XII. *On Diatomaceous Deposits in Scotland.*

By W. Ivison Macadam, F.C.S., F.I.C., Professor of Chemistry,
New Veterinary College, Edinburgh.

[Read June 24th, 1884.]

DEPOSITS of Diatoms have been long known to exist in Scotland, but such deposits have so far always been of limited extent. Specimens for the microscope have been readily obtained from certain localities, such as Peterhead, but the occurrence of large deposits covering great tracts of land was unknown.

In the year 1881 my attention was directed, by Mr. Hamilton Bell, to a white substance he had obtained from the Peat of Aberdeenshire. During April, 1882, I read a short paper before the Edinburgh Geological Society* in which I gave the analysis of a sample received from Mr. Bell, with particulars furnished by the Rev. Geo. Davidson, Minister of Logie Coldstone, Dinnet, who also kindly furnished a list of the Diatomaceæ he had identified in the deposit. The list contains some 200 species.

A further communication on the same subject was made by myself to the same Society at the January Meeting, 1883,† in which I gave the detailed analyses of samples received from the Black Moss, Kinnord, Ordie and Drum, all in Aberdeenshire, and from Gress, Isle of Lewis. A list of species as obtained by Mr. E. W. Burgess from the last named place is included in the paper. To these localities may be added deposits at Aros in Mull, Campbeltown; in Strath Cur, and in Glen Shira, Argyllshire; in Sutherlandshire, &c. &c.

The Black Moss, Aberdeenshire, deposit has been carefully investigated by the Earl of Aberdeen, to whom it partly belongs, and has been found to contain over 800,000 cubic yards, which amount is equivalent to about 150,000 tons weight. Ordie and Kinnord contain at least a like quantity. The deposit at Gress, Lewis, occupies a basin-shaped cavity, not many feet above sea-level, and is said to be more than 12 feet deep.

The Glen Shira deposit has not been as yet worked sufficiently to prove its extent, but from scattered notices (principally by Professor Gregory, of Edinburgh) I am inclined to consider it one of our largest deposits, and I intend to spend some time on the ground during August and September this year.

* *Transactions Geological Soc of Edin.* Vol. IV. Part 3.

† *Trans. Geol. Soc. of Edin.* Vol. IV. Part 3, p. 277.

The material is sometimes obtained from Morasses or Lochs, but is more generally found forming a bottom layer or stratum underlying peat. This lower layer has long been known, and wherever peats have been cast in the Highlands the cutting is suspended when the "white layer" is reached. G. H. Kinahan also refers to this lower layer,* but does not mention of what it is composed.

When freshly cut the substance is brown in colour and very similar to the overlying peat, but when dried acquires a light gray colour. The material forms a light porous mass of Diatoms bound together by fragments of *Sphagnum*, *Equisetum limosum* and *E. fluviatile*, *Phragmites communis*, &c. &c.

I have made a careful series of analyses of the various deposits, and the results will be found in the tables at the end of the present paper. The proportion of siliceous matter (Diatoms with a few particles of sand) varies from 50 to 95 per cent., the remainder consisting of organic matter (woody fibre, &c.). The proportion of sand is very small, and in this respect the deposits compare favourably with the Kieselguhr obtained from the Continent. The Aberdeenshire specimens are also very free from iron, and yield on calcination a mass which has an absorbent power in excess of Kieselguhr in the following proportions:—

Kieselguhr (Lauenburg)	...	...	316
Sutherland Diatomite	...	...	381
Aberdeenshire ,,	...	...	639

or taking Kieselguhr at 1, the Sutherland deposit will be equal to 1·2, and the Aberdeenshire beds to 2·02.

This absorbent power is being largely taken advantage of in this country by Messrs. Nobel's Dynamite Company, who have to a great extent employed this substance in place of Kieselguhr, and with good results. Other uses, such as the artificial manufacture of Ultramarine, suggest themselves.

ANALYSES OF DIATOMITE.

	Black Moss.			*Ordie Moss.*	
	No. 1. Margin.	No. 2. Centre.	No. 3.	No. 1.	No. 2.
Organic Matter	43·472	36·613	28·286	50·570	33·586
Inorganic Matter	56·528	63·387	71·714	49·430	66·414

	Drum Moss.	*Kinnord.*	*Lewes.*	*Sutherland.*
Organic Matter	4·779	22·371	13·874	13·08
Inorganic Matter	95·221	77·629	86·125	86·92

* *Geol. of Ireland*, Cap. 16, and *Journal of Science*, No. XLIII. July 1874.

DETAILED ANALYSES OF THE INORGANIC CONSTITUENTS OF DIATOMITE.

	Black Moss.			*Ordie Moss.*		*Drum Moss.*	*Kinnord Moss.*
	No. 1. *Margin.*	No. 2. *Centre.*	No. 3.	No. 1.	No. 2.		
I. *Soluble in Water.*							
Calcic Oxide	0·741	0·946	0·841	0·765	0·362	0·943	1·040
Magnesic ,, ...	0·332	0·552	0·548	0·482	0·371	0·456	0·606
Potassic ,, ...	0·076	0·213	0·224	0·187	0·108	0·315	0·327
Sodic ,, ...	0·048						
Sulphuric Anhydride ...	0·168	0·374	0·289	0·253	0·242	0·832	0·733
Chlorine	trace.	trace.	trace.	trace.	trace.	0·171	trace.
II. *Soluble in Acid.*							
Ferric Oxide	1·903	1·343	2·885	6·565	2·273	1·459	4·120
Aluminic ,, ...	0·236	0·429	0·407	0·201	0·154	1·104	1·854
Calcic ,, ...	2·737	2·692	2·484	2·897	0·782	2·378	0·998
Magnesic ,, ...	0·670	0·741	0·646	0·632	0·326	0·854	0·205
Alkalies	0·268	0·187	0·215	0·194	0·103	0·358	0·143
Phosphoric Anhydride	—	—	—	—	—	—	—
Soluble Silica ...	0·541	0·621	0·437	0·441	0·281	1·121	0·921
III. *Silicates decomposed by Hydric Fluoride.*							
Ferric Oxide	0·142	0·089	0·156	0·166	0·579	4·853	0·142
Aluminic ,, ...	0·535	0·202	0·342	0·383	0·463	4·404	0·303
Calcic ,, ...	0·114	0·132	0·127	0·155	0·432	2·136	0·058
Magnesic ,, ...	0·022	0·071	0·095	0·102	0·138	0·632	0·014
Silica (mostly Diatoms)	91·067	91·012	87·962	86·125	93·075	77·498	88·232
	99·600	99·704	99·658	99·548	99·689	99·514	99·696