

Popular Geology—No. 10.

BY J. HOYES PANTON, M. A., F. G. S.

My last communication ended by referring to the eighth system (Permian) in the geological records. As a blank occurs in the records represented in Ontario from the seventh system (Devonian) to the fifteenth (Pleistocene), I shall briefly notice the missing systems, and refer more particularly to those represented in the Province of Ontario.

The Triassic system (No. 9) is interesting for reptile tracks that have been discovered among its deposits, and also for salt beds which occur in it in England.

The Jurassic system (No. 10) is marked by the remains of enormous fossil reptiles which it contains. So numerous are they that it has been styled the "Age of Reptiles." The Rocky Mountains began to rise out of the sea towards the close of this period.

The Cretaceous system (No. 11) is largely represented in the Northwest. The extensive coal deposits of that district belong to this system. This coal is of a much later date than that of the true Carboniferous (No. 7) system. With the Cretaceous closes the Third Age (Mesozoic) in geology.

The Eocene system (No. 12) is marked by the appearance of several mountain chains towards its close, viz., Alps, Pyrenees, Carpathian, and Himalaya.

The Miocene system (No. 13) indicates the presence of some large mammalian forms, such as the Mastodon.

The Pliocene system (No. 14) closes the fourth age (Cainozoic) in geology. During this the climate was getting much colder than it had been before, and changes occurred that modified at a later date the deposits of North America.

In the Rocky Mountains there was a marvellous outbreak of volcanic energy; the slumbering fires of those days are partially represented in the innumerable boiling springs and geysers of Yellowstone Park, in the north-west corner of Wyoming.

The Pleistocene system (No. 15) introduces to our notice the "Ice Age," when Ontario received an additional deposit, after having been at a geological standstill since the close of the sixth system (Devonian). The deposits of the Pleistocene occur as beds of clay, sand, gravel and loose boulders, well represented in all parts of Ontario. Frequently it represents three distinct layers:

1. Unstratified clays, with angular fragments of stone more or less polished and striated. These beds form the so-called boulder clay or till, resting on rock, which is smoothed and scratched.

2. Stratified sands, gravels and clays, also with boulders.

3. Sands and gravels also stratified, but the stones in them are more rounded and water-worn than in the preceding.

It is considered that, when the boulder clay was formed, the northern part of America was higher than now and the climate Arctic, so that the mountain tops became the starting points of glaciers (rivers of ice). Then followed a time of subsidence, which supplied conditions favorable for floating ice and glaciers. After this re-elevation began and the continent assumed something of its present features. The glacial deposits have always been a subject of much interest, for during the period in which they were formed enormous quantities of rock material were ground up and mixed with soil formed previous to the "Ice Age." In countries where the mountains are high above the level of the sea, a line of perpetual snow is formed, and ice keeps accumulating during the year. In time the mass becomes so great that it begins to descend. If the slope is steep the descent is rapid, and an avalanche results. But if the descent is gradual the body of ice moves slowly towards the lower country, and forms a glacier, which may be miles long and hundreds of feet thick. In the course of its journey, fragments of rock are constantly falling upon it, and many became embedded in it, and thus a glacier becomes a great agent in grinding up rock.

If the glacier reaches the sea before it melts, a portion of it breaks off and moves away as an iceberg. This will carry away all the rock material in it and will deposit it, where it finally melts.

This occurs yearly along the coasts of Labrador and Newfoundland, where so many bergs stand at certain seasons. The question naturally arises now, Is it possible that such conditions have ever been in Ontario? The following facts seem to indicate that such has been the case:

1. Boulders are found all over the Province that resemble rocks north of this and not the stones of quarries near by.

2. These boulders are not found much south of 30° north latitude; that is a little south of Lake Erie.

3. In many parts of Ontario, where a rock surface is exposed, the rock is smoothed and covered by peculiar scratches that have a more or less northerly direction, and indicate the direction from which the ice came.

4. Our clay beds lie to the south, north are areas of gravel, and still farther north extensive areas of boulders.

No better explanation to account for this state of affairs can be given than the presence of a glacial period in Ontario—a time when the northern part of our continent was more elevated, and became the starting point of glaciers that made their way southward until regions were reached where they melted, leaving the boulders by our wayside as silent monuments of the past. In regard to the duration of the "Ice Age," there is great diversity

of opinion. No doubt it lasted thousands of years. During this time much rock would be ground up and form a contribution to soil.

At the close of this wonderful period, it is supposed that all our fresh water lakes were united and formed a vast body of water which covered the entire Province. This would aid in mixing up the soil that had been formed before the glaciers existed, and that which had been prepared during that period. During this time the waters of this great lake found an exit by the Mississippi River. In time the waters began to subside, and Queenston Heights formed a shore line. The Niagara River existed before the glacial period; part of its course extended from the present Whirlpool to St. David's. This became filled up with glacial clays. When the river began to flow again, instead of keeping its old bed, it turned from the Whirlpool to Lewiston, which became the starting point of the "Falls." As the lake diminished the falls increased and receded gradually until they reached the place we find them to-day. It is now considered that this has taken 10-15,000 years. It is doubtful at what period the waters found an outlet into the Atlantic Ocean by the River St. Lawrence. But shortly after this took place, the physical features of Ontario began to assume their present outline, and the Modern system (No. 16) appeared.

From a study of geology we learn that the soil of Ontario has been obtained from the decomposition of rock during the vast period of time extending from the Sixth to the Fifteenth system of the geological records, the grinding action of ice, both as glaciers and icebergs, during the Pleistocene period (Ice Age), and what has resulted from changes since then, together with the remains of plants and animals that have been added to it from time to time.

The Merits of Lucerne.

BY W. A. M'GEACHY, KENT CO., ONT.

Lucerne (or Alfalfa) is a forage plant that is rapidly gaining favor with farmers and dairymen, especially those who have poor land of light, sandy nature, for, although it does well on any soil if well drained, sand seems to be its natural home, and on such its roots have been known to penetrate to a depth of from fifteen to twenty feet. A few years ago, upon the high recommendation of a neighboring dairyman, we purchased enough Lucerne to seed down one of our fields, and, I must say, we are more than satisfied with results. Unlike Red clover, the seed is rather large to be sown on fall wheat, but does well on any spring-sown grain. Ours was sown broadcast on oats at the rate of fifteen pounds per acre, and then lightly harrowed. If two or three pounds of Red or Alsike clover is added it both thickens and improves the first crop. If the Lucerne does not appear very heavy on the start, don't plough it up, as the older it becomes the thicker it grows, and in a short time it will run the other clover out, and there is not a weed but what will follow the clover sooner or later. As pasture it is excellent, affording abundant herbage during the driest of seasons, as the tests of the past two years have proved. We have had all kinds of stock pastured on it, and they all relish it, thrive and grow fat. Our calves came right through fly-time on it last year, and came into the stable in the fall in grand order. The only points to watch in pasturing is to see that the dew is dried off and that the stock are well fed before turning them on the first time. In sections where soiling is practiced it will be found invaluable, coming in as it does so far in advance of peas and oats or the common clovers. Dairymen in these parts begin cutting it for this purpose about the first of June. We would highly recommend it to those wishing a good early soiling crop. When cut for hay it should be mown when out in full blossom, which is generally about a week in advance of Red clover. Care must be taken to see that it is thoroughly cured before mowing away to prevent heating. At the same time it must not be allowed to become too dry, as the leaves, which are the most nutritious part, become brittle and drop off. But if bunched after lying in the sun several hours, and then allowed to stand a few days, it makes splendid hay which, though rather coarse the first few cuttings, is relished by all stock. To test the feeding qualities of Lucerne for horses, a neighboring farmer has fed his nothing else during the past winter, and they are coming out this spring in grand condition. He has placed good timothy and Lucerne before them, and he says they prefer the Lucerne every time. We have cut ours three times in one season, and then pastured it, as it is hard to get favorable weather for curing it in the fall. Last year, after taking off one crop of hay, we kept the next for seed. We had it threshed by an ordinary clover mill, and from three acres we threshed thirteen bushels of first-class seed, which sold for from five to six dollars per bushel. A crop that will turn off two tons of hay and twenty-five dollars' worth of seed per acre per annum is one that, we think, should commend itself to every farmer's most earnest consideration these hard times.

Last, but not least, are its fertilizing qualities. When found necessary to plough it up, the dense mass of roots greatly increase the fertility of the soil. Those who have ever tried ploughing an asparagus bed will have some idea of what ploughing Lucerne is like; but all that is necessary is plenty of horse power and a good sharp plow. In conclusion, we would advise every farmer to give Lucerne a trial, and it will be as well with everyone as it does with ourselves, and neighbors, they certainly never would be without it.

Have Silos Been a Success?

In our list of inquiries sent out to seed grain correspondents we asked, "Have silos been used in your district, and with what success? Of what are the most satisfactory ones constructed?"

From twenty-three counties and one American state have been received thirty-eight replies. Some report them to be numerous in their vicinity; others say they are yet few, but increasing slowly. In the whole number of replies we have failed to hear of anything but satisfaction to their owners. Those who have had most to do with them speak out most decidedly in their favor. Many speak of them as being especially valuable in winter dairying, and also to stock-breeding. Says an Oxford man: "Silos are quite numerous in this vicinity, and all who have them like them. The number of silos increase yearly, but not as fast as they should, or must, if winter dairying is to be a success." From Huron we hear, "Silos are gaining ground in this district. They are all built of wood—mostly inside the barn. Some of those who have them were discouraged the first year: the ensilage did not keep well, for some reason—probably lack of skill in handling; but the longer they use them the better they like them." An Ontario correspondent says: "There are several silos in this district; nearly all have been successful. One or two parties complain somewhat. The reason in one case was corn too green; in another, too much waste of space near top. These difficulties have, I expect, been overcome the past season. Our own silo is a complete success." Says a Northumberland man: "There are twenty-two silos in this section, and as many more have a place picked out to build one. In fact, every farmer is satisfied with them; and all, without exception, are pleased with the results." Our Prince Edward Co. correspondent says: "A few silos were built last year. Here is what one practical farmer says of his silo: 'We have used one for nine years, and would not do without it if we had to build one every year. Ensilage is the feed for beef and dairy cattle, pigs, and other stock. There is no other food so cheap and profitable to the farmer.'

Materials Used, and Mode of Construction.—We find that the majority of silos are built of wood, and mostly square in form. A goodly number are double lined (hemlock), with tarred paper or felt between. Hemlock boards for the outside and matched tamarack for the inside have been recommended. Says a Gengarry correspondent: "Silos mostly constructed of wood; some have their lower section of stone when constructed inside a basement barn." From Northumberland we learn that matched pine coated with coal tar gives good satisfaction as a lining, as the tar keeps out the dampness from the lumber. The inside boards, next the ensilage, are usually dressed. One great essential is to secure strength in the frame, so that there may be no giving way, for the pressure is very great. A silo should be deep, and not too large (in surface of ensilage) for the stock kept.

Round Silos.—Round silos are coming into use in many sections, and give satisfaction in every instance. From Whitechurch township, Ontario Co., we hear of round silos being built like cistern-tubs,—with two-inch planks, held together by iron hoops. They are said to be much cheaper than other wooden structures, and appear to answer the purpose quite as well. The April 1st ADVOCATE gave details of building a round silo.

Stone Silos.—Our Wisconsin correspondent writes: "The stone silos, with outside of wood, and plastered inside with cement, are proving best, and when stone and lime are plenty, are cheap at the end of twelve to fifteen years." From Middlesex, and elsewhere, we learn of silos having stone foundations, upon which a brick wall is built, and the whole lined with cement, which are giving entire satisfaction. In Brant Co. some are built of stone, lined with matched lumber, and are proving satisfactory.

Our Peterboro' correspondent says: "If some who have had success with silos would explain their methods in the ADVOCATE, it would be profitable reading to many subscribers."

At Bothwell, Ont., a cement concrete silo has given splendid satisfaction.

The above testimony, coming, as it does, from leading farmers, should carry conviction to many who have hitherto held prejudices against the silo. We believe, however, that the prejudiced ones are becoming fewer year by year, and the reason silos are not being more rapidly built is because of lack of ready funds. Now, while it is unwise to increase one's obligations in an uncertain speculation, yet, when a silo can be home-made, with material which can be purchased for the price of a few hogs or a couple of cows, surely no one will be made bankrupt by putting up a good silo. From our knowledge of the present state of agriculture, we conclude that success in farming in the future must come from producing that which will command the best prices, and by lowering the cost of production, both of which are materially aided by the judicious use of the silo.