XII.—*Note on the Composition of a Boiling Spring in New Zealand.*

By PROFESSOR SMITH, University of Sydney.

STRETCHING in a north-easterly direction from Taranaki, in the north island of New Zealand, is a line of volcanic action, terminating in White Island, in the Bay of Plenty. In this line are numerous solfataras, boiling springs, basins of seething mud, and hot lakes, presenting, in some localities, scenes of remarkable beauty and grandeur. Some of the boiling springs are intermittent jets, of the same character, though not of the same magnitude, as the geysirs of Iceland. The New Zealand springs have, in many cases, formed terraces and incrustations of siliceous matter, probably unsurpassed, in extent and magnificence, by any similar deposits in the world. One of the most copious of the boiling pools is named "Te Tarata." It is on the shore of Rotomahana ("Hot Lake"), at an elevation of some fifty feet. The water is of a beautiful pale blue colour. It descends to the lake in a series of cascades over the edges of extensive basins and terraces of siliceous deposit. On the occasion of my visit, the water was in violent ebullition, the temperature being a little above that of pure water boiled at the same place. I carried a bottle of it with me to Sydney, and made an analysis of it about a month after its collection. The specimen was then milky, and had a slight smell of sulphuretted hydrogen. Taste soft and unpleasant. It was highly alkaline to test paper. Specific gravity 1.00205. A slight sediment had fallen, which seemed to be chiefly vegetable matter. The quantity of water in my possession was too small for a complete and unexceptionable analysis, but the following Table gives, I believe, a tolerably close approximation :—

58 SMITH ON A BOILING SPRING IN NEW ZEALAND.

	Grains per Gallon.
Silica.. .. .	.. 42.40
Soda (probably combined with silica)	.. 16.00
Chloride of sodium	.. 113.57
Chloride of potassium	.. 6.67
Sulphate of potash	.. 5.28
Carbqnate of lime	.. 1.76
Alumina	.. 0.32
Magnesia and iron	.. traces
	<hr/>
	186.00
Total solid matter obtained by evaporation	
at 212° F.	.. 189.12
Matter volatilized by ignition	.. 4.00
	<hr/>
Leaving for fixed salts	.. 185.12

The arrangement of acids and bases is of course, to a considerable extent, matter of opinion. There being only a small amount of carbonic acid present (not directly estimated), I assume that it is just sufficient to supply the lime. The sulphuric acid found (2.42 grs.) is given to potash, the remainder of the potassium being supplied with chlorine. The potassium (calculated from the precipitate by bichloride of platinum) amounted in all to 5.87 grns. The whole chlorine was 72 grns. There is a residue of soda which, I suppose, may be combined with silicic acid. There could have been no sulphide of sodium present, for the precipitate with nitrate of silver was white, and there was no escape of sulphuretted hydrogen on adding hydrochloric acid to the dry residue obtained by evaporation. Boracic acid was tested for, but none found.

In a bottle of water that I afterwards obtained from the same locality, though, perhaps, not from the same spring, I found solid matter at the rate of 178.8 grns. per gallon. Of this the silica amounted to 57.08 grns., 30.08 grns. being in a state of solution, and 27 grns. having separated as a yellowish-white gelatinous sediment. The chlorine amounted to 70 grns. per gallon.

I examined the white incrustation upon reeds and other objects immersed in the spring. It was silica, with traces of common salt, lime, and alumina. Dried at 212° F., it lost 2.26 per cent. of its weight. On ignition, there was a further loss of 5.05 per

RODWELL ON THE SOLUBILITY OF SULPHATE OF LEAD 59

cent., making altogether a loss of 7·20 per cent., calculated on the air-dried powder.