sists of as many turnips and as much straw as the animals can consume, with some artificial stuffs, for about six weeks before selling, to give a finish to the fattening; cake or grain it may be, or both, according to their relative prices. The feeds are twice a day, at 6 a.m. and 2 p.m., a satisfying feed to each animal. The tied-up cattle are groomed, and washing with carbolic soap is practiced when deemed advantageous. Mr. Colvin adds: "I have found that Canadian cattle have paid better for the past five years than either Irish or home-bred beasts, as they can be bought at less money, and they are *healthier* than Irish cattle, and as a rule fatten more quickly."

In the five counties remaining between Moray and "John O'Groat's house" (at the extreme north), the systems of fattening vary little from those already given. That is, to commence winter feeding, cattle coming two years old about Oct. 1st, on a liberal supply of turnips and straw, with a small amount of linseed—or cotton-cake at first, increased and supplemented with oat—or barley-meal as the finishing period advances. Hay, too, is often given instead of straw for a few weeks at the last. Great importance is attached to keeping the bodies of the animals scrupulously clean. Some good men practice serving the grain food in a hashed state, moistened with water and treacle.

FARM.

Soil Exhaustion.

BY JAMES MILLER.

I propose answering two questions: Why is the soil exhausted? and What will restore it?

First. Why is the soil exhausted? Too much credit cannot be given to our forefathers, whose worldly possessions were small in starting life, but whose energies and perseverance were great. After a large part of the land was cleared of timber and made ready for the ploughs, a want of scientific knowledge or a wrong impression prevailed in their minds. They thought that the virgin soil would always remain as it then appeared, and even when they commenced to discover their mistake they did not change their habits, but kept on in the old routine, taking off the land wheat crop after wheat crop, thereby removing the soluble organic vegetable matter that had been deposited by nature for generations, and at the same time putting nothing back to replace the substances carried off. At last the available natural resources became exhausted, or nearly so, and did not supply the wants of the husbandman, hence the encumbrances that subsequent generations have had, and will have to contend with; so serious, in some cases, that farms have had to change hands. This is illustrated by the number of the older settlers that have moved either west or north to virgin soil, where the process was repeated. By way of adding force to what has just been stated, I will give an illustration: A young merchant has a store bequeathed to him by his father. He takes possession. It is stocked to the very doors with the most valuable goods. The clerks are in attendance. The doors are flung open. Customers are invited to enter. Selling commences in earnest. First the centre tables and counters are cleared, then one shelf after another becomes empty. And during all this time the merchant is living on the fruits of his bequest. Every commercial traveller that comes along receives the same answer: "Nothing wanted to-day." At last the store becomes entirely empty, and the proceeds spent in good living. What can be done? What is there to do? The mouths of the family must be fed. The only resource is a mortgage on the building, which in time becomes foreclosed, and the poor wife and children are turned upon the street. Now, what will my readers say of such a merchant? He was very foolish, indeed, to say the least. But such is the case with too large a per cent. of farmers of the present time. The farm delegates who visited this country from Britain, in 1890, styled three out of every four farmers here as soil robbers. This may be somewhat severe, but it is not wholly without truth.

Let us go more into detail. It is a wrong term to use when we say that the soil is exhausted. It is not exhausted, but the different matters which were soluble and available for plant food become exhausted. The soil, properly speaking, is that part of the land upon the surface, and varies in thickness. In Ontario it is from 3 to 10 inches, and is the decomposed rock, mixed with vegetable and animal remains. Below the soil is the sub-soil, resting upon the solid rock, which is frequently of a different color from the soil. We cannot here go into the details explaining the formation of soils, but my readers must take certain things for granted. [NOTE.—An interesting treatment of this topic will be found in Prof. Panton's articles on "Popular Geology," now running through the ADVOCATE.—ED.]

The soil has a two-fold office. First, it holds the plant fixed in the earth, and keeps it in an upright position. Second, it serves the office of a store-house, storing up different ingredients for the future food of the plant. The soil itself, or the inorganic matter contained therein, contribute but a small per cent. of the dry substance of plants. This can best be explained by burning straw, wood, etc. That which remains, or the ash, is that portion which came from the soil. That portion which disappears into the atmosphere, originally came from there, and was fed to the plant by carbonic acid, ammonia, nitrogen, etc., being washed into the soil by means of rain-water, or taken in through the leaves. Thus we see that the soil occupies the same position as the merchant's shop, merely a store-house. We have noticed that the soil is supplied by the rain-falls, which bring down the organic elements of the atmosphere, and also by the actions of the frosts of winter and the sun at all seasons. But nature only supplies enough to keep up the ordinary wear and tear the soil undergoes, and if the substances extracted by cropping are not restored in the form of fertilizers, the strain will be too great, and the store-house becomes more or less empty. Manures not only give up the plant food contained in them, but they also render the vegetable matter already in the soil more soluble by their chemical ingredients, through the agency of rain-water.

To be continued.

Popular Geology—No. 7.

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

Having considered some of the changes that rocks may undergo, we are in a position to understand how they may be grouped for study.

An examination of the earth's crust in all parts of the world, shows that it consists of regular layers, that these layers always occupy the same relative position to one another—that is to say, that if the layers are numbered 1, 2, 3, 4, 5, 6, 7, etc., you will never find 4 above 5, 6 above 8. This fact is of great importance, for it enables us at once to arrange the layers represented at any place in regular order; some may be absent: in fact, no district has all, for we have learned that a place is usually beneath water before it can receive a deposit, and it is not likely all places are submerged at the same time. The layers have characteristic fossils, so that by knowing some of the important fossils we at once know the position of the geological records before us. Remembering these four things: 1) the earth's crust is composed of layers; (2) no place has all the layers; (3) these layers are in regular order; (4) each layer has its special fossils; we can see how it is possible to make a systematic arrangement of the various rock formations found in the earth's crust. The absence of layers is usually accounted for by considering that the locality was above the water when the deposits were laid down The layers of rock which compose the earth's crust are grouped into Ages, Systems and Formtions.

Comparing the stony records of geology to a book on history, we may call the Ages, volumes; the Systems, periods, and the Formation, chapters.

The Ages are named according to the condition of life at the time, *e. g.*, Palæozoic, ancient life; Mesozoic, middle life. The Systems are named in some cases from places where they have been found (Huronian); some from the nature of the deposits (carboniferous), and some from the resemblance of the life to that of the present day (Eocene).

We shall now refer to the records of geology, and note some of the most important things in each.

I. ARCHÆAN AGE.—This volume is distinguished for vast areas of hard rocks, rich in minerals, and contains 50,000 feet of rock. It is represented in Ontario by two systems, Laurentian and Huronian.

Laurentian System.—This name has been given on account of the rocks being well represented along the shore of the Lower St. Lawrence. It is a mineral area; the rocks are hard, more or less disturbed, and often present the appearance of granite. Veins containing mineral ores are often seen in these rocks.

Muskoka, and the east side of Lake Winnipeg, and between Morrisburg and Kingston on the G. T. R., are places where rocks of this system occur. Many of the boulders scattered throughout fields in Ontario belong to this system; how they came here will be explained in an article upon the Ice Age.

The economic products of this system are: Limestone, serpentine, iron ore, asbestos, apatite, mica, graphite, lead ore, and some gold.

Huronian System.—This name has been applied on account of large areas of it along the northern shores of Lake Huron. The rocks are much the same as in the preceding, but not so crystalline. They occur around Georgian Bay and Lake Huron, and yield as economic products, copper and silver ores, with some gold and iron. It is questioned by many whether the rocks of this Archæan Age yield any traces of life, but some believe they do, although the evidence is somewhat doubtful.

PALÆOZOIC AGE.—This volume is represented by 70,000 feet of rock, and includes six systems. During it many animals appear, but they are largely confined to the sea.

The Cambrian System is named from Cambria in Wales, where the rocks are well represented and have been studied. In the triangular area extending from Morrisburg on the G. T. R. to the junction of the Ottawa and St. Lawrence rivers and north to the Ottawa, rocks of this period are found. Traces of life in the form of fossils occur, and economic products such as gold, copper, iron, asbestos, soapstone and sandstone suitable for building and glass-making are found.

Cambro-Silurian System.—This name implies a transition between the Cambrian below and Silurian above. Limestone is very common among the rocks of this system which extends along the G. T. R. from Kingston to Weston. Whitby, Toronto, Bowmanville and Peterboro' are in this area. The traces of life are now quite plentiful. Corals are very common; trilobites, crab-like creatures, are very numerous. The economic products are limestone, sandstone, gas, some marble, hydraulic limestone and lithographic stone. From this, as we pass upward, each system reveals greater variety of life, both animal and plant, each being nearer the forms of our time than those of the preceding.

To be continued.

QUESTIONS AND ANSWERS.

[In order to make this department as useful as possible, parties enclosing stamped envelopes will receive answers by mail, in cases where early replies appear to us advisable; all enquiries, when of general interest, will be published in next succeeding issue, if received at this office in sufficient time. Enquirers must in all cases attach their name and address in full, though not necessarily for publication.]

Veterinary.

A SERIOUS CASE.

JOHNSTON BROS, Miami, Man.:—"We have a ten-year-old mare; she is very thin at present; is stiff and sore in the front quarters; exercise pains her so much that she groans; has been bad in her wind for some years; cannot cough now; think she would be easier if she could cough; is swollen on belly, between the forelegs. Have given soft feed for last three weeks; gave her five drams aloes and oil a week ago; it operated well, but she is getting costive again; appetite good."

[The symptoms are indicative of a diseased condition, both of the lungs and liver, and, from the evidently serious nature of the ailment, I doubt if medical treatment would be of much benefit. Try the following: Give every night, for ten days, a scalded bran mash containing one pound of crushed flax seed, and into each mash put two ounces sulphate of magnesia, and half a dram of calomel. Give every morning and noon in half a pint of water, as a drench, four ounces of the following mixture:—Sulphate of quinine, two ounces; dilute sulphuric acid, one ounce; gin, one quart; syrup, one pint; water, one quart. Put the animal in a comfortable box stall, and keep its body well blanketed. W. A. DUNBAR, V. S., Winnipeg.]

CHOREA IN DOG.

A SUBSCRIBER:—"Will you please answer through your Veterinary column the following enquiry:—My little cocker bitch is troubled with an affection of the lower jaw; it is a continual opening and closing of the mouth. She had distemper some time ago; her eyes were very watery, and had snuffles a great deal. Her digestion is not very good. I attribute the present trouble being caused from her stomach. She seems in pretty good spirits, and is running round the same as usual. Can you tell me what the trouble is, and what treatment would you put her under? Do you think it is a kind of paralysis? Kindly let me hear from you as early as convenient."

[From the very accurate description you have given of the symptons, there is no difficulty in recognizing the disease in your dog, as being chorea, and not paralysis. The treatment is not always satisfactory, but with patience and good nursing, you may relieve the urgent symptoms. Procure from the chemist the following medicine:—R.—Arsenic, 2 grains; Ferric sulph., 1 dram; Piper nigra, 1 dram; pil. aloes and myrrh, 2 drams. Mix and divide into 60 pills. Give one pill night and morning, until the bowels are well relieved, at the same time keeping the animal warm and comfortable.

DR. MOLE, M. R. C. V. S., Toronto, Ont.]

Miscellaneous.

VENTILATING HOG PEN.

G. W. GRANT, Ballinafad:—"Can you inform me, through your valuable paper, whether ventilators in a hog pen should start from the ceiling or a short distance above the floor?"

[In order to have a constant circulation of fresh air, it should be admitted at the bottom, arranged so as not to strike upon any of the pigs directly. It is important to keep the walls of a hog pen dry, which can only be done by ventilation through the ceiling to allow the escape of steam and over-heated air which rise. All ventilators should be arranged to close when desired, which will be most of the time in a good many hog pens. We would refer Mr. Grant to Mr. E. D. Tilson's method of ventilation of farm buildings, as given in November 1st FARMER'S ADVOCATE, page 433. Fresh air is brought into his stable through pipes, for a distance underground, thus raising the temperature of the air to that of the earth—a very important consideration in frosty weather.]

MANITOBA REGULATIONS *re* GLANDERS.

ENQUIRER:—"Would you kindly advise me what the law is in the Province of Manitoba, as to the slaughter of horses effected with glanders, and if any compensation is allowed therefor?"

[The Provincial Veterinarian, in any district, has power to slaughter any horse effected with glanders, and to quarantine any horse in a doubtful condition until he is satisfied that all danger of contagion is past. There is no compensation allowed, but the municipalities have power to pass a by-law granting compensation for horses killed within their boundaries. If the municipality has passed no such by-law, the owner of the animal killed for glanders has no recourse.]

THE TREATMENT OF MUCK DEPOSITS.

"The vast deposit of black mud" on the farm of your New Brunswick reader, is evidently a bed of swamp muck. This material, consisting of more or less decomposed remains of marshy plants, is composed of combustible matter, ash and water. It may contain very little water or amount to as much as 50 to 80 per cent. The combustible matter of muck contains considerable nitrogen in combination, some as ammonia, but the greater part inactive. The ash of muck is similar to that of ordin-