ART. X.—*Bernardinite: a new Mineral Resin from San Bernardino County, Cal.;* by J. M. STILLMAN, Ph.B.

THROUGH the kindness of Mr. B. B. Redding, of San Francisco, I have been put in possession of some specimens of a new and interesting mineral said to occur in considerable quantity in San Bernardino County, California, and exposed by excavations for a tunnel. The pieces in my possession were homogeneous masses of from one to five or six cubic inches dimensions, and appeared to have been broken from still larger masses. It presents a nearly white mass, friable, light and porous, containing much enclosed air, so that it floats on water like cork. On fracture it presents a slightly fibrous structure. Under the microscope it exhibits a two-fold structure—a quantity of very fine irregular fibers permeating a mass of a brittle, amorphous, structureless substance. No definite structure could be perceived indicating previous woody or vegetable

tissue. The specific gravity of the mineral freed from air was determined as 1·166 at 18° C. The mineral does not melt perfectly at 140° C., but softens *slightly* at temperatures below 100° C.

It is insoluble in water;—entirely soluble in hot absolute alcohol, about 86·6 per cent dissolving on boiling for some time. The soluble portion is quite soluble, remaining in solution in about $2\frac{1}{2}$ parts of hot alcohol. In cold absolute alcohol it is not so soluble, about one-third of that portion soluble in hot alcohol, not re-dissolving in cold. The alcoholic solutions are of a slightly yellow color, marked bitter taste, and acid reaction. Ether dissolves about one-third of the native mineral at ordinary temperatures. Carbon disulphide dissolves it but slightly. The residues from the solutions were in every case white and amorphous.

The extract with hot alcohol melts at temperatures between 115° and 125° C., but has no constant melting point, and softens somewhat at lower temperatures. On cooling after fusion it forms a brittle, translucent mass. Heated on platinum foil the mineral burns with smoky flame, with fixed carbon residue, but with only a trace of ash. An ash determination gave 00·12 per cent of a white, infusible ash, evidently silica. With concentrated sulphuric acid it gives a red-brown color, which on warming becomes black; on dilution with water black flakes are precipitated. The mineral, dried for several days over sulphuric acid, lost on heating to temperatures below its melting point 3·87 per cent in weight, probably, though not certainly, water. It contains no nitrogen. Elementary analysis of the mineral dried over sulphuric acid gave—

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| Carbon | = | 64·53 | per cent. |
| Hydrogen | = | 9·20 | " |
| Hence Oxygen | = | 26·27 | " |
| | | 100·00 | |

Admitting the loss in weight above quoted, of 3·87 per cent, as being due to loss of water, we should have as a complete analysis—

| | | |
|---|---|---|
| Water | 3·87 | per cent. |
| Carbon | 64·46 | " |
| Hydrogen (not in water) | 8·75 | " |
| Oxygen (not in water) | 22·80 | " |
| Ash | 0·12 | " |
| | 100·00 | |

In caustic potash the mineral dissolves very readily and almost completely (93·5 per cent). The solution when concentrated is of a light, clear, brownish-yellow, and may be diluted

to any extent with distilled water without precipitation, but with dilute chlorhydric acid gives a flocculent precipitate which settles to the bottom on standing. The alkaline solution is gelatinous in the cold when concentrated, but dissolves on dilution, and gives a froth like soap-suds on agitation. The portion insoluble in caustic potash (6·5 per cent) is left as a glue-like mass of a brownish color.

A quantity of the mineral was dissolved in caustic potash, precipitated with chlorhydric acid; the resin thus obtained was subjected after drying to elementary analysis. It gave—

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| Carbon | = | 69·71 per cent. | } 100·00 |
| Hydrogen | = | 9·59 " | |
| Oxygen | = | 20·70 " | |

The melting point of this purified resin was determined at 127°–129° for perfect fusion, though softening at lower temperatures.

The acid character of the alcoholic solution, the oxygen contents, the behavior toward solvents, and especially toward caustic potash, as well as the temperature at which it melts, all indicate the resinous character of the new mineral. To confirm this it was treated in alcoholic solution with alcoholic solution of lead acetate, and a flocculent, white precipitate of the lead resinate was obtained. It is noticeable that the oxygen contents of this resin, as evidenced by both analyses, is much greater than is usually found in resins either of mineral origin or freshly obtained from plants.

The filtrate, obtained by dissolving in caustic potash and precipitating with chlorhydric acid, was evaporated to dryness and exhausted with alcohol, and a small quantity of a yellowish waxy substance obtained of an intense bitter taste, evidently the substance to which the bitter taste of the mineral as well as of its alcoholic extract is due, as the purified resin possessed no bitter taste.

This new resin appears to possess entirely different properties and composition from any organic mineral heretofore described. The South American mineral Guyaquillite seems to resemble it in some properties, but differs very materially in other essential properties as well as in composition. Berengelite, also from South America, possesses a somewhat similar elementary composition ($C_{20}H_{30}O_4$), but differs in all other essential properties. At the suggestion of Mr. Redding, to whom I am indebted for the specimens which form the subject of the foregoing examination, I propose the name of *Bernardinite* for the new mineral, from the name of the locality.

I hope soon to be able to subject the mineral to a more thorough investigation, with the object of ascertaining the true chemical nature of its constituents.

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