are stated to have scintillated like iron when at a white heat.

The Piprassi stone was seen to fall by a witness quite independent of the other, but unfortunately from a much greater distance. In the midst of the calm hot day, while sitting in a field on the east side of the village of Piprassi, with many of the villagers, he states that they were startled by three loud reports succeeded by a rumbling sound which gradually died away. Their attention was immediately arrested by a cloud of smoke, which rose from the ground at about 1000 yards from them. They saw nothing like a falling body, but they heard a whistling sound as of a bullet, but much louder. They went to the spot and found the stone, round which the gravel had been thrown up for some 2 feet. Fortunately the stone was not carried away, for nobody touched it for two days. It was Mahadeo!

Two hours after the fall, the serenity of the weather was interrupted by a storm accompanied by a little rain.

The reports of the explosion were heard at a distance of sixty miles from the locality.

Dr. Oldham, on sending these most interesting aërolites to England, accompanied them by remarkable observations of his own. The two little Bulloah fragments fit exactly together, and both fit on to the Piprassi stone. The Chireya stone in like manner fits with sufficient precision to that which fell at Qutahar. He surmised also that a careful adjustment would succeed in uniting all five fragments into a whole; and he indicated as a guide to this adjustment, a remarkable vein of iron which ran through the Piprassi and the Qutahar stones. I have since tried every possible means of effecting this; and though it is not practicable to find continuous surfaces of contact on the Piprassi and Qutahar stones, I have been enabled to determine the precise position they must have occupied relatively to each other, and have modelled and constructed an intermediate piece which, allowing contact of the stones at one part, builds the whole of the fragments into one large shell-like piece, obviously itself a fragment of some far larger mass. But this presents also another point of great interest. The Bulloah and the Piprassi stones, at the contact surfaces by which they fit together, exhibit no crust, though in other respects coated with it. The Chireya and Qutahar fragments, on the other hand, present a crust hardly, if at all, distinguishable from that covering the rest of their mass, on the very parts that form the faces of junction, and at which they fit with unquestionable precision. These surfaces indeed are smooth, and the edges very much rounded off, while those of the Bulloah and Piprassi stones fit together with the exactitude of adjustment with which the portions of a broken piece of oolite might be reunited.

Before attempting to draw conclusions from these facts, I will describe the general characters of the several fragments, in order that all the data offered by this aërolitic fall may be given in consecutive order.

The two that have been preserved out of the five stones that fell at Bulloah are small fragments, fitting on, as before mentioned, to one of the long edges of the Piprassi stone. Probably the whole five formed a long bar-like piece fitting on to that edge, and these two would, in that case, constitute the half of it.

The Bulloah stones (numbered 1 and 2 in the figures on Plate IV.) are rounded along their summits and sides, and are there coated with a crust of a sooty black, and of dense texture. On the surface of contact they and the Piprassi are not crusted. The material of which the interior of the Bulloah stones is composed proves, when examined by a lens, to contain a profusion of protruding points of metallic iron. It presents a yellowish-brown ground-mass. It is mottled with irregular dark stains, which surround the metallic iron. This iron, associated with a considerable amount of meteoric pyrites, is present in this aërolite to a very high percentage. It is very evenly distributed in small, isolated, irregularly formed and sometimes crystalline-looking particles, not aggregated into a sponge, as in the siderolites, but, as in the beautiful aërolite of Akbarpúr, the grains of metal seem linked by a ferruginous or iron-stained mineral, which may possibly indicate the vestiges of a sponge-like structure of the iron at some earlier period in its history, when perhaps the silicates were less basic than at present, and less of the iron oxidized.

Besides these ingredients, there are several very irregularly-distributed spherules of a mineral of the greenish-brown colour and translucency, as well as the lustre, of dirty bees-wax. It is somewhat transparent in thin sections, and presents the characters of olivine.

A minute amount of iron pyrites occurs besides the meteoric pyrites; and a little of a very dark-coloured mineral is also present, generally with a lustrous fracture, and perhaps occasionally somewhat crystalline.

In a section under the microscope with a power of one-inch focus, this aërolite does not prove to be a very remarkable one. The mass of it seems to consist of olivine. This is associated with a grey mineral, and also with one that is of an opake white. This grey mineral in some cases seems to constitute entire nodules of the aërolite, and sometimes seems mingled in the sort of brecciated mass, containing olivine crystals, that forms other nodules in it. It presents the appearance, in the former case, either of a dark mottled surface spangled with dark points (consisting sometimes of iron, and in some cases curiously distributed, as if spurted through the mass from a centre), or of a mineral presenting very regular and minute parallel cleavage-planes with dark grey bars running along them, often rayed out like a fan, and with cross cleavages usually oblique, but at angles which vary with the inclination of the section to the axis of the crystal.

There is also another mineral, transparent and presenting cleavages nearly perpendicular to each other, which appears to be distinct from the foregoing.

What these minerals thus associated in small proportion with the olivine may be—whether they are solely augitic, or whether also the long felspathic-looking bars are really fragments of some felspar—is at present difficult to say with certainty. But in a subsequent article in these Notes I purpose giving all the data I possess for assigning to these and other meteoric minerals their true mineralogical character.

The Butsura fall, therefore, seems, like other aërolites rich in iron, to approach in character to a siderolite in that the silicates it contains consist, as I believe, for the most part of olivine. This olivine is generally very transparent, and comparatively colourless; but near the iron particles, and forming a continuous fringe to them, its granules become of a ferruginous colour, and are at times, especially in parts of the Qutahar and Chireya stones, red, like fragments of garnet or zircon.

The meteoric pyrites is present in a ratio of about one-half the apparent quantity to that of the iron. It is generally in little independent particles of the same average size as those of the iron; and it sometimes is continuous with the iron in the same particle, like the copper and silver of Lake Superior.

The Bulloah stone exhibits less of the ferruginous olivine than the others around the iron, and may perhaps contain more of the barred and grey mineral or minerals. The result is a paler hue on it. Its crust, on the other hand, is thicker and coal-black, that on the other stones having a browner cast.

But the specific gravity of the aërolite seems pretty constant in its different parts, namely about 3·60.

The next stone in order to the fragments that fell at Bulloah is the thin slab-like piece that fell at Piprassi, marked 3 in the figures. One of the faces of this piece is convex, while the other side presents a somewhat hollowed form. It is nearly rectangular in its general outline. The inner, as well as the outer, side presents some large but shallow hollows or "pittings." This piece, as before observed, does not fit on directly to the great mass that fell at Qutahar Bazar; but that it formed a closely contiguous part to it on the original aërolite there can be no doubt. In fact the general contour of the stone, the correspondence of the outline and character of the shallow hollows on both, and, finally, the existence in them of the remarkable vein of nickel-iron before alluded to, and which runs persistently in one plane through each of them from the top to the bottom,—these all serve as guides to the restoration of the original form of the aërolite, so far as these two parts of it are concerned, and are the grounds of justification for the restoration of this part of the meteorite which I have attempted, by moulding the small intermediate piece, to unite the two stones, and which is marked on the figure with the number 4. The Qutahar stone, which becomes thus adapted to the Piprassi piece, is a fine mass of an irregular wedge shape (it is numbered 5). The inner side is fitted with large shallow depressions, and presents a rather concave surface. The outer side is flat and smooth. The base on which it stands, and which is the result of the wedge-like form, is also smooth, rounded at the edges, and presenting hollows and irregularities on one half of its surface, while to the side of this base, on the inner or just below the concave part of the stone, the irregular piece that fell at Chireya adapts itself. This last fragment (numbered 6) is somewhat pitted and deeply grooved on its upper side, and rounded everywhere else. Indeed, notwithstanding the precision with which it fits to the Qutahar stone, the faces and edges at the parts of contact are rounded off so as almost to obliterate the original form of the stones at this part. The contour presented by the reconstructed mass, so far as the reuniting of these scattered fragments enables one to build it up, is that of a shell or the thick outer rind of one side of a considerable aërolite.

The lithological character of the Piprassi, Qutahar, and Chireya stones is very similar to that of the Bulloah pieces. But there are differences between them worthy of being noticed. Thus the crust on them is not very different from the dense black crust that coats those of Bulloah; it is, however, less characteristic and less thick. They are all dull, as the crusts on highly olivinous meteorites generally are, as contrasted with the shining enamels on the felspathic-augitic kinds. It exhibits crystalline metallic-looking points, as well of iron as of meteoric pyrites and, at very rare intervals, of iron pyrites, that are disseminated among small globular projections of a pitch-black colour. It is these black projections, on the other hand, that constitute the whole mass of the Bulloah crust. But in the three larger masses the crust assumes a dirty blackish-brown hue.

The facts above recorded appear to me to throw some light upon several interesting questions.

We may hazard a pretty safe conjecture as to the direction of the Butsura fall, by observing that the lighter stones fell to the S.E. of the heavier ones; the Bulloah three miles S.E. of Piprassi; the Chireya a similar distance E.S.E. of Qutahar. If we suppose that the disruption of all the stones was simultaneous, we might further assume that they fell with a diverging flight; for the Qutahar Bazar and Piprassi points are considerably further asunder than those of the Bulloah and Chireya falls. In fact, a line passing from the E.S.E. to W.N.W. would represent the direction of the flight of the aërolite; and if we are to judge by the different divergences of the stones, that flight would not have been at a great inclination to the horizon.

Had it been quite horizontal, the point of divergence would have been, on this view, about seven miles E.S.E of the central point of the fall, and two miles N.W. of Mudbuni. As, however, it would seem to have fallen from a considerable elevation, it may have been much further off, though the point of disruption would have been somewhere nearly vertical over the position thus indicated.

But this fall is remarkable for the evidence it affords of the incrustation of an aërolite subsequently to its disruption, as well as of the probability of successive disruptions, of which one, at least, was not followed by incrustation. In the great Parnallee aërolite, and still more in that which fell at Bustee, we have cases, of which indeed every collection must exhibit some more or less evident examples, showing crusts on different parts of an aërolite that seem not to have been contemporaneous—where, in fact, the crust on one part has not the thickness and homogeneity that characterizes that on another part. The following, in the British Museum collection, are cases in point: Stannern, Bokkeveldt, Benares, l'Aigle, and Mezö-Madaras. These facts are among those we have to explain. On the present occasion they were accompanied, according to every witness, by reports in the air, and by a subsequent roll of thunder. In two cases the distinct reports were three in number. There was a cloud in the sky, out of which the aërolite seemed to descend; while at Bulloah the stone or stones were seen to fall as a luminous body, which at some part of its path appeared to scintillate in the air. The shell-like form, too, of the united fragments, in suggesting the idea of an internal core or mass from which the external pieces have been severed, recalls to mind the suggestion of Mr. Benjamin Marsh, that the bursting of the meteorite is the result of the expansion produced by heat. If we couple with Mr. Marsh's suggestion the remarkable explanation by Hofrath Haidinger of the intense coldness declared to have been exhibited by the Dhurmsala stones after their having fallen quite hot, I believe that suggestion will prove a very fertile one. The coldness of cosmical space must be shared by bodies wandering therein without atmosphere.

Such a body entering with planetary velocity the terrestrial atmosphere, is arrested in its course with an abruptness of which it is as difficult to get a clear conception as is that velocity itself. The intense heat instantaneously developed on the surface of the mass will assuredly be sufficient to melt that surface down into an enamel, before it could have time to penetrate to even a sensible depth into the body. If, as is probable, this fused and white-hot enamel flies off from the mass as it proceeds with the scream of a huge projectile through the air, its place will be continually taken by a fresh and continuously flowing stream of the same incandescent material. That material, too, is combustible. The metallic iron in many an aërolite ranges above 20 per cent., and is associated with sulphur as pyrites, and sometimes in other forms. Here at least is cause for much, if not a sufficient cause for the whole, of the spectacle exhibited by the blaze of a meteor. That the air itself is also heated to whiteness, and as such becomes visible, as Haidinger suggests, is highly probable, and would add still more to the brilliancy of the light.

But while the enormous velocity of the body is thus instantaneously arrested and converted into heat, the effect of that heat will not be exhibited in the molten spray of enamel alone. The heated surface will gradually, but by no means slowly, impart its heat to the interior; and notwithstanding the non-conducting character of the stony ingredients of an aërolite, the outer portions (a sort of shell around it) will rapidly rise in temperature. The coldness of the interior would only gradually be overcome, and, long before it would be so, the expansion of the external parts would tend to tear them away from a contracted and far more than ice-cold core within. The limits and the form of that core, the conditions under which disruption would ensue (indeed, whether it would ensue at all, as it would not if the mass were absolutely homogeneous), would depend on the structure of the mass, its directions or planes of weaker aggregation, or perhaps the unequal distribution in it of matter of various degrees of conductibility. But when the disruption comes, it must come with explosion.

The process may be repeated, or it may take place at different intervals on the different sides of the meteorite. The earlier explosions may take place at points in its path where there is still velocity enough to produce a fresh enameling,—sometimes in a copious flow, at others only enough to barely glaze the exposed surface of the stone again; the later ones may occur when the velocity is more nearly spent, and the friction is no longer competent to generate the glaze.

The cloud in the air, out of which the meteorite has been seen to come in so many authenticated instances, would be satisfactorily explained by the dust of the enamel after its separation from the aërolite in its course, and the combustion of its iron, sulphur, &c.; perhaps, also, small fragments are splintered and fly off by the same principle as the larger ones, and, partially burning, become dust too.

Following in the track of the body, this dust would soon, however, linger behind it and hang in the air like a vapour-cloud, as is often seen to be the case in the wake alike of a meteor and of a meteorite.

Finally, if the reports represent the successive concussions of the air produced by the disruption of the aërolite (and reaching the ear generally in the inverse order of their occurrence in time), we must attribute the "thunder" that is so often described as succeeding the reports, to the echo of the reports themselves.

That a noise, the true extent of which is likely to be exaggerated, should be heard over so large a range of country as sixty linear miles, is perhaps not so surprising when we consider the distance to which a small cannon can be heard, even over a surface of country teeming with obstacles and air-currents calculated to impede the passage of the sound; whereas from a height of two or three miles in a still, clear air, the spread of even a comparatively small sound over an area with a radius of thirty or forty miles seems nothing astonishing. To me, at least, who have heard the roar of a train between Shrivenham and Swindon, as I stood, on a still night, in the station at Cirencester, a distance of certainly nearly twenty miles, such a wide promulgation of a sound in the air is no more difficult to understand than it is to credit the assertion of our aëronauts, who a few months back heard a musical instrument played on the earth when their balloon was some three miles above the ground. That this propagation of the sound of a cannon or a train is not due to the conduction of the earth, is proved by the fact that it is only in certain states of the atmosphere, independent of wind, that it occurs.

The cause to which I have assigned the disruption of a meteorite, and the reports which accompany it, may also furnish an explanation of the great size of some aërosiderites and siderolites, as compared with that of the largest stones. The more rapid conducting power of the metal, as well as its greater power of resisting a divellent force, would—perhaps after a first disruption—tend to prevent the repeated breaking up of the mass; and this may be the case in many instances, notwithstanding the fact that in others meteorites of this kind have fallen in associated and perhaps dissevered masses or even in showers.