

roire, Te Aroha, Helensville, Morere, and Hanmer, and a more close investigation of the mineral springs of the Rotorua district. To this latter area I confined my close attention, after having come to the conclusion that here must be centred our chief activities.

The town of Rotorua was well laid out originally, but the far-seeing views of the founders have been too widely departed from. The broad straight streets suggest boundless possibilities which have never been realised. Electric cables, too much in evidence, obtrude on the eye, and beauty has been too much sacrificed to utility. Situated in a pumice plain, Rotorua should be an oasis, a garden city; charming restful surroundings are absolutely essential to a successful health resort. Trees have already been planted in the streets, but much more remains to be done. Owing to the magnificent breadth of the streets, there is ample room for beds of turf and flowers, evergreen shrubs, and fountains, all of which will tend to remove the glare and dust inseparable from a white pumice soil. To prevent the further erection of unsightly buildings, I would suggest that the plans of every new building should be submitted to the authorities before erection. The same authorities should have the power of ordering the alteration or removal of any specially unsightly existing structure.

Much, too, might be done towards brightening up the town by the judicious use of the paint-pot. Hitherto the fear of sulphur-fumes has led to the universal adoption of ochres and dull-browns, but if proper colours are chosen and zinc foundations used instead of lead the brightest tints may be employed. What a transformation may be wrought in this manner may be at once seen on comparing the present aspect of the baths and surrounding structures in their recent gay attire with the dull and sombre aspect they formerly presented. With a view to ascertaining which colours will stand and which will not, I have had experiments made, exposing a variety of pigments in situations where they will be exposed in varying degree to sulphur-fumes, wind, rain, and sun, to open-air and to indoor conditions, and I hope that the experience thus gained will prove invaluable in the future.

NATURE OF THE WATERS.

While amongst the countless springs arising in the Rotorua district there are, as might be expected, considerable numbers of varieties, and although it is no uncommon thing to observe two springs of almost diametrically opposite chemical properties arising side by side, yet there are certain features common to all.

In the first place, all the mineral springs in the district are hot, and where at times there may appear to be exceptions to the rule it will always be found that the coolness of the water is due either to admixture with fresh water or to evaporation in a basin comparatively large and fed only by a small spring. Without exception, too, the waters contain in solution either sulphuretted hydrogen, sulphurous acid, or both gases. Another invariable ingredient is silica, either in the form of silica, silicic acid, or a combination of that acid with various bases. This is a special characteristic of the waters of geyser regions, and is noticeable in Iceland and in the Yellowstone Park, U.S.A. To this silica is due the formation of those wonderful terraces for which New Zealand has long been famous. The hot water as it cools and concentrates, being no longer able to keep in solution its dissolved salts, these are deposited in layers, either horizontal and delicately rippled or in stalactite masses, the colour varying generally from white through every shade of grey to pink, according to the nature of the metals present with the silica. The waters, which may therefore be classed under the heading of sulphurous siliceous thermal waters, may be roughly divided into two main groups—acid and alkaline—with various subdivisions, and it is to the close juxtaposition of these entirely unlike waters that Rotorua owes its unique importance.

GROUP I.—THE ACID SULPHUROUS WATERS.

The distinguishing characteristic of these waters is the presence of free hydrochloric acid, free sulphuric acid, or both, in considerable quantity. In addition, they contain a large amount of alum, sulphate of soda, and iron-oxides, and in the somewhat cumbersome nomenclature of modern science would be classed as acid sulphurous sulphated siliceous waters, a type which does not exist in Europe, though found in the Yellowstone Park, U.S.A., and in Tuscarora, Canada.

Such waters are more suitable for external than for internal use, and for baths of what are known as the "simple immersion" kind they are especially valuable.

In addition to the therapeutic action which they exert in common with all other thermal baths, these waters possess a very powerful rubefacient action in virtue of the free acids they contain. By rapidly withdrawing large quantities of blood to the skin over the whole surface of the body, they profoundly modify the circulation, relieving congestion of internal organs and inflamed joints and nerves, easing pain and stiffness, resolving exudations, and promoting glandular activity. They act, in fact, in medical parlance, as powerful alteratives.

Besides their use as baths, some of these waters, more especially those containing a large proportion of alum, have been used with great success as astringents, especially as gargles in cases of relaxed and congested throat. The Egg-pot, a small but powerful spring near the Postmaster Baths, has long had a reputation for this purpose.

The best-known examples of the acid waters are the springs supplying the Priest and Postmaster Baths.

Class 1.—The "Priest" Water.

This spring percolates through a layer of hot pumice a few feet beneath the surface of the ground, and flows into the lake. The water has a greenish tinge, a very acid taste, an odour of sulphuretted-hydrogen and sulphurous-acid gases, and issues from the earth at a temperature of from 98° Fahr. to 110° Fahr. The total output it is impossible to estimate, on account of the numerous sources of leakage, but it is very large.