That the presence of certain impurities, with the corresponding irregularity in the crystal structure, increases the radio-detector properties of many minerals is evident. The relatively pure galenas from the Joplin district and elsewhere in the Mississippi Basin, for instance, are poor, while on the other hand the argentiferous galenas from many of the Rocky Mountain deposits are excellent detectors. Examination of the cleavages of the latter specimens with a lens almost always shows the existence of a wavy-striated surface, indicating some distortion in the crystal structure, no doubt connected with the presence of the silver compound. It seems probable that such distortion of the layers of atoms may shift electrons out of their normal positions, so that groups of them are held by one-sided attractive forces, and may thus give rise to the radio-detector properties exhibited.

SUMMARY. About 75 minerals which have been found to possess more or less radio-detector properties are tabulated with respect to their compositions. Sulfides are usually better than oxides of the same metals, selenides sometimes better than sulfides. Most of these minerals are moderate conductors of low-voltage electricity. The theory of Roberts and Adams that sensitive spots on crystals are merely layers composed wholly of one kind of atom is shown to be insufficient, and a modification is suggested. In some cases such layers are perpendicular to "hemimorphic" or polar axes, and the detector properties may be due to the corresponding one-sided attraction of the electron layers. In most minerals the presence of certain impurities improves the detector properties, which may be due to resulting irregularities in the crystal structure, with corresponding one-sided attractive forces holding groups of electrons.

A REEXAMINATION OF BEAUMONTITE FROM BALTIMORE[1]

EARL V. SHANNON, *U. S. National Museum*

Beaumontite, described as a new mineral from Baltimore in 1839 by Levy and named after Elie de Beaumont,[2] was the subject

---

[1] Published by permission of the Secretary of the Smithsonian Institution. This paper is the fourth preliminary paper on subjects of interest developed in the course of an investigation of the minerals of Maryland undertaken in cooperation with the Maryland State Geological Survey.

[2] F. Michel Levy: L'institut, No. 313, p. 455; Berzelius Jahrsbericht, **20,** 217, (1840); London & Edinb. *Phil. Mag.*, **Feb.** 1840.

of vigorous discussion for years thereafter. Alger maintained that the mineral was identical with heulandite crystallographically[3] while Des Cloizeaux reached the same conclusion from an optical examination.[4] G. Rose failed to agree with preceding authors in regarding beaumontite as identical with heulandite. Mallard[5] considered the two as identical from experiments on the effect of heat upon the optical properties while Klein,[6] on the same basis, held a different view. The literature has been previously summarized by Geo. H. Williams[7] who concludes, from crystal measurements made by Burton and Gill, that the crystals agree with heulandite in angle.

The only analysis thus far made on the mineral was on a very small sample by Delesse and published by Des Cloizeaux. This was probably made upon material of doubtful purity.

It was deemed desirable that a further examination of this mineral be made to more definitely settle its status and, fortunately, several good specimens were available in the collections of the National Museum.

The mineral occurs as minute crystals, averaging 1 millimeter or less in diameter, disseminated as crusts on other minerals, especially partly altered crystals of "haydenite." The crystals vary in color from colorless to green and pale yellow. When green it is obviously from inclusions of the clayey material which is a common product of the decomposition of the first generation of zeolites, notably haydenite and stilbite, which has been called halloysite. This material will be further investigated and described in a later paper. It turns brown quickly on exposure to air and the yellowish crystals are evidently pigmented by an oxidised form of the same material.

Much of the discrepancy in the measured angles of the mineral has been due to a tendency to parallel growth or curvature of the faces. With a modern 2-circle goniometer it is possible to measure very minute crystals but even these do not give very good signals. A number were measured and all of those seen had the simple habit

---

[3] F. Alger: *Am. Jour. Sci.*, **46**, 233, (1844).

[4] Des Cloizeaux: Manuel de Mineralogie, **1**, 428, (1862).

[5] *Bull. Soc. Min. France.*, **5**, 260, (1882).

[6] *Zeits. Kryst.*, **9**, 66, (1884).

[7] Minerals occurring in the neighborhood of Baltimore. Johns Hopkins Publication Agency, pp. 10-11, **1887**.

illustrated in figure 2, in Dana's System. The forms present are *c* (001), *b* (010), *m* (110), *t* (101) and *s* ($\bar{1}01$). The negative dome *s* ($\bar{1}01$) is commonly somewhat larger than the corresponding positive dome *t* (101). The average coordinate angles measured are compared with the corresponding angles of heulandite in the following table:

ANGLES OF BEAUMONTITE

Form		**Symbol**		**Quality**	**Measured**		**Calculated**	
No.	Letter	Gdt.	Miller	Description	φ	ρ	φ	ρ
1.	*c*	0	001	Fair	89°48′	2°09′	90°00′	1°25′
2.	*b*	0∞	010	Good, usually double	0°59′	90°00′	0°00′	90°00′
3.	*m*	∞	110	Rounded, poor.	66°46′	90°00′	68°02′	90°00′
4.	*t*	10	101	Poor, dull	89°48′	65°06′	90°00′	65°05′
5.	*s*	−10	$\bar{1}01$	Excellent	$\bar{9}0°00'$	64°58′	$\overline{90}°00'$	64°34′

The above figures, considering the quality of the crystals, show a fully satisfactory agreement between the angles of beaumontite and those of heulandite.

The crystals split readily along a perfect cleavage parallel to *b* (010). Optically they are biaxial with $2V$ medium, estimated at 50° and are positive with pronounced dispersion. Complete crystals lying on *b* (010) give approximately parallel extinction but the extinction is undulatory with a confused and ill-defined hour-glass structure. The thin cleavage flakes split from the crystals yield better results with the acute bisectrix perpendicular to the (010) cleavage and the trace of the optical plane approximately parallel to (001). Such sections give extinction up to $5\frac{1}{2}°$ measured against the trace of (001) so that the optical orientation is $X=a$, $Y \wedge C=+5\frac{1}{2}°$, $Z=b$. The refractive indices measured are $\alpha=1.493$, $\beta=1.498$, $\gamma=1.505$. The crystals are distinctly zoned with the exterior layers of higher refractive index. These data are in relative agreement with those given by Larsen for heulandite, differing only in the size of the optical angle and the character of the dispersion, which are doubtless variable in heulandite as recently shown by Ross and the writer on heulandite from Challis, Idaho.

By the use of an electromagnet and heavy solutions a small sample (0.1 gram) was separated for analysis which was pure except for about 1 to 2 per cent of stilbite and 2 per cent of yellowish inclusions of the oxidised "halloysite." Upon analysis this gave the results shown in column 1 of the following table while in column 2 is listed the analysis by Delesse and in column 3 the theoretical composition of heulandite according to Dana.

	1. Beaumontite, (Shannon)	2. Beaumontite, (Delesse)	3. Heulandite, (Theory)
SiO_2	56.73	64.20	59.20
Al_2O_3	16.96	14.10	16.80
Fe_2O_3	2.05	1.30	——
CaO	4.31	4.80	9.20
BaO	0.61	——	——
MgO	1.08	1.70	——
Na_2O	0.16	0.50	——
K_2O	3.28	——	——
$H_2O+110°C.$	12.13	13.40	14.80
$H_2O-110°C.$	3.60		
Total	100.91	100.00	100.00

The composition is essentially that of a heulandite in which potash enters to a notable extent.

From the foregoing optical, crystallographic, and chemical evidence, the conclusion of Dana and others that beaumontite is not a distinct mineral but merely a variety of heulandite is abundantly sustained.

FLUORITE FROM ROCHESTER, NEW YORK

A. C. Hawkins, *University of Rochester*

The Lockport dolomite (Niagara limestone), which underlies Rochester, New York, is at this locality some 170 feet in thickness, and its upper part, known as the Guelph limestone member, was originally composed of coral heads and fragments in a matrix of calcareous mud. The formation is now thoroughly solidified into a firm rock, and the larger coral heads, whose cellular structure has largely broken down, afford circular cavities, often several inches in diameter, in which crystallized minerals have developed. These minerals have already been quite thoroughly listed and described,[1] and it is the aim of the present writer merely to present a few

[1] Giles, Albert W.; Minerals in the Niagara Limestone of Western New York, *Proc. Rochester Acad. Sci.*, **6**, 57-72, (1920). Whitlock, H. P.; New York Mineral Localities, *New York State Museum Bulletin* **70**, 1903.