URANINITE. Cleveite. Bröggerite. Nivenite. Pitchblende.

Isometric. In octahedrons (*o*), also with dodecahedral faces (*d*); less often in cubes with *o* and *d*. Crystals rare. Usually massive and botryoidal; also in grains; structure sometimes columnar, or curved lamellar.

Fracture conchoidal to uneven. Brittle. H. = 5·5. G. = 9·0 to 9·7 of crystals; of massive altered forms from 6·4 upwards. Luster submetallic, to greasy or pitch-like, and dull. Color grayish, greenish, brownish, velvet-black. Streak brownish black, grayish, olive-green, a little shining. Opaque.

Comp. — A uranate of uranyl, lead, usually thorium (or zirconium), often the metals of the lanthanum and yttrium groups; also containing the gases nitrogen, helium and argon, in varying amounts up to 2·6 p. c. Calcium and water (essential?) are present in small quantities; iron also, but only as an impurity. The relation between the bases varies widely and no definite formula can be given. Radium was first discovered in this mineral and it has been shown that it and the helium present are products of the breaking down of the uranium.

Var. — The minerals provisionally included under the name uraninite are as follows:

1. *Crystallized. Uranniobite* from Norway. In crystals, usually octahedral, with G. varying for the most part from 9·0 to 9·7; occurs as an original constituent of coarse granites. The variety from Branchville, Conn., which is as free from alteration as any yet examined, contains chiefly UO_2 with a relatively small amount of UO_3. Thoria is prominent, while the earths of the lanthanum and yttrium groups are only sparingly represented.

Bröggerite, as analyzed by Hillebrand, gives the oxygen ratio of UO_3 to other bases of about 1 : 1; it occurs in octahedral crystals, also with *d* (110) and *a* (100). G. = 9·03.

Cleveite and *nivenite* contain UO_3 in larger amount than the other varieties mentioned, and are characterized by containing about 10 p. c. of the yttrium earths. Cleveite is a variety from the Arendal, Norway, region occurring in cubic crystals modified by the dodecahedron and octahedron. G. = 7·49. It is particularly rich in the gas helium. Nivenite occurs massive, with indistinct crystallization. Color velvet-black. H. = 5·5. G. = 8·01. It is more soluble than other kinds of uraninite, being completely decomposed by the action for one hour of very dilute sulphuric acid at 100°.

2. *Massive*, probably amorphous. Pitchblende. Contains no thoria; the rare earths also absent. Water is prominent and the specific gravity is much lower, in some cases not above 6·5; these last differences are doubtless largely due to alteration. Here belong the kinds of pitchblende which occur in metalliferous veins, with sulphides of silver, lead, cobalt, nickel, iron, zinc, copper, as that from Johanngeorgenstadt, Germany; Přibram, Bohemia, etc.; probably also that from Black Hawk, Col.

Pyr., etc. — B.B. infusible, or only slightly rounded on the edges, sometimes coloring the outer flame green (copper). With borax and salt of phosphorus gives a yellow bead in O.F., becoming green in R.F. (uranium). With soda on charcoal gives a coating of lead oxide, and frequently the odor of arsenic. Many specimens give reactions for sulphur and arsenic in the open tube. Soluble in nitric and sulphuric acids; the solubility differs widely in different varieties, being greater in those kinds containing the rare earths. Not attractable by the magnet. Strongly radioactive.

Obs. As noted above, uraninite occurs either as a primary constituent of granitic rocks or as a secondary mineral with ores of silver, lead, copper, etc. Under the latter condition it is found in Germany at Johanngeorgenstadt, Marienberg, and Schneeberg in Saxony; in Bohemia at Joachimstal and Přibram; in Hungary at Rezbánya. Occurs in Norway in pegmatitic veins at several points near Moss, viz.: Anneröd (*bröggerite*), Elvestad, etc., also near Arendal at the Garta feldspar quarry (*cleveite*), associated with orthite, fergusonite, thorite, etc.

In the United States, at the Middletown feldspar quarry, Conn., in large octahedrons, rare; at Hale's quarry in Glastonbury, a few miles N.E. of Middletown. At Branchville, Conn., in a pegmatite vein, as small octahedral crystals, embedded in albite. In N. C., at the Flat Rock mine and other mica mines in Mitchell Co., rather abundant, but usually altered, in part or entirely, to gummite and uranophane; the crystals are sometimes an inch or more across and cubic in habit. In S. C., at Marietta. In Texas, at the gadolinite locality in Llano Co. (*nivenite*). In large quantities at Black Hawk, near Central City, Col. Rather abundant in the Bald Mountain district, Black Hills, S. D. Also with monazite, etc., at the Villeneuve mica veins, Ottawa Co., Quebec, Canada.

Use. — As a source of uranium and of radium salts.

Gummite. An alteration-product of uraninite of doubtful composition. In rounded or flattened pieces, looking much like gum. G. = 3·9–4·20. Luster greasy. Color reddish yellow to orange-red, reddish brown. $n = 1{\cdot}61$. From Johanngeorgenstadt, Germany, also Mitchell Co., N. C.

YTTROGUMMITE. Occurs with cleveite as a decomposition-product.

THOROGUMMITE. Occurs with fergusonite, cyrtolite, and other species at the gadolinite locality in Llano Co., Texas.

Thorianite. Chiefly thorium and uranium oxides. Isometric, cubic habit. G. = 9·3. Color black: Radioactive. Obtained from gem gravels of Balangoda, Ceylon. Also noted from Province of Betroka, Madagascar.

Uranosphærite. $(BiO)_2U_2O_7.3H_2O$. In half-globular aggregated forms. Color orange-yellow, brick-red. From near Schneeberg, Saxony.