DISCUSSION AND CORRESPONDENCE

THE YELLOWSTONE

TO THE EDITOR OF SCIENCE: In a recent lecture before the students of Lehigh University describing a camping trip through the Wind River Mountains and through the Yellowstone Park during the summer of 1911, I exhibited a working model of a geyser which erupted about forty times per hour, and a working model of the curious Handkerchief Pool which is located in the Upper Geyser Basin about a mile west and north of Old Faithful Inn. Perhaps some of the readers of SCIENCE may be interested in the model of the Handkerchief Pool and the explanation of its action.

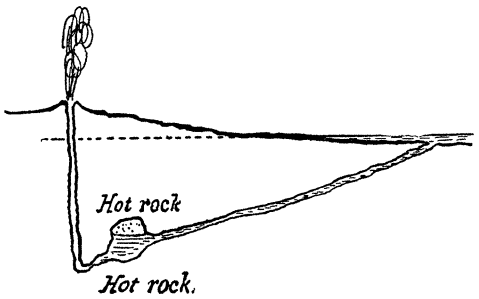

FIG. 1.

The eruptive action of a geyser is probably due, as Bunsen suggested, to the heating of the water at the bottom of a deep hole to a temperature much above 100° C., and the consequent violent boiling of this over-heated water when the pressure is suddenly lowered by the blowing out of the water in the upper part of the hole. A small working model of the geyser can not conveniently be made on this principle. The principle of operation of the model geyser I used in my lecture is shown in Fig. 1, and the actual apparatus is shown in Fig. 2.

The principle of operation of the Handkerchief Pool is shown in Fig. 3. Hot water is pushed in a sudden pulse through a channel and through the small throat *TT* into a shallow pool *PP*, and the condensation of the driving steam causes a sudden backward suction through the throat. This action is repeated several times per minute, and the hot water in the shallow pool being cooled, flows downwards at the edges of the pool and towards the throat as indicated by the arrows. Placing the handkerchief at the edge of this

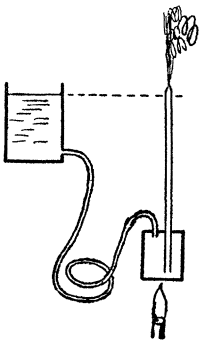

FIG. 2.

pool it is carried towards the throat by the downward flow of cool water, and when it comes near the throat it is suddenly sucked out of sight into the chamber *C*. The impres-

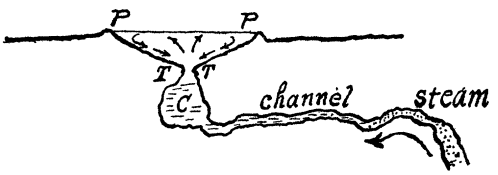

FIG. 3.

sion is that one will never recover his handkerchief, but in the course of about half a minute the handkerchief is thrown violently out of *C* by an upward surge of hot water. If the handkerchief is left in the pool this behavior is repeated over and over again.

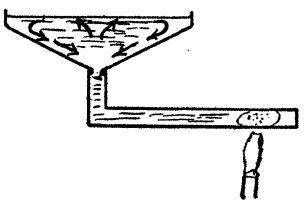

FIG. 4. Working Model of Handkerchief Pool.

In all probability the numerous small hot springs in the Geyser Basin and perhaps also at Mammoth Hot Springs come from jets of

steam which are condensed near the surface of the rock and the condensed water collects in small pools from which it flows in a small stream. The hot springs at the lower levels may be genuine streams of water flowing from great depths, but it is inconceivable that they should originate in one connected body or stream of water.

Tourists who camp in the Park are called "sagebrushers," and if you wish to excite the indignation of a "sagebrusher" talk to him about Yellowstone Park bears! One or two bears feeding at each hotel garbage dump would be sufficient for tourists; but at present bears congregate at the various hotel garbage dumps to the number of fifteen or twenty at a time, and the cleaning out of sagebrushers' camps by marauding bears is a nightly occurrence. The one all-absorbing topic of conversation among sagebrushers is marauding bears; and it is by no means a joke, for three or four sagebrushers are killed nearly every summer in attempting to drive bears out of their camps! The Yellowstone Park bears are an unmitigated and intolerable nuisance, and nine tenths of them should be killed at once. The only alternative is for the Park authorities to establish a vigilant all-night watch around every camping ground.

One of the points of interest at Mammoth Hot Springs is a grotto, a cavity in the hot-springs formation, and tourists are taken into this grotto in parties of twenty or thirty at a time. Only one hundred yards or so from the grotto is an opening through which carbon dioxide issues, filling a small depression at the bottom of which two or three dead birds are usually seen. If a crevice should be opened up from the grotto to any of the old hot-water channels, the grotto would in all probability be filled with carbon dioxide, and the next party of tourists would be left at the bottom of the grotto like the birds in the little valley near by. It would be wise on the part of the park management to provide for a test of the air of the grotto every morning during the tourist season. If this is not done a disaster is likely to occur at any time.

At Mammoth Hot Springs Hotel I wished to purchase a number of large colored views and I naturally went to the "official photographer of the park." The next day, however, I found a better grade of pictures for sale at an outside place and at a cheaper price, and to my disgust I found that the colored views I had purchased from the official photographer were of foreign manufacture, whereas the cheaper and better ones which were sold by the unofficial photographer were of American manufacture! Surely the position of official photographer should be done away with in the Yellowstone Park. Very certainly it is not right for the public to be led by the term "official photographer" to purchase foreign-made colored views which are more expensive than American-made views and at the same time distinctly inferior.

Any one who has traveled through the region to the south and east of the Yellowstone Park must realize what a splendid game preserve we could have if the Yellowstone Park were extended to the east so as to include the Absaroka Mountains and to the south so as to include Jackson's Hole and Teton Mountains and Gros Ventre Mountains. The private holdings of land in Jackson's Hole could be purchased for a very moderate sum and the entire surrounding mountain region is already included in the National Forest Reserves. It would be a very easy matter for the national government to greatly extend the boundaries of the Yellowstone Park and create what would be perhaps the most magnificent asylum for wild animals in the whole world.

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ALLEGHANY VALLEY EROSION

TO THE EDITOR OF SCIENCE: In the recent issue of the *Bulletin* of the Geological Society of America, Vol. XXIII., p. 295, is the paper of G. F. Wright on "Postglacial Erosion and Oxidation." In the summary of the discussion which followed, the reporter states that Mr. Leverett offered as disproof of the conclusions of Professor Wright the "great erosion in the upper Alleghany region which occurred between the deposition of the old drift and of the young or Wisconsin drift."