

On the black mica of the granite of Leinster and Donegal : and its probable identity with lepidomelane / by Samuel Haughton.

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3. *On the BLACK MICA of the GRANITE of LEINSTER and DONEGAL; and its probable identity with LEPIDOMELANE.* By the Rev. SAMUEL HAUGHTON, F.R.S., F.G.S., Fellow of Trinity College, Dublin, and Professor of Geology in the University of Dublin.

WE owe our knowledge of Lepidomelane to a single analysis, made by Soltmann, of a specimen from Petersberg, Wermland. He describes it as occurring in an aggregate of minute black scales, in small six-sided tables, with perfect basal cleavage—either hexagonal or trimetric, easily dissolved in muriatic or nitric acid, leaving a skeleton of silica.

Its composition is as follows—

Lepidomelane.

	Per centage.		Atoms.	
Silica	37.40	..	0.831	3
Alumina	11.60	..	0.223	} 0.569 2
Peroxide of Iron	27.66	..	0.346	
Protoxide of Iron	12.43	..	0.345	} 0.551 2
Lime and Magnesia	0.26	..	0.010	
Potash	9.20	..	0.196	
Water	0.60			
	99.15			

This analysis gives very nearly, in atoms—

SiO ₃	....	3	....	9
R ₂ O ₃	....	2	....	6
RO	....	2	..	6

Soltmann does not appear to have ascertained whether his mica were uniaxal or biaxal, as he is in doubt whether it is trimetric or hexagonal.

In my first paper* on the Granites of Leinster, I have mentioned the black mica which is found accompanying the white margarodite of the Leinster granite, in small flakes, and noticed the curious fact that these flakes are sometimes physically imbedded in the plates of white mica, without injuring their fissility or lustre, but always effecting a reduction of about 20° in the angle between the optic axes of the latter.

Since the publication of that paper, I have ascertained the existence, in large quantities, of a similar black mica in the Co. Donegal, both in granite and gneiss; and also, through the kindness of Mr. Cotton, C.E., obtained specimens of the black mica of the Leinster granite, found in large crystals in the cuttings of the Bagenalstown and Wexford Railway, at Ballyellin, in the Co. Carlow.

The black mica of Ballyellin is found in crystalline plates, 2 in. by $\frac{1}{2}$ in.; it is not only associated with, but physically united to, the

* Quart. Journ. Geol. Soc., vol. xii. p. 175.

white margarodite mica of the same locality,—plates of the white mica being frequently met with containing large crystals of the black mica, imbedded without any breach of continuity—and *vice versa*. The angles of the crystalline plates of black mica are all 120° ; and, on examination by polarized light, it turned out to be uniaxal. I examined with care the optical condition of the plates of white mica which are continuous with the plates of black uniaxal mica, and found that the plane of the optic axes of the white mica was perpendicular to the common surface of the black and white micas, and always contained the bounding line between the two minerals.

I found the angle between the optic axes of the white mica to range, in different specimens, from $56^\circ 30'$ to 71° .

The black and white micas of Ballyellin occur in a coarse granite, of which the other constituents are grey quartz and white orthoclase in large crystals.

In the neighbourhood of Ballyellin, at Scalloge Gap, between Mount Leinster and Blackstairs, the black mica occurs in nests and lenticular sheets, in a fine-grained granite, composed of white mica, white felspar, and grey quartz.

The following is the composition of the

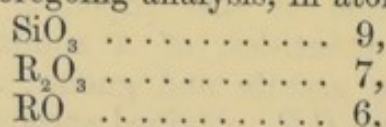
Black Mica of Ballyellin.

	Per centage.	Atoms.	
Silica	35.55 ..		0.790
Alumina	17.08 ..	0.328	} 0.624
Peroxide of Iron	23.70 ..	0.296	
Lime	0.61 ..	0.021	
Magnesia.....	3.07 ..	0.153	} 0.538
Soda	0.35 ..	0.011	
Potash.....	9.45 ..	0.201	
Protoxide of Iron	3.55 ..	0.098	
Protoxide of Manganese ..	1.95 ..	0.054	} 0.477
Loss by ignition	4.30 ..		

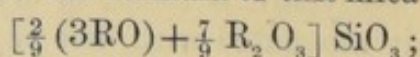
99.61

Ten grains of the mineral, acted on with muriatic acid, were found to be completely decomposed, giving 3.52 grs. of slightly gelatinized silex, much of which retained the skeleton form of the mica.

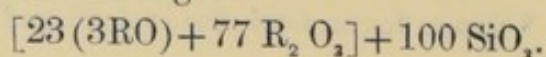
The result of the foregoing analysis, in atoms, is very accurately



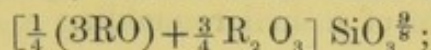
differing from Soltmann's result by the addition of one atom to the peroxides. If we compare directly the total quantity of oxygen in all the bases with the oxygen of the silica, we see that they are exactly equal; so that the formula of this mica may be thus written:



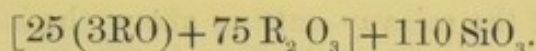
Or, as I would prefer stating it—



Soltmann's lepidomelane, written in the same way, gives us, either



or,



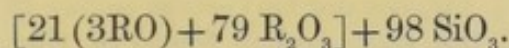
A black mica, similar to that of Ballyellin, Co. Carlow, occurs in the Poison Glen, leading to the Pass of Ballygiheen, in the Co. Donegal. It is uniaxal and soluble in muriatic acid. It occurs in granite, in $\frac{1}{2}$ -inch plates, accumulated, at times, to $\frac{1}{4}$ -inch thickness. The following is its analysis.

Black Mica of Ballygiheen.

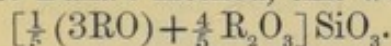
	Per centage.	Atoms.	
Silica	36.20 ..	0.804	
Alumina	15.95 ..	0.307	} 0.647
Peroxide of Iron	27.19 ..	0.340	
Lime	0.50 ..	0.018	} 0.515
Magnesia	5.00 ..	0.250	
Soda	0.16 ..	0.005	
Potash	8.65 ..	0.184	
Protoxide of Iron	0.64 ..	0.017	
Protoxide of Manganese ..	1.50 ..	0.041	} 0.433
Loss by ignition	3.90 ..		

99.69

If the result of this analysis be written as the former one, we obtain for its formula



If written according to Dana's method, this would be



The black mica of Donegal is certainly identical with the black mica of Carlow and Leinster, and probably the same as the black mica described as "lepidomelane" by Soltmann. In the Ballygiheen district, after passing the Gap, the mica of the granite becomes white mica, biaxal, in large plates, with angles between the axes ranging from $62^\circ 10'$ to $65^\circ 10'$. It is not associated with the black mica, however, as is the case in the Leinster granites.

4. *On an OUTLIER of LIAS in ABERDEENSHIRE.* By T. F. JAMIESON, Esq.

(In a Letter to Sir Roderick I. Murchison, V.P.G.S., &c. *)

IN a cutting of the Banff, Macduff, and Turriff Extension Railway, about four miles to the north of the latter town, close beside the turnpike-road at the Plaidy toll-bar, there has been exposed a mass of a very tenacious clay, blue in colour, and of homogeneous texture, which contains many *Ammonites*, *Belemnites*, and other fossils characteristic of the Lias, such as *Gryphæa*, *Plagiostoma*, and possibly others ;

* Dated Ellon, Aberdeenshire, March 17, 1858.

these I have got myself. I also saw in the possession of one of the "navvies" a fragment of a shell resembling a *Nerinea*, in remarkably fine preservation.

The altitude of the railway-cutting above the level of the sea, as I learn from the engineer on the line, is 250 feet. At the time of my visit the excavation had reached a depth of from 10 to 15 feet, and the "navvies" were busy at work in the "gullet," filling their waggons with the clay, which is a mass of a fine greenish-blue colour, very compact and tenacious, and unlike any other clay in this part of the country. It consists of a fine impalpable mud, devoid of all manner of stones or pebbles, save occasionally a hard greenish nodule, enclosing the remains of a large Ammonite.

This clay is covered by a stratum of the Pleistocene Drift, of a brownish-grey colour, very sandy in some places, and of a more clayey nature in others. In this drift I found many striated fragments of clay-slate, together with bits of other primary rocks. The line of junction between the two beds is very undulating and irregular; in some places the Lias-clay reaches nearly the surface of the ground with a well-defined outline; while in others it is covered by several feet of the drift, which, towards the southern end of the cutting, appears to occupy almost the whole of the excavation, the Lias being wasted almost wholly away, and imparting in some places to the overlying mass a dark-bluish hue, and a more clayey nature, so that the line of junction becomes less defined. The bottom of the Lias-clay had not been reached, so that I did not see what it rests upon; but the old clay-slate comes to the surface within a stone's throw of the spot, and is found in the neighbourhood all around; so that we have here but a small remnant—the merest patch—left of this interesting deposit.

The most abundant fossil is the Ammonite, of all sizes, from individuals of a quarter of an inch in diameter to five inches. The nacreous lustre of these shells—especially in the smaller and more delicate specimens—is generally in beautiful preservation. These Ammonites were most plentiful at the north end of the section, where the cutting was commenced. In some places every spadeful contained dozens of delicate thin-shelled Ammonites, much decayed, but still preserving their rainbow-like lustre. Owing to the progress of the work, and the sloping of the sides, they are now more difficult to be obtained. Next to these, the most common organism is a large bivalve like a *Lima*, measuring 4 inches in the longest direction, by $3\frac{1}{2}$ inches across. Part of the brown-coloured shell remains in complete preservation; and both valves are in conjunction and shut, the interior being filled with a greenish-coloured mass of the same appearance as the surrounding clay, but of a more stony texture.

The clay in some places contained the decayed remains and impressions of many smaller shells, from 1 inch to $1\frac{1}{2}$ inch in size, and having the characters of *Lima*.

Broken pieces of *Belemnites* are also not very unfrequent; also specimens of a *Gryphæa*, measuring 5 inches in diameter, resembling *G. incurva*. Among some specimens, which I owe to the kindness