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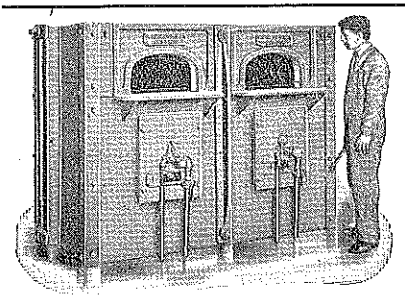
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The COLORADO SCHOOL OF MINES MAGAZINE

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No. 6

Lower Yellowstone Irrigation Project, Montana.

Robert S. Stockton, '95, Resident Engineer in Charge.

Gilbert L. Davis, '99, Construction Engineer.

Location and Source of Water Supply.

The Lower Yellowstone project, as its name suggests, is situated near the mouth of the Yellowstone River, in Northeastern Montana and Western North Dakota. The project embraces a strip of land extending 65 miles along the west bank of the Yellowstone River, and about five miles broad at its widest point.

Water for the irrigation of this land is diverted from the river at a point fourteen miles northeast of Glendive, Mont. A low diversion dam, 12 feet high and 700 feet long, of stone and timber, is so located that the water can be taken from the river through eleven 5-foot gates in a massive concrete structure. From the headgates the canal runs for several miles through a deep cut and is protected by a bank or dike from overflow due to ice gorges. For the first nineteen miles the canal covers only a few thousand acres of land, but beyond this point the valley is wider and a tract of 7,000 acres below the main canal affords an opportunity to drop the water for its irrigation through a turbine water-wheel operating a centrifugal pump and supplying water to about 3,000 acres of fine land on the Tokna bench. Thirty-six miles below the headworks the canal crosses Fox Creek in a double-barreled concrete siphon 225 feet long. Below this point there is but little difficult construction and the valley widens. Most of the heavy work on the canal is in the first thirty-six miles and includes deep cuts and concrete flumes and culverts for passing storm water over or under the canal.

The Yellowstone River affords an ample water supply, as the low waterflow past the headgates of the Lower Yellowstone Canal is several times the maximum amount required for irrigation of the project lands.

Items of Historical Interest.

In the settlement of nearly all of our country, trappers and traders have been the pathfinders for civilization. They were the first to penetrate Montana, but it was many years after Lewis and Clark had explored the territory and given a new impetus to the fur trade before much was accomplished in the settlement of this region. In 1832 the American Fur Company, of which John Jacob Astor was the founder, established Fort Union at the junction of the Missouri and Yellowstone Rivers, and sent the first steamboat to that point. This post, at the gateway to Montana, holds a conspicuous place in the early history of the State.

About 1860 the discovery of gold called thousands of prospectors into the country, and these men were followed later by others, bringing their families and establishing their homes in the rich valleys. But the Indians fiercely guarded their hunting grounds along the Yellowstone and so the tide of immigration passed on to the west. Only thirty years ago one could stand on a peak overlooking the Yellowstone Valley and see a herd of 25,000 buffalo grazing where today broad fields of grain extend for miles. Trains were sometimes halted for hours while the buffalo went down to the Yellowstone to drink, and in the fall, when the buffalo left for their winter pastures, the stockmen's little shacks stood trembling, enveloped in a cloud of dust, while the buffalo thundered past—not walking, but on the lope—a continuous hurrying procession for three days and three nights. The buffalo hunter was one of the first residents of the valley. One party of hunters, under contract to supply a firm at Buford with buffalo meat, killed as many as seventy animals daily. In a few years the buffalo disappeared from the valley, and

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with the loss of their game the Indians moved away. This was one of the first steps in opening the valley to settlement.

Though the region ceased to be a hunting ground, for many years it remained a battle ground, ranged by the Sioux and other warlike tribes. Sitting Bull and his braves held the district in continual unrest. Fort Buford was twice besieged by this wily medicine man, and the constant attacks by Indian bands on immigrant trains and on steamers plying the Missouri made the valley a zone of terror. All attempts to establish roads through the valley were futile, and, notwithstanding the rich grazing lands of the district, even the pioneer stockmen delayed settlement here until a late period.

In 1869 the first steamer ascended the Yellowstone with General Sully's command, and in 1875 General Forsyth made an exploration of the stream as far as Huntley, 418 miles above the mouth of the river. Having found that troops could be supplied by boat, the government, the next year, sent General Terry against the hostile Sioux. From that time on the country was occupied by troops, and steamboats were employed on the Yellowstone to transport men and baggage, and to carry supplies for the construction of the Northern Pacific Railroad, then being extended into Montana. This road reached Glendive in 1882, and after this time steambotting on the Yellowstone practically ceased for several years.

With the irrigation of the valley, the river has reached its highest use. A vast arid country is made productive and hundreds of families have found comfortable homes.

Statistical Statement of General Features.

1. States: Montana, North Dakota.
2. Counties: Dawson, Mont. McKenzie, N. D.
3. Latitude, 47°; longitude, 104°.
4. Townships: 18 to 26 north, ranges 56 to 60 east, Montana meridian; 150 to 152 north, range 104 west, fifth principal meridian, North Dakota.
5. Altitude: 1,865 to 1,980 feet above sea.
6. Irrigable area: 66,520 acres. Ownership: public, 19,550; railroad, 5,584; State and school, 2,150; private, 39,236 acres.
7. Size farm units: 40 to 160 acres; maximum irrigable area, 80 acres public land.
8. Watershed area: 66,000 square miles.
9. Average precipitation in irrigable area: 16 to 20 inches.
10. Average annual discharge: 16,900 second feet April to November, inclusive, 1903 to 1906.
11. Storage reservoirs: None.
12. Diversion dams: Type, rock fill crib; height, 12 feet; length, 700 feet.
13. Towns on project: Newlon, Sidney, Fairview, Ridgelawn, Burns, and Tokna.
14. Location land offices: Miles City and Glasgow for Montana; Williston for North Dakota.

15. Soil: Deep sandy loam.
16. Prevailing winds: West and north-west.
- 16A. Temperature: Maximum, 107°; minimum, 49°.
17. Principal products: Forage crops, grains, fruits and vegetables.
18. Markets: Minneapolis, St. Paul, Minnesota and local points.
19. Value irrigated lands: \$60 to \$80 per acre.
20. Value non-irrigated lands: \$15 per acre.
21. Capital required: Entirely dependent on the individual.
22. Railroads: Great Northern and Northern Pacific.
23. Duty of water: 1 second foot per 100 acres.
24. Length main canals: 62 miles.
25. Length laterals: 121 miles.
26. Fuel supply: Wood and coal.
27. Power developed: 290 horsepower.
28. Domestic water supply: Wells 15 to 30 feet deep.
29. Date of opening: December 21, 1908.
30. Charges: Construction, \$42.50 per acre; maintenance and operation, \$1.00 per acre for 1909.
31. Per cent. project completed: 92 per cent. to September 30, 1909.
32. Allotments: \$2,910,000 to December 31, 1909.

Altitude.

The lands of the project are very nearly flat or gently sloping benches, with an elevation of from 1,865 to 1,980 feet above sea level.

From Yellowstone Valley the rolling grass lands rise gradually until they reach an altitude of about 3,000 feet on the divide between Yellowstone and Missouri Rivers.

Area of Irrigable Lands.

The irrigable area includes 66,520 acres of land, of which 19,550 acres are public lands, 2,150 acres State and school lands, 5,584 acres railroad land grant lands, and 39,236 acres lands under private ownership.

The tract presents a varied appearance. The Yellowstone River in this part of its course flows through a broad valley, in which it has built up a series of level or gently sloping terraces. Usually at least two of these terraces are well defined, though varying in width from less than half a mile, in the southern end of the project, to four or five miles in the widest portion, and ranging in height from four or five feet to fifty or sixty feet. The low bottom lands are occasionally subject to overflow and possess some of the characteristics of alluvial flood plains. They are quite heavily wooded, and, while generally level, the surface is made slightly irregular by small hummocks and kettle holes. Where an intermediate terrace occurs it resembles the lowest one, except that it is less liable to inundation

and is usually smoother and freer from heavy vegetation. The upper terrace, comprising three-fourths of the land in the valley, is entirely different from the lower ones. It has a decided slope toward the river, and its smooth surface is grass covered and free from heavy brush and trees.

Size of Farm Units.

The farms on the project vary from 40 to 160 acres in size, according to the character of the land and the distance from a town.

The public lands now open to entry are divided into units having as nearly as possible eighty acres of irrigable land. The private holdings are restricted to 160 acres for each owner.

Costs of Filing.

When a filing is made on one of these farm units a filing fee is required amounting to \$6.50 for a 40-acre farm and \$3 for an 80-acre farm; or, if the filing is within the limits of a railroad grant, the fee is \$8 for a 40-acre tract and \$11 for an 80-acre. Should the filing be made before the United States Commissioner at Glendive, Ridgelawn or Mondak, his fee is \$1 in addition to the fees stated.

Townsites and Community Life.

The long irrigation canal, stretching like a shining magic wand across the lands of the project, is transforming them with startling swiftness from a vast free range to a thickly settled community. Framed in by gently sloping hills on the west, and by the river, with the steep, rugged and picturesque bluffs, here and there highly colored, that form its farther bank, on the east, the valley is dotted for miles with broad fields of grain and growing towns.

Sidney, with a population of between four and five hundred, is the largest of these towns. It is a pleasant, prosperous place, the center of activity for the lower part of the valley. The town has three general stores, drug store, two harness shops, livery stable, hotel, schoolhouse, church and bank, and numerous dwellings and business houses are rapidly being constructed. It is an important distributing point for agricultural machinery.

Dore is a postoffice at the lower end of the project.

At Fairview, about five miles south of Dore, there are several stores, a postoffice, a church and blacksmith shop. The schoolhouse here seats forty children.

About five miles farther south is Ridgelawn, where there is a general store and postoffice. A good selection of farm machinery and other supplies may be found here.

Newlon, Tokna, Sears and Burns are small but growing towns, in each of which a general store furnishes the farmers with whatever supplies they may need.

Railway transportation is afforded the

project at Glendive, a division point on the Northern Pacific Railway and a prosperous town of about 3,000 people, and at Mondak, an up-to-date and growing village on the Great Northern road, at the lower end of the project. A branch of the Northern Pacific is now being constructed from Glendive down the valley to Sidney which will be extended later to Mondak, giving first-class transportation facilities.

There are good wagon roads throughout the district, and a network of telephone wires brings the farmers and townsmen into close touch with one another.

Water Power and Electricity.

Thus far no use has been made of the water power or electricity that can be developed on this project when suitable plants are installed. The lignite coal which is everywhere present will admit of the cheap development of power wherever needed.

Domestic Water Supply.

Many wells have been dug in the valley, and in most cases good water has been obtained at a depth of from fifteen to thirty feet. Wells have been drilled at various locations and a fair flow of good water obtained at depths of from 150 to 200 feet.

Experiment Farms.

The Reclamation Service expects to establish on the project several experiment and demonstration farms. These farms will be under the management of skilled agriculturists, and will afford valuable sources of information to the settlers. The farms are to be open to inspection and a knowledge of the results obtained will be available at all times. Settlers new to the country will find this experimental work of special benefit in determining the crops to be grown and the most efficient methods of culture.

The Soil.

Compared with other localities of equal area, the soil of the Lower Yellowstone Valley is remarkably uniform. Few light soils are found and practically none which are thin and unproductive. The soil of the upper terraces and of some of the lower benches is a deep loam, colored rich brown by the large amount of organic matter which it contains. It is strong and retentive of moisture, but plows easily, and works into a good tilth under cultivation, without baking or forming clods. The surface soil is often overlaid with a subsoil of heavier clay loam, extending generally to a depth of three or four feet, but in some places from six to eight feet. These lands have good natural drainage, due to their slope and to the porous character of the subsoil.

In the river bottoms there is greater variation in the soil than on the higher benches. Here are found a fine sandy loam, of light brown color, varying in depth from one to six feet or more, and, in the lower

portions of the valley, a heavy bottom land soil. This soil is nearly black with organic matter, and exceptionally heavy and impervious. It varies in depth almost directly with the distance from the river, in some places lying only a foot deep over beds of fine sandy loam, and in others becoming a sticky clay from four to six feet deep. In drying it cracks at the surface, but when the moisture has entirely evaporated the soil crumbles, rendering it easily handled under cultivation.

The soils of the project possess almost inexhaustible fertility, in average years producing, without irrigation, a luxuriant growth of grass and grain of all sorts.

The few areas where accumulations of alkali have been found are too small to be seriously considered. A system of drainage ditches has been started and will be extended as the country develops and the need arises.

Prevailing Winds.

The prevailing winds of the region are from the west and northwest. They are constant enough to make the use of wind-mills practicable, but are never of a serious character. The district is outside the path of cyclones and tornadoes, and consequently these storms are unknown. During the winter the cold is greatly mitigated by the warm chinook winds from the west.

Distributing System.

The main canals and main laterals are built by the government to a point from which water can be conveniently delivered to the farm units. The government engineers lay out the scheme of distribution and stake out on the ground the location of sub-laterals, which must be built in accordance with these plans approved by the engineers. The farmers must keep these sublaterals in good condition so that the water is not wasted.

Methods of Irrigation.

The flood method of irrigation is most commonly used. The land is leveled, a head ditch brought along the high side of the field and field laterals plowed down the slope at from 60 to 150 feet apart. The water is then run down the field laterals and checked up and flooded over the lands.

Other methods of applying water are also used—such as the furrow method, by which water is run down furrows beside the plants.

Date of Opening to Settlement.

The lands of the Lower Yellowstone project were declared open to settlement by public notice, December 21, 1908. On November 9, 1908, the Secretary of the Interior issued a second notice cutting the holdings of a few of the settlers from 160 to 80 acres. There are, consequently, a few desirable 80-acre tracts now open to homestead entry. In addition to the public lands which may

be had by homesteading, numerous tracts of various sizes are for sale by persons owning more than the 160 acres to which water rights can be secured. These lands, together with the railroad lands on the market, form an extensive area for the development of which settlers are needed.

THE NEW ORE TESTING PLANT.

What the mining newspapers of the State think of the Colorado School of Mines' Ore Testing Plant and its plans for the future. Compiled from editorials in three Colorado newspapers of recent date:

It is perhaps not generally known that there has already been built at the State School of Mines at Golden buildings designed for the installation of an experimental ore treating plant available to the entire State for the experimental testing of lots of ore, to enable the claim owner to discover the values carried in his product and to determine by exact test the methods of treatment best adapted to the reduction of the ore and the saving of values carried. These completed buildings are now standing idle, a sheer waste of the money invested, by reason of a want of machinery for equipment.

A bill is now before the Legislature providing for an appropriation of \$100,000 for the installation of machinery and the equipment of the plant for prompt and continuous operation, and not in many years has a measure of equal importance to the mining sections been before the people. It is therefore imperative that the press of the State, particularly of the mining counties, interest themselves actively to the end that their representatives may exert themselves to secure the enactment of this bill into a law. The proposed plan of this movement is broad and comprehensive, and its achievement means very materially increased prosperity for the State.

It is doubtful if any projected aid to mining development, ever suggested, is fraught with possibilities quite equal to this proposed plan. Once in operation it will give a tremendous impetus to mining. In the first place the modern plant with all its up-to-date equipment and the highest standard of geological, mineralogical skill and learning will be available for testing and experiment to any miner in the State, enabling him to make an absolutely accurate test of the values in his ore, and to determine by thorough practical experiment, the method of treatment adapted to the reduction of his product. If the mine owner so wishes he may ship a lot of his ore to Golden, and his own expert millmen and metallurgists may conduct the experiments in the State plant. The benefits possible to the progress and prosperity of the entire State, are beyond computation.

The institution, too, will be equally valuable as an addition and adjunct to the established course of the School of Mines. With these buildings equipped and in operation, the school itself will carry on important investigations into the steadily advancing problems of ore treatment, which as demonstrated and established, will be available to the mining fraternity of the entire world.

With proper interest and activity on the part of the constituencies of the mining districts, it will be an easy matter to complete this legislation and to have this important enterprise in early commission.—Telluride Journal.

The putting into operation of this plant, for which the buildings have already been erected, will be one of the most notable developments in Colorado mining circles in years, and in view of present-day conditions of mining, the equipment and operation of such a plant is absolutely imperative.

Briefly stated, the operation of this plant will mean that Colorado mining interests, through the aid of this feature of the School of Mines, will be able to have ore dressed, refined and the method of successfully treating each particular class of ore established at a comparative small cost and in a most thorough manner.

It will mean the annual saving of thousands and thousands of dollars now wasted in fruitless experimentation.

With this plant properly equipped and in operation, the Ouray County mining men or the mining man from any other county can find out just what method of dressing and treating his ore will require, without building an expensive mill only to find out that he has put in the wrong milling system for his class of ore.

In the early days of Colorado mining such a plant was not so badly needed. There was so much high-grade ore that the extracting of values was comparatively easy.

It is different now. Low grade ore predominates and not only is the ore low grade but complex in character and refractory.

In our own county and every other mining county there are millions of tons of low-grade ores, of varying classes, requiring varying processes and methods of dressing and treating.

Therefore, serious problems in metallurgy confront every mining district.

In attempting to solve these problems, to ascertain what process of ore treating is needed, in past years, since attention has been turned to low-grade ores, fortunes have been spent by mining men in every county in experimenting.

As grim and convincing proofs of these costly experiments, abandoned and costly mills are to be seen on many hillsides in this county and in many other counties. The

Plaindealer could name a dozen such mills in this county. Expensive attempts to solve the difficult metallurgical problems.

And now the opportunity is before the State to prevent any further extensive waste of money and time in these experiments.

By the passage of this measure now before the Legislature, a long step will be taken. The School of Mines will be placed into position to tell the mining man what process his particular ore requires, without his going to work and building a mill only to find, in many cases, that the milling process he has installed is not the right process for his ore.

Wouldn't this be a great improvement and saving over the present method of building mills on an uncertainty?

The practical training of students in all of the various methods of ore treating and a great many other advantages will characterize the operation of this plant.

The passage of this measure will go a long way toward solving the low-grade ore problem, perhaps the biggest problem confronting Colorado's prosperity. The benefit will be unlimited and lasting.

This measure providing for the equipment of this plant and for the important investigation of the Mexican mining practices and for the two new buildings, certainly should pass each house easily.

The appropriations asked for are exceedingly modest in view of the vast importance of the work contemplated. It is practically all that the mining industry is asking for from this Legislature.

The Plaindealer hopes that the Representatives and Senators from every county will carefully consider the measure and give it their approval.—Ouray Plaindealer.

Every mining district in the State is interested in this plant, which bears the same relation to the mining industry that the experimental farms and stations do to the agricultural industry.

The hills in every mining region in the State are dotted with abandoned and dismantled plants—monuments to the unsuccessful attempts of the operator to solve a difficult metallurgical problem by costly and fruitless experimentation.

This is sheer economic waste, and it is the duty of the State to remedy it, just as it undertakes to prevent economic waste in farming.

The experimental plant at the Golden School of Mines will give a tremendous impetus to mining. Its plans and purposes are broad-gauged and extensive.

In the first place the students will receive practical training in all the various methods of ore treatment. This is the instructional feature.

Students completing their courses will have an opportunity of doing original work in the preparations of theses for graduation.

The school itself will conduct original investigation into the important problems of ore treatment, the results of which will be available to the mining fraternity.

Mine operators desiring to have their ore tested for the purpose of ascertaining the best method of treatment can ship carload lots to the Golden plant. The operator in this case pays for the actual cost of the work.

If mine operators desire tests made under the direction of their own experts the plant will be available for this purpose, a milling charge being made to cover actual expense.

This is the broad scope of the proposed plant, and the great benefits that it will confer on the whole mining industry should enlist the hearty support of every Representative and Senator from the mining regions. In fact there is every reason why it should appeal to the representatives from all sections who are interested in the prosperity of the State.

We know what such an institution will mean to Leadville. We know of the millions of tons of ore lying in these hills simply because there are no adequate methods for handling the material to a profit. Isn't it time that the State stepped in and gave the industry just the life it needs at a critical time in its history? Colorado can well afford to be generous to the Golden School of Mines. It has made good, and it will continue to make good if it is given the necessary financial assistance.—Leadville Herald-Democrat.

SHORT METHOD FOR THE DETERMINATION OF TITANIUM.

Barneby and Isham suggest a new method for the determination of titanium, which has the merit of brevity combined with accuracy.

The method is based on the volatilization of silica by hydrofluoric acid, evaporation to dryness, fusion of the residue with sodium carbonate and a little sodium nitrate, which converts the iron and titanium to insoluble ferric oxide and sodium titanate, extraction of the soluble compounds with hot water, solution of the insoluble residue in hydrochloric acid, extraction of the ferric chloride with ether, reduction of slight traces of iron with sulphur dioxide, and the precipitation of the titanate by boiling in acetic acid solution followed by filtration and ignition of the titanium oxide or its volumetric determination (if the directions are strictly followed the sulphur-dioxide reduction may usually be omitted as the iron will have been completely removed).

Detailed Description of Method.

Place the weighed sample in a platinum crucible, moisten with water and add five to ten drops concentrated sulphuric acid and 1 c. c. hydrofluoric acid. Then heat on an

asbestos plate until sulphur-trioxide fumes are given off. Add five to ten grams of sodium carbonate and a little sodium nitrate and fuse at least thirty minutes. Heat with hot water in a beaker until the melt is disintegrated; filter and wash.

Perforate the filter and wash the residue into a clean beaker with hydrochloric acid of sp. gr. 1.11. Wash out any adhering particles from the crucible with hot hydrochloric acid of the same specific gravity, adding these washings to those already in the beaker, and heat on a hot plate until the solution is complete and the volume reduced to about 20 c. c. To the solution add 2 c. c. of concentrated hydrochloric acid and transfer it to a separatory funnel, rinsing out the beaker with hydrochloric acid of sp. gr. 1.11.

Separation of Iron from Titanium.

Add an equal volume of ether which has been previously shaken with concentrated hydrochloric acid, insert a rubber stopper in the top, invert the funnel, open the stopcock and thoroughly shake. Close the stopcock, place the funnel in an upright position and allow to stand at least ten minutes. Draw off the aqueous layer into another separatory funnel; rinse the ether twice by shaking well with 5 to 10 c. c. portions of hydrochloric acid (sp. gr. 1.11) and add the washings to the aqueous solution. The ether is run off into an ether residue bottle and saved for purification. The treatment with ether is repeated two or three times until the ether no longer shows the greenish tinge of dissolved iron. Transfer the aqueous solution to a beaker, and add 3 to 5 c. c. of hydrogen peroxide.

If an intense color develops, heat the solution to expel any dissolved ether, add 10 c. c. of concentrated sulphuric acid and evaporate to sulphur-trioxide fumes. Dilute the cool solution to about 100 c. c. (if platinum is present precipitate at this point with hydrogen sulphide) and neutralize the solution with ammonia. Add 1 to 2 grams of ammonium bisulphide and warm the solution on the hot plate for half an hour. Add 10 to 15 grams of ammonium acetate and 5 to 10 c. c. of glacial acetic acid and boil the solution for ten minutes. Filter. The precipitated titanate is then washed with dilute acetic acid, ignited and weighed as titanium oxide.

Volumetric Method of Titanium in Small Amount.

In case the hydrogen peroxide tests indicate the presence of only a small amount of titanium, determine colorimetrically. Heat the solution to expel dissolved ether, cool, transfer to a Nessler's tube, treat with 4 to 5 c. c. of hydrogen peroxide, dilute to 100 c. c. and determine by comparison with measured quantities of a standard solution of titanate in hydrochloric acid which should have been subjected to the same peroxide treatment.—Eng. & Min. Journal.

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How many of the graduates realize what a power the alumni of the school has become? What we can accomplish if we will get together, work together, and stick together through thick and thin? Few of the older graduates realize the wonderful advance the school has made in recent years, both in material progress and in the estimation of the general public. Do you know that the standing of the Colorado School of Mines is so high that students of the school who have not been able to stand the pace set, who have fallen by the wayside in their attempt to keep up, are usually ranked higher than the graduates of nine out of ten of the colleges and universities of the country?

The standing of any school depends entirely upon the standing of its graduates, and their standing depends upon the high standard the school maintains. The standard of the Colorado School of Mines is high, and has always been high. There is no school in the country that maintains a higher standard and few, if any, that equal it.

These remarks are not made with the idea of bragging. They are simply the statement of well-known facts. You do not have to take our authority for it at all; just read the editorials from the Denver Republican and the Rocky Mountain News, reprinted elsewhere in this issue, and keep your eyes and ears open. You will see and

hear evidences of it everywhere and from all sorts of unexpected sources.

From the criticism of some of the younger graduates and from evidences we have observed recently ourselves, we are afraid that we older graduates, as a class, have been taking most of the credit for the high standing of the school unto ourselves. All that should be necessary for complete recovery from that conceit would be to carefully look over the list of graduates as given in the recent school catalog and notice the positions held by the more recent graduates.

With the high standing we have as alumni of the Colorado School of Mines and with our rapidly increasing numbers, we can accomplish nearly anything we would care to undertake if everyone would join in and stand by the school and by the alumni through fair weather and through storm.

A large part of the standing we may have as individuals is due to the school, to the training and education we received there, and we should each and everyone of us stand up for the honor and reputation of the school and its graduates, even fight for it if necessary, just as thoroughly as we would stand up for and fight for the honor and reputation of members of our own personal families. You are a part of the school, and if you "throw mud" at the school or at any part of it, or criticize its conduct or its members among outsiders, you are only besmirching yourself or condemning yourself. If your young son, John, showed a tendency toward untruthfulness you might realize it fully yourself, but you would not tell all your friends and neighbors about it, would you? You would even strongly resent it if they came to you and insisted upon calling him a liar, now would you not?

We are, more or less, all one family, whether we like it or not, and we can easily correct or expel any member or members that may be misbehaving, without asking for help from the neighbors. If you do not like the way the school is being conducted, do not complain about it to outsiders. When talking about the school to outsiders, do not even admit that there could possibly be anything wrong with the school or its conduct. Take up your grievance, or fancied grievance, with other members of the alumni and find out first whether there IS anything wrong. We think that in most cases you will find nothing but a bit of "sore-headedness" at the bottom of the complaint. If that is the case, sit down on the knocker good and hard and advise him very strongly to keep his complaints to himself in the future.

If there is good grounds for the complaint, discuss it thoroughly with other members, and with the entire alumni. When we have fully determined just where and what the trouble is we can easily correct it, if we will stick together and fight. It will not

make a particle of difference what the trouble is or who is causing the trouble. In most cases we will not have to even think of fighting. If we fully decide what is wrong and what changes are needed and will stand by that decision as a unit the changes will be made gladly.

Early graduates have blazed the trail to success, and traveled it with burros and packs. Later graduates have widened the trail into a road good enough for mule teams and ore wagons. Now, if every graduate will join in and help, we can make the Alumni Association, with its magazine and capability exchange, a steam roller of sufficient weight and strength to so smooth the wagon road that we may use the modern motor car and travel the road in comfort. Later we may abandon the steam roller and the motor car and use an aeroplane, leaving the old road altogether and taking a short cut over the mountains. However we had better postpone that trip until some one invents a safety pin to hold our aeroplane up in the air when we want to get out and fix the propeller.

Two or three have said that were not interested in the Magazine, and several others have said they were not interested in the Alumni Association. They will find out, whenever we can get a minute to spare, that we have not lost interest in them even if they have lost interest in themselves, and that we are willing to spend the price of a year's subscription, or a year's dues, in postage, in the endeavor to arouse them sufficiently so that they will take a little interest in themselves. On the whole, however, we are pleased to see many signs of awakening interest and, while we still have a hard time to make both ends meet and to get sufficient material together in time for the Magazine each month, we know that conditions are improving.

THE SCHOOL OF MINES.

According to the latest issue of its quarterly publication, the State School of Mines at Golden has at present enrolled: Twenty-two post-graduates, 36 Seniors, 76 Juniors, 92 Sophomores, 105 Freshmen; a total of 331 students in attendance. These have come from higher schools all over the country and a number of special students are entered from China. The list speaks well for the international character of the institution, and helps the people of the state to see that in supporting a training school for young men who have a specific work to perform in the world, they are discharging a duty wide in its scope and of the highest importance to the mining industry the world around.

Something of the efficacy of the school curriculum is to be gathered from the study of the alumni list. This shows that practically every graduate of the Golden school

is at present actively connected in some way with the business of mining. The men fitted by its course of study have scattered to the points of the compass, and wherever mining is done, there the graduates of the Colorado institution are to be found in positions of trust and large responsibility, applying in a practical way the knowledge gained at the school and utilizing it to solve mining problems.

A splendid type of young man is this graduate of the Colorado school; you meet him in mines and mills wherever you go, and once the hallmark is identified, thereafter you will recognize him. He goes to his task with clear eyes, head up, a man unafraid. The hard drill that the course of study demands has served to stamp him with a courage and a confidence in himself which you are quick to recognize. Enter a mine or a mill where some proud step has been made in advance of established ideas; you are greeted by the man held responsible, finding him a clear-eyed young chap in overalls; a half a dozen sentences usually suffice to prompt you to enquire: "School of Mines?" and nine times out of ten you have guessed aright.

Other schools may cost more, may polish and roundout more members of society and spill them into what lines of work they will, but this school shoots steadily at one target, sending its graduates out to do a specific thing. You seldom have in this case to ask: "What did he do after he left school?" All you need to inquire is, "Where did he go?" Was it to this home camp or that, to Europe, to South America, to Africa, to China, to Australia, he has carried his message to some corner of the globe, his message of closer economy in harvesting the metal store, and is there today, on the job and making good.

Good boys; they have to be; the school will not put the hallmark on any other kind!
—Denver Republican, Jan. 24, 1911.

The last number of the quarterly journal of the Colorado School of Mines is full of interesting information. Part of it is information for the prospective student, and part for the general public. To the second class belongs the list of students, and the catalogue of graduates.

At the present moment, the School of Mines has 331 students, of whom twenty-two are taking post-graduate courses. These students come from thirty-seven states, from the Philippine Islands and from eight foreign countries. The list of states is too long, to give here, but the foreign countries include England, Ireland, Mexico, Canada, Honduras, Chili, Korea and China. China, indeed, has quite a delegation—ten students in all.

The graduates of the school are scattered from Russia to Australia, from the Federated

Malay states to South Africa. They are particularly thick in Mexico.

The mere list of the lands from which the school draws its students and to which it sends its graduates is proof of the high class of work the school is doing. There are plenty of other proofs if there were room to record them. The State School of Mines is one of the glories and one of the big assets of Colorado.

—Rocky Mountain News, Jan. 27, '11.

NICHOLSONITE.

Considerable interest has been aroused by the announcement that Professor Butler had discovered a new Leadville mineral and named it after the man who gave it to him and who has shown great interest in the work of the school—Mr. S. D. Nicholson.

The papers, with their usual disregard for facts, announced that it was of great value and interest to all connected with the mining industry. As a matter of fact, Professor Butler says, the substance appears to be very rare and is, under present methods of treatment, of absolutely no economic value, altho of much scientific interest.

Nicholsonite is a zinc aragonite, or a zinc calcium carbonate, running about 10% zinc. It resembles aragonite quite closely, but differs somewhat in lustre, specific gravity, the presence of good prismatic cleavage, and in the angle of the unit prism. It occurs in radiating, fan-like groups of prismatic white crystals, imbedded in the manganese-iron ore common in Leadville, and was found near the Adams shaft in the blue limestone horizon.

LEADVILLE WON'T STAY DOWN.

Change greets the years in a mining camp,
The boom days pass away
With the dare-devil reckless gambling times,
That never come to stay,
But beneath the froth of the waves of chance
A solid foundation grows,
And grit and energy combine a future to disclose.

This was branded as a "surface camp"
Some thirty years ago—
Just sedimentaries here and there,
Or a "blanket" overflow—
Yet thousands of tons from the sulphide stopes
Our yearly output swell,
And we've fissure veins with granite ribs,
That reach clear down to—well!—

It is "in-and-out" in a mining camp,
Between Fortune's smile and frown—
It is "chicken one day and feathers the next!"—
But Leadville won't stay down.
For the rock-bound lexicon of the hills
Has been studied with ceaseless toil
And faith and industry have solved
The secrets of the soil.

When silver was crucified by greed
And the miner's lot looked blue,
He turned his search to the favored gold
And showed what he could do.

The silver queen who had blessed mankind
Changed the metal in her crown,
And proved to the world we had the gold,
And they couldn't keep Leadville down.

When the panic of nineteen hundred and seven
Struck the toilers in the hills,
And the metals slumped to the famine notch,
Multiplying our many ills,
These men of brains, and sand, and strength,
Still clung to the old town,
For they knew by the past that it could not
last,
And Leadville wouldn't stay down.

As the silver era of 'seventy-nine
Changed to gold in 'ninety-three,
So the age of zinc in nineteen-ten
Has made the hard times flee,
And so it has been, and so it will be,
As the decades come and go,
For the greatest mineral belt on earth
Is here, as the miners know.

Silver, lead, bismuth, zinc, iron, gold,
With copper and manganese—
How can a camp for long be dull
That produces all of these?
Now zinc is the theme of our mining men,
And once more they've gained renown,
While press and people sing their praise;
For Leadville won't stay down.

Old mines that were long since thought worked
out
Are starting in to sink,
And it seems as though the entire belt
Was underlaid with zinc.
We have found prosperity once more—
Have taken it from the shelf—
Here's the dual song of the new-found ore;
Let each sing it for itself:

Silicate of Zinc.

I glittered and gleamed in winze and shaft,
I sparkled and shone in level and drift;
The learned exponents of mineral-craft
Passed me by like the diggers on the
shift,
My value unknown, until one day
A common miner who chanced to think
Took a small sample of me away
And had the assayer test for zinc.
Now prospectors seek me through all the earth,
They rend rocks where my crystals shine,
They know my character and worth,
And Science has christened me "CALA-
MINE."

Carbonate of Zinc.

For years I lay in my earth-bound bed,
Heavy and sullen, dark and red,
Or went into the waste and over the dump,
Making the trammers and shovelers hump.
They cursed my weight, and the assayers swore
When I was mistaken for valuable ore.
So it was—but now, with keen delight,
They delve in the breasts of "SMITHSONITE."

So the old camp, after many years,
Has taken another tack,
And proved, in spite of pessimists' sneers,
The district can "come back,"
Which is only another way to say
(In one bumper all sorrow drown—
We will drink to zinc and a glorious fact)
Old Leadville won't stay down.
F. E. VAUGHN.

Cupid is a sorry leader; after leading people into trouble he leaves them to fight it out themselves.

Ambition, enterprise, effort and success are largely states of mind; happiness is the united states.

Athletic News.

MINERS' SCRUB FIVE WINS.

Defeats Thunderbolts in Fast Game, 40 to 17

Golden, Colo., Feb. 2.—The Mines second team defeated the Manual Training High School team in a fast game tonight, 40 to 17. Harper and Bregman starred for the Miners with 12 points each. Reid was high man for Manual with three baskets and a foul. The Mine 'varsity line-up against Denver University tomorrow night in Denver.

The line-up:

MINES.	MANUAL.
Place	Forward.....
Bregman	Hoskinson
Galligan	Forward.....
Happer	Reid
Minister	Center.....
Guard.....	Judelowitz
DeWitt	Walter
Referee—Lannon.	Guard.....
Umpire—Paulcheck.	DeWitt
Referee—Lannon.	

—Rocky Mountain News.

MINERS BEAT MINISTERS AT BASKETBALL, 51 TO 25.

Feb. 4.—In a very one-sided but nevertheless interesting game the School of Mines basketball team walloped the Denver University five last night to the tune of 51 to 25—or, to be more exact, they defeated Captain Wallace by the score of 51 to 22, as that man made all but three of the losers' points. Had it not been for his goal shooting D. U. would have been nearly shut out.

The Miners had wonderful team work, especially considering the fact that they were playing on a strange floor and one that is much smaller than their own. There were times when the Ore Diggers were passing the ball around so quickly that the Denver men did not even know where it was and stood around looking for it. The local men fought their best and never once quit. Their great fault was lack of team work and endeavoring to shoot the baskets from too great a distance. The champions were willing to pass the ball around until they were right under the basket before taking a shot. Little "Johnny" Davis, the smallest man on the floor, was the bright star of the game. His goal throwing was nothing short of marvelous. Twice he threw baskets from the middle of the floor. The rest of the team were not far behind him. Captain Kissock, at center, although a head shorter than his opponent, always got the jump on his man. He was always very accurate at throwing goals from fouls. On the defense, Rockward, Litchfield and Tollman were like a stone wall when Denver got anywhere near the basket. The lineup:

MINES. DENVER.

J. Davis	Forward..	(capt.)	Wallace
Tollman	Forward.....		Wells
Kissock, (capt.)	Center.....		Davis
Litchfield	Guard.....		Brubaker
Rockwood	Guard.....		Bailey

Referee—Lannon. Umpire—Tracy. Field Goals—Davis 9, Tollman 5, Kissock 1, Litchfield 5, Rockwood 3, Brubaker 1, Wallace 9. Goals from Goal—Kissock 5, Wallace 4, Wells 1.—Denver Post.

CHEYENNE QUINTET WINS FROM SCHOOL OF MINES.

Woolf No Match for Lamm and Wyoming

Team Goes Ahead from the First
Cheyenne, Wyo., Feb. 10.—Superior team work on the part of the C. A. C. enabled the Cheyenne team to defeat the Colorado School of Mines team, by a score of 44 to 21, in the fastest game of basketball that has been staged in Cheyenne this season. The locals were called upon in the first half to use everything in their repertoire and toward the last of this session secured the advantage, the half ending 20 to 9 in favor of Cheyenne. Mines' crack Left Guard Woolf was no match for Lamm of Cheyenne. —Rocky Mountain News.

STATE DEFEATS MINES.

Boulder, Colo., Feb. 17.—By playing superior basketball in every department of the game the University of Colorado five ran away from the State School of Mines here tonight and won by a score of 40 to 23.

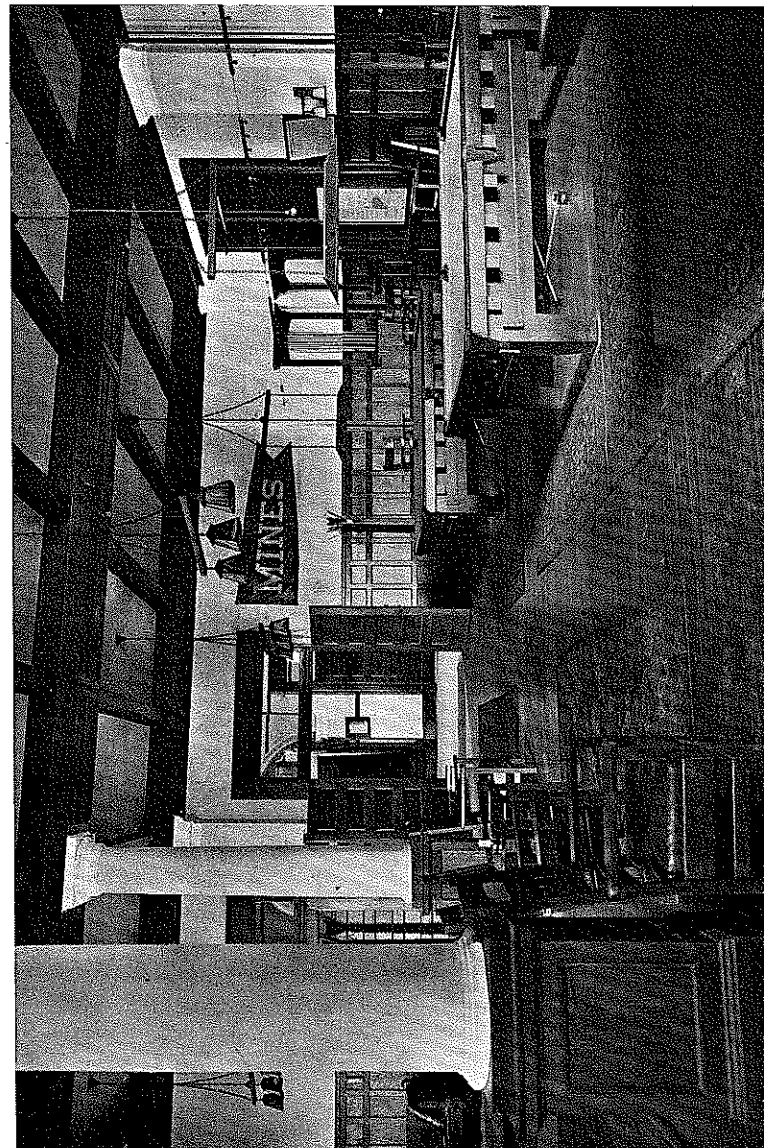
The contest was one of the fastest ever seen in Boulder, but the team work of the 'varsity was too much of a handicap for the Golden team and Colorado held the lead from the start.

Record-Breaking Crowd.

The crowd which attended the game was the biggest which has ever been in the university's gymnasium and the rafters had to do service in the seating line to accommodate the spectators. The lineup:

COLORADO.	MINES.
MacFadden	Forward.....
Cresto	Forward.....
Taylor	Center.....
Accola	Guard.....
Andrus	Guard.....
	Place,
	Litchfield.

Baskets: MacFadden, 3; Cresto, 6; Taylor, 5; Andrus, 1; Kissock, 2; Davis, 1; Rockwood, 1; Tolman, 2; Place, 1.



Another View of The Integral Club.
Come up and make yourself at home.

Fouls: Cresto, 10; Kissock, 6; Davis, 3.
Score at end of first half: Colorado, 14;
Mines, 11; end of game: Colorado, 40;
Mines, 23.

Officials: Referee, Roy Willetts, Mines;
umpire, Harry Aurand, Colorado.—Rocky
Mountain News.

D. U. IS DEFEATED BY MINERS' FIVE; SCORE 37 TO 19.

Ministers Outclassed in Team Work in Fast Game Played at Golden.

Golden, Colo., Feb. 23.—The Miners defeated Denver University tonight in the last basketball game scheduled in Golden, by a score of 37 to 19. The game was set ahead a day on account of the Junior smoker at the Mines tomorrow night.

Denver was outclassed in team work and never had a chance to win, although the team showed better form than in previous games with the Miners. The honors for scoring went to Tollman who made eighteen of the Miners' points. Wallace was high man for Denver with three baskets and three free throws.

The first half was slow and ended with a score of 12 to 6 against D. U. The only feature of this session was the playing of Davis of the Mines. The Miners increased their lead in the second half by faster playing and consistent team work, and rolled up twenty-five points. Denver's points were made on long shots by Ramsey and Wallace.

The only game remaining to be played by the Miners is with the Aggies next week at Fort Collins. The lineup:

MINES.		D. U.	
Davis	.....Forward.....	Wallace	
Tollman	.....Forward.....	Ramsey	
Kissock	.....Center.....	Davis	
Thomas	.....Guard.....	Bailey	
Litchfield	.....Guard.....	Templin	

Baskets: Kissock, 4; Tollman, 9; J. Davis, 3; Litchfield, 1; Wallace, 3; Ramsey, 3; Bailey, 1; Davis, 1.

Free throws: Kissock, 3; Wallace, 3.
Referee, Fairfield; umpire, Lannon.—
Rocky Mountain News.

MINES AND TIGERS AT SWORDS' POINTS.

(By Edward C. Day.)

The old trouble between the Colorado Springs and Golden institutions has broken out again, and from the Miners' camp comes the word that as long as Herb Sinton, star athlete, is a member of the Tiger teams the mining institution will refuse to have athletic relations with Colorado College.

The ultimatum is of immediate importance, as not only does it affect the football

situation, but the baseball and track as well. Schedules arranged by the two schools call for their opposing each other in each of these lines of athletic endeavor. No contracts for games have been signed, however, and none will be, according to the Goldenites.

Sinton Fight Old One.

The fight on Sinton was first taken up last fall. The School of Mines authorities protested him previous to the Colorado College-Mines football game and the matter was carried into the conference. This body voted three to two to exclude Sinton, but one dissenting voice was all that was needed, under the rules, to prevent his being ousted. At the same time Leadbetter of the Ore Diggers was protested and the members of his own faculty barred him from further participation in football.

Sinton was accused of having accepted pay as instructor in the Salt Lake City Y. M. C. A. According to the Golden management, he admitted this, but held that the grounds were insufficient to disqualify him as an amateur. Capt. Will C. Bryan, athletic director at the School of Mines, wrote to James E. Sullivan, secretary of the A. A. U., for a ruling, and he replied that anyone who accepts pay for acting as instructor in athletics is a professional.

Protect Own Students.

In view of this ruling, the Mines' management holds it would be unfair to the members of their athletic aggregations to allow them to compete against Sinton. It would result in disqualifying them as amateurs and prevent their competing in amateur events in the future, they say.

Just what stand Colorado College will take in the matter is still a matter of conjecture. Sinton is one of their most dependable grid-iron men and has been elected captain of this year's football team. Of more immediate importance is the fact that he is a leading member of the track team and is depended upon in the footracing events. He also is a star baseball player, filling the position of first base on the university nine.—
Denver Times.

Cough Medicine.

I had a little husband—
I never knew a worse;
For better than his wife or life
He loved his little purse.

I did my best to wheedle him,
He saw my deep intent;
And though he had a chronic cough,
He never coughed a cent.

So I sought a little lawyer—
My husband's own close crony—
And divvied with the man of law
My lawful alimony.

College Notes.

Mine Rescue Car No. 2, U. S. Bureau of Mines, was in Golden for several days in the early part of February. J. C. Roberts, formerly a professor in the school, is in charge of the car. His assistant is Thomas Tweedale, a former student. They gave practical instruction to the students on first aid to the injured and in the use of the oxygen helmets. Parties of students, with the helmets on, made trips up to Castle Rock and to the School Mine and thus became familiar with the helmets from actual use.

The car will be back in Golden again in the near future, and the professors and students who missed the previous instruction will have a chance to become familiar with first aid to the injured and rescue work.

George J. Bancroft, of Denver, read a paper before the Scientific Society some weeks ago. The paper will be published in the magazine later.

Monday, February 13th, most of the students decided they needed a holiday and "cut" their classes. The seniors started it, but later, realizing how much they needed all the available time to complete their courses, most of them appeared at their classes.

Some rough play was indulged in, several students who remained at work being rather roughly "wrinkled." The "cutting" will bring its own punishment for some at the end of the year, when they find they haven't time to properly finish their work.

The rough play bordered closely on hazing and as such would make those who indulged in it liable to expulsion. As a matter of fact, there is a State law that says that students guilty of hazing must be expelled.

Y. M. C. A. NOTES.

Religious Meetings.

Four meetings have been held since the last issue of this Magazine and the average attendance has been over twenty men. At the last meeting in January, we had Mr. John W. Nipps, Washburn, '10, the State student secretary of Colorado, as the speaker, and he gave a fine talk on the subject of "Opportunity." Following this meeting Professor Allison spoke upon the topic, "Duty," showing how the idea of duty produced many acts of bravery in many different situations, and on the part of men of whom little was expected. Illustrations were given by citing the examples of men and their actions in situations in the campaign in the Philippines, where the speaker spent considerable time.

The evening of February 14 was given to one of former presidents, Carl E. Leshner, '08, who told of his experiences since graduation and gave much good advice to the undergraduates. Mr. Leshner was strong in his praise of the City Y. M. C. A.s throughout the country, and told of several instances in which they had helped him to get acquainted with the finest men in the city in which he was staying, in addition to furnishing him a real home in a strange community. His talk was greatly enjoyed by a large group of men.

J. B. Watson, general secretary, spoke on "Decision" at the meeting of February 21, emphasizing the value of decision in the formation of character.

During the coming months the Religious Work Committee plans to alternate the leadership of the weekly meetings by having a student leader, a Faculty member, and an out-of-town speaker address the men every third week. It is hoped that this plan will meet with the approval of all the members of the Christian Association.

THE STATE CONVENTION.

It can be said without any exaggeration that the recent convention at Fort Collins was the best Colorado has had. There have been larger gatherings in the past, and some in which there has been more opportunity for recreation, but there has never been a convention in which the leadership has surpassed that of the Fort Collins convention, nor one in which the spiritual tone has been higher. Beginning Thursday night with an address by Dr. Merle N. Smith, of Colorado Springs, and ending Sabbath night with a Missionary appeal by "Dad" Elliott, and Y. F. Chen of "Mines," followed by the Farewell service in charge of Mr. A. G. Knebel, of the International Committee, the convention was of intense interest throughout.

The banquet tendered by the people of the city of Fort Collins on Saturday night was very pleasant, especially for the College fellows. The representatives from the different schools sat by delegations and there was a continual round of yells during the banquet, each school yelling for all the others, and then yelling for their favorite speakers, singing parodies of popular songs in which the virtues of their own school were extolled, or the weakness of a rival school was exposed, all of which was good-natured and added to the pleasure of the evening.

Denver University had the largest delegation, thirty-nine men, including their male quartet; Colorado College sent nineteen men, and we were represented by ten men,

as follows: R. V. Thurston, J. I. Glendinning, C. L. French, E. F. Baker, D. H. Orr, Jewhan Chung, T. T. Kao, Y. K. Kwong, Y. F. Chen and J. B. Watson.

The convention will meet at Pueblo, Colorado, next year, and be present at the dedication of the new Y. M. C. A. building in that city.

THE MILLER CONCERT COMPANY.

Everyone who attended the concert given by the Gertrude Miller Company on the evening of February 3, was delighted by the character of the music, and the high-class of readings selected by Miss Miller. She was easily the leader of the company, even though the other members were very strong in their respective lines.

Mr. Ralf Hammer, tenor, made a strong impression upon the audience by his interpretation of both popular and operatic music; Mr. Konecny, the violinist, was a real master of that most difficult instrument, and Mr. Whip, the pianist, was an artist of marked ability.

The Alumni.

ALUMNI MEETING.

There was a meeting of the executive committee in President Titsworth's office on Wednesday, Feb. 22, at 4:30 p. m. to canvass the vote for the Alumnus member of the Board of Trustees.

The members present were: F. S. Titsworth, president; A. R. Hodgson, secretary; F. C. Steinhauer, treasurer; T. P. Ellis; J. W. Johnson; and Orville Harrington, assistant secretary.

The vote was canvassed and a resolution adopted which gave the result in detail and empowered the president to select two members of the Alumni to form, with the president, a committee of three to submit the name of the successful candidate to the Governor and to urge his appointment. At the meeting it was decided, for various reasons, to keep the result of the balloting secret until after the appointment was made, but, as the result got out a day or so later and was published in a Denver paper, it was then decided to announce the result in the Magazine.

Frederick C. Steinhauer received the highest number of votes and was declared the first choice of the Alumni for the Alumnus member of the Board of Trustees. Thos. B. Crowe was the second choice and Edmond C. van Diest, the third choice.

The committee to wait on the Governor and urge the appointment of Mr. Steinhauer,

IN LATER DAYS.

An old "grad," who happened to see a crowd of new students disporting themselves in a manner which appeared to him to be quite unseemly, was heard to philosophize as follows:

When I see a youth with his pants turned up and his beautiful socks on view,
And over one eye perched a little round hat,
with a ribbon of mauve or blue,
And fourteen rings and seven pins that he got at his dear prep school,
Why, it strikes a cord, and I say, "Oh, Lord!
Was I ever that big a fool?"

When I see a youth with his gloves turned down, and a cigaret stuck in his face,
And a luck check coat and a horse cloth vest and a half-inch wide shoe lace,
And a bunch of hair that hides his ears, and a line of senseless drool,
Then I paw the sward as I say, "Oh, Lord!
Was I ever that big a fool?"

"Do you live within your income?"
"Yes, and I'm crowded for space."—Yale Record.

consists of F. S. Titsworth, chairman; E. C. van Diest; and Thos. B. Crowe.

Several other matters of importance then came before the executive committee for discussion. The question of holding a reunion of the Alumni in Golden on or just before Commencement day was discussed at the annual meeting last May, but was left undecided at that time. As a result of a conference between President Alderson of the school and President Titsworth of the Alumni Association, the following suggestions are made: that the morning of Commencement Day be set aside for the graduates to visit the school, meet the undergraduates, perhaps have a baseball game between the graduates and the undergraduates, and other appropriate stunts; have luncheon, attend the commencement exercises and the reception in the afternoon. The Junior Prom. occurs Commencement evening.

The question of the possible rearrangement of the schedule during the football season so that the school work could close at 4 p. m. in order to allow a reasonable time for football practice, was discussed and will come up later.

Further suggestions along either of these lines and a thorough discussion of these questions will be welcomed.

The suggestion was made that the assistant secretary be made the assistant treasurer also, in order to simplify the keeping of

the accounts and to eliminate many of the chances for errors. This matter will be brought before the association at the annual meeting.

The meeting then adjourned.

ALUMNI BANQUET.

The second annual mid-winter banquet of the Alumni Association was held at the University Club, Denver, Saturday evening, February 25. Everyone present had a very enjoyable time.

The dining room was decorated with the School of Mines Intercollegiate Championship pennants. The tables were tastefully adorned with smilax and vases of white carnations.

The menu was good and satisfying, thoroughly mixed up with all the songs we knew, cigarettes and cigars, and liquids of various colors and tastes. A trio of dardies, with mandolins, furnished music, though, whenever they started on any of the college songs the singing very quickly drowned the mandolin music.

Following the coffee, the toastmaster, F. S. Titsworth, and the three guests Victor C. Alderson, Chas. A. Dudley, and B. L. Jefferson, held forth for awhile and, in spite of interruptions, witty and otherwise, managed to get through with their speeches and tell a few stories.

These addresses were followed by songs and short talks or stories (some old and some comparatively new) from nearly every member present. The keynote of the whole banquet was loyalty to the school, get together, work together, stop all "knocking" or criticism outside, and stand up for the school and its graduates everywhere and at all times. Subscribe for the Magazine and use it to air your grievances or fancied grievances. When the Alumni, as a body, decides on what is the right thing to do, abide by the decision and help put it into effect.

President Titsworth said in part:

Fellow Alumni, I have never yet been able to deliver myself of a speech before this august assemblage. You probably never suspected it, but I came before you on several occasions fully prepared to give expression to thoughts that were soulful and uplifting.

I might insist upon your listening while I extolled the competency and efficiency of the present executive committee. But we now have a medium in the monthly Magazine, through which every one can express his opinions, and by a casual perusal of its columns you all can learn what the Alumni Association is doing and plans to do. The officers invite criticism on everything that affects the Alumni and the school.

I would like tonight to enlarge and dwell upon the opportunities that suggest them-

selves to me, that are open to this association and its individual members, which if seized and acted upon will result in great gain to ourselves and our Alma Mater. There is just one thought that I cannot help leaving with you. We must all pull together. Those present here this evening do not need to have this rubbed in, but there are a great many graduates of the school that do need it, and I want each one of you to constitute himself a committee of one to urge upon every graduate of the school that he meets the necessity and value of joining this association. We can do absolutely nothing if we work at cross purposes. If we are to accomplish anything we must have a common purpose. This idea, of course, is nothing new—it is fundamental. But strange to say, so many alumni of the school do not seem to realize it.

But better times are coming. In fact, they are now here, as evidenced by the large influx of new and rejuvenated alumni that are coming into the fold and joining the association.

We cannot all have the same opinion on everything that affects the school or our own professional life. We would not be men if we did, but brainless invertebrates. But, we can get together and talk things over and decide what is best.

The world hates a knocker, and by that class of men we mean the fellow who never solves a problem, who never builds up, but one who always criticises the other man's solution and is continually endeavoring to destroy what others build.

Therefore, let us all be boosters and join our efforts in making this association one that does things. As a starter let no one of us be content until every last graduate of the School of Mines is a member of this association.

President Alderson said in part:

There are three important facts about the recent development of the school that all the Alumni should know.

First. During recent years much money has been spent upon the equipment of our laboratories, so that now they are in such a condition as to be attractive places for any advanced or original work the graduates may wish to do. It is a settled policy of the Board of Trustees to place at the disposal of the graduates any and all of the facilities of the school. A few of the graduates have made use of this opportunity, but it is the wish of the board that all the Alumni will make free use of the school in any way that may be of service to them.

Second. The new experimental plant, when in operation, will call for the services of engineers familiar with ore-testing methods. This will be a new field of work for which few mining engineers are well prepared. It is hoped that our own men will see these opportunities and take advantage

of them. The school will, of course, boost its own graduates above all others.

Third. The library is destined to become a genuine research library. For some time a lack of funds has prevented the Trustees from developing the library as it should be developed, but now they see their way clear to do so. Efforts will be made to secure complete sets of the proceedings of the mining and metallurgical societies, to purchase all new books bearing on these subjects, and to secure, as far as possible, all books of an historical nature that a research library should have. It is hoped that before long the library of the school will be recognized as unquestionably the most complete of its kind in the West.

The banquet ended shortly after midnight with the singing of "Auld Lang Syne."

PERSONALS.

'91.

C. Dupree Smith returned to Denver recently from Mocorito, Sonora, Mexico, because of the death of his mother. He will remain in Denver for awhile.

'95.

Robert S. Stockton has resigned his position with the Reclamation Service of the Government, to accept a better one with the Alberta Irrigation Co., of Canada.

'07.

C. G. Warfel has been actively engaged in hydraulic work recently and will have some valuable data and information on the subject, for the Magazine, at a later date.

'08.

C. E. Leshner was in Denver recently to take an examination to make his position in the United States Geological Survey, under Max W. Ball '06, permanent.

'09.

T. D. Benjovsky, E. C. Brooks and Louis Schafer are operating, under lease, the Unexpected group of claims in the California Mining District, La Plata County, Colorado. Postoffice, Hesperus, Colorado.

Louis Schafer visited the school and the assistant secretary, recently.

E. B. Wood returned to the school for a short visit early in February.

'10.

F. A. Goodale was married to Miss Annette Warfel, sister of C. G. Warfel, '07, a few weeks ago. They are living in Denver at present.

S. M. Soupcoff is in the surveying corps of the Amalgamated Mines, Butte, Mont. He was promoted from a Burleigh drill to the position, when the town was full of mining engineers looking for jobs, because he "made good" at the drill. He expects to be married in June.

COMMUNICATIONS.

Hailey, Idaho, Feb. 7, 1911.

Committee of Instruction of the C. S. M. Alumni Association,

Gentlemen: The February number of the C. S. M. Magazine has been received and read. I was especially interested in the five and six-year course discussion and would like to make the following suggestions.

I have forgotten a very large part of the things I learned in school and have often wished to review some of the subjects that interested me, such as mathematics, mechanics, and engineering subjects. I have no doubt but that this has occurred to a good many of the rest of us.

I should like to have an outline, in considerable detail, of the work we did in the recitation and lecture rooms, giving the items that are of importance, why they are of importance, and what their applications are. Text books used should be named and the articles of importance referred to by name and number.

A five-year course is spoken of and deemed inadvisable. Why was it spoken of—because there was so much work—more than could be crowded into a four-year course? Now some of the Alumni would probably like to have such a course (post graduate course, I mean) but for most of us it is impracticable.

I believe it would meet with approval to have a course of further study outlined so that those who did want to study further would have something for a guide and not have to read through a lot of irrelevant matter to find what was wanted. A man is not able to pick out what he wants, oftentimes, until he gets a good way beyond so he can look back, and, if a lot of stuff has to be waded through, he often loses sight of what he really wanted most. Such an outline might increase the efficiency of his study.

Yours truly,

M. C. ALLEN, '06.

Butte, Mont., February 19, 1911.

Orville Harrington,
Asst. Sec'y Alumni Association,
Golden, Colo.

Dear Sir: Please find enclosed my tardy subscription to the School of Mines Magazine. I think the magazine as started by Jay Lonergan the best the school has ever issued, and I liked your February editorial very well indeed. The magazine has been better each number, and it appears as though it would continue so to do. Emrich was always afraid he would do something right and you do something wrong. But he generally did.

As to the charges by the capability exchange being too high. Those remarks must have come from someone just out. By

the time he has rustled as many jobs as he will have to after eight or ten years have passed, and left him perennially stranded with nothing but his self-respect to hold on to, and the need of a pair of pliers to get hold on that, he may feel with you and me that a good job is worth any money the Exchange may see fit to ask.

By the way, almost any job is a good job if the man holding it down has the ability to make it so.

I am getting prices of every one who advertises in the "Maggy," and make loud mention of where I saw his "ad." Please laud me for this exhibition of alumnistical spirit, for I haven't a thing to do with the buying.

Most sincerely,

M. W. ATWATER.

[We very readily forgive him for the tardiness of his subscription as he sent five dollars for four years' subscription, and for the boosting he is doing among the advertisers. Everyone please boost for the Magazine all you can and on every possible occasion. Even make the occasions, as Mr. Atwater does.—The Editor.]

Cuervo, Guadalupe Co., N. M., Jan. 27, '11.

Orville Harrington,
Asst. Sec'y, C. S. M. Alumni Assn.,
Golden, Colorado.

Dear Sir: Please send my copies of the Alumni Magazine to the above address until further notice.

An old prospector and stockman was telling me of the contempt which the prospectors of Arizona in the "early days" held for the "Mining Experts" which held out in the small mining towns. He brought out several copies of an old newspaper printed in 1882, and pointed out a stock brand advertisement which may be of some interest. It ran as follows:

"My brand is heart on left shoulder. Anybody caught monkeying with this brand will catch hell. My place is on Date Creek. Everybody is welcome. Even Horse Thieves and Mining Experts may stay one night and no questions asked." Adam Grigsbee.

Very truly yours,

V. K. JONES.

Unexpected Mine, Jan. 29, 1911.

P. O. Hesperus, Colo.

Mr. Orville Harrington,
Asst. Sec'y C. S. M. Alumni Assn.,
Golden, Colorado.

Dear Sir: We have just received, via mule train, the January number of the Colorado School of Mines Magazine. In this isolated place, remote from civilization and Golden, the receipt of that publication was especially welcomed.

The Collegiate concentrates therein were

carefully sampled and treated by our mental reduction works, special attention being given to high-grade lot shipped by our fellow graduate in Russia. The high-grade lot has gone to umpire. The umpire says "foul ball."

We most thoroughly agree with the constructive criticism of Mr. Emrich's remarks, but fail to appreciate his destructive attitude toward the Alumni Association. Should all "we fellows at a distance" believe it "throwing good money away" to join the Association, this organization would become in fact, as well as in reputation, a foothills club.

The main criticism, according to our light, should be directed toward the spirit of the graduates in general. From observation before and since graduation, we have noticed among the Alumni a spirit conspicuous by its absence. It is a rule rather than the exception where a Mines graduate heads a department to find those next in rank men from other institutions and "bohunks," rather than fellow graduates. Whether this attitude is due to indifference or disloyalty, the Association and the school suffers from its disintegrating effect. When the Alumni show the same loyal spirit of team work, that characterizes the undergraduates, the School and the Association will get results.

Those who have gotten out of touch with the School and Alumni Association, should remember that this is the one chance where a "man can come back." The new gymnasium, with its Integral Club the new equipment, and the new laboratories, offer meeting places for graduates to acquire as well as impart new ideas, and to make new acquaintances. This holds good for any day in the school year, but special effort should be made by every Alumnus to be in Golden commencement week. The faculty could help by setting aside a day before commencement as a graduates day, and by arranging for a program of entertainment so that the Alumni and undergraduates could become acquainted. If such a day were set aside, classes could hold reunions which would go far to foster the right Alumni spirit. As it is, commencement at the Mines is an unpleasant duty. The Alumnus finds no pleasure in being present even if he can find a place to rest after his trip from Denver.

The Alumni's relationship to the school athletics also calls for criticism. While past Alumni representation on the Board of Athletic Control may have been open to criticism, the chief fault is the lack of interest shown by the Alumni in general. If every Alumnus should do his part, the athletic material representing the school would reach a much higher standard. It is the Alumni who have made athletics in the best institutions of the country.

It is hoped that these few remarks will

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not offend but may prove to be a push in the right direction. Further, should any offense be taken we will be glad to give personal satisfaction to one and all on our appearance at the '09 reunion on the Wednesday before commencement, nineteen hundred and eleven.

Yours in the Alumni Association,

T. D. BENJOVSKY, '09
LOUIS SCHAFER, '09
E. C. BROOKS, '09

[The matter of entertainment for the graduates at commencement has been taken up between President Alderson of the School, and President Titsworth of the Alumni Association. Any other remarks on this subject or on any of the other subjects above mentioned will be welcomed.—Ed.]

Denver, Colo., Jan. 21, 1911.

Mr. Orville Harrington,
Asst. Sec'y C. S. M. Alumni Assn.,
Golden, Colorado.

Dear Sir: In the January issue of the Colorado School of Mines Magazine, a discussion has been started in regard to the criticism raised by a letter from Mr. Emrich to the President of the Alumni Association.

While not knowing Mr. Emrich personally, and not intending to defend or denounce anything he writes, I still think he has a kind of grievance which he has not expressed quite plainly.

Mr. Emrich, no doubt, has that feeling that many of us must have felt some time in our relations with other Alumni, but has not expressed it in the most happy terms.

I have never attended an Alumni meeting, but not because I didn't want to, but because I have always been unable to do so, therefore I can not tell about the spirit of such occasions, but I have noticed that one great fault of the C. S. M. graduates is their tear or indisposition to get acquainted with one another. What I mean is, the earlier or older graduates hold themselves aloof from the more recent ones, making it extremely hard for the younger man to get acquainted and on friendly terms with the older one so that he may ask about things that he can not find out from anybody else.

That class feeling which was so strong and predominates at school is carried along after graduation, and unless this feeling is changed for a new one, dissatisfaction and unfriendly feeling will remain.

Let this new feeling or spirit remain a class spirit of the same intensity, but let the class be the WHOLE Alumni, and if the Alumni as a whole would stick together as one class and help one another with the same loyalty as members of the same class have done, more goodwill and better results will follow.

There are more ways in helping the Alumni Association than by just paying the

annual dues, and I take this opportunity in suggesting that the older graduates be a little more cordial and friendly to the younger ones; to have a little more patience with their inexperience and youth.

I have just opened a small office in the Gas and Electric Building in Denver, and hereby extend a welcome invitation to both old and younger Alumni to call and at least get acquainted. The latch string is always hanging on the outside.

Yours truly,

W. J. GILBERT, '06.

BOOK REVIEWS.

Theory and Practice of Surveying, by Johnson and Smith. Wiley & Sons, New York, \$3.50.

For years Johnson's Surveying was considered the standard work on the subject it aimed to cover, and it has been used in many technical schools as a text. However, as is the case with any book, it was found necessary to make frequent revisions to keep it up to date. This Dean Johnson did at frequent intervals, but since his death, there seemed to be no prospect of the work surviving in usefulness for any extended period. However, Professor Smith, the topographic and geodetic authority at the University of Wisconsin, has succeeded in placing the seventeenth edition before us as a really masterful work. Revision has been exercised to the fullest extent. One of the finest points about the revision is the elimination of material that has become obsolete in an engineer's practice. There are many additions of new and valuable material which more than equal in number of pages the portions omitted. Throughout the book one notices new cuts that were necessary to illustrate modern pieces of equipment. Whole chapters have been omitted or given a new place in the book's make-up. While the new edition has some 900 pages (200 pages more than the earlier editions), the book itself is actually smaller. It is 8¼x5¾ inches, 12mo.

Among the features of the book which are worth the attention of the mining engineer are the following: The manner of taking direct observations on the sun for meridian; a chapter written by Professor Comstock on practical field astronomy, whereby a person with a transit may determine his meridian, latitude, longitude and time; complete description, with cuts, of the markings of corners of U. S. public land monuments; stream measurement; a chapter on mine surveying with new material and problems as in use at the Colorado School of Mines; lists of references at the end of each chapter; numerous appendices, including useful field tables.

PROF. ARTHUR J. HOSKINS

A Pocket Handbook of Minerals, by G. Montague Butler, E. M., assistant professor of geology and mineralogy, Colorado School of Mines, Golden, Colorado. Wiley & Sons, New York, \$3.00.

No one actively interested in mining or prospecting can afford to do without a copy of this valuable little handbook of minerals. If you do not already own a book on mineralogy this is the first one you should buy, and, no matter how many or what books you may have on the subject, you will welcome this one. In fact, after you have once looked this book over carefully you will just naturally slip it into your pocket so as to be sure to have it handy when needed.

To the graduates of the Colorado School of Mines it will not be necessary to say much more in praise of the book beyond saying that it is an almost perfect set of notes on Prof. H. B. Patton's course in mineralogy at the Colorado School of Mines.

The most valuable feature of the book is that, while nothing essential to the determination of a mineral in the field has been omitted, there is little that is not essential in the book. There are no long-winded descriptions of the unessential peculiarities that may or may not be present in certain individual specimens, or of the rare varieties that one seldom finds outside of the largest collections.

An equally valuable feature, and one original with the author, is the placing of emphasis upon the most important characteristics by means of heavy faced type so that, ordinarily, a mere glance at a page will suffice to recall the appearance of the mineral. This feature alone will, in nine cases out of ten, reduce the time necessary to thoroughly determine a given specimen fully one-half. In every case a few perfectly determinative tests are given and the numerous details of minor or doubtful importance, that so often only confuse, are omitted.

The book is not intended to be used as a manual of mineralogy, but is planned as a supplement to lectures on the subject and serves as a complete and accurate set of notes. Abundant space is left throughout the book for any additional notes the owner may wish to include. However, the essential features are explained so carefully and simply that collectors and mining men with no previous training in the subject will find this book of more use than any other book of mineralogy of which we have knowledge. Emphasis is placed on the characteristic physical features and only the simplest chemical tests that may easily be made in the field with a blowpipe are given.

Another original feature is the systematic arrangement of the features by paragraphs so that the owner readily becomes familiar with the scheme used and can find at a glance the feature wanted without reading the whole description.

The book is neatly and strongly bound and

just the right size for the pocket, 4¼x7 inches and ¾ of an inch thick.

At the back of the book are a number of well arranged and useful tables. The first one is a table of commercially important ores, with the most important ones in heavy faced type, less common ones in lighter type, and minerals that are only occasionally mined and treated for the element specified are in italics. Figures after each name of an ore indicate the percentage of the element specified which the pure mineral contains.

Then follow tables of the retail prices of good to fine gems and the values of metals and minerals. Then a glossary with examples. For any one who has had a course in mineralogy the examples given will thoroughly fix the meaning in the mind much better than any mere word description could. Then follow tables of the elements with atomic weights, Moh's scale of hardness and Von Kobell's scale of fusibility.

At the back of the book are some larger folded determinative tables which give the principal physical characteristics of all the minerals. By the use of these tables it is usually possible to eliminate all but two or three minerals from the list of possibilities with great rapidity. Then by referring to these minerals under their descriptions the exact distinctive feature may be found.

The book is now used as a text-book in at least seventeen schools and colleges, including the Colorado School of Mines. You will not regret investing in this book.—The Editor.

ABSTRACT OF CURRENT ARTICLES G. Montague Butler.

GEOLOGY.

Climate and Physical Conditions of the Keewatin, by A. P. Coleman.

Journal of Geology, Jan.-Feb., 1911.

The author shows that the oldest Archean rocks include large amounts of sedimentary material. They do not take us back to the beginning of geological time and contain no hint of a molten earth in the process of cooling down.

The Agency of Maganese in the Superficial Alteration and Secondary Enrichment of Gold Deposits, by Wm. H. Emmons.

Journal of Geology, Jan.-Feb., 1911.

An extremely suggestive and valuable summary of a longer article that appeared in Bul. 46, T. A. I. M. E., p. 768-857. The article treats of a very important phase of the chemistry of ore deposition, and his conclusions should be carefully studied by all mining engineers and geologists.

The Laws of Intrusion, by Blarney Stevens.

T. A. I. M. E. Bul. 49, p. 1.

An article of considerable interest to the advanced geologist who can appreciate good

theorizing as well as the more practical application of his science.

The author attempts to prove that "the main factor governing igneous intrusions is the system of stress to which the rocks are subject, and that existing dislocations, planes of stratification, and other accedents and complex lines of weakness are of secondary importance in determining the shape and position of the intrusion."

MINING.

Mining in Nicaragua, by T. Lane Carter. T. A. I. M. E. Bul. 48, p. 965.

A very interesting presentation of all phases of the subject. Anyone will find it worth reading, and it should be very helpful to anyone intending to work in that part of the world.

NOTICE.

The Alumni Association has for some time been trying to locate the following graduates. Some of these have not sent in their address for several years. If any of the readers of the Magazine know the whereabouts of any of the following men, they will be helping the work along by

sending what information they can to the Assistant Secretary at Golden:

Walter D. Abel, '06.
Walter J. Atkinson, '96.
J. E. Bergh, '02.
Albert Berry, '05.
Chas. E. Breed, '01.
Harry F. Bruce, '00.
Herbert A. Canning, '97.
W. E. Canning, '09.
Paul H. Carpenter, '10.
Burt Cole, '92.
Chas. R. Ewing, '00.
Louis D. Fry, '03.
Geo. W. Griswold, '96.
Frank R. Hamilton, '98.
L. P. Hills, '08.
Geo. F. Hoyt, '96.
Gilbert E. Jewel, '93.
Fred G. Kelly, '99.
Victor E. Kerr, '00.
Oscar A. Lampe, '98.
N. W. Logue, '97.
Wm. B. Middleton, '83.
Wm. E. Newman, '96.
Enrique A. Schuman, '97.
E. M. Smith, '05.
Howard Spangler, '05.
J. J. Weisz, '09.
Chas. E. Wheeler, '94.

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The COLORADO SCHOOL OF MINES MAGAZINE

Vol. I.

GOLDEN, COLO., APRIL, 1911.

No. 7

Genesis Of Ore Deposits.

George J. Bancroft.*

(Lecture delivered before the Colorado School of Mines Technical and Engineering Society and later before the Colorado Scientific Society.)

The study of the genesis of ore deposits is one of the most fascinating studies connected with mining. Its fascination is, no doubt augmented by the fact that we have so little direct knowledge bearing on the subject. At the present time almost all of the theories of ore genesis are merely tentative hypotheses advanced simply to aid in gaining more definite knowledge rather than the final laws established by enduring facts. It is this tantalizing haze of the unknown which adds to the charm of studying ore deposits and spurs one on to attempt to add to the reclaimed area of science one small tract, at least, of the great desert of the unknown.

To my mind, a theory is not at all a satisfactory one unless it starts somewhere, ends somewhere, and presents a logical sequence of progress from the beginning to the end. Hence, in briefing my gleanings from the field of the study of ore deposits I shall endeavor to present only such theories as have the above characteristics. Moreover, as this is to be a very short paper, I will make no attempt to the history of my ideas, nor shall I hesitate to borrow part of one man's theory and to attach it to another's, and then mayhap add a piece of my own if by so doing I can present a theory which begins somewhere, ends somewhere, and has a logical sequence of progression, nor will I, in this short paper, try to make any defense of, or argument for or against, any theory. I will simply present the theories which appeal to me, and my readers will naturally exercise the same discretion and accept what appeals to them and reject what does not.

I shall endeavor, so far as possible, to

*Mining Engineer, 222 McPhee Building, Denver, Colo.

avoid the use of that foolish system of nomenclature which besets our science of mineralogy and stick to simple words. There are, however, two or three technical words which it is easier to use than walk around, namely:

Syngenetic—which means "born together with," and signifies an ore deposit which was formed at the same time and by the same agencies as the country rock.

Epigenetic—which means "born upon" and signifies an ore deposit formed after the country rock was in place.

Metasomatic Replacement—which means the replacement in whole or in part of the crystals of the country rock by the salts of a salt bearing solution.

The first question one naturally asks when studying the formation of ore deposits is—where did the metal originally come from? We see that the great majority of the surface rocks are either barren or extremely lean in metal values, while workable ore deposits of any kind are few and far between, and such as there are, we observe, are nearly always associated directly or indirectly with eruptive rocks. To my mind, the most plausible explanation of the original source of the useful metals is that it came from the Barysphere. Physicists and astronomers have weighed the earth and found it not "wanting," but over weight. Chamberlin and Salisbury in their treatise on geology give the specific gravity of the entire earth as 5:57, while the average specific gravity of the lithosphere is given as 2:7. It is very evident that the center of the earth is much more dense than the exterior. While it is no doubt true that the material near the center is greatly compressed by the pressure of the super-incumbent masses, still we have no reason to believe that the compression of the rocks alone is sufficient to account for the great specific gravity of the earth, and it is far more logical to assume that the central materials themselves are heavier.