ported, in particular lower values for $c \wedge Z$ and higher ones for $2V_x$ have been observed.

In a very recent paper, Parker (1961) presents, in separate diagrams, the curves relative to the extinction angle and refractive indexes on (110) for a number of different amphibole and pyroxene series, without pointing out however the advantages of this method. Some obvious inconsistencies result when Parker's data are compared with those that can be calculated from his primary data. This is especially true for the extinction angles of hornblendes having compositions near those of the end-members, and of hastingsites having a prevalence of Fe^{2+} over Mg^{2+}; but also, for the whole glaucophane series for the greatest refractive index on (110), n_2, which results in smaller values than the index $\beta(N_y)$.

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DIMORPHIC RELATION IN Ag_3SbS_3

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The dimorphic relation in Ag_3SbS_3 has not been well understood. In nature monoclinic pyrostilpnite is very rare, whereas rhombohedral pyrargyrite is described as an important and abundant ore of silver and formed at low temperatures (Palache *et al.*, 1952). Miers (Palache *et al.*, 1952), who first studied these two minerals, concluded that pyrargyrite and pyrostilpnite were always contemporaneous. Jensen (1947), in his study on the system Ag_2S-Sb_2S_3, stated that "the compound $3Ag_2S \cdot Sb_2S_3$ showed no heat effects below the melting point. This was unexpected, because this compound is formed in nature as two distinct mineral species, pyrargyrite and pyrostilpnite."

Pyrargyrite has been prepared previously by several methods (van

Klooster and Jaeger, 1912; Palache *et al.*, 1952), but pyrostilpnite has not been successfully synthesized to date.

Two techniques were employed in the present study. Experiments at low pressures were carried out in sealed Vycor tubes; where a greater range of pressures was necessary, sealed gold tubes in pressure vessels were used. The starting materials were reagent grade Ag, Sb and U.S.P. sulfur. All products were examined by the *x*-ray powder method.

Over fifty Vycor-tube runs were made, and in these only three phases could be recognized. They are stibnite, argentite and pyrargyrite. Ag_2S and Sb_2S_3 were prepared and used as starting materials in low temperature runs, since there is a miscibility gap in the ternary system. A pertinent summary of the runs appears in Table 1. No pyrostilpnite was obtained in any of the runs. Above 450° C., pyrargyrite was formed as a single phase irrespective of the starting materials.

TABLE 1. PERTINENT SUMMARY OF DRY-RUNS IN VYCOR-TUBE

Starting Materials	Temp. ° C.	Time, hrs.	Products
Stoichiometric amounts of Ag, Sb and S	300	300	Stibnite, argentite
	400	300	Pyrargyrite, stibnite, argentite
	450	300	Pyrargyrite, stibnite, argentite
	500	20	Pyrargyrite
	800	1	Pyrargyrite
Stoichiometric amounts of Ag_2S and Sb_2S_3	150	500	Stibnite, argentite
	250	500	Stibnite, argentite
	350	100	Pyrargyrite, stibnite, argentite
	400	20	Pyrargyrite

Hydrosynthesis was carried out in sealed gold tubes in Morey bombs. Temperatures to which the charges were subjected range from 100 to 400° C. Equivalent pressures were estimated (Kennedy, 1950). Solvents used in alkaline runs were $Na_2S \cdot 9H_2O$ and K_2S. For acid runs, HCl was used. Table 2 lists some of the results. No pyrostilpnite was observed to have formed. The largest crystals of pyrargyrite rarely exceeded 1 mm, and most of them formed in the alkaline runs with K_2S as solvent, Ag_2S and Sb_2S_3 as charges, with the temperature above 350° C.

Thermal study of natural materials was carried out in Vycortube. Pyrargyrite used was from Guanajuato, Mexico. An analysis published by Castro (1919) shows pyrargyrite 98.34%, argentite 1.61% and pyrite 0.37%, of which the pyrargyrite is represented by 17.40% S, 22.13% Sb and 58.81% Ag. The natural pyrostilpnite was from pribrau, Bohemia, Czechoslovakia. The total quantity of pyrostilpnite available was only

TABLE 2. PERTINENT SUMMARY OF WET-RUNS IN GOLD-TUBE

Starting Materials	Temp., ° C.	Pres. bars	Time hrs.	Products
Stoichiometric amounts of Ag, Sb and S in 0.1 M. K_2S sol.	100	—	200	Argentite, stibnite, alkaline polysulfide
	200	800	200	Argentite, stibnite, pyrargyrite, alkaline polysulfide
	300	1000	200	Pyrargyrite, stibnite, argentite, alkaline polysulfide
Stoichiometric amounts of Ag, Sb and S in 0.1 M $N_2S \cdot 9H_2O$ sol.	100	—	200	Argentite, stibnite, alkaline polysulfide
	200	800	200	Pyrargyrite, stibnite, argentite, alkaline polysulfide
Stoichiometric amounts of Ag_2S and Sb_2S_3 in 0.1 M K_2S sol.	100	—	200	Argenite, stibnite, alkaline polysulfide
	200	800	200	Pyrargyrite, stibnite, argentite, alkaline polysulfide
	300	1000	100	Pyrarygyrite, alkaline polysulfide

TABLE 3. SELECTED RESULTS OF THERMAL RUNS OF PYRARGYRITE AND PYROSTILPNITE

Starting Material	Temp. ° C.	Time, hrs.	Product
Pyrargyrite	1000	10	Pyrargyrite
Pyrargyrite	800	25	Pyrargyrite
Pyrargyrite	428	96	Pyrargyrite
Pyrargyrite	315	240	Pyrargyrite
Pyrargyrite	150	350	Pyrargyrite
Pyrostilpnite	210	300	Pyrargyrite
Pyrostilpnite	197	300	Pyrargyrite
Pyrostilpnite	188	350	Pyrostilpnite
Pyrostilpnite	150	350	Pyrostilpnite

about 0.03 g. No analysis is available. Selected results are shown in Table 3. Thus although pyrargyrite was synthesized from the elements only at temperatures above approximately 350° C., it was formed by inversion of pyrostilpnite at temperatures as low as 197° C. This inversion took place without the development of any other phases; the *x*-ray diffraction patterns of the pyrargyrite showed no extra lines. There is thus no doubt that these two minerals are polymorphs and the inversion temperature can be stated as lower than 197° C.

The failure to synthesize pyrostilpnite is probably due to its low temperature range of stability. The lowest temperatures in which reaction could be produced in this system lie in the pyrargyrite stability field.

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ERRATA AND ADDENDA

MARGARET D. FOSTER

Certain errors and omissions in our paper "Origin of dunite and of olivine-rich inclusions in basaltic rocks," *Am. Mineral.* **39,** 693–737, 1954, have been pointed out to Dr. Ross and me. The changes to be made, all occurring on p. 697, are:

39:697, line 31, last sentence of paragraph should read: "No diopside was found in these inclusions, but diopside (Table 6, no. 9), and a fraction of 1 per cent of spinel (Table 7, no. 9) were found in inclusions in Kauai samples that were studied later."

39:697, line 38, last sentence of paragraph should read: "An analysis of the chromian spinel is presented in Table 7, no. 10." Reference to chromian diopside analysis should be deleted.

39:697, line 13, at the end of the paragraph, add the sentence: "Analyses of diopside and of spinel from nodules in samples of the 1801 flow are given in Table 6, no. 11, and Table 7, no. 11, respectively."