

California Building & Decorative Stones circa 1891

Excerpts from the

Stones for Building and Decoration

By George Perkins Merrill
J. Wiley & Sons, Publisher, 1891

(This book is available on Google Books.)

http://books.google.com/books?id=sRhNAAAAMAAJ&dq=decorative+stones+merrill&source=gs_navlinks_s

This transcription, which begins on the next page, is presented on the Stone Quarries and Beyond web site in the California state section.

<http://quarriesandbeyond.org/states/ca/california.html>

Peggy B. Perazzo
Email: pbperazzo@comcast.net
September 2011

California Building & Decorative Stones circa 1891

Excerpts from *Stones for Building and Decoration*
George Perkins Merrill, Curator for Geology in the United States National
Museum, J. Wiley & Sons, 1891

Part I. Historical

(pp. 1-2)

“The use of stone for purposes of construction dates from a very early period of human history. Within the limits of North America, however, except as practiced in a crude way by certain tribes in the arid regions of the West, its use necessarily dates from a period comparatively recent.

“The early settlers in the eastern states found wood abundant and cheap. They were as a rule comparatively poor, and with little taste for architectural display, even had their means permitted its indulgence. But with the gradual increase in individual wealth and culture there was naturally developed a taste in architecture which could be gratified only in the employment of some less perishable material: for such, fortunately, the early settlers of eastern Massachusetts had not far to look. The first stones quarried in this State are thought by Professor Shaler to have been the clayslates in the vicinity of Boston. These, however, were worked only in a small way and the product used for grave- and mile-stones, and a few lintels.

“According to Shurtleff* one of the first stone buildings in Boston was the house of Deacon John Phillips. This was erected about 1650, and continued to stand until 1864. It is supposed to have been built from granite bowlders found in the immediate vicinity. In 1737 was built of bowlders at Braintree granite the old Hancock house, since torn down, and in 1749-'54 King's chapel, which is still standing on the corner of School and Tremont Streets. This last was at the time the greatest stone construction ever undertaken in Boston, if not in America....”

(* Footnote: *History of Boston*, p. 589.)

Part II. The Rocks, Quarries and Quarry Regions

(Please note that only the portions that relate to California will be transcribed in this document. You can read about the other states in the book available on Google Books. Peggy B. Perazzo)
http://books.google.com/books?id=sRhNAAAAMAAJ&dq=decorative+stones+merrill&source=gbs_navlinks_s

Soapstones of the Various States and Territories – in California

(pp. 47)

“California. – Soapstone of fine quality is said to occur near Placerville, El Dorado County; also in Tuolumne County, near Sonora and Buchanan.”*

(* *Footnote: Eighth Annual Report State Mineralogist of California, 1888.*)

Serpentines of the Various States and Territories – in California

(pp. 57-58)

“**California.** – Inexhaustible quantities of serpentine of a deep green or yellowish color occur in the region round about San Francisco, and often in such situations as to be easily available, as at the head of Market street. So far as observed none of the material is of such a quality as to render it of value for ornamental work, while its gloomy color renders it equally objectionable for purposes of general construction.

“The rock is also abundant in other parts of the State, but the writer having seen little of the material excepting as displayed in small fragments in the State museum at San Francisco, is obliged to reply mainly upon the statements of others regarding economic value.

“A body of serpentine varying from dark green to dark mahogany is stated* to occur six or seven miles north-east of Ione, near Dry Creek, in Amador County. Other deposits are stated by the same authority to occur near Benicia in Solano County. According to Becker,** serpentine occurs in irregular areas throughout the quicksilver belt of California sometimes in comparatively pure masses and sometimes as one of the mineral constituents of altered sandstones and granular metamorphic rocks. The entire area covered by the rocks of this class is estimated as not less than 1000 square miles, between Clear Lake and New Idria. These Mr. Becker regards not as altered olivine rocks, but as derived from a variety of minerals including even the quartz and feldspar granules in silicious sandstones.

(* *Footnote: Report State Mineralogist of California, 1888, p. 104.*)

(** *Footnote: Geology of the Quicksilver Deposits of the Pacific Slope. Monograph XIII., U. S. Geological Survey, p. 108.*)

“Near the town of Victor, San Bernardino County, are extensive beds of a serpentinous limestone which perhaps may as well be described here. According to the reports of the State Mineralogist* the stone occurs in inexhaustible quantities and blocks of large size as obtainable free from flaws. Samples of the stone examined by the writer vary from light yellowish and greenish to deep green, variously mottled and streaked. The stone has apparently a similar origin to the verdantique of New York State (see p. 65) and is therefore a mixture of calcareous and serpentinous matter. It is of fine grain, close texture, and acquires a high polish. It is possible that owing to its general lighter and more harmonious colors this stone may prove more successful in our markets than have the majority of verdantique marbles.”

(* *Footnote: 10th Annual, 1890, p. 528.*)

Limestones and Dolomites. Marbles. – in California

(pp. 85-87)

“California. – It has been stated that owing to the violent geological agencies that have been in operation since the formation of the marble deposits in this State the stones are found to be so broken and shattered in nearly every case, that it is impossible to obtain blocks of large size free from cracks and flaws.* The State is nevertheless not lacking in desirable material.

(* *Footnote: Report of Tenth Census, 1880, vol. X., p. 279.*)

“Near Indian Diggings, in Eldorado County, there occurs a fine-grained white, blue-veined marble that closely resembles the Italian bardiglio, from the Miseglia quarries, but that the groundmass is lighter in color. It has been used only for grave-stones and to but a slight extent at that. In Kern County are deposits of marble of various shades, but all so broken and shattered on the surface as to be very difficult to work.

“Near Colfax, in Placer County, are also beds of a dark blue-gray mottled magnesian limestone that takes a good polish and might be utilized as marble. Other deposits occur in Los Angeles, Monterey, Nevada, Butte, Humboldt, Tuolumne and Plumas Counties. At Colton, in Los Angeles County the marble beds are described by Prof. Jackson* as affording pure white clouded with gray and grayish black finely mottled with white varieties, the clouded white being the most abundant. This is stated to be a medium grained granular stone, homogeneous in texture quite sound and strong and taking a good polish. Chemical tests show that the stone is composed of a mixture of calcite and dolomite granules. This not only renders the production of a perfect surface and polish more difficult than would otherwise be the case, but will also cause it to weather unevenly (see p. 381). The clouding of the marble and the dark gray colors are here due to scales of graphite.

(* *Footnote: Seventh Annual Report State Mineralogist of California, 1887, p. 212.*)

“At the foot of the Inyo Mountains in Inyo County, above five miles north of the town of Keeler, there occurs an extensive bed of dolomite in which within a few years marble quarries have been opened. The strata here are upturned at an angle of 75° to 80° and the beds superficially seamed

and cracked to such an extent that large blocks on the immediate surface are unobtainable. Although the quarry openings are as yet shallow the indications are, however, that these defects soon disappear, and at no great depths sound blocks of any size that can be handled may be obtained.*

(* *Footnote: Tenth Annual Report State Mineralogist, 1890.*)

“The stone at the various outcrops now exposed is quite variable. At one of the openings it is pure snow white, fine grained and equal in texture to Italian marble, but much harder, firmer and more compact. But a few hundred yards from this is an opening which seems destined to furnish some of the most unique and yet beautiful stone thus far produced in America. In texture this is of the same quality as the last, but the white groundmass is injected in every direction with blotches, streaks and finely divided branching and feathery dark brown nearly black dendritic or fern-like markings – presumably caused by oxide of manganese – and which added to occasional blotches of Siena yellow produce an effect that must be seen to be appreciated. Still a third variety is Siena yellow of varying shades. This last while nearer the true Italian Siena than any now produced, differs in being distinctly granular in texture, and can perhaps be more correctly compared with the well-known Estremoz, or so-called Lisbon yellow from Alemtejo Province, Portugal.

“A fine grained black marble is also found in the near vicinity, which, while it does not polish well may answer for floor tiling.

“The Inyo marbles are perhaps among the most promising the west has as yet produced. Chemically they are a very pure dolomite, close grained and compact, and equally well adapted for exterior and interior work. Their superior hardness will cause a greater expense in working than in the eastern or Italian marbles, but whether these items will not be more than counterbalanced by cost of transportation the future only can decide. The quarries are on steep hillsides quite devoid of timber or soil, and cost of fuel necessitates the transportation of the rough blocks to Essex, Nevada,* a distance of some miles, before the can be sawn.

(* *Please note: According to the Yale Peabody Museum – GNIS Dataset Service, the historical Essex, Nevada, was located in Washoe County. Peggy B. Perazzo*)

“Chemical analysis made at the laboratores of the State Mining Bureau yielded 54.25% carbonate of lime, 4.45% carbonate of magnesia, and but 0.60% of iron and silica. Specific gravity 2.80, which is equal to a weight of 179 ½ pounds per cubic foot.

“Near Plymouth in Amador County there are said to be white and variegated marbles suitable for general building, but of too coarse a grain for decorative work.

“White marble occurs in the mountains near San Jacinto in San Diego County. Good stone is described* as occurring in San Bernardino County, near Slover Mountain. This last has been worked for the San Bernardino market. Massive aragonite suitable for ornamental work also occurs here. It is described as most beautifully striped and banded in various colors. This and other of the so-called onyx and serpentinous marbles are more fully described elsewhere.”

(* *Footnote: Eighth Annual Report State Mineralogist of California, 1888, p. 504.*)

The Onyx Marbles, or Travertine – in California

(pp. 116-118)

“The so-called onyx marbles, although of the same composition, differ from those of the common type in being chemical deposits rather than altered sedimentary beds. Like the stalagmitic deposits in caves, they are formed by the evaporation of water holding carbonate of lime in solution, and owe their banded structure and variegated colors to the intermittent character of the deposition, and the presence or absence of various impurities, mainly metallic oxides. The term onyx, as commonly applied is a misnomer, as has been given merely because of their banded appearance they somewhat resemble the true onyx, which is a variety of agate. The stone is properly a travertine. It is an interesting illustration of the misleading character of popular names that the onyx marbles, and particularly those from Algeria and Egypt, are so universally known as alabaster, while true alabaster is a pure white and compact variety of gypsum; in fact the alabaster boxes mentioned in the scriptures, as used for holding precious ointments, are said to have been in reality constructed from travertine.

“Owing to their translucency, delicacy and variety of colors, the readiness with which they can be worked and the high polish which they admit of, these marbles have long been favorites for smaller ornamentation and highly decorative work, and will doubtless long so continue. As with the red granites of Syene, the green and red porphyries, the ancient Egyptians knew their value, and utilized them as long ago as the time of the Rameses; the ancient Romans, too, appreciated their beauty and utilized them in the construction of their monuments and the interior decorations of their houses.

“The only onyx marble until recently of any commercial importance within the limits of the United States, is found at San Luis Obispo, California. The stone as I have seen it in the dealers’ shops in San Francisco, and as shown in the National collection, is nearly white, finely banded, translucent, and takes a beautiful surface and polish. It lacks the variety of colors of the Mexican onyx, but is nevertheless a beautiful stone and if it can be obtained in any abundance will find a ready market.

“According to Mr. Angell,* the San Luis Obispo onyx quarries are situated in the heart of the Santa Lucia Mountains. There are two openings on sections 9 and 16, township 31 south, range 15 east, Mount Diablo meridian.

(* *Footnote: Tenth Annual Report State Mineralogist of California, 1890, p. 585.*)

“The two out-croppings so far discovered are about half a mile apart, one on the northern and one on the southern slope of a hill which rises about 80 feet between them. Whether or no (sic) they are portions of the same bed is yet to be determined. The strike of the two is not the same. The rock of the northern outcrop is milky white. That of the southern variegated in yellow, green, pink, blue, golden and red colors beautifully blended. The enclosing rock is sandy slate, the ledges of the onyx standing nearly perpendicular and having a thickness of about 16 feet.

“The stone is stated to be worth about \$100.00 a ton in San Francisco, and when polished about \$10.00 a square foot.

“A dull red resinous, or yellow travertine, but which occurs only in small masses, has been quarried in times past at Suisun in the same State, and a beautiful light emerald green variety in Siskiyou county, but neither deposit, so far as can be learned, is sufficiently extensive to have any great commercial value.

“Other onyx marbles are mentioned in the various reports of the State mineralogist as occurring in the State, but not having seen samples, the writer is obliged to quote wholly from other authorities. An orange and blue variety is stated to occur in the southeast quarter of section 9, township 32 south, range 15 east, Mt. Diablo meridian.

“An onyx marble is also stated to occur in the form of veins and bunches in the limestone of Slover Mountain near the town of Colton in San Bernardino County. The stone is described as beautifully striped and banded with various shades of yellow and brown. It is regarded as a promising stone.*

(* *Footnote: Annual Report of State Mineralogist, 1888, p. 509.*)

“The serpentines and other marbles occurring (sic) here are noted elsewhere.”

Granites of the Various States and Territories – in California

(pp. 180-182)

“California. – It is stated that the first stone house erected in San Francisco was built of stone brought from China, and at the present day (*circa 1891*) the granites most employed are brought from Scotland and the Eastern United States. However, this may be, it is obvious that this condition of affairs need not long continue to exist, since granites of good quality occur in inexhaustible quantity in the near vicinity. As early as 1853 a granite quarry was opened in Sacramento County, and since then others have been opened and systematically worked in Penrhyn and Rocklin in Placer County. The Penrhyn works are some 28 miles east from Sacramento on the line of the Central Pacific Railroad. The first quarries were opened in 1864, and are now said to cover some 680 acres at Penrhyn and Rocklin,* the latter point being some 6 or 8 miles distant from the former in a westerly direction.

(* *Footnote: Samples of stone said to be from Rocklin, and which the writer has examined, are rather quartz diorites than true granites.*)

“The rock varies in color from light to dark gray, one variety, which contains both hornblende and biotite, being almost black on a polished surface. They are, as a rule, fine grained, and take a good polish. Blocks more than 100 feet long, 50 feet wide, and ten feet thick have been quarried out and afterwards broken up.

“The Penrhyn stone is designated a hornblende granite by Jackson,* who gives its mineral composition as quartz, orthoclase, plagioclase, hornblende, and biotite, with microscopic apatite and magnetite. Submitted by the above authority to the action of a carbonic acid gas solution, a

sample of this stone lost 0.05 per cent in weight; by disintegration in acid fumes it lost 1.09 per cent. In this latter treatment every mica scale on the surface of the exposed fragments bleached to a pearly whiteness. The iron was dissolved out, staining the rock slightly, while the feldspar grains became a trifle duller in lustre. On being heated in a muffle to somewhat above a bright redness, the stone developed a complete network of deep-seated cracks, and after emersion in water could be readily crushed to powder in the hands.

(* *Footnote: Eighth Annual Report State Mineralogist of California. 1888.*)

“The Rocklin stone is described by the same authority as a fine-grained white stone, carrying abundant small scales of mica and occasional granules of pyrite. The composition is given as essentially the same as the Penrhyn stone, but that muscovite replaces the hornblende. Submitted to the same tests as above the stone lost in the carbonic acid gas solution 0.1 per cent; and by decomposition and disintegration in the strong acid fumes 0.68 per cent. In this, as in the last case, mica scales bleached white, and the rock became slightly stained. Heated in the muffle the stone behaved like the Penrhyn granite, though not cracking quite so deeply; it, however, could be readily crushed to powder after immersion. Reports on crushing strength and ratio of absorption of these stones, and also that of a very similar granite from Mount Raymond is (sic) Fresno County are given in the table, on p. 404. A fine quarry of granite is stated to occur some eight miles northeast of Sonora in Tuolumne County.

“A fine-grained, very light-gray granite of excellent appearance, said to be found on the line of the California Railroad between Los Angeles and Cucamonga, is beginning to be used in Los Angeles. In texture it is as fine as the finest Westerly, (Rhode Island), or Manchester (Virginia) stone, and of a uniform light gray color. A coarser stone, carrying abundant hornblende and black mica, is found also at Sawpit Cañon, in the same county. It works readily, but contains too much hornblende, and also too many small crystals of sphene, to be of value for fine monumental work.”

The Liparites (pp. 221-223)

Adaptability for Constructive Purposes

“Tertiary and post-tertiary rocks of any kind are at present very little used for constructive purposes in the United States, owing, in the case of fragmental rocks, to their state of imperfect consolidation and consequent feeble tenacity, and in the case of eruptives to their almost entire absence in those portions of the country that have become permanently settled, and where as a consequence there has arisen a demand for a more durable building material than wood. Of the eruptive rocks of this class only the liparites, andesites, and basalts have been at all utilized, and these to but a small extent. Their textures are, as a rule, such as to fit them only for the rougher kinds of construction, since, with the exception of the glassy varieites, they will not polish, and their rough appearance unfits them for any kind of interior decoration.”

Varieties of Liparite

“According as they are crystalline throughout, felsitic and porphyritic or entirely glassy, liparites are class as (1) granitic liparites or *nevadites*, (2) *rhyolites*, and (3) glassy liparites as *obsidian*, *pumice*, *pearlite*, and *pitchstone*. Of these only the felsitic and porphyritic variety *rhyolite* is as yet quarried.

Liparites of the Various States and Territories – in California

“Near the Mokelumne Hills, in Calaveras County, California, rhyolite occurs in several different colors, and has been quarried to some extent for use in the immediate vicinity. The rock is also abundant in Colorado, New Mexico, Nevada, Utah, Montana, and other of the Western States and Territories....”

Basalt – in California

(pp. 239)

“This rock differs from diabase only in point of geological age, being a product of post-Tertiary eruptions. It is, as a rule, less perfectly crystalline, still retaining portions of its glassy magma. Owing in great part to the fact that basalts occur in this country only in the western and more recently settled portions, as do also the andesites and rhyolites, they have been heretofore but little utilized. There would seem, however, no reason for excluding the rock from the list of available building materials in those regions where it occurs in such form as to be accessible. At Petaluma, Bridgeport, and other places around the bay of San Francisco there lie immense sheets of this rock, but which are worked now only for paving materials. Like the andesites and rhyolites the basalts will not polish, and their colors are such as to exclude them from all forms of interior decorative work.”

Amphibole Plagioclase Rocks (Trap and Green Stone, in part)

Diorites and Kersantites – in California

(pp. 239-242)

“The name diorite...is used to designate a group of pre-Tertiary eruptive rocks consisting essentially of the minerals hornblende and plagioclase, and occurring in the form of dikes, bosses and intrusive sheets. The individual crystals composing the rock are sometimes grouped in globular aggregations forming the so-called orbicular diorite or kugel diorite. The texture is as a rule compact, fine and homogeneous, though sometimes porphyritic. The common colors are dark gray or green....”

“The rocks of this group are as a rule exceeding compact and strong, but are scarcely at all used for building purposes owing to their lack of rift and poor working qualities in general. Their sombre colors are also a draw-back to any form of architectural display....”

“A quartz diorite of a coarse granitic structure is found and quarried at Rocklin, Placer County, California. The stone resembles granite in general appearances, and works with equal facility.”

Sandstones of the Various States and Territories – in California

(pp. 251-254)

“California. – Around the bay of San Francisco there occur sandstones of a considerable variety of colors, which are beginning to come into use to some extent. The prevailing hues are brownish and gray. On Angel Island, in Marin County, there occurs a fine sandstone of a bluish or greenish-gray color, which has been used in the Bank of California building, and others of a lighter shade are found in various parts of Alameda County. A few miles south of San José, Santa Clara County, there are also inexhaustible supplies of light gray and buff stone, but which are at present worked only in a small way.

“Other beds more or less worked are found near Almaden in this same county; in the Santa Susanna Mountains in Los Angeles County and near Henley in Siskiyou county; near Redwood City in San Mateo County and near Arroyo Grande, San Luis Obispo County.

“According to Prof. Jackson* the Angel Island stone consists of grayish white quartz and feldspar, black mica scales, and angular fragments of black clay slate varying in sizes from 15 m.m. or more in diameter, to minute black particles that are thickly disseminated through the stone. These granules and fragments are held in a dull, earthy, scarcely perceptible cement, hardened somewhat by carbonate of lime. Submitted to the fumes of strong acid the stone lost its bluish tint and turned to a light gray, discolored by streaks and patches of yellow iron oxide. The loss in weight during the exposure amounted to 2.13 per cent. Heated in a muffle furnace to bright redness and allowed to cool to just below red heat the cube was found to be cracked completely through in several directions, and on then being plunged into cold water became friable and fell to fragments on handling. As shown in the bank building above mentioned the stone weathers unfavorably. Although erected only in 1864 disintegration has already gone so far that recourse has been had to a coating of paraffine in hope of arresting further decay.

(* *Footnote: Annual Report State Mineralogist of California, 1888, p. 886.*)

“The San José stone is described by the above authority as of rather a coarse and uneven texture, friable in small pieces, and containing carbonate of lime in its cement. On exposure to acid fumes the color was leached out of a one an inch in depth all over the fragment experimented upon, and concentrated in streaks on the surface. Fissure joints were developed, not visible on the fresh specimen, and fragments could easily be separated by the hand in places; the loss by disintegration was 1.94 per cent. The stone stood the test of heat and subsequent immersion without serious disintegration.

“The Alameda County stone is described as light grayish, yellow and fine grained, though somewhat variable in texture, and quite friable. Samples when exposed to the strong acid fumes became still more friable and lost by disintegration 3.43 per cent in weight. The color was also leached out of a superficial zone and concentrated on the surface in dark yellowish-brown streaks. On exposure to bright red heat the stone changed in color to a light reddish brown, and underwent no further change on plunging it while still hot into cold water. The crushing strength and ratios of absorption of these stones are given in the tables (p. 413). Near Sespe in Ventura county are also several outcroppings of a fine-grained, brown sandstone, which are now supplying material for the San Francisco market. Like the other mentioned it carries a considerable amount of calcareous matter, but it is nevertheless regarded by Prof. Jackson as a valuable stone. Exposed to the acid fumes, samples bleached somewhat and lost by disintegration 2.37 per cent.

“In the Santa Susanna Mountains, about eight miles from San Fernando Station in Los Angeles County and on the Southern Pacific Railroad occur inexhaustible deposits of coarse and fine yellowish sandstone and which are now being worked from boulders by a Los Angeles company. Prof. Jackson reports* the coarse variety, when treated as above, as absorbing 5.33 per cent of water, and losing on treatment with acid fumes 7.3 per cent of its weight by disintegration, besides becoming discolored. Highly heated the stone changed to a beautiful brownish red, but did not crack or scale when dropped into cold water. The finer-grained variety from this source is described as a beautiful evenly fine-grained stone, of nearly uniform light grayish yellow color, minutely specked with black and silver-white mica scales. This variety absorbed 6.19 per cent of water and in the acid fumes lost by disintegration 16.9 per cent of its weight besides staining yellowish in spots. In the heat test it behaved as did the coarser variety. The Henley sandstone is described as a moderately fine grained light bluish gray stone, showing to the unaided eye, dark gray and whitish quartz granules with numerous black and few white mica scales, held together by an argillaceous and calcareous cement. The absorption of water was 4.07 per cent. In the acid fumes it lost by disintegration 5.55 per cent, and changed to a bright yellow color. In the muffle samples at full red heat turned to a brownish red color, cracked and scaled somewhat, but underwent no further change when dropped in cold water. The stone is stated to work readily, and as shown by the specimens is free from flaws. The beds as above noted are quarried near Henley, at a point within one mile of Hornbroke Station on the California and Oregon Railroad. The supply is inexhaustible.

(* *Seventh Annual Report State Mineralogist of California, 1887, p. 209.*)

“Near Cordelia, Solano County, there occurs a coarse, dark-gray volcanic tuff, that can, perhaps, be utilized for rough construction should occasion demand.”

Slates of the Various States and Territories - California

(pp. 299)

“California. – Slate of excellent quality and color is said* to occur in El Dorado County, near Placerville, where it has been quarried to some extent; the color is blue-black.”

(* *Footnote: Eighth Annual Report State Mineralogist of California, 1888, p. 199.*)