Hydraulic Gold Mining, 1875

Before proceeding to the discussion of the process of this important branch of industry, it might not be out of place to state my standpoint, viz: my idea of the formation of the old channels and the gravel banks which now constitute our hydraulic mines.

In the October number of the Overland Monthly for the year 1868, I think, was published an article from the pen of John S. Hittell, entitled "The Dead Rivers of California." I contemplated at that time, answering publicly some of its many, to me, erroneous statements and false theories. I lost sight of the article, and as time past in the daily routine of business, my purpose gradually faded, until revived a short time ago by a newspaper article, apparently plagiarized from Hittell's.

My principal object, however, is not so much to advance my own theory of the formations of the old channels, or "Dead Rivers," and the causes which filled them with gravel and gold, as to give a succinct statement of the progress of mining therein at this place and vicinity.

But, first, that my premise may be understood, and second, that this letter may be of interest to the general reader, I propose giving my theory of the formation of the

Old Channels,

As they are familiarly called by the miners, and the deep gravel beds which fill and overlie them.

The reader will please bear in mind that I write dogmatically and generalize solely for the sake of brevity.

The great auriferous belt of California is sitnate upon the western slope of the Sierra Nevada. The bed rock of this belt consists principally of trap, serpentine and talcose slate. Its average width may be estimated at forty miles, and it extends from Fresno county on the south to the southwest corner of Oregon on the north, a distance of several hundred miles; narrow at the south, it gradually widens to the northward, till it is lost beneath the waters of the Pacific.

A line drawn through its center would run north northwest and south southeast, parallel with the western summit of the Sierra Nevada, forty miles to the Westward thereof, at an average altitude of about three thousand feet above the sea.

Within this belt are three distinct talcose slate strata; the western or lower, the middle, and the eastern or upper, which are separated by strata of other rock.

The rock separating the lower and middle slate is highly metamorphic, and is not distinct nor continuous along the whole line of the auriferous belt.

Of this lower slate stratum I have nothing more to say in this letter, I have only to do with the middle and upper strata, which are distinctly separated by strata of trap and serpentine, the latter skirting the upper slate and the former the middle slate. These different strata run parallel, so to speak, to each other, lengthwise of the belt. The slate strata are largely composed of talc and ore quartz bearing, containing all the principal gold bearing quartz ledges and veins, from which, in part, the gravel and gold filling the old channels came. I say in part, for there is reason to believe that not only the precious metals, but quartz also, were, at one time suspended or held in a diffused, vaporous state, and that during the epoch of ledge formation, in the cracks and fissures of the bedrock were, by the slow action of chemical process in nature's great laboratory, precipitated, and, by the natural law of crystallization, formed not only the ledges and veins, but also overspread the entire surface of this region of the country with a deep incrustation of gold bearing quartz.

These old channels are remnants of ancient and extinct river systems, of which there are

three or four very distinct and separate. I shall write of only one of them, known among miners as the Big Blue. It occupies the central portion of the great auriferous belt, from Calaveras county on the south to Plumas county on the north and drained a country two hundred miles and possibly more in length.
Mr. Hittell traced the Big Blue from Sierra county, southward to Forest hill in Placer county, a distance of about sixty miles, and erroneously assumed it to have been once a large and powerful river flowing to the southward and imagined its source to have been far to the northeast in Montana or Idaho. He correctly assumed that this ancient stream flowed in all its pristine majesty and beauty, prior to the existence of the Sierra Nevada as a formidable mountain chain. It is unreasonable to suppose that a river of any capacity would flow, for even sixty miles, along the side of a high mountain range, parallel with the bend of its summit, at an elevation of from three to five thousand feet above the sea.

The land occupied by the Big Blue and its two main tributaries was, probably, no higher above the level of the ocean at the time their channels began actively to fill with gravel, than the valleys of the Sacramento and San Joaquin are at present; Sacramento city being but sixty-five feet in altitude. These two large valleys were then a part of the ocean, and the coast range of mountains cropped out of it a long line of island reefs.

Our present river system, though larger, is copied from the ancient one, we now have the Sacramento from the north, and the San Joaquin from the south; their waters meet and flow into the ocean through the Golden Gate. All of their principal tributaries take rise in the mountains to the eastward.

The Big Blue had its main north and south branches which took their rise, as did also their tributaries, in what was then the rising hilly upland to the eastward; they ran down upon, and for many miles along the soft rock of the upper slate, thence across the intervening, nongold producing strata of serpentine and trap—which latter strata average about seven miles in width—to the middle strata, thence, generally along this slate stratum to their confluence, a short distance south of Scott's flat, in Nevada county, forming the Big Blue, which runs thence for eight or nine miles southwesterly to Buena Vista slide; thence north of Grass Valley to Alta hill; down north of Rough and Ready to Mooney's flat, Smartsville and Timbuctoo, emptying thence into the then ocean not far to the west of the latter place.

The south Blue or main south fork crossed the serpentine and trap strata, from the upper to the middle slate in the neighborhood of Newtown, in El Dorado county; it passed Placerville to Gold Hill, Mamaluke hill, Bald mountain, Peckham hill, Yankee Jim's, Wisconsin hill, Iowa and Indiana hill a distance of many miles along the middle slate; at the latter place it turned to the eastward upon the trap stratum and followed it to Dutch flat. Let the reader bear in mind this digression of the stream from the slate at this point, for it has to do with explanations hereafter—thence it bore to the westward, along where is now the canon of Bear river, to Little York, You Bet and Red Dog; thence about half way to Hunt's hill, when it made a sharp horseshoe bend southwesterly, along down the present line of the canon of Green Horn river to the western edge of the slate, where it struck a hard stratum of syenite, faced with a narrow stratum of trap, which caused it to cut an acute (if I may so speak of a running stream) angle, and following the western edge of the slate, ran north to its junction with the north Blue or main north fork.

Again, we trace a large tributary of the south Bine, running to the northward along the upper slate in EL Dorado county, to the east of Volcanoville, it crossed the serpentine and trap, striking the middle slate at Forest hill, and another ran by Michigan bluffs; these united with the south Blue before it reached Indiana hill.

Still farther to the east, and up the mountains, we find channels of old streams at Dead Wood and Last Chance, which ran down to and united upon the upper slate, flowing northward to Damascus, thence to Alta, on the railroad, where it was joined by a large stream from the northeast; thence to Dutch Flat and debouched into the south Blue at Thompson's hill—of which hereafter. The waters flowing in this tributary channel caused the south Blue, at this juncture to bend its course to the westward and forced it back to the middle slate at Little York. One other large tributary is worthy of mention; it drained what is now the eastern central portion of Nevada county, and is called the Quaker hill and Hunt's hill channel. This stream united with the south Blue, just south of Hunt's hill, causing it to turn down where now runs Green Horn, as before mentioned. All these streams were, of course, supplied with numerous tributaries, and all their waters flowed in the south Blue to the northward.

The north Blue, from the highlands of Plumas, came down along the upper slate by Downeyville, Forest City, Allegany and Chip's Flat to Snow point, in Nevada county; thence down to North Bloomfield, crossing the serpentine and trap to Kenebeck hill; thence along the middle slate a south by east course to Blue Tent, Scott's Flat and the Junction. It is possible that the main junction was between Hunt's hill and Red Dog, where I have located the junction of the Hunt's hill channel with the south Blue, but I think not; time will develop the truth regarding it. The north Blue also had its numerous tributaries and drained a large area of country.

Another stream of considerable magnitude ran down through Yuba county, by Camptonville, to North San Juan and French Corral, and was received by the Big Blue at or near Mooney's Flat, forcing the main river southward from thence to Smartsville.

Thus I have set forth the true theory of the formation of the ancient channels which underlie, are filled with, and in many places are deeply buried beneath the auriferous earth and gravel which constitutes our hydraulic and drift mines.

These ancient river channels became filled with auriferous earth, gravel and debris during the slow upheaval of the land. This rise was most rapid to the eastward, along the line of the summit of the Sierra Nevada, and required a great many thousand years for its accomplishment, for if we allow a rise of two and one half feet every century, (a very high estimate if we allow no interval of repose,) It would require four thousand centuries, or four hundred thousand years to elevate the land ten thousand feet and place the summit where it stands to-day; and it has once been more elevated than now.

As the land arose to the eastward, the currents of all the tributaries to the south and north Blue, and even theirs, from their sources for some miles along their courses was accelerated from century to century, and the land reaching gradually into the higher, consequently the colder regions of atmosphere, condensed continually more and more moisture which fell as snow and rain, these increasing the volume of water which, alone would increase the rapidity of the currents; their channels wore deeper, the quartz ledges and veins were cut down; slides occurred on all sides; trees slid into the streams; the crustaceous quartz overlying the surface came tumbling down, and the entire surface of the land became in time denuded. This mass was deposited in these old streams, washed away, re-deposited and re-washed at each succeeding freshet, over and over again and again, till it found its final place in the Big Blue, the north Blue and the south Blue, whose currents were too sluggish to carry it along to the ocean. It blocked up these streams, (and set back into the mouths of the tributaries) spreading out to a great width along nearly their entire course, but principally along the middle slate stratum.

When this deposture was overtaken by the volcanic epoch, the Dutch Flat gravel beds were three or four hundred feet thicker than when first discovered by the miner, and such was the case all along the middle slate.

Subsequent to the deposition of this enormous mass of earth, gravel and debris, the most extensive volcanic action known took place. Great lava fields extended from southern central Oregon to Tejon Pass; from the summit of the Sierra Nevada to the valleys of the Sacramento and the San Joaquin, and eastward throughout the Great Basin. During this long era the lava from hundreds of volcanoes, or craters, poured over the land, filled the old channels left unfilled by gravel, covered the lateral mountain ridges to a level; flowed over and covered up the ancient gravel deposits, of which, those now lying along and to the east of the upper slate stratum, are mostly still covered by it, in places to the depth of a thousand feet or more.

During this epoch the ancient rivers were obliterated, and, it is possible the land was so heated as to vaporize and drive away all moisture, that no stream of any magnitude existed upon this desert waste.

Afterwards the present river system had its birth on the surface of the lava, followed by a long period of glacial action, during which the lava was to a great extent worn away, and long lines of the old gravel deposit laid bare, the major part of which was swept along by the ice and rivers into the valleys to the west.

I have thus briefly set forth the true theory of the formation of our ancient channels and our auriferous gravel beds. 1 am aware that I open a wide field for discussion, and raise a gateway for a flood of interrogatories from both the learned and the unlearned; yet 1 submit the foregoing, confident that I can maintain my position with facts, sound reason and fair logic, and if the most skeptical require ocoular proof, let them follow these streams for miles beneath the lava upon these mountains, trace them across these deep gorges and canons and satisfy themselves. It would be easier for me to trace the channels than to satisfy all, or even, perchance, a majority of jour patrons with the pen. C. J. Brown.

Dutch Flat. June 22d, 1875.

(To be Continued.)

Mining and Scientific Press, V 31, 7/24/1875, p 50

Hydraulic Gold Mining. [No. 2.—Written by C. J. Brown, for the Press.]

In article No. 1, on this subject, in the Press of July 24th, I stated that my principal object in - writing these letters was to give a statement of the progress of mining at this place and vicinity. Progress pre-supposes obstacles, and in order to give the readers of the Press a true and comprehensive idea of the progress of this kind of mining in any given locality, the obstacles with which the miner has to contend should also be discussed. The first and most noticeable obstacle is the ignorance of the miners of even the rudiments of geology, few of them being able to tell whether a given boulder is crystalline, sedimentary or igneous; or whether a certain stratum in the mines is true washed gravel or otherwise; and when in formed that the waters of the South Blue flowed north, they doubt the sanity of their informant, and reply "water don't run up hill." It would be as fruitless for me to estimate the amount of money wasted in absurd and foolish mining enterprise as to estimate the value of hopes crushed, anticipations and exertions doomed, from the first, to inexorable disappointment and defeat, all owing to a deplorable lack of what would be termed In every other business—common sense. But there are other formidable obstacles to be met and overcome, and only the intelligent and' thinking, persevering
miner can remove them, with success. I will give an example of a failure, and the reasons for it further on.

I will confine myself, for the present, to a section of the South Blue from Indiana hill on the south to Thompson's hill on the« north, and its tributary, known as the Dutch Fiat channel, from the latter place eastward one mile, in all, six linear miles of these two channels of ancient rivers long since extinct.

Twenty years ago they were filled and overspread with auriferous gravel to a depth of from three hundred and fifty to five hundred feet, upon which grew a forest of gigantic pines.

It will be observed that I locate this section of mining lands on the divide between the north fork of the American river and Bear river, in Placer county, and that the Central Pacific railroad crosses it between Gold Run and Dutch Flat at an altitude of three thousand four hundred and twenty feet above the sea.

As the South Blue ran its waters toward the north, Indiana hill (which is one mile southeast of Gold Run,) is located on the inlet, and Thompson's hill, (one mile west of Dutch Flat), on the outlet of its old channel across the divide. I use the words inlet, and outlet, because to the south of Indiana hill, the north fork of the American river has crossed the South Blue and cut a canon to a perpendicular depth of fifteen hundred feet below the old channel, completely obliterating all evidence of its former existence between the latter place and Iowa Hill, a distance of four or five miles, and to the north of Thompson's hill, Bear river crossed it in like manner and cut a canon to a perpendicular depth of one thousand feet below its channel, destroying about two miles of it.

In my first letter I also called the attention of the reader to the fact, that at Indiana hill, the South Blue left the middle slate stratum and turned its course to the eastward on to the trap rock, over which it ran to near the town of Little York, in Nevada county.

Trap is an igneous rock, fine as iron, hard and very tough. A stream flowing across it cuts a narrow and steep canon for its channel, as witness the stupendous gorge of the north fork of the American river where it crosses this same stratum with its walls standing almost perpendicular, in bold, barren and rugged relief and picturesque grandeur, at a hight of two thousand feet above the river. So, too, the South Blue, along this stratum of rock, wore its channel deep and narrow, and the eastern wall of its canon stood high and precipitous.

During the slow upheaval of the Sierra Nevada, and after the old river channels here had filled with gravel to the hight of fifty feet or more, this wall of trap was precipitated into the ancient streams of the South Blue and the Dutch Flat. This slide was probably caused by the lateral pressure of the mountain as it arose, aided by an earthquake convulsion, as it has the appearance of being a sudden and formidable drift with a momentum which forced it far over upon the blue at Little York, and no doubt beyond, for it now shows several feet thick at the latter place; it appears in patches at Indiana hill, where the old river first entered upon the trap bed-rock, as before mentioned, and it still overlies the first, or what is called the blue gravel deposit, along nearly the whole extent of this section of hydraulic mining ground, from ten to eighty or ninety feet in depth; deepest near the western rim rock or side of the channel toward which it slid. When first deposited, it was of course, much deeper than at present, for the waters came upon and overflowed it, cutting down channels into it, and washed away the lighter surface material, leaving a non-gold-producing stratum of angular, unwater-worn erratics, which was, in time, deeply buried beneath a deposit known among miners as the red gravel banks. Of course, this trap slide contains many boulders apparently water-worn, but to an observant eye it is plainly distinguished from the true gravel deposits.

This slide has been a serious obstacle to successful mining operations along this section because miners have been and are, to some extent, still ignorant of its true nature, and those, and those only, who comprehend its character and work it accordingly as they would a bank of pipe-clay or any other barren and vexatious incumbrance, to rid the claims of it to the best advantage, will ever mine this section successfully. Now for my example!

The most notable failure was that of the Dutch Flat blue gravel mining company, composed

of San Francisco capitalists, which in a. d. 1871, commenced operations of a grand scale, and, under the direction of a California street mining broker as superintendent, erected the finest hydraulic works in the State, and commenced mining at two different points upon their ground located near the center of the Dutch Flat channel; bear in mind that the red gravel above the trap slide had been previously washed away by the miners, to the depth of about 200 feet, and near to this slide stratum, and a long sluice tunnel been run in the gravel near the bottom of the slide. The company commenced washing with 1,000 inches of water under a pressure of 500 feet, upon the top of this non-gold-producing trap slide, which at this point is fifty feet thick, and by dint of perseverance, an extravagant waste of labor, water and powder, and a most remarkable exhibit of ignorance, they bored a hole down through it, to the head of their tunnel, and washed a pit about 150 feet square; a cut was also opened on the southern rim of the claim on a level with the bottom of the same slide, with the expectation of large returns. The superintendent of the works was informed by your correspondent of the utter futility of his undertaking, but his scientific(?) knowledge of hydraulic mining was too profound to receive any questions from country bumpkins who believed there was a difference between a stratum of water-worn gravel and a slide of barren earth and rock.

The enterprise was, of course, a failure, and after a useless expenditure of nearly or quite $100,000 the company struck its colors and surrendered.

I here venture the assertion that every attempt to open and work this Dutch Flat channel of mines on a higher level than the bottom of the channel will result in loss and grievous disappointment.

There are one or two companies which are now engaged in opening claims on this channel in an intelligent and sensible manner, and with fair prospects of a grand success. I will reserve them for my next. Dutch Flat, August 6th, 1875.

Mining and Scientific Press, V 31, 8/21/1875, p 114

Hydraulic Gold Mining., [No. 5.—Written for the Press by O.J. Brown

In this letter I propose to speak more minutely of the Yankee claim. It has a present bank face of about three hundred feet, reaching from the easterly side of the channel toward the westerly side thereof, past the center. It will average about one hundred and thirty feet in hight, the lower forty feet of which is the blue gravel stratum, the balance is the trap slide, which I have described in my previous letters, capped with a few feet of red soil. This slide, as I have before stated, lies very much deeper upon the western rim in this channel. Strange as it may appear to one unacquainted with this kind of mining in this section, the last work done in this claim (it is now lying idle for want of water) was upon this western side where the gravel is most shallow and the trap slide thickest.

An English, or even an American stockholder, who was not familiar with this style of mining, would naturally inquire why time and money should be expended upon the least profitable portion of the claim. The object of the superintendent is, evidently, to open up a bank face across the entire width of the channel from rim to rim. No prudent miner would try to flank this slide on the east, for it is not compact like the gravel and is very treacherous. Resting, as it does, in part, upon the sloping rim rock, if its support was taken away from the east side it would, in the rainy season, when saturated with water, slide into the claim thus opened, close up and destroy, possibly, the labor of many months, and the last state of the claim be deplorably worse than the first.

If these claims are ever worked from the present line of operation—and there is no other feasible one—this slide must be removed from the front, across the whole width of the channel, at whatever cost to the company.

The expense of the Yankee claim thus far (exclusive of the first cost of Burleigh machine and compressor) is not far from $35,000. The company have taken from the ground the sum of $55,000 or thereabouts. I call this a remarkably good showing for the opening year, and is an evidence of the value of the ground, sufficient, at least, to encourage any mining company to push the work ahead with unabated exertion. It should be borne in mind by the stockholders of this company that most of this ground was drifted by the former owners, many years ago, from the bedrock up to the hight of eight, and occasionally to the hight of twenty feet. It is impossible to hydraulic this bottom stratum of gravel with satisfactory results, unless it is first pulverized with heavy bank blasts, for it is cemented by heavy pressure and is very hard. Small tunnels are run into the bottom of the gravel bank the required distance, from which cross tunnels are run, and, according to the effect anticipated, from one hundred to two thousand kegs of powder confined therein, and exploded at one blast. It is impossible to do this with ground that has been once drifted, the dirt having been extracted and the boulders piled back and left under the hill or bank of gravel. It will be seen that the drifters not only worked the richest of the ground, but left it in a bad and perplexing condition for hydraulicing. Even where the gravel remains intact, it is impossible by blasting—owing to its cementitious nature—to so pulverize it by hydraulic washing as to save all the gold it contains; consequently a certain per cent, of the gold is washed through the sluices in lumps of hard cement, and lost in the canon of Bear river. This loss cannot be avoided by any hydraulic process yet invented, and is but a repetition of the experience of every hydraulic company.

What Should the Cedar Creek Company Do?

In my opinion it should erect, at once, a cement mill in which to stamp the dirt and cement adhering to the bedrock, which, even where the ground is well blasted, will remain in solid patches from one to ten feet deep. The top of the rock itself, which in places contains much gold, should be blasted, and stamped in a mill. It may also be found more profitable to mill the gravel lying much higher above the bedrock, then to wash it by hydraulic process. It will naturally occur to any member of the company as he reads the foregoing, "why haven't we built a mill long ago?" Because you have had no convenient place for it. "Why, we have a space three hundred feet square!" Yes, but there must be room for the lead pipes to cross it; for the giants to play unobstructed at the distance of eighty feet; space for the derrick and its machinery with a free sweep on either hand for its long boom, besides the space occupied by large piles of boulders swung back by it. The economy of space is not the least perplexing study of a true miner. Such a mill, well conducted, cannot fail to be of profit to the company, and will, no doubt, be built in due time. But, above all, it should, without any unnecessary delay, press its main tunnel to a final completion and (Continued on Page 316.)

Mining and Scientific Press, V 31, 11/13/1875, p 313

(Continued from Page 313.)

open a claim on the South Blue. (See No. 4, Sept. 18th, 1875.)

After a pit shall have been opened at this point sufficiently roomy, six or eight giants can be placed in position, facing both north and south, and all playing upon high banks of rich virgin gravel never yet disturbed by the drifters' pick and drill. The indispensable derricks and another cement mill would be erected, and a mine developed the like of which has never been witnessed in California, and in which the company could utilize every inch of its water.

Again, the ditches of this company have a capacity of six thousand inches of water, but they will supply this amount to the mines, in average seasons, for from three to four months only, each year. Its chief reliance is in the Placer County canal, which is about fifty miles long and has a opacity of two

thousand two hundred and fifty inches of water, which it will furnish—including the reserve from its reservoirs—for seven months each year. The reservoirs situated along the line of this ditch are three in number, with an aggregate capacity of 50,000 inches, which will supply the ditch a full head for three weeks. It will be seen from the foregoing that this company must, on an average, do without water for five months each year, unless it resorts to some method to obtain a greater supply. This can be done in two ways only. First, by building new reservoirs to retain surplus water and, at the same time, enlarging the capacity of the present ones. Second, by constricting new ditches However necessary new ditches may become in the future, they are not needed at present. I would (gratuitously, of course) advise the company to proceed at once to enlarge the capacity of its reservoirs, and, if possible—and I believe it to be—construct new ones which shall, in the aggregate, give a head of two thousand inches for, at least, three months longer.

There is no doubt that one of the months from April to December is, on an average, as valuable for hydraulic mining as the three months of January, February and March. One reason is that the days are much longer. True, the work goes On both night and day, still, much more and better work can be accomplished in the same number of hours by natural light than by the artificial light used in the mines; but the greatest difference is caused by temperature. It is not only difficult and disagreeable for men to work in a hydraulic claim, especially at night, in weather when it is snowing, blowing, raining and freezing, but the quicksilver, used in the sluices to amalgamate the gold, congeals in cold and snowy water, and loses, to a large degree, its amalgamating properties, resulting in the washing away and loss of a much larger per cent, of quicksilver and gold, in the winter, than in the summer months.

Consequently a good supply of water during the summer and autumn is, to every hydraulic mine, a great desideratum.

Enough! methinks I already see the slow, plodding, cautious and methodical English stockholder shake his head, and hear him inquire after his yearly dividends.

I may save him much anxiety and valuable time, and the officers of this company much vexatious interference and many aggravating interrogations, by informing him that he can reasonably expect no dividends for, at least, three years from date, nor then, unless, in the meantime, he comes up promptly with his assessments. "What, assessments!" Exactly, sir; the company needs $100,000, together with the proceeds of the Yankee claim, and three years' time to perfect the needed improvements If you are unable or unwilling to meet the demand, sell out to some one who is both willing and able that the necessary work may be done in the shortest possible time. In my humble judgment a rich reward awaits him who shall hold out to the end.

If the tenor of my letters and the soundness of my suggestions meet the approbation of your superintendent—and from my personal observation of his policy I feel confident they must—I would say further to every member of the corporation, vote all the required aid without a dissenting voice and pay your assessments promptly; and to the officers thereof, promptly support and second the efforts of your superintendent—and soon an enterprise will be developed which, under proper management, will gladden the heart with annual dividends for twenty years to come.

Before concluding, I wish to say, in justice to myself, that I am not the owner of a foot of mining ground in this section, and in writing, have no personal interest to subserve, but only the general welfare and prosperity of a town where I have lived for nearly twenty years, witnessing the failure of foolish and absurd mining enterprises which, successively, brought into ill repute and disfavor a rich and valuable section of mining lands. I owe, perhaps an apology to other companies operating in this vicinity for the time and space devoted to so minute a description of the Cedar Creek company's property and prospects.

My excuse lies in the fact that it is the pioneer deep gravel hydraulic company of Dutch Flat, undertaking the enterprise with any reasonable hopes of ultimate success, and its failure now, from lack of means and properly directed energy would be deplorable, and the more so, as we all feel assured that if it fights the battle out on this line, success must crown its efforts.

Other companies shall receive attention in due time.

Dutch Flat, Sept. 16th, 1875.

Mining and Scientific Press, V 31, 11/13/1875, p 316