

at the highest temperature given. Column (7) is interesting as showing the extreme difficulty there is in securing reliable results in work of this kind. At the lowest temperature this gives .29^{mm} higher than (2); at 50° they agree, and at 90° column (7) is .76^{mm} lower than (2), and .36^{mm} lower than (6). It seems to me the work has now been narrowed within pretty small limits, and but little more is needed to give us an absolute standard of values of this important element, which enters into so many discussions in meteorology. I hope shortly to obtain values from Professor Kahlbaum at very much lower temperatures.

CURIOUS IROQUOIS POTTERY.

BY W. M. BEAUCHAMP, BALDWINVILLE, N. Y.

THE common earthenware of the North is well known, and its styles of ornament are simple. Incised lines, rows of dots, notches either pinched or cut, impressions of corn or grass, small circles made by a hollow bone, are among these, but there are others which are almost unique. Hough speaks of rude attempts at human faces in pottery along the St. Lawrence River, and these appear in a more distinct manner on some Mohawk and Onondaga sites. On these they occur from about A.D. 1600 to 1640, apparently reaching their proper territory at the time of the migration of these two nations, which may have been a little before the earlier date here given.

The earliest hint of such attempts which I have seen in New York is in the arrangement of three dots to represent the eyes and mouth. Such examples occur in Jefferson County, N. Y., and in one of these the elliptical and horizontal indentations are placed inside four lines, arranged as a diamond, at the lower angle of the vessel. The point of the diamond forms the chin. In a similar one the boundary lines form a pentagon, with the apex above. Still another has a horizontal line for the chin, as in the last, and mostly the same general form. About this are lines and notches, and the three circular impressions were formed by a hollow bone. I have a pottery rim much like these, said to be from a small burial mound near Columbus, Ohio. In this, however, the small elliptic indentations have their longest diameter vertical. There are no distinct bounding lines, though two lines run parallel with the notched rim, and the general decoration is of vertical and diagonal lines.

In the more advanced types the body and limbs, when present, are almost always made of raised bars of clay, which are crossed by grooves. Rarely these bars appear without human faces. In the Canadian Institute Report, 1891, fig. 2, is the representation of a fine vessel from Lanark County, Canada, which has several such bars symmetrically arranged. I picked up a rim on the Seneca River, N. Y., which had two such raised bars, placed vertically and rising so far above the rim as to be continued within. They are each two inches long.

On one of the two early Mohawk sites I know of no earthenware of this description, though the general style is very bold. On the other I found a fragment of the largest figure that I have yet seen. It was broken through part of the angle, and though the body was gone its impress remained. One arm is nearly perfect and is 3.5 inches long. The vessel was ornamented with lines and notches, and this was continued below the projection. Usually this class of pottery has no ornament on the lower part. I figured a very elaborate specimen from the same early site. The face reached the top of the angle, and the feet to the lower edge of the projecting top. The limbs were less conventional in arrangement than usual, and there were many parallel and intersecting lines.

The figure was but slightly raised, and may not have been made like the others. No European articles have been found on this site except two long and cylindrical brass beads.

A site in a like elevated position near the same stream is a little more recent, containing iron articles, copper saws of Mohawk make, unfinished bone combs, etc., and it is several miles nearer the river. It yields fragments of many of these vessels. In one the angle is low, and the small face is close to the rim. There is a curious arrangement of dots and lines. Another has a large face, with general ornaments of lines and notches. The most curious one I have seen came from this spot. The figure is rather large, and while one extended arm has the left hand raised, the other has the right hand turned down. Fingers and toes are also represented, and the general surface has some incised lines. Another with a small face and body has circles for eyes, with a raised surface in the centre of each.

On a still later site a few miles east of this I found an angle of a vessel with a projecting head above the level of the rim. The face is round and flattened, with very wide eyes and mouth, suggesting an ape. The body forms a single bar with the usual cross indentations, and lines slope away from it on either side. I have seen nothing like it. In the same place I found another fragment, one arm and part of the body remaining, and on these were deeper notches than usual, of an elliptic form. The face was broken off from another. It was placed below a dotted angular rim, and the body was slight. In this one lines of dots represented the arms instead of bars. Still another preserved the face and body, the latter in two vertical lines, whereas it is usually in one. At a site not far from this the face at the angle of a broken vessel was broken off, and the legs reached only to the edge of the upper projection. The body of this was also double, and the arms were nearly perpendicular, but not symmetrically arranged. They had fingers. All these were from the north side of the river.

I have a figure of but one on the south side, and think the early clan there made few or none. This one had a curious face and body. Three circular dots represented the eyes, and the shoulders were distinctly rounded. Of a few Mohawk specimens I made no figures.

The Onondaga forms are remarkable in the frequent occurrence of the detached faces, especially on their earliest site. The range in time is about the same as the Mohawk, and all have been found within a distance of six miles except one specimen. The detached faces are of many sizes and features, but a broad, good natured face was quite a favorite. Usually the face is placed squarely on the vessel, but sometimes it has an oblique position. One has a large nose and projecting forehead, and this, like most of the others, is from the site occupied about 300 years ago. Excepting one already noted this has the only example of the perpendicular raised bars which I have seen here unconnected with heads. Among the Mohawk specimens the legs usually end with the projecting upper part. Here they often extend below. One of this kind has the arms represented by lines of dots. A face below a notched rim shows traces of arms but no body or legs. The parallel legs of another are over two inches long. One round face has a broad body, which has no lines across it, but they may have been worn away. Another body is very broad and has lines; the extremely short incurved legs end in long toes in this example.

Several miles southwest of this is the next site in point of time. One fragment has a very high angle, with the head, body and arms on the upper part, which is decorated with lines and dots. Two slender legs appear on the sharply receding lower part. Another has a twisted face

and mouth under a notched rim. One detached face has much the character of some of the heads at Hoculago, but the Onondagas seem to have made some terra cotta articles merely as ornaments.

Two other later sites, not far off, supply some more articles of this kind, but it is needless to describe all of these. Quite a number have been passed over now. On the earliest of these Onondago sites are occasionally found some large and curious clay pipes, with from four to five grotesque faces encircling the top of the bowl, while others intertwine all down the curving sides even to the mouthpiece. I have seen them nowhere else.

Of this pottery one fragment with a face at the angle was recently found on a fishing site near the head of Onondaga Lake. It is of interest as showing that the Onondagas even then visited the lake, though their homes were far away. It is interesting, too, to find that the Mohawks and Onondagas, the real founders of the Iroquois League, both had this unique pottery for a short time three centuries ago, and that it has not yet been found in the homes of the other Iroquois.

HOW ALUMINIUM IS OBTAINED FROM ITS ORES.

ALUMINIUM is now so rapidly growing in demand with the cheapening of the metal that it attracts more or less popular attention. In the form of clay the metal is all around us, but this ore is too poor in the metal and too difficult of working to make it a profitable source of supply. Corundum is the oxide and theoretically nearest the metal from a metallurgical point of view. Indeed, the metal has been extracted from this mineral on a small commercial scale, but the supply is too limited.

The metallurgy of the aluminium is theoretically the same as iron, that is, the compound used for extracting the metal is in each case an oxide. The oxygen in both cases is removed by carbon. The facility of carrying into practice the extraction of the metal is entirely different. In an ordinary blast furnace the carbon of the coal or coke easily extracts the oxygen from the iron ore, so that a pound or two of coal produces a pound of metallic iron. The oxide of aluminium defies such easy processes, and requires a temperature vastly greater than the fiery iron furnace. This is obtained by electric currents, and a process of electro-metallurgy is adopted. A trough is lined with gas carbon. In this, cryolite to the extent of 500 pounds is placed. Into this press, enormous electrodes are inserted, and the heat melts the cryolite, which is not decomposed by the electricity. With this fused mineral, about a third of its weight of oxide of aluminium is mixed, and it is soon dissolved. In this condition the aluminium compound is decomposed, the oxygen being removed at the expense of the carbon electrodes, and the molten particles sink in the cryolite. As the cryolite (fluoride of aluminium and sodium) is not consumed, the operation is continuous. However, the affinity between the metal and oxygen is so great that not merely the carbon of the electrodes is consumed, but about 75 pounds of coal are needed to develop horsepower to produce electricity enough to decompose the oxide.

From the method pursued, we see that the ore most available is that nearest approaching an oxide and rich in the metal. Of the natural compounds occurring in large quantities, beauxite is the most important. This is essentially a hydrated oxide of aluminium, but with usually an admixture of oxide of iron and frausilica. A high grade ore contains 60 per cent of alumina, only one

or two per cent of each of the other constituents, and the balance is water. In this country the beauxite occurs in Georgia, Alabama and Arkansas. It is from the recent volume on the Paleozoic Belt of Georgia, by Dr. J. W. Spencer, that we derive the materials for this notice. This report is the most exhaustive treatise upon beauxite which has appeared in this country. The mineral occurs as masses of small concretions in great products in the Knox dolomite (the lowest formation of the Lower Silurian system). Where it is formed, the calcareous matter has been leached out of the impure limestone, leaving a great mass of a peculiar siliceous clay or loam, which is sometimes 200 feet thick. This represents that as much as 2000 feet of limestone have been removed from the region, which has been exposed to atmospheric degradation for long geological ages. As the alumina has resisted solution, a process of concentration has gone on so that the accumulations make themselves conspicuous. The ore always occurs in proximity to brown iron and manganese ores. The author explains their occurrences as having been brought down in solution by streams and deposited in lagoons, in which the limestones were also forming. The author gives us here an interesting chapter on chemical geology, without saying so in his treatment of the origin of the beauxite. Under the conditions of occurrence ferric oxide often replaces a portion of the alumina, sometimes to the extent of twelve or fifteen per cent. This, however, is no injury, for in preparing alumina for furnace uses a valuable by-product is obtained. Silica may sometimes reach 20 or 30 per cent. In this case, the mineral must be considered more or less a mixture of beauxite and clay. Amongst the beauxite, iron and manganese deposits, great pockets or "horses" of clay, or often kaolin, are frequently seen. When the silica is present in such quantities the mineral becomes too poor to be of use. For making alumina the beauxite is fused with soda, from which mass the pure alumina is extracted. With the visible supply of beauxite and greater economy in the power consumed, we may hope before very long to see the metal at twenty-five or thirty cents a pound, when its uses in the arts will be enormously increased.

—When we examine the total number of books that have for their subject an Oriental country we are surprised to find how large a proportion of them have been written by travelers who were there for a comparatively short period, who did not understand the language of the people they describe, and whose knowledge must, consequently, have been acquired mainly at second-hand. It is a pleasure, therefore, to find in Miss Adele M. Fielde's forthcoming volume—"A Corner of Cathay"—a graphic record of original research concerning the life of the Chinese, by one who lived among them for twenty years, and whose familiarity with their language enabled her to enter into their modes of thought, and to ascertain from themselves the reasons for their peculiar and amazing customs. As an inmate of native households she possessed peculiar facilities for a study of their life, domestic, social, and intellectual, from the question of the legal status of the women to the curious games played by the children. In her illustrations she was aided by a native artist of wide local fame, and his pictures, as winsomely guiltless of perspective as were those of the early Italian artists and as charming in tint as Pekinese enamels, are skillfully reproduced in colors and present a new feature in American illustration. The name of the book is taken from the populous and picturesque region about Swatow, in the southeastern corner of China. It will be published by Macmillan & Co.