Analyses of Saponite by Miss Helen E. Vassar.

1. South Kearsarge Mine (178 G 542).
2. Ahmeek Mine (166 G 908).

	1.	Molecular Ratio		2.	Molecular Ratio	
SiO_2	42.78	.709	.709 = 10× .071	42.99	.713	.713 = 10× .071
Al_2O_3	6.44	.063	.071 = 1× .071	6.26	.061	.072 = 1× .072
Fe_2O_3 / FeO	1.27	.008		1.83	.011	
				2.57	.036	
MgO	24.78	.615	.671 = 9× .0745	22.96	.570	.661 = 9× .074
CaO	2.35	.042		2.03	.036	
MnO	0.12	.002		0.11	.002	
Na_2O	0.75	.012		1.04	.017	
K_2O	trace			trace		
H_2O+	7.90	.440	1.216 = 16× .076	6.85	.380	1.140 = 15× .076
H_2O-	13.96	.776		13.6‾	.760	
	100.35			100.29		

Considering the highly hydrous nature of this mineral these two analyses from different localities agree remarkably closely. They yield, it is true, a formula not very simple, but the two are identical save for a difference of one molecule of water; Al_2O_3. $9MgO.10SiO_2.16H_2O$ or $15H_2O$.

THE IDENTITY OF ECTROPITE AND BEMENTITE

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In 1921, Pardee, Larsen, and Steiger[1] showed the identity of bementite with caryopilite but on the basis of the chemical analysis and available crystallographic and optical data they concluded that ectropite was a distinct species.

I have since examined a specimen of ectropite in characteristic crystals from the type locality, Långban. The crystals are of the type described by Flink,[2] elongated tablets. Lying on the flat face they give parallel extinction and show that the acute bisectrix is inclined at a large angle to the normal to the plates. Broken

[1] Pardee, J. T., Larsen, E. S., and Steiger, Geo.; Bementite and neotocite from western Washington, with conclusions as to the identity of bementite and caryopilite, *Journ. Wash. Acad. Sc.*, **11**, 25-32, 1921.

[2] Flink, Gust. Einege Neuigkeiten in schwedischer Mineralogie. *Geol. Fören. Förh., Stockholm;* **39**, 426-31, 1917.

TABLE 1. PHYSICAL AND OPTICAL PROPERTIES OF BEMENTITE, ECTROPITE, AND SERPENTINE (WITH CUBIC CLEAVAGE)

	Bementite New Jersey	Bementite Washington	Caryopilite Sweden	Ectropite Långban	Serpentine Brewster
Form	Orthorhombic, radiated, foliated.	Felted masses, radiating, platy.	Felted masses, radiate-fibrous.	Monoclinic(?), tabular (100) elongated *b*.	Orthorhombic
Cleavage	3 pinacoids with different perfection.	Resembles sericite, micaceous.	Micaceous.	(001) perfect.	3 pinacoids with different perfection.
Hardness	5.5	6	3 to 3.5 (?)	4(?)	3
Sp. gr.	2.981	3.106	2.83 to 2.91	2.46(?)	2.48
Fusibility	Fuses readily to a black glass.	Fuses easily to a black glass.			Dif. Fus.
Solubility	Dissolves in hot HCl without gelatinization	Decomposed by hot acid.	Easily soluble in strong acid.	Decomposed by acid	Decomposed by acid
2E	Near 0.	Near 0.	Near 0.	Near 0.	Small to med.
Optical orientation	X normal to best cleav.	X normal to cleav.	X normal to cleav.	X sensibly normal to perf. cleav.	X $\perp$ best cleav. Z = second cleav.
α	1.624	1.624	1.603	1.608	1.550
β	1.650	1.647	1.632	1.633	1.556
γ	1.650	1.647	1.632	1.633	1.556
$\gamma-\alpha$	0.026	0.023	0.029	0.025	0.006

crystals show a perfect cleavage that bevels the long edge of the plates. The acute bisectrix is nearly normal to this cleavage. The optic angle is very small and the plane of the optic axes is parallel to the long edge of the plates. Hence, using Flink's orientation, X is sensibly normal to (001) and $Z=b$.

Its optical properties are so much like those of bementite as to make the identity of the two minerals seem highly probable. The optical data for bementite from three localities and of ectropite are shown in Table 1 for comparison. A comparison of the analysis of bementite and ectropite is made in Table 2 and shows that the difference is not so great but that it could be accounted for as due to impurities.

The crystal data would seem to establish the difference between the two species as bementite is orthorhombic while ectropite is in tabular, monoclinic crystals. However, the powder of the ectropite crystals and of bementite are very similar and show a perfect cleavage sensibly normal to the acute bisectrix. These data are believed to establish the identity of the two. Bementite has priority. Ectropite is a pseudomorph after some older mineral.

Table 2. Analyses of Bementite, Ectropite, and Serpentine

	1	2	3	4	5	6
SiO_2	39.92	38.36	39.00	36.16	35.02	41.98
MnO	41.58	39.22	42.12	46.46	37.20	—
FeO	4.15	4.94	3.75	—	5.80	2.87
MgO	4.46	3.35	3.83	4.80	7.20	41.38
CaO	0.40	0.62	trace	0.28	3.59	—
ZnO	—	2.93	2.86	—	—	—
PbO	—	—	—	0.37	—	—
Alkalies	—	—	—	0.20	1.25	—
Al_2O_3	1.32	0.96	—	0.35	0.75	—
Fe_2O_3	—	0.71	—	1.33	—	—
H_2O	0.49	0.60	8.44	—	—	—
H_2O+	7.90	8.01		9.81	8.89	13.78
Cl	—	—	—	0.09	0.19[a]	—
	100.22	99.70	100.00	99.85	99.89	100.01

Molecular Ratios Reduced to 100

	1	2	3	4	5	6
SiO_2	35.40	34.61	34.30	31.10	30.10	27.88
MnO[b]	40.55	40.62	40.95	40.22	43.55	42.00
H_2O	23.36	24.07	24.75	28.12	26.00	30.12
Al_2O_3	0.69	0.70	—	0.56	0.35	—
[a]S.	100.00	100.00	100.00	100.00	100.00	100.00

[b] Under MnO have been summed up the molecular ratios of MnO, FeO, MgO, CaO, ZnO, and PbO.

1. Bementite, Olympic Range, Washington, Analyst, Steiger.
2. Bementite, Franklin Furnace, New Jersey, Analyst, Steiger.
3. Bementite, Franklin Furnace, New Jersey, Analyst, König.
4. Caryopilite, Pajaberg, Wermland, Sweden, Analyst, Hamberg.
5. Ectropite, Långban, Analyst, Naima Sahlborn.
6. Serpentine with cubic cleavage, Brewster, N. Y., Analyst, Friedel.

Bementite and Serpentine Compared

The large cleavage pieces of bementite from Franklin have a striking similarity to the serpentine with cubic cleavage from Brewster, New York. The optical properties of such serpentine are given in Table 1 for comparison. The axial angle of this serpentine varies from nearly 0 to rather large and the birefringence from nearly or quite 0 to about 0.007. Large cleavage plates show rather uniform optical properties except that lamellae of rather strongly birefracting serpentine are present parallel to the cleavages. The material appears to be coarsely crystalline, but it may be made up of minute aggregates arranged so as to appear homogeneous.

As shown in Table 2 the molecular ratios for RO, SiO_2, and H_2O for bementite and serpentine are rather near together. The similarity in physical and optical properties and in chemical composition is sufficient to suggest that bementite may be the MnO end of the serpentine series. The analyses of ectropite and caryopilite yield formulæ very similar to that of serpentine with MgO replaced by MnO.

NOTES ON DACHIARDITE

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D'Achiardi has described a supposedly new zeolite in the granite pegmatite of San Piero in Campo, Elba, associated with other zeolites, pink tourmaline, and feldspar, in a preliminary report[1] consisting chiefly of a chemical analysis and good photographic illustrations. He termed it provisionally "zeolite mimetica" from its characteristic mimetic structure. Lack of suitable material prevented a crystallographic and optical discussion of the material analyzed; however, he later published[2] an additional chemical analysis agreeing essentially with the first. The name dachiardite

[1] *Proc. Soc. Tosc.*, (Pisa) 14, 1905.
[2] *Proc. Soc. Tosc.*, (Pisa) 22, 160, 1906.