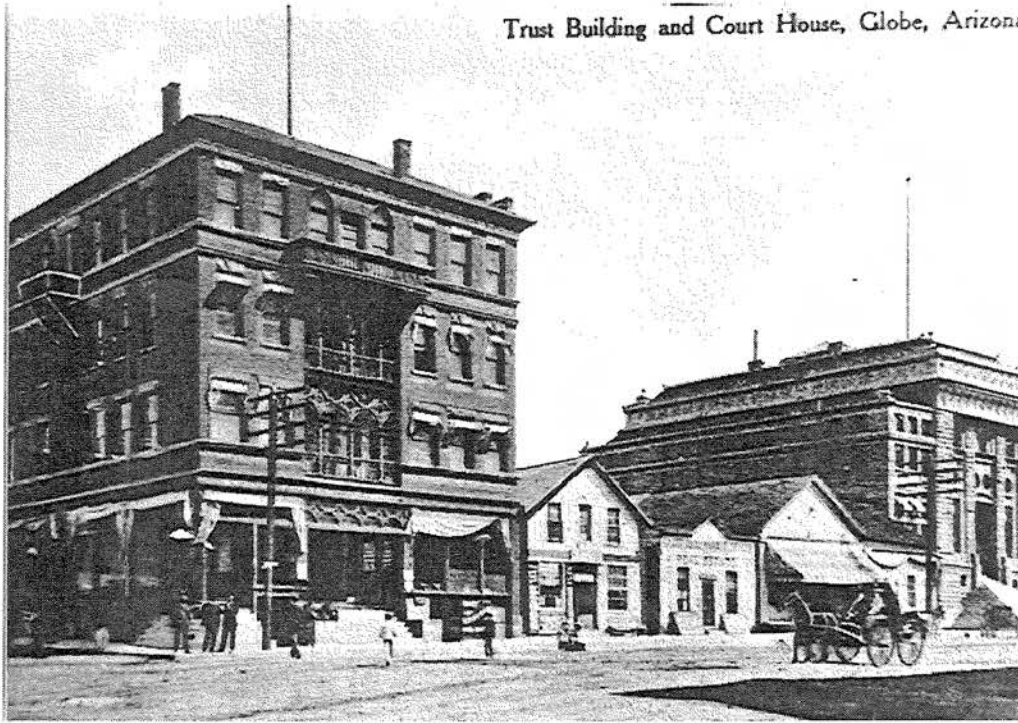

The Arizona & Michigan Mining Company, Globe District, Arizona Territory: A Study of a Small Mine in a Large Network

By Erik Nordberg

Trust Building and Court House, Globe, Arizona



Globe, Arizona, showing the Trust Building, site of Arizona & Michigan's Globe office. Photograph courtesy of the Gila County Historical Society, image GM 34-10.

In the archives at Michigan Tech University, stowed in an overcrowded vault, lay six bound volumes. These comprise the surviving record of the Arizona & Michigan Mining Company, a seemingly nondescript company that was organized in Calumet, Michigan, to explore and mine claims near Globe, Arizona Territory. At first glance, Arizona & Michigan seems just another of the time-honored attempts by starry eyed investors to augment income through a small investment. Like hundreds of tales of optimistic speculations gone bad,

Arizona & Michigan follows the course of many dollar-per-share mining companies. Except, in this case, the corporate records survive.

Although there is certainly value in examining Arizona & Michigan as representative of other failed small-scale mining speculations, several things merit further interest in this short-lived company. Foremost amongst these is the survival of a near-complete set of corporate records, including Arizona & Michigan's original stock register, stock transfer journal, cash book, invoice book, accounting ledger, and payroll book.¹ Unlike other defunct companies, this archival material preserves a detailed portrait of the corporate venture, including primary data documenting the owners and financial backers of the company, as well as the operations and costs of their failed min-

Erik Nordberg is University Archivist at the MTU Archives and Copper Country Historical Collections at Michigan Technological University in Houghton, Michigan.

Table 1: Major Investors in the Arizona & Michigan Mining Company
(asterisks indicate executives directly employed by the company)

<u>Subscriber</u>	<u>No. of Shares</u>	<u>Shareholder</u>	<u>No. of Shares</u>
Paine, Webber	20,000	Paine, Webber	9,977
Hayden, Stone & Co.	10,000	J.A. Minnear & Co.	5,302
J.A. Minnear & Co.	9,949	Aron Tronjanovich**	2,000
Gay & Sturgis	3,250	Hayden, Stone & Co.	1,400
Fred H. Merritt	2,585	Will H. Boon	1,283
Anton Trojanovich**	2,000	Gay & Sturgis	1,150
James Chynoweth**	2,000	Alonzo D. Nicholas	1,050
Martin Rosendahl	1,825	Edward E. Thompson	1,000
William B. Anderson**	1,375	Mrs. Ada M. Wright	1,000
George Kingdon	1,000	Charles Mugford	1,000
Silas C. Chynoweth**	1,000	Duncan A. Cameron	950
S.W. Clawson **	1,000	James Chynoweth **	900
Mort C. Getchell	1,000	William Milford	900

Source: Collection MS-023, The Arizona & Michigan Mining Company Collection, MTU Archives and Copper Country Historical Collections at Michigan Technological University in Houghton, Michigan.

ing operations. Along with other resources, it is possible to place Arizona & Michigan into the larger context of early twentieth century mine exploration and development, and to explore the many networks that channeled mining expertise from the mature Michigan copper district to developing western mines.

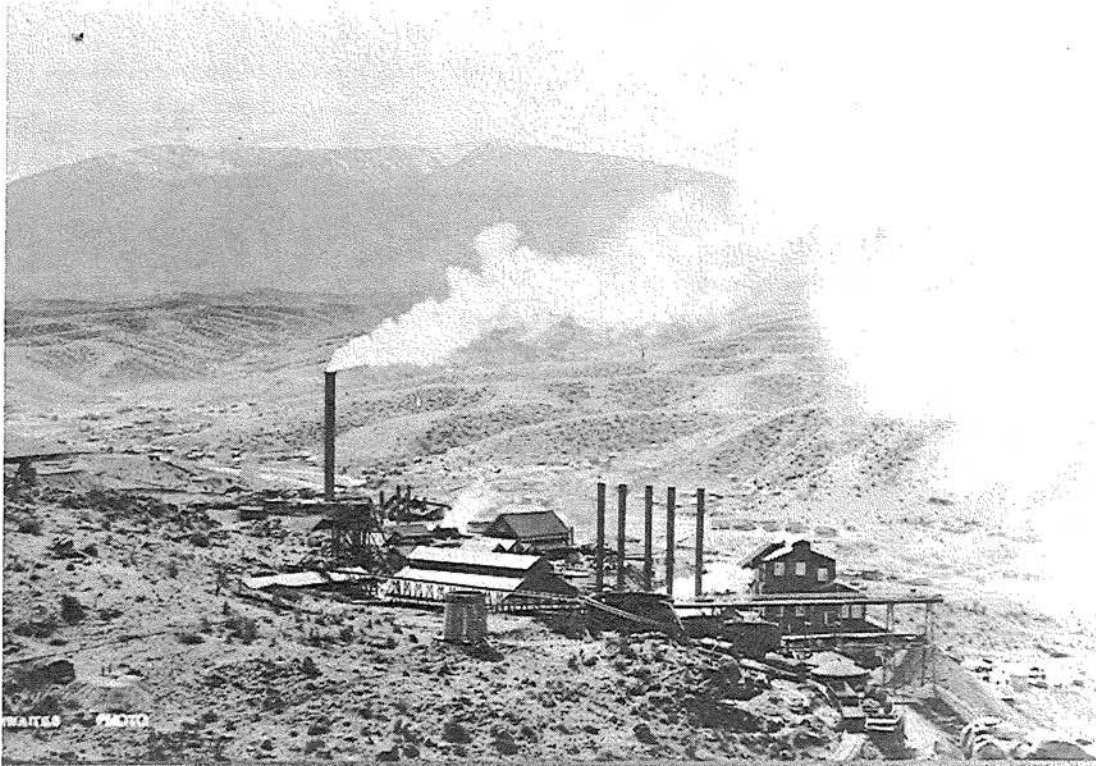
A group of businessmen organized the Arizona & Michigan Mining Company under the laws of the Territory of Arizona in December 1908. With one exception, officers of the company lived and worked in the copper mining communities of Upper Michigan, and the company's headquarters were located at Calumet.² Company records document two sets of financial backers: those who subscribed to the initial stock offer, and those who later had actual share certificates issued in their names.³

Stock subscription books opened in December 1908 and activity was robust through April 1909. Michigan brokerage houses, including J. A. Minnear,

Gay & Sturgis, and the Calumet office of Paine-Webber, bought or managed large blocks. The fourth important player was Hayden, Stone & Company, an investment banking firm based in Boston, with offices in Marquette. Hayden, Stone had links to Michigan copper, but gained notoriety by bankrolling several western porphyry copper deposits, including the Nevada Consolidated, Utah Copper, and Chino ventures.⁴ Among Arizona & Michigan's largest stockholders were several Michigan natives with direct involvement in the management of the company.⁵ (See Table 1)

Capitalization of Arizona & Michigan was set at 150,000 shares at \$10 par, but as with most high-risk mining ventures, 135,000 shares were issued to the public with only a single dollar required up front. Detailed corporate stock records permit profiling of investors, a mix of middle-class people of relatively modest means living in the Copper Country of Michigan. Although many of the larger subscribers remained with the company as share holders, the trend at Arizona & Michigan tended to favor the small investor. More than 87% of the company's investors held fewer than 200 shares each, and a full third of the investors held fewer than 50 shares each. Several larger blocks were in the names of brokerage houses, but it is unclear if these shares were held as corporate blocks, or merely held in the brokers' street name in order to sell to individual investors. (See Table 2)

Data taken from the 1910 Polk Directory for Houghton County, Michigan, indicates that Arizona & Michigan's smaller shareholders came from many backgrounds – everything from students and school teachers to commercial businessmen and mining company presidents.⁶ This was in direct contrast to many earlier Michigan-based copper mining ventures, where East Coast dollars generally constituted the larger percentage of stockholder rolls. Arizona & Michigan relied on a new wave of Keweenaw-resident investors to lay their dollar down in hope that Arizona might hold the next big strike. From the list of initial stockholders, it was clear that many were willing to try their luck.⁷



The Old Dominion mine, one of Globe's most successful mining companies. Arizona & Michigan worked nearby claims for two years searching for extensions of ore bodies that fueled companies like Old Dominion, Arizona Commercial and Superior & Boston. Photograph courtesy of the Gila County Historical Society, image GM 2-49.

Table 2: Distribution of Shareholders

# of Shares	Shareholders at this level	% of All Shareholders	% Shares held by this group
1000+	12	1%	18%
500-999	35	3%	15%
400-499	13	1%	4%
300-399	23	2%	5%
200-299	86	6%	12%
100-199	316	24%	24%
50-99	351	26%	13%
1-49	493	37%	6%

Source: Collection MS-023, The Arizona & Michigan Mining Company Collection, MTU Archives and Copper Country Historical Collections at Michigan Technological University in Houghton, Michigan.

By the turn of the century, Michigan's copper mines had reached what William B. Gates calls their period of "maturity." Production and profits were at their zenith in the first two decades of the twentieth century, but emerging mining districts (particularly new mines in the western United States applying new technologies to low-grade porphyry copper deposits) had already toppled the Keweenaw from its place as the nation's pre-eminent copper district.⁸ Arizona had taken the lead in American copper production in 1907, just one year before Arizona & Michigan was organized.

As its name implies, Arizona & Michigan blended two very different cultures, and its history highlights key links between the districts during an important period of change in international copper production. As a Michigan company, with predominantly Michigan executive management, flotation of Arizona & Michigan was buoyed by the widely-lauded stability of Lake Superior copper. Although only a handful of Keweenaw mines had paid dividends and even fewer had declared true profits, the profits of giants like the Calumet & Hecla were impressive.⁹ (See Table 3) By the time of Arizona &

Michigan's founding, the Michigan district was in its third generation of successful, big-dividend-paying copper mines. The success of these companies was the mark against which other districts measured their mettle. It was also clear, however, that expected declines in Michigan production and ore reserves had Keweenaw mining men and investors considering the lure of new prosperity in the budding Arizona territories.

Of Arizona's many developing districts, the region around Globe had only slowly come into production because of isolation, Apache warfare, and



3) James Chynoweth worked his way through mines in Cornwall, New Jersey, Pennsylvania and Michigan before organizing Arizona & Michigan in 1908. An able mining man, Chynoweth brought extensive experience from successful Michigan copper mines to the new operation in Globe. Photograph from *Livingstone's History of the Republican Party* (Detroit, Michigan: W. Livingstone, 1900), courtesy Michigan Technological University Archives and Copper Country Historical Collections, neg. 05681.

Table 3: Michigan Copper Mines (data through 1908)

Mine	Assessments (thousands)	Dividends (thousands)	Profits/Losses (thousands)
Cliff	111	2,518	2,407 +
Minesota [sic]	456	1,820	1,364 +
National	320	320	0 +
Copper Falls	1,000	100	900 -
Central	100	2,130	2,030 +
Phoenix	2,387	20	2,367 -
Quincy	200	17,665	17,465 +
Pewabic	585	1,000	414 +
Franklin	220	1,240	1,020 +
Ridge	470	100	370 -
Calumet & Hecla	1,200	106,900	105,700 +
Osceola	1,700	7,612	5,912 +
Tamarack	320	9,600	9,280 +
Kearsarge	180	160	20 +
Wolverine	230	5,100	4,870 +
Mohawk	2,100	1,750	350 -
Atlantic	980	990	10 +
Baltic	1,800	4,550	2,750 +
Champion	2,500	5,200	2,700 +
Trimountain	1,900	800	1,100 +

Source: B.S. Butler and W.S. Burbank, *Copper Deposits of Michigan*, United States Geological Survey Professional Publication 144 (Washington, DC: USGS, 1929).

lack of capital and labor. A decade after the initial discovery and boom of the 1870s-1880s, the Old Dominion mine alone remained in operation. The 1890s heralded the arrival of big capital with the Lewisohn Brothers at the Old Dominion and the Phelps Dodge interests in the adjacent United Globe. With the completion of the railroad into Globe in 1898, the district began a substantial spurt in growth and production. The productive giants attracted imitators. Between 1905 and 1910, dozens of new ventures were begun. The 1908 Stevens Copper Handbook lists nearly 100 separate companies with links to Globe.¹⁰

Not surprisingly, many Arizona mining compa-

Table 4: Mines in Arizona: Links to Michigan

AZ property	City, date	Michigan Principal	MI property
Arizona Commercial	Globe, 1908	William Paine	Copper Range
Arizona-Hancock	Florence, 1902	Cuddihy/Baer	Hancock Cons.
Arizona & Michigan	Globe 1908	Chynoweth	Centennial, et al.
Calumet & Arizona	Bisbee 1901	Briggs, Ruppe, Hoatson	Various
Lake Superior & Arizona	Super, 1902	Cuddihy/Baer	Hancock Cons.
Miami	Globe, 1907	Lewisohn Bros.	Tamarack & Osceola
Old Dominion	Globe, 1895	Bigelow & Lewisohn	Tamarack & Osceola
Superior & Boston	Globe, 1906	William & John Rice	Copper Range
Superior & Globe	Globe, 1908	John Daniell	Tamarack & Osceola
Wolverine & Arizona	Bisbee, 1904	John Daniell	Tamarack & Osceola

Source: *The Copper Handbook: A Manual of the Copper Industry of the World* (Houghton, MI: Horace Stevens, various years 1908-15).

nies benefited from the input of individuals linked to Michigan mines or eastern investors experienced with Michigan stocks. (see Table 4) The Lewisohn and Bigelow names – closely tied to early Michigan successes at Tamarack and Osceola – were also tied to Old Dominion's early development. Although the Lewisohns sold their interest to Phelps Dodge in 1904, they returned to Globe in 1907 to help organize the Miami Copper Company, one of Arizona's first porphyry copper mines. William Paine and other Paine-Webber interests shared investments in the Copper Range Company of Michigan and the Arizona Commercial of Globe. Michigan influences can be documented in at least three other Globe operations, as well as successful mines in Superior and near Florence. Additional passengers on this southwestward migration were waves of mining engineers educated by the Michigan College of Mines, many of whom gained practical experience in Keweenaw copper mines.¹¹ Of course, by 1908, the dream of any Michigan venture was to follow the example set by Bisbee's Calumet & Arizona, a speculative venture that poured millions of dollars in dividends into the accounts of Michigan stockholders.¹²

The Michigan sojourner central to the Arizona & Michigan story was James Chynoweth. Born into a Cornish mining family in 1846, Chynoweth had worked mines in Cornwall, New Jersey and Pennsyl-

vania before settling in Michigan's Copper Country at age thirty-two. He worked his way up through the ranks of several Michigan mines, gaining a reputation as an able and enthusiastic mining captain. For a period, he was superintendent of the Tamarack Junior mine in the 1890s, a mine within the Bigelow's Michigan Syndicate. He left the Bigelow fold to superintend Michigan's Centennial mine, directed by Harry Fay, a Keweenaw land and mine speculator.¹³

Chynoweth's tenure with Fay likely reinforced and further developed his approach to mine speculation. Of the dozen properties worked by the group, none ever reached dividend-paying status under their ownership. To the speculator, however, this was not necessarily a reflection of failure. Although many of the properties were never subsequently proven, several including the Centennial, Allouez, and the Tri-mountaine produced refined copper and paid substantial dividends to subsequent owners. Chynoweth and Fay likely posited themselves as mine developers, identifying promising prospects and bringing them to production or closure. For the few producing mines, profits were pocketed from the sale of operating mines to established syndicates.¹⁴

So how did Chynoweth, aged 62 in 1908 and well-versed in Michigan's snowy copper mines, find himself digging holes in the arid mountains near

Globe, Arizona? The answer may lie with another industry Chynoweth was active in that of Michigan banking. Chynoweth served on the Boards of two Houghton County banks from 1902 to the time of his death in 1922. This other career likely reflects a high regard for his business acumen and personal integrity. Also, many Lake Superior bank directors had ties to Arizona mines, reflective of the capital transfer

Table 5: Men Serving on Bank Boards with Chynoweth and their links to mining ventures outside of Michigan

Individual	Linked to	Location
William Anderson	Herminia	Ontario, Canada
	Calumet & Cerro Gordo	Inyo Co., California
	Arizona & Michigan	Globe, Arizona
	Lake Superior & Arizona	Superior, Arizona
Henry L. Baer	Lake Superior & Arizona	Superior, Arizona
	Arizona & Hancock	Globe, Arizona
Charles Briggs	Calumet & Arizona	Bisbee, Arizona
	Superior & Pittsburgh	Bisbee, Arizona
Gordon Campbell	Calumet & Arizona	Bisbee, Arizona
John Cuddihy	Lake Superior & Arizona	Superior, Arizona
	Arizona & Hancock	Globe, Arizona
John Daniell	Finnish-American	Finland
	Superior & Globe	Globe, Arizona
	Wolverine & Arizona	Bisbee, Arizona
James Hoatson	Calumet & Arizona	Bisbee, Arizona
Oscar Larson	Finnish-American	Finland
William E. Parnall	Calumet & Arizona	Bisbee, Arizona
	Old Dominion	Globe, Arizona
Stephen Paull	Calumet & Arizona	Bisbee, Arizona
Louis Richardson	Lake Superior & Arizona	Superior, Arizona
Paul Roehm	Herminia	Ontario, Canada
	Calumet & Montana	Butte, Montana
Peter Ruppe	Calumet & Arizona	Bisbee, Arizona
Fred Smith	Superior & Globe	Globe, Arizona

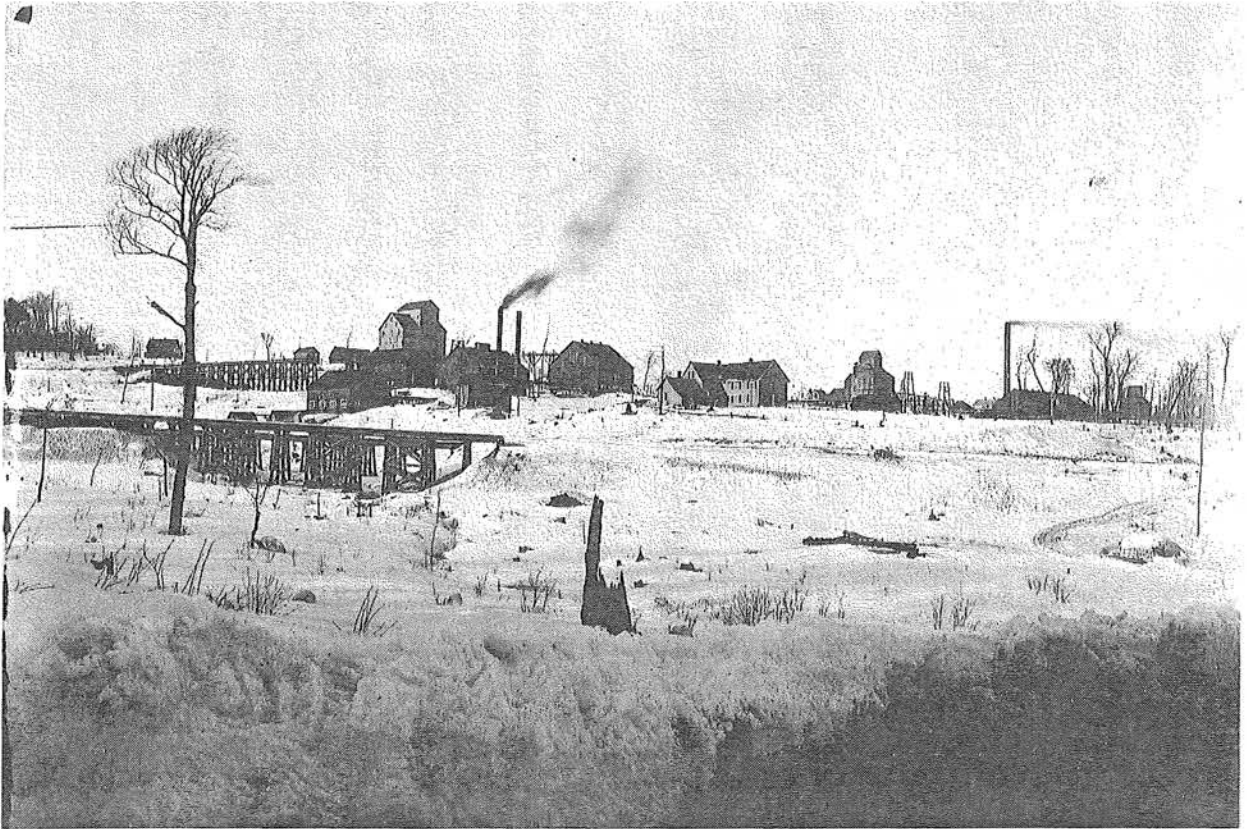
Source: *The Copper Handbook: A Manual of the Copper Industry of the World* (Houghton, MI: Horace Stevens, various years 1908-15).



Anton Trojanovich arrived in Globe in 1894, having escaped Eastern Europe via the merchant marines and several California gold mines. A noted local entrepreneur, Trojanovich brought an extensive list of contacts in the central Arizona mining industry to Arizona & Michigan. Photograph courtesy of John Trojanovich of Tucson, Arizona.

occurring at the beginning of the century.¹⁵ (See Table 5) In 1910, as it is today, a bank board member would likely be expected to attract large deposits and, more importantly, large borrowers. Arizona mines would be large borrowers.

At the time of his service on these bank boards, Chynoweth interacted with much of the Lake Superior elite, individuals well-versed in the floatation and operation of mining ventures both within and outside the Michigan copper district. Within a short period of time, Chynoweth was actively involved with several non-Michigan mining companies, including a copper prospect in the Sudbury district of Ontario, Canada, and the failed floatation of a lead/silver/copper prospect in Inyo County, California. His first



Surface works of the Trimountain Mine near Painesdale, Michigan. Trimountain was one of Chynoweth's great successes. Photograph courtesy Michigan Technological University Archives and Copper Country Historical Collections, neg. 00092.



Calumet, Michigan, showing Bloy Block in background. The building housed the corporate offices of the Arizona & Michigan Mining Company. Photograph courtesy Michigan Technological University Archives and Copper Country Historical Collections, neg. 05616.

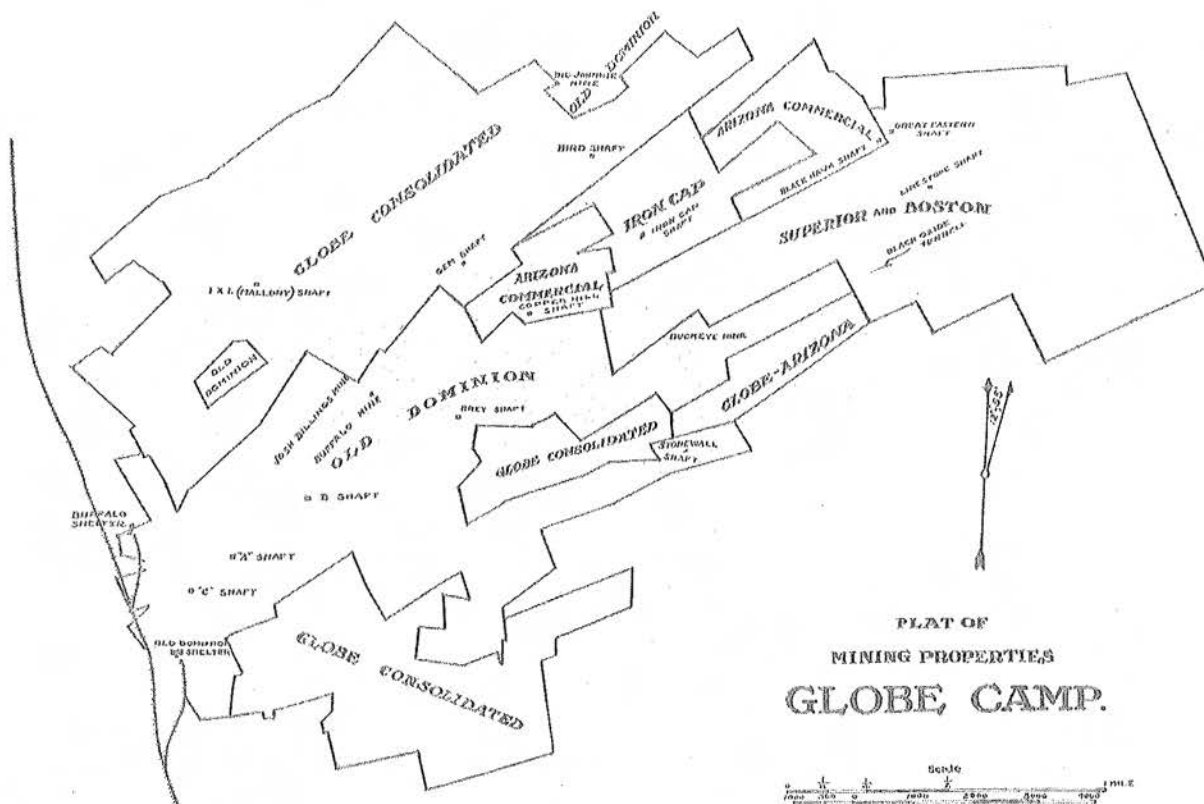
activity in Globe appears to have been a brief appearance on the executive of the Superior & Boston in 1907. One year later, Chynoweth organized Arizona & Michigan on property adjacent to the Superior & Boston.¹⁶

Arizona & Michigan was a real dig-in-the-ground attempt to develop a paying mine, and one that did not seek or rely upon corporate stockholders to fund a false-front of activity, while paying directors and officers high salaries and perks. It was not, however, a completely Michigan-led activity. Arizona & Michigan's man in Arizona was Anton Trojanovich. Like Chynoweth, he was a successful banker, land speculator and mine promoter. It is unclear how they met, but it seems likely that Chynoweth made his acquaintance while working for the Superior & Boston.

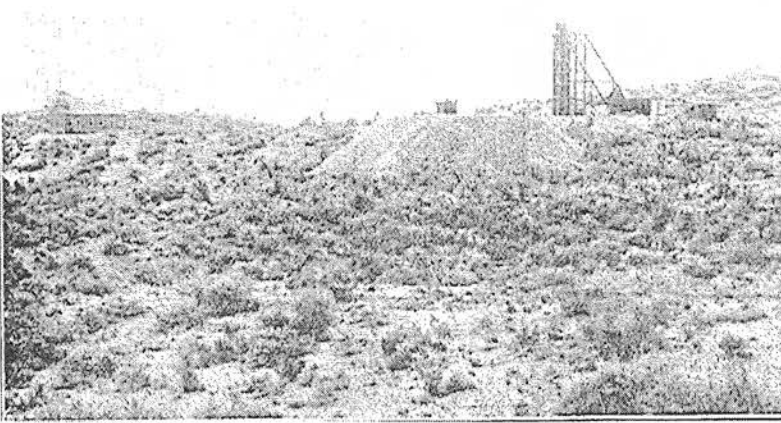
Trojanovich's participation in the company was

important, too; his reputed success in attracting Eastern money to Globe made him a valuable partner in the company. The company's stock records suggest that Globe investors were expected to absorb approximately 10% of the original stock offering. Unlike the respected and experienced mining man Chynoweth, however, the 36-year-old Trojanovich had followed a very different path to Globe.

Born in eastern Europe, Trojanovich made his way to California as a merchant seaman, jumping ship in San Francisco harbor to seek the gold fields and the life of a miner. Very little is known of his life as a hardrock miner other than a stint at George Hearst's Homestake mine and duty as a shift foreman at another mine. His footsteps seem to have been pointed toward Arizona throughout this period as he arrived in Globe in 1894 just in time for the District's boom in copper.¹⁷



Map of mining claims north of Globe, Arizona. The most profitable strike of copper-bearing ores followed a line marked by shafts of the Old Dominion, Arizona Commercial, Iron Cap, and Superior & Boston. Arizona & Michigan's claims lay north of the Superior & Boston property. Map from the 1908 *Report of the Superior and Boston Copper Company*, photograph courtesy Michigan Technological University Archives and Copper Country Historical Collections, neg. 01234.



Telfair Shaft of the Arizona & Michigan Mining Company. Boarding house and mine office in background. Photograph from "Special Mining Edition," *Arizona Silver Belt*, Globe, Arizona, 1910.

Where and how Trojanovich gathered his seed money is hidden in the past but he quickly developed into quite a successful entrepreneur. He served as President and part-owner of the Bisbee Lumber Company, a partner in the Gibson Lumber Company near Safford, and a partner in a hay and feed store in Safford. By 1908, when he joined the Chynoweths in forming Arizona & Michigan, he was owner of the Globe Lumber Company, chief supplier of timbers to the dozens of local mines.

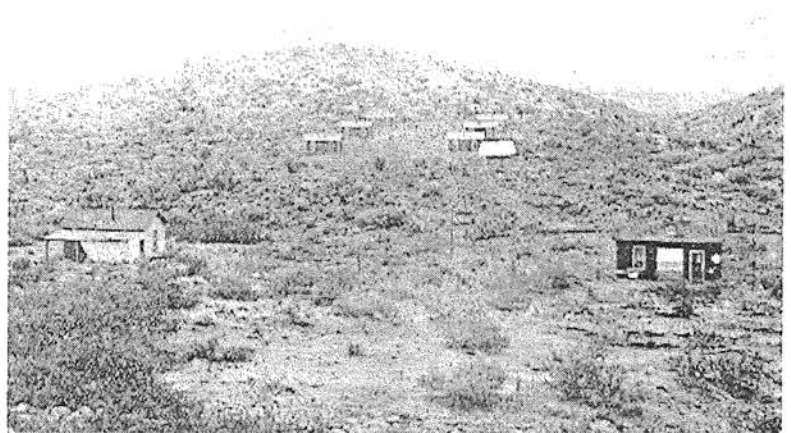
Trojanovich did not confine his Bisbee mining interests to the provision of mining supplies and lumber. He bought his first mining claim in the Globe Mining District in 1896 and was deeply involved in trading claims and promoting and developing mines until the time of his death in 1922. His success with mining interests was part luck, part shrewdness and made him an attractive ally for speculative Michigan interests. It is doubtful that one could spend much time in the small community that was 1908 Globe without becoming acquainted with the ebullient Trojanovich.

Arizona & Michigan's initial stock offer managed to raise \$285,000 of working capital, not a great deal of money even in 1908, but enough to option ground and set up a prospecting operation. The company took options on 32 claims at the northeast end of Copper Gulch. Fortunately, the leases, totaling \$235,000, were progressive

in nature, requiring small annual payments in the first two years, delaying a more significant lump sum payment until 1911. Interestingly enough, none of the claim owners took shares in the initial stock offer.¹⁸

The company worked the claims for two years, searching for extensions of the ore bodies that were bringing success to other Globe ventures. Many Globe area mines were producers at this stage, especially the series of adjacent holdings up the Globe Hills: the Old Dominion, the United Globe Mines, the Arizona Commercial and the Superior & Boston.¹⁹ The company established offices in both Calumet and Globe, and developed appropriate surface works near their shaft heads.

The mine site developed relatively quickly. Arizona & Michigan accounting journals record the capital investment in the site: a gallows frame, engine room building, and hoist (\$653.00, \$436.00, and \$1950.00 respectively), a boarding house (\$1500.00), nine single family houses (\$245.00 each) and one larger dwelling, likely for the mine superintendent (\$436.00). The surface works were completed with two barns/corrals, a blacksmith shop and two powder magazines. Underground operations began early in 1909. A description of the operation, illustrated with photographs, was published in a special 1910 mining edition of the *Globe Arizona Silver*



Property of the Arizona & Michigan Mining Company. The company built nine single family houses and one larger dwelling for its superintendent. Photograph from "Special Mining Edition," *Arizona Silver Belt*, Globe, Arizona, 1910

Belt newspaper. The editors praised the company and its experienced Michigan mining men, yet without saying much about the financial prospects of the property:

To have acquired over 600 acres of first-class mineral land; to possess strong financial backing and a management of capable experienced mining men; to have put down one of the best timbered three compartment shafts in Globe district to a depth of 519 feet, and to have run more than 200 feet of crosscuts is pretty good evidence that a mining organization is in earnest and determined to bring its property to the front rank of producers.²⁰

The corporate records document the mine's operations and appear to reflect an honest desire to keep annual operating expenses low. The company sank two main shafts, its Telfair shaft reaching a depth of 500 feet and its Blackbird down to the 400 foot level. Various crosscuts and drifts acknowledged the operation's exploratory nature, and much of the surface expense was given to building decent roads between the mine's claims and shafts and hauling water into the site from further down the valley. After its first few months, Arizona & Michigan switched to a contract-based system for much of its underground work. The company's early records show underground laborers were on straight payroll, earning \$4.00 to \$4.50 per day rate, while miners and shift bosses earned an average wage of \$110 to \$125 per month. Starting in August 1909, however, the payroll records document a change in this employment and wage practice, indicating that shift bosses began to administer contract teams. The names of shift bosses appear only sporadically, with the word "contract" appearing where their daily pay rate had previously appeared. Miners are still shown earning the same average \$110 - \$125 per month, but the new contract system awarded shift bosses substantially higher monthly wages in the \$200 - \$250 range.

The company's executives set a good example by keeping their own salaries and expenses as low as possible. Of the six members of the company's directorate, only two actually drew salaries. James Chynoweth was paid only \$250 per month for the first twelve months of the company's life; his salary line drops from the company accounts in December 1909. The only other to draw a salary was company Secretary Silas Chynoweth

— his \$150-per-month salary was slashed in half in March 1911, and completely ceased four months later. The gesture, however, appears to have been less than inspiring. The directorate sought additional capital from the shareholders in December 1909, but received only lukewarm response to their fifty-cent assessment call.²¹

There is no record, however, of any mineral being shipped or any refined copper being produced by Arizona & Michigan. The company had hoped to find an extension of the Arizona Commercial's Black Hawk vein, but located only a few copper stains and some specks of chalcopyrite in diorite. General work was stopped at the site in September 1910.²² By January 1911, the company's coffers only held \$136,000 against remaining lease payments of \$162,000. The company released additional new shares in March 1912, but this second issue was not intended to raise additional working capital — the majority of the shares were given to the claimowners in lieu of cash. The move provided only a brief respite to Arizona & Michigan's cash problems, however, and the company was forced to liquidate in December 1912, unable to carry on annual assessment work required by the government to hold the property.²³ The property was allowed to revert to its original owners and there is no record that it was ever worked again.

It is ironic to compare the fate of Arizona & Michigan with one of its successful neighbors. The Lewisohn's Miami Copper Company, ten miles to the west, was formed in 1907, found an extensive low-grade ore body, began full production in 1911, and had paid \$30,000,000 in dividends by 1925. Arizona & Michigan's failure to locate economic values of copper in the shadow of such giants may merely reflect the vagaries of the "subterranean lottery" undertaken in Globe-area mining.²⁴ Yet the comparison also underscores the ascent of mining engineers, churn drills, and massive concentration plants to the forefront of American copper.

Aged 66 at the time of the company's final demise, Chynoweth continued his service on his two Keeweenaw bank boards, but there is no indication of his personal involvement in any additional speculative mining ventures. James Chynoweth died ten years later in 1922.²⁵ Yet, it seems short-sighted to view the closure of Arizona & Michigan as the final failure of a non-scientific "Cousin Jack" with a supposed nose for copper. Chynoweth's Michigan background was in

testing and proving mineral claims, not operating producing mines – Arizona & Michigan was merely one of the many dollar-per-share Chynoweth mines that failed to locate ore. Even had Arizona & Michigan uncovered a bonanza ore body in the Globe hills, it is likely Chynoweth would have turned the property over to a larger syndicate and pocketed his profit. At a personal level, the Arizona & Michigan story may carry its greatest value as the final adventure of a true experience-bred mining man.

The Arizona & Michigan Mining Company also provides many unique opportunities to examine the cross-fertilization of American mining districts. The survival of a critical mass of primary source material from the company allows detailed examination of the capitalization of the company, the men who designed its workings in Globe, the technical and administrative aspects of its operation, and also invites opportunities for comparative research with other mines and

other mining districts.

The field of mining history is still somewhat in its infancy. Important work is being accomplished in developing histories of specific mining companies and establishing seminal analyses of individual mining districts. More must be accomplished, however, in documenting the national and international pathways of development – not merely the lines occurring within a single district, but those longer lines linking different mining areas. The hero of this piece, for instance, provides a single, personal, link from the declining mines of Cornwall, through the establishment and growth of mines in New Jersey, Pennsylvania, and Michigan, and ends with developing operations in Arizona. Although Arizona & Michigan may be viewed as just another pothole on the rocky road to fortune, its story reflects important linkages of men and investment dollars that are the untold story of North American mining history.

Notes

The author wishes to acknowledge the invaluable research assistance of the late Lew Orrell of Carefree, Arizona. Bob Spude suggested a variety of historical background sources on Arizona mining; he and Jane Nordberg each provided immeasurable editorial support.

1. Collection MS-023, The Arizona & Michigan Mining Company Collection, MTU Archives and Copper Country Historical Collections at Michigan Technological University in Houghton, Michigan (hereafter cited as A&M Collection).
2. R. L. Polk and Company, *1910 Calumet, Houghton, Hancock and Laurium Directory* (Detroit: R.L. Polk and Company, 1909).
3. Original stock subscriptions are recorded on even-numbered pages 2-48 of the Arizona & Michigan Journal, Box #2, while issued shares are recorded in the Stock Register, Box #2, A&M Collection.
4. Hayden, Stone & Co. owned stock in numerous Michigan mining ventures. Hayden, Stone's investment in the Nevada Consolidated was based upon the report of consulting engineer J. Parke Channing who had spent the first fifteen years of his career in Michigan, and their Chino investment involved Albert Burrage, another name known to the Michigan district. See A.B. Parsons, *Porphyry Copper* (NY: American Institute of Mining and Metallurgical Engineers, 1933), 121, 76, 211-212. For further information on Channing, see T.A. Rickard, "J. Parke Channing, and Copper Mining" *Mining and Scientific Press*, Vol. 113, September 30, 1916, 487-494. For an interesting link between Burrage and Arizona & Michigan president James Chynoweth, see Richard Fields, *Range of Opportunity* (Hancock, MI: Quincy Mine Hoist Assn., 1997), 14.
5. The Stock Register documents shares held by President James Chynoweth, Secretary Silas Chynoweth, Treasurer William B. Anderson, and board members Anton Trojanovich and James Nankervis. Box 4, A&M Collection.
6. Polk & Co., *1910 Calumet, Houghton, Hancock and Laurium Directory*. More than half of the initial shareholders are listed in the 1910 Polk as residents of Houghton County, Michigan. Additional work is necessary to identify the remaining stockholders, but the available information suggests that many were residents of Arizona, or of Marquette County, Michigan. The iron mining communities of Marquette County had helped to bankroll the Calumet & Arizona Mining Company in Bisbee, Arizona.
7. For information on the capitalization of nineteenth century Michigan copper mines see William Gates, *Michigan Copper and Boston Dollars* (Cambridge, MA: Harvard University Press, 1951) and Larry Lankton, *Cradle to Grave* (New York: Oxford University Press, 1991).
8. Gates, *Michigan Copper and Boston Dollars*; Navin, Thomas, *Copper Mining and Management* (Tucson: University of Arizona Press, 1978), 117.
9. B.S. Butler and W.S. Burbank, *Copper Deposits of Michigan*, United States Geological Survey Professional Publication 144 (Washington, DC: USGS, 1929).
10. *The Copper Handbook: A Manual of the Copper Industry of*

- the World, Vol. VIII* (Houghton, MI: Horace Stevens, 1908). For background on the development of Globe as a silver district, and its subsequent rise to fame as a copper camp, see Robert Sigando, *Globe Arizona: The Life and Times of a Western Mining Town* (Globe: Mountain Spirit Press, 1989), passim; Ira B. Joralemon, *Copper* (Berkeley, CA: Howell-North, 1973), 214-215; information on the construction of the Gila Valley, Globe and Northern Railway in David F. Myrick, *Railroads of Arizona: Volume III, Phoenix and the Central Roads* (LaJolla, CA: Howell-North, 1980), 828-953.
11. The 1910 Michigan College of Mines *Alumni Directory* lists mining engineering graduates, each company they had worked for since graduation, and the position held with each company. Although MCM grads were dispersed throughout the world, several Arizona mining companies served as "nodes" for Tech graduates seeking entry-level work. These include the Calumet & Arizona in Bisbee, the Shannon in Clifton, and both the Arizona Commercial and Old Dominion in Globe.
 12. See Mason Coggin, "Roots of the C&A", Phoenix, AZ, 1993), ms.
 13. *Calumet News* (Calumet, Michigan), March 25, 1922.
 14. The Stevens *Copper Handbook* (various volumes/years) documents Chynoweth's involvement with Michigan's Tamarack Junior (1894-1897), and the following Fay Group companies: Union Copper Land Company (1897-1908), Trimountain (1899-1902), Allouez (1898-1906), Centennial (1897-1907), Elm River (1899-1907), Mayflower (1899-1907), Old Colony (1899-1907), Tecumseh (1899-1902), Washington (1899-1902), and the Erie-Ontario Development Company (1905-1908). Documents indicate that Chynoweth owned stock in Trimountain from its founding, and continued as one of a limited number of shareholders after its takeover by Paine's Copper Range Consolidated.
 15. *Report of the Commissioner of Banking* (Lansing, MI: State of Michigan, 1908).
 16. Chynoweth served as President of the Herminia Mining Company near Sault Ste. Marie, Ontario from 1908-1911, and was involved with the initial public offering of the Calumet & Cerro Gordo Mining Company in Inyo County in 1907. Chynoweth's link to Globe may have been Michigan College of Mines alumnus Henry V. Snell, who also served on the board of the Superior & Boston in 1907; see *Annual Report of the Superior & Boston Mining Company*, 1907. Snell became a prominent Globe mining engineer, including employment as an engineer with Old Dominion and as superintendent of Arizona Commercial. The *Globe Arizona Silver Belt* mentions the two men together in Globe on January 2, 1907, and the *Houghton Daily Mining Gazette* records another Chynoweth visit to the Superior & Boston property on February 5, 1908.
 17. Biographical information taken from undated, unsourced newspaper obituary and interview with Anton Trojanovich's grandson, John Trojanovich of Tucson, Arizona.
 18. Journal, Box 3, Stock Register, Box 4, A&M Collection.
 19. The 1908 Stevens *Copper Handbook* details the productivity of these mines. For a map of the Globe district, see the 1908 *Annual Report for the Superior & Boston Copper Company*.
 20. "Special Mining Edition," *Arizona Silver Belt*, Globe, Arizona, 1910.
 21. The company's Stock Register records fewer than half of the investors making the additional assessment payment. Box 5, A&M Collection.
 22. Stevens, *Copper Handbook* (1908), 364-365.
 23. The company's Cash Book indicates that the company held out hope of a turnaround right to the bitter end - one of the last items to be sold was the company's gasoline-powered hoisting engine. Box 2, A&M Collection.
 24. Charles Hyde, "From Subterranean Lottery to Orderly Investment: Michigan Copper and Eastern Dollars, 1841-1865," *Mid-America: An Historical Review*, 66 (Jan. 1984) 3-20.
 25. *Calumet News* (Calumet, Michigan), March 25, 1922.