even line, in some places reaching 4 feet, while in others not over a foot. The deepest spots are along cracks or joints, or following roots of weeds, shrubs or trees.

Thus we see how irregular is the contact between this Red Top clay and the underlying Erie clay. This fact leads to a great deal of trouble for those brick makers using the Red Top clay, as they are constantly digging too deeply, thereby including some of the underlying Erie clay, which causes the resulting brick to be spotted by inclusions of the white-burning clay.

From the analyses given below, it will be noticed that the lime is reduced from over 15 per cent. in the case of the Erie clays, to about 2 to 4 per cent., in the Red-top, while the percentage of iron remains about the same. The percentage of magnesia is also reduced, and the loss on ignition is also lessened from roughly 18 per cent. to about 5 per cent. All these are the result of the weathering of the original Erie clay.

With these various losses there is naturally a corresponding increase in percentage of the insoluble residues in the resulting clay. Iron oxides are insoluble in these weak solutions, therefore the percentage of ferric oxides in the new clay is a little larger as a rule. All the free silica will remain undissolved, thereby increasing its percentage in the resulting clay. Similarly with the other insoluble ingredients.

I mentioned above that the Erie clay contains much calcium carbonate. In burning this Erie clay, the calcium carbonate is broken up by heat, and carbon dioxide gas is given off, which accounts for the large percentage of loss by ignition.

In every place where the Erie blue clay is found in the Province, and exposed on the surface, a band of the Red-top clay of some thickness was found as the first mantle, varying from a few inches to 4 feet, according to the ease with which the percolating solutions could attack the clay. And in every case upon digging through the Red-top clay, the underlying Erie clay was found. We can therefore see that our supply of red-burning clay in what is usually spoken of as "Old Ontario," is quite limited, and consists of a weathered belt rarely over three feet in thickness, and on steep gradients entirely wanting. An examination of the analyses of Erie clays given below will impress one with the close similarity in their composition, though taken from wdely separated sections of the country; and when we consider the mechanical means by which these clays have been formed and collected, we are surprised that such a similarity should exist.

COMPARATIVE ANALYSES OF ERIE AND RED TOP CLAYS (LYING TOGETHER).

Locality	Clay	SiO_2	Al_2O_3	Fe_2O_3	CaO	MgO	$(Na_2K_2)O$	Loss by Heat
Ridgetown ...	Erie	39.82	12.69	4.67	15.56	3.72	3.19	18.82
	Red Top	65.06	14.15	4.67	2.36	2.18	4.14	6.76
Exeter	Erie	37.72	10.72	3.51	16.90	7.05	3.06	21.76
	Red Top	63.56	19.91	6.24	1.91	2.42	3.85	5.64
Stratford	Erie	46.16	13.76	5.58	15.74	3.78	2.70	17.48
	Red Top	69.12	14.03	4.81	1.94	1.10	3.58	4.80
Waterloo	Erie	44.30	11.21	4.05	16.10	3.81	3.02	17.74
	Red Top	68.06	14.18	6.13	1.34	1.98	3.42	4.86
Preston	Erie	51.30	9.80	3.70	13.63	3.82	3.91	13.88
	Red Top	67.10	15.30	4.80	1.63	1.59	3.21	5.44
Picton	Erie	39.48	9.11	3.71	18.33	4.83	2.66	23.30
	Red Top	59.48	14.80	5.38	4.60	3.32	4.70	6.82
Beaverton ...	Erie	37.50	10.31	3.59	22.56	2.61	3.45	19.60
	Red Top	59.96	19.58	5.86	2.62	2.30	4.05	5.00
Peterboro	Erie	47.50	13.66	4.44	15.58	0.80	4.42	12.94
	Red Top	64.44	15.26	5.96	3.65	1.78	5.72	2.92
Renfrew	Erie	50.06	14.58	4.78	14.00	3.47	4.10	9.76
	Red Top	54.38	19.18	7.30	4.60	3.20	5.24	5.60
Prescott	Erie	49.85	13.10	6.18	14.32	3.13	4.14	10.28
	Red Top	55.34	19.80	7.62	2.18	2.40	5.67	5.50

Ordinary meteoric waters on meeting the Erie blue clay dissolve much of the calcium carbonate, carrying it away in solution. The same reactions apply to $MgCO_3$ but to a lesser degree. Thus we have the resulting weathered Red-top clay, much reduced in lime and magnesia and with a corresponding diminution in the amount of loss on ignition.

The iron which was present in the Erie clay is therefore still present in the Red-top clay, and being no longer counteracted by the high percentage of lime, it is able to burn to the ferric state, thereby coloring the brick red.

The Leda Clay.

Turning now to the eastern part of Canada we find that east of the line described above, the clay is entirely different from that west of the line. It is a stiff blue clay, which would be readily mistaken for Erie clay. Upon examination, however, it is found to be very different, e.g., the percentage of CaO is the most noteworthy point, it rarely exceeds 6 per cent., and since the percentage of iron oxide is about equal, the burning of this clay yields ferric compounds instead of ferrous ones, and the products are therefore red in color instead of white, as in the case of burned Erie clay. This Leda clay is contemporaneous in age with the Erie, but as has been pointed out above, it was laid in salt water instead of fresh. In some places it reaches a depth as great as that of the Erie clay, e.g., at Ottawa, where the foundations were being dug for the new geological museum, an exposure of blue Leda clay was very like the great depths of Erie clay in the west. I visited these excavations on two occasions, and the contractor told me that after digging twenty feet without finding rock bottom, he had bored 94 feet and still failed to find rock. The eastern part of Canada is therefore ensured an unlimited supply of red-burning clay, but lacks the white-burning clay.

I give below a few analysis of Leda clay, and a glance is sufficient to show that it differs essentially from the Erie clays of Western Ontario.

ANALYSES OF LEDA CLAY.*

Locality	Clay	SiO_2	Al_2O_3	Fe_2O_3	CaO	MgO	$(Na_2K_2)O$	SO_3	Loss by Heat
Arnprior	Leda	57.98	19.00	6.18	3.78	3.82	5.68	0.35	3.18
5 miles east Arnprior	Leda	62.06	15.54	5.70	4.91	3.11	4.30	0.14	4.01
Ottawa East	Leda	58.54	17.02	5.48	6.36	2.22	5.13	0.56	3.42
Ottawa West	Leda	56.00	17.07	8.27	4.17	4.55	4.38	0.59	4.89
Hull	Leda	52.86	17.42	8.58	3.69	3.37	4.97	0.58	5.65

Saugeen Clay.

The last of our clays mentioned above, is the Saugeen. It lies unconformably upon both Erie and Leda clay, and in many places in the northern parts of Canada lies directly on the glaciated surface of the rocks. Starting at the St. Lawrence River somewhere about the mouth of the Ottawa, if we follow the river upwards to Casselman, Ottawa, Pembroke, then cut across country to Bracebridge, Paisley, Hepworth, Walkerton to Georgian Bay, then take the north shore of Lake Huron and Superior to the Soo and Fort William, then extend on to Dryden, Kenora, etc., we will have a rough line which will mark approximately the southern border of the great Saugeen clay belt.

This clay is composed of a great number of alternate bands of "fat" clay with bonds of calcareous sand, or some places, even marl. The bands of clay and sand are rarely over three-quarters of an inch thick, but this relationship is repeated so many times that banks of Saugeen clay twenty feet thick are a common occurrence and present a very unique appearance. All the Saugeen clay seen in the Province lies north of this line mentioned above, and the farther north we go, the more abundant is this clay. I have seen it from Kenora to the St. Lawrence River, and for 100 miles north of Lake