



Rocks.

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ROCKS

The quartz sand of Coney Island has one part of silicon and two parts oxygen, just like the quartz sand of the Sahara Desert.

Midwest sedimentary rocks and the minerals that occur in them. Eastern Plutonic, some igneous and many metamorphic rocks, with their host of related minerals and veins. Even a few sediments may be seen - like Maine limestones and the red sandstones of the Connecticut Valley, with their dinosaur tracks and ripple marks, or the fossil-rich recent West Coast sediments.

Three great groups - igneous, sedimentary and metamorphic

Igneous or Plutonic: have formed into a molten state. Formed from extrusive lava which spilled out on the surface, or from intrusive lavas (known as magmas) which have been solidified quickly. The Plutonics have cooled and solidified at some depth and much more slowly. (grain formation) Igneous rocks have hardened from a molten mass. They are characterized by a uniformity of texture - except in the porphyries, where larger crystals have been embedded in a fine-grained ground mass. When they flowed out on the surface they are considered extrusives.

Extrusive Igneous - Obsidian - comparatively rare glassy rock which has not crystallized at all because it has cooled too quickly for any atoms, or ions to group into the regular arrangements of the minerals. No obsidian can be very old. Most often grey to black. Make pumice.

Old Obsidian flows sometimes take up water and change their glassy lustre to a duller gleam. Sometimes a network of cracks develops in the obsidian, along which alteration extends, leaving round, glassy cores or pebbles and are freed. Translucent and of a light smoky color. Locally (in the west and down into Mexico) collected by amateurs for cutting and called Apache Tears.

Obsidian is high in silica and is the uncrystallized equivalent of rhyolite and granite.

Felsite - fine grained - may be light grey, yellow, pale and deep red. Would have to know where, what region comes from in order to identify because can be confused with fine-grained, very compact sandy sediments.

Basalt - "most of the recent volcanoes and many of the older ones, now erupt a lava which solidifies to a fine-grained black rock, composed largely of microscopic grains of a calcium-sodium feldspar (plagioclase), pyroxine, and olivine, but no quartz. Slightly coarser old sheets of basalt, now partially altered but still dark in color, are extensively quarried, crushed and sold as "traprock". Its lava is more fluid than rhyolite. The higher the proportion of silica, the more viscous is the flowing lava.

Intrusive Igneous - Molten rock does not always reach the surface and pour out as a lava flow. May cool too rapidly to be trapped below the surface.

Porphyries are like a frozen rock-mush.

Plutonic Rocks : coarse-grained. All rocks have a chemical content. Professional rock classification goes according to chemical formulae and a mineral content but the collector can be content to identify by merely looking and knowing regions.

Granite - coarse-grained. Of quartz and orthoclase feldspar,

with usually a few grains of a dark mineral. Grain size may range from $1/16$ of an inch up to $\frac{1}{2}$ in. or more. Pegmatite is a very coarse kind - grain may be several feet across. The dark mineral may be mica, amphibole, or pyroxene. If albite feldspar is also present and even more abundant than the orthoclase, the rock is called soda-granite. But when the albite feldspar has more than a $1/10$ content of calcium feldspar molecules then it's called a quartz monzonite. Not necessary for collector to know all this - simply call it granite. Granites are usually light in color and individual mineral grains can be easily distinguished. They may be grey, white, pink, yellow-brown.

Diorite - darker than granite as a rule, the texture and occurrence are similar.

Gabro is still darker in color and still lower in silica. Chemically it is the coarse equivalent of diabase.

Pyroxenite a dark rock, composed almost entirely of dark minerals, olivine, and/or pyroxene. A relative is Kimberlite in South Africa. It is the matrix of diamonds.

Sedimentary Rocks

The feldspars change to clay, freeing the quartz grains. Ground water may dissolve the silica or the metal elements and carry them off in the water that seeps thru the rocks. Streams carry the sand and clay to lower levels. Somewhere the streams stop running and drop their loads.

Sedimentary formations - masses pile up in horizontal stratifications. The loose grains cement together and form rocks. Thick beds, often thousands of feet thick. Most of N. Am. mantled by sedimentary rocks, now raised again from sea floor where they were laid down on top of the older crystalline rocks that mark the real crust of the earth.

Arkose - a coarse sandstone whose grains are both quartz and feldspar.

Conglomerate - rounded water-worn pebbles, usually of quartz cemented by the mass of finer material filling the spaces between. Often there is a contrast between the color of the pebbles and the matrix which makes appropriate the name "puddingstone".

Breccia - fragmentary - almost same as conglomerate except not rounded by water. Breccia marble used ornamentally on bldgs.

Sandstone - a common rock of sand grains cemented together - may be white, grey, yellow, or dark red. Often the cementing material is strongly stained with iron. "Brownstone fronts" in NYC, came from almost horizontal sandstone beds in the Conn. Valley.

Shale - composed principally of clay particles, often with a little sand intermixed. Stream-carried mud will obviously be carried farther from the shore than sand. Sandstone beds are sometimes overlain by shale with this in turn mantled by still finer material from clearer water.

Limestone - of calcium carbonate (calcite) in a very finely granular texture. Some of the lime was chemically precipitated. Other limestone beds represent the accumulation of lime removed from sea water by living organisms. Often remains of the organic life of the sea at time of lime deposition included - fossils.

Dolomite - resembles limestone but chemically it is

richer in magnesia. Salt, coal and oil are also

richer in magnesia. Salt, coal and oil are economically valuable. A rock salt can be produced.

Special features of sedimentary rock : ripple marks and raindrop dents (for waves washed seashores and rain showered down millions of years ago just as it does today. Animal remains, shells and plant remains may become entrapped and preserved. Fossils common in shales and limestone.

Metamorphic Rocks : As pressure and heat continue the minerals at the top of the sedimentary beds changes - some revert to the original mica and feldspar. i.e. the clay of shales will revert to these. But the minerals will retain the banding created by their water -laid origin.

The original heterogeneous mixture of mineral-composition has been destroyed, ~~the X the X the X~~

Slate - resembles shale, except that it is a first stage in a progressive change back to mica. Slate has a lustre.

Phyllite - not very different from slate. May be greenish, grayish, or reddish, like slate. Not found in regions where unaltered sediments prevail.

Schist - the final product of the alteration by heat and pressure alone of a mixture of hydrated and oxidized minerals. i.e. Shales on complete recrystallization, will compress to a final rock which is predominantly mica. The mica especially conspicuous in the direction of the easy fracture, the cleavage direction of the schist. Often certain typical high-pressure minerals, like garnet, andalusite etc. grow in the mica of the schists.

Gneiss - here in metamorphism the mineral make-up, mica (or hornblende) is less predominant. Its sedimentary ancestor may be a sandy shale, or a shaly sandstone. Fresh granite can also be changed to gneiss by a simple rearrangement of its mica, so that the plates are all aligned in one direction, in place of the less conspicuous structure of an ordinary granite. Gneisses which may be gray to almost white resemble granite very closely except for this alignment of the mica. An exact line of distinction between gneiss and ~~schist~~ schist is hard to draw for many gneisses look far richer in mica than they truly are, when only a mica-rich parting-plane is seen.

Quartzite - formed by the metamorphism of sandstone. Quartzites are among the hardest and the most resistant of all rocks. They show the same colors as the sandstones - brown, yellow, gray, reddish or white.

Marble, like the quartzites, forms in regional metamorphosis from another single-mineral sedimentary rock, and like sandstone is a rock in which no major change can take place other than a growth and cementation of the individual crystal units. Marble forms from dolomite and limestone.

Contact Metamorphism - A magma with the varied accompanying gases that soak out ahead thru the enclosing rock, carrying metallic elements and silica in solution with them, will change to a different kind of rock which permits garnet and epidote.

Hornfels - a compact fine-grained black rock which forms near the line of contact of sedimentary rocks with an invading magma, where there is a zoning away from the source of the heat and gases.

Summary of rock characteristics

Igneous

Igneous

Volcanic - Fine-grained, a mixture of unrecognizable minerals; their only inherent structure that of the flow lines in obsidians and rhyolites.

Plutonic: Coarse-grained and composed of primary minerals (quartz, feldspar, mica, dark minerals)

Sedimentary: Mainly a single, low-temperature mineral; banded, stratified and often fossiliferous.

Metamorphic: High-temperature minerals, like those of Plutonic rocks, but banded, stratified, and as a general rule, with a concentration of one type of mineral in a formation.

Quartz = aluminum oxide (Canada)

Astros is a strange-looking mineral that comes in threadlike slices. The best kind of astros

comes from Perpetue. Either grayed or mixed. The major share of world supply from

Canada

Granite was used by Romans in bridges that have lasted 20 centuries. The type for

granite must have small crystals of more or less uniform size & capable of

taking a very high polish. The Library of Congress, Wash. D.C. is made of granite. ~~gold~~ is black.

Graphite, like coal & diamond is black, is black.

Limestone - forms & is produced for architectural purposes.

The National Gallery of Art (Wash. D.C.) is made of marble.

Mica - large deposits in Canada.

When quartz, colorless, when colored by concentrations takes on hues that give it many beautiful semi-precious gem stones.

In shale oil is found.

Rubies result in the presence of chromium oxide in corundum. Sapphires depend on titanium & iron impurities in corundum.

Lime goes into (after being heated limestone) goes with evaporation of concrete.

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Agate - of quartz family. Distinguished by bands of strongly contrasting colors. When some of the bands are black, the stone is called onyx. Agate gets its name from Achates R. in Sicily, where the Greeks discovered the stone in ancient times. Once popular as a love-charm and a protection against poison. "In the United States, agates are found everywhere, near Lake Superior and in several western states." (LN I think they meant to omit the comma after everywhere) The finest are found in Brazil and best cutting was done for centuries in Germany.

Today finest amethysts come from Brazil and Uruguay.

Carnelian - a form of quartz (latin carneus - flesh-colored) but the color is closer to a ripe tomatoe. (LN a brilliant kind of flesh-rust) The ancient Egyptians and Assyrians were using carnelian by 2000 BC if not earlier. Mohammed is said to have had it in a signet ring.

Garnet - a silicate, may be emerald green.