On the Pinite of Breage in Cornwall.

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IT has long been known that several of the felspar-porphyry dykes (Elvans) of the West of Cornwall contain crystals of pinite—apparently pseudomorphous after iolite—as an accessory mineral, and similar crystals occur in the granite in several places.[1]

In the parish of Breage there are several of these dykes running towards the sea in a south-easterly direction, which are somewhat largely used as road-material. That which reaches the sea at Praa is in places thickly charged with the pinite crystals, and the same in a somewhat less degree may be said of the dyke which passes from the village of Trew through Great Wheal Fortune. By a careful examination of the heaps of stone broken from these dykes for road material good specimens may be readily obtained, and sometimes one hand-specimen will contain several of the crystals.

The general appearance of the rock is that of a moderately fine-grained porphyry, having a basis of white quartz and greenish-gray and slightly kaolinised felspar. In this basis are set occasional "blebs" of smoky quartz, macled crystals of pink or white orthoclase, some as much as three-quarters of an inch long, and flakes of a dark ferruginous micaceous mineral, together with the pinite crystals already referred to.

The pinite is very dark greenish or brownish in colour, sometimes indeed almost black; the hardness is from 2 to 2·5, and the specific gravity about 2·8. The crystals are frequently grouped into bundles, and the lateral planes, apparently 12 in number, are rarely very perfect. There is a distinct basal cleavage, and the basal planes are often found coated with minute scales of some micaceous mineral. The crystals are evidently pseudomorphs by alteration, and there seems reason to believe that the original mineral was iolite, although an analysis of the pinite

[1] See the Author's "Handbook to the Mineralogy of Cornwall and Devon," 1876, and Mr. A. K. Barnett's "Observations on the Elvans, &c., of Cornwall."

suggests a difficulty which is not easily explained away. My analysis of a number of the crystals of the Breage pinite is as follows (I give Dana's type composition of iolite beside it for comparison) :—

		Breage pinite.	Dana's typical iolite.
H_2O	by desiccation 0·20 by ignition 5·00	5·20	
SiO_2	... ...	45·90	... 49·40
Al_2O_3	... ...	38·80	... 33·90
FeO & Fe_2O_3	... ...	0·50	... 7·90 (protoxide)
MnO	... ...	trace	
CaO	... ...	0·24	
MgO	... ...	0·16	... 8·80
K_2O	... ...	8·09	
Na_2O	... ...	trace	
	Loss & not det. ...	1·11	
		100·00	100·00

Now if this pinite was originally iolite of ordinary composition, it must have lost magnesia and protoxide of iron, and acquired water and potash. The only difficulty here is the acquisition of so large a proportion of potash, since the ordinary course of change, as in the kaolinisation of felspar, is for alkalies to be carried off by the circulating waters. It thus appears, that we have to suppose, either that the original mineral contained potash —in which case it was not iolite as we know it—or else that potash has been in some extraordinary way absorbed and condensed in this mineral. And this same dilemma exists in all cases where pinite is supposed to be altered iolite—for pinite always and iolite never contains alkali in notable proportions.

The difficulty is much lessened if we suppose the pinite to be pseudomorphous after nepheline, like Allan's gieseckite from Greenland. Normal nepheline contains large quantities of potash and still larger quantities of soda. A removal of the soda, leaving the potash intact, and a small part of the silica from nepheline would give us just such a mineral as this pinite. Dana gives for the type composition of nepheline—silica 44·2 ; alumina 33·7 ; soda 16·9 ; potash 5·2 = 100. Removing the soda and introducing 5 per cent. of water, the proportions would become near to 49 silica, 38 alumina, and 6 potash—or quite sufficiently near to our analysis to allow of the supposition.