

DEPARTMENT OF THE INTERIOR

FRANKLIN K. LANE, Secretary

UNITED STATES GEOLOGICAL SURVEY

GEORGE OTIS SMITH, Director

BULLETIN 620—N

THE AZTEC GOLD MINE  
BALDY, NEW MEXICO

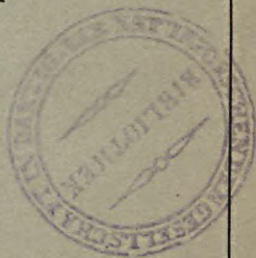
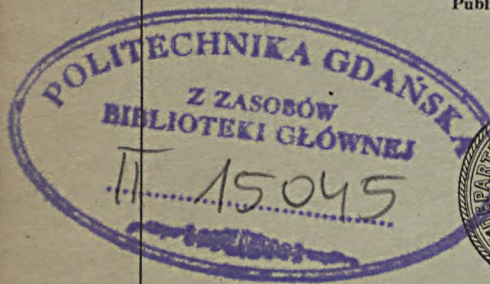
BY

WILLIS T. LEE



Contributions to economic geology, 1915, Part I  
(Pages 325-330)

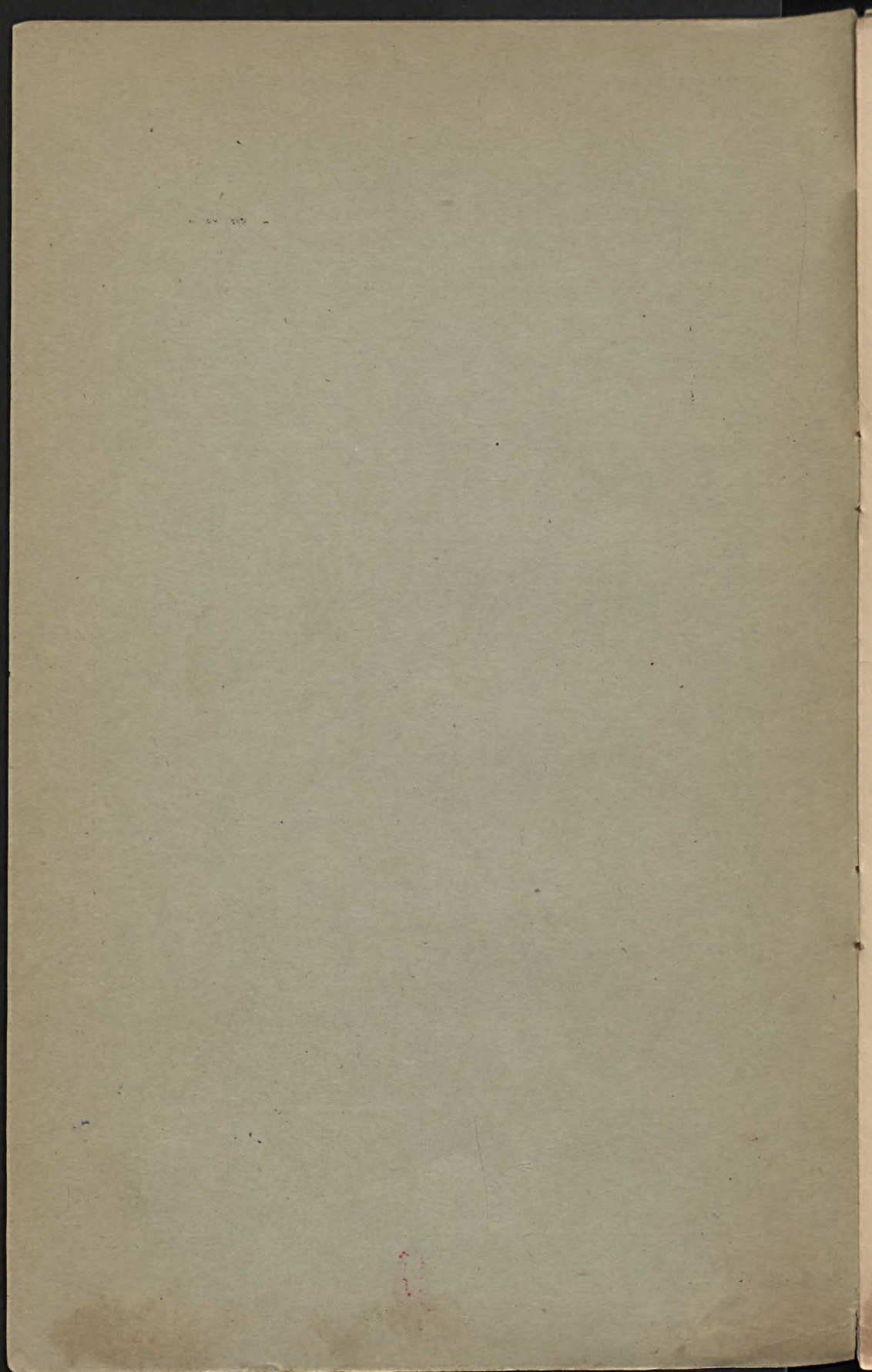
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## CONTENTS.

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	Page.
Introduction.....	325
Discovery and development.....	325
Geography.....	327
Geology.....	327
Occurrence of ore.....	329

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## ILLUSTRATIONS.

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	Page.
FIGURE 19. Map showing Baldy Peak and Aztec mine, Baldy, N. Mex.....	328
20. Sketch profile through Baldy Peak and Aztec mine, Baldy, N. Mex..	329
21. Sketch profile illustrating the occurrence of gold ore on the down-slope side of anticlinal ridges at Baldy, N. Mex.....	330



## THE AZTEC GOLD MINE, BALDY, NEW MEXICO.

By WILLIS T. LEE.



### INTRODUCTION.

Interest has recently been revived in the Aztec mine at Baldy, Colfax County, N. Mex., which was first described by Raymond<sup>1</sup> in 1870 and later by Jones<sup>2</sup> and Graton,<sup>3</sup> by the discovery of a large body of high-grade gold ore. This mine, situated on the Maxwell land grant, was a famous producer 45 years ago, but after the exhaustion of the body of ore then worked the mine attracted little attention. An adit, started a few years ago, was driven through several small deposits of moderately rich ore and in August, 1914, entered a large body of high-grade ore. This ore body has yielded good returns. Its extent had not been ascertained at the time of the writer's investigation in July, 1915.

### DISCOVERY AND DEVELOPMENT.

The Aztec mine, owned and operated by the Maxwell Land Grant Co., is situated at an altitude of more than 10,000 feet above sea level, on the eastern slope of Baldy Peak, which reaches an altitude of nearly 12,500 feet. The mine is connected by wagon road with Ute Park, the present terminus of the St. Louis, Rocky Mountain & Pacific Railway, a branch line of the Santa Fe System. According to a published report the gold was discovered on Baldy Peak by a man prospecting for copper, which had previously been found there. The account states that an Indian who came to Fort Union on a trading expedition exhibited some specimens which he had picked up on the peak. The white men at the fort recognized them as copper ore and sent one of their number with the Indian, who showed him where the ore was found. This resulted in the location of a prospect which for several years was known locally as the Copper mine, but which later became known as the Mystic lode. It is on the west side of Baldy Peak, near the top, at an altitude of about 12,200 feet.

<sup>1</sup> Raymond, R. W., Statistics of mines and mining in the States and Territories west of the Rocky Mountains for 1869, pp. 385-388, 1870.

<sup>2</sup> Jones, F. A., Mines and minerals of New Mexico, pp. 144-151, 1904.

<sup>3</sup> Lindgren, Waldemar, Graton, L. C., and Gordon, C. H., The ore deposits of New Mexico: U. S. Geol. Survey Prof. Paper 68, pp. 92-105, 1910.



A considerable amount of development work was done at various times on this prospect, but its great altitude and its distance from a railroad shipping point prevented profitable operation. However, when a railroad was constructed to Ute Park in 1906 it was thought that some of the best ore might be shipped with profit. One carload, yielding 20 per cent of copper, was later sent to the smelter. At the time of the writer's visit another carload was ready for shipment. The ore is carried by burros down the mountain to Baldy and thence carted by wagon to Ute Park, a distance of 8 miles. The present opening is not sufficiently developed to permit a determination of the size of the ore body or its relation to the rocks containing it, but from what may be seen it is probable that the ore occurs in a fissure vein. It consists of chrysocolla and cuprite, the former predominating. The cuprite occurs as dark-red, clearly defined angular fragments embedded in the bluish-green chrysocolla, the mass resembling a cemented breccia.

According to the published account a party sent out in 1866 to do development work on the copper prospect found placer gold on Willow Creek, on the west slope of Baldy Peak, in October of that year. The news of this discovery spread rapidly, and in the summer of 1867 placer mining was begun in this region, which later became known as the Elizabethtown district. These placers were worked for several years, and according to Jones<sup>1</sup> about \$2,250,000 worth of gold was recovered. However, the scarcity of water made operation expensive, and although only a small part of the placer ground has been worked, no extensive operations have been carried on there for several years. The placer gold was found only along streams heading on Baldy Peak, and this led to a search of its slopes for the lode. In June, 1868, the outcrop was discovered, and later the Aztec mine was opened on it. The mine was rapidly developed, and a 15-stamp mill was put into operation October 29, 1868. For a few years the yield was sometimes as high as \$21,000 a week. Raymond<sup>2</sup> reported in 1870 that ore from this mine averaged as high as \$68.83 a ton saved on the plates. It is estimated, according to Graton,<sup>3</sup> that the total amount of gold taken from this mine was "between \$1,250,000 and \$1,500,000, of which about \$1,000,000 was taken out in the first four years."

This mine brought the district into prominence and is said to have been the immediate cause of the sale to an English syndicate of the Maxwell land grant, consisting of 1,750,000 acres. The original grant was made by Mexico in 1843, but its boundaries, as claimed, were called into question by the officials of the United States Government until 1861, when Congress confirmed the grant. The body

<sup>1</sup> Jones F. A., *op. cit.*, p. 145.    <sup>2</sup> Raymond, R. W., *op. cit.*, p. 387.    <sup>3</sup> Graton, L. C., *op. cit.*, p. 97.



of the ore which had yielded the rich returns was soon exhausted. In 1872 the mine became involved in litigation and mining operations ceased. Thereafter for more than 40 years occasional efforts were made to find other bodies of paying ore. Accounts of these attempts are contained in the reports cited. The sedimentary rocks of the district are faulted and intruded by igneous rock in the form of dikes and sills. Near these bodies of igneous rock and in the zone of fracture many prospects have been opened, and in some of them small quantities of ore have been found, but none that yielded notable returns.

In 1909 J. T. Sparks, then in charge of the development work at Baldy, ascertained that a quartzose conglomerate, now known to constitute the base of the Raton formation in this region, is the "quartzite" and that the underlying Pierre shale, of Cretaceous age, is the "slate" of the old Aztec workings. He confined his attention to this contact and found ore in several places. In the extension of one of the entries started on this contact his successor, E. V. Deshayes, found the body of rich ore which is being worked at the present time.

#### GEOGRAPHY.

Baldy Peak (fig. 19) is the highest point of a prominent ridge which Graton called the Cimarron Range and which is separated from the main range of the Rocky Mountains by Moreno Valley, a troughlike basin draining eastward by a narrow canyon cut through this range by Cimarron River. Because of its great altitude Baldy Peak receives relatively heavy precipitation, but the mine is situated on the steep slope so near the head of Ute Creek that the streams are small and difficulty is experienced in obtaining enough water for mining operations. Farther down Ute Creek there is a small, steady flow that has been utilized for many years in placer mining.

#### GEOLOGY.

Only two sedimentary formations crop out in the vicinity of Baldy—the Pierre shale, of Cretaceous age, and the Raton formation, of early Tertiary age. At Ute Park and localities farther east the Pierre shale is overlain by the Trinidad sandstone and the Vermejo formation, both of Cretaceous age. The Vermejo contains the most valuable coal beds of the Raton coal field. These formations are overlain unconformably by the Raton formation, and between Ute Park and Baldy the Trinidad and Vermejo were eroded away before the sediments of the Raton were deposited, so that the Raton now lies across beveled edges of the older rocks, as indicated in figure 20.

The sedimentary formations, which were originally almost horizontal, are now faulted and upturned on the flanks of the mountain. Minor folds and small faults, formed probably at the time the beds



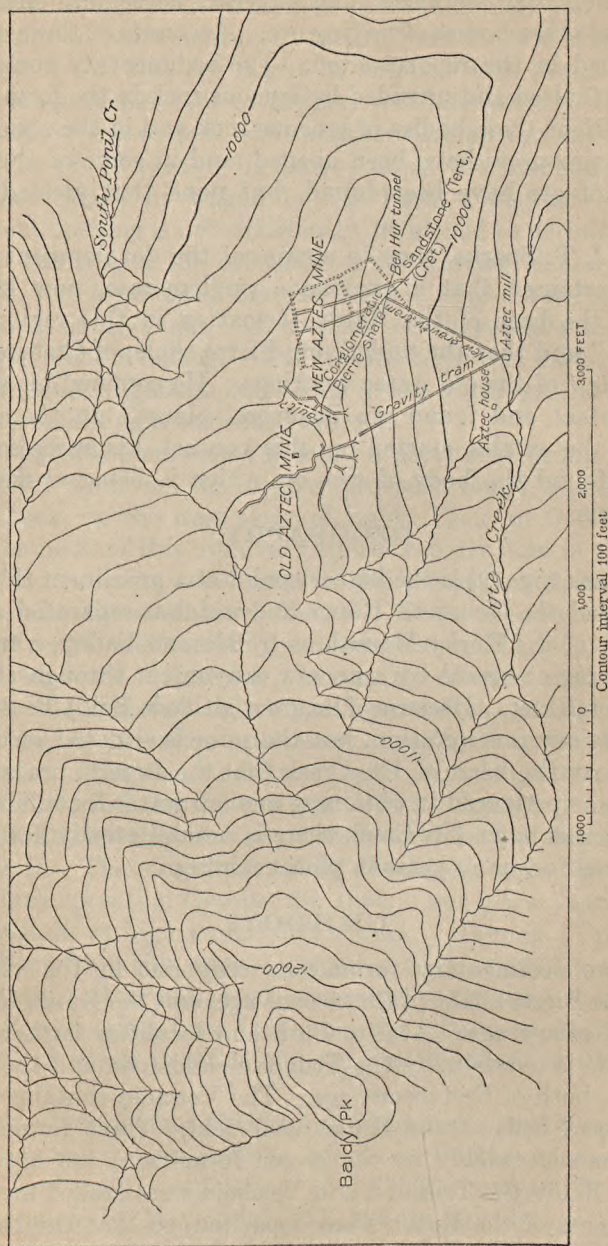


FIGURE 19.--Map showing Baldy Peak and Aztec mine, Baldy, N. Mex. From data furnished by the Maxwell Land Grant Co.



were upturned, antedate the deposition of the ore. The movements that produced these faults and folds occurred some time after the beginning of the Tertiary period, for the beds of early Tertiary age—the Raton formation—are involved in them.

The igneous rock of the district consists of quartz monzonite porphyry and occurs as dikes and sills. The sills are numerous, and many of them were intruded into the Pierre shale, although some occur also in the Raton formation; the dikes cut both formations. Inasmuch as these igneous rocks cut the Raton formation, the intrusion was of post-Raton date and possibly accompanied the uplifting of the sedimentary beds. A prospect tunnel driven into the west side of the mountain in penetrating a thickness of 1,400 feet of rock went through six sills aggregating 425 feet in thickness. As Graton has pointed out, these intrusive rocks have effected pronounced local metamorphism of the shales.

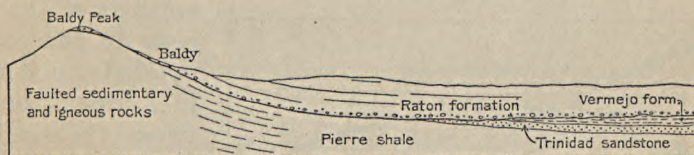


FIGURE 20.—Sketch profile through Baldy Peak and Aztec mine, Baldy, N. Mex., showing the unconformity between the Raton formation and the Pierre shale. The gold ore at Baldy occurs along this unconformity.

### OCCURRENCE OF ORE.

The gold ore is clearly associated with the igneous rock, and many of the small ore deposits of the district are reported to occur at the contact of this rock with the shale. However, the principal bodies of ore known at the present time are not in immediate contact with the intrusive rock.

The principal bodies of ore near Baldy occur at the plane of the post-Cretaceous unconformity, where the basal conglomerate of the Raton formation rests on the Pierre shale. The ore was deposited during the Tertiary period, at some time later than the Raton epoch. Some of the ore is found in small pockets and stringers in the conglomeratic sandstone, but most of it that is worked at the present time is in the underlying shale, into which it extends for distances of a few inches to 5 feet or more. The richest and largest bodies occur on the down-slope side of the crests of the minor folds, as illustrated in figure 21.

The folding seems to have fractured the shale at the crests and opened minute fissures. Many of these openings are now filled with calcite, which appears as an intricate network in the shale. The calcite carries pyrite, chalcopyrite, sphalerite, and possibly galena. Pyrite also occurs very generally along the contact. The gold occurs



in part as wire gold or as thin irregularly shaped masses, as if deposited in cavities, but usually in minute particles coated with dark material, so that to the eye they do not appear metallic. In some places these particles appear to be rather generally distributed through the shale, but in others they occur especially in dark nodular masses of heavy fine-grained crystalline rock that apparently consist chiefly of chlorite. These masses are particularly sought for in mining, for they constitute the richest ore. Their origin was not ascertained.

The ore is free milling and is treated in a 10-stamp mill, by far the greater part of the gold being caught on the amalgamating plates. The concentrates are sent to the smelter and the tailings are impounded for future treatment.

Until recently the greater part of the ore mined came from the lower part of the conglomeratic sandstone or from the fractured

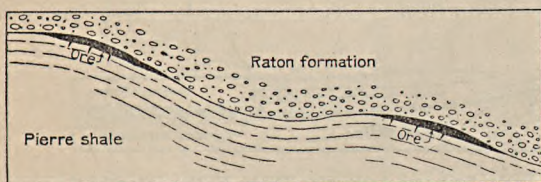


FIGURE 21.—Sketch profile illustrating the occurrence of gold ore on the down-slope side of anticlinal ridges at Baldy, N. Mex.

portions of the shale close to the contact. Sparks found it mostly in a rusty zone between the sandstone and the shale in calcareous gangue matter, mainly as free gold but also in the sulphides. He reported "sulphides and arsenides of silver, copper, nickel, and cobalt" in association with the gold and stated that the sulphides occurred most abundantly near the contact, while the free gold was more often found along slips and fractures ranging from a few inches to a few feet in width both above and below the main contact. The gold-bearing solutions seem to have penetrated everything near the contact, but the rich ore body now being worked indicates that they deposited gold most readily in the shale. As elsewhere in this region, the conglomeratic sandstone contains small irregular masses of coal, probably derived from buried wood. A piece of such coal from one of the openings of the Aztec mine was assayed by E. E. Burlingame & Co., of Denver, who report that the ash from the coal runs 8 cents a ton in gold.

The ore handled at the time of the writer's visit was reported to range in value from \$15 to \$250 a ton. During the 10 months prior to the visit more than 2,100 tons had been treated, with an average return of \$107.60 a ton. Of this yield 80 per cent was recovered by amalgamation and 20 per cent was derived from the concentrates. A small amount of gold, which will probably be recovered in time, still remains in the tailings.





