

No. 126 (Sp. 990).—*Grayish-White Quartzyte.*

Huronian.—Slate River, Sect. 28—T. 51—R. 31.

Grayish-white, with a light shade of yellow; shining.

A very hard, tough, compact Quartzyte, of moderate fineness of texture, chiefly made up of grains of glassy Quartz, easily distinguishable on a fresh fracture, through which are disseminated fewer and more minute granules of milky Quartz, and also tiny and rounded particles of a soft yellowish-white substance.

Fracture uneven and rough. A few seams. Streak grayish-white.

Weathered surface a shade darker than the fresh fracture, and taking a good polish under glacial action, which better reveals its texture; certain bands of slightly grayer color than the bulk of the rock apparently indicate its plane of bedding.

No. 127 (Sp. 991).—*Conglomeritic Feldspathic Quartzyte.*

Huronian.—Sect. 28—T. 51—R. 31.

Grayish-black, with specks of grayish and reddish-white, etc.; glistening.

A very hard, tough, cellular, coarse, conglomeritic Quartzyte, made up of angular grains, usually $\frac{1}{16}$ inch across. It consists of about 6 parts of black, smoky, and grayish-white Quartz, of 2 parts of reddish-white Feldspar, and 2 parts of grayish, blackish, and greenish-white Feldspar. The Feldspar grains have a good cleavage and lustre, and are sometimes $\frac{1}{8}$ to $\frac{3}{8}$ inch long. A few black fragments resembling Hornblende were observed. The interstices and the Feldspar-grains are very generally stained with films of reddish-brown and brick-red Ochre.

Fracture uneven.

Weathers unevenly and roughly, with a little loss of lustre, to a blackish-brown, to the depth of $\frac{3}{8}$ inch, with a reddish-brown section, terminated inwardly by a blackish-brown band.

No. 128 (Sp. 803).—*Reddish-Brown Quartzyte.*

Huronian.—Bed V.—Chocolate Marble Quarry, South of mouth of Carp, L. S.

Gray, inclining to reddish or light chocolate-brown, with grayish-white specks; shining.

Material chiefly a mixture of smoky and white and glassy Quartz, many of the grains of which (few larger than $\frac{1}{8}$ inch) may be distinguished. Much Ferric Oxide is disseminated in innumerable minute seams throughout the rock, imparts to it its purple tint, and also covers its larger fissures. On the surface of the latter many tiny geodes of small Quartz crystals occur, but these are generally filled with Ferric Oxide.

Fracture uneven, but pretty smooth. Streak reddish-white.

The weathered differs from the fresh surface chiefly in the absence of all lustre; is rendered somewhat irregular by the splitting of the rock in flakes, on account of its many minute seams; and where polished by glacial action, the various grains of which it is composed are very well displayed.

No. 129 (Sp. 1251).—*Light-Brown Quartzyte.*Huronian.—From near S. $\frac{1}{4}$ post, Sect. 34—T. 43—R. 30.

A light shade of snuff-colored brown, mottled with grayish-white; shining.

A very hard, tough, rather coarse, but homogeneous, compact Quartzyte, made up of particles readily distinguishable by the eye; chiefly a mixture of light-brown and white or glassy Quartz, with a few seams containing small crystals of Garnet and Actinolite, and minute scales of silvery-white Mica.

Fracture uneven. Streak grayish-white.

Weathered surface grayish-white, smooth, and often polished by glacial action.

No. 130 (Sp. 1471).—*Flesh-Colored Quartzyte.*S. $\frac{1}{4}$ post, Sect. 10-47-45.

Flesh-colored, faintly banded with grayish-white; slightly shining.

A very hard, tough, uniform, fine-grained rock, with granules easily distinguishable, and of laminated structure. The bands are usually about $\frac{1}{4}$ inch in thickness, and consist of alternations of granules of light reddish-brown and glassy Quartz.

Fracture sub-conchoidal and smooth. Streak reddish-white.

Weathered surface a little lighter in color, and somewhat roughened by the irregular projection of some of the laminae.

Specimen 1472 is more coarsely schistose, composed of the same material (chiefly of the flesh-colored sort), in layers about an inch thick, alternating with layers $\frac{1}{8}$ – $\frac{1}{4}$ inch thick, of a coarse and crystalline aggregation of granules of milky and glassy Quartz, and of a soft blackish-green mineral, with many small geodes lined with crystals of these two minerals.

No. 131 (Sp. 1243).—*Smoky-Gray Quartzite*.

Huronian.—Michigammi River.—Sect. 25—T. 43—R. 30.

Smoky-gray, minutely speckled with grayish-white, almost without lustre.

A hard, very compact, and tough, rather fine-grained, uniform calcareous Quartzite, which appears under the lens to consist of about equal bulks of gray and grayish-white Quartz, interspersed with a few granules of smoky-gray Quartz, and a few tiny facets of Feldspar.

Fracture even. Streak grayish-white. Effervesces slightly with acid. A little Pyrite also occurs in tiny yellow particles.

Weathered surface smooth, and of an olive-color.

Specimen 907 (Boulder from N. W. $\frac{1}{4}$ S. 9—T. 49—R. 33) is a little finer grained, contains no Pyrite, and weathers to an ashy-gray.

The color of Specimen 909 (Boulder like 907) is of a slightly lighter shade; a schistose structure can be just distinguished, and it weathers somewhat unevenly to dirty shades of greenish, blackish, and brownish-gray. Effervesces decidedly in acid.

No. 132 (Sp. 1459).—*Greenish-Gray Quartzite*.

Huronian.—N. W. $\frac{1}{4}$ of S. W. $\frac{1}{4}$ of Sect. 10—T. 47—R. 45.

Dark greenish-gray, slightly mottled with light brownish-gray; dull.

A fine-grained, compact, tough, uniform material, with granules distinguishable by the lens, and of schistose structure, chiefly made

up of smoky Quartz, with a little white or glassy Quartz, and many minute particles, just visible to the eye, of a yellowish or reddish-brown color.

Fracture sub-conchoidal. Streak greenish-white.

Weathered surface smooth, and colored two or three very light shades of drab.

No. 133 (Sp. 812).—*Rosy-Gray Quartzite*.

Huronian.—Bed V.—Chocolate Marble Quarry.

Rose-colored, mottled and banded with ashy or brownish-gray; slightly shining.

A very hard, compact, fine-grained Quartzite, of sub-schistose structure, the layers being usually from $\frac{1}{2}$ to 2 or 3 inches in thickness. The thickest layers are of a flesh-color, inclining to rose, the thinner are darker, and incline to grayish; and both these shades are often mingled in the same layer. When the color is uniform, the texture is crypto-crystalline, but in the portions of darker and mingled colors, the minute grains are easily distinguishable with a lens.

Fracture sub-conchoidal and smooth, but covered with the edges of tiny flakes which betoken the fineness of the grain. Streak reddish-white. One thin layer consists of chocolate-brown Argillite (with a light pinkish streak), through which are disseminated many very minute seams of silvery-white scales of Talc.

The weathered surface is smooth, lustreless, and banded, the darker layers weathering to a blackish color, and the lighter to a light-brown.

No. 134 (Sp. 816).—*Slaty-Gray Quartzite*.

Huronian.—South of mouth of Carp, L. S.

Specimen covered with ripple marks; grayish-white, with the slightest shade of brown.

A rather brittle, tough, hard, fine-grained, compact, schistose Quartzite, made up of very fine granules, ranging often in size up to $\frac{1}{16}$ of an inch, and generally very distinct. Layers generally about $\frac{1}{2}$ inch in thickness, the lines of lamination being usually a

crevice, and of a darker and yellowish tint; a few minute seams of Quartz crossing the lamination obliquely.

Fracture almost even. Chocolate-brown spots on some of the surfaces of lamination. Streak grayish-white.

No. 135 (Sp. 1473).—*Brownish-Gray Quartzyte.*

Huronian.—S. W. $\frac{1}{4}$ Sect. 9—T. 47—R. 45.

A light brownish-gray, slightly mottled with light-gray, and covered with large reddish-brown spots, about an inch in diameter; shining.

A very hard, tough, uniform, fine-grained material, with distinguishable granules, chiefly smoky Quartz, with a very little glassy Quartz; while the spots are composed of a loose aggregation of small granules of glassy Quartz, with their tiny interstices lined or partly filled with a brown powder.

Fracture sub-conchoidal and smooth. Streak grayish-white.

Weathered surface smooth and of a light grayish-drab color, spotted with brown.

No. 136 (Sp. 1476).—*Bluish-Gray Quartzyte.*

Huronian.—N. E. corner Sect. 17—T. 47—R. 46.

A cast-iron gray, with a shade of dark bluish-green; dull.

A tough, hard, uniform, calcareous Quartzyte, of impalpable texture, in which any granules can barely and seldom be distinguished by the lens. Entirely composed of smoky Quartz.

Fracture nearly conchoidal and very smooth. Streak greenish-white. Effervesces slightly with acid.

Weathering smooth, of a dirty cream color, and rarely penetrating $\frac{1}{16}$ of an inch in depth.

No. 137 (Sp. 901).—*Manganiferous Smoky Quartzyte.*

Huronian.—L'Anse Iron Range, N. W. $\frac{1}{4}$ Sect. 9—T. 47—R. 33.

Smoky-gray, with reddish tint, mottled with seams of brownish-yellow; dull.

A very compact, hard, tough, fine-grained Quartzyte, consisting of minute granules of smoky, and, in smaller quantity, grayish-white Quartz, with many minute particles interspersed of brownish-yellow Ochre. Large irregular seams, uniformly lined with brownish-yellow Ochre and with a few tiny bunches, films, and geodes of lustrous brownish-black Pyrolusite; minute glittering crystals of the latter are also disseminated through the Ochre.

Fracture sub-conchoidal, too hard for the file.

Weathered surface uneven and covered with the Ochre.

No. 138 (Sp. 939).—*Feldspathic Quartzyte.*

Laurentian.—N. side of Sect. 16—T. 49—R. 33, south of Plumbago Creek.

Cast-iron gray, closely covered with tiny smoky-gray specks.

A very hard, tough, compact, fine-grained, uniform Quartzyte, made up of smoky-gray and grayish-white Quartz, mostly in indistinguishable particles, but with a few, about $\frac{1}{32}$ inch in diameter, with much Feldspar of the same color disseminated in glistening facets of about the same size, and a few thin flakes, $\frac{1}{8}$ to $\frac{3}{8}$ inch long, of a soft, blackish, laminated mineral, with gray streak, perhaps Argillyte, by whose parallel arrangement a slightly schistose structure is produced. A few irregular fissures. A vein of milky Quartz, about $\frac{1}{4}$ inch thick.

Fracture uneven. Streak grayish-white.

Weathers evenly to a dirty light brownish-gray color.

Another variety may be described as follows:—

(Sp. 977.)—*Feldspathic Quartz-Schist.*

N. side of Sect. 27—T. 51—R. 32.

Brownish-gray; slightly glistening.

A hard, compact, tough, very fine-grained Quartz-Schist, which appears under the lens to consist of perhaps 7 parts of grayish-white and smoky-gray Quartz, in minute granules rarely $\frac{1}{16}$ inch in diameter, and 3 parts of smoky- or brownish-gray Feldspar, in minute angular grains, rarely in facets with good cleavage and lustre, $\frac{1}{16}$ inch long. Olive-green, shining Chlorite also

occurs, in a few minute scales, and in one shining oval flake, $\frac{3}{8}$ inch long.

Fracture uneven. Streak reddish-white. A few fissures stained reddish-brown.

Weathers unevenly to a dirty chocolate-brown, covered with minute cream-colored specks.

No. 139 (Sp. 1478).—*Jaspersy Quartzyte*.

Huronian.— $\frac{1}{4}$ post between Sects. 7 and 18—T. 47—R. 45.

Bright brownish-red, and speckled with white and gray spots; dull.

A hard, somewhat brittle, granular, but compact rock, traversed by numerous irregular fissures. Chiefly consists of rounded, sometimes nearly spherical grains, rarely over $\frac{1}{32}$ inch in diameter, of brownish-red Jasper, set in a paste of white and smoky-gray Chalcedony. When the grains are spherical their section presents somewhat of an oölitic appearance. Many other minute particles are revealed by the lens, of a yellowish-white and of a black color, and the separation of the latter from the powdered rock by the magnet identifies them as Magnetic Iron. A hand specimen slightly affects the compass. Some of the surfaces of the fissures and of tiny cavities are drusy with Quartz crystals or covered with white films of Chalcedony.

Fracture even. Hardly touched by a file.

Weathers about $\frac{1}{2}$ inch deep, with a smooth exterior surface, and of dirty reddish and yellowish-brown colors, darker than the fresh surface.

No. 140 (Sp. 1479).—*Magnetic Jaspersy Quartzyte*.

Huronian.— $\frac{1}{4}$ post between Sects. 7 and 18—T. 47—R. 45.

Cast-iron gray, mottled with reddish-brown; dull.

Similar in texture to No. 139, but the paste predominates, and is of a slightly darker shade than cast-iron gray, while the Jasper grains are of a dull reddish-brown, larger and more irregular in shape. Contains more Magnetite disseminated and affects the compass more decidedly. The fissures are sometimes occupied by

films of exceedingly minute silvery-white scales, of micaceous structure.

Fracture even. Untouched by a file. Powder pinkish-gray and dull. The magnet separates about 12 per cent. of the bulk, in a grayish-black powder.

No. 141 (Sp. 1477).—*Chalcedonic Quartzyte*.

Huronian.— $\frac{1}{4}$ post between Sects. 7 and 18—T. 47—R. 45.

Smoky-gray, with irregular streaks and spots of white and brownish-red; dull.

A compact, hard mass, of chalcedonic Quartz, through which pass many seams, somewhat parallel, of smoky and glassy Quartz and brownish-red Jasper, with black, irregular grains of Magnetite.

Fracture uneven, or sometimes inclining to sub-conchoidal and smooth. Untouched by a file. Powder brownish-yellow and dull; the magnet separates about 10 per cent. of the bulk in a blackish-brown powder. A few minute particles of Pyrite.

Weathered surface uneven and of a brownish color, mottled with black.

No. 142 (Sp. 1225).—*Reddish Hematitic Quartzyte*.

Huronian.—Felch Mountain, Sect. 32—T. 42—R. 28.

Reddish-gray, with a few minute specks of bright brownish-red.

A very hard, compact, tough, fine-grained Quartzite, chiefly made up of granules of smoky and grayish-white Quartz, with a very few scales of silvery-gray Mica and minute particles of brownish-red Ochre. Hard iron-black micaceous Hematite is disseminated through the rock in large glistening seams and bunches, about $\frac{1}{8}$ to $\frac{1}{4}$ inch thick, associated with thin bunches of finely granular Magnetite.

Fracture even. Too hard to be scratched by a file. Powder of Quartzite, free from ferruginous veins, is reddish and slightly glittering. Very slightly magnetic. The magnet separates about 4 per cent. of the bulk in black granules.

Weathers smoothly, with duller shade.

No. 143 (Sp. 993).—*Ochrey Cellular Quartzite*.

Huronian.—Slate River, Sect. 28—T. 51—R. 31.

Reddish-brown, mottled with bright brownish-yellow and smoky-gray.

A hard, tough, cellular Quartzite, made up of minute granules of smoky-gray and grayish-white Quartz, with its cavities lined with a slightly calcareous aggregation of compact reddish-brown to brownish-black Hematite and brownish-red Hematite-Ochre, in films or irregular layers and bunches, with about an equal quantity of bright brownish-yellow Limonite-Ochre, irregularly intermingled. The Quartzite appears to constitute about $\frac{2}{3}$ of the bulk of the rock, and is too hard for the file.

Fractured surface exceedingly cellular and uneven. Streak brownish-red and bright brownish-yellow on the bunches of ore. Effervesces feebly with acid.

No weathered surface on the specimen.

No. 144 (Sp. 902).—*Banded Quartz-Schist*.Huronian.—L'Anse Iron Range.—N. W. $\frac{1}{4}$ Sect. 9—T. 49—R. 33.

Alternate narrow bands of smoky-gray and yellowish-brown; dull.

A very hard, compact, fine-grained Quartzite, of almost slaty structure, made up of layers, $\frac{1}{32}$ to $\frac{1}{4}$ inch in thickness, of two materials. The one consists of minute granules of smoky and grayish-white Quartz, and is too hard for the file. The other, of the same granules, with a greater or less intermixture of yellowish, rarely reddish-brown Ochre, producing a kind of Jasper. The latter are usually the softer, and give a brownish-yellow, rarely a brownish-red streak.

Fracture almost even. A few tiny seams crossing the laminae transversely or obliquely, with tiny faults, and filled with smoky Quartz; others covered with a black film.

Weathers with an even surface, colored with the Ochre, the harder layers projecting slightly, with the glacial polish.

No. 145 (Sp. 903).—*Banded Quartz-Schist*.

Huronian.—L'Anse Iron Range.

Faint narrow bands of smoky-gray, grayish-white, and light reddish-brown.

A very hard, compact, tough, fine-grained Quartz-Schist, similar to No. 144, but with laminae of the above-mentioned three colors, composed of very minute granules of smoky Quartz and grayish-white Quartz, intermingled with very minute particles of reddish-brown Ochre. The grayish-white laminae rarely exceed $\frac{1}{32}$ inch in thickness. Many thin seams crossing the laminae more or less obliquely, with tiny faults, minutely drusy, or lined with tiny geodes of Quartz often covered with brownish-black stains and films of Pyrolusite.

Fracture uneven, on account of the seams. Too hard for the file. Weathered surface smooth and strongly marked with the bands.

No. 146 (Sp. 1232).—*Greenish Quartz-Schist*.Huronian.—S. E. $\frac{1}{4}$ Sect. 35—T. 42—R. 30.

Greenish-gray, mottled with grayish-white; shining.

A hard, compact, coarse, schistose Quartzite, consisting of a mixture of smoky and white or glassy Quartz, without distinguishable grains, with less than $\frac{1}{10}$ of its bulk of a soft, dark-green transparent mineral, in tiny fibrous folia, with grayish-white streak. The laminae of the latter are generally arranged parallel, so as to impart a schistose structure.

Fracture sub-conchoidal on plane of lamination, and somewhat uneven across it. Streak grayish-white.

Weathered surface slightly darker and rather uneven.

No. 147 (Sp. 1092).—*Chloritic Quartz-Schist*.

Huronian.—Bed XI.—South of Edwards Mine.

Blackish-green, and dull on the fresh fracture, mottled with tiny grayish-white spots, grayish-black and shining on cleavage surfaces.

A compact, tough, hard schist, made up of about 6 parts of grayish, sometimes greenish-white, arenaceous Quartz, in minute granules, and of 4 parts of shining scales of black and brownish-gray Mica and blackish-green Chlorite, usually very minute, but sometimes in scales $\frac{1}{4}$ inch across. A peculiar mottling is imparted to the cross-fracture by the aggregation of the Quartz in angular, often rectangular masses, $\frac{1}{32}$ to $\frac{1}{4}$ inch long, which resemble pseudomorphs after some mineral (perhaps Feldspar?). Many crystals are disseminated through the rock, $\frac{1}{8}$ to $\frac{1}{4}$ inch in diameter, of a brown mineral which resembles brown Garnet.

Fracture somewhat uneven. Streak white to greenish-gray. Cleavage surfaces are often stained to brownish-gray, and a fissure to a blackish-brown.

Weathers unevenly to a reddish-brown, the crystals before-mentioned projecting above the surface. This seems to be a pseudomorphous rock, perhaps after a porphyritic Amphibole-Schist, in which the Amphibole has been entirely altered into Chlorite and Mica and the Feldspar into Quartz.

No. 148 (Sp. 801).—*Calcareous Quartz-Schist*.

Huronian.—Bed V.—Chocolate Marble Quarry, South of mouth of Carp, L. S.

Light flesh-color, with a few yellowish-white and smoky-gray bands.

An exceedingly hard, fine-grained, and compact, calcareous Quartzite, giving evidence by numerous fissures of a somewhat rhomboidal cleavage. It is made up of minutely laminated layers, about $\frac{1}{8}$ inch in thickness, of yellowish and grayish-white chert, passing into smoky-gray, alternating with layers of reddish-white and flesh-colored siliceous Dolomite.

Fracture even, on account of the cleavage, but it is rather difficult to obtain a fresh surface. Streak white, with slightly reddish tinge. Very feeble effervescence in acid.

Weathers unevenly, and of a dirty reddish-white color.

Another specimen, Sp. 802, has a slight film of Micaceous-Iron on the surface of one fissure. Very feeble effervescence with acid, like 801.

No. 149 (Sp. 891).—*Opaline Quartz-Schist*.

Huronian.—L'Anse Iron Range, near Centre N. W. $\frac{1}{4}$ Sect. 9—T. 49—R. 33.

Grayish-white and smoky, mottled with glistening brownish-yellow and lustrous brownish-black.

An exceedingly hard, compact, brittle, fine-grained, schistose Quartzite, composed of granules, hardly distinguishable, of smoky and white Quartz, and with perhaps $\frac{1}{4}$ of its bulk of bright, brownish-yellow, glistening semi-opal, disseminated throughout in thin layers, somewhat parallel, and in irregular bunches. Many irregular seams lined with films, and sometimes with tiny crystalline bunches, of brownish-black Pyrolusite.

Fracture uneven. Too hard for the file.

Weathers rather evenly, with a smoky color, striped and mottled with yellowish-brown.

No. 150.—*Talcose Quartz-Schist*.

Huronian.—S. of Foster Mine, on the road to Maillet's Camp.

Brownish-gray, mottled with smoky-gray; shining.

A compact, hard, coarse Quartz-Schist, made up of about 7 parts of milky to smoky-gray Quartz, in irregular lenticular bunches, about $\frac{1}{2}$ to 1 inch long, and $\frac{1}{8}$ to $\frac{1}{4}$ inch thick in the centre, and of nearly 3 parts of brownish-gray Talc, with greasy feel and white streak, in thin silvery flakes and films enveloping the bunches of Quartz.

Fracture hackly.

Weathers unevenly to a smoky-gray, mottled with reddish-gray.

No. 151 (Sp. 734).—*Magnetic Quartz-Schist*.

Huronian.—Bed XIII.—Spurr Range, E. side Sect. 23—T. 48—R. 31.

Reddish-brown, inclining to light purple, with a few narrow black bands.

A hard, fine-grained, compact schist, made up of layers of Quartzite, about an inch thick, alternating with black, glittering, ferruginous layers, about $\frac{1}{4}$ inch thick. The Quartzite consists chiefly of minute granules of reddish-brown Quartz, with a little

grayish-white Quartz, black scales of Micaceous-Iron (rarely octahedral), and silvery-gray scales of Mica. Irregular veins and bunches traverse it, consisting of an aggregate of granules of yellowish and brownish-white Quartz and black scales of Micaceous-Iron. The ferruginous layers consist of minute granules of reddish-brown Quartz, with a larger proportion of minute, glittering, black scales, some of which are octahedral. When this mineral is finely powdered, about 35 per cent. of the bulk is taken up by a magnet.

Fracture uneven. Streak reddish-brown on the black layers; and the powder, reddish-gray, slightly glittering. The Quartzite is too hard for the file. Magnetic, and with polarity.

Weathers unevenly to a light yellowish-brown color.

No. 152 (Sp. 740).—*Magnetic Quartz-Schist*.

Huronian.—Bed XIII.—Spurr Range, E. side Sect. 23—T. 48—R. 31.

Speckled reddish-gray, with narrow glittering bands of iron-black.

A fine-grained, hard, compact, and brittle schist, made up of quartzose layers, about $1\frac{1}{2}$ inches thick, with layers of Magnetite, $\frac{1}{8}$ to $\frac{1}{2}$ inch in thickness. The former consist of an aggregate of granules of grayish-white and brownish-red Quartz, particles of a blackish color, and minute silvery scales of grayish Mica. The black layers consist of the usual aggregate of grayish-white and brownish granules of Quartz and minute octahedra of Magnetite.

Fracture uneven. Streak reddish-white on the quartzose, iron-black on the magnetic layers. Many irregular fissures across the quartzose layers, colored light brownish-yellow. Strongly magnetic, and with polarity. Powder of black layers is blackish-gray and glittering. The magnet takes up all the powder, the grayish-white Quartz granules becoming distinct towards the latter part of the operation.

No weathered surface on the specimen. The quartzose layers are soft to crush, and give a lighter reddish-gray, dull powder, from which the magnet separates about 13 per cent. of the bulk in black granules.

No. 153 (Sp. 999).—*Magnetic Quartz-Schist*.

Huronian.—Felch Mountain, Sects. 32 and 33—T. 42—R. 28.

Lustrous cast-iron-gray, inclining to bluish, speckled and slightly striped with brownish-red, rarely with grayish and reddish-white.

A very hard, compact, fine-grained, crystalline rock—an aggregate of minute crystalline particles of Magnetite, without distinct form, which glitter under the lens, and of minute granules of grayish and reddish-white Quartz, which are irregularly disseminated throughout the rock in small particles, lenticular masses, and parallel laminae, $\frac{1}{16}$ to $\frac{1}{8}$ inch thick, which resemble a coarse Jasper. Small veins and bunches occur, of glistening micaceous Magnetite, sometimes $\frac{1}{2}$ inch long.

Fracture rather even, streak iron-black, dotted with reddish-brown. Very feebly magnetic. Powder reddish-brown and dull; the magnet separates about $1\frac{1}{2}$ per cent. of the bulk.

Weathered surface smooth, but harsh to the touch, the minute granules being irregularly removed.

No. 154 (Sp. 1227).—*Hematitic Quartz-Schist*.

Huronian.—Felch Mountain, Sects. 32 and 33—T. 42—R. 28.

Alternate lustrous bands of bluish-black and of brownish-black, speckled with brownish-gray.

A hard, compact, fine-grained schist, made up of layers, about $\frac{1}{2}$ inch thick, of fine-grained Hematite, consisting of particles visible to the eye, and which under the lens appear somewhat octahedral in form, together with minute granules of brownish-gray Quartz—alternating with thicker layers of Quartzite, in which granules of white and smoky Quartz greatly predominate. A few glistening scales and bunches of Micaceous-Iron occur.

Fracture uneven. Streak dark reddish-brown. Powder reddish-brown and glittering. Not magnetic. The magnet separates about 1 per cent. of the bulk.

Weathers rather smoothly, the quartzose layers assuming a reddish-white color.

No. 155 (Sp. 1236).—*Hematitic Quartz-Schist*.

Huronian.—Sect. 31—T. 42—R. 29, Upper Menominee Range.

Cast-iron-gray, with bluish shade.

A hard, compact, fine-grained, arenaceous Quartz-Schist, with coarse columnar structure. Under the lens its minute granules are shown to be grayish-white Quartz and iron-black irregular scales of Micaceous-Iron. Weathered seams connected with the columnar cleavage, stained reddish-, yellowish-, and blackish-brown, or grayish-white, and sometimes lined with coarser scales of Micaceous-Iron.

Fracture even. Streak light reddish-brown. Powder reddish-gray and glittering; the magnet separates about 4 per cent. of the bulk, in black granules.

Weathers, with a slightly ribbed surface, to a blackish-brown color.

No. 156 (Sp. 994).—*Ferruginous Quartz-Schist*.

Huronian.—Slate River, Sect. 28—T. 51—R. 31.

Smoky gray and grayish-white, speckled and mottled with bright brownish-yellow and a few black and reddish-brown spots.

A very hard, tough, fine-grained, schistose Quartzite, somewhat cellular, but much less so than No. 143. It is composed of minute granules of smoky and grayish-white Quartz, intermingled with about $\frac{1}{4}$ of its bulk of irregular calcareous veins and bunches of compact reddish and blackish-brown Hematite, of which the core is generally converted into bright brownish-yellow Limonite-Ochre. The small cavities are lined with layers or films of the two ores, and are sometimes drusy with Quartz crystals. A very few facets of brownish-gray Calcite, sometimes $\frac{1}{4}$ inch across, occur on the surface of the Quartz.

Fracture uneven. Streak of the bunches of ore reddish-brown, and bright brownish-yellow. The bedding seams are stained reddish-brown.

No weathered surface on the specimen.

No. 157 (Sp. 883).—*Limonitic Quartz-Schist*.Huronian.—S. E. $\frac{1}{4}$ of S. W. $\frac{1}{4}$ Sect. 9—T. 49—R. 33.

Light-brown, slightly mottled with grayish-white; slightly lustrous.

An exceedingly hard, compact, tough Quartzite, of somewhat schistose structure (denoted by a few irregular grayish-white bands), and of a very fine-grained texture; consists of minute granules of grayish-white Quartz, more or less intermixed with, and colored by, brownish Ochre.

Fracture uneven to conchoidal. Too hard for the file. Many tiny transverse veins and bunches of white and glassy Quartz.

Weathers unevenly, and with the color unchanged.

No. 158 (Sp. 1484).—*Green Banded Siliceous Schist*.

Huronian.—Sunday Lake Outlet, W. side Sect. 18—T. 47—R. 45.

Greenish-gray, with narrow blackish-gray stripes.

A compact, homogeneous, tough, hard, siliceous schist, of almost impalpable grain, made up of laminæ, from $\frac{1}{32}$ to $\frac{1}{2}$ inch in thickness, of the two colors above mentioned; chiefly composed of Quartz, with a few small scales of Mica, and is probably covered by a small quantity of Chlorite, a few minute fissures, sometimes 2 or 3 inches long, crossing the lamination transversely, occasionally with tiny faults.

Fracture even. Streak greenish-white.

Weathers smoothly, to the depth of about $\frac{1}{8}$ inch, to a reddish-brown color, mottled and banded with brownish-yellow. The transverse fissures and seams of lamination, just below a weathered surface, are often colored brownish or yellowish by the weathering.

Specimen 1499 is a slate of a greenish and brownish-gray color, with lines and stripes of reddish-brown, exactly like the lighter-colored layers of 1484 in material, color, etc., but is calcareous. Effervesces with acid.

Weathers rather unevenly to a reddish-brown color, mottled with yellowish shades; and the crevices also assume these colors.

Specimen 1500 is exactly like the lighter-colored layers of 1484,

but with layers $\frac{3}{8}$ –1 inch thick, colored reddish-brown along the crevice of lamination. A few fissures covered with a film of Calcite.

Specimen 1493 is a blackish Siliceous Slate. Alternate narrow stripes of greenish-, blackish-, and brownish-gray, resembling 1484; but with layers about $\frac{1}{8}$ inch in thickness, and calcareous. Effervesces with acid.

Weathers smoothly to a dirty-brownish color, some of the harder laminæ, of a reddish-brown color, slightly projecting.

No. 159 (Sp. 1508).—*Argillaceous Siliceous Slate.*

Huronian.—S. side of S. E. $\frac{1}{4}$ Sect. 10—T. 47—R. 45.

Alternate stripes of light chocolate-brown and brownish-gray.

A compact, fine-grained slate, made up of alternate laminæ $\frac{1}{32}$ to $\frac{1}{8}$ inch thick, of brownish-gray Siliceous Slate, and chocolate-brown Argillyte. Minute scales of Mica or Talc are disseminated throughout.

Streak reddish-white.

Weathers smoothly, with a surface faintly banded with dirty shades of green and brown. A transition rock between Argillyte-Slate and Siliceous Schist.

No. 160 (Sp. 806).—*Greenish Siliceous Schist (Novaculyte).*

Huronian.—Bed V.—Chocolate Marble Quarry, South of mouth of Carp, L. S.

A very light greenish-gray and reddish-white, much mottled in an irregular manner with reddish-brown; slightly shining.

A hard, compact, fine-grained schist, made up of the greenish-gray Novaculyte, with an almost equal quantity of the reddish-brown argillaceous material, irregularly intermingled. The former is as usual chiefly made up of Quartz, with a small quantity of silvery scales of greenish-gray Talc, and with films and scales of greenish-gray Talc so arranged as to impart the finely laminated structure. Reddish-white and grayish-white Quartz also occurs in segregated veins and spherical bunches of concentric structure, from 1 to 2½ inches in diameter.

Weathers smoothly and of a light brownish-gray, but with the quartzose bunches projecting.

No. 161 (Sp. 807).—*Greenish-Drab Siliceous Slate (Novaculyte).*

Huronian.—Bed V.—Chocolate Marble Quarry, South of mouth of Carp, L. S.

A light shade of greenish-drab, sometimes passing into reddish, mottled and banded with light reddish-brown; slightly shining.

A compact, fissile Siliceous Slate, which is harder than No. 190, and whose stratification, at an angle of 45° with the slaty lamination, is apparently denoted by the bands, about an inch thick, of light reddish-brown color (much lighter than that of No. 190), speckled with minute lenticular olive-green spots. A schistose Novaculyte, apparently made up of Quartz and exceedingly minute scales of greenish-gray Talc.

Weathered surface even and of dirty-brown and reddish-brown shades. Streak greenish-white.

Another specimen, 805, is striped throughout by reddish-brown, parallel, and mostly continuous bands, $\frac{1}{8}$ to $\frac{1}{4}$ inch thick. The plane of these layers forms an angle of about 70° with that of the slaty lamination, and their granular material consists of grains of Quartz, enveloped in argillaceous laminæ, forming little bunches.

In 804 the brown layers are obscure and irregular.

No. 162 (Sp. 1509).—*Banded Talco-Siliceous Slate.*

Huronian.—S. side of S. E. $\frac{1}{4}$ Sect. 10—T. 47—R. 45.

Alternate stripes of brownish-gray and greenish-gray, made up of layers $\frac{1}{32}$ to $\frac{3}{8}$ inch thick, of brownish-gray Quartz, with a little Feldspar, and others of a greenish-gray color, apparently of minute granules of Feldspar, and tiny scales of greenish-gray Talc. The slaty lamination makes an angle of about 25° with the bedding lines.

Streak greenish-white. Before the blowpipe the material of the talcose layers fuses at about 5, while a thin splinter from the siliceous layers is only covered with a film of enamel.

No. 163 (Sp. 1458).—*Ferruginous Siliceous Slate*.Huronian.—N. side of S. E. $\frac{1}{4}$ Sect. 7—T. 47—R. 45.

Dark greenish-black and slightly lustrous.

A hard, compact, homogeneous slate, of impalpable texture, in which only a few minute glittering scales can be distinguished by the eye or lens. The specimen is remarkable for a series of several peculiarly sharp cleavage-planes, by three of which the rock is divided up into inclined rhombohedrons, with sharp angles. By one of these cleavages a finely laminated structure is produced, which imparts a fibrous surface to the cleavage plane which crosses the laminae.

Streak, light brownish-yellow.

No. 164 (Sp. 1503).—*Ferruginous Siliceous Slate*.

Huronian.—Sunday Lake Outlet Series.

Drab, with a slight brownish shade, and a few narrow grayish-white and reddish-brown bands; dull.

A very hard, compact, and fine-grained Siliceous Slate, consisting of very minute granules of brownish-gray Quartz, a little Chlorite (?), and a little Mica in silvery-gray scales, which glitter on a fresh fracture in the sun. Slight differences in the shade of color distinguish the laminae of the rock, especially near the weathered surface. A few thin layers of grayish-white Chalcedony occur.

Fracture sub-conchoidal. Streak brownish-white, a few seams drusy with Quartz.

Weathered surface smooth, and, like that of many weathered seams, brownish-black; the interior of the rock being reddish-brown, to a depth of $\frac{1}{8}$ to $\frac{1}{4}$ inch.

No. 165 (Sp. 747).—*Hematitic Siliceous Schist*.Boulder near $\frac{1}{4}$ post Sects. 34 and 35—T. 48—R. 27, Deer Lake.

Cast-iron gray, with reddish shade, striped with brownish-red lines; dull.

A very hard, compact, homogeneous and fine-grained schist,

with few particles visible to the eye; but consists of very minute granules of smoky Quartz, intermingled with red Ochre and minute scales, probably of Micaceous-Iron. The Ochre predominates in many of the minute laminae, marking the stratification and rendering them softer and of a brownish-red color.

Fracture sub-conchoidal. Streak cherry-red.

Weathers unevenly, but smoothly, the harder layers projecting irregularly, and receiving a slight polish.

No. 166 (Sp. 1485).—*Banded Jasper-Schist*.

Huronian.—Sunday Lake Outlet, W. side Sect. 18—T. 47—R. 45.

Narrow bands of reddish-brown, yellowish-brown, brownish-black, and brownish-gray.

An exceedingly hard, compact, brittle schist, made up of layers of fine-grained Jasper, almost of impalpable texture, of the above-mentioned colors, $\frac{1}{16}$ to $\frac{1}{2}$ inch thick. A few seams of a bright brownish-red mineral, sometimes drusy.

Fracture uneven. Streak of some softer laminae, reddish-brown.

Weathers smoothly, and unchanged in color.

No. 167 (Sp. 1486).—*Banded Jasper-Schist*.

Huronian.—Sunday Lake Outlet, W. side Sect. 18—T. 47—R. 45.

Narrow bands of bright brownish-red, grayish, and gray speckled with red.

A Jasper-Schist resembling No. 166, but having many layers, finely granular, with tiny fragments of smoky, grayish-white, greenish-gray, and reddish-white Quartz, and bright brownish-red Jasper; others are chiefly composed of the latter Jasper, slightly speckled with greenish-gray Jasper; and many thin laminae consist of smoky-gray Chalcedony. Many minute seams occur, crossing the layers obliquely, with tiny faults, and filled with the material of the granular layers.

Fracture sub-conchoidal. Too hard for the file.

Weathered surface smooth, and a little darker in color and duller than the fresh fracture.

No. 168 (Sp. 1491).—*Banded Jasper-Slate*.

Huronian.—Sunday Lake Outlet, Sect. 13—T. 47—R. 46.

Bright brownish-red, with glittering, brownish-black, parallel lines.

Chiefly consists of brownish-red Jasper, not quite so bright as that of No. 173, interlaminated with many thin parallel films of smoky-gray Jasper, often with crevices drusy with brownish-black and yellowish-brown acicular crystals, resembling Göthite, and having a brownish-yellow streak. A few transverse fissures, covered with a drusy film of the same mineral.

Fracture even. Too hard for the file.

Weathers smoothly, with a slight polish and unchanged in color.

Specimen 1492 is a hard, compact, brownish-black layer, $\frac{1}{2}$ inch thick, corresponding to the blackish laminæ in 1491. Consists of smoky-gray Jasper, with minute crystals of the brownish-black mineral disseminated throughout.

Fracture even. Streak brownish-yellow.

No. 169 (Sp. 1510).—*Banded Jasper-Slate*.

Huronian.—N. side of S. E. $\frac{1}{4}$ of Sect. 8—T. 47—R. 45.

Dark greenish-gray and dull, with grayish-white and chocolate-brown narrow bands.

A very hard, compact, tough, and fine-grained slate, made up of films and laminæ of different colors and shades, up to $\frac{1}{8}$ inch in thickness. It consists of very minute granules of grayish-white Quartz, with perhaps a little Chlorite. (?) The color varies in the different laminæ, becoming of a darker green, with a larger intermixture of Chlorite, of a greenish- or grayish-white where the Chlorite is lacking, and of a chocolate-brown where the Chlorite has decomposed.

Fracture even. Streak greenish-white.

Weathered surface smooth, and covered on a section with alternate cream-colored and chocolate-brown narrow bands.

No. 170 (Sp. 1506).—*Green Jasper-Slate*.

Huronian.—N. side of S. E. $\frac{1}{4}$ of Sect. 7—T. 47—R. 45.

Dark greenish-gray and dull, with a few narrow glittering bands.

A very hard and brittle, banded Jasper-Slate, made up of loosely compacted layers, about $\frac{1}{8}$ inch thick, and consisting partly of green Jasper and partly of very minute granules of smoky and white Quartz with a little Chlorite. (?) In some layers coarser granules of smoky and white Quartz predominate, whose fresh fracture produces the slight glittering appearance, together with a very few scales of Mica.

Fracture uneven. Streak greenish-white.

Weathering smooth, and of a brownish-black color, the weathered interior seams assuming yellowish- and reddish-brown shades.

In another variety (1507) the coarser layers are absent.

No. 171 (Sp. 690).—*Magnetic Jasper-Slate*.

Huronian.—Bed X.—Near centre Sect. 19—T. 47—R. 27.

Iron-black, striped with greenish-gray.

A fine-grained, compact, hard, slaty Magnetite, interlaminated with greenish-gray Jasper, translucent on the edges; layers from $\frac{1}{16}$ to $\frac{1}{4}$ inch thick. The layers of Magnetite glitter with minute points, which, under the lens, appear almost always to be irregular scales, sometimes rectangular, and rarely octahedral. These layers are further divided into thin laminæ, by seams whose surfaces are of a dirty yellowish- and reddish-brown color.

Fracture uneven. Streak iron-black on the layers of Magnetite, those of Jasper being untouched by the file. Feebly magnetic with slight polarity. Powder light reddish-brown, and almost dull.

Weathers smoothly, the Jasper layers slightly darkening in color, and those of Magnetite assuming a brownish-black.

No. 172 (Sp. 1480).—*Hematitic Jasper-Schist*.

Huronian.—Sunday Lake Outlet, Sect. 18—T. 47—R. 45.

Dull chocolate-brown, with faint narrow and slightly lustrous bands, and a few minute white specks.

A hard, compact, and very fine-grained schist, made up of layers, alternately dull and slightly lustrous. The former are about $\frac{1}{4}$ inch thick, and consist of exceedingly minute granules of Hematite and of smoky and grayish-white Quartz, the latter greatly predominating, and sometimes so much so as to render the layer decidedly quartzose; they also contain minute scales of silvery-gray Mica. The lustrous material consists of groups of two or three parallel laminae, about $\frac{1}{8}$ inch thick, slightly separated by films of the material of the other layers; their material is the same as that of the other layers, but of much finer grain—a green Jasper—and rendered slightly lustrous on the section by exceedingly minute films of silvery-gray Mica. A few tiny seams and bunches of smoky- and grayish-white Quartz, reddish-brown Ochre, and soft white Kaolin.

Fracture rather uneven. Streak bright reddish-brown.

Weathers smoothly, to dirty greenish and blackish shades of brown, speckled with yellowish- and grayish-white and reddish-brown.

No. 173 (Sp. 1488).—*Hematitic Jasper-Schist*.

Huronian.—Sunday Lake Outlet, W. side of Sect. 18—T. 47—R. 45.

Cast-iron gray, with bluish shade, with reddish-brown streaks; dull.

A very hard, compact, tough, and fine-grained Jasper-Schist, consisting of minute particles of reddish-brown Jasper and of bluish-black Hematite, interspersed with micaceous scales of the same. Much Jasper is also gathered together in irregular layers

or bunches, $\frac{1}{4}$ inch to 1 inch thick, and thus an imperfect schistose structure is produced. A few minute veins of white and glassy Quartz, and seams covered with films of yellowish-brown Ochre or reddish-brown Quartz.

Fracture uneven. Streak reddish-brown.

Weathers unevenly to reddish and blackish-brown shades, the Jaspers layers projecting and somewhat polished.

No. 174 (Sp. 1088).—*Brown Anthophyllitic Quartz-Schist*.

Huronian.—Bed X.—S. E. of old Washington Mine.

Brownish-gray, slightly streaked with grayish-white; glittering.

A hard, compact, fine-grained schist, which is made up of about 6 parts of grayish-white Quartz, in minute granules, nearly 1 part of Magnetite in minute black particles (apparently associated with smoky Quartz), and 3 parts of brownish-gray Anthophyllite in silvery scales, which have often an elongated bladed form and fibrous structure, and are sometimes gathered in radiating groups.

Fracture irregular and uneven. Streak grayish-white. Many fissures stained reddish-brown. Yields water when heated in a closed tube.

Weathers unevenly, to a reddish-brown.

No. 175 (Sp. 1090).—*Brown Anthophyllite-Schist*.

Huronian.—Bed VIII.—S. E. of old Washington Mine.

Like No. 174, but a little coarser, on account of the somewhat greater length and abundance of the micaceous blades. A few little bunches of grayish-white and smoky Quartz project from the weathered surface.

In Specimen 1091, many tiny bunches are disseminated, sometimes $\frac{1}{4}$ to $\frac{1}{2}$ inch long, of yellowish-, reddish-, and blackish-brown Ochre. A few thin laminae occur, in which the Magnetite predominates, producing faint parallel blackish streaks.

No. 176 (Sp. 1093).—*Brown Anthophyllite-Schist.*

Huronian.—Bed X.—S. E. of Edwards Mine.

A coarser variety of No. 174, the blades of Anthophyllite being often over $\frac{1}{16}$ inch in length. In parts of the specimen much of this mineral is of a black color, and by this, as well as by the concentration of the Magnetite in certain tiny bunches or layers, the surface of a fracture is mottled with grayish-black and brownish-gray.

Weathers rather unevenly, to a greenish-gray, mottled and streaked with light reddish-brown.

Specimen 1094 is the coarsest variety of No. 174, the blades of Anthophyllite often reaching $\frac{1}{8}$ inch in length. Yields more water than No. 174, when heated in a closed tube. The specimen is traversed by a few layers of grayish-white Quartz, $\frac{1}{4}$ inch thick.

Specimen 1095 is traversed by many of the reddish-brown fissures.

No. 177 (Sp. 1098).—*Brown Anthophyllite-Schist, passing into Magnetite-Schist.*

Huronian.—Bed VIII. (?)—S. E. of Edwards Mine.

This specimen seems to have been taken from the junction of the above two rocks, the former being fine-grained like No. 174, and the latter a strongly magnetic, hard, compact, black schist, of almost impalpable texture, having a few of the micaceous blades disseminated throughout.

Weathered surface smooth and blackish.

No. 178 (Sp. 1116).—*Magnetic Anthophyllite-Slate.*

Huronian.—Bed XIX.—N. E. of Champion Mine.

Blackish-gray, inclining to greenish, covered with thin parallel brownish-gray and blackish streaks; minutely glittering.

A compact, very tough, and fine-grained slate, made up of about

7 parts of Anthophyllite in fibrous translucent blades, varying in color from brownish-gray to grayish-white, mostly microscopic but partly needles $\frac{1}{32}$ to $\frac{1}{16}$ inch in length, and of 3 parts of black particles of Magnetite, barely to be distinguished by the lens. The predominance of the latter in parallel films covers the section with blackish lines, while certain layers, $\frac{1}{16}$ inch thick, and $\frac{1}{8}$ to $\frac{1}{4}$ inch apart, consist chiefly of an aggregation of the larger needles of Anthophyllite, arranged obliquely to the lamination. Loses much water by ignition in a closed tube. Decidedly magnetic, and with polarity; the magnet separates about 19 per cent. from the powdered rock.

Fracture uneven. Streak reddish-gray.

Fissures occur, covered with a reddish-brown stain and films of brownish and reddish-brown Quartz.

Weathers evenly but roughly, to a reddish-brown.

The following manganiferous variety may be here inserted.

(Sp. 1155).—*Black Magnetic Anthophyllite-Slate.*

Greenish-black; minutely glittering.

A compact, fine-grained slate, which appears, both to the naked eye and to the lens, to be chiefly or entirely made up of minute glistening black scales, chiefly Magnetite, but often of a bladed form, probably Anthophyllite, separated by tiny films of a blackish and greenish-brown color, which seem to consist of Pyrolusite. A schistose, almost slaty, structure is produced by minute parallel films, about $\frac{1}{8}$ to $\frac{1}{4}$ inch apart, which mark a section with dull reddish-brown lines, and with blackish lines somewhat more lustrous than the general surface. Decidedly magnetic, and with polarity; and the magnet separates about 9 per cent. of the powdered rock.

Fracture rather uneven. Streak shining black, and the least friction of the surface imparts the same lustre. The rock is of medium hardness, but soils paper and the fingers with a greenish-black stain. Loss by ignition, over 5 per cent., much water passing off, and some oxygen being absorbed.

Weathers rather unevenly, to a slightly shining blackish-brown.

No. 179 (Sp. 729).—*Pseudomorphous Chlorite-Schist*.

Huronian.—Bed XIII.—Spurr Range, East Side of Sect. 23—T. 48—R. 31.

Olive-green, inclining to blackish, covered with glittering facets.

A soft, compact, homogeneous, fine-grained Chlorite-Schist, which appears under the lens to consist of minute granules of grayish-white Quartz and scales of olive-green Chlorite, in about equal proportions. Through this matrix are disseminated large numbers, perhaps about 400 to the square inch, of highly lustrous black scales and octahedra, nearly $\frac{1}{32}$ inch across, with greenish-gray powder—apparently pseudomorphs of Chlorite after Magnetite. A few tiny granules of ruby-red color occur, resembling Garnet.

Fracture uneven. Slightly magnetic, with polarity. Streak and powder light olive-green and slightly glittering. The magnet separates about 23 per cent. by weight, in a powder of the same color.

Weathers evenly to a blackish-brown, mottled with olive-green and shades of reddish and yellowish-brown, the black scales and octahedra weathering to bright brownish-yellow dots.

No. 180 (Sp. 730).—*Pseudomorphous Chlorite-Schist*.

Huronian.—Bed XIII.—Spurr Range, E. side of Sect. 23—T. 48—R. 31.

Resembles No. 179, but the scales and octahedra are much smaller—few of them being distinguishable by the eye. Crystals of Amphibole of fibrous structure, of a shining black color, and with irregular acicular terminations, are disseminated throughout the rock, 5 or 6 being visible on a square inch of surface. They vary in breadth from a mere line up to $\frac{1}{16}$ inch, and in length from $\frac{1}{8}$ to $\frac{1}{2}$ inch. The commencement of their alteration is denoted by a film of greenish-gray material, still retaining the original lustre and structure, into which the minute crystals are wholly converted, and the outer coat of the larger: so that the longitudinal section of the latter shows a black band enclosed by two very thin greenish-gray lines. A smoky gray and grayish-white seam, about $\frac{1}{4}$ inch

thick, crosses the lamination obliquely, composed chiefly of grayish-white Quartz, sometimes greenish, with a small intermixture in some places of black particles. Golden-yellow Pyrite is disseminated in tiny particles through the rock, the seam, and the crystals of Amphibole. Effervesces slightly in acid. Slightly magnetic. Streak and powder grayish-green and dull; the magnet separates $2\frac{1}{2}$ per cent. by weight.

Weathers unevenly to shades of yellowish-brown, rendered shining by exceedingly minute brownish-yellow scales.

No. 181 (Sp. 731).—*Pseudomorphous Chlorite-Schist*.

Huronian.—Bed XIII.—Spurr Range, E. side of Sect. 23—T. 48—R. 31.

Resembles No. 180 in color, materials, and general character. No octahedra occur, but many thick, soft, brownish scales, $\frac{1}{32}$ inch across, with a grayish-green streak. Pseudomorphs, probably after Amphibole, are also disseminated throughout, similar in shape, size, and number to the Amphibole crystals of No. 180, but faintly defined and of a grayish-white color. These consist chiefly of aggregated tiny facets of a grayish-white, glistening, laminated mineral, with a small intermixture of dark scales—apparently of Chlorite.

Not magnetic. Streak and powder grayish-green and dull. The magnet separates nothing.

Weathering like that of No. 179.

No. 182 (Sp. 820).—*Dark-Green Chlorite-Schist*.

Huronian.—N. of North-Western Hotel, Marquette.

Dark olive-green, faintly spotted and streaked with reddish brown.

A compact fissile Chlorite-Schist, about as hard as No. 190.

Streak greenish-white, sometimes reddish-white. Fuses at 4.5, to a black glass.

Weathered surface uneven, and, like many of the cleavage surfaces, of a reddish-brown color from the decomposition of the

Chlorite. A very few irregular veins of granular yellowish-white Calcite. Apparently the last stage in the alteration of a Dioryte, through Dioryte-Schist, into Chloritic Schist.

No. 183 (Sp. 828).—*Green Calcareous Chloritic Schist.*

Huronian.—S. of North-Western Hotel, Marquette.

Light greenish-gray, inclining to brownish, with reddish-brown streaks.

A compact, hard, fissile, chloritic, and calcareous schist, with a few layers, about $\frac{1}{4}$ inch thick, of a finely granular Calcite of reddish-brown color. It is apparently composed of Feldspar, Chlorite, many exceedingly minute silvery greenish-gray scales (apparently of Talc), and a little Calcite. Besides the ordinary cleavage fissures, lined with Chlorite or Talc, a few seams of the reddish-brown Calcite occur.

Weathered surface smooth, and of a dirty greenish-gray, mottled with dirty brown; color lighter than the interior.

Specimen 829 differs from 828 only in the greater abundance of Calcite, in films and seams of a grayish-white and reddish-brown color, and in geodes of minute crystals.

No. 184 (Sp. 1097).—*Garnetiferous Chlorite-Schist.*

Huronian.—Bed VIII.—S. E. of the Edwards Mine.

Blackish-green, and slightly glittering.

A soft, compact, heavy, tough, fine-grained schist, which appears under the lens to consist chiefly of minute scales of Chlorite, with a small intermixture of a grayish-white Mica, in minute scales and acicular blades, visible to the naked eye. Many crystals of brown Garnet, $\frac{1}{8}$ to $\frac{1}{4}$ inch across, are disseminated through the rock, and are partly decomposed.

Fracture uneven. Streak greenish-gray. Many irregular fissures occur, stained reddish-brown.

Weathers rather unevenly, to a dirty greenish-gray, mottled with brown shades, the Garnets projecting above the surface.

No. 185 (Sp. 1130).—*Green Chlorite-Schist.*

Huronian.—Bed XIII.—Lake Superior Mine.

Olive-green, and very minutely glittering, with many blackish-brown glittering specks.

A compact, soft, rather brittle, crypto-crystalline schist, with an irregular fissile structure, apparently made up of about 7 parts or more of olive-green Chlorite, in exceedingly minute glittering scales, and of nearly 3 parts of greenish-white Feldspar, in microscopic particles. A small quantity of altered crystals of Magnetite is distributed throughout, in blackish-brown shining octahedra, less than $\frac{1}{32}$ inch in diameter, whose material is brittle, and soft, and gives a reddish-brown streak.

Fracture hackly. Streak greenish-gray. Surface of the fissures is stained yellowish, mottled with light reddish-brown. Does not affect the magnetic needle, and the magnet separates only a few particles from the pulverized rock.

Weathers unevenly, to a dull and dirty shade of the same color.

No. 186 (Sp. 1148).—*Porphyritic Chlorite-Schist.*

Huronian.—Bed XI.—Lake Superior Mine.

Blackish-green (and shining, on cleavage surfaces), speckled with greenish-black and reddish-gray shining facets.

A compact, tough, coarse schist, made up of about 4 parts of angular, often rhombic, masses or crystals of greenish-black Feldspar, with good cleavage and lustre, in facets $\frac{1}{16}$ to $\frac{1}{8}$ inch across, distributed throughout a crypto-crystalline soft blackish-green matrix, with greenish-gray streak, which amounts to about 6 parts of the rock. This matrix consists of about $\frac{7}{10}$ of soft blackish-green Chlorite, in exceedingly minute glistening scales, and of $\frac{3}{10}$ of grayish-white Quartz in microscopic particles.

Fracture hackly. Surface of fissures stained to a dirty reddish-brown.

Weathers evenly and smoothly, to a grayish-green, speckled with reddish-gray (the Feldspar).

No. 187 (Sp. 1543).—*Chloritic Feldspathic Schist*.Laurentian.—Near W. $\frac{1}{4}$ post Sect. 19—T. 47—R. 42.

Greenish-gray, minutely speckled with gray; slightly glittering. Resembles No. 217, but is slightly coarser. The Mica is irregularly dispersed, is mostly black, but in part is silvery-white. Many irregular fissures, covered with films of blackish-green Chlorite, a soft white mineral (perhaps Kaolin?), and a hard brownish-white Feldspar in tiny facets, with good cleavage and lustre. No Quartz is discernible by the lens, but the fresh surface is hard to a knife edge. Streak greenish-white. Fuses before the blowpipe at 5, to a brown glass.

Another variety, 1544, effervesces slightly in acid. Weathers unevenly to a reddish (projecting Feldspar), mottled by blackish-brown (eroded Chlorite), to the depth of $\frac{1}{16}$ to $\frac{1}{8}$ inch, with a section of the same color, terminated by a blackish-brown band.

No. 188 (Sp. 1545).—*Green Calcareous Chloritic Schist*.

Laurentian.—W. branch of Ontonagon River, Sect. 13—T. 46—R. 41.

Dark grayish-green, inclining to olive, faintly striped with gray.

A compact, fine-grained, fissile aggregate of crystalline grains of grayish and reddish-white Feldspar, with fine granular gray Calcite, arranged in thin lenticular seams, about $\frac{1}{8}$ inch apart, and separated by abundant films and seams of olive-green Chlorite in minute glistening scales.

Fracture uneven. Streak greenish-white. Effervesces strongly in acid.

No weathered surface on the specimen.

No. 189 (Sp. 692).—*Micaceous Feldspathic Argillyte*.

Boulder, Ann Arbor, Mich.

Gray, covered with fine parallel blackish gray lines; minutely glistening.

A compact, rather soft and brittle, homogeneous, fine-grained schist, which appears under the lens to consist chiefly of minute

scales of black and white Mica, rarely distinct to the eye, and minute granules of grayish-white Feldspar (and Quartz?), and of a blackish-gray mineral, the latter preponderating in parallel films, usually less than $\frac{1}{32}$ inch apart. Bronze-yellow Pyrite is distributed in minute particles, and a bunch occurs, over an inch long, of Pyrite associated with brownish-gray Siderite.

Fracture uneven. Streak grayish-white. Fuses before the blowpipe at 5.5, to a white blebby enamel.

Weathers evenly to a dirty brownish-gray color, minutely ribbed with the slightly projecting edges of the darker laminae.

No. 190 (Sp. 794).—*Brown Chloritic Argillyte*.

Huronian.—Bed V.—Chocolate Marble Quarry, S. of mouth of Carp, L. S.

Dark reddish or chocolate-brown, with a few bands of lighter shades of brown and of dark olive-green.

A compact, fissile Argillyte, harder than a true Argillyte. On a close examination the original stratification is displayed by a series of minute bands, almost at right angles with the slaty lamination, varying in shade from yellowish-gray to dark reddish-brown, usually uniform in color for about $\frac{1}{8}$ inch in thickness; and in one case in the hand specimen, of an olive-green inclining to brown (probably chloritic in material), and swelling out, in lenticular form, to a thickness over an inch.

Streak slightly reddish-white on the brown layers, and greenish-white on the green layers. Talc is disseminated throughout the rock in minute bunches and seams of silvery-greenish-gray scales, and to this is apparently due a slightly greasy feel, as well as a minutely granular structure, in the brown material.

Weathered surface rather smooth and even, and of same color.

No. 191 (Sp. 810).—*Brown Feldspathic Argillyte*.

Huronian.—Bed V.—Chocolate Marble Quarry, S. of mouth of Carp, L. S.

Dark reddish-brown, with a few large greenish-white and many tiny light russet-brown spots; slightly shining.

A compact, rather hard, fine-grained Argillyte, with its slaty lamination at an angle of about 56° to the plane of stratification. It is apparently identical with the brown material of No. 160, and is chiefly made up of Feldspar and Quartz, interspersed with exceedingly minute scales, in layers $\frac{1}{16}$ – $\frac{1}{4}$ inch thick, which appear on a section as a series of bands alternately dull and shining. Many thin seams of the same material, 1 to 2 inches long, cross the layers irregularly, sometimes with tiny faults. Also a few irregular seams and bunches of greenish-gray Feldspar, sometimes 3 inches long, a few thin seams of reddish-gray Calcite and a few tiny bunches of reddish-brown Feldspar.

Fracture uneven. Streak reddish-white.

Weathers smoothly, of same color, and with slight polish.

No. 192 (Sp. 814).—*Banded Chloritic Argillyte*.

Huronian.—Bed V.—Chocolate Marble Quarry, S. of mouth of Carp, L. S.

Dark greenish-brown (sometimes speckled with light yellowish-brown spots), with light chocolate brown parallel bands.

A compact, fissile, slaty Argillyte, differing from No. 190 only in the predominance of the green bands, their usual thickness being $\frac{3}{4}$ inch, while that of the brown is $\frac{1}{8}$ inch. The stratification is, like that of No. 190, nearly at right angles with the slaty lamination, and the Talc is disseminated in the same way but chiefly through the brown bands. Fuses before the blowpipe at about 5.5.

No weathered surface on the specimen.

No. 193 (Sp. 815).—*Banded Chloritic Argillyte*.

Huronian.—Bed V.—Chocolate Marble Quarry, S. of mouth of Carp, L. S.

Parallel stripes of olive-green, yellowish-brown, and chocolate-brown.

A compact, fissile, slaty Argillyte, with stratification at an angle of about 12° with the slaty lamination, and about as hard as No. 190. The olive-green and chocolate-brown bands are identical

with those described in Nos. 190 and 192, but the third material is finely granular, of a light reddish or yellowish-brown color, and made up of layers about $\frac{1}{16}$ inch in thickness, composed of loosely aggregated granules of Feldspar and Quartz, separated by minute parallel and continuous films of reddish-brown Argillyte. Fuses before the blowpipe at 5.5, to a greenish-white enamel.

Weathering smooth and unchanged in color, the green bands receiving a polish and the yellowish-brown bands being slightly pitted by the removal of granules.

No. 194 (Sp. 881).—*Micaceous Feldspathic Argillyte*.

Huronian.—Bed V.—L'Anse Iron Range, S. side Sect. 9—T. 49—R. 33.

Greenish-gray; slightly lustrous.

A soft, compact, tough, calcareous schist, of almost impalpable texture, composed of minute granules of grayish- or greenish-white Feldspar and a smoky-gray mineral (Quartz?), with many scales of silvery-gray Mica, sometimes distinct to the eye.

Fracture uneven. Streak grayish-white and partially metallic (iron abraded from the knife). Seams of lamination shining and very slightly corrugated, sometimes covered with a film or thin layer of gray Calcite.

No. 195 (Sp. 882).—*Greenish-Gray Shale*.

Huronian.—L'Anse Iron Range, S. E. $\frac{1}{4}$ of S. W. $\frac{1}{4}$ Sect. 9—T. 49—R. 33.

Greenish-white, with minute parallel brown lines; general effect, greenish-gray.

A rather soft, compact, fine-grained, fissile rock, of an imperfectly slaty structure, approaching a shale, made up of exceedingly minute granules of Feldspar and a few scales of Mica, and with reddish-brown Ferric Oxide disseminated throughout in very minute specks, scales, or continuous parallel seams.

Fracture smooth and even. Streak grayish-white, dotted with light brownish specks. Adheres decidedly to the tongue and yields an argillaceous odor when moistened. The Feldspar is

probably altered to Kaolin to a considerable extent. Bedding seams colored dirty reddish-brown.

Weathered surface even, and of a dirty yellowish-brown color.

No. 196 (Sp. 906).—*Siliceous Feldspathic Argillyte*.

Huronian.—L'Anse Iron Range, N. W. $\frac{1}{4}$ post, Sect. 18—T. 50—R. 33.

Ash-gray, inclining to greenish; minutely glittering in the sunlight.

A compact, homogeneous, crystalline rock of exceedingly fine texture, rather soft and brittle. Under the lens it appears to be made up of about 9 parts of minute particles of greenish-gray Feldspar, often with a distinctly marked cleavage, whose facets chiefly produce the glittering appearance, with 1 part of irregular grains of dark smoky Quartz (?) and a few silvery grayish-white soft scales (Talc or Mica).

Fracture sub-conchoidal. Streak grayish-white.

Weathers rather evenly, to a lighter shade of greenish-gray, minutely speckled with grayish-white; or to brownish-white, minutely speckled with black (the Quartz granules).

The weathering is sometimes $\frac{1}{16}$ to $\frac{1}{8}$ inch deep on flat surfaces, with a brownish-gray section; while at the angular corners of a mass it reaches to the depth of half an inch, with a light brown section, terminated inwardly by a grayish-black band.

No. 197 (Sp. 908).—*Greenish-Gray Feldspathic Argillyte*.

Huronian.—L'Anse Iron Range.

Greenish-gray; slightly shining.

A rather hard, homogeneous, fine-grained, and very fissile schist, with curving laminae, and a very minute fibrous corrugation of its cleavage surfaces; resembles Nos. 335, 339, and 221.

Fracture hackly. Streak grayish-white. Fuses before the blow-pipe at 4 to a greenish-gray glass. Under the lens, exceedingly minute scales, like those of Mica, can be distinguished throughout. A very thin seam of Calcite occurs.

Weathers rather unevenly, to light shades of brownish-gray and cream color.

No. 198 (Sp. 917).—*Banded Feldspathic Argillyte*.

(A small weathered pebble.)

Huronian.—L'Anse Bay, E. side, say 1 mile from South end.

Alternate bands of grayish-white, sometimes speckled minutely with black, and of light chocolate-brown, with darker specks and narrow gray bands.

A soft, compact, fine-grained, finely laminated Argillyte, made up of bands about $\frac{3}{4}$ inch thick. Streak lighter grayish-white and light yellowish-brown. Contains many exceedingly minute silvery-gray scales, perhaps of Talc, to which a very slight greasy feel may be due.

Specimen 918 is a pebble of similar rock to 917. Colors of layers chocolate-brown—grayish-white, with a greenish tinge, with small spherical masses, $\frac{1}{8}$ to $\frac{1}{4}$ inch across, of a softer, light, reddish-brown material—and cast-iron gray, with dark greenish tinge, and traversed by narrow bands of reddish-brown and light greenish-gray. Slaty lamination at angle of about 30° with the bands. Scratched by the nail.

Another specimen, 919, consists of layers $\frac{1}{2}$ to 1 inch thick. Angle of slaty lamination with bands about 36° . Greasy feel a little more decided.

No. 199 (Sp. 920).—*Greenish Feldspathic Argillyte*.

Huronian.—L'Anse Bay, E. side, say 1 mile from South end.

Light greenish-gray, mottled by seams with dark reddish- and yellowish-brown.

A soft slate, of impalpable texture, and finely fissile lamination, which seems to be chiefly composed of grayish-white Feldspar, with much greenish-gray Talc or Chlorite, in silvery scales, not distinguishable by the naked eye. The specimen is traversed, at the same angle with the slaty lamination as in No. 198 (919), by a layer about an inch thick, which appears to differ from the rest of the material only in a slightly granular texture, but on certain cleavage surfaces is weathered sometimes to a tinge of yellowish-brown, and sometimes to a deep reddish-brown. Scratched by the nail and

of slight greasy feel. Streak greenish-white. A narrow seam, $\frac{1}{8}$ inch thick, distinguished by a somewhat granular structure.

Weathers to a lighter shade of greenish-gray, slightly tinged with yellowish or reddish-brown, the surface being minutely furrowed by projecting laminae.

Another specimen (921) is a shade darker and harder, more compact, and with a slight lustre. Contains a minute fossil too imperfect for determination.

Specimen 922 consists of the same material, with various lighter and darker shades of greenish-gray, the layers being $\frac{1}{4}$ to 2 inches thick, and sometimes of a somewhat granular structure, speckled with tiny reddish-brown angular stains.

No. 200 (Sp. 982).—*Gray Feldspathic Argillyte*.

Huronian.—Near centre of Sect. 13—T. 50—R. 32.

Cast-iron gray inclining to greenish; slightly glittering.

A rather hard, compact, fine-grained schist, in which only minute scales of brownish-gray Mica can be distinguished by the eye; but under the lens it appears to consist chiefly of a mixture of exceedingly minute granules of smoky Quartz and grayish-white Feldspar. A few yellow grains of Pyrite also occur. On a section its schistose structure is seen to be produced by parallel films of a grayish-black material (probably Argillyte), which divide up the rock into laminae, about $\frac{1}{32}$ inch thick. The surface of the joints is stained reddish-brown.

Fracture uneven. Streak grayish-white.

Weathers somewhat evenly, to a dirty blackish-brown, mottled by yellowish-brown, and on the edges of the laminae to the depth of about $\frac{1}{32}$ inch, with a brownish-white section.

No. 201 (Sp. 992).—*Green Speckled Argyllite*.

Huronian.—N. part of Sect. 21—T. 51—R. 31.

Grayish-green, spotted with brownish-red.

Similar to No. 200, but of a rather brighter shade of green, and with the section speckled over with circular brick-red stains, nearly

$\frac{1}{8}$ inch across. It is apparently made up of greenish-gray Feldspar, with a little Mica (Talc or Chlorite?), in minute glistening scales. Its structure approaches a slate.

Streak grayish-white, dotted with brick-red.

Weathers irregularly and roughly, to a dirty greenish-gray, inclining to citrine-yellow, mottled over with faint irregular streaks and spots of reddish-brown.

No. 202 (Sp. 998).—*Brownish-Gray Feldspathic Argillyte*.

Huronian.—Slate River, Sect. 21—T. 51—R. 31.

A rather slaty rock which resembles No. 199, but is of a dark greenish-gray, with brownish tinge, and faintly banded with yellowish-brown. The lamination or "stripe," which forms an angle of about 60° with the plane of cleavage, is chiefly marked by lines of minute rectangular cavities, rarely $\frac{1}{32}$ inch in length, as if derived from the decomposition of some crystallized mineral (Pyrite?), filled with a soft yellowish-brown Ochre.

Streak reddish-white to light brick-red.

Weathers smoothly, with a slightly reddish tinge, the bedding-lines being somewhat pitted by the weathering of the rectangular cavities.

No. 203 (Sp. 1101).—*Magnetic Feldspathic Slate*.

Huronian.—E. of mouth of Tunnel, Washington Mine.

Blackish-gray, slightly greenish; minutely glittering.

A compact, tough, very fine-grained and rather slaty rock, which appears under the lens to consist of about 6 parts of particles of greenish-white Feldspar, 3 parts of exceedingly minute black micaceous scales, and 1 part of Magnetite in black octahedra, just visible to the naked eye. A joint occurs, with the surface stained reddish-brown.

Fracture nearly even. Streak grayish-white.

Weathers smoothly and evenly, to a brownish-black.

No. 204 (Sp. 1102).—*Micaceous Feldspathic Slate*.

Huronian.—S. E. of mouth of Tunnel, Washington Mine.

Blackish-gray ; minutely sparkling.

A slate of the same texture as No. 203, consisting of about 4 parts of grayish-white Feldspar, 4 parts of smoky Quartz, and two parts of black, sometimes grayish-white, Mica, in minute glittering scales, often gathered in flakes on a cleavage surface, $\frac{1}{16}$ to $\frac{1}{8}$ inch across.

Fracture sub-conchoidal. Streak grayish-white. Surface of fissures stained brownish-gray.

Weathers rather evenly and smoothly, to the depth of $\frac{1}{16}$ inch, with shallow pits about $\frac{1}{4}$ inch in diameter, to a brownish-gray, covered (as well as the surface of the fissures) with minute blackish specks and parallel lines. This surface shows the Feldspar to exist in angular fragments, about $\frac{1}{32}$ inch across, surrounded by the mixture of Quartz and Mica, while much of the latter is gathered in minute irregularly parallel films or seams, which produce the fine lines barely distinguishable on a fresh fracture, usually $\frac{1}{32}$ to $\frac{1}{4}$ inch apart, but generally running in pairs.

No. 205 (Sp. 1109).—*Amygdaloidal Amphibole-Schist*.

Huronian.—Bed XIII.—Washington Mine, S. end of McConnell's Pit.

Grayish-black, with a few glistening facets, and covered with tiny, round, greenish-gray specks.

A compact, fine-grained schist, the bulk of which is made up of about 4 parts of the usual grayish-, rarely greenish-white Feldspar, in minute particles, of 4 parts of a black mineral in tiny particles, and in facets with slightly marked cleavage, and hardly touched by a file, $\frac{1}{16}$ to $\frac{1}{8}$ inch across, which resembles Amphibole, and of 2 parts of black or grayish-white Mica, in minute silvery scales. Through this matrix are disseminated, to the amount of nearly $\frac{3}{10}$ of the bulk of the rock, many slightly elliptical masses, usually $\frac{1}{16}$ inch across, but sometimes $\frac{1}{8}$ to $\frac{3}{16}$ inch in length, arranged parallel to the stratification, and imparting an amygdaloidal appearance to a section. They consist of a soft material, with greenish-white streak, of a greenish-gray color, passing into reddish-brown, in which only a few very minute scales of Mica can be distinguished.

Fracture uneven. Streak gray. Surface of fissures covered with a film of reddish-brown Ochre.

No. 206 (Sp. 1138).—*Greenish Feldspathic Argillyte*.

Huronian.—Bed XIII.—Lake Superior Mine.

Grayish-green, and dull, with many minute black glittering points.

A compact, rather soft, crypto-crystalline schist, which is apparently made up of about 9 parts of greenish-gray Feldspar, in microscopic particles, with about 1 part of Micaceous-Iron, in minute black scales, with a high lustre and reddish-brown powder, which appear under the lens almost all to be triangular scales, evidently derived from the alteration of octahedra of Magnetite.

Fracture rather uneven. Streak grayish-white. Surface of fissures stained reddish-brown. Does not affect the magnetic needle. The magnet separates about 4 per cent. of the pulverized rock.

Weathers evenly and smoothly, to a reddish-brown.

No. 207 (Sp. 1238).—*Micaceous Feldspathic Argillyte*.

Huronian.—Armstrong's Camp, Michigamme River.

Resembles No. 261 (1229) in color and general character, but minutely glittering.

Under the lens it appears to consist chiefly of minute smoky-gray particles (Feldspar?), often grayish-white, studded with glistening scales of black Mica (like an Ottrelite Schist).

Fracture uneven. Streak grayish-white. Yellow Pyrite is disseminated in minute particles.

Weathers unevenly to a dirty brownish-gray.

No. 208 (Sp. 1240).—*Chloritic Argillyte*.Huronian.—About $\frac{1}{2}$ mile above mouth of Fence River.

Cast-iron-gray, inclining to olive ; shining.

A rather slaty rock, which resembles No. 207, but the glittering

scales or films of Mica (or Chlorite) are quite minute. Very little is visible under the lens, and the texture of the rock is consequently much finer and more fissile. The Pyrite also occurs in less quantity; the seams of lamination are dotted with tiny quartzose bunches, and have a uniform lustre. The streak is greenish-white; and a minute transverse vein of brownish-gray quartz occurs.

Weathers smoothly, to a dirty brownish-gray.

No. 209 (Sp. 1249).—*Chloritic Feldspathic Argillyte*.

Huronian.—Michigamme River, about $\frac{1}{2}$ way from Paint to Grand Portage.

Grayish-green; dull.

Resembles No. 339. A few seams, $\frac{1}{16}$ to $\frac{1}{4}$ inch wide, cross the laminæ, and are occupied by an aggregate of grayish-white Feldspar, with good cleavage and lustre, and smoky-gray Quartz, with geodes of tiny Quartz crystals, surrounded by a little red Ferric Oxide. Fuses before the blowpipe at 4.5, to a black glass.

Weathers to a blackish-brown, mottled by brownish-yellow and reddish-brown rhomboidal spots, usually about $\frac{1}{8}$ inch square. These are revealed under the lens to consist of oölitic granules of Quartz of those colors, and are probably quartzose pseudomorphs after Feldspar crystals.

No. 210 (Sp. 1250).—*Micaceous Siliceous Slate*.

Huronian.—Norway Portage, Sect. 15—T. 42—R. 31.

Resembles No. 261 (1229) in color, and No. 207 in the glitter of its surface; but the latter character is much more decided. The material appears under the lens to consist of about 6 parts of minute granules of grayish-white Feldspar, 1 part of smoky Quartz, and about 3 parts of glistening scales of black Mica. The structure is finely laminated, and the Feldspar predominates in many of the layers, which become lighter colored and vary in thickness from a film up to $\frac{1}{16}$ inch; while other layers are quartzose.

Fracture uneven. Streak grayish-white and partially metallic (abraded iron).

Weathers evenly, to a dirty greenish-gray, covered with parallel lines and narrow stripes of grayish and reddish-white.

No. 211 (Sp. 1368).—*Iron-Gray Argillaceous Mica-Slate*.

Laurentian.—S. end of Lake Gogebic, S. E. $\frac{1}{4}$ Sect. 3—T. 46—R. 42.

Cast-iron-gray, inclining to bluish; shining on cleavage surfaces.

A rather soft fissile rock, of almost impalpable texture. Under the lens appears to consist chiefly of equal bulks of a grayish-white (Feldspar) and grayish-black mineral (Smoky Quartz?) with many minute scales of Mica disseminated throughout. The cleavage surfaces are much corrugated and covered with a shining film of brown Mica.

Streak bluish-white. Fuses before the blowpipe at 4.5, to a greenish-black glass.

Weathers unevenly to a greenish-gray. Strongly resembles a Huronian schist, like No. 197 (908), No. 222, etc., rather than any other Laurentian rock.

No. 212 (Sp. 1369).—*Gray Feldspathic Schist (Siliceous)*.

Laurentian.—S. end of Lake Gogebic, S. E. $\frac{1}{4}$ Sect. 3—T. 46—R. 42.

Gray, slightly reddish, minutely speckled with grayish-white; minutely glittering on cleavage surfaces, almost dull on the section.

A hard, compact, homogeneous, fine-grained schistose rock, made up of the same materials as No. 187, in somewhat larger granules, the scales of Mica being prominent only on the cleavage surfaces.

Fracture uneven. Cuts hard to a knife-edge. Streak grayish-white. Effervesces slightly in acid, fuses before the blowpipe at 5, to a grayish-white glass.

Weathers rather evenly, to a cream color, and to the depth of $\frac{1}{8}$ to $\frac{1}{4}$ inch: on examining the weathered surface with a lens, it is

found to be roughened and lightened in color, by projecting granules of Quartz and Feldspar.

No. 213 (Sp. 1379).—*Banded Magnetic Mica-Slate*.

Laurentian.—From iron locality, N. E. corner Sect. 22—T. 46—R. 42.

Gray, inclining to brownish, with minute grayish-white and with also glittering specks; highly glistening on cleavage surfaces.

Resembles No. 210 in material and structure, but is a little more fissile and contains more and brighter Mica. It is made up, with a loose adherence, of hard laminæ, about $\frac{1}{32}$ inch thick, consisting of Quartz and Magnetite, alternating with laminæ, not quite so hard to the knife-edge, usually $\frac{1}{8}$ to $\frac{1}{4}$ inch thick, consisting of an aggregate of Quartz and Feldspar. The surface of the seams is covered with glistening films, consisting of large scales of brown Mica. Decidedly magnetic, and polarity strongly marked. Fracture hackly. Cuts hard to the knife-edge. Streak grayish-white and partially metallic (abraded iron). Powder ash-gray, inclining to brownish; the magnet separates 23 per cent. by weight, in grayish-black particles. Fuses before the blowpipe at 4.5, to a black glass.

Weathers rather evenly on the edges of the layers, to a surface covered with narrow parallel bands of light-red and grayish-black, more strongly contrasted and redder than the weathering of No. 210.

No. 214 (Sp. 1380).—*Banded Magnetic Siliceous Schist*.

Laurentian.—From iron locality, N. E. corner Sect. 22—T. 46—R. 42.

Like No. 213 in color and material, but the laminæ are adherent and but faintly distinguishable on a fresh fracture. On the weathered surface, however, the Feldspathic layers are usually $\frac{1}{8}$ to $\frac{1}{4}$ inch thick, and form light-red and brownish-gray bands, while the magnetic quartzose vary in thickness from a film to $\frac{1}{4}$ inch, and project slightly above the surface as zigzagged brown bands, rarely mottled with grayish-white Quartz, studded with many sparkling octahedra of Magnetite. Strongly magnetic and with decided polarity. Many of the cleavage surfaces are stained brown and

blackish-brown by the weathering, to the depth of $1\frac{1}{2}$ inches or more. Powder ash-gray, slightly inclining to blackish; the magnet separates about 33 per cent. by weight in black particles.

No. 215 (Sp. 1390).—*Greenish Feldspathic Schist (Siliceous)*.

Laurentian.—N. part of N. W. $\frac{1}{4}$ of Sect. 22—T. 46—R. 42.

Greenish-gray, minutely speckled with gray; minutely glistening.

A hard rock resembling No. 212, but it is a little coarser in texture, with slight traces of schistose structure in the hand specimen; and appears under the lens to consist chiefly of granules of grayish-white and greenish-gray Feldspar, with good cleavage and lustre, and of a black and blackish-green shining mineral, in micaceous fragments, probably Mica, sometimes with good cleavage and lustre (perhaps fragments of Amphibole); much Pyrite is disseminated in yellow granules.

Fracture uneven, approaching sub-conchoidal. Cuts hard to the knife-edge. Streak greenish-white.

Weathers evenly and smoothly, to a dirty yellowish-brown, which under the lens is seen to consist of very slightly projecting thin flakes of Quartz, which is thus shown to be one of the chief constituents of the rock.

No. 216 (Sp. 1466).—*Feldspathic Siliceous Schist (Micaceous)*.

Laurentian.—S. of Sunday Lake, Sects. 16 and 21—T. 47—R. 45.

Greenish-gray, speckled with grayish-white and pale yellow; glittering.

Resembles No. 215, but it is coarser, some of the grains of grayish-white and greenish-gray Feldspar being $\frac{1}{16}$ to $\frac{1}{8}$ inch long, with good cleavage and lustre. It also contains more Mica, of a brownish-black color, in rather larger scales, and has a decided but irregular schistose structure. Pyrite is abundantly disseminated in pale yellow particles visible to the eye. Fuses before the blowpipe at 4.5, to a blackish-brown glass. Cuts hard to the knife-edge, with a partially metallic streak (abraded iron).

Weathers rather unevenly, to a reddish-brown, with a few tiny lighter-colored and quartzose spots; many of the cleavage surfaces are stained the same color.

No. 217 (Sp. 1467).—*Feldspathic Siliceous Schist (Micaceous)*.

Laurentian.—S. of Sunday Lake, Secs. 16 and 21—T. 47—R. 45.

Gray, speckled with grayish-white, and dotted with short, minute, black, glittering, parallel lines.

Resembles No. 216, but the texture is finer, the Feldspar is gray and grayish-white, and above all the elongated scales of gray Mica are peculiarly arranged, being disseminated throughout the material separately and in parallel planes, thus producing a fibrous appearance. A thin seam of grayish-white Quartz occurs.

Weathers smoothly to a dirty brownish-gray; the streak of the weathered surface is partially metallic with abraded iron, and shows the presence of Quartz as a constituent.

No. 218 (Sp. 1474).—*Green Feldspathic Schist (Siliceous)*.

Laurentian.—N. side of Sect. 16—T. 47—R. 45.

Greenish-gray and slightly lustrous.

A compact, tough, homogeneous schist, of almost impalpable texture, made up of a greenish-gray Feldspar, grayish-white on thin edges, and of exceedingly minute glittering scales.

A little Quartz is disseminated in tiny bunches and transverse veins; seams covered with a soft, lustrous, sometimes fibrous, black and blackish-green film, traverse the rock and produce apparently a schistose structure.

Fracture uneven. Streak greenish-white. Many irregular seams and tiny cavities, stained reddish-brown.

Weathers unevenly, to a brownish-gray (Feldspar) to the depth of about $\frac{1}{4}$ inch, with greenish-white section; a little Quartz projects here and there in thin flakes.

Specimen 1475 is of a little coarser texture. Much Pyrite is

disseminated in pale yellow minute particles, and a seam occurs, $\frac{1}{16}$ inch wide, of grayish- and brownish-white Feldspar, in tiny facets, with good cleavage and lustre.

No. 219 (Sp. 1523).—*Decomposed Chloritic Schist*.

Laurentian.—W. branch of Ontonagon River, Sect. 13—T. 46—R. 41.

Chocolate-brown, mottled with large spots of greenish-gray.

A rather soft, fissile, and rather slaty fine-grained aggregate of scales of greenish-gray Chlorite and Talc. Mostly decomposed into chocolate-brown, with perhaps a little Feldspar. Surface of laminae somewhat corrugated and shining. A few irregular fissures.

Streak brownish-red or greenish-white.

Weathered surface even, and unchanged in color. Many exceedingly minute silvery greenish-gray scales, apparently of Talc, to which a somewhat greasy feel is due.

Resembles Nos. 190, 192, and 193.

No. 220 (Sp. 1540).—*Green Feldspathic Schist (Siliceous)*.

Laurentian.—W. branch of Ontonagon River, Sect. 13—T. 46—R. 41.

Greenish-gray, minutely speckled with gray; slightly glittering.

Resembles Nos. 212 and 215, and seems to be chiefly made up of greenish-gray and greenish-white Feldspar, in minute granules, and probably Quartz, with a little Mica in minute black scales. Irregular fissures occur, covered with films of the Mica and of brownish-white Calcite.

Fracture uneven. Cuts hard to the knife-edge. Streak reddish-white and partially metallic (abraded iron). Fuses before the blow-pipe at 5, to a grayish-white glass.

Weathers evenly and smoothly, to a light reddish-brown, to the depth of $\frac{1}{16}$ inch.

Specimen 1541 is a coarser and altered variety of 1540, of a reddish-brown color, speckled with greenish-gray, the Feldspar

being in tiny facets visible to the eye, often minutely striated, and with good cleavage, and much stained with brownish-red films. Effervesces slightly in acid. Streak reddish-white.

No. 221 (Sp. 968).—*Bluish-Gray Argillyte-Slate*.

Huronian.—1 mile S. of Sturgeon River, Sect. 18—T. 48—R. 34.

Dark bluish-gray; a slight lustre.

A homogeneous, very fine-grained, and finely-laminated roofing-slate, with a very minute fibrous corrugation of the laminæ.

Streak light bluish-gray. Fuses before the blowpipe at 6. Under the lens many exceedingly minute, dark, glistening scales are distinguished.

Specimen 969 is similar to 968, but shade of dark-green, rather than blue; corrugation not so regular; streak light greenish-gray.

In Specimen 970 the corrugation is a little coarser.

In Specimen 971 the corrugation is less decided and regular.

Specimen 983 (near centre of Sect. 13—T. 50—R. 32) is similar to 968, but not so fissile, and with only a slight fibrous structure.

Streak bluish-white.

Weathers roughly and to an ashy-gray color; cleavage surfaces lined with films of Calcite.

No. 222 (Sp. 974).—*Bluish-Gray Argillyte-Slate*.

Huronian.—Plumbago Brook, S. W. $\frac{1}{4}$ Sect. 13—T. 49—R. 34.

Dark bluish-gray; dull.

Streak bluish-white, not so finely laminated as No. 221, and with the bedding layers suggested by faint parallel lines, slightly darker and more granular.

Weathers smoothly and to a lighter color, revealing the bedding lines, even the more minute, in alternate thin bands of light and dark bluish-gray and bluish-white. A minute fibrously corrugated structure, but not so regular as in No. 221.

Another specimen (975) is similar to 974, but slightly darker in color, and with a slight lustre. A few parallel small bunchy veins $\frac{1}{16}$ – $\frac{3}{16}$ inch thick, filled with a coarse and irregular aggregate of glassy and milky Quartz and yellowish-brown scales of Mica. A coarse corrugation of the laminæ, which produces another cleavage resembling that of No. 247.

The weathered surface has a minute cross-striation, by the projection of laminæ on the two cleavage planes.

No. 223 (Sp. 976).—*Pyritiferous Argillyte-Slate*.

Huronian.—S. $\frac{1}{4}$ post Sect. 28—T. 51—R. 31, in Slate River.

Similar to No. 221, but without the corrugated structure, and dotted over with minute specks of yellowish-gray Pyrite.

Streak bluish-gray.

Weathers smoothly, to a lighter shade, speckled over with reddish-brown.

Specimen 979 is similar to 976, but with Pyrite disseminated throughout, in numerous specks and films of a yellowish-gray color.

Streak bluish-white.

No. 224 (Sp. 1104).—*Talcose Feldspathic Argillyte*.

Huronian.—Bed XIII.—Washington Mine, Anderson's Pit.

Ash-gray, with a very slight tinge of green, and dull, with reddish-gray stripes; with a few minute glittering points.

A very compact, fine-grained, rather soft and brittle schist, made up of about 8 parts of grayish-, sometimes greenish- or yellowish-white, Feldspar, in minute particles—1 part of grayish-white, reddish-white, or reddish-gray Quartz, and 1 part of minute scales of black Mica and silvery-white scales of Talc. The Quartz is mostly gathered together, with a little greenish-white Feldspar, into layers about $\frac{1}{8}$ inch thick and $\frac{1}{4}$ inch apart, which occur in tiny faults.

Fracture uneven. Streak grayish-white. A few fissures occur, whose surface is colored grayish-black, inclining to greenish, and possesses a greasy feel.

Weathers rather evenly, to a dirty brownish-gray, mottled with greenish-gray.

No. 225 (Sp. 1241).—*Talcose Feldspathic Argillyte*.

?— $\frac{1}{2}$ way from Paint to Grand Portage, Michigamme River.

Greenish-gray, covered with tiny blackish-green dots; dull.

A soft, compact, tough, crypto-crystalline schist, which appears under the lens to consist of exceedingly minute granules of grayish-white Feldspar, covered with greenish-gray scales of Talc; through this are dispersed irregularly oval spots, about $\frac{1}{32}$ inch long, which are produced by tiny parallel films of a blackish-gray material.

Fracture uneven. Streak grayish-white. The feel is slightly greasy, like Talc. Many irregular fissures, stained blackish-brown.

Weathers unevenly to a blackish-brown, mottled with yellowish-brown.

No. 226 (Sp. 1081).—*Magnetic Talc-Schist*.

Huronian.—Bed XIII.—Old Washington Mine.

On cleavage surface, gray and shining, minutely speckled with black and somewhat mottled with brownish-gray; on a fresh fracture, grayish-green and dull, with many glittering black points.

A rather soft, compact, talcose schist, with slightly greasy feel, which appears to be made up of about 5 parts of greenish-gray Talc, in silvery scales (which may be partly altered into a Mica), of about 3 parts of greenish-white Feldspar, and of 2 parts of Magnetite in octahedral crystals, which has been almost entirely converted into black glittering scales of Micaceous-Iron, many of which retain triangular shapes.

Fracture hackly. Streak white. Slightly attracts the magnetic needle. Cleavage surfaces are generally stained with a brownish-gray film and covered with a very minute corrugation.

Weathered surface rather even, and colored to reddish and yellowish shades of brown.

No. 227 (S).—*Porphyritic Talc-Schist*.

Huronian.—Parsons Mine.

Reddish-brown, streaked and speckled with grayish-white; minutely glittering.

A rather hard, compact, heavy, fine-grained schist, which appears under the lens to consist chiefly of a very fine-grained aggregate of grayish-white Feldspar, minute scales of silvery-white Talc, and reddish-brown Ferric Oxide.

Fracture uneven. Streak grayish-white, dotted with brick-red. Surface of fissures stained reddish-brown.

Weathers rather unevenly, to a uniform chocolate-brown, covered with reddish-white to reddish-gray rectangular specks. These last consist of Kaolin, and reveal the dissemination, to the amount of nearly one tenth of the bulk of the rock, of thin tabular crystals of Feldspar, usually $\frac{1}{16}$ to $\frac{1}{8}$ inch in length, and rarely over $\frac{1}{32}$ inch in thickness, which cannot be distinguished on a fresh fracture.

No. 228 (Sp. 738).—*Tabular Magnetite-Schist*.

Huronian.—Bed XIII.—Spurr Range, Sect. 23—T. 48—R. 31.

Bluish-black, slightly lustrous, and divided into parallel bands of thin glittering streaks.

An exceedingly fine-grained, homogeneous, hard Magnetite, of steely compactness, and of a tabular lamination. The layers are usually regular and parallel, from $\frac{1}{4}$ to $\frac{1}{2}$ inch in thickness, and contain a few octahedra visible to the eye. They are separated from each other by thin laminae through which much Mica is disseminated in distinct brownish scales. Many irregular fis-

tures occur, stained with dirty shades of yellowish and reddish-brown.

Fracture rather even. Streak iron-black. Powder grayish-black and dull. Strongly magnetic, and with decided polarity. The magnet separates about 99 per cent. of the bulk.

Weathers roughly, the Mica assuming a golden yellow color and lustre, mingled with a reddish-brown powder.

No. 229 (Sp. 728).—*Fine-Grained Magnetite-Schist.*

Huronian.—Bed XIII.—Spurr Range, E. side Sect. 23—T. 48—R. 31.

Glittering bluish-black, striped with many narrow dull bands.

A brittle and friable, fine-grained, schistose Magnetite, made up of parallel layers, $\frac{1}{4}$ to $\frac{1}{2}$ inch thick, some of which are soft, loose aggregations of glittering crystalline particles, easily visible to the eye, and sometimes having a brownish tinge; while the others are exceedingly fine-grained, hard, and dull. They both consist of aggregates of octahedral crystals of Magnetite, varying in size, and more or less perfect in form, and of minute granules of brownish and grayish-white Quartz.

Fracture somewhat uneven. Streak iron-black. Strongly magnetic and with decided polarity. Powder black and glittering; the magnet separates about 92 per cent. of the bulk.

Weathers rather evenly, and unchanged in color, though slightly streaked with brownish-gray.

No. 230 (Sp. 1502).—*Black Magnetite-Slate.*

Huronian.—Sunday Lake Outlet.

Bluish-black and dull.

An exceedingly hard and brittle Magnetite-Slate, of impalpable texture, showing only a very few glittering points (probably Mica), and made up loosely of laminæ, about $\frac{1}{16}$ to $\frac{1}{8}$ inch thick.

The fissures between the laminæ are stained yellowish-brown. A transverse vein of glassy Quartz, about $\frac{1}{16}$ inch wide.

Fracture of laminæ even. Strongly magnetic, and with strong

polarity. Hardly touched by the file. Streak and powder brownish-black and dull; the magnet takes up all the powder.

Weathers smoothly, to a dirty cream color, mottled with light reddish-brown.

No. 231 (Sp. 737).—*Chloritic Magnetite-Schist.*

Huronian.—Bed XIII.—Spurr Range, Sect. 23—T. 48—R. 31.

Lustrous bluish-black, with narrow bands of dark greenish-gray.

A compact, tough, fine-grained schist, made up of laminæ, mostly parallel, but often coalescing, from a film in thickness up to $\frac{1}{4}$ inch, and of two materials. The one consists of an exceedingly compact steely Magnetite, with lustrous fracture, in which the glittering octahedral and grayish-white granules of Quartz are distinguishable by the lens; the other of a fissile, soft Chlorite, through which many larger octahedra of Magnetite and minute granules of grayish-white Quartz are disseminated.

Fracture uneven. Streak iron-black, dotted with light greenish-gray. Strongly magnetic, and with decided polarity. Some of the chloritic laminæ are dotted, apparently by decomposition, with minute yellowish-brown specks. Powder dark grayish-green and dull. The magnet separates about 94 per cent. of the bulk.

Weathers smoothly, to dirty shades of reddish and yellowish-brown.

No. 232 (Sp. 733).—*Chloritic Magnetite-Schist.*

Huronian.—Bed XIII.—Spurr Range, Sect. 23—T. 48—R. 31.

Exactly like No. 231, except that many of the layers of Magnetite are coarser and glitter with minute octahedra of Magnetite, and some of the chloritic layers, near the weathered surface, are decomposed irregularly into a soft brown powder. Powder dark grayish-green, slightly glittering. The magnet separates about 80 per cent. of the bulk, in a blackish-green, slightly glittering powder, the re-

mainder being an olive-green, dull mixture of granules of grayish-white Quartz and olive-green Chlorite.

No. 233 (Sp. 1512).—*Green Magnetite-Schist*.

Huronian.—N. side of S. E. $\frac{1}{4}$ Sect. 8—T. 47—R. 45.

Cast-iron gray, with greenish shade, with faint narrow stripes, slightly darker in color; glittering in the sun.

A compact, tough, fine-grained Magnetite-Schist, of crypto-crystalline texture, with a laminated structure denoted by many faint dark lines on its section. It consists of exceedingly minute granules of a black color (Magnetite), and of a grayish-white (Feldspar and Quartz?), with minute silvery-gray scales of Mica (or perhaps Chlorite?).

Decidedly magnetic, and with decided polarity.

Fracture sub-conchoidal. Streak white. Powder ash-gray, slightly inclining to brownish, grayish, and dull. The magnet separates about 96 per cent. of the bulk, having the same ash-gray color—showing intimate admixture of the constituents.

Weathering yellowish- and reddish-brown, $\frac{1}{8}$ – $\frac{1}{3}$ inch in depth, and with an even surface.

No. 234 (Sp. 736).—*Quartzose Magnetite-Schist*.

Huronian.—Bed XIII.—Spurr Range, Sect. 23—T. 48—R. 31.

Bluish-black, with more or less glittering bands, some of which are mottled with grayish-white.

Consists of layers, $\frac{1}{8}$ to $\frac{1}{2}$ inch thick, of the two undecomposed materials of No. 236, with others, $\frac{1}{4}$ to $\frac{1}{2}$ inch thick, which are decidedly quartzose and hard, the grayish-white Quartz granules greatly predominating.

Fracture even. Streak iron-black. One crystal of Pyrite, about $\frac{1}{4}$ inch square, occurs in a quartzose layer. Powder blackish-gray and dull. Magnetic and with decided polarity. The magnet separates about 97 per cent. by weight.

Weathers of a dirty brownish-yellow color, and rather evenly, the quartzose layers slightly projecting.

No. 235 (Sp. 1230).—*Quartzose Magnetite-Schist*.

Huronian.—Felch Mountain, Sects. 32 and 33—T. 42—R. 28.

Iron-black, slightly lustrous, banded with blackish-gray, mottled with reddish-gray.

A very hard, fine-grained, compact schist, resembling No. 154, made up of layers, about $\frac{1}{2}$ inch thick, of reddish-gray Quartzite, consisting of grayish-white and brownish-red granules of Quartz and minute glittering scales, perhaps Mica, and of layers of fine-grained Magnetite, generally of almost steely compactness, but sometimes with glittering particles visible to the eye, among which good octahedrons can rarely be distinguished by the lens.

Fracture uneven. Streak reddish-white on the Quartzite layers, and on the black layers mostly reddish-brown, but in places iron-black. Strongly magnetic, and with decided polarity. A system of transverse parallel cleavage planes, stained reddish-brown. Many minute strings and bunches, sometimes $\frac{3}{4}$ inch long, of glistening Magnetite, associated with particles of a soft brown Ochre and reddish-white Quartz. Powder reddish-black and somewhat glittering, and is completely taken up by the magnet.

Weathered surface uneven, and of a dirty reddish-brown color.

No. 236 (Sp. 735).—*Ochrey Magnetite-Schist*.

Huronian.—Bed XIII.—Spurr Range, Sect. 23—T. 48—R. 31.

Dull bluish-black, with a few glittering bands, and with others of a reddish-brown color.

A form of No. 229, consisting chiefly of the dull compact layers, but partly of glittering layers which are not so coarse as those of No. 229. Many thin laminae are partly weathered into a softer reddish-brown Ochre. A few transverse seams occur, colored brownish-yellow. Strongly magnetic, and with decided polarity.

Streak iron-black and reddish-brown. Powder snuff-brown and dull. The magnet separates about 98 per cent. of the weight.

No. 237 (Sp. 689).—*Specular-Iron Schist*.

Huronian.—Bed XIII.—N. side of Sect. 19—T. 47—R. 27.

Iron-black and shining.

A compact, homogeneous schist, of finely fibrous and minutely lamellar structure, with a high lustre, and covered with minute glittering points, which under the lens are shown to be tiny scales of irregular shape. On a fresh fracture it is faintly perceptible (more clearly under the lens) that the ore is made up of thin and irregular lenticular layers, which differ from each other in fineness of grain, height of lustre, hardness, and abundance of the glittering scales; minute granules of grayish-white and reddish-white Quartz are disseminated throughout the ore, occasionally in tiny lenticular or rounded masses visible to the eye.

Fracture uneven. Streak reddish-brown. Powder brownish-black and glittering.

Weathers evenly, but with a fibrous surface, from the thin edges of many irregularly projecting laminæ.

No. 238 (Sp. 1234).—*Quartzose Hematite-Schist*.

Huronian.—Upper Menominee Range, Sect. 31—T. 42—R. 29.

Bluish-black, slightly lustrous, streaked and speckled with reddish-brown.

A rather fine-grained, hard, cellular schist, mostly made up of an aggregate of granules of smoky and grayish-white Quartz, glittering particles of Hematite of bluish-black color, and many of which are revealed by the lens to possess an octahedral form (Martite), and larger scales $\frac{1}{16}$ inch across, apparently of Micaceous-Iron, with much reddish-brown Ochre dispersed throughout in irregular particles and parallel seams, which mark the schistose structure. The smoky and grayish-white Quartz are also often gathered in irregular bunches and lenticular masses, sometimes 1 or 2 inches long.

Fracture uneven. Streak reddish-brown. Powder reddish-brown and glittering, from which the magnet separates a very few black particles.

Weathers very unevenly, to a brownish-black color, the quartzose layers and bunches projecting irregularly.

No. 239 (Sp. 1235).—*Quartzose Hematite-Schist*.

Huronian.—Upper Menominee Range, Sect. 31—T. 42—R. 29.

Sparkling bluish-black, exactly like the color of No. 229.

A compact, homogeneous, and somewhat brittle Hematite-Schist, rather fine-grained, but with distinct particles, and having a sub-schistose structure. Under the lens most of the particles appear to be irregular scales, but many retain an octahedral form (Martite). Granules of grayish Quartz are also revealed; in some places the Quartz is gathered in tiny particles and bunches visible to the eye.

Fracture uneven. Streak reddish-brown. Powder reddish-brown and glittering. The magnet separates about 1 per cent. of the bulk.

Weathers rather unevenly, with a diminution of lustre.

No. 240 (Sp. 1237).—*Quartzose Hematite-Schist*.

Huronian.—Upper Menominee Range, Sect. 31—T. 42—R. 29.

Cast-iron gray, with bluish shade; glittering.

A very hard, compact, tough, homogeneous, fine-grained Hematite, of imperfectly schistose structure, chiefly made up of minute glittering irregular scales of iron-black Micaceous-Iron, together with granules of grayish-white Quartz, only to be distinguished by a lens. A few irregular fissures, stained reddish- and yellowish-brown.

Fracture uneven, but approaching sub-conchoidal on large surfaces. Streak reddish-brown. Slightly magnetic. Powder blackish-brown and glittering. The magnet separates only a few black particles.

Weathered surface smooth and somewhat polished, of a dirty shade of blackish-brown.

No. 241 (Sp. 1429).—*Ochrey Quartzose Hematite-Schist*.

Huronian.—W. line of Sect. 18—T. 47—R. 45.

Blackish-brown, irregularly mottled with brownish-red and reddish-gray; dull.

A soft, compact, somewhat schistose Hematite, mostly of impalpable texture, in which grayish and yellowish-white Quartz and brownish-red Ochre are disseminated, in irregular tiny bunches, and a very few minute scales of silvery-gray Mica.

Effervesces slightly with acid. Thin films of a grayish-white and yellowish-brown color traverse the rock irregularly.

Fracture uneven. Streak bright reddish-brown.

Weathers unevenly, assuming lighter shades of color.

No. 242 (Sp. 872).—*Calcareous Ochrey Siliceous Schist*.

?—Near North end of Presqu'isle.

Grayish-white, striped throughout with yellowish-brown.

A tough, fine-grained, ferruginous, schistose rock, traversed throughout by layers about $\frac{1}{16}$ inch thick and apart, largely composed of hard grayish-white crystalline Calcite, somewhat but irregularly parallel, and with thinner laminae crossing at all angles. The chief material is a brownish-yellow, siliceous Ochre, through which are disseminated small scales of brownish-black Hematite and tiny crystalline masses of a light green mineral—probably Talc.

Fracture uneven. Streak brownish-white. Effervesces briskly with acid, the grayish-white layers dissolving out.

Weathers smoothly and of same color, the calcareous laminae sometimes projecting above the brown oxide, where somewhat separated from each other.

No. 243 (Sp. 995).—*Ochrey Calcareous Hematite*.

Huronian.—Slate River, Sect. 28—T. 51—R. 31.

Blackish-gray, mottled with reddish-brown and bright brownish-yellow; glistening.

A compact, coarsely crystalline aggregate of Calcite, in large

facets, often $\frac{1}{4}$ to $\frac{1}{2}$ inch across, with irregular crystalline bunches of calcareous reddish-brown Hematite, smaller bunches of Limonite and of grayish-white fine-grained Quartz being interspersed in less proportion. Effervesces strongly with acid.

Fracture uneven. Streak white, reddish-brown, and bright brownish-yellow.

Weathers unevenly, to dirty shades of yellowish and reddish-brown, the Hematite projecting above the Calcite, and the surface of the latter being minutely furrowed by the weathered-out edges of its harder laminae.

No. 244 (Sp. 896).—*Kaolinic Ochre-Schist*.

Huronian.—L'Anse Iron Range, Sect. 9—T. 49—R. 33.

Stripes of gray and reddish-brown.

A soft, compact, finely granular rock, made up of layers $\frac{1}{4}$ inch thick of two materials; the one being reddish-brown and composed of Hematite-Ochre, and amounting to about 6 parts; and the other being a mixture, of a gray color, speckled with white, of red Ferric Oxide with a very soft white Kaolin, amounting to about 4 parts. Many irregular fissures, one of which is mottled with black and possesses a high polish of slickensides.

Streak light reddish-brown. No weathered surface on the specimen, which is a decomposed variety of a schist associated with the specular ores.

No. 245 (Sp. 890).—*Brown Limonite-Schist*.Huronian.—L'Anse Iron Range, near centre N. W. $\frac{1}{4}$ Sect. 9—T. 49—R. 33.

Blackish-brown, with reddish shade.

A compact, hard, rather brittle rock, of rather slaty structure, made up of minute granules of light reddish-brown Quartz, particles of Limonite, and minute micaceous scales.

Fracture even. Streak light yellowish-brown. A few tiny geodes lined with Limonite, and others filled with brick-red Ochre.

Weathered surface smooth, and covered with reddish-brown Ochre.

No. 246 (Sp. 879).—*Carbonaceous Slate.*

Huronian.—Lower Bed.—L'Anse Iron Range, S. side of Sect. 9—T. 49—R. 33.

Blackish-brown; dull.

A compact, hard, fine-grained, fissile, Carbonaceous Argillyte, with a few minute seams of a light brown color. Consists of minute grains of gray Quartz, scattered through the black schistose material.

Streak glistening black, and rock receives a high polish by a little friction. Soils paper by rubbing.

Weathers smooth and of same color.

No. 247 (Sp. 904).—*Carbonaceous Shale.*Huronian.—Lower Bed.—L'Anse Iron Range, S. W. $\frac{1}{4}$ of Sect. 13—T. 49—R. 34.

Grayish-black.

A rather hard, compact, slightly Carbonaceous Argillyte, with a finely fibrous corrugation of all the laminae, which imparts a minute and peculiar cleavage in 2 planes at right angles to each other. On the cleavage plane of corrugated surface, the color is blackish-gray and slightly shining; on the surface of the other cleavage plane (which divides the rock into thin flakes) the color is blackish-gray and slightly shining, speckled with grayish-black spots without lustre. In a diffused light, with no reflection from the shining surfaces, the color of the rock is grayish-black.

Streak greenish-white. Does not soil paper, with carbon, by rubbing.

No. 248 (Sp. 880).—*Quartzose Carbonaceous Shale.*

Huronian.—Lower Bed.—L'Anse Iron Range, S. side of Sect. 9—T. 49—R. 33.

Color like No. 246, but a shade blacker; dull.

A rock similar to No. 246, but softer, and soiling paper more readily. Contains seams of glassy Quartz, $\frac{1}{4}$ inch thick; also small veins and bunches, distributed irregularly, and filled with an aggregate of Quartz, yellowish-brown Ochre, and minute scales of Mica.

No. 249 (Sp. 898).—*Quartzose Carbonaceous Slate.*Huronian.—Lower Bed.—L'Anse Iron Range, N. W. $\frac{1}{4}$ of Sect. 9—T. 49—R. 33.

Similar to No. 246, but a little blacker and softer, and containing a seam of glassy Quartz, $\frac{1}{16}$ inch thick.

No. 250 (Sp. 899).—*Graphitic Shale.*Huronian.—Lower Bed.—L'Anse Iron Range, N. W. $\frac{1}{4}$ of Sect. 9—T. 49—R. 33.

Resembles No. 246, but with many layers covered with a glistening graphitic film, some layers harder and more compact than others. Contains large bunches of an aggregate of Quartz and yellow and brownish-yellow Ochre. A few minute transverse seams, filled with the same material as the shale, but of more granular structure.

No. 251 (Sp. 900).—*Graphitic Shale.*Huronian.—Lower Bed.—L'Anse Iron Range, N. W. $\frac{1}{4}$ of Sect. 9—T. 49—R. 33.

Similar to No. 250, but of a laminated structure, some layers being graphitic.

Weathered surface smooth, the graphitic layers being more polished so as to impart a banded appearance. A seam filled with an aggregate of Quartz and brownish-yellow Ochre, and covered with indistinct impressions of fucoidal remains.

No. 252 (S).—*Coarse Red Granite.*

Laurentian.—Foster Mine.

Light salmon-colored spots, surrounded by grayish-black; shining.

A coarse Granite, made up of about 7 parts of angular masses of Orthoclase, with good cleavage and lustre, 1 to 2 inches across, in an aggregate of about 2 parts of smoky-gray to grayish-white Quartz, in angular grains about $\frac{1}{4}$ inch across, and grayish-black Mica, inclining to greenish, in soft scales, giving a gray streak,

inclining to greenish. Much of the Quartz is also interlaminated, in thin films and leaves, through the cleavage seams of the Orthoclase.

Fracture very uneven. Irregular fissures, slightly stained blackish and brownish.

Weathers unevenly, the Feldspar being a little brightened in color, but losing its lustre.

No. 253 (Sp. 1228).—*Ferruginous Granite.*

Huronian.—Dyke.—Felch Mountain, Sects. 32 and 33—T. 42—R. 28.

Reddish-gray, mottled with light brown and black.

A hard, tough, coarse, compact rock, consisting of Feldspar and Quartz, with a little Micaceous-Iron and Mica. The Feldspar, apparently Orthoclase, constitutes about 6 parts of the bulk, and consists of small masses of grayish-white color, passing into the softer brownish-red material, with a few large irregular glassy crystals, $\frac{1}{2}$ to 1 inch long, of a light-brown color. The Quartz constitutes nearly 3 parts of the bulk, and is smoky-gray, rarely greenish-white, and occurs in small masses. The Micaceous-Iron amounts to nearly one part, and occurs in tiny bunches and thin seams, often 1 to 2 inches long, running and crossing each other irregularly. The Mica is present in very small quantity, in minute silvery-gray scales, and seems to be replaced by the Micaceous-Iron: so that this rock, to judge by the hand specimen, resembles and may be identical with the Eisen-Granit of the Germans.

Fracture uneven.

Weathers unevenly, by the removal of the Micaceous-Iron and decomposition of the Feldspar, and to a reddish-white color.

No. 254 (Sp. 741).—*Fine-Grained White Granite.*

Boulder, near 34th Mile Post, M. & O. Road.

Grayish-white, with minute blackish-brown specks disseminated throughout; glittering.

A hard, compact, tough, fine-grained Granite, made up of 4

parts of grayish-white Feldspar, often with good cleavage, minutely striated and iridescent; of 5 parts of smoky-gray Quartz, in grains, like those of the Feldspar, rarely $\frac{1}{8}$ inch across; and of one part of soft brownish-black Mica, with gray streak, in minute scales, disseminated throughout, without any parallel arrangement. A coarse bunch occurs, in which the scales of Mica are $\frac{1}{8}$ inch across. A little of the Mica inclines to a massive or fibrous structure, resembling an altered Amphibole; and under the lens many minute grains are seen to be associated with it of a translucent yellowish-green color, and with a glassy fracture (Epidote).

Fracture sub-conchoidal. Streak white.

Weathers smoothly to a slightly reddish-white, some of the small grains of Feldspar becoming soft and reddish.

No. 255 (Sp. 746).—*Fine-Grained Black Gneiss.*

Boulder, near 34th Mile Post, M. & O. Road.—Lake Michigamme, Sect. 3—T. 47—R. 30.

Grayish-black, minutely speckled with gray; glittering.

A hard, compact, rather brittle, fine-grained Gneiss, made up of minute scales of black Mica and granules of grayish-white Feldspar and smoky Quartz, just distinguishable by the eye. Pyrite occurs in a very few tiny particles.

Fracture even. Streak gray and grayish-white. Effervesces slightly in acid. Fuses before the blowpipe at 4, to a brownish-black blebby enamel. A few seams occur, covered with films of yellowish- and reddish-brown Ochre.

Weathers to an even surface, of a reddish-white color, minutely speckled with gray and reddish-brown scales, and with a few angular fragments projecting, about $\frac{1}{4}$ inch long, of a coarse reddish-white Feldspar.

No. 256 (Sp. 1248, B).—*Fine-Grained Black Gneiss.*

?—Michigamme River.—E'ly part of Sect. 21—T. 42—R. 31.

Blackish-brown, speckled with gray; decidedly glittering.

A hard, compact, tough, minutely porphyritic, fine-grained

Gneiss, made up of nearly 4 parts of blackish-brown Mica, in minute glittering scales, of 4 parts of a gray Feldspar, in thin plates $\frac{1}{32}$ to $\frac{3}{16}$ inch long, and of over 2 parts of grayish-white Quartz, in minute granules. A little yellow Pyrite is disseminated in small particles.

Fracture uneven and rough. Streak grayish-white. A thin seam of reddish-brown Feldspar crosses the specimen, and a fissure stained reddish-brown.

Weathers unevenly, to a blackish-brown, speckled with yellowish-brown.

No. 257 (Sp. 1252).—*Fine-Grained Grayish-Black Gneiss.*

?—Long Portage.—Sects. 32 and 33—T. 42—R. 31.

Grayish-white, minutely speckled with black; glittering.

A hard, tough, compact, and very fine-grained, uniform, laminated Gneiss, which consists of about 1 part of tiny scales of black Mica, about 4 parts of grayish-white Quartz, in minute grains, and 5 parts of smoky-gray or blackish-gray Feldspar, in tiny crystalline grains.

Fracture almost even. Streak white. A transverse seam of blackish-green, glistening scales of Chlorite, with a few yellow grains of Pyrite.

Weathers unevenly, to a brownish-black, the scales of black Mica becoming silvery-gray. Somewhat resembles a Slate-Gneiss (Cotta)—Schiefer-Gneiss (Germ.).

Another variety, 1253, resembles 1252, but the amount of Feldspar is much less, and the color of the rock is lighter. A few tiny, short, lenticular seams of grayish-white Quartz occur; and the weathered surface is of a dirty reddish-brown.

No. 258 (Sp. 935).—*Coarse Reddish Gneiss.*

Laurentian.—Head of 2 miles Portage in Sect. 18—T. 45—R. 29.

Mottled grayish-white, reddish-brown, smoky-gray, and black.

A compact, hard, tough, coarse, porphyritic Gneiss, with a parallel arrangement of all its constituents, especially of the Mica.

The Feldspar constitutes over 6 parts of the bulk of the rock, and mostly occurs in large angular masses, often 1 inch by $\frac{1}{4}$ inch, of a grayish and grayish-white color. Along the edges of the facets and throughout many of the smaller masses, it passes into a somewhat softer material, of a brownish-red color, inclining to deep orange, and with a reddish-white streak, which is evidently the result of decomposition. The Quartz, which amounts to over 2 parts, occurs in smaller masses, rarely $\frac{1}{2}$ inch long, of a grayish-white and smoky-gray color. The Mica is very generally disseminated in tiny bunches and somewhat parallel short seams, consisting of minute black scales, rarely silvery-gray, which are soft and give a greenish-gray streak, from partial decomposition.

Fracture uneven. Tiny yellowish-brown coatings occur on the Mica.

Weathers unevenly, to a grayish-black color and to a depth of about $\frac{1}{8}$ inch, being brownish-black and shining on the fresh fracture.

In Specimen 936, the Feldspar is a shade whiter, the gneissic structure is less marked, and the weathering smoother, thinner, and of a brownish-black color.

Specimen 937 contains very little Mica, the Quartz is nearly equal in bulk to the Feldspar, and the weathering is like that of 936.

No. 259 (Sp. 947).—*Grayish-White Gneiss.*

Laurentian.—From State Road L'Anse to Champion, T. 49—R. 33.

Grayish-white, with black specks and streaks.

A compact, hard, tough, fine-grained Gneiss, of which the Mica is arranged in parallel seams, but is chiefly disseminated in a few layers, about $\frac{1}{2}$ inch thick. The Feldspar is grayish-white, often minutely striated, occasionally decomposed into a softer light brownish-red material, occurs usually in tiny particles, but renders the micaceous layers porphyritic with masses sometimes $\frac{1}{4}$ by $\frac{1}{2}$ inch, and constitutes about 6 parts of the bulk of the rock. The Quartz is the same as in No. 258, but occurs in smaller particles, and constitutes nearly 4 parts of the bulk of the rock. The Mica is the decomposed variety of No. 258, is not so generally diffused,

and is present in small quantity. Yellowish-green Epidote occurs in small quantity, in minute particles, through a micaceous layer, and in tiny crystals in a transverse vein of smoky-gray Quartz.

Fracture rather even.

Weathers rather evenly to a reddish-gray color.

No. 260 (Sp. 1548).—*Mottled Gneiss*.

Laurentian.—From N. $\frac{1}{2}$ of T. 46—R. 41.

A small fragment of Gneiss, coarser than 1546, chiefly made up of angular masses of a brownish-red and a grayish-white Feldspar, and smoky-gray Quartz, about $\frac{1}{4}$ to $\frac{1}{2}$ inch across, in about equal quantities. A little Mica, with silvery-gray scales, is also disseminated in tiny seams.

Fracture uneven. A few fissures.

The specimen is too small to distinguish the feldspars (which may both be varieties of one species). The angular crystalline masses may also entitle it to the name porphyritic. This specimen may be from a vein in No. 296.

No. 261 (Sp. 1226).—*Black Hornblende-Gneiss*.

Laurentian.—Felch Mountain, Sects. 32 and 33—T. 42—R. 28.

Black and glittering, speckled with gray.

A rather fine-grained, uniform Gneiss, resembling Nos. 262 and 265, and is composed of about 5 parts of black Amphibole, in fibrous facets of high lustre, slightly altered and softened, rarely $\frac{1}{16}$ inch across, and with a decided parallel arrangement, and of a gray mixture of about 3 parts of grayish-white Quartz and 2 parts of grayish-white Feldspar, in particles not distinguishable by the eye.

Fracture nearly even. Streak greenish-white. A few fissures stained reddish-brown.

Weathers evenly but roughly, to a grayish and reddish-white color, speckled with blackish-green to a depth of $\frac{1}{4}$ inch.

The following two varieties illustrate the common alteration of the Amphibole of these Gneisses, partially (Sp. 1229) or entirely (Sp. 1224) into a black Mica.

(Sp. 1229.) *Fine-Grained Black Gneiss*.

Dark cast-iron gray, inclining to a slight tinge of purplish or greenish in different lights; slightly lustrous.

A rather hard, compact, tough, fine-grained Gneiss, of quite fissile structure, which appears under the lens to consist of about 2 parts of minute granules of grayish-white Quartz, 4 parts of gray Feldspar, and 4 parts of minute narrow-bladed scales of black and blackish-brown Mica. Seams of lamination often stained reddish-brown. A few transverse irregular veins, $\frac{1}{8}$ to $\frac{1}{4}$ inch wide, sometimes widening into bunches, 1 inch across, filled with a fine-grained aggregate of gray and grayish-white Feldspar, grayish-white Quartz, and black Amphibole, with greenish-gray streak, sometimes in crystals $\frac{1}{4}$ inch long.

Fracture uneven. Streak grayish-white.

Weathers evenly, the veins slightly projecting, to a lighter greenish-gray, mottled with grayish-white and dirty brownish-gray.

(Sp. 1224.) *Fine-Grained Black Gneiss*.

Blackish-gray; slightly glittering.

A hard, tough, compact, very fine-grained Gneiss, whose imperfectly schistose structure is chiefly shown in the shape of the specimen. It appears under the lens to consist of about 3 parts of minute granules of gray Quartz, 4 parts of minute scales of black Mica, which glitter on the section, and 3 parts of grayish-white to brownish-gray Feldspar, in minute granules—a single crystal of which was observed, $\frac{1}{8}$ inch long.

Fracture uneven. Streak greenish-white. A few fissures stained reddish-brown, yellowish-brown, and white.

Weathers unevenly, to grayish-black minutely speckled with brownish-gray, the surface being studded with reddish-white rectangular spots. The spots consist of irregular rectangular masses, dispersed at intervals of about $\frac{1}{2}$ inch apart, $\frac{1}{8}$ to $\frac{1}{4}$ inch long, of

a reddish-white fine-grained aggregate of grayish-white Quartz and reddish-white Feldspar, appearing to be altered crystals of Feldspar and producing a porphyritic appearance.

No. 262 (Sp. 949).—*Black Hornblende-Gneiss*.

Laurentian.—From State Road L'Anse to Champion, S. $\frac{1}{2}$ of T. 49—R. 33.

Greenish-black, with minute specks and narrow bands of grayish-white; glittering.

A hard, compact, tough, finely crystalline Gneiss, with a few coarse-grained layers, varying irregularly from $\frac{1}{8}$ to $\frac{1}{2}$ inch in thickness. It consists of slightly altered greenish-black Amphibole, in tiny fibrous crystals, just distinguishable on a fresh fracture, of grayish-white and smoky-gray Quartz, and of milky-white and grayish-white Feldspar (?), in minute particles. The coarse thin layers consist of an aggregate of the last two, the facets of Feldspar being often $\frac{1}{4}$ inch across.

Fracture even. Streak greenish-white. A few irregular broad seams, covered with films of shining Amphibole. A little Pyrite is disseminated throughout, in particles, generally minute, but sometimes $\frac{1}{16}$ inch across.

Weathers rather evenly, the coarse layers slightly projecting, of a reddish-white color, with smoky-gray specks; while the finer material is reddish-white, speckled with the dark-green crystals of Amphibole.

No. 263 (Sp. 742).—*Coarse Altered Hornblende-Gneiss*.

Laurentian.—Near 34th Mile Post, M. & O. Road, Lake Michigamme.

Grayish-white, speckled throughout with spots and irregular parallel streaks of greenish-black; glittering.

Apparently a coarse vein from No. 254, and consists of the same materials. The Feldspar constitutes about 4 parts and the Quartz 3 parts, in facets and grains $\frac{1}{16}$ to $\frac{1}{8}$ inch across. Through this matrix are disseminated, to the amount of about 3 parts, bunches $\frac{1}{16}$ to $\frac{1}{8}$ inch thick and often $\frac{1}{2}$ inch long, sometimes irregular and

isolated, but generally gathered in long aggregations with a parallel arrangement. These consist of about equal quantities of the brownish-black scales of Mica, and fibrous masses of black Amphibole, both soft and with gray streak, and of the yellowish-green mineral (Epidote?)—each in masses about $\frac{1}{16}$ to $\frac{1}{8}$ inch across, and therefore distinguishable without the lens. Effervesces but very slightly in acid.

Fracture uneven, almost sub-conchoidal.

Weathered surface uneven, and differs from the fresh fracture in a slight reddish tinge to the Feldspar, and a bronze-yellow tinge to the Mica.

No. 264 (Sp. 744).—*Altered Hornblende-Gneiss*.

Laurentian.—Near 34th Mile Post, M. & O. Road, Lake Michigamme.

A vein, about two inches broad, of the material of No. 254, crossing a coarse Gneiss like No. 263. It differs from those specimens in the general mottling of the Feldspar with spots and streaks of a reddish-white, sometimes brick-red color; in the occurrence of a few thin seams or films of crystalline Epidote; in the occurrence of a few particles of Pyrite in the grains and seams of Epidote; and in the association of a little silvery-white Mica, in minute scales, with the black Mica of some parts of the vein.

No. 265 (Sp. 954).—*Altered Hornblende-Gneiss*.

Laurentian.—From State Road, L'Anse to Champion, T. 49—R. 33 and S. E.

Grayish-white, speckled and streaked with blackish-green, and with a few grayish-white bands; glittering.

A compact, tough, fine-grained, hard Hornblende-Gneiss, chiefly made up of about 6 parts of grayish-white Feldspar, in facets rarely $\frac{1}{16}$ inch across—of about 3 parts of similar grains of Quartz, grayish-white inclining to smoky—and of about 4 parts of a fine-grained aggregate of the three minerals of No. 268, denoted a, b, and c, viz., blackish-green softened fibrous Amphibole, greenish-black scales of Mica, and minute particles of the yellowish-green Epidote. This last dark-green mixture is arranged in decidedly

parallel scales, giving the section a streaked or laminated appearance. A few bands, about $\frac{3}{8}$ inch thick, chiefly composed of a coarse aggregate of the Quartz and Feldspar, the latter in facets sometimes nearly $\frac{1}{8}$ inch across. A little Pyrite is disseminated, in minute yellow particles.

Fracture even. Streak greenish-white.

Weathers smoothly, to a grayish-white color, divided on a section by dark-green lines into narrow stripes and bands.

No. 266 (Sp. 1086).—*Chloritic Hornblende-Gneiss*.

Huronian.—Bed XI.—Old Washington Mine.

Blackish-green, minutely streaked with grayish-white; glittering.

A compact, tough, hard Gneiss, which consists of nearly 6 parts of grayish-white Quartz, in minute granules, of probably about 1 part of greenish or grayish-white Feldspar, in exceedingly minute granules, of over 2 parts of Amphibole, in black and greenish-black blades, $\frac{1}{16}$ to $\frac{1}{8}$ inch long, and of 1 part of silvery scales of a grayish-white (Mica?) and blackish-green (Chlorite?). Much of the Quartz is gathered in thin lenticular, greenish-white flakes, $\frac{1}{16}$ to $\frac{1}{4}$ inch long, which contrast with the crystals of Amphibole; and certain layers, $\frac{1}{8}$ to $\frac{3}{8}$ inch thick, consist almost entirely of the greenish-white Quartz-granules.

Fracture uneven. Streak greenish and grayish-white. A few particles of yellow Pyrite are disseminated through the layers.

Weathers unevenly to dirty shades of greenish-gray, mottled by reddish-brown.

No. 267 (Sp. 1087).—*Hornblende-Gneiss*.

Huronian.—Bed XI.—Old Washington Mine.

Blackish-green, minutely speckled with black and grayish-white; glittering.

A hard, compact, tough, homogeneous, fine-grained Gneiss, with

no evidence of stratification in the hand specimen except its flattened shape. It seems to be made up of the same constituents as No. 266, and about the proportion of 4 parts of Amphibole, in blades rarely exceeding $\frac{1}{16}$ inch in length, of 4 parts of grayish-white Quartz, and of 2 parts of Feldspar. The micaceous scales are not distinguishable. A very few glistening flakes occur, showing cleavage, sometimes nearly $\frac{3}{16}$ inch long, which appear to be partially altered facets of Feldspar. A little Pyrite occurs in rather larger particles than in No. 266.

Fracture nearly even. Streak greenish-white. Surface of fissures is stained reddish-brown.

Weathers to the depth of $\frac{1}{4}$ inch, with a surface which is even but rough, and of a greenish-gray color, the crystals of Amphibole assuming a blackish-green and projecting above the other grayish-white constituents.

No. 268 (Sp. 1361).—*Banded Hornblende-Gneiss (Epidotic)*.

Laurentian.—Near centre S. W. $\frac{1}{2}$ Sect. 19—T. 47—R. 42.

Blackish-green, speckled with grayish-white, and mottled with greenish-gray and with reddish-white parallel stripes; glittering.

A compact, tough, calcareous Hornblende-Gneiss, of rather coarse texture, made up of somewhat wavy layers, some dark and speckled, $\frac{1}{2}$ to 1 inch thick, separated by others which are reddish-white, about $\frac{1}{4}$ inch thick. The latter consist of an aggregate of grains of varying fineness, rarely exceeding $\frac{1}{16}$ of an inch, of glassy grayish-white Quartz and crystalline reddish-white Feldspar; thin seams, of the same material but finer grained, sometimes run obliquely across and connect two adjacent layers. The dark layers consist, to the extent of about $\frac{1}{2}$ their bulk, of the same aggregate, as a matrix with irregular crystals of the three following minerals disseminated throughout, the first greatly predominating:

a—Blackish-green Amphibole, with a slight lustre, in facets $\frac{1}{8}$ to $\frac{1}{4}$ inch long, but having about the hardness equal to 2, and greenish-gray streak; the greater dimension of the facets is usually parallel to the lamination.

b—Glistening scales of black Mica, never over $\frac{1}{32}$ inch in diameter, soft and giving a greenish-white streak. The same Mica as that of No. 258.

c—A rather soft, gray mineral (probably Epidote), with tinge of yellowish-green, giving a white streak, which occurs abundantly, sometimes in amorphous particles, or in facets having the fibrous structure, cleavage and general appearance of those of Amphibole. These particles are generally concentrated in certain portions of a layer, imparting to it their color.

Fracture of the rock rather uneven. Effervesces with acid.

Weathers roughly to a dirty-gray color, with tiny spots of blackish-green (facets of Amphibole), the white layers and seams projecting slightly as ridges over the surface.

No. 269 (Sp. 1363).—*Chloritic Hornblende-Gneiss*.

Laurentian.—Near W. $\frac{1}{4}$ post Sect. 19—T. 47—R. 42.

Blackish-green and highly glistening, speckled and banded with brownish-gray and greenish-white.

A compact, tough Gneiss, of medium texture, with grains and scales about $\frac{1}{32}$ inch across. The Feldspar constitutes about 5 parts of the rock, occurring in gray, grayish-white, and brownish-gray glistening facets, often minutely striated, which are easily distinguishable in certain coarsely crystalline layers, about $\frac{1}{2}$ inch thick, made up of the Feldspar and Quartz. The latter is grayish-white and smoky gray, in distinct grains, and constitutes nearly 3 parts of the rock. The third mineral is apparently an altered Amphibole, constitutes over 2 parts of the rock, occurs in glistening scales, often $\frac{1}{8}$ to $\frac{1}{4}$ inch across, which resemble Amphibole in fibrous structure and cleavage, and have a blackish-green color by reflected light, but are soft, give a greenish-gray streak, and have a light yellowish-green color by transmitted light.

Fracture uneven.

Weathers evenly, to a light flesh-red color, mottled with blackish-green.

In another variety (Sp. 1362), described below, the Amphibole has been completely altered into Chlorite.

(Sp. 1362).—*Green Chloritic Gneiss*.

Olive-green, with glistening greenish-black specks and greenish-gray streaks.

A compact, tough, fine-grained, rather hard schist, made up of about equal quantities of soft olive-green Chlorite, minutely crystalline, but enclosing many brownish-, sometimes greenish-black glistening scales of altered Mica, often $\frac{1}{4}$ inch across—of tiny grains of glassy Quartz, varying in color from grayish-white to grayish-black, and of greenish-white Feldspar, which can only be distinguished in certain grayish-white and greenish-gray layers, which are coarsely crystalline and contain little Chlorite.

Fracture uneven. Streak greenish-gray.

Weathers unevenly, to a dirty yellowish-green, inclining to citrine-yellow, bespangled with brownish scales of weathered Chlorite.

No. 270 (Sp. 1370).—*Altered Hornblende-Gneiss*.

Laurentian.—Near W. $\frac{1}{4}$ post Sect. 19—T. 47—R. 42.

Blackish-green and glistening, with grayish-white specks, traversed by broad brownish-gray bands.

A hard, compact, tough, coarse calcareous Gneiss, in which occurs a lighter-colored band, $\frac{1}{2}$ inch thick. The dark matrix consists of about 5 parts of blackish-green Amphibole, altered like that of No. 269, in fibrous facets $\frac{1}{8}$ inch long—of 2 parts of grayish-white and smoky-gray Quartz, in tiny granules—and of 3 parts of grayish-white, often smoky or reddish, Feldspar, in tiny facets, often minutely striated. The facets of Amphibole are generally parallel to the bands, and produce the schistose structure. The lighter-colored band consists of a coarser aggregate of the Feldspar and Quartz, in grains sometimes $\frac{1}{16}$ inch across, with tiny crystals of Amphibole scattered throughout in small quantity.

Fracture rather uneven. Effervesces decidedly in acid, especially the material of the lighter-colored bands. This is apparently a coarse seam in Amphibole-Gneiss.

Weathers rather unevenly, to a dirty reddish-brown, speckled with blackish-green and reddish-white.

No. 271 (Sp. 1089).—*Black Hornblende-Schist*.

Huronian.—Bed IX.—Old Washington Mine.

Black, minutely speckled with grayish-white; glittering.

A compact, hard, tough, coarse rock, with a feebly schistose structure in the hand specimen, which consists of about 7 parts of black Amphibole, with greenish-gray streak, in fibrous shining plates, $\frac{1}{16}$ to $\frac{1}{8}$ inch in diameter,—of 2 parts of greenish-gray Feldspar, and perhaps nearly 1 part of grayish-white Quartz. Blackish-green scales (of Chlorite?) are abundantly associated with the facets of Amphibole and denote their partial alteration.

Fracture uneven. A few fissures occur, stained grayish-black. A small segregated vein lines the side of the specimen, consisting of crystals of Amphibole and grayish-white Quartz, with cleavable crystalline masses of grayish and reddish-white Feldspar.

Weathers very unevenly and roughly, to a reddish-brown (the projecting Amphibole), speckled with reddish-white.

No. 272 (Sp. 946).—*Chloritic Hornblende-Schist*.

Laurentian.—From State Road L'Anse to Champion, T. 49—R. 33 and S. E.

Blackish-green and shining, minutely mottled with yellowish-green, with a few spots and streaks of reddish-white.

A rather hard, compact, tough, fine-grained, slightly calcareous schist, chiefly made up of a softened blackish-green Amphibole, with light greenish-gray streak, sometimes in tiny fibrous facets which produce a granular texture, but usually in soft glistening and slightly fibrous films (Chlorite?), which give the rock a scaly lamination in many irregular planes, the filmy scales enveloping the granular masses in all directions. The interstices between the films are occupied by massive yellowish-green Epidote, which also occurs in tiny bunches and thin scales. Grayish-white Feldspar and grayish and reddish-white Quartz are also disseminated in particles through the rock, and gathered in bunches and veins, sometimes $\frac{1}{2}$ inch thick.

Fracture uneven. Streak grayish-white. Effervesces very feebly in acid.

Weathers unevenly, to a brownish-gray, mottled with yellowish-green.

No. 273 (Sp. 948).—*Chloritic Hornblende-Schist*.

Laurentian.—From State Road L'Anse to Champion, T. 49—R. 33 and S. E.

Blackish-green and glittering, sometimes with grayish-white specks.

A tough, compact, rather hard, uniform, finely-crystalline, slightly calcareous schist, chiefly made up of tiny, irregular, fibrous facets of altered Amphibole, harder than those of No. 272, giving a greenish-white streak. A few films also occur, whose approximately parallel arrangement imparts to the rock a faintly distinguishable schistose structure. Grayish-white and smoky-gray Quartz and white Feldspar are disseminated, in particles rarely distinguishable without a lens, but sometimes appearing as whitish specks on the dark-green ground. A vein of a coarse aggregation of these two minerals occurs, about $\frac{1}{4}$ inch thick, the facets of Feldspar being sometimes $\frac{1}{4}$ inch across.

Fracture uneven. Effervesces feebly in acid.

Weathers evenly, but with a slightly pitted surface, to a blackish-green, mottled with light-brown.

No. 274 (Sp. 950).—*Chloritic Hornblende-Schist*.

Laurentian.—From State Road L'Anse to Champion, T. 49—R. 33 and S. E.

Dark grayish-green, with glistening spots; shining on planes of lamination.

A coarsely crystalline, tough, soft, homogeneous, slightly calcareous schist, which resembles No. 272 in color and general structure. Appears to the eye and to the lens to be entirely made up of large fibrous facets of softened Amphibole, with greenish-gray streak, which are conspicuous on the cross-fracture, together with more or less Chlorite in minute scales. Their frequent parallel arrangement produces a decidedly schistose structure.

Fracture uneven.

Weathers quite unevenly and roughly to a dirty greenish-brown.

No. 275 (Sp. 1393).—*Greenish Chloritic Gneiss*.Laurentian.—N. $\frac{1}{2}$ of N. W. $\frac{1}{4}$ of Sect. 14—T. 47—R. 43.

Greenish-gray, with reddish-white and glittering blackish-green spots.

A rather coarse, compact, tough, hard, uniform, feldspathic rock, with very little evidence of schistose structure in the hand specimen. It consists of about 3 parts of greenish-white Quartz—1 part of greenish-black to black Chlorite, in tiny glistening soft scales, with greenish-gray streak—3 parts of reddish-white Feldspar, in crystalline facets, often $\frac{1}{8}$ inch across—and 3 parts of a greenish-gray, finely granular, crystalline, apparently feldspathic mineral, with slightly greenish-white streak, in undefined masses, about $\frac{1}{8}$ inch across.

Fracture uneven. A few irregular minute seams of reddish-brown Ochre.

Weathering uneven, with a surface of dirty gray, but imparts a deep reddish-brown color to the depth of about $\frac{1}{4}$ inch.

No. 276 (Sp. 867).—*Chloritic Gneiss*.

Laurentian.—Mouth of Dead River, near Marquette.

Greenish-gray, with specks of smoky-gray, black, and reddish-white, and occasionally small rusty reddish-brown spots.

A very compact, tough, rather hard, uniform, Chloritic Gneiss. The Feldspar is grayish-white, often greenish-white, reddish-white, or light brownish-red, often minutely striated, with white or reddish-white streak, in tiny massive grains, and constitutes about 4 parts of the rock. The Quartz is smoky-gray, with a lighter or deeper blackish tint, in tiny grains uniformly distributed, and amounts to about 4 parts. The Chlorite constitutes about 2 parts of the rock being uniformly distributed in soft minute particles or scales of blackish-green, in a somewhat parallel arrangement, and is sometimes mixed with a few glistening, silvery-gray, micaceous scales. Many large irregular seams occur, covered with a film of Chlorite.

Fracture rather uneven.

Weathers to a rusty reddish-brown color, evenly, but with many grains of Quartz projecting.

No. 277 (Sp. 870).—*Epidotic Chloritic Gneiss*.

Laurentian.—Mouth of Dead River, near Marquette.

Resembles No. 276, contains however very little Chlorite, arranged in thin parallel scales, and nearly a quarter of the bulk of the rock consists of light yellowish-green, translucent Epidote, with greenish-white streak, in tiny masses uniformly distributed. Also broad seams occur covered with films of Epidote of a deeper green.

Weathered surface rather reddish, with tiny specks of yellowish-white.

NOTE.—The following rock occurs as a narrow vein in Chloritic Gneiss:

(Sp. 874.)—*Epidotic Greenstone*.

Blackish-green, minutely speckled with greenish-gray; glittering.

A compact, tough, homogeneous rock, of medium hardness and very fine texture, which appears under the lens to consist of about 4 parts of grayish and reddish-white Feldspar, in tiny facets, with good cleavage and lustre—of 3 parts of minute scales of blackish-green and greenish-white Chlorite—and of 3 parts of crystalline grains of yellowish-green translucent Epidote. Pyrite is also disseminated in pale yellow particles. A few tiny bunches of grayish-white and flesh-red Feldspar are disseminated, and much yellow Pyrite, in minute particles, is disclosed on a polished section.

Fracture uneven. Streak greenish-white.

Weathers evenly to a yellowish-green, mottled by flesh-red and minutely speckled with dark-green—the surface being roughened by the removal of the Chlorite. The weathering is about $\frac{1}{8}$ inch deep, its section being greenish-white, shading inwardly to grayish-green.

No. 278 (Sp. 938).—*Chloritic Gneiss*.

Laurentian.—N. E. side of Sect. 16—T. 49—R. 33.

Dark grayish-green and glittering, with tiny grayish-white specks arranged in parallel lines.

A rather soft, compact, tough, fine-grained, uniform, calcareous

schist, made up of tiny particles, rarely $\frac{1}{16}$ inch across, of an aggregate of about 2 parts of grayish-white and smoky-gray glassy Quartz, —4 parts of grayish-white Feldspar, in facets often minutely striated—and 4 parts of a dark grayish-green mineral, with light greenish-gray streak, which appears under the lens to consist of exceedingly minute glittering scales. The last mineral, which may be altered Amphibole, is disseminated in thin seams or lenticular flakes, with a parallel arrangement which produces a schistose structure. A little Pyrite is disseminated in minute golden-yellow crystals and irregular particles. A few thin seams or films of grayish- or brownish-white Calcite cross the layers obliquely. Effervesces with acid.

Fracture rather uneven.

Weathers evenly but roughly, to a dirty-brown color, mottled with dark-green, some surfaces being covered with tiny pits and others roughened by the irregular weathering of certain scales.

No. 279 (Sp. 941).—*Red Chloritic Gneiss*.

Laurentian.—N. E. side of Sect. 16—T. 49—R. 33.

Brownish-red, minutely speckled with grayish-white, mottled and streaked with olive-green; dull.

An exceedingly hard, compact, tough, calcareous Chloritic Gneiss, with a peculiar fibrous structure, composed of about 7 parts of brownish-red Feldspar, minutely crystalline, almost impalpable in texture—1 part of grayish-white Quartz in particles which can be barely distinguished, even by the lens—and about 2 parts of soft olive-green Chlorite, irregularly distributed in certain seams, or concentrated in certain thin layers, perhaps an inch apart, approximately parallel. The Chlorite also has a minutely fibrous structure, so as to impart the same to the rock. Silvery-gray Mica is also associated, in exceedingly minute scales, with the chloritic layers, rendering their surface glistening. Many transverse seams or films of Calcite occur.

Fracture uneven. Streak reddish and greenish white. One weathered seam has a greenish-brown color, inclining to citrine, some of the projecting layers of Feldspar being polished. Effervesces very feebly with acid.

Weathers unevenly, of a light flesh-red color, streaked with greenish-gray.

No. 280 (Sp. 942).—*Red Chloritic Gneiss*.

Laurentian.—N. E. side of Sect. 16—T. 49—R. 33.

Bright brownish-red, inclining to orange, slightly speckled with grayish-white; glistening.

Resembles No. 279, but is a very coarse aggregate of crystalline Feldspar, with ill-defined glistening facets, $\frac{1}{4}$ to $\frac{1}{2}$ inch across, and of grayish-white Quartz, distributed in minute or tiny bunches, sometimes $\frac{1}{8}$ inch, rarely $\frac{1}{2}$ inch across; olive-green Chlorite is also disseminated in small quantity, in tiny bunches and films of a fine-grained aggregate of minute glittering scales.

Fracture uneven. Streak reddish-white.

Weathers smoothly to a dirty reddish-brown, mottled with iron-black.

No. 281 (Sp. 951).—*Porphyritic Chloritic Gneiss*.

Laurentian.—From State Road L'Anse to Champion, T. 49—R. 33.

Reddish-gray, mottled with greenish-black.

A compact, hard, tough, coarse Porphyry, in which a schistose structure is produced by the parallel arrangement of the Feldspar crystals. The latter constitute about 3 parts of the rock, are usually $\frac{1}{2}$ to 1 inch long, by $\frac{1}{4}$ inch wide, and consist of grayish-white, passing into softer reddish-white, Feldspar. The Quartz amounts to less than 3 parts of the rock and occurs in small inconspicuous masses. The Mica amounts to over 3 parts of the rock, is of the same decomposed variety as in No. 258, and occurs in tiny bunches and seams of rather larger scales, often $\frac{1}{16}$ inch in diameter. Much yellowish-green Epidote, in tiny crystals and crystalline masses just visible to the eye, is disseminated throughout, in association with the Mica.

Fracture somewhat uneven.

Weathered surface of a grayish-white color, even and very rough—being deeply pitted by the removal of the bunches of Mica and a slight projection of the larger Feldspar crystals.