at the mouth of the incline ready for shipment when a suitable wagon road shall have been constructed. Apparently all that is necessary to make a big mine of this property is a determined and systematic exploration of the vein now opened.

The Southern Tier, which for so many years has been idle, has, encouraged by the development of its neighbor, started a tunnel for the purpose of opening its known vein at a greater depth than was possible from the old washings.

This property in times gone by shipped a considerable amount of extremely rich ore, and the new work will be followed with much interest by all who own property in the vicinity.

Immediately south of the Southern Tier is the Lone Pine property, which has an excellent showing of ore in the 160 foot winze, and also in the tunnel driven on the vein.

Assays from the vein run from 14 to 60 oz. silver, 10 to 40 per cent lead and 1 to 3 dollars gold.

Only work is needed on this poperty to make a paying mine, as the vein is strong and ore comes clear to the surface.

The Steamboat company has a large group of claims near the head of Snake Creek, which it is developing by means of a long tunnel.

About 900 feet were driven during the past season, but the objective point is not yet reached and work his been suspended for the winter.

The Elkhorn mining district, which lies east of the Blue Ledge, has been explored but little, and its resources are almost entirely unknown.

The Majestic company, however, is working a few men on its group of 12 claims, and from the showing near the surface it has good ground, the rock shows much galena scattered through it and the vein on the surface is 80 feet in width. A 50 foot shaft, 125 foot tunnel and two shorter ones comprise the present openings.

Buildings are being erected for the winter campaign and a determined effort will be made to locate an ore body of size.

The Fahey-Wanning group of claims, 15 in number, is the nearest neighbor of the Majestic, and is keeping a few men at work developing and performing the annual assessment work required by law. The present openings consist of a shaft 100 feet deep and two short tunnels. Assays from the vein show 8 ounces silver $2 in gold and a little lead.

The Glencoe has been operated by a small force of men during the season and some ore taken out. This property is worked through a tunnel and is already a considerable producer, several hundred tons of milling ore being now on the dump.

The East Blue Ledge Mining company's ground lies just east of and adjoining the Glencoe, and is supposed to be upon the same vein. Two or three men have been steadily working on a tunnel to intercept the vein and the owners are greatly encouraged at the showing made by the season's campaign.

North of the East Blue Ledge and southeast of the Liberty is the Homestake on which a large amount of work has been done during the past three years. The property so far as opened shows a very large and strong vein carrying much iron, some silver and a small percentage of lead, but as yet no pay ore in shipping quantities has been found. It is believed, however, that a shaft of 700 to 800 feet in depth would show the vein to be well loaded and a paying proposition.

Nothing of importance has been done on the Valeo during the past season, and only assessment work on the East Valeo and West Valeo, although all these properties have excellent surface showings and the Valeo has in the past shipped many thousand tons of ore.

This section, however, seems at present to be in a dormant condition, from which it would undoubtedly at once awaken if work were resumed upon the Valeo.

The Park City sampler during the first 11 months of the present year has handled 90,000 tons of ore from the various properties of this district. During the same period the Silver King sampler has handled 59,000,000 pounds of crude ore and 23,000,000 pounds of concentrates, a total of 41,000 tons of shipping ore, making the grand total of ore shipped from the camp in 11 months 131,000 tons and for the entire year not les than 143,000 tons.

It is expected that next year will witness the erection of a commodious and first class miners' hospital in this city, which institution will fill a long felt want among the miners of the camp.

Altogether the outlook for the future presperity and continued happiness of the people of this favored camp has never in its history been more roseate than at the present time.

GLORIOUS RECORD OF THE DALY-WEST MINE OF PARK CITY.

The great Daly-West mine made a record to be proud of in the way of out put in the year 1903. With the month of December, estimated the value of the production was $2,339,072.00, against $1,827,585.72 during the previous year, a gain of $511,486.28. A total of 76,528 tons of ore was shipped; from which was extracted 17,057 tons of lead, 4,261,818 ounces silver, 3,116 ounces gold, 3,070,000 pounds of copper, and 22,158,000 pounds of zinc. In 1902, from 65,363 tons of ore shipped was realized 14,903 tons of lead, 3,575,796 ounces silver, 2,943.96 ounces gold and 19,477,443 pounds of zinc. It will be seen from the foregoing comparisons that there has been a material increase in production all around. While there is no way of determining at present, the probabilities are that, when the year is ended this Park City bonanza will be found to be in the lead of all others in the country in the production of at least one of the metals—silver. The company now has under construction a plant for the treatment of its zinc ores, so that the revenue from this source will cut more of a figure in the future. The dividends for the year amounted to $1,332,000, making the total since Oct. 2, 1899, $3,491,000.

THE COPPER MINES OF UTAH'S DIXIE.

Utah's Dixie is in the vicinity of a good mineral section, one that is yet undeveloped. The extreme southwestern part of the state first came into prominence when the silver-lead mines of the Silver Reef district attracted attention.

COPPER BECAME A FACTOR.

It is only in late years that the copper districts have been a factor in bringing about a revival and furnishing a market for the products of the soil around St. George. The industry is yet in its infancy there, but whenever better transportation facilities are available new mines will be opened up and worked.

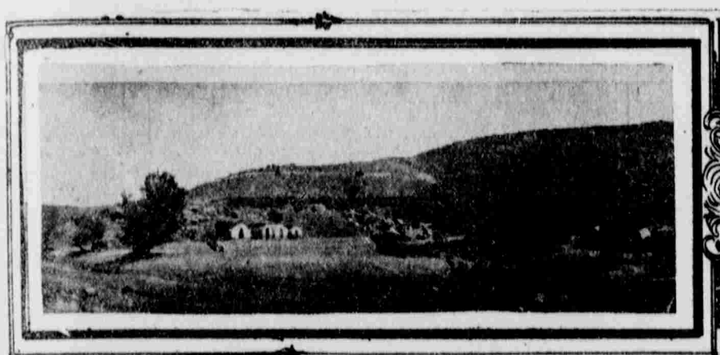
MINES NEAR ST. GEORGE.

The Utah & Eastern Copper company, operating the Dixie mine, is conducting the most extensive operations in this remote section at the present time. Last March a new smelter of 50 tons daily capacity, modern in every respect, was blown-in and has since been in successful operation on ore averaging 15 per cent copper, from which the plant is turning out 90 per cent fine copper bullion. The smelter is located at Shem City, on the Shebit Indian reservation, 13¾ miles from St. George and 55½ miles from Modena, the nearest station on the San Pedro, Los Angeles & Salt Lake railroad. On account of the lack of water in that part of the country the plant was built at a convenient point 12 miles from the company's mines. The ore is transported by teams, 15 are employed for this service while 40 are kept constantly on the road hauling in coke and going out with bullion. The mines and smelter are under the management of Mr. C. H. Doolittle, to whom the "News" is indebted for the accompanying illustrations.

NEAR ARIZONA COPPER CAMPS.

Just over the statelin in Arizona is a good undeveloped copper country. The Grand Gulch, owned largely by Salt Lake parties and the Savanic, owned by Col. H. L. Pickett, formerly of this city, but now of Tucson, both have records of producing ore in carload lots running better than 40 per cent copper.

DR. C. M. WILSON,
Mayor and Mayor-Elect of Park City.



VIEW of SMELTER.

UTAH AND EASTERN COPPER CO. SMELTER, SHEM CITY, UTAH.

VIEW of MINE AND MINE BOARDING HOUSE.

THE RICH AND RARE RADIUM DEPOSITS OF THE LA SALS.

DISCOVERIES of radium-uranium ores in the La Sal mining regions have attracted wide attention in the east during the present year, and, if the deposits of this rare mineral bearing zone turn out as it is anticipated they will, this vast unexplored region will take on new life and command the attention of capital which it justly deserves.

IN SOUTHEASTERN UTAH.

The La Sal country is situated in southeastern Utah, and stretches along the western boundary of Colorado. Its length is about 50 miles from north to south, while its width will probably average 20 miles. The La Sal mountains consist of a solitary group rising out of a vast sandstone plain to an altitude of 13,000 feet. They are unlike regular chains of mountains in this respect as they rise directly out of the plain, as a well known geologist expresses it, "like to a volcano cone." In their uplift the mountains show no stratification from granite to quartzite, and from quartzite to limestone; the whole range seems to be granite from base to summit. Some of the peaks rise abruptly, some of them peering above the timber line. The range lies partly in Grand and partly in San Juan counties.

HOW ACCESSABLE.

The La Sal region is more easily accessable from Cisco on the main line of the Denver and Rio Grande railroad, from which point stages and private conveyances can be had to almost any point.

SCENE OF RADIUM DISCOVERIES.

The scene of the radium discoveries is about 12 miles from the town of Richardson in Grand county. This town is located along the banks of the Grand river and in what is known as Professor valley. The soil is rich and the few inhabitants who reside there seem to be fairly prosperous.

Don Maguire, the well known geologist and metallurgist who has been collecting specimens for the Utah mineral exhibit to be sent to the St. Louis World's Fair, visited the rare metal mines a few weeks ago and has written the following concerning them:

DON MAGUIRE'S OBSERVATIONS.

"In the town of Richardson I found Mr. James H. Loftus, who is a large owner and manager at present of these mines; he it was who discovered them. I at once made arrangements with Mr. Loftus to visit the mine: he accompanied myself and assistants, and upon reaching the spot I found the formation to be white sandstone breaking as a reed through red standstone. A sharp ridge rises in a course from east to west for a distance of about 4,000 feet, and along that creek is found the outcrop of the vein. The mineral is associated with uranium oxides and sulphates, and it is as a uranium mine, vein or deposit that this property first impresses the visitor. However, upon a little examination of the ore and the sandstone in which it is, you at once see the physical conditions that are found at Silver Reef, Washington county, Utah. There as here we have a white sandstone, capped by red sandstone, and there as here, we find uranium associated with silver ores.

Strange as it may seem, at these mines the silver possibilities are ignored, and all attention is given to the uranium and radium with which it is associated.

ORE A BRIGHT YELLOW.

"The ore is of a bright yellow and orange color, with flecks of blue and black running through it in crystalizations; as an ore of uranium I have never seen its equal.

"There is a shaft run down to a depth of less than 100 feet, on the Jessie Day claim, and from the bottom of this shaft a drift runs in ore to the eastward for about 75 feet. On the dump there is piled out and sacked awaiting shipment about 200 tons of uranium-radium ore, and from the same workings for the past four months from time to time ore has been sent by express to Buffalo, N. Y., for treatment by the electrolytic process, which of course is the only way by which the radium can be obtained from it.

"The group of claims as situated here is owned by what is known as the Rare Metals Mines company, and as matters now look, the future most certainly promises much to the present owners of the group.

BECAME INTERESTED.

"The areas of these mines as obtained during my visit most certainly show up as the most interesting and high grade of any known in the world, and if they assay anything like what their appearance would indicate, they are also valuable as ores of silver. The quantity of this ore found here seems to be extensive and the vein in which the ores exist is a fissure in sandstone running east and west for a long distance. Copper is present in much of it, occurring as blue and green silicate with an occasional example of native copper, and also at times flecks of native silver.

"A day was passed in the extraction of ores from this property, and it was with reluctance that I left the spot, which is one of the most interesting to be found in the mining world."

REVELATIONS OF SCIENCE.

The Engineer, London, of late date, in a short account of the recent discourse by Prof. Curie on the new element, discovered by him in collaboration with his wife, calls attention to the certainty with which the latest revelations of science may be depended to be heard of in the proceedings of the Royal Institution, and the account of the wonders of radium is certainly a worthy addition to its record. Prof. Curie first explained that radium was capable of giving out heat rays sufficient in quantity to permit of measurement of rise in temperature by means of a thermometer. Moreover, it was apparently capable of doing this without suffering diminution itself in either bulk or weight. The emanations affect photographic plates through opaque substances much in the same way as do the Roentgen rays, though it is noticeable that the effects produced by the former are not nearly as sharp as are those obtained with the latter. Radium, too, will render some bodies—such as sulphide of zinc and platinocyanide of barium—into proximity with which it is brought, phosphorescent. Moreover, it did not lose this extraordinary property when its temperature was lowered to that of liquid air, and it, as far as has yet been discovered, is capable of causing these phenomena for indefinite periods, without any loss to itself or any diminution of activity.

Another attribute possessed by this element, or its compounds—for it was with the chloride and bromide of radium that Prof. Curie was experimenting—is its ability to render air a conductor of electricity. When brought near either of the terminals of an induction coil, between which sparks were passing, the sparking ceased. Apparently the infinitesimally small particles thrown off in the radiations actually render the air a conductor. Then, too, when brought near a charged electroscope it has the power of discharging it.

Prof. Curie described the different radiations given off by the radium compounds and classified them in accordance with their behavior under the influence of a magnetic field, their power of penetration, etc., and went on to explain that in addition to these radiations, emanations possessing the same properties as the substance itself were given off. These emanations possess many of the properties of gases. They could for example, be sucked through a tube. They could also be condensed by the action of intense cold and would diffuse again when the temperature was raised. As an example of one of the effects produced two vessels, one containing sulphide of zinc and the other radium chloride, were connected by a tube in which had been fixed a stop-cock. As long as this latter remained closed no effect was produced on the zinc sulphide, but this substance at once became luminous as soon as the stopcock was opened. The emanations, like the substance from which they come, can also discharge electrified bodies.

That radium actually did give off heat rays was demonstrated by a striking experiment with what the professor termed a liquid air calorimeter. A vacuum flask was so arranged that the quantity of air boiling off in a given time from some liquid air contained in it could be accurately measured. Into this flask were successively lowered a small piece of glass and a small vessel of like size, containing a small quantity of a radium substance, it was shown that the quantity of air coming off in the second case was very much greater than it had been in the first case—the times in both instances being the same.

Before concluding Prof. Curie alluded to some of the other characteristics of radium. He explained that it was obtained from pitchblende, in which mineral it was present in very minute quantities. We believe that Sir William Crookes has succeeded in extracting a gramme from a ton of pitchblende. The rays will discolor paper, give glass an abiding violet tint, turn oxygen into ozone, yellow phosphorous into the red variety and mercury chloride into calomel. Some of these powers were exhibited. Finally the lecturer gave some account of the experiments which he and his wife had carried out and which had led up to the discovery of radium and other similar bodies. He also made mention of a few of the speculations as to the possible gradual transformation of the elements, suggested by the already known properties possessed by this wonderful substance.

COPPER CROPPINGS.

In some portions of the La Sal district immense copper croppings are found but the investigation of them has been limited. The same is true of the gold quartz veins which give promise of big things in the future. The country is certainly worthy of serious investigation by mining men.

THE HENRY MOUNTAIN MINING DISTRICT.

About 100 miles west of the La Sal mountains in southeastern Utah is the Henry Mountain mining district, a well mineralized, but undeveloped section.

In a contribution to the Mining Review recently Prof. Marcus E. Jones treated the mineralization and geology of that section as follows:

There is no part of Utah which seems to the average man so far away as the Henry mountains. The reason is that this section is off from all the routes of travel both by rail and wagon. Until within a few years it was reached only by trail. Of late years, however, the demands of the stockmen for a short cut into southeastern Utah have led to the building of two roads. One of these starts from Green River, on the Rio Grande Western railroad, and passes over a desert of clay and sand for many miles, where there is but little water, and the watering places are far apart. This road goes to Hanksville, on the Fremont river, and follows around and through the clay hills to the Henry mountains, and to what is called Dandy Crossing, on the Colorado river. From Dandy Crossing there is a fair wagon road over to Bluff City, where connection is made with different routes to Arizona, New Mexico and Colorado. This road is considered the best in the winter time, because there are no mountains to cross, and because the sand is more easily traversed and there is no trouble from the heat.

The other road is better to the summit because it is higher, is never far away from water, has better grass, and passes more settlements. This route can leave either at Price or Salina. If it starts from Price it follows along settlements at the base of the coal range to Ferron, and then runs diagonally to Hanksville. The road leaving Salina has to pass over the coal range, then down into Grass valley and over a branch of the mountains adjoining Fish lake down to Loa, thence to Hanksville.

The entire region adjoining the Henry mountains is a desert country, with no trees, sage brush or grass to speak of. Every 10 or 15 miles along the river are settlements of hardy people who have redeemed the desert by water taken from the river. During the Utah "Coal Age" this whole region was alternately above and below the sea from Loa to eastern Utah, and contains large beds of coal and deposits of oil. It was at that time nearly level, but later on a series of volcanoes came up in the center of the plain and tilted it up in the form of a great dome, but it did not burst through the whole thickness of the beds. When these volcanic cores had reached an elevation of about 10,000 feet some of the volcanic matter forced its way along the bedding planes and lifted up the overlying rock in smaller secondary domes. At a later time the action of the rain and melting snow wore off the crests of the dome and exposed the volcanic cores. Now the black mountains of volcanic matter, having around their bases other smaller domes, stand out in great contrast in the midst of gray and soft clays which form the desert around them. These mountains reminds one of a hen and chickens.

A long time after the formation of these mountains there was a scond disturbance, like, but smaller than the first, which thrust up large dykes of volcanic matter through the original eruptive rock. These dykes run in series parallel to one another and in secondary series crossing the first ones at varying angles. They are generally along the flanks of the higher peaks. From the nature of the case, as the volcanic matter is limited, the dykes soon pass out beneath the soft clays of the desert. The veins of quartz are along these dykes.

For many years gold has been found in abundance along the Colorado river opposite these mountains at Dandy Crossing, but it was supposed to have come from the main river and its branches, such as the Dolores, Gunnison and Grand rivers. It is only recently that prospectors have found gold in the streams leading down from the Henry mountains. This led miners to trace up the gold until it was established that it came from the eruptive rock in the Henry mountains. After a great deal of prospecting, miners at last located some veins on the southeastern side of Mt. Ellen at an elevation of nearly 10,000 feet above sea level. The principal vein discovered was the Bromide. This is a quartz vein lying nearly vertical and running southeast and northwest. It runs all the way from a few inches to four feet in width. The gold occurs in a chute which is not far under ground and contains very nice values, though the high-grade ore is not so abundant as the low grade. The property has been opened up down to water level and considerable ore has been milled or shipped. A small stamp mill was erected on this property about 10 years ago and an attempt made to mill the ore and collect the gold on its short plates. This was necessarily a failure, because most of the ore is base. No attempt was made to handle the tailings, which were run off in the gulch and lost. The operation of this mill was by the rule of thumb. The ore in this property is sufficiently rich to make a paying and productive mine if properly handled. There is practically no water at the mine with the exception of a small spring. There is considerable timber along the mountain side sufficient for fuel and mining use. A number of other claims have been located adjoining the Bromide vein, both as extensions of it and on parallel veins. Further up the mountain other veins have been located which run in other directions, and further over to the north, on the drainage of the main creek which flows from Mt. Ellen, near the saw mill, are claims showing some gold. There is a small amount of placer gold along this creek. Up to this time practically no work has been done on any claims outside of the Bromide mine.

This is a beautiful region, high up in the mountains. It is prettily and heavily wooded with yellow pine and other evergreens. It has an abundance of grass, and at the saw mill there is a beautiful little stream of the purest and coldest of water. There is considerable game in this region, such as deer and chickens. The mines are only about 25 miles from Hanksville, where produce and supplies can be had.

There is no place in Utah which affords an opportunity of knowing better what a real desert is like than that which is found along the road from Loa to the Henry mountains. The air is as pure as crystal, very dry and bracing, and the scenery is beautiful as well as strange. Here the magic rain sculpture on the soft hills has changed them into the most peculiar and remarkable shapes. The different layers of rock and clay are beautifully colored in bands of blue, pink, yellow, green, gray, and black. The clay underlying these beds of rock, being softer than the overlying material, has worn away so rapidly that most of the hills face the rivers and streams in precipices. Here the geologist, traveling along, can read the story of the rocks in the different layers of strata as easily as he would turn the pages of a book. Two illustrations of this section are given in this article to show the different kinds of sculpture.

This region is valuable not alone for its gold, but also for its gypsum, oil and anthracite coal.