

SCIENCE

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BAUXITE MINING.

BY HENRY M'CALLEY.

BAUXITE mining in America is a new thing, only a few years old, and hence its methods, etc., are known to but few. Four companies have been engaged in it, viz.: Republic Mining and Manufacturing Company, formerly of Hermitage, Ga., now of Rock Run, Ala., the pioneers in the business; Southern Bauxite Mining and Manufacturing Company, Piedmont, Ala., Georgia Bauxite Company, Linwood, Ga., and the John D. Taylor Bauxite Company, Summerville, Ga. Only the first two of these companies, however, are now actively engaged in the work, the Georgia Bauxite Company having laid off a few months ago until the tariff question is settled, and the Taylor Bauxite Company having never done anything more than to develop the quality and extent of its deposits. The two companies now actively engaged in the work have mines in both Georgia and Alabama, though they both, in 1892, concentrated all of their forces in Alabama, in the "Dyke District," Cherokee County, and so they are not now working their Georgia mines. They each have in the "Dyke District" two mines, though the Southern Bauxite Mining and Manufacturing Company are at present working only one of theirs. These mines consist of nothing more than irregular holes, diggings in the ground, on the sides of hills, with deep, open drainage channels, or ditches, leading off from them and with graded ways leading down into them. In other words, they are the counterparts of limonite and manganese diggings, with the addition of the drainage channels, the ore occurring very much as do the limonites and manganese, in irregular or ill-defined beds or deposits in residual clays. It is, however, more or less stratified, or, in other words, follows the strike and dip of certain strata.

The mining of the ore is made easy by its comparative softness below the surface, being usually soft enough to be dug up with a pick. It is, however, expensive to mine, from the fact that it is so variable in quality that it has to be condensed and assorted. The ore in the same mine often changes from one quality to another, sometimes suddenly and sometimes gradually. It is condensed and assorted by means of the screen and the hand.

The mining implements are of the most simple kind, consisting of only the pick, shovel, churn-drill, wheelbarrow and tram-car. The ore has to be dried before it is shipped, as it has a very great affinity for hygroscopic water. This drying is done at present by simply spreading the ore out over the yard and under the shed; and leaving the rest to the sun and the winds. The preparatory work, therefore, in commencing to mine bauxite consists in leveling off a yard, building a shed, building of a road or track to the dump piles, and the securing of perfect drainage for the mine.

As now conducted, the drying process goes on only during favorable weather, and hence at the expense of much time and often of completeness. This will doubtless be corrected as soon as the profits of the business

will admit of the additional outlay of capital for the erection of artificial driers. The present method of mining will, of course, have to be varied some, as the diggings get too deep to be drained by open ditches, and as bedded rocks are struck, provided the deposits still hold out. No bedded rocks as yet, other than the ore itself, have been struck in any of the mines.

The Alabama ores have, up to this time, invariably improved with depth, though, in some of the Georgia mines, the ores have deteriorated, or have increased in iron and silica with depth. The best variety of ore now makes up most of the shipments, and so the inferior ores, though many of them of very good quality, are accumulating at the mines. This is to be regretted very much, especially since nearly all of the present shipments are used for the manufacture of alum, and a much inferior ore, or one much higher in iron and silica, might just as well be used for this purpose. This shipment of only the best ore is, however, a necessity, from the fact that these new enterprises have to meet in competition old and well established shippers of cheap foreign ores. They have been so successful in this competition that they have about killed the import trade. If the shipment of the best ore first was not a necessity it would be nothing more than what might be expected, as it would be simply repeating the history of all new mining enterprises at their very beginning.

The three mines that are now in active operation are known as the "Washer or Taylor Bank," "Dyke or Burst-Up Bank" and the "War-Whoop Bank." The first two, on the property of the Bass Furnace Company, are leased and worked by the Republic Mining and Manufacturing Company. The last one is owned and worked by the Southern Bauxite Mining and Manufacturing Company. These mines are in a broken country, from three to four miles to the northeast of Rock Run furnace, to where the ore has to be hauled in wagons to be loaded on the cars. One of these companies employs from fifteen to twenty hands and the other from fifteen to forty, exclusive of the teamsters. This ore now costs, as stated by one of the companies, about \$3.45 per long ton, loaded on the cars at Rock Run furnace. The exact cost, however, as stated by this company, is hard to get at, as, the mines being new, a great deal of expense for prospecting and dead work has properly to be taken into account to get the cost per ton. The cost per ton at the different mines would, therefore, probably vary materially from each other.

The "Washer or Taylor Bank or Mine" has now reached a depth at its back or deepest part, next to the hill or ridge, of some forty feet. It will hardly be dug any deeper until there is provided some other means of keeping it dry than the present open ditch. It is proposed to drain it to a still lower depth of some twenty feet by means of a tunnel or drift that will start in some distance away at the foot of the hill. The ore is continuous across the mine in the direction of the strike, a general northeast and southwest direction, though the strike is in waves. The dip, in a general way, is from 30° to 40° toward the northwest. The deposit, however, is irregu-

lar, and little can be known about it until it has been laid bare. The ore is about thirty-five feet thick in the mine. It is concretionary or pisolitic and is of very good quality. The upper twenty feet is better ore than the lower fifteen feet, and the best of all is an inter-bedded seam of four to five feet in thickness. An average sample of the mine is said by Mr. John H. Hawkins, superintendent of the Republic Mining and Manufacturing Company, to have about the following analysis:

Alumina	-	-	-	-	61.00
Ferric oxide	-	-	-	-	2.20
Silica	-	-	-	-	2.10
Titanic acid	-	-	-	-	3.12
Water (Com. and Hydro.) and loss	-	-	-	-	31.58
					100.00

The "Dyke or Burst-Up Bank" in its back or deepest part is from twenty to twenty-five feet deep. Its ore is divided into two irregular seams by an unctuous clay of white, blue and mottled colors. On the outcrop the ore over the clay is near thirty feet thick, and that under the clay has been dug into to a depth of some twenty feet, though its full thickness cannot be seen. In the mine the ore does not appear to be so thick. The bottom bauxite has in it some spots of bauxitic clay and some streaks of manganese stain. The general strike is to the northeast and southwest, and, in the mine, the dip is near 30° toward the northwest. An average sample of the ore of this mine is said to have about the following analysis:

Alumina	-	-	-	-	58.21
Ferric oxide	-	-	-	-	3.60
Silica	-	-	-	-	2.90
Titanic acid	-	-	-	-	3.40
Water (Com. and Hydro.)	-	-	-	-	31.89
					100.00

The "War-whoop Bank," in its back or deepest part, is some twenty feet deep. The different varieties of ore of this mine are known by the commercial names of "War-whoop Ore," "Bird's-eye Ore," "Purple Ore," "War-whoop Bobo Ore" and "Hard White Ore." The "War-whoop Ore" has a putty or dove-colored matrix. The "Bird's-eye Ore" is the "War-whoop Ore" with decomposed matrix; it is inferior in alumina and is so thrown into the waste dump. The "Purple Ore" is "War-whoop" stained, presumably with manganese; it is also thrown over the dump. The "Hard White Ore" has a very white matrix; and the "War-whoop Bobo Ore" is a flour-like ore of about the same composition as the "Hard White Ore." These different ores occur as in the following section, made by Mr. R. S. Perry, general manager of the Southern Bauxite Mining and Manufacturing Company, along a straight line across the mines, commencing with the top ore:

	Feet.
(10) "War-whoop Ore," about	13
(9) "Bird's-eye Ore," about	8
(8) "War-whoop Ore," about	10
(7) "Purple Ore," nearly	3
(6) "Clay Horse," a little over	3
(5) "War-whoop Ore," with 3 inches of (4), nearly	3
(4) "War-whoop Bobo Ore," nearly	3
(3) "Hard White Ore," nearly	9
(2) "War-whoop Bobo Ore," soft, something over	2
(1) Clay, underbed, white for several feet and then mottled.	

The following analyses are given by Mr. R. S. Perry as the average of those made by the consumers of car-load samples of the "War-whoop" and "Hard White" ores of the "War-whoop Bank or Mine."

	1.	2.
Alumina, from	57.00 to 62.00	56.00 to 62.00
Ferric Oxide	under 1.00	2.50 to 3.00
Silica, about	2.50	5.00
Titanic Acid	3.00 to 4.00	3.00 to 4.00
Water, Combined	29.00 to 30.00	about 30.00
Moisture, Hygroscopic	2.00 to 4.00	3.00 to 4.00

(1) The "Hard White Ore." Average analysis of car load samples of between 500 and 1000 long tons.

(2) The "War-whoop Ore." Average of consumers' analyses.

The company contemplates driving a tunnel from near the bottom of an adjacent ravine under the "War-whoop Bank or Mine." This tunnel would drain the ore to a depth of some forty feet under the present floor of the mine.

The bauxite mining in America, or in Alabama and Georgia, is gradually on the increase, and, unless nipped in the bud by unfavorable legislation, promises to be of no little importance.

A SOUTH AMERICAN LAMPREY.

BY THEO. GILL, WASHINGTON, D. C.

IN September, 1867, a lamprey was found in a street of Buenos Ayres and was the cause of much comment, some conjecturing it to have fallen from the heavens (!) and others that it was transported by a water spout. A valuation of 15,000 pesos (dollars) was placed on it, and subsequently it was actually sold for 1,000 pesos. (This was, however, in the much depreciated currency of Argentina.) Later the species was described by Dr. Burmeister as *Petromyzon macrostomus*. In 1882 I ventured to propose for it the generic name *Exomegas*. In 1893 it was re-described and figured by Dr. Carlos Berg, the successor of Dr. Burmeister, as *Geotria macrostomus*. Another specimen was found near Montevideo in 1890, and on it Dr. Berg's communication was based. The description and figure do not, however, entirely agree, and to call attention to such discrepancies is the object of this note. It is to be hoped that Dr. Berg will further examine the specimen and elucidate the doubtful points.

From Dr. Berg's illustration, it is evident that the lamprey is not a *Geotria* and that the genus *Exomegas* based on it is perfectly valid. It is not clear, however, what is the character of the annular cartilage, and, from the figure, one might even be excused for thinking it might not be developed. Such want, however, is very improbable.¹ If there should really be no annular cartilage the lamprey so distinguished would have to be referred to an independent family at least.

Dr. Berg says: "*Lamina maxillaris angusta lobulis quatuor valde humilibus fere inermis instructa*," but not the slightest indication of such a corneous lamina is given in the accompanying plate. Only four concentric (not at all diverging) rows of conic teeth are represented as arming the upper half of the oral disk, and one row of numerous (24) teeth is delineated in a marginal lower row. Is there really an upper or suproral lamina, and can the lower teeth possibly be developed from tubercles of the annular cartilage? Dr. Berg says: "*Lamina mandibularis humilissima mutica*." Let us hope that Dr. Berg will dissect the subject sufficiently to inform us, and give us a better illustration. Either the figure of Dr. Berg's memoir is quite inaccurate, or the species deviates remarkably from all other *Petromyzonids* in dental arrangement. I may add that in common with all others of late years, I have adopted for the family the name *Petromyzontidae*, for which Professor Agassiz (1850) was responsible. The proper form of the name is *Petromyzonidae*.

¹The shape of the mouth sufficiently indicates the existence of an annular cartilage.