

XXXVII.—*On Sombrerite.*

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THIS mineral forms a large portion of some small islands in the West Indies, especially of Sombrero Island (N. lat. $18^{\circ} 35'$, W. long. $63^{\circ} 28'$), about 60 miles from St. Thomas. Its composition and properties prove it to be a new species, to which I have given the name sombrerite. It is remarkable for the large proportion of phosphoric acid it contains.

Sombrerite presents itself in nature as a white, yellowish white, or reddish coloured rock, having a straight fracture and, in some portions, a peculiar horny aspect; its appearance is, in general, compact, though, in reality, the rock is very porous. It shows no signs of crystallisation whatever, but appears like an amorphous, gelatinous phosphate that has been submitted to a high temperature. It is thought to be of comparatively recent geological origin, as it encloses fossil bones (of mammalia?) and several kinds of shells. In a mineralogical point of view, sombrerite is a compound of phosphate of lime with phosphate of alumina; in some specimens a portion of the alumina is replaced by a corresponding proportion of sesquioxide of iron; in others, where little or no iron is present, the mineral adheres to the tongue like other aluminiferous minerals. Sombrerite is not phosphorescent by heat like apatite; before the blowpipe, when moistened with sulphuric acid, it colours the flame pale green. It contains no fluoride or chloride of calcium.

The specific gravity of sombrerite is 2.52. A well-chosen specimen has given me the following composition:—

			Atomic ratio.	
Water	9.00	1.00	20
Phosphate of lime Ca^2P	..	65.00	0.41	8
Phosphate of alumina Al^2P^3	..	17.00	0.05	1
Carbonate of lime	..	5.00		
Chloride of sodium	..	1.44		
Sulphate of lime	..	1.36		
Silica	..	1.00		
Crenate of ammonia, &c.	..	0.20		
			100.00	

The formula of sombrerite is therefore $8\text{Ca}^2\text{P} + \text{Al}^2\text{P}^3 + 20\text{H}$

Persons who have seen this rock think that it owes its origin to guano, some looking upon it as "fossil guano," and others as "guano modified by volcanic action." In order to bring forward, if possible, some proof of these theories, I took a large quantity of the mineral and sought carefully for uric acid. Though the experiment was repeated several times, I have not been able to find the least trace of that compound, but only a very small quantity of *crenate of ammonia*, which I have frequently met with in many other minerals, notably in iron ores of various ages. At the same time it is possible that sombrerite may have derived its origin from ancient deposits of guano, modified by time and geological phenomena, as we see large beds of limestone and sandstone almost completely formed by the *débris* of organised beings. However that may be, I look upon this rock as having found its way to the surface at a high temperature, in contact with water or steam, and under great pressure. This would account for its peculiar appearance.

As regards the uses of sombrerite, I believe it has been employed already for the preparation of phosphorus, phosphoric acid, &c. But for agricultural purposes, though doubtless valuable, it presents a drawback to the manufacturer of "super-phosphate of lime." In producing the latter, sombrerite gives rise to a certain quantity of sulphate of alumina, and this salt being deliquescent, attracts and retains so much moisture that the product can be dried only with great difficulty.

Sombrerite has, however, the advantage of being easily reduced to powder, and could, in that state, be advantageously mixed with certain soils.
