LETTERS TO THE EDITOR.

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Radium and Solar Energy.

THE extraordinary discovery that radium has the property of continuously radiating heat without itself cooling down to the temperature of surrounding objects may possibly afford a clue to the source of energy in the sun and stars.

Taking the Curies' observation that one gram of radium can supply 100 calories per hour, I thought it would be of interest to compute how much radium would suffice to supply the sun's output of energy.

Taking from Langley's observations that this is equal to 828,000,000 calories per square cm. per hour, I find that 3·6 grams of radium per cubic metre of the sun's volume would supply the entire output.

It may be possible that at solar temperatures radium is capable of much more energetic radiation, and, if so, the 3·6 grams might be reduced to a much smaller figure.

Daramona, July 1. W. E. WILSON.

"Red Rain" and the Dust Storm of February 22.

IN a letter under the above heading which you did me the honour to print in your issue of May 21, vol. lxviii. p. 53, I gave the results of the chemical examination of a sample of dust collected from the roof of Bayham Abbey, Lamberhurst, after the dust storm of February 22, and sent to me by the kindness of Lord Camden, and I stated that it would be interesting to compare its characters with those of the dust, presumably of African origin, which was observed to fall in the district of Taormina by Sir Arthur Rücker, and was the subject of an interesting communication to NATURE by Prof. Judd in 1901 (vol. lxiii. p. 514).

Thanks to the kindness of Prof. Judd, who sent me about a gramme of the Taormina dust collected by Sir Arthur Rücker and placed among the geological specimens at South Kensington, I have been enabled to make the comparison.

In external characters the Taormina dust closely resembles that from Bayham Abbey. Its microscopical features are also generally similar.

Mr. C. Simmonds, of the Government Laboratory, to whom I am indebted for the analyses already published, found that after drying at 100° C., the sample had the following composition :—

	Per cent.
Silica	36·32
Alumina	16·35
Ferric oxide, with traces of manganese oxide	6·08
Cobalt oxide	0·32
Lime	6·24
Magnesia	2·21
Sodium oxide	2 59
Potassium oxide	2 72
Water and organic matter	23·49
Chlorides and sulphates	traces
Carbonic acid	3 68
	100·00

The cobalt oxide may include a little nickel, but the quantity was too small to identify with certainty.

After being heated to redness, 28·08 per cent. of the sample was dissolved on boiling with dilute hydrochloric acid, the soluble constituents being :—

	Per cent.
Silica	0·88
Alumina	10·16
Ferric oxide	5·52
Lime	6·24
Magnesia	2·21
Alkalis	2·57
Carbonic acid (by difference)	0·50
	28·08

The organic carbon in the sample amounted to 9·89 per cent., and the organic nitrogen to 0·16 per cent. This small proportion of nitrogen shows that the organic matter is mainly, or entirely, of vegetable origin. Calculated from the mean proportion of carbon in cellulose and humic acid, the amount of organic carbon present in the sample would correspond to about 19 per cent. of organic matter, or, from cellulose alone, to 16½ per cent.

A comparison of the dust from Taormina with the "red rain" dust from Bayham Abbey may be made by calculating the inorganic constituents as percentages on their sum, after deducting water and organic matter :—

	Taormina Dust. Per cent.	Bayham Abbey Dust. Per cent.
Silica	47·47	50·53
Alumina	21·37	20·18
Ferric oxide	7·94	7·23
Cobalt oxide	0·42	—
Lime	8·16	9·50
Magnesia	2·89	2·04
Sodium oxide	3 38	1·27
Potassium oxide	3·56	2 53
Carbonic acid	4·81	6·72
	100·00	100·00

Reduced thus to a common basis for comparison, the inorganic portions of the two samples show a general similarity of composition, the chief differences being that the Bayham Abbey specimen contains a little more silica and chalk, and a little less alumina and alkalis, than the sample from Taormina.

The constituents soluble in dilute hydrochloric acid may similarly be compared, after deducting carbonic acid and raising the figures to percentages :—

	Taormina Dust. Per cent.	Bayham Abbey Dust. Per cent.
Silica	3·19	2·28
Alumina	36·84	39 93
Ferric oxide	20·02	19·35
Lime	22·62	29·20
Magnesia	8·01	4·03
Alkalis	9·32	5·21
	100·00	100·00

It is of interest to compare the foregoing results with an old analysis by Gibbs of dust which fell on a ship in the Atlantic (*Pogg. Ann.*, lxxi., 367). After deducting 18·53 per cent. of water and organic matter, the composition was found to be as follows :—

	Per cent.
Silica	45·58
Alumina	20·55
Ferric oxide	9·39
Manganic oxide	4·22
Calcium carbonate	11·77
Magnesia	2·21
Potash	3·64
Soda	2·33
Cupric oxide	0·31
	100·00

Except for the presence in this sample of a notable quantity of manganese and copper, the analysis bears a close resemblance to that of the Taormina dust; the fact of the similarity is particularly interesting, considering that something like half a century has probably elapsed since Gibbs's sample was collected.

Mr. J. J. H. Teall, the director of the Geological Survey, kindly sent me a sample of "blood rain" dust which fell at Palermo at about the same time as the dust from Taormina collected by Sir Arthur Rücker. This closely resembles the Taormina dust in general characters. Mr. Teall has suggested that the question of the origin of the dust might be elucidated if the samples were found to contain free aluminium hydroxide. The bearing of this upon the question of origin is as follows :—Evidence has been recently adduced to show that laterite, a decomposition-product of the felspars, is an aluminium hydroxide, though always mixed with more or less silica. This type of decomposition, it is believed, occurs only in tropical regions, and hence the presence of uncombined alumina in the dust,