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.

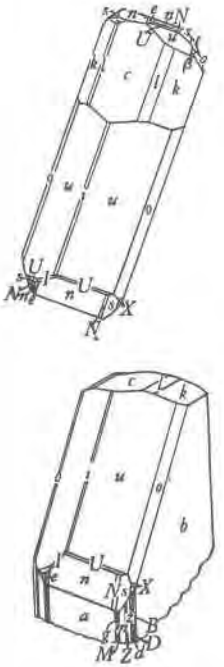

FIG. 1. Manganotantalite, Amelia, Va.

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

owe most of the knowledge we possess of the formations in this locality. He thoroly explored the strand-hills forming the peninsula, and, taking a section of the cliffs where the geological structure is exposed, he found that wherever the Tertiary formation crops out it always comprises two different deposits. The underlying one consists of thick beds of glauconitic sand, which sometimes attain a height of 20 meters above the sea level. Upon this rest beds of lignite or brown coal, from 20 to 30 meters or more in thickness. Above this is a drift deposit of marl and sand with erratic blocks. All these deposits contain amber, tho in the two upper ones it occurs only in isolated pieces. Thruout the lower glauconitic or greensand bed, on the contrary, it is distributed evenly and in great abundance. In the lower part of the greensand is a dark clayey-sandy vein, known as the *blue-earth*, which is the great treasure chamber of the amber. It occurs here so plentifully that an area of 10 square meters yields several thousand kilograms of the precious material. This layer of blue-earth varies from 1 to 7 meters in thickness, and in it are found, in company with the amber, remains of wood, numerous well-preserved fossils of lower Oligocene age, marine mollusca, sea urchins, teeth of sharks, saurians, etc. The greensand also contains numerous pebbles or pieces of compact stone, which is evidently its parent rock, as it is composed of exactly similar granules of quartz bound together by a marly cement. The amber earth also abounds in fragments of chalk-marl containing Cretaceous fossils identical with those found in the Cretaceous deposits of Bornholm. This proves that the Oligocene glauconitic sand has been made from the greensand of the Cretaceous formation, and that the trees yielding the amber resin must have grown upon the sand of the early Oligocene formation which then formed the shores of the sea or estuary where the lower division of the Tertiary accumulated. Zaddach assumes that at that time the coast sank slowly, and the forest soil being washed by the waves, the amber was carried into the sea.

The deposit stretches along the peninsula from Kraxtepellen to Rantau, and Zaddach's researches showed that in many places it sinks to depths inaccessible to the miners' shafts and that it also runs out below the sea level. It was discovered within recent years that this undersea stratum extended to a distance of some 30 kilometers, and hence, as Runge points out, we have an

explanation of the presence of amber in the Baltic. Large quantities of this submarine deposit are constantly being washed ashore by the waves and tide, particularly after the heavy storms of November and December.

At the time when the amber trees grew, Europe seems to have existed as a great archipelago. Some of the fairest countries we know were at that time covered by the sea, which spread over the southeast of England, a great part of France, Belgium, Holland, Holstein, northern Germany, Bavaria, Hungary, and Italy. A vast continent existed in the north, however, which, it is believed, embraced not only the present Norway and Sweden and a large part of Russia, but also extended into the Arctic zone beyond Spitzbergen, where it was connected with Greenland and North America. Prof. Boyd Dawkins (Early Man in Britain) says that the existence of such a continent is the only satisfactory explanation of the presence in Europe in the Eocene and Miocene ages of the Tertiary Period of plants and animals whose nearest allies belonged to North America. To the south and eastward this continent was joined with Iceland and the British Isles and northwest France.

(To be continued)

SIR WILLIAM CROOKES

GEORGE F. KUNZ
New York City

The death of the great physicist, Sir William Crookes, on April 5, 1919, at the ripe old age of eighty-seven years, removes from our midst one of the most noted of British scientists. His long life, spent in the cause of scientific progress, enabled him to accomplish much highly important work in various directions, so that his memory will endure as long as the history of science.

From an autobiographical sketch which he prepared in his own hand-writing and presented to the writer, the following account of his life has been prepared.

He was born in London, June 17, 1832, and became, in 1848, a pupil of the noted chemist, Dr. Hofmann, at the Royal College of Chemistry. A year later, when but seventeen, he won the Ashburton Scholarship, and after studying two years longer,