

Inesite. $2(\text{Mn,Ca})\text{SiO}_3 + \text{H}_2\text{O}$. Crystals small, prismatic; also fibrous, radiated and spherulitic. $H. = 6$. $G. = 3.029$. Color rose to flesh-red. Occurs at the manganese mines near Dillenburg, Germany. *Rhodotilite* is the same species from the Harstig mine, Pajsberg, Sweden.

Ganophyllite. $6\text{H}_2\text{O} \cdot 7\text{MnO} \cdot \text{Al}_2\text{O}_3 \cdot 8\text{SiO}_2$. In short prismatic crystals; also foliated, micaceous. Color brown. $H. = 4-4.5$. $G. = 2.84$. From the Harstig mine, near Pajsberg, Sweden.

Okenite. $\text{H}_2\text{CaSi}_2\text{O}_6 + \text{H}_2\text{O}$. Commonly fibrous; also compact. $H. = 4.5-5$. $G. = 2.28-2.36$. Color white, with a shade of yellow or blue. Occurs in basalt or related eruptive rocks; as in the Färöer; Iceland; Disko, Greenland; Poona, India, etc.

Gyrolite. $\text{H}_2\text{Ca}_2\text{Si}_2\text{O}_6 + \text{H}_2\text{O}$. In white concretions, lamellar-radiate in structure. From the Isle of Skye, with stilbite, laumontite, etc.; in India, etc. With apophyllite of New Almaden, California; also N. Scotia.

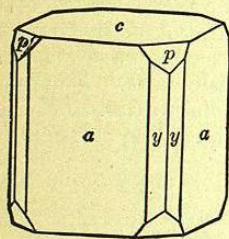
APOPHYLLITE.

Tetragonal. Axis $c = 1.2515$.

$$ay, 100 \wedge 310 = 18^\circ 26'$$

$$cp, 001 \wedge 111 = 60^\circ 32'$$

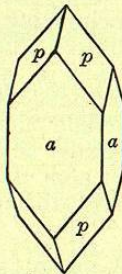
882.



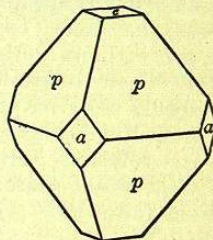
$$ap, 100 \wedge 111 = 52^\circ 0'$$

$$pp', 111 \wedge \bar{1}\bar{1}\bar{1} = 76^\circ 0'$$

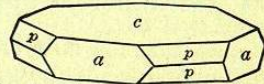
883.



884.



885.



Habit varied; in square prisms (a) usually short and terminated by c or by cp , and then resembling a cube or cubo-octahedron; also acute pyramidal (p) with or without c and a ; less often thin tabular $\parallel c$. Faces c often rough; a bright but vertically striated; p more or less uneven. Also massive and lamellar; rarely concentric radiated.

Cleavage: c highly perfect; m less so. Fracture uneven. Brittle. $H. = 4.5-5$. $G. = 2.3-2.4$. Luster of c pearly; of other faces vitreous. Color white, or grayish; occasionally with a greenish, yellowish, or rose-red tint, flesh-red. Transparent; rarely nearly opaque. Birefringence low; usually +, also -. Often shows anomalous optical characters (Art. 411, Fig. 565). Indices: $\omega_r = 1.5309$ Li, $\epsilon_r = 1.5332$.

Comp.— $\text{H}_2\text{KCa}_2(\text{SiO}_3)_6 + 4\frac{1}{2}\text{H}_2\text{O}$ or $\text{K}_2\text{O} \cdot 0.8\text{CaO} \cdot 1.6\text{SiO}_2 \cdot 1.6\text{H}_2\text{O}$ = Silica 53.7, lime 25.0, potash 5.2, water 16.1 = 100. A small amount of fluorine replaces part of the oxygen.

The above formula differs but little from $\text{H}_2\text{CaSi}_2\text{O}_6 + \text{H}_2\text{O}$, in which potassium replaces part of the basic hydrogen. The form often accepted, $\text{H}_2(\text{Ca,K})\text{Si}_2\text{O}_6 + \text{H}_2\text{O}$, corresponds less well with the analyses.

Pyr. etc.—In the closed tube exfoliates, whitens, and yields water, which reacts acid. In the open tube, when fused with salt of phosphorus, gives a fluorine reaction. B.B.

exfoliates, colors the flame violet (potash), and fuses to a white vesicular enamel. $F. = 1.5$. Decomposed by hydrochloric acid, with separation of slimy silica.

Diff.—Characterized by its tetragonal form, the square prism and pyramid the common habits; by the perfect basal cleavage and pearly luster on this surface.

Obs.—Occurs commonly as a secondary mineral in basalt and related rocks, with various zeolites, also datolite, pectolite, calcite; also occasionally in cavities in granite, gneiss, etc. Greenland, Iceland, the Färöer, and British India afford fine specimens of apophyllite in amygdaloidal basalt or diabase. Occurs also at Andreasberg, of a delicate pink; Radauthal in the Harz; at Orawitza, Hungary, with wollastonite; Utö, Sweden; on the Seisser Alp in Tyrol; Guanajuato, Mexico, often of a beautiful pink upon amethyst.

In the U. S., large crystals occur at Bergen Hill, N. J.; in Penn., at the French Creek mines Chester Co.; at the Cliff mine, Lake Superior region; Table Mt. near Golden, Colo.; in California, at the mercury mines of New Almaden often stained brown by bitumen; also from Nova Scotia at Cape Blomidon, and other points.

Named by Haüy in allusion to its tendency to exfoliate under the blowpipe, from $\alpha\pi\acute{o}$ and $\phi\acute{\alpha}\lambda\lambda\omicron\nu$, a leaf. Its whitish pearly aspect, resembling the eye of a fish after boiling, gave rise to the earlier name *Ichthyophthalmite*, from $\lambda\chi\theta\upsilon\varsigma$, fish, $\acute{o}\phi\theta\alpha\lambda\mu\acute{o}\varsigma$, eye.

2. Zeolites.

The ZEOLITES form a family of well-defined hydrous silicates, closely related to each other in composition, in conditions of formation, and hence in method of occurrence. They are often with right spoken of as analogous to the Feldspars, like which they are all silicates of aluminium with sodium and calcium chiefly, also rarely barium and strontium; magnesium, iron, etc., are absent or present only through impurity or alteration. Further, the composition in a number of cases corresponds to that of a hydrated feldspar; while fusion and slow recrystallization result in the formation from some of them of anorthite ($\text{CaAl}_2\text{Si}_2\text{O}_8$) or a calcium-albite ($\text{CaAl}_2\text{Si}_4\text{O}_{16}$), as shown by Doelter. The Zeolites do not, however, form a single group of species related in crystallization, like the Feldspars, but include a number of independent groups widely diverse in form and distinct in composition; chief among these are the monoclinic PHILLIPSITE GROUP; the rhombohedral CHABAZITE GROUP, and the orthorhombic (and monoclinic) NATROLITE GROUP. A transition in composition between certain end compounds has been more or less well established in certain cases, but, unlike the Feldspars, with these species calcium and sodium seem to replace one another and an increase in alkali does not necessarily go with an increase in silica.

Like other hydrous silicates they are characterized by inferior hardness, chiefly from 3.5 to 5.5, and the specific gravity is also lower than with corresponding anhydrous species, chiefly 2.0 to 2.4. Corresponding to these characters, they are rather readily decomposed by acids, many of them with gelatinization. The intumescence B.B., which gives the name to the family (from $\zeta\epsilon\iota\nu$, to boil, and $\lambda\acute{\iota}\theta\omicron\varsigma$, stone) is characteristic of a large part of the species.

The Zeolites are all secondary minerals, occurring most commonly in cavities and veins in basic igneous rocks, as basalt, diabase, etc.; less frequently in granite, gneiss, etc. In these cases the lime and the soda in part have been chiefly yielded by the feldspar; the soda also by elæolite, sodalite, etc.; potash by leucite, etc. The different species of the family are often associated together; also with pectolite and apophyllite (sometimes included with the zeolites), datolite, prehnite and, further, calcite.

Ptilolite. $\text{RAl}_2\text{Si}_4\text{O}_{24} + 5\text{H}_2\text{O}$. Here $\text{R} = \text{Ca} : \text{K}_2 : \text{Na}_2 = 6 : 2 : 1$ approx. In short capillary needles, aggregated in delicate tufts. Colorless, white. Occurs upon a bluish chalcidony in cavities in a vesicular augite-andesite found in fragments in the conglomerate beds of Green and Table mountains, Jefferson Co., Colorado.

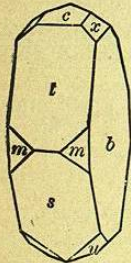
Mordenite. $3\text{RAl}_2\text{Si}_4\text{O}_{24} + 20\text{H}_2\text{O}$, where $\text{R} = \text{K}_2 : \text{Na}_2 : \text{Ca} = 1 : 1 : 1$. In minute crystals resembling heulandite in habit and angles; also in small hemispherical or reni-

form concretions with fibrous structure. $H. = 3-4$. $G. = 2.15$. Color white, yellowish or pinkish. Occurs near Morden, King's Co., Nova Scotia, in trap; also in western Wyoming near Hoodoo Mt., on the ridge forming the divide between Clark's Fork and the East Fork (Lamar R.) of the Yellowstone river.

HEULANDITE. Stilbite *some authors.*

Monoclinic. Axes: $\hat{a} : \hat{b} : \hat{c} = 0.4035 : 1 : 0.4293$; $\beta = 88^\circ 34\frac{1}{2}'$.

886.



mm'' , $110 \wedge \bar{1}\bar{1}0 = 43^\circ 56'$. cs , $001 \wedge \bar{2}01 = 66^\circ 0'$.
 ct , $001 \wedge 201 = 63^\circ 40'$. ca , $001 \wedge 021 = 40^\circ 38\frac{1}{2}'$.

Crystals sometimes flattened $\parallel b$, the surface of pearly luster (Fig. 886; also Fig. 22, p. 11); form often suggestive of the orthorhombic system, since the angles cs and ct differ but little. Also in globular forms; granular.

Cleavage: b perfect. Fracture subconchoidal to uneven. Brittle. $H. = 3.5-4$. $G. = 2.18-2.22$. Luster of b strong pearly; of other faces vitreous. Color various shades of white, passing into red, gray and brown. Streak white. Transparent to subtranslucent. Optically +. Ax. pl. and $Bx_a \perp b$. Ax. pl.

and Bx_o for some localities nearly $\parallel c$; also for others nearly $\perp c$ in white light (Dx.). $Bx_o \wedge \hat{c} = +57\frac{1}{2}^\circ$. Axial angle variable, from 0° to 92° ; usually $2E_1 = 52^\circ$. Birefringence low. $\beta = 1.499$; $\gamma - \alpha = 0.007$.

Comp.— $H_4CaAl_2(SiO_3)_6 + 3H_2O$ or $5H_2O.CaO.Al_2O_3.6SiO_2 =$ Silica 59.2, alumina 16.8, lime 9.2, water 14.8 = 100.

Strontium is usually present, sometimes up to 3.6 p. c.

Pyr.—As with stilbite, p. 457.

Obs.—Heulandite occurs principally in basaltic rocks, associated with chabazite, stilbite and other zeolites; also in gneiss, and occasionally in metalliferous veins.

The finest specimens of this species come from Beruiford, and elsewhere in Iceland; the Färöer; in British India, near Bombay; also in railroad cuttings in the Bhor and Thul Ghats. Also occurs in the Kilpatrick Hills, near Glasgow; on the I. of Skye; Fassathal, Tyrol; Andreasberg, Harz.

In the United States, in diabase at Bergen Hill, New Jersey; on north shore of Lake Superior; with haydenite at Jones's Falls, near Baltimore (*beumontite*). At Peter's Point, Nova Scotia; also at Cape Blomidon, and other points.

Named after the English mineralogical collector, H. Heuland, whose cabinet was the basis of the classical work (1837) of Lévy.

Brewsterite. $H_4(Sr.Ba.Ca)Al_2Si_6O_{18} + 3H_2O$. In prismatic crystals. $H = 5$. $G. = 2.45$. Color white, inclining to yellow and gray. From Strontian in Argyleshire; the Giant's Causeway; near Freiburg in Breisgau, etc.

Epistilbite. Probably like heulandite, $H_4CaAl_2Si_6O_{18} + 3H_2O$. Crystals monoclinic, uniformly twinned; habit prismatic. In radiated spherical aggregations; also granular. $G. = 2.25$. Color white. Occurs with scolecite at the Beruiford, Iceland; the Färöer; Poona, India; in small reddish crystals, at Margaretville, N. Scotia, etc. *Reissite* is from Santorin.

Phillipsite Group. Monoclinic.

		$\hat{a} : \hat{b} : \hat{c}$	β
Wellsite	$(Ba,Ca,K_2)Al_2Si_4O_{10} + 3H_2O$	0.768 : 1 : 1.245	$53^\circ 27'$
Phillipsite	$(K_2,Ca)Al_2Si_4O_{12} + 4\frac{1}{2}H_2O$	0.7095 : 1 : 1.2563	$55^\circ 37'$
Harmotome	$(K_2,Ba)Al_2Si_4O_{14} + 5H_2O$	0.7032 : 1 : 1.2310	$55^\circ 10'$
Stilbite	$(Na_2,Ca)Al_2Si_6O_{16} + 6H_2O$	0.7623 : 1 : 1.1940	$50^\circ 50'$

The above species, while crystallizing in the monoclinic system, are remarkable for the pseudo-symmetry exhibited by their twinned forms. Certain of

these twins are pseudo-orthorhombic, others pseudo-tetragonal and more complex twins even pseudo-isometric.

Fresenius has shown that the species of this group may be regarded as forming a series, in which the ratio of $RO : Al_2O_3$ is constant (= 1 : 1), and that of $SiO_2 : H_2O$ also chiefly 1 : 1. The end compounds assumed by him are:



Here $R = Ca$ chiefly, in phillipsite and stilbite, Ba in harmotome, while in wellsite Ba , Ca , and K_2 are present; also in smaller amounts Na_2 , K_2 . The first of the above compounds may be regarded as a hydrated calcium albite, the second as a hydrated anorthite. Pratt and Foote, however, show that the anorthite end compound more probably has the formula $RAl_2Si_2O_8 + 2H_2O$ (or this doubled). The formulas given beyond are those corresponding to reliable analyses of certain typical occurrences.

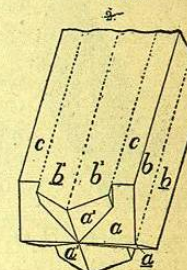
Wellsite. $RAl_2Si_4O_{10} + 3H_2O$ with $R = Ca : Ba : K_2 = 3 : 1 : 3$; Sr and Na also present in small amount. Percentage composition: SiO_2 42.9, Al_2O_3 24.3, BaO 6.6, CaO 7.3, K_2O 6.1, H_2O 12.8 = 100. Monoclinic (axes p. 454); in complex twins, analogous to those of phillipsite and harmotome (Figs. 887, 888). Brittle. No cleavage. $H. = 4-4.5$. $G. = 2.278-2.366$. Luster vitreous. Colorless to white. Optically +. $Bx \perp \hat{b}$ (010). Birefringence weak.

Occurs at the Buck Creek (Cullakancee) corundum mine in Clay Co., No. Carolina; in isolated crystals attached to feldspar, also to hornblende and corundum; intimately associated with chabazite.

887.



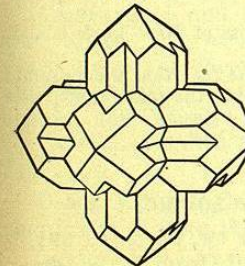
888.



PHILLIPSITE.

Monoclinic. Axes $\hat{a} : \hat{b} : \hat{c} = 0.7095 : 1 : 1.2563$; $\beta = 55^\circ 37'$.

889.



mm'' , $110 \wedge \bar{1}\bar{1}0 = 60^\circ 42'$. cm , $001 \wedge 110 = 60^\circ 50'$.
 af , $100 \wedge \bar{1}01 = 34^\circ 23'$. ee' , $011 \wedge 0\bar{1}1 = 92^\circ 4'$.

Crystals uniformly penetration-twins, but often simulating orthorhombic or tetragonal forms. Twins sometimes, but rarely, simple (1) with tw. pl. c , and then cruciform so that diagonal parts on b belong together, hence a fourfold striation, \parallel edge b/m , may be often observed on b . (2) Double twins, the simple twins just noted united with e (011) as tw. pl., and, since ee' varies but little from 90° , the result is a nearly square prism, terminated by what appear to be pyramidal faces each with a double series of striations away from the medial line. See Figs. 422-424, p. 130; also Fig. 362, p. 122. Faces b often finely striated as just noted, but striations sometimes absent and in general not so distinct as with harmotome; also m striated \parallel edge b/m . Crystals either isolated, or grouped in tufts or spheres, radiated within and bristled with angles at surface.

Cleavage: c , b , rather distinct. Fracture uneven. Brittle. $H. = 4-4.5$. $G. = 2.2$. Luster vitreous. Color white, sometimes reddish. Streak uncolored. Translucent to opaque. Optically +. Ax. pl. and $Bx_o \perp b$. The ax. pl. lies in the obtuse angle of $\hat{a} \hat{c}$, and is usually inclined to \hat{a} about 15° to 20° , or 75° to 70° to the normal to c . The position, however, is variable. $2H_{ar} = 71^\circ-84^\circ$.

Comp.—In some cases the formula is $(K_2,Ca)Al_2Si_4O_{12} + 4\frac{1}{2}H_2O =$ Silica 48.8, alumina 20.7, lime 7.6, potash 6.4, water 16.5 = 100. Here $Ca : K_2 = 2 : 1$.

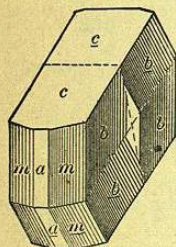
Pyr., etc.—B.B. crumbles and fuses at 3 to a white enamel. Gelatinizes with hydrochloric acid.

Obs.—In translucent crystals in basalt, at the Giant's Causeway, Ireland; at Capo di Bove, near Rome; Aci Castello and elsewhere in Sicily; among the lavas of Mte. Somma; at Stempel, near Marburg; Annerod, near Giessen; in the Kaiserstuhl, with faujasite; Salesl, Bohemia; in the ancient lavas of the Puy-de-Dôme.

HARMOTOME.

Monoclinic. Axes $a : b : c = 0.7031 : 1 : 1.2310$; $\beta = 55^\circ 10'$.

Crystals uniformly cruciform penetration-twins with c as tw. pl.; either (1) simple twins (Fig. 890) or (2) united as fourlings with tw. pl. e . These double twins often have the aspect of a square prism with diagonal pyramid, the latter with characteristic feather-like striations from the medial line. Also in more complex groups analogous to those of phillipsite.



890.

Cleavage: b easy, c less so. Fracture uneven to subconchoidal. Brittle. $H. = 4.5$. $G. = 2.44-2.50$. Luster vitreous. Color white; passing into gray, yellow, red or brown. Streak white. Subtransparent to translucent. Optically +. Ax. pl. and $Bx_a \perp b$. Ax. pl. in obtuse angle $\hat{a} \hat{c}$ and inclined about 65° to \hat{a} and 60° to \hat{c} . $2H_{ar} = 87^\circ 2'$. $\beta = 1.516$.

Comp.—In part $H_2(K_2, Ba)Al_2Si_2O_{10} + 4H_2O$ or $(K_2, Ba)O \cdot Al_2O_3 \cdot 5SiO_2 \cdot 5H_2O = \text{Silica } 47.1, \text{ alumina } 16.0, \text{ baryta } 20.6, \text{ potash } 2.1, \text{ water } 14.1 = 100$.

Pyr., etc.—B.B. whitens, then crumbles and fuses without intumescence at 3.5 to a white translucent glass. Some varieties phosphoresce when heated. Decomposed by hydrochloric acid without gelatinizing.

Obs.—Occurs in basalt and similar eruptive rocks, also phonolite, trachyte; not infrequently on gneiss, and in some metalliferous veins. At Strontian, in Scotland; in a metalliferous vein at Andreasberg in the Harz; at Rudelstadt, Silesia; Oberstein, on agate in siliceous geodes; at Kongsberg, Norway.

In the U. S., in small brown crystals with stilbite on the gneiss of New York island; near Pt. Arthur, L. Superior.

Named from $\alpha\rho\mu\acute{o}\varsigma$, joint, and $\tau\acute{\epsilon}\mu\upsilon\epsilon\iota\nu$, to cut, alluding to the fact that the pyramid (made by the prismatic faces in twinning position) divides parallel to the plane that passes through the terminal edges.

STILBITE. Desmine.

Monoclinic. Axes $a : b : c = 0.7623 : 1 : 1.1940$; $\beta = 50^\circ 50'$.

Crystals uniformly cruciform penetration-twins with tw. pl. c , analogous to phillipsite and harmotome. The apparent form a rhombic pyramid whose faces are in fact formed by the planes m and n ; the vertical faces being then the pinacoids b and c (cf. Figs. 560-562, p. 227). Usually thin tabular $\parallel b$. These compound crystals are often grouped in nearly parallel position, forming sheaf-like aggregates with the side face (b), showing its characteristic pearly luster, often deeply depressed. Also divergent or radiated; sometimes globular and thin lamellar-columnar.

Cleavage: b perfect. Fracture uneven. Brittle. $H. = 3.5-4$. $G. = 2.094-2.205$; 2.161 Haid. Luster vitreous; of b pearly. Color white; occasionally yellow, brown or red, to brick-red. Streak uncolored. Transparent to translucent. Optically —. Ax. pl. $\parallel b$. Bx_a inclined 5° to axis \hat{a} in obtuse angle $\hat{a} \hat{c}$; hence $Bx_a \wedge \hat{c} = -55^\circ 50'$. Ax. angle approx. 52° to 53° (blue glass); $\beta = 1.498$.



891.

Comp.—For most varieties $H_2(Na_2, Ca)Al_2Si_2O_{10} + 4H_2O$ or $(Na_2, Ca)O \cdot Al_2O_3 \cdot 6SiO_2 \cdot 6H_2O = \text{Silica } 57.4, \text{ alumina } 16.3, \text{ lime } 7.7, \text{ soda } 1.4, \text{ water } 17.2 = 100$. Here $Ca : Na_2 = 6 : 1$.

Some kinds show a lower percentage of silica, and these have been called *hypostilbite*.

Pyr., etc.—B.B. exfoliates, swells up, curves into fan-like or vermicular forms, and fuses to a white enamel. $F. = 2-2.5$. Decomposed by hydrochloric acid, without gelatinizing.

Diff.—Characterized by the frequency of radiating or sheaf-like forms; by the pearly luster on the clinopinacoid. Does not gelatinize with acids.

Obs.—Stilbite occurs mostly in cavities in amygdaloidal basalt, and similar rocks. It is also found in some metalliferous veins, and in granite and gneiss.

Abundant on the Färöer; in Iceland; on the Isle of Skye, in amygdaloid; also in Dumbar-tonshire, Scotland, in red crystals; the Giant's Causeway, Ireland; at Andreasberg in the Harz, and Kongsberg and Arendal in Norway, with iron ore; on the Seisser Alp in Tyrol, and at the Pufferloch (*pufferite*); on the granite of Striegau, Silesia. A common mineral in the Deccan trap area of British India.

In North America, sparingly in small crystals at Chester and at the Somerville syenite quarries, Mass.; at Phillipstown, N. Y.; and at Bergen Hill, New Jersey; also at the Michipicoten Islands, Lake Superior. At Partridge Island, Nova Scotia; also at Isle Haute, Digby Neck, Cape Blomidon, etc.

The name *stilbite* is from $\sigma\tau\acute{\iota}\lambda\beta\eta$, luster; and *desmine* from $\delta\acute{\epsilon}\sigma\mu\eta$, a bundle.

Gismondite. Perhaps $CaAl_2Si_4O_{12} + 4H_2O$. In pyramidal crystals, pseudo-tetragonal. $H. = 4.5$. $G. = 2.265$. Colorless or white, bluish white, grayish, reddish. Occurs in the leucitophyre of Mt. Albano, near Rome, at Capodi Bove, and elsewhere, etc.; on the Gorner glacier, near Zermatt; Schlauroth near Görlitz in Silesia; Salesl, Bohemia, etc.

LAUMONTITE. Leonhardite. Caporcianite.

Monoclinic. Axes $a : b : c = 1.1451 : 1 : 0.5906$; $\beta = 68^\circ 46'$.

Twins: tw. pl. a . Common form the prism m ($mm''' = 93^\circ 44'$) with oblique termination e , $\hat{201}$ ($ce = 56^\circ 55'$). Also columnar, radiating and divergent.

Cleavage: b and m very perfect; a imperfect. Fracture uneven. Not very brittle. $H. = 3.5-4$. $G. = 2.25-2.36$. Luster vitreous, inclining to pearly upon the faces of cleavage. Color white, passing into yellow or gray, sometimes red. Streak uncolored. Transparent to translucent; becoming opaque and usually pulverulent on exposure. Optically —. Ax. pl. $\parallel b$. $Bx_a \wedge \hat{c} = +65^\circ$ to 70° . Dispersion large, $\rho < v$; inclined, slight. $2E_r = 52^\circ 24'$.

Comp., Var.— $H_2CaAl_2Si_4O_{14} + 2H_2O = 4H_2O \cdot CaO \cdot Al_2O_3 \cdot 4SiO_2 = \text{Silica } 51.1, \text{ alumina } 21.7, \text{ lime } 11.9, \text{ water } 15.3 = 100$.

Leonhardite is a laumontite which has lost part of its water (to one molecule), and the same is probably true of *caporcianite*. *Schneiderite* is laumontite from the serpentine of Monte Catini, Italy, which has undergone alteration through the action of magnesian solutions.

Pyr., etc.—B.B. swells up and fuses at 2.5-3 to a white enamel. Gelatinizes with hydrochloric acid.

Obs.—Occurs in the cavities of basalt and similar eruptive rocks; also in porphyry and syenite, and occasionally in veins traversing clay slate with calcite.

Its principal localities are the Färöer; Disko in Greenland; in Bohemia, at Eule in clay slate; St. Gothard in Switzerland; the Fassathal; the Kilpatrick hills, near Glasgow; the Hebrides, and the north of Ireland. In India, in the Deccan trap area, at Poona, etc.

Peter's Point, Nova Scotia, affords fine specimens of this species. Found at Phippsburg, Maine. Abundant in many places in the copper veins of Lake Superior in trap, and on I. Royale; on north shore of Lake Superior, between Pigeon Bay and Fond du Lac. Found also at Bergen Hill, N. J.; at the Tilly Foster iron mine, Brewster, N. Y.

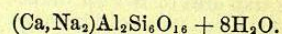
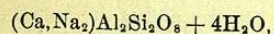
Laubanite. $Ca_2Al_2Si_2O_{10} + 6H_2O$. Resembles stilbite. $H. = 4.5-5$. $G. = 2.23$. Color snow-white. Occurs upon phillipsite in basalt at Lauban, Silesia.

Chabazite Group. Rhombohedral.

	rr'	ϵ
Chabazite $(Ca, Na_2)Al_2Si_4O_{12} + 6H_2O, pt.$	$85^\circ 14'$	1.0860
Gmelinite $(Na_2Ca)Al_2Si_4O_{12} + 6H_2O$	$68^\circ 8'$	0.7345 or $\frac{2}{3}\epsilon = 1.1017$
Levynite $CaAl_2Si_3O_{10} + 5H_2O$	$73^\circ 56'$	0.8357 $\frac{4}{3}\epsilon = 1.1143$

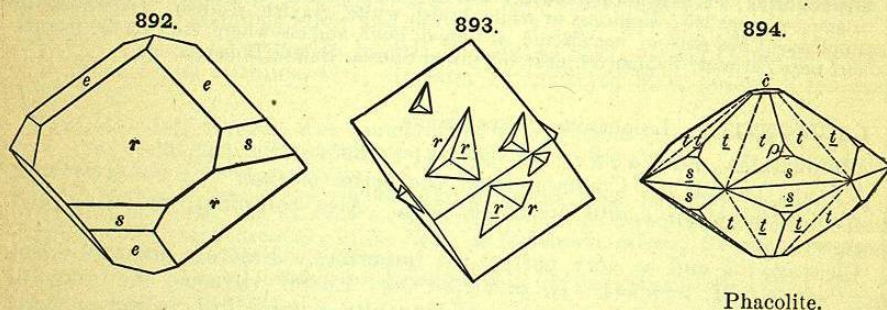
The Chabazite Group includes these three rhombohedral species. The fundamental rhombohedrons have different angles, but, as shown in the axial ratios above, they are closely related, since, taking the rhombohedron of Chabazite as the basis, that of Gmelinite has the symbol $\frac{2}{3}(20\bar{2}3)$ and of Levynite $\frac{4}{3}(30\bar{3}4)$.

The variation in composition often observed in the first two species has led to the rather plausible hypothesis that they are to be viewed as isomorphous mixtures of the feldspar-like compounds



CHABAZITE.

Rhombohedral. Axis $\epsilon = 1.0860$; $0001 \wedge 10\bar{1}1 = 51^\circ 25\frac{1}{2}'$.



Twins: (1) tw. axis ϵ , penetration-twins common. (2) Tw. pl. r , contact-twins, rare. Form commonly the simple rhombohedron varying little in angle from a cube ($rr' = 85^\circ 14'$); also r and e ($01\bar{1}2$), ($ee' = 54^\circ 47'$). Also in complex twins (Fig. 348, p. 118). Also amorphous.

Cleavage: r rather distinct. Fracture uneven. Brittle. H. = 4-5. G. = 2.08-2.16. Luster vitreous. Color white, flesh-red; streak uncolored. Transparent to translucent. Optically -; also + (Andreasberg, also haydenite). Birefringence low. The interference-figure usually confused; sometimes distinctly biaxial; basal sections then divided into sharply defined sectors with different optical orientation. These anomalous optical characters probably secondary and chiefly conditioned by the variation in the amount of water present. Mean refractive index 1.5.

Var.—1. *Ordinary*. The most common form is the fundamental rhombohedron, in which the angle is so near 90° that the crystals were at first mistaken for cubes. *Acadialite*, from Nova Scotia (*Acadia* of the French of last century), is a reddish chabazite; sometimes nearly colorless. *Haydenite* is a yellowish variety in small crystals from Jones's Falls, near Baltimore, Md. 2. *Phacolite* is a colorless variety occurring in twins of hexagonal form (Fig. 894), and lenticular in shape (whence the name, from $\phi\alpha\kappa\acute{o}\varsigma$, a bean); the original was from Leipa in Bohemia. Here belongs also *hershelite* (seebachite) from Richmond, Victoria; the composite twins of great variety and beauty. Probably also the original hershelite from Sicily. It occurs in flat, almost tabular, hexagonal prisms with rounded terminations divided into six sectors.

Comp.—Somewhat uncertain, since a rather wide variation is often noted even among specimens from the same locality. The ratio of $(Ca, Na_2, K_2) : Al$ is nearly constant ($= 1 : 1$), but of $Al_2 : Si$ varies from $1 : 3$ to $1 : 5$; the water also increases with the increase in silica. The composition usually corresponds to $(Ca, Na_2)Al_2Si_4O_{12} + 6H_2O$, which, if calcium alone is present, requires: Silica 47.4, alumina 20.2, lime 11.1, water 21.3 = 100. If $Ca : Na_2 = 1 : 1$, the percentage composition is: Silica 47.2, alumina 20.0, lime 5.5, soda 6.1, water 21.2 = 100.

Potassium is present in small amount, also, sometimes, barium and strontium. Streng explains the supposed facts most satisfactorily by the hypothesis that the members of the group are isomorphous mixtures analogous to the feldspars, as noted on p. 453.

Pyr., etc.—B.B. intumesces and fuses to a blebby glass, nearly opaque. Decomposed by hydrochloric acid, with separation of slimy silica.

Diff.—Characterized by rhombohedral form (resembling a cube). It is harder than calcite and does not effervesce with acid; unlike calcite and fluorite in cleavage; fuses B.B. with intumescence unlike analcite.

Obs.—Occurs mostly in basaltic rocks, and occasionally in gneiss, syenite, mica schist, hornblende schist. Occurs at the Färöer, Greenland, and Iceland, associated with chlorite and stilbite; at Aussig in Bohemia; at Oberstein, with harmotome; at Annerod, near Giessen; at the Giant's Causeway, Antrim, Renfrewshire; Isle of Skye, etc.

In the U. S., in syenite at Somerville, Mass.; at Bergen Hill, N. J., in small crystals; at Jones's Falls near Baltimore (*haydenite*). In Nova Scotia, wine-yellow or flesh-red (the last the *acadialite*), associated with heulandite, analcite and calcite, at Five Islands, Swan's Creek, Digby Neck, etc.

The name *Chabazite* is from $\chi\alpha\beta\alpha\zeta\iota\omicron\varsigma$, an ancient name of a stone.

GMELINITE.

Rhombohedral. Axis $\epsilon = 0.7345$.

Crystals usually hexagonal in aspect; sometimes ρ ($01\bar{1}1$) smaller than r ($10\bar{1}1$), and habit rhombohedral; $rr' = 68^\circ 8'$, $r\rho = 37^\circ 44'$.

Cleavage: m easy; c sometimes distinct. Fracture uneven. Brittle. H. = 4.5. G. = 2.04-2.17. Luster vitreous. Colorless, yellowish white, greenish white, reddish white, flesh-red. Transparent to translucent. Optically positive, Cyprus, also negative, Andreasberg, the Vicentine, and Glenarm, N. Scotia. Birefringence very low. Interference-figure often disturbed, and basal sections divided optically into section analogous to chabazite.

Comp.—In part $(Na_2, Ca)Al_2Si_4O_{12} + 6H_2O$. If sodium alone is present this requires: Silica 46.9, alumina 19.9, soda 12.1, water 21.1 = 100. See also p. 458.

Pyr., etc.—B.B. fuses easily (F. = 2.5-3) to a white enamel. Decomposed by hydrochloric acid with separation of silica.

Obs.—Occurs in flesh-red crystals in amygdaloidal rocks at Montecchio Maggiore; at Andreasberg; in Transylvania; Antrim, Ireland; Talisker in Skye, in large colorless crystals.

In the United States in fine white crystals at Bergen Hill, N. J. At Cape Blomidon, Nova Scotia (*lederite*); also at Two Islands and Five Islands.

Named *Gmelinite* after Prof. Ch. Gmelin of Tübingen (1792-1860).

Levynite. $CaAl_2Si_3O_{10} + 5H_2O$. In rhombohedral crystals. H. = 4-4.5. G. = 2.09-2.16. Colorless, white, grayish, reddish, yellowish. Found at Glenarm and at Island

