making an unusual effort to increase the bulk of the hay being so pressing that many experiments were tried with the object of increasing the bulk of the aftermath, by means of top-dressing meadows and the shutting off of pastures. But the experiment that gave the most satisfactory results, both as regards weight per acre and also the quality of the fodder, was when the grass land was given a dressing of nitrate of soda. At the end of June a temporary fence was placed across a field, so arranged as to shut off six acres of the field ; it was then dressed with a compound of nitrate of soda and bonemeal, in the proportion of five pounds of the one to four of the latter. The fertilizer was applied at the rate of one hundred and fifty pounds per acre, and the gate finally closed to stock on the first of July. Although handicapped by the dry weather of July and August, the grass made substantial progress, never attaining a great length, but being very thick and dense. Each load of hay, as it passed in, was drawn over the weigh bridge and the weight entered. The total was found to be eleven tons—a most satisfactory and gratifying return under these conditions for any season, no matter how favorable for growth. The contrast between this plot and land not so treated was shown to be much in favor of the nitrate of soda treatment, as by the same test thirty acres gave but twenty tons of hay.

Popular Geology.

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

The writer, in contributing a series of papers upon popular geology for the ADVOCATE, will endeavor to give, in as simple and as concise language as possible, an outline of the subject, so that its teachings may be readily understood by the reader. He also hopes that the articles will prove of use to many teachers throughout the Province, who are desirous to give weekly talks to their pupils, with a desire to enable them to understand how soil has been derived, and some of the changes that the rocks from which it is obtained have undergone since they were formed.

Few subjects are better fitted to develop the observation, comparison, and grouping of facts, and the forming of certain conclusions from them, than this. Few present more practical information to those who till the soil than that which deals with rocks and the changes they undergo in the formation of soil. This subject cannot fail to awaken a desire to observe objects around us, especially in a Province so wealthy in mineral deposits, and so rich in fertile soil.

Hoping to arouse interest in a science which reveals the nature of mineral deposits and the story of how our soil was formed, the writer has consented to give a series of papers in this department of agricultural science.

Geology may be defined as a scientific knowledge of the earth, and has to deal largely with rocks. A *rock* is any portion of the earth's crust, and hence the term is applied to sand, mud, gravel, clay, as well as a mass of so-called solid rock. All rocks may be considered as belonging to one or other of three classes:

1. Igneous, embracing such as whose origin is associated with the presence of heat, *e. g.*, the products of volcanoes.

2. Aqueous: those deposited in water as sediment, and afterwards hardened, *e. g.*, limestone, etc.

3. Metamorphic: those which have undergone marked change, likely through the influence of heat and pressure, *e. g.*, marble, slate, etc.

Each of these divisions will be fully discussed in a future paper. Take any stone by the wayside, or in the field, and it can readily be placed in one of these three groups; most in Ontario belong to the second and third groups. We find the rocks of these divisions are usually represented in masses, such as: *limestone*, *dolomite*, *granite*, *gneiss*, *chalk*, *coal*, *salt*, *trap*, *trachyte* and *quartzite*.

These contain certain minerals, among which some of the most important in connection with the formation of soil are: Quartz, Feldspar, Mica, Hornblende, Pyroxene, Talc, Serpentine, Chlorite, Calcite, Gypsum, Apatite, and the Ores of Iron. The nature and composition of these will be considered in the next paper.

It is said that of the earth's crust 48 per cent. is Feldspar, 35 per cent. Quartz, and much of the balance combinations of lime.

These minerals are composed of certain elements, thirteen of which enter largely into the composition of soil: Oxygen, Silicon, Sulphur, Chlorine, Carbon, Hydrogen and Phosphorus, non-metallic; Iron, Aluminium, Calcium, Magnesium, Sodium and Potassium, metallic. We have thus reached the ultimate elements which enter into the composition of the rocks from which soil is derived.

Let us repeat the various steps by which we reached the final elements in rocks:

1. Rocks divided into three great divisions: Igneous, Aqueous, Metamorphic.

2. The rocks of these exist in masses, such as, Limestone, Gneiss, etc.

3. Constituents in the rock masses, such minerals as: Quartz, Feldspar, Gypsum, etc.

4. Elements found in the minerals: Oxygen, Carbon, etc.

It would not be difficult to collect, in our fields, most of the minerals referred to, and it would be of great practical use for teachers to get their pupils enlisted in the work of making a collection suitable to illustrate the history of the soil as we find it written upon the fragmentary leaves of the geological records.

A Typical Ranch.

BY A FARMER'S DAUGHTER.

A pretty drive of five miles west from the town of Calgary brings you to Elbow Park Ranch, the property of Mr. R. G. Robinson. This property was originally owned by Chipman Bros., of Halifax, and while in their possession was known as the Chipman Ranch, but with a change of ownership came also a change of name, and for the last five years it has been known by its present one.

Elbow Park is in every respect a typical ranch, as there the smallest detail of farm life receives its attention as well as the larger and more important interests in connection with stock raising on a large scale.

The ranch proper or horse ranch, as it is called, consists of about two thousand acres, excellently fenced and beautifully situated on both sides of the Elbow River, with a frontage of three miles on the same. From the buildings looking down into the valley you get one of the prettiest views, perhaps, to be seen in Alberta. Stretching beneath you is a regular wilderness of pines, elm and cottonwood trees on a perfect carpet of green, with such a prodigality of lovely wild flowers as only our western prairies can grow. This, with the river twisting and turning and sparkling through its midst, gives it such a beautiful park-like appearance, hence its name.

At the time of your correspondent's visit, sometime in July, we left Calgary at eight o'clock in the morning, reaching the ranch half an hour later, just in time to meet the cowboys bringing in a band of from one hundred and fifty to two hundred mares with their colts off the range, and to see what is one of the most interesting sights in connection with the business—the cutting them out in the different corrals.

A number of horses were driven into the first corral. Mr. Robinson, with note book in hand, indicated those in the bunch required for the day, and the cowboys on foot began the work of cutting them out. Those who were not required were separated and sent through a gate into a corral, those who were going through a shoot into still another corral. This process was repeated until all the band were separated, when those which were not required were allowed to go back to the range. The band consists of five hundred horses, two hundred and twenty-five of which are mares for breeding purposes. These include Clydes, Percherons, Roadsters, Saddle horses, Trotters, Thoroughbreds and Shires, each one being bred to its own particular class, Mr. Robinson's aim being to raise all classes of horses, so that intending purchasers cannot fail to be satisfied. This season they have something in the neighborhood of ninety colts, all well-bred, good-sized, likely-looking animals, and as many young mares have come in this summer; they hope next year to be able to double the number. Among their sires they have the imported Clydesdale Culzean 8560, registered in the British and Canadian Stud book, bred by Wm. Gall, Smiddyburn, Rothie, Scotland. He is sired by Lord Erskine 1744, dam Jewel 6188, by Prince of Wales 673, and is full brother to Lord Ailsa, one of the most celebrated Clydes in Scotland. Also the Shire horse King of the Marsh (7507), got by King of the Valley 2854, dam Smiler, by Matchless 1542, bred by Mr. D. C. Walsh, Christie House, Holbuck, England, and imported from there by Mr. Robinson in 1889.

Then there is the imported and registered stallion Faughaballaugh (late Pirate) 351, one of the finest thoroughbreds in Alberta. Faughaballaugh was bred by Robert Morrison, Rosconnor House, County Down, Ireland, was imported by Gilkinson & Blackwood in 1889, and purchased by Mr. Robinson in 1892. He is a grand looking chestnut, large, strong and splendidly filled out for his age, with nicely tapered neck and beautiful clean-cut head. At the Toronto Industrial, in 1890, he carried off the red ticket, and also first prize at the spring stallion show there this season; he also succeeded in carrying off first at the Calgary Fair. Then they have the well-known trotter, Patchen Eclipse; these with a Coach horse and Clydesdale, both of them Alberta-bred, fill the list of sires. Up to date, Mr. Robinson has had a good home market for all he has had to sell, but in future he intends shipping any surplus either to England or Eastern Canada.

The buildings on the ranch are good, and instead of being of logs, as you usually find in the west, are of frame. These consist of a horse stable thirty by sixty feet, with lean-to of fifteen feet at each side, making it sixty feet square, providing stabling for twenty horses and nine box stalls for registered stock. On one side of the stable is the foal yard, an open shed a hundred feet long by seventy feet wide. A little to the west of the stable is a large three-story barn, with stone foundation, utilized for storing hay, grain, implements, etc., the basement being used for pigs, of which a number of pure-bred Berkshires and Yorkshires are kept. Beside the barn is the men's house, a comfortable looking building twenty by forty feet, with cellar underneath. A man is employed as cook. A little to the west of the ranch proper is the dwelling house, a pretty little frame cottage with verandah in front. The water supply on the ranch is perfect and unlimited. For home consumption it is brought from a spring three-quarters of a mile away by wooden pipes two and a-quarter inches in diameter, and as it has a natural fall all the way, the cost of bringing it is very trifling. A large tank is in the barnyard, which is always full for stable and other purposes. Mr. Robinson also endeavors to raise, as far as possible, all the grain consumed on the place. This year he had one hundred and fifty acres under cultivation—sixty of wheat, four of barley, the rest being oats. A windmill is on the premises, which, of course, crushes free of charge all the grain consumed.

Besides the horses, Mr. Robinson has a thousand head of cattle. These are kept at what are called the winter and summer camps—the former up in the foothills of the mountains, thirty-five miles away, the latter some twenty miles from the home ranch; and during my stay, Mr. Robinson very kindly drove us out to the summer camp, where we were fortunate enough to see about seven hundred head of stock on the range, which, without doubt, was a sight worth driving many miles to see. Until two years ago, Mr. Robinson bred Shorthorns exclusively, then he crossed with Herefords, the result being admirable, the Shorthorns giving size and bone, the Herefords giving flesh, besides being found to be particularly good rustlers—and this where they feed very little, if any at all, is a great consideration. Mr. Robinson, however, thinks, taking all things into consideration, for a general purpose animal in the Northwest, there is nothing like the old reliable Shorthorn, and after crossing once more, he intends to get back as soon as possible to them again. This year, as far as is known, they have about two hundred and seventy-five calves, but until the annual fall round-up and branding an accurate estimate cannot be made. At both the summer and winter camps, the buildings, sheds and corrals are good, and are all that are required for the handling of such a large bunch of cattle; in fact, everything in connection with the ranch indicates the best possible management and prosperity. Mr. Robinson has got for sale this year one hundred and fifty steers and thirty yield cows, and in the spring will have some fifty head of horses, all the progeny of eastern animals.

Ginseng Culture.

The Ginseng is a plant about which we hear very many inquiries, but unfortunately there are very few reports from those who have attempted its cultivation. Nearly all the roots exported from this country are gathered from wild plants by the Indians, therefore there is great danger that, unless care is taken and the natural beds reserved or the cultivation of the plant encouraged, it will soon become extinct, and through this neglect we will lose an industry which annually brings a large amount of money into the country. Realizing the importance of this matter, the Ontario Government, two or three years ago, published a bulletin which contains a large amount of useful information regarding the nature and value of this plant. For the benefit of those who are interested, we give the experience of Mr. George Stanton, Summit Station, N. Y., who commenced experimenting with the Ginseng as early as 1886. His first attempts were unsuccessful, but in 1888 he obtained results which, even under the unfavorable circumstances, convinced him that the cultivation of the Ginseng could be made a success. He then commenced a careful study of the habits and requirements of the plant, while the experience which he had already gained enabled him to improve upon his methods of culture, so that he now considers that success is assured. He says that the best way to get started is to transplant the wild roots, and by this means a person soon gets in the way of raising his own seed. Fresh, reliable seed is expensive, and cannot be obtained in any considerable quantity; in fact, cannot be handled in bulk like other seeds, as it must be sown the autumn of the season in which it is grown, and must not be allowed to get dry. It may be sown in any secluded spot in the forest, and left for nature to produce a crop of roots, but this process is slow. The best plan is to prepare the ground, make it very rich, and sow in drills two or three inches apart; seeds one inch apart and one inch deep. Mr. Stanton considers that his crop of seed, which was produced upon a piece of ground 300 feet in length, and no more than three feet wide, was worth over one hundred dollars. The indications are, that the cultivation of ginseng can be made very profitable to those who have time and patience to devote to it. The exportation of the root is an old established industry, dating back to the year 1818, when it was first exported from Canada. From 1882 to 1891, the exportations from the United States were valued at the enormous sum of $7,700,000. The supply of the wild root is rapidly becoming exhausted, and it is certainly worth while to make an effort to establish the cultivation of so valuable a root while there is something left to start with. Those beginning should guard against purchasing seed out of season, and avail themselves of all the information that they may be able to obtain.