THE

AMERICAN JOURNAL

OF

SCIENCE AND ARTS.

CONDUCTED BY

PROFESSORS B. SILLIMAN, B. SILLIMAN, Jr.,

AND

JAMES D. DANA,

IN CONNECTION WITH

PROF. ASA GRAY, of CAMBRIDGE,
PROF. LOUIS AGASSIZ, of CAMBRIDGE,
DR. WOLCOTT GIBBS, of NEW YORK.

SECOND SERIES.

VOL. XXII.—NOVEMBER, 1856.

WITH THREE PLATES AND A MAP.

NEW HAVEN: EDITORS.
NEW YORK: G. P. PUTNAM & CO.

E. HAYES, PRINTER.

ART. X.—*Five New Mineral Species;* by Professor CHARLES U. SHEPARD.

1. *Xanthitane.*

IN hollow crystals with the form of sphene, and pulverulent. Color pale yellowish white, resembling some varieties of sulphur or of decomposing wulfenite. Lustre generally feeble, but in some instances bright and resinous. Brittle. Hardness =3·5. G. =2·7 to 3·0. Cleavage indistinct. Heated in a glass tube emits moisture; and before the blowpipe, has all the reactions of titanic acid. It contains 12·5 p. c. of water, and consists of titanic acid with traces of zirconia. It is found in a decomposing feldspar, associated with zircons, at Green River, Henderson Co., N. C.; and probably proceeds from the decomposition of sphene.

2. *Pyromelane.*

Found in crystalline grains of the size of kernels of Indian corn (and rather larger), in the gold washings of McDonald County, N. C. The grains are irregular and much pitted, somewhat like those of chondrodite. Hardness =6·5. G. =3·87. Color dull red brown to nearly black, rarely with patches of yellow. Translucent. Lustre resinous, to resino-vitreous.

Before the blowpipe infusible, but turns black and becomes opaque; and hence the name, in distinction from pyrochlore, which by heating, becomes green, or greenish yellow. It is soluble in the fluxes, with the reaction of titanic acid and iron. It is undecomposable with sulphuric acid, except in a slight degree; but yields to fusion with bisulphate of potash. It is essentially a titanate of alumina and iron, with only traces of glucina? and lime. It may also contain zirconia. It would seem to be exceedingly scarce.

Pyro-guanite minerals.

The three following species occur at Mong's Island, one of a group of five small islands, situated in the Caribbean sea, 30 miles distant from the Musquito coast, in lat. 12° N, long. 71° W. They were brought, as a sample of the so called *petrified guano,* to Charleston, S. C., in the bark Jane Dolen, Capt. A. F. Winslow, in a recent voyage to Porto Cabello. Captain W. informs me, that the island where it occurs, has an area of about two hundred acres; and that the formations are coralline, tertiary rocks and trap, which rise into hills, four hundred feet above the level of the sea. The petrified guano incrusts nearly the whole island, to the depth of many inches. In general character, it is hard and stoney; of a cream color when exposed to the weather, and yellowish brown, within. It is totally destitute of ammonia, having been subjected to the agency of heated trap rock, whereby the greater portion of it has been thoroughly fused. The altered guano is composed almost exclusively of two mineral species, which I have called pyroclasite and glaubapatite, each of which is essentially a hydrated phosphate of lime.

3. *Pyroclasite.*

Massive; in large tuberose and reniform masses, much resembling the menilite opal, from Menil Montant near Paris, except, that they are flatter, more irregular, and rarely oval on both sides. In this respect, they more resemble the large druses of calcedony from Faroe, or the electric calamine from Cumberland. Structure indistinctly concentric; and when broken across (through masses an inch thick) it presents a banded surface like agates or ribbon-jasper. Color, cream color: but on the botryoidal surfaces which have been exposed to the weather, milk-white, and presenting when viewed with a single lens, a very remarkable corroded appearance, much resembling the vermiculated surface of marble, as employed in architecture. Lustre dull, feebly resinous on a fresh fracture. Opaque. Brittle. Fracture even, to sub-conchoidal. H. =4·0. G. =2·36 . . . 2·4.

Heated in a glass tube, it flies to pieces with a brisk decrepitation, much of the mineral being at the same time projected from the tube. At the same time, it turns of a dark color, emits moisture and a feeble animal odor, not more perceptible however than in many secondary limestones when heated. It is impossible to hold a piece of the unheated mineral before the flame of the blowpipe long enough to bring it to redness; but occasionally, a fragment large enough for this purpose, is left in the glass tube, which will bear ignition in the platina forceps without flying to pieces. It then instantly becomes white, phosphoresces strongly, tinging the flame yellow, slightly tipped with green. At length it fuses on the edges into a white glassy enamel: and the fragment being placed upon a piece of moistened turmeric paper, occasions a feebly alkaline reaction. The heated mass on being moistened with sulphuric acid tinges the flame of the blowpipe momentarily, of a still deeper green. The powdered mineral mixed into a paste with sulphuric acid, and heated in a glass tube, produced an etched ring just above the charge in the tube, indicating the presence of fluorine. Fused with borax, the mineral dissolves into a clear glass, unless there is an excess of the powder.

The powdered mineral is almost wholly taken up, by hydrochloric and by nitric acid, without sensible effervescence, forming a porter-colored solution, from which ammonia precipitates the characteristic bulky white precipitate of hydrated triphosphate of lime.

On being heated in powder in a porcelain crucible, over a spirit lamp, it turns gray for a moment, emits a faint smell of organic matter, but none of ammonia,* and loses 10 p. c. in weight.

It consists of not far from 80 p. c. of phosphate of lime, and 10 p. c. of water; while the remainder is made up of a little insoluble matter, carbonate of lime, sulphate of lime, sulphate of soda, and traces of chlorid of sodium and fluorine.

The trap rock is often found intermingled with the mineral in fragments many inches in diameter. It has the characteristic fracture and color of this rock; but when examined more nearly, it is found to contain but little feldspar, being almost wholly composed of a dark green pyroxenic mineral, nearly allied to bronzite or schiller spar. The phosphate is completely fused where in contact with the trap; and occasionally the mixture between the two, is that of a brecciated mass.

The name of the species has allusion to its property of flying to pieces, when heated.

4. *Glaubapatite.*

Crystals small, tabular, in druses, forming botryoidal and stalactitic masses: columnar, fibres somewhat flattened and radiating from the centre of little oval masses and stalactites. Color, pale yellowish or greenish brown. Translucent. H.=3·5. Gr.=2·6. Also massive, with a conchoidal fracture and of a dark chocolate brown color, to nearly black. Brittle.

When heated in a glass tube, gives water, at the same time turning brown and evolving a slight organic odor. Before the blowpipe it does not decrepitate, but turns brown on the first impression of the heat, and quickly fuses with ebullition, coloring the flame yellow, with a very distinct tinge of green around the heated mass. It finally yields a semi-transparent glass. With borax, melts into a colorless glass. When powdered, the mineral dissolves without effervescence, in hydrochloric and in nitric acid, affording solutions of a porter-brown color, from which ammonia throws down the same precipitate as in pyroclasite. Analysis gave the following result:

Phosphate of lime,	74·00
Sulphate of soda,	15·10
Water,	10·30
With traces of organic matter; sulphate of lime and chlorid of sodium.	
	99.40

It occurs abundantly in irregular corroded, drusy shaped masses, (but very rarely crystalline) often coated on one side with pyroclasite; and sometimes, the two species are intimately blended together. It is named out of regard to its relationship to apatite and to glauber's salt.

---

* Even when heated with caustic potash or lime.

5. *Epiglaubite.*

In small aggregates, or interlaced masses of minute semi-transparent crystals of a shining vitreous lustre, which are always implanted upon druses of glaubapatite. H. = about 2·5.

Yields abundance of water when heated in a close tube. Insoluble in water, until after addition of hydrochlyric acid, when it disappears without effervescence. Melts easily into a semi-transparent colorless glass tinging the flame green. It is a largely hydrated phosphate, chiefly of lime. It may also contain magnesia and soda; but at present the quantity in my possession is too small to determine more accurately its composition. It would appear to be rare at the locality.

It is named from its position, upon the previously described species.

ART. XI.—*Correspondence of M. Jerome Nicklès, dated Paris, April 26th,* 1856.

Report on the history of the manufacture of Artificial Soda.—The question of priority as to the process of manufacturing artificial soda has just been the subject of thorough investigation by the Academy of Sciences. This work was called forth by the Minister of Public Instruction at the request of the children of Leblanc, author of the process which bears his name. Another claim, that of the children of Dizé, collaborator of Leblanc, being presented at the same time, the Section of Chemistry in the Academy of Sciences was obliged to proceed to a historical and bibliographical research which has resulted in a complete elucidation by M. Dumas of this important point in the history of Science.

The discovery of the process which derives soda from marine salt was made by Leblanc, who was also the first to give it a trial. It was not till afterward that he associated himself with Dizé, then chemical assistant at the College of France.

Nicholas Leblanc was born in 1743. Toward 1780 he was attached as surgeon to the household of the Duke of Orleans. He commenced in 1785 his communications upon crystallization which gave him a distinguished rank among the chemists of the time. His first researches upon methods of obtaining soda economically, date from 1784. This problem had already been broached, and different processes had been proposed for making soda from marine salt either by means of lime, or by means of the oxyd of lead, but without industrial results.

In 1777, Father Malherbe, a Benedictine, pointed out a process of converting marine salt first into sulphate of soda which he afterwards decomposed by means of charcoal and iron; a process which has quite lately been put in practice by Mr. E. Kopp, as has been already mentioned in this Journal.*

In 1789, De la Métherie proposed to convert marine salt into sulphate of soda, and to reduce this sulphate by carbon. This reduction would

---

* Corr. of J. Nicklès, Nov. 1, 1855.