In describing this peculiar aggregate, the writer is somewhat at a loss to account for its structure. Possibly the deposition of the barite, even tho not going on today, continued until the present land surface was attained, and the mineral was deposited on root fibers projecting down from the surface to the cavernous parts of the veins where the specimens were found. The formation of these peculiar aggregates would then find its analogy in the crystallization of rock-candy on threads suspended in saturated solutions of sugar. While the exact depth at which the specimens were obtained is not certain, it was probably less than 15 meters, as at the time of the writer's visit little work had been done below that depth.

MANGANOTANTALITE FROM AMELIA, VIRGINIA

O. IVAN LEE AND EDGAR T. WHERRY

Jersey City, N. J., and Washington, D. C.

A deep red "columbite" from Amelia (at that time called Amelia Court House) was analyzed by Dunnington[1] many years ago and shown to contain manganese in excess over iron, and tantalum slightly in excess over columbium; it should therefore be classed as a manganotantalite. That it can still be obtained on the dumps at the locality was noted by Mr. Gordon[2] in 1918, and in the spring of the present year one of us (O. I. L.) found there a mass of bladed albite containing an unusually large crystal of the manganotantalite. It is about 7 mm. thick, and of irregular outline, tapering from about 30 to 15 mm., with small marginal portions showing distinct crystal faces. One of these, which was practically a separate crystal 3 x 2 x 1 mm. in diameter, proved to be brilliant enough for crystallographic measurement, as described below.

As manganotantalite is not a common mineral, it seems worth while to describe the physical properties of this specimen in some detail. The color varies from reddish brown to black, but in thin splinters is ruby red to orange brown, and where fractures traverse the mass it lights up in a bright light with intense red flashes like rutile or pyrargyrite. The streak is correspondingly red brown. The luster is metallic to adamantine. Hardness

[1] *Am. Chem. J.*, **4**, 138–139, 1882.
[2] *Am. Min.*, **3**, 28, 1918.

= 6–6.5, rather brittle. Sp. gr. = 6.50. It is not at all magnetic, either before or after heating. Before the blowpipe it is infusible, readily becoming incandescent. In the borax bead, hot, is yellow brown to violet brown; cold, violet rose. It colors a sodium carbonate bead olive green, and when this bead is dissolved in nitric acid, sodium bismuthate yields an intense violet color, indicating abundant manganese.

The crystal was measured (by E. T. W.) on a Goldschmidt two-circle goniometer and found to have the development shown in the figure. There appear to be several forms new to columbite present, but they are too minute to yield definite reflections; these are indicated by an asterisk (*) in the angle table. A noteworthy feature is the different development of forms shown at opposite ends of the *a* axis, the crystal being ecto-hemimorphic according to the nomenclature of mimetic relations recently proposed.[3] It thus resembles stibiotantalite, which is, however, endo-hemimorphic.[4]

The angular measurements obtainable on the more prominent forms proved to be in many cases certain to ± 2′, so that the axial ratio could be calculated with a considerable degree of accuracy. The orientation adopted is that of Schrauf and of Goldschmidt rather than that of Dana, since the former gives the forms simpler indices, and also brings out the isomorphism between columbite and other rare-metal minerals such as euxenite, polycrase, and the above mentioned stibiotantalite. The axial ratios, on this basis, which have been determined on material of fairly well established composition, are as follows:

TABLE 1

RELATIONS BETWEEN COMPOSITION AND AXIAL RATIO IN COLUMBITE

Locality	Observer	Ta_2O_5	MnO	$a:b:c$
Standish, Maine......	E. S. Dana ...	9	4	0.4023:1:0.3580
Haddam, Ct..........	J. D. Dana ...	30	5	0.4020:1:0.3529
Amelia, Va...........	E. T. W.	53	8	0.4017:1:0.3562
Sanarka, Russia.......	Arzruni.......	80	14	0.4014:1:0.3505

There is accordingly in columbite a definite tho small decrease in the *a* axis (or increase in the *b* axis), with increasing Ta content, apparently independent of the Mn. On the other

[3] *J. Wash. Acad. Sci.*, **9**, 153–157, 1919.

[4] Penfield and Ford, *Am. J. Sci.*, [4], **22**, 61, 1906.

hand the c axis appears to be less definitely related to the composition, and perhaps changes in it are the result of balance between effects due to increase in Ta and increase in Mn.

The results of all the measurements are combined in the following angle-table; the formulas used for calculating angles are as follows: For all forms, $\cot \varphi = k/h \cdot a$. For front domes (macrodomes), $\tan \rho = h/l \cdot c/a$; for side domes (brachydomes), $\tan \rho = k/l \cdot c$; for pyramids, $\tan \rho = k/l \cdot c/\cos \varphi$.

TABLE 2

ANGLE TABLE FOR MANGANOTANTALITE FROM AMELIA, VA.

$a : b : c = 0.4017 : 1 : 0.3562$

PROMINENT FORMS

No., Letter	Symbols		Description	Observed		Calculated	
	Gdt.	Mill.		ϕ	ρ	ϕ	ρ
1 c	0	001	Large but dull......	....	0° 00′	....	0° 00′
2 b	0 ∞	010	Dominant form.....	0° 00′	90 00	0° 00′	90 00
3 a	∞0	100	Well developed.....	90 00	"	90 00	"
4 g	∞	110	Striations on a......	68 ±	"	68 07	"
5 m	∞3	130	Dominant prism....	39 40	"	39 41	"
6 z	∞5	150	Narrow, bright.....	26 30	"	26 28	"
7 k	01	011	Broad but rough....	0 00	20 ±	0 00	19 36
8 o	13	131	Narrow but definite.	39 40	54 ±	39 41	54 14
9 u	1	111	Chief termination...	68 08	43 42	68 07	43 42
10 s	2	221	Well developed.....	"	62 20	"	62 23
11 n	21	211	Well developed.....	78 44	61 04	78 39	61 05
			MORE OR LESS DOUBTFUL FORMS				
12 G*	∞ 2	120	Line face, rear only..	51° ±	90° 00′	51° 13′	90° 00′
13 M*	∞ $\frac{5}{2}$	250	Line face, front only.	45 ±	"	44 52	"
14 Z*	∞ 4	140	Line face, front only.	32 ±	"	31 54	"
15 d	∞ 7	170	Line face..........	19 ±	"	19 35	"
16 D*	∞ 9	190	Line face..........	15 ±	"	15 28	"
17 B*	∞13	1.13.0	Line face..........	11 ±	"	10 50	"
18 l	0$\frac{1}{2}$	012	Rough, curved......	0 00	10 00	0 00	10 06
19 i	10	101	Line face, front only.	90 00	42 ±	90 00	41 34
20 I*	$\frac{3}{2}$0	302	Line face, front only.	"	53 ±	"	53 04
21 e	20	201	Curved face........	"	61 ±	"	60 35
22 N*	2$\frac{3}{2}$	432	Line face..........	73 ±	62 ±	73 14	61 38
23 U*	$\frac{4}{3}$	443	Line face..........	68 ±	52 ±	68 07	51 52
24 β	12	121	Line face, back only.	51 ±	49 ±	51 13	48 41
25 t	24	241	Line face, back only.	"	67 ±	"	66 16
26 X*	26	261	Line face, front only	40 ±	70 ±	39 41	70 12

* Possible new forms.

With reference to the forms listed as more or less doubtful, it may be stated that the majority of them are narrow bevelings of the edges of larger forms, and can hardly be regarded as definite faces; nevertheless there is a distinct maximum shown in the reflections of light from them at the angle given in each case, and as this angle agrees with a definite and in general rather simple form, they are at least worth recording as possible forms.

The development of the forms is shown in orthographic and clinographic projection in Fig. 1. The relative sizes of the faces in the sketch are similar to the relations actually existing on the crystal — the usual idealization having been avoided — except that the width of some of the minor forms has been exaggerated somewhat to show them better. How badly the crystal is distorted is thus clearly shown, the system being, as far as habit goes, ecto-triclinic; the especially marked ecto-hemimorphic character along axis a is also well brought out.

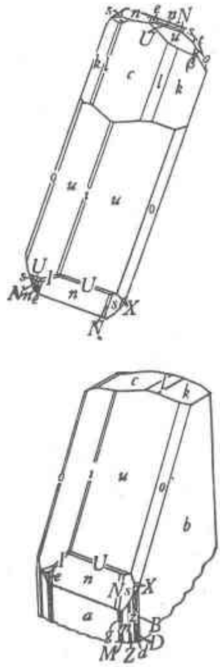

FIG. 1. Manganotantalite, Amelia, Va.

AMBER AND ITS ORIGIN

GEORGE F. BLACK
New York Public Library

Amber is a fossil resin, derived from one or more extinct varieties of pine which flourished in great abundance during the Oligocene epoch. The strata of this formation, which belongs to the earlier part of the Tertiary Period, are particularly well developed in northern Germany, where they occupy large more or less detached areas or basins, with local lithological and paleontological variations. The basin which contains the peninsula of Samland, in East Prussia, is the great amber mine of the world, and the only place where the geological conditions admit of an advantageous study.

To the researches of Professor Zaddach, of Königsberg, we