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FURTHER DATA ON LAPIS LAZULI FROM LATIUM, ITALY

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Stevenson *et al.* (1974) have shown that a specimen of lapis lazuli from Latium, Italy contains sodalite but apparently lacks lazurite or haüyne*. We also studied lapis lazuli from Latium, during the course of an investigation of lapis lazuli from world-wide localities. Our findings are somewhat at variance with those of the above authors and we would like to put on record another mineral association.

Our specimen is No. 18495/65 from the Museo Mineralogico, Università di Roma, provided by Dr. Adriana Maras, curator of the collection. It is labelled "lapis lazuli from peperino" and the locality is given as "Ariccia, Monti Albani, Lazio, Italy". In hand specimen the rock appears to be made up of grey, saccharoidal carbonate with streaks of sky-blue material up to 5 mm wide and mottled with a few centimetric white patches. It is similar to the rock described by Strüver (1877, pp. 238-239) and Lacroix (1893, pp. 336-337) who regarded it as produced from limestone xenoliths that were caught up in the leucitic tuff ("peperino") and endometamorphosed under the agency of volcanic heat.

In thin section, the rock is composed mainly of calcite but the blue layers are made up of calcite and wollastonite enclosing tiny, irregular blue grains of medium depth of colour that scarcely attain 0.1 mm in maximum dimension. The blue grains have a refractive index less than 1.57 and are completely isotropic. Microprobe analysis showed them to be haüyne (Table 1). Fine-grained, anhedral pyrite is quite common.

The white patches are composed of silica and a fine-grained mixture of silica and an unidentified magnesium mineral separated by veinlets of cross-fibre chalcedony. The silica-bearing patches are apparently secondary but occur within 1 mm of some of the haüyne grains.

Analyses were carried out on an ARL-EMX electron microprobe housed in the Central Institute for Industrial Research, Oslo, using natural minerals as standards. Accelerating voltage was 15 kv; sample current was reduced to 2×10^{-8} amperes to prevent decomposition of the sample. Raw data were corrected for matrix effects by the method of Bence & Albee (1968). The analysis of haüyne given in Table 1 is an average of closely corresponding analyses from four grains. The sulphide sulphur (S) and SO_3 were resolved from the formula, the 24*i* positions being filled with S^{2-} and the remaining sulphur being allocated to S^{6+} in 2 *a* (nomenclature for space group T^4_d in *International Tables for X-Ray Crystallography).*

The analysis shows a rather high value of K_2O, a feature also characteristic of the "volcanic" haüynes of the region (see Taylor 1967, analyses 12, 13, 22, 24 and 27). The 2½% deficit in the analytical sum can probably be ascribed to H_2O.

A detailed search of the polished section did not reveal any sodalite despite the fact that this mineral is easily recognizable, even in minute grains, by its bright orange cathodoluminescence. The absence of sodalite is hardly surprising as there is little chlorine in the haüyne and, even at temperatures as low as 600°C. haüyne-nosean will dissolve appreciable sodalite before sodalite and haüyne can appear together in the equilibrium system (Van Peteghem & Burley 1963; Tomisaka & Eugster 1968). By the same token,

TABLE 1. HAÜYNE FROM MARBLE, LATIUM, ITALY

	Wt. %		Ions based on 12 z-ions	
SiO_2	33.85	Si	6.322	12.00
Al_2O_3	25.8	Al	5.678	
FeO	0.00	Fe	0.000	
MgO	0.06	Mg	0.017	
CaO	8.6	Ca	1.721	7.25
Na_2O	11.45	Na	4.146	
K_2O	5.75	K	1.370	
Cl	0.08	Cl	0.025	1.67
SO_3	11.7	SO_4	1.643	
S	0.67	S	0.235	
	97.96	O	23.765	24.00
O=Cl+S	0.33	Cl	0.000	
	97.63			

*In this publication lazurite will be regarded as a sulphide-bearing haüyne, following the usage proposed by Rogers (1938).

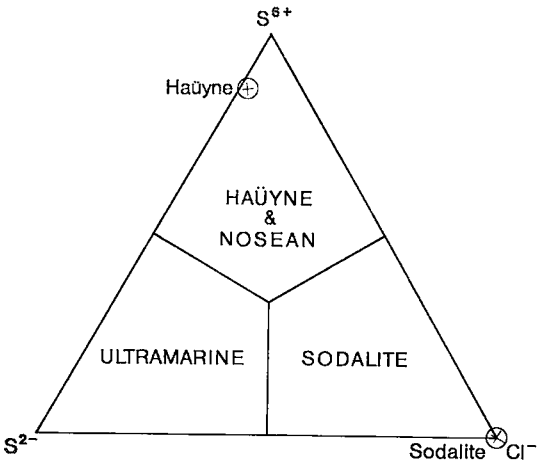

FIG. 1. Sodalite-group minerals from marble of Latium, Italy, plotted according to their atomic content of S^{6+}, S^{2-} and Cl^-. Sodalite composition from Stevenson *et al.* (1974).

it is not surprising that the specimen of sodalite studied by Stevenson *et al.* (1974) contained no haüyne, as its composition also lies outside of the haüyne-sodalite solvus. The compositions of the two analysed minerals are shown in Figure 1.

One may conclude that these specimens came from different localities in the Latium district or, at least, were collected from different flows. It is therefore recommended that museum curators proceed with caution before deleting the name "lazurite" from specimens of Latium lapis lazuli in their collections.

This research is part of a much larger project on the nature and origin of lapis lazuli. It was undertaken in Oslo when Hogarth was on sabbatical leave. A National Research Council operating grant (A2122), which paid for microprobe analyses, and a travel fellowship (TO214) are gratefully acknowledged.

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