



LXXXVII. On a new mineral substance, proposed to be called murchisonite

A. Levy Esq. M.A. F.G.S.

To cite this article: A. Levy Esq. M.A. F.G.S. (1827) LXXXVII. On a new mineral substance, proposed to be called murchisonite , Philosophical Magazine Series 2, 1:6, 448-452, DOI: [10.1080/14786442708674359](https://doi.org/10.1080/14786442708674359)

To link to this article: <http://dx.doi.org/10.1080/14786442708674359>



Published online: 10 Jul 2009.



Submit your article to this journal [↗](#)



Article views: 2



View related articles [↗](#)

fectured in only one way. Now the most important part of my paper is occupied in endeavouring to show that the proof offered by Laplace is insufficient, and in giving a demonstration not liable to the same objections. Laplace's proof professes to be general; mine applies only to the cases in which y can be expressed (at any rate approximately) by a rational function of the coordinates. Where then is the unavoidable consequence of which Mr. Ivory speaks? I have endeavoured to show that the fundamental equation of Laplace is general, but that its application to the theory of the attractions of solids, is restricted by the limited nature of the proof of one of the subsequent steps. In this I can discover no inconsistency, nor do I perceive that I have embroiled the subject with new difficulties. I have only done with regard to one point, what Mr. Ivory has done respecting another: I have endeavoured to show that a demonstration professing to be general, is unsatisfactory, and have substituted one which appears, though more restricted, to be better founded.

I am sorry that I should have come in contact with Mr. Ivory, for the first time, on an occasion so disagreeable. I am not desirous of appearing in a public controversy of this nature; and under any common censure I should have remained quiet. But the manner in which I have been mentioned is so gross, and the name of the person who has mentioned me stands so high, that I have no other resource than to lay my defence before all who have read the accusation. I am aware, that the Editors of a Philosophical Journal can take little pleasure in inserting the squabbles of quarrelsome writers; and therefore, whatever further provocation may be offered, I shall not trouble you again with my complaints.

I am, Gentlemen, yours, &c.

Trinity College, Cambridge, May 9, 1827.

G. B. AIRY.

LXXXVII. *On a new Mineral Substance, proposed to be called Murchisonite.* By A. LEVY, Esq. M.A. F.G.S.

IN looking over some specimens of the conglomerate of the new red sandstone, which Mr. Murchison had brought from the neighbourhood of Dawlish, and which he was so good as to show me, I observed, in many of them, a felspar-like laminated substance, with a peculiar nacreous cleavage, which induced me to believe, it might differ from common felspar. Upon further examination I found that it had cleavages

ages in three different directions, two of which are at right angles to each other, like the two principal cleavages of common felspar, are obtained with the same facility, and present the same characters. The third has a nacreous appearance, is obtained as easily as the other two, and is found by the reflective goniometer to be perpendicular to one of them, and to make with the other an angle of $106^{\circ} 50'$. So that the solid obtained by cleavage is a tetrahedral prism, such as fig. 1, the incidences of the planes of which are as follow :

$$P, g^1 = 90^{\circ}. \quad P, h^1 = 106^{\circ} 50'. \quad g^1, h^1 = 90^{\circ}.$$

This substance in the specimens from Dawlish, is white with a slight tinge of red, and is opaque; it is accompanied by quartz, a little mica, and very minute crystals of black tourmaline disseminated throughout the mass. The whole forms rather a compact rock; but in some specimens the substance is partly or entirely disintegrated, almost pulverulent, and of a pure white colour.

Mr. Brayley jun. having kindly given me for examination several specimens he had himself collected, of the conglomerate of Heavitree, near Exeter, I found disseminated among the minerals and rocks which compose it, a great many crystals of this substance, always rounded on the edges, either slightly adhering to the red marl, or strongly attached to the more solid parts of the conglomerate. The form of these crystals is generally that represented by fig. 1, parallel to the planes of which they readily cleave.

Another form offered by these crystals is that represented by fig. 2; the plane *a* is always narrow, dull, irregular and curved, and its incidence upon P, measured by the common goniometer, is about 120° . Most frequently, however, these crystals are maced. Suppose two crystals of the form fig. 2. first placed in a parallel position, and in contact by their planes g^1 or penetrating each other; if then one of the crystals be supposed to turn round an axis perpendicular to the plane g^1 till its face P makes an angle of $128^{\circ} 10'$ with the face P of the other, they will be in the relative position of the two individuals which form the macles of this substance. The two nacreous planes are then inclined to each other at an angle of $161^{\circ} 10'$, and the plane *a* of one crystal is nearly on the same level as the plane P of the other: so that as these crystals are always so much rounded on the edges, and their planes so irregular, it is, in the greater number of cases, only by cleavage that it can be discovered that they are macles.

The nacreous cleavage of these crystals is not always so easily obtained, and frequently more interrupted than in the
New Series. Vol. 1. No. 6. June 1827. 3 M speci-

specimens from Dawlish; and instead of the silvery reflection of light of the latter, presents a gold-yellow reflection, generally not uniform but in spots. It somewhat resembles in this respect the variety of felspar called sun-stone, and when cut in a proper manner gives a similar play of light: but the red marl which is generally disseminated throughout the crystal, prevents the effect from being so great as it may reasonably be supposed it would have been had not that circumstance interfered. A further comparison between this substance and sun-stone would have been very interesting; but I could not procure the sight of a rough sun-stone, to examine whether it had any indication of cleavage; and the very high value set upon those which are cut, does not leave much hope of our being allowed to cleave them.

The natural plane itself parallel to the nacreous cleavage presents frequently a gold-yellow reflection. Simple and macled crystals are also found divided in two parts by a thin layer of red marl in a direction parallel to the nacreous cleavage, as if the crystal had been broken and cemented again. Small perihexahedral crystals of black mica are sometimes found in the interior of the crystals. Thin laminæ parallel to either of the two cleavages perpendicular to one another, are sometimes transparent. The hardness of the substance is rather less than that of felspar. Mr. Kent has been so good as to take with great care the specific gravity, and has found it to be 2.5091: I had found it somewhat lower, but I give in preference his result, as being determined with greater accuracy. Mr. R. Phillips has also had the kindness to analyse the substance, and has found the following result:

Silica	68.6
Alumina	16.6
Potash	14.8

100.0

I have now to state the reasons which induce me to consider these crystals as belonging to a species distinct from felspar. The characters which are common to both are very apparent: they both possess cleavages in two directions perpendicular to each other; they have nearly the same hardness, nearly the same specific gravity; and the analysis, although indicating a greater proportion of silica and a smaller proportion of alumina than the adularia analysed by Vauquelin, and the common felspar analysed by Klaproth,—presents precisely the same result as the analysis of glassy-felspar by the latter. Finally, the macled crystals have a very remarkable resemblance to the macled crystals of felspar found in Auvergne
and

and in Bohemia, and represented in the translation of Mohs's "Mineralogy," by figures 80 and 81. For in both, the axis of revolution is perpendicular to one of the two cleavages at right angles to each other, and in felspar the second cleavage of one of the individual crystals forming the macle is inclined upon the second cleavage of the other, at an angle of $127^{\circ} 3'$, according to the dimensions I have assigned to the primitive form of felspar; whilst in the crystals under consideration, the same angle is about 128° .

The only difference which is now left to distinguish this mineral from felspar, whether in its laminar form, as in the specimen from Dawlish, or in crystals, as in those from Heavitree, is therefore the nacreous cleavage which it possesses, under both forms, and which cannot be obtained in felspar. But not only this cleavage does not exist in the varieties of felspar which have hitherto been examined, but it is not parallel either to any known modification of that substance, or to any unobserved modification, which might be derived by some simple law from the primitive form. To show the truth of what I have advanced, it is sufficient to observe, that in order to compare fig. 1. with a crystal of felspar,—for instance, with the figure given in Mr. W. Phillips's "Mineralogy," we must suppose that the plane P, fig. 1, corresponds to his plane P, and the plane g^1 to his plane M. Then we ought to find that the plane h^1 corresponds to either of his planes c^1 , c^2 , c^3 , which are perpendicular to M, and inclined to P. But this is not the case: for these planes are respectively inclined upon P, at angles of $99^{\circ} 15'$, $129^{\circ} 29'$, and $146^{\circ} 3'$, whilst the inclination of the plane h^1 on P, fig. 1, is $106^{\circ} 50'$. Moreover, I find that a plane, the inclination of which upon P would be equal, or nearly equal, to $106^{\circ} 50'$, could only be derived by one of two laws, from the oblique rhombic prism, which is the primitive form of felspar, either by the law $a \frac{1}{3}a$ or $a \frac{2}{3}$. Now neither of these modifications has ever been observed in felspar, and they are rather beyond the simplicity which might be reasonably expected in a modification parallel to which a cleavage is found to exist in some varieties. If now it is remembered that, as far as crystallographic observations go, it is found that, although some varieties of a species present occasionally cleavages which do not exist in all, in no occasion a cleavage has been obtained which did not correspond to some simple modification; even the false cleavage or faces of composition,—then the ground upon which I would propose to consider the substance I have just now described as distinct from felspar, will I hope become sufficiently obvious. The definition of the mineralo-

gical species which appears most consistent with the actual state of the science is, that a mineral species contains all the individuals composed of the same principles united in the same proportion, and when regularly crystallized, referable to the same primitive form. Now since cleavage has in every instance observed some very simple relation with the dimensions of the primitive, if we meet with a substance having a great resemblance to another, but having a cleavage that does not correspond to some simple modification of the primitive form of that other substance,—we must necessarily infer, that the first has a primitive form differing at least in its dimensions from the primitive form of the second, and consequently, according to our definition of the species, must constitute a new one. To the essential difference existing between the new substance and felspar, it may be added, that the first has no cleavage parallel to the lateral planes of the primitive form of the second, which most of the varieties of the latter present. But this difference would not be sufficient, since the facility of cleavage seems to vary with circumstances. Thus Mr. Faraday has discovered the means of obtaining crystals of sulphate of copper in which he may increase at will the facility of cleavage parallel to one of the primitive planes of that substance; so that he can even make it to crystallize in a mica-like state with a nacreous reflection of light on the face of the easiest cleavage.

I shall propose for the substance I have described the name of *Murchisonite*, in compliment to the gentleman who first directed my attention to it, and whose zeal for mineralogical science is so well known.

Fig. 1.

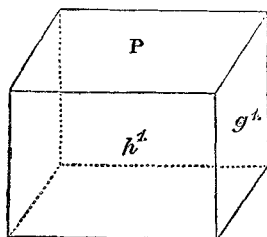
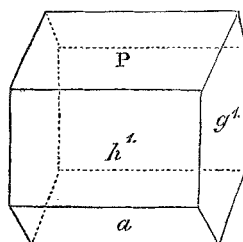


Fig. 2.



 LXXXVIII. *Proceedings of Learned Societies.*

ROYAL SOCIETY.

April 5.—**T**HE reading of Dr. Thomson's paper, On the compounds of chromium, was resumed and concluded. The principal object of this paper is to give an account of a singular