

## SCIENCE:

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## THE MINERAL WATERS OF THE YELLOWSTONE NATIONAL PARK.

THE recent publication of Bulletin No. 47, of the United States Geological Survey, containing analyses of hot-spring, geyser, and river waters from the Yellowstone National Park, is not without interest to the medical profession and to the public at large.

The waters, collected by experts employed by the Geological Survey, have been most carefully examined by Dr. F. A. Gooch, now professor of chemistry at Yale College, and Mr. J. Edward Whitfield of the survey laboratory, and represent the latest and best methods of water-analysis.

The analyses of these waters are of particular interest, because the great variety of mineral springs found in the Yellowstone, attracting the attention of all visitors to that region, suggests their use as remedial agents in the cure of disease.

Aside from the well-known resorts of the Virginias, there are but few places in the United States where natural hot waters are thus utilized. The hot-springs of Arkansas have long been known, and many cures effected by their use, combined with the care of the attendant physicians. More recently the Spas of Las Végas, N. Mex., have been brought

before the notice of the medical profession and the public generally.

Without detracting from the merits of these justly noted sanitarium, it may be stated that at neither place do the waters present as important a combination of salts in solution as those of the Yellowstone Park. Indeed, with the exception of the hot-springs in New Zealand, no waters readily accessible are known presenting the variety and remedial constituents of the Yellowstone springs. In New Zealand the government, appreciating the munificent endowment which nature has given the country in its hot-springs, has set apart certain tracts as sanitary resorts; and at the most famous resort, Rotorua, bath-houses and bathing-pools, with the usual accessories of reading-rooms and hotels, have been built at government expense, and are under the supervision of a government physician.

From a therapeutic standpoint, the analyses of hot-spring waters from the Yellowstone may be grouped as calcareous, alkaline-silicious, acid, and sulphurous.

The former, comprising the hot water of the Mammoth Hot Spring, are highly charged with carbonate of lime, which they deposit, on exposure, in the form of travertine. They resemble in composition the waters of Carlsbad, as will be seen by a comparison of the analyses of the two waters.

For bathing purposes they are less agreeable, and probably less beneficial, than the alkaline waters of the geyser basins of the Yellowstone Park.

These latter waters are generally highly charged with alkaline salts, — sodium chloride and sodium carbonate, together with silica, being the chief constituents, — but there is generally present also a small amount of sodium borate, also sodium arseniate, the latter a most valuable therapeutic agent in a variety of diseases.

The luxury of bathing in these waters must be indulged in to be appreciated. The extreme softness of the water, and the delightful freshness which one notices after the bath, render the use of the water a great pleasure. In New Zealand, where a water almost identical in composition, save that it lacks the arsenic, has been used for several years, this type of water has been found most beneficial in the treatment of gout, rheumatic troubles, and sciatica. In France the curative properties of waters carrying arsenic in solution are fully recognized, especially for the cure of certain forms of nervous and skin diseases. While the Yellowstone waters contain a little less arsenic than those of the French springs at La Bourboule, there is no reason to doubt their usefulness for similar diseases. At present the only water of this class utilized for bathing purposes is that of the Hygeia Spring, supplying the baths of the hotel at the Firehole, or Lower Geyser Basin.

This water carries three-tenths of a grain of sodium arsenic to the gallon. It has been tried by the writer, and found a most delightful water for bathing, but no invalids have yet tested its virtues. Springs of this character are, however, very numerous, and their waters might be easily utilized for bathing.

The acid waters, carrying free hydrochloric acid, are less numerous in the park, but many springs of this character are found at the Norris Geyser Basin. The waters may be perfectly clear, as is the case with the outflow of the Echenis Geyser and the discharge from Green Spring, or turbid, and charged with more or less sulphur, as is more frequently the case. Such waters have achieved a considerable reputation in New Zealand as a tonic and alterative, particularly in diseases of the liver and in functional troubles of females.

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