ART. XXIX.—*Notes on Unusual Minerals from the Pacific States*; by H. W. TURNER.

Mineral Phosphates.

Pyromorphite.—This lead phosphate is found abundantly in the Rocky Mountains and elsewhere, but, so far as known, has not yet been reported from the Pacific slope. Mr. G. W. Kimble, of Placerville, California, sent some specimens of quartz from a vein in Mosquito Gulch, about six miles north-east of Placerville. This quartz contains a little galena, and a yellow-green mineral supposed by Mr. Kimble to be pyromorphite. The yellow-green mineral was tested by Dr. Hillebrand and found to be pyromorphite. It occurs as coloring matter in botryoidal chalcedonic quartz, coating seams and lining cavities; and also as little crystals along seams in the quartz. Mr. Kimble states that the vein occurs in gneissic rock near granodiorite, and that it contains, besides the pyromorphite and galena, a little pyrite and gold.

Monazite.—This phosphate of the cerium metals occurs usually in granites and gneisses, notably in North Carolina* and Brazil,† but is known to be common in many parts of the world in sands. Mr. Waldemar Lindgren reports monazite in abundance in the Idaho Basin, twenty-five miles NNE. of Boise City. It is usually called "yellow sand." The monazite occurs in small grains, and is presumed to have come from the surrounding granite. Its occurrence here in considerable quantity is of interest, as later it may serve as a source for the rare earths of the cerium group used in the manufacture of the mantles of Welsbach and other similar burners. North Carolina and Brazil now furnish the commercial monazite in sufficient quantity for this purpose.

Apatite.—As is well known, apatite is a very abundant constituent of many granodiorites and other igneous rocks, in the form of minute grains and prisms. The composition of this apatite probably varies, but to determine its character in a specific instance a gneiss was selected (No. 1743 Sierra Nevada collection) which contains a relatively large amount of this mineral. This gneiss was collected in the canyon of the North Fork of the Mokelumne River east of the mouth of Bear River. It is one of a series of old gneisses possibly Archean‡ in age.

* H. B. C. Nitze, 16th Ann. Rept. U. S. G. S., pp. 667-693. This article gives a complete description of monazite as to its chemical composition, crystallographic character, distribution, production and bibliography.

† O. A. Derby, this Journal, vol. vii, 1899, p. 343. Mining and Scientific Press, Aug. 21, 1897.

‡ H. W. Turner, 17th Ann. Rep. U. S. Geol. Survey, Part I, 1896, p. 700.

The gneiss is composed chiefly of plagioclase, amphibole, pyroxene, reddish brown biotite, quartz, with accessory pyrrhotite, titanite, magnetite, zircon and apatite.

The heavy minerals were separated from the other constituents by means of the Thoulet solution. The magnetite was extracted with a horse-shoe magnet, and the amphibole, pyroxene and biotite with an electro-magnet. The remaining powder contained titanite, zircon and apatite. This was examined chemically by Dr. W. F. Hillebrand, who states that "the apatite contains a very small amount of chlorine, but apparently no fluorine whatsoever; at least it could not be detected. Neither does there seem to be hydroxyl replacing fluorine or chlorine." It thus appears in this instance that the apatite is neither a fluor- or a chlor-apatite.

Vivianite ($\text{Fe}_3\text{P}_2\text{O}_8 + 8\text{H}_2\text{O}$).—Prof. H. G. Hanks*, reports this mineral from the Bree ranch in Los Angeles Co. associated with asphalt. The vivianite is in small enclosed nodules, never larger than a pea and generally smaller.

Silicates.

Chloropal.—In the Palmetto Mountains and in the southern part of the Silver Peak Range in Esmeralda County, Nevada, there are numerous dikes and interbedded layers of light colored acid lavas (meta-rhyolites and meta-dacites) in cherts of Ordovician age. These cherts, or rather layers of thin slate in them, contain the remains of graptolites. In one of these streaks of acid lava at a point about fifteen miles SW. of Silver Peak village, there was found a vein of yellowish-green material having the following composition.

Analysis of yellow-green material.

By GEORGE STEIGER.

	Per cent.
Insoluble less SiO_2 soluble in Na_2CO_3 after treatment with HCl	51.5
SiO_2 soluble after treatment with HCl	19.
Fe_2O_3 soluble in HCl	13.5
CaO " "	3.4
MgO " "	0.5
Alkalis	none
H_2O calculated by difference	9.5
CO_2 " from CaO	2.6
	<hr/> 100.0

Leaving out the impurities, CaO , CO_2 , and insoluble material and calculating to 100 per cent, we have :

* 4th Ann. Rep. State Mineralogist of California.

SiO ₂ soluble in Na ₂ CO ₃	44.8
Fe ₂ O ₃	31.8
MgO	1.2
H ₂ O	22.2
	<hr/>
	100.0

The composition of the yellow-green mineral thus determined corresponds nearly with chloropal.

Diopside.—In the Palmetto Mountains in Esmeralda County, Nevada, there are a few small areas of serpentine at or near the contact of granite and other rocks, either acid metamorphic lavas or cherts of Ordovician age. Associated with the serpentine are bunches of limestone, and at one point a streak of garnet and magnetite.

In the serpentine was found a considerable amount of a monoclinic pyroxene, which was separated and analyzed.

Partial analysis of pyroxene No. 323 from serpentine mass.

GEORGE STEIGER, analyst.

Silica	46.04
Al ₂ O ₃ *	1.21
Fe ₂ O ₃ †	5.24
MgO	16.98
CaO	25.23

This pyroxene is evidently near diopside in composition, and it is possible that it is of metamorphic origin from dolomite, as has been shown to be the case at Montville, N. J., by G. P. Merrill.‡ The serpentine is presumed to be derived from the pyroxene.

Vesuvianite.—It is well known that at the contact of granite and limestone various silicate minerals often form from the action of heat and vapors of the intrusive granite on the calcareous material. At such a contact in the NE. part of the Silver Peak quadrangle a silicate mineral was found associated with garnet and quartz. This silicate, freed from the associated minerals by means of the Thoulet solution, was analyzed with the following results (p. 346). Boron was looked for but not detected by blowpipe test.

Sulphates.

Jarosite.—On the east side of Soda Springs Valley in Esmeralda County, Nevada, at the edge of the foothills by the road to the Vulcan Copper mine, there is quite an amount of a golden-brown micaceous mineral, the origin of which was not

* Includes any TiO₂ and P₂O₅ that may be present.

† Includes any FeO, calculated as Fe₂O₃.

‡ On the Serpentine of Montville, N. J., Proc. U. S. Nat. Museum, vol. xxii, pp. 105-111.

Analysis of Vesuvianite No. 186.

GEORGE STEIGER, analyst.

SiO ₂	36·80
Al ₂ O ₃	17·53
FeO	1·56
Fe ₂ O ₃	3·27
MgO	1·23
CaO	35·00
Na ₂ O }	·13
K ₂ O }	
H ₂ O—	·10
H ₂ O+	1·56
TiO ₂	·66
CO ₂	·65
P ₂ O ₅	·07
SO ₃	none
Cl	none
F	·88
MnO	·48
BaO	none
<hr/>	
	99·92
Less O	·36
<hr/>	
	99·56

investigated. The nearest railroad station is Luning. Some of this material is said to have been used as a pigment for paint at the Midwinter Fair in San Francisco. The mineral was examined by Dr. W. F. Hillebrand, who made the following report:

“The mineral is a basic sulphate of sodium and ferric iron which if freed from foreign matter might agree in formula with *jarosite*. This is a potassium salt of formula

$K_2O3Fe_2O_34SO_36H_2O$, or written structurally $[SO_4]_3[Fe^{III}(OH)_2]_3K$, since the water is constitutional, not being expelled below redness.”

“The pure crystallized sodium salt does not seem to have been heretofore observed. The mineral contains a small fraction of a per cent of potassium with nearly 6 per cent of sodium.”

Nickel minerals.

About three miles from Candelaria, Nevada, east of the road to Columbus, is a nickel deposit. Specimens sent by Mr. A. C. Dwelle were examined by Mr. E. T. Allen, of the Geological Survey, who found a sulph-arsenide of nickel, perhaps *gersdorffite*, and a green hydrous magnesian silicate *genthite*, present.