of Vermland, Skaraborg, Elfsborg, and down to the province of Kristianstad. The formation is very uniform in its character, the gneiss having a red colour and containing small granules of magnetite, but, nevertheless, not a single iron mine belongs to this region. The red gneiss contains in many places beds or masses of hyperite.

The granulite, also called eurite and hälleflinta, is the most important of the Pre-Cambrian formation, as it contains all the metalliferous deposits of Sweden. It prevails in the middle part of the country, in Kopparberg, Vestmanland, Upsala and parts of Vermland. It occurs also in Östergötland, Kalmar and Krono- berg. The rock is a very compact and fine-grained mixture of felspar, quartz and mica, often graduating to mica schist, quartzite and gneiss. With these are often associated limestones, dolomites and marbles containing serpentine (Kolmården). the metalliferous deposits have generally the form of beds or layers between the strata of granulite and limestone. They are often highly con­torted and dislocated.

The iron deposits occur in more or less fine-grained gneiss or granulite (Gellivara, Grängesberg, Norberg, Striberg), or separated from the granulite by masses of augitic and amphibolous minerals *(grönskarn),* as in Persberg and Nordmark. Sometimes they are surrounded by hälleflinta and limestone, as at Dannemora, Långban, Pajsberg, and then carry manganiferous minerals. Argentiferous galena occurs at Sala in limestone, surrounded by granulite, and at Guldsmedshytta (province of Örebro) in dark hällefiinta. Copper pyrites occur at Falun in mica-schists, surrounded by hälleflinta. Zinc-blende occurs in large masses at Ammeberg, near the northern end of Lake Vetter. The cobalt ore consists of cobalt-glance (Tunaberg in the province of Södermanland) and of linneite (at Gladhammar, near Vestervik). The nickel ore of Sweden is magnetic pyrites, containing only a very small percentage of nickel, and gener­ally occurs in diorite and greenstones. Besides the crystalline gneiss and hälleflinta there are also sedimentary deposits which are believed to be of pre-Cambrian age. The most important of these are the Dala Sandstone (chiefly developed in Dalarne), the Almas- åkra and Visingsö series (around Lake Vetter) and the Dalsland formation (near Lake Vener).

Large masses of granite are found in many parts of Sweden, in Kronoberg, Örebro, Göteborg, Stockholm, &c. Sometimes the granite graduates into gneiss; sometimes (as north of Stockholm) it encloses large angular pieces of gneiss. Intrusions of hyperite, gabbro (anorthite-gabbro at Rädmansö in the province of Stock­holm) and diorite are also abundant.

Thc Cambrian formation generally occurs along with the Ordovi­cian, and consists of many divisions. The oldest is a sandstone, in which are found traces of worms, impressions of *Medusae,* and shells of *Mickwitzia.* The upper divisions consist of bituminous limestones, clay-slates, alum-slate, and contain numerous species of trilobites of the genera *Paradoxides, Conocoryphe, Agnostus, Sphaeroplithalmus, Peltura,* &c. The Ordovician formation occurs in two distinct facies—the one shaley and containing graptolites; the other calcareous, with brachiopods, trilobites, &c. The most constant of the calcareous divisions is the Orthoceras limestone, a red or grey limestone with *Megalaspis* and *Orthoceras.* The sub­divisions of the system may be grouped as follows: (ι) Ceratopyge Limestone; (2) Lower Graptolite Shales and Orthoceras Limestone; (3) Middle Graptolite Shales, Chasmops and other Limestones, Tri nucleus beds. The Cambrian and Ordovician strata occur in isolated patches in Vesterbotten, Jemtland (around Storsjö), Skara­borg, Elfsborg, Örebro, Östergötland and Kristianstad. The whole of the island of Öland consists of these strata. The deposits are in most places very little disturbed and form horizontal or slightly inclined layers. South of Lake Vener they are capped by thick beds of eruptive diabase (called *trapp).* North of Lake Siljan (pro­vince of Kopparberg), however, they have been very much dislocated. The Silurian has in Sweden almost the same character as the Wenlock and Ludlow formation of England and consists partly of graptolite shales, partly of limestones and sandstones. The island of Gotland consists entirely of this formation, which occurs also in some parts of the province of Kristianstad. In the western and northern alpine part of Sweden, near the boundaries of Norway, the Silurian strata are covered by crystalline rocks, mica schists, quartzites, &c., of an enormous thickness, which have been brought into their present positions upon a thrust-plane. These rocks form the mass of the high mountain of Åreskutan, &c.

The Triassic formation (Rhaetic division) occurs in the northern part of Malmöhus. It consists partly of sandstones with impressions of plants (cycads, ferns, &c.), and partly of clay-beds with coal.

The Cretaceous formation occurs in the provinces of Malmöhus and Kristianstad and a few small patches are found in the province of Blekinge. Only the higher divisions (Senonian and Danian) of the system are represented. The deposits are marls, sandstones and limestones, and were evidently formed near the shore-line.

The most recent deposits of Sweden date from the Glacial and Post-Glacial periods. At the beginning of the Glacial period the height of Scandinavia above the level of the sea was greater than at present, Sweden being then connected with Denmark and Germany and also across the middle of the Baltic with Russia. On the west the North Sea and Cattegat were also dry land. On the elevated parts of this large continent glaciers were formed, which, proceeding downwards to the lower levels, gave origin to large streams and rivers, the abundant deposits of which formed the diluvial sand and the diluvial clay. In most parts of Sweden these deposits were swept away when the ice advanced, but in Skåne they often form still, as in northern Germany, very thick beds. At its maximum the inland ice not only covered Scandinavia but also passed over the present boundaries of Russia and Germany. When the climate became less severe the ice slowly receded, leaving its moraines, called in Sweden *krosstenslera* and *krosstensgrus.* Swedish geologists distinguish between *bottengrus* (bottom gravel, bottom moraine) and ordinary *krossgrus* (terminal and side moraine). The former generally consists of a hard and compact mass of rounded, scratched and sometimes polished stones firmly embedded in a powder of crushed rock. The latter is less compact and contains angular boulders, often of a considerable size, but no powder. Of later origin than the krosstensgrus is the *rullstensgrus* (gravel of rolled stones), which often forms narrow ranges of hills, many miles in length, called *åsar.* During the disappearance of the great inland ice large masses of mud and sand were carried by the rivers and deposited in the sea. These deposits, known as glacial sand and glacial clay, cover most parts of Sweden south of the provinces of Kopparberg and Vermland, the more elevated portions of the pro­vinces of Elfsborg and Kronoberg excepted. In the glacial clay shells of *Yoldia arctica* have been met with in many places *(e.g.* near Stockholm). At this epoch the North Sea and the Baltic were connected along the line of Vener, Vetter, Hjelmar and Mälar. On the other side the White Sea was connected by Lakes Onega and Ladoga with the Gulf of Finland and the Baltic. In the depths of the Baltic and of Lakes Vener and Vetter there actually exist animals which belong to the arctic fauna and are remnants of the ancient ice-sea. The glacial clay consists generally of alternate darker and lighter coloured layers, which give it a striped appearance, for which reason it has often been called *hυarfvig lera* (striped clay). The glacial clay of the Silurian regions is generally rich in lime and is thus a marl of great fertility. The deposits of glacial sand and clay are found in the southern part of Sweden at a height ranging from 70 to 150 ft. above the level of the sea, but in the interior of the country at a height of 400 ft. above the sea.

On the coasts of the ancient ice-sea, in which the glacial clay was deposited, there were 'heaped'-up masses of shells which belong to species still extant around Spitzbergen and Greenland. Most renowned among these shell-deposits are the Kapellbackarne near Uddevalla. With the melting of the great ice-sheet the climate became milder, and the southern part of Sweden was covered with shrubs and plants now found only in the northern and alpine parts of the country *(Salix polaris, Dryas octopetala, Betula nana,* &c.). The sea fauna also gradually changed, the arctic species migrating northward and being succeeded by the species existing on the coasts of Sweden. The Post-Glacial period now began. Sands *(mosond)* and clays *(åkerlera* and *fucuslera)* continued to be deposited on the lower parts of the country. They are generally of insignificant thickness. In the shallow lakes and enclosed bays of the sea there began to be formed and still is in course of formation a deposit known by the name *gyttja,* characterized by the diatomaceous shells it contains. Sometimes the gyttja, consists mainly of diatoms, and is then called *bergmjöl.* The gyttja of the lakes is generally covered over by peat of a later date. In many of the lakes of Sweden there is still in progress the formation of an iron ore, called *sjomalm,* ferric hydroxide, deposited in forms resembling peas, coins, &c., and used for the manufacture of iron. (P. La.)

*Climate.—*The climate of the Scandinavian peninsula as a whole is so far tempered by the warm Atlantic drift from the south-west as to be unique in comparison with other countries of so high a latitude. The mountains of the Keel are not so high as wholly to destroy this effect over Sweden, and the maritime influence of the Baltic system has also to be considered. Sweden thus occupies a climatic position between the purely coastal conditions of Norway and the purely continental conditions of Russia; and in some years the climate inclines to the one character, in others to the other. As a result of the wide latitudinal extent of the country there are also marked local variations to be contrasted. About one-seventh of the whole country is north of the Arctic Circle. The mean annual temperature ranges from 26∙6° F. at Karesuando on the northern frontier to 44∙8° at Gothenburg and 44∙6° at Lund in the south (or 29∙5° to 45° reduced to sea-level). Between these extremes the following actual average temperatures have been observed at certain stations from north' to south which are appropriately grouped for the purpose of comparison (heights above sea-level following each name) :—

Jockmock (850 ft.), at the foot of the lake-chain on the Little Lule River—29·7°; and Haparanda (30 ft.), at the head of the Gulf of Bothnia—32∙4°.

Stensele (1076 ft.), at the foot of the lake-chain on the Ume— 31·8°; and Umeå (39 ft.) at its mouth on the Gulf of Bothnia—34·9°.

Östersund (1056 ft.) on Storsjö—35∙2°∙, and Hernösand (49 ft.) on the Gulf of Bothnia—37∙8°.

Karlstad (180 ft.) at the head of Lake Vener—42·3°; Örebro (102 ft.) at the west of Lake Hjelmar—41·4°,∙ and Stockholm (144 ft.) —42·1°.

Gothenburg (26 ft.) on the Cattegat—44·8°; Jönköping (312 ft.)