Magnesium in Water and Rocks.

THE recent publication of analyses of salt in the pans in Cape Colony by Dr. Juritz (*Agricultural Journal*, November, 1908, Cape Town) brings to a head a problem which has been puzzling me for a long time. A large amount of magnesia is dissolved in water on the decay of rocks, yet a very small portion finds its way to the sea. Dead coral reefs become dolomitised, but, as a general rule, recent limestone deposits do not contain more than 1 per cent. of magnesia; the magnesia dissolved in sea-water, therefore, is the accumulation of long ages, and should bear some relation in quantity to that of sodium, yet magnesium in the salts of sea-water is less than one-twelfth that of sodium. In the up-country pans in Cape Colony which collect the water washing over dolerite hills and evaporate the contents on their shallow surfaces, we find plenty of magnesia in the liquors, but practically none in the crystallised product. Here are Dr. Juritz's figures for an average sample:—

Locality	Water, grains per gallon	Salt, per cent.	
Varsch Vley	1204·0 ...	2·13 ...	Lime sulphate
(Ground salt)	Nil ...	Nil ...	Lime chloride
	553·0 ...	0·33 ...	Magnesium sulphate
	658·0 ...	1·16 ...	Magnesium chloride
	Nil ...	Nil ...	Sodium sulphate
	22050·0 ...	96·43 ...	Sodium chloride
	70·0 ...	Nil ...	Potassium chloride

Of the seventy-three samples of salt analysed, all tell the same tale; one from Belmont Salt Pan, near Kimberley, contains 7·59 per cent. magnesium sulphate, two contain more than 1·5 per cent., and the rest 1·5 per cent. or under. The ground water, however, struck in wells, is often entirely undrinkable with Epsom salts.

Magnesia compounds, on the other hand, are constantly being drawn down in the earth's crust by the descending surface waters, and cause dolomitisation. The older the limestone, generally speaking, the more it is dolomitised; joints and bedding planes in limestone are dolomitised when the rest is pure limestone, as in the "dunstone" selvages along joints in the Carboniferous Limestone of Durham and Northumberland. Why do the magnesia compounds go downwards and not outwards as the salts of lime and soda do?

The same happens with solutions of iron; practically none reaches the sea, but large amounts descend and replace limestone by spathic iron or hæmatite. In this case one would conclude that the earth's magnetic nucleus exerted a pull on the free iron in solution, which, ceaselessly acting, tended to impoverish the surface of iron. Is there some such action going on with regard to magnesia? Taking Farrington's suggestion that the average composition of meteorites represents the average composition of the earth, then the nucleus should contain a very large proportion of magnesium. Is there any evidence for an attraction of magnesium for magnesium when magnetised as there is in the case of iron for iron?

ERNEST H. L. SCHWARZ.
Rhodes University College, Grahamstown, Cape of Good Hope, December 21, 1908.

Phosphorescence on a Scottish Loch.

A REMARKABLE illumination was observed about eight years ago on a certain part of Loch Bulig (which lies in the north-western boundary of Aberdeenshire). As it appears to be the only known occurrence of phosphorescence on a Scottish loch, your readers may be interested in it. It appeared in the form of innumerable brilliant lights, shooting rapidly on the surface of the water, but many leaping one or two feet above it. It lasted for about a minute, and was repeated twice at intervals of about ten minutes. The effect was very striking, the brilliance being almost dazzling. It seemed that it could not be accounted for in any other way than by phosphorescent animalculæ, disturbed probably by a shoal of fish which are known to inhabit the loch.

Inquiry elicited the information that near where the lights were seen a soft bank stretched out from the side towards the centre of the loch. I have been desirous since that time to gather some of the deposit, if possible, for examination, but only a few months ago was I able to carry out my intention. I found it was a matter of no little difficulty, as the loch at that part is about 25 feet deep, and though it is usually quite smooth it sometimes is somewhat rough. The first attempt was a failure, the day being squally, the waves 2 or 3 feet high, and the strong wind and current rendered it difficult to locate the bank and collect specimens. The second attempt, however, was successful, and I found that the bottom was generally stony, but gave place to soft material just above where the lights had been seen. I collected two quantities of the deposit, and found that it consisted of sand mixed with a large quantity of carbonaceous matter, mostly in the form of small rolls, half an inch to one inch long. Microscopic examination showed that these rolls contained animals encased like tubicolous annelids; they were quite active, emerging from the tube, grasping black particles, and then retreating; some were encased in parchment-like tubes, through which the rapid actions of the animal could be distinctly seen; one was found with a transparent tunic, hanging by a ring from the neck, resembling *Oxyethira costalis* (Hydrophilideæ); I still have this specimen. Along with these and other animals were numerous diatoms, nematodes, &c. As some of these animals belong to classes which are known to be phosphorescent, it seems that their presence in the deposit is sufficient to account for the remarkable appearance seen. This was confirmed by finding that the sand contained much more phosphate than sand usually contains; also, by testing with ammonium molybdate some of the black matter, including one of the black rolls containing an animal, after a few hours a distinct yellow precipitate was found, but only in the vicinity of the black roll.

I should think that this deposit would form an interesting preserve for zoologists, and therefore I relate the circumstance, and shall be glad to give any further information to anyone who may desire it.

THOS. JAMIESON.
Chemical Laboratory, 10 Belmont Street, Aberdeen.

[IT is to be hoped that Mr. Jamieson will re-observe the interesting phenomenon he saw on Loch Bulig and collect material *at the time*. If he saw numerous luminescent organisms leaping in the air, they may *possibly* have been Chironomids with phosphorescent bacteria. He gives no convincing evidence in his letter that the organisms collected from the deposit were connected with the "phosphorescent" display. We may recall the fact that a "phosphorescent" Enchytræid has been reported in Britain.—ED. NATURE.]

The Movement of Water in Soils.

IN NATURE of August 6, 1908, Dr. Russell refers, in his note on *soil moisture*, to some information on this subject which I published in Memoir No. 6 (Chemical Series) of the Department of Agriculture in India, and says, "Dr. Leather argues that water moves upwards from a limited depth only. . . . The results are equally well explained on the supposition that the upward movement takes place at all depths, since the amount of water present in a particular layer depends on the respective rates at which water is gained from below and lost to the upper layers."

I still maintain that the process of upward movement of water through a soil during dry weather is one which is not brought into operation throughout all strata of a soil instantaneously, but that, on the contrary, time is required for it to be communicated through succeeding strata; consequently, during a dry period there will be strata in which the process has not yet become established. Until an alteration of the surface tension occurs in any stratum there can be no movement (due to this cause) of water, and a *necessary* result of the fact that this alteration of surface tension through succeeding strata is *gradual* is that any such alteration *must* be accompanied by a decrease of water per cubic foot.

A second consequence is that if the total decrease of water which occurs during a dry period throughout the