Mysteries of the Ancient Rivers of the Forest Hill Divide, Placer Co., Cal.

Written for the Mining and Scientific Press.

The recent announcement of the discovery by Felix Chappellet Jr., on the Forest Hill divide, near Centerville, Cal., of what is presumed to be a continuation of the rich channel worked in former years in the Dix mine, adds another interesting chapter to the history of the divide. The discovery was made in the workings of the Eureka Con. Co., after years of diligent search, under constant heavy expense, and evinces what determined effort intelligently directed may accomplish in solving the mysteries of that system of ancient river channels which in prehistoric times cut their sinuous courses through the valley that has since become a mountain—the Forest Hill divide. Years ago two mines were worked in the vicinity of this recent find. They were known, one as the Dix mine, the other as the Greek claim. Both were rich, but several thousand feet of unexplored ground lay between, and it was for the purpose of developing this section that the Eureka Con. Co. was formed. A large tract of land was bought and operations began to find the channel in the body of the mountain under hundreds of feet of andesite breccia and volcanic mud. The tunnel was driven straight in, through bedrock, a distance of 3000 feet, having discovered nothing. Then an inclined raise was put in, at 2100 feet from the mouth of the tunnel, until it broke through the bedrock and entered lava. This was on the rim of a channel. The rim was followed a short distance and a winze sunk 6 feet to bedrock, which was pitching east. Then from the main tunnel a vertical raise was put up 2500 feet from the mouth of the tunnel, 338 feet, which struck lava. This was evidently too high, so a drift from the raise was started 300 feet above the main tunnel, which, after progressing 317 feet backward in the direction of the mouth of the main tunnel, struck the rim of the channel. The drift was continued 100 feet and at that point a winze was sunk into the channel, which was found to contain large, smooth, well-worn boulders and wash, but the water came in so rapidly as to make it all but impossible. Mr. Chappellet then went back to raise No. 1 and at 194 feet above the tunnel level started a drift back which is now in 100 feet. Should this drift be found to be beneath the channel a series of raises will determine its location, and, if too high, another drift will be run lower down.

There is not a more interesting feature in mining geology than a study of those ancient river channels. The above description of the discovery of a channel is a single instance; the discovery of the Mayflower channel, near Forest Hill, by Felix Chappellet Sr., is another of similar character. This latter was made some years ago, when the channel system of the Forest Hill divide was not so well known as now; but even to-day some of the best and most experienced mining engineers on the divide are sometimes at a loss, coming unexpectedly upon channels whose existence was unknown, and again failing to find a certain channel where it was calculated it should be found.

If the channels were all bedrock channels—that is, all of a contemporaneous time—the vexatious problem would be much simplified, but such is not the case. There are four periods of channel formation, including the recent—those of the first period, usually broad, with heavy wash, including numerous large boulders, and cutting into the underlying crystalline rocks. The main channel of the Mayflower mine is a type of channel of the first period. (See Fig. 1, on page 285.)

When these broad channels, which in places were 1000 feet wide, were still living rivers, volcanic disturbances occurred, which lasted doubtless many centuries, but which, geologically, are of one age—the Pliocene. These disturbances extended hundreds of miles along the Sierra Nevada mountains. They were characterized by the vast amount of material ejected from the volcanic rents. In various parts of the range these materials differed. In the region under discussion it consisted chiefly of andesitic fragments, ashes, and, doubtless, also vast quantities of mud. This volcanic ejectments covered thousands of square miles of territory, and, flowing slowly westward, filled the river channels in places, no doubt, to the tops of the neighboring hills and possibly burying them from sight. Immediately the streams began the task of cutting new channels for themselves across this sloping and probably undulating plain of lava. While these channels appear to have been confined within certain broad limits, they did not follow the courses of the first streams. It would seem that the streams were now more numerous, narrower, and carrying large amounts of detritus derived from the freshly deposited volcanic material, cutting their ways rapidly into the soft lava rocks, until they had reached either the channel of the original stream beneath or cut into the bedrock itself, thus becoming gold bearing. Thus were formed channels of the second period. (See Fig. 2, page 285.) The channel of the first period is seen in the center, with a channel of the second period on either side. Fig. 3 illustrates a longitudinal section along a channel of the first period, channels of the second period having cut their way across it.

The channels of the second period had apparently no sooner cut their way into the older channels or underlying bedrock than they in turn were filled by further volcanic outbursts, which poured again from the crest of the Sierra Nevada; but the work of erosion was continued without cessation, and the channels of the third period were soon under way, their sinuous courses being determined by the inequalities of the surface. The channels of the third period only repeated the history of those of the second period. The fact that the channels of the second period, and again those of the third period, were able to cut through the great thickness of lava and even scour their ways down into the underlying bedrock, indicates what a vast time must have been necessary to accomplish this. Erosion was doubtless more rapid than at the present day, for the modern streams, though still hundreds of feet above the base level of erosion, do not flow as swiftly as then, nor do they carry the vast amount of sharp-cutting sand and rock fragments. Then, too, the bedrock is universally harder than the lavas, with few exceptions.

Channels of the second period cutting those of the first period, as in the center of Fig. 3, would at a lower point on its course deposit in its bed a body of gravel derived from the erosion of the channel of the first period, as may be seen in Fig. 4, where a channel of the second period is marked "upper lead." This deposit may occur in places directly above a channel of the first period, and in some instances follows such older channel for long distances. Where this condition obtains, it is quite evident that the rims of the channel of the first period had some influence in determining the course of the upper lead. Fig. 4, page 285, represents a channel of the first and also of the second period, and Fig. 5 illustrates channels of the first period, the Weske channel; the second period, the white channel in the center, and the third period, that on the right side, cutting into the Weske channel. Fig. 6 may represent a channel of the first period cut by a channel of either the second or third periods. Many channels of the third period contain only lava boulders and little or no gold.

The channels of the fourth period are the river courses of to-day. Fig. 7 illustrates the relation of the ancient system to the recent erosion. The forks of the American river have cut their canyons through 2500 to over 3000 feet of lava cap and hard bedrock since volcanic disturbances ceased in the Sierra Nevada.

The grades of the various channels are not at all uniform, some being much heavier than others, and, too, the grade of any particular channel varies from place to place, as may be seen in any modern stream. Fig. 8 illustrates the grades, as given by Ross E. Browne in his valuable contribution, "Ancient Rivers of the Forest Hill Divide," in the 10th annual report of the State Mineralogist of California. In the mind of the writer there remains no doubt that throughout the ancient river period and lasting possibly till the present time there has been a slow upward movement of the entire Sierra region, extending from the crest of the range to the great interior valley of California, and that this uplift was somewhat greater in Placer and adjoining counties than farther south in Calaveras, Amador or Tuolumne counties. There is much difference of opinion on this subject among those who have given the ancient river channels study, but there appear to be valid reasons for thinking that such uplift did occur.

Should the channel recently discovered by Mr. Chappellet prove to be the Dix-Greek channel, it will be a good thing for the mining industry in that section, as it would be the means of opening another large new mine which would give employment for years to several hundred men.

A glance at the map of the Forest Hill divide, made by Messrs. Browne and Hoffman, suggests that it might not have been unwise to have drifted directly up the old channel, where it might have been reached in the old Dix ground. This would have positively assured the identity of the channel. Should the newly-found channel eventually prove to be some other than the Dix channel, which may lie farther in the hill, then the Eureka Con. Co. have two channels to develop and work instead of one, as was the case in the Mayflower mine.

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FIG. 1.

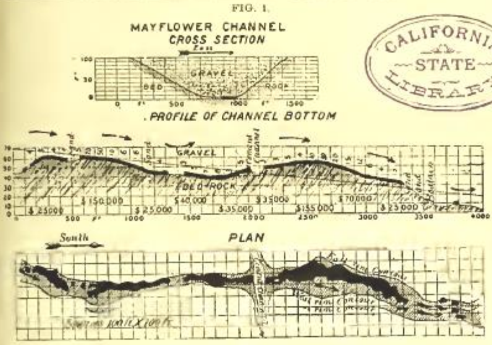


FIG. 2.

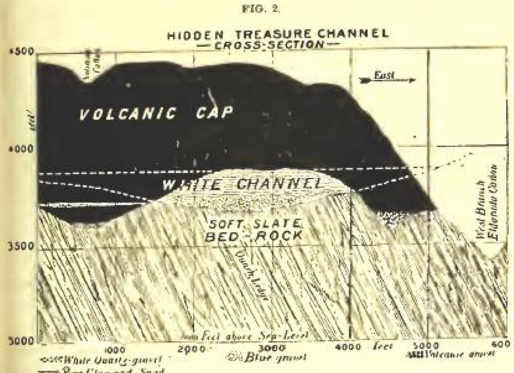
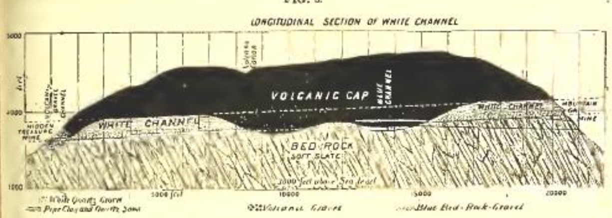


FIG. 3.



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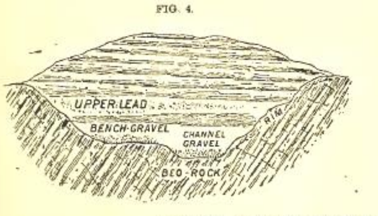

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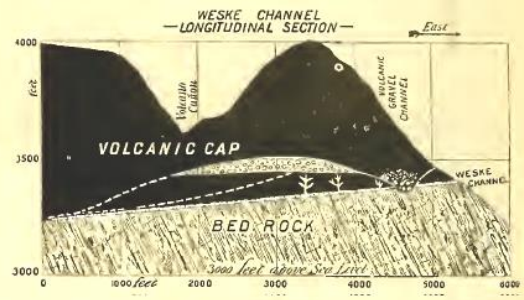

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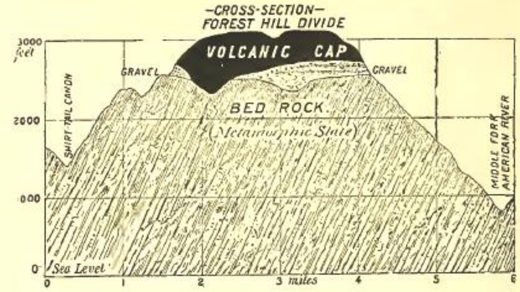

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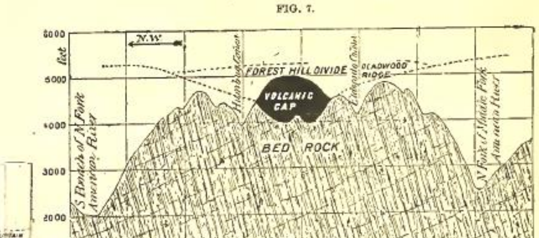

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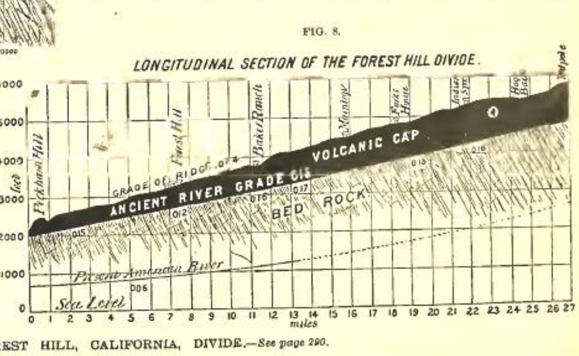

ANCIENT RIVER CHANNELS OF THE FOREST HILL, CALIFORNIA, DIVIDE.—See page 290.