AMBER AND ITS ORIGIN

GEORGE F. BLACK
New York Public Library

(*Continued from page 85*)

Thru repeated upheavals of the sea-bottom a broad belt of land was formed in the center of the enclosed sea which embraced the islands of Rügen and Bornholm, and extended over Jutland, the Danish islands, and the whole space now occupied by the Baltic. This newly-formed land was separated from Central Germany and the rest of Europe by a great sea-arm sometimes called the "North German Tertiary sea," one of whose bays or gulfs covered East and West Prussia and Pomerania. On the borders of this northern Atlantis, where the waters of the Baltic now roll, a rich and abundant vegetation was developed, and here, in the midst of luxuriant forests extending into the Polar area, grew the trees which produced our amber.

In early Tertiary times the climate of northern Europe, even within the Arctic circle, was subtropical or, at any rate, warm and equable, admitting the growth in the far north of mighty forests of bald cypress (*Taxodium*), the undoubted ancestors of the trees (*Taxodium distichum* Rich., sp.) which lend such a charm to the marshy lands of Louisiana, Texas, and Mexico. In Spitzbergen (78° N. Lat.) flourished the American incense cedar (*Libocedrus decurrens*) and the deep-green *Sequoia*, analogous to the gigantic redwood (*Sequoia sempervirens* Lamb.). This remarkable tree, which is now restricted to a narrow district of California, grew in the Miocene period all over Europe and the northern circumpolar area, together with its near relative, the bluish-green *Glyptostrobus*, a cypress now only met with in China and Japan (Heer, Primitive World of Switzerland, vol. 1, p. 325). In Greenland grew the large-leafed and fragrant magnolia, the date-palm tree, several species of oak, pine, poplar, and walnut, *Salisburia*, *Planera*, and the elegant *Thujopsis*—now indigenous only to eastern Asia—while the vine, the flowering tulip tree, the elm, and the mammoth redwood tree (*Sequoia gigantea* Lindl.) flourished in Iceland. It will have been observed from this enumeration that in the amber forest trees grew side by side whose living representatives are now scattered far and wide thru all climates from the tropics to far northern latitudes.

The amber forests, in which a wealth of species prevailed, such as never has been known since, consisted largely of coniferous trees. Professor Göppert distinguished thirty species of pine, to which Menge has added another, the *Taxoxylum electrochyton*. This great variety of resiniferous trees leads to the conclusion that amber is the product of not one but several species of extinct conifers; the most common being a "tree of life," closely resembling the American *Thuja occidentalis*, ten twigs of which, says Menge, occur in amber to one leaf or blossom of any leaf-bearing tree, and five to one of any other needle-leaved tree. Of leaf-bearing trees, preserved for us by the amber, may be mentioned several species of oak, willow, beech, a birch, an alder, and a poplar, as well as leaves and blossoms of the camphor tree (*Cinnamomum*), whose living congeners now grow in China, Japan, Formosa, and Cochin-China.

After leaving behind such opulent traces of former existence the amber forests have vanished—not one remains on the face of the earth. The trees have not only disappeared, but beyond the amber itself they have left few substantial indications of their former existence. True it is that in the blue earth of Samland we find along with the amber ligneous remains, but they are mostly fragments and small boughs. These fragments, which bear visible signs, like the amber itself, of having been rolled about by water, are such as lie about in every forest. That they belong to the amber forests is indubitable, for among them may be seen numerous small boughs of the amber-bearing trees, entirely filled with resin. In connection with all geological strata, we find accumulated the remains of the corresponding vegetation, and why do we not find the remains of the amber forests? The few fragments that have been found do not in the remotest degree represent the mass of wood they must have possessed in order to produce the quantities of resin we know to exist in the form of amber. Runge, in 1868, estimated that the forests yielded 100 million hundredweights of resin; a mass that would make a cube of which each side would measure about 160 meters, or roughly 5 million cubic meters of amber (Der Bernstein in Ostpreussen, p. 56). At present no satisfactory reason is forthcoming to explain the entire absence of substantial remains of these immense forests.

Practically every specimen of wood enclosed in amber displays the characteristic properties peculiar to conifers. Un-

fortunately this in itself is not sufficient to determine the species with certainty. Leaves and blossoms are also required, and a specimen of amber containing both the wood and leaves belonging to it has not yet been found. Hence the difficulty of deciding the question whether amber belongs to the genus *Pinus* or *Picea*. Göppert's designation, "*Pinites succinifer*," which leaves it indefinite whether it is a pine or a fir-tree, is, therefore, generally accepted. Göppert determined no less than 163 species of plants found in amber, which he classified into 64 genera and 24 families.

The amber resin appears to have been shed in very different stages of liquidity. Sometimes it was glutinous, sometimes it fell in drops from the branches, thus yielding the "drop" and "icicle" forms. These drops vary in size from that of a pea to that of a medium-sized orange. Others have dropped from the trees while in a more fluid state and are flattened out and show the impression caused by falling. Sometimes, again, the drop fell on leaves, the form of which it preserves with remarkable delicacy. From its abundance it is evident that the trees must have been as productive as the present day *Dammara australis* of New Zealand, the twigs and branches of which are so laden with white resin as to have the appearance of being covered with icicles. The largest known mass of amber is in the Museum in Berlin; it weighs over 8 kilograms and is said to be valued at $30,000.

(*To be continued*)

NOTES AND NEWS

Mr. William F. Foshag, a recent graduate of the University of California, has been appointed assistant curator of the Division of Mineralogy and Petrology, U. S. National Museum.

Mr. Whitlock calls our attention to an error in his paper on "Pyrite crystals from Broadway and 207th Street, New York City," published in our April number. The form described as the trapezohedron (766) is really another form, its correct symbol being (655). A change should be made accordingly both in the text and in the table on page 31; and on page 32, in the third line of the table, in the angle column the same change should be made, while in the calculated angle column the value should be 49° 41′.

We take this occasion to remind subscribers whose subscriptions expired with the June number that we will greatly appreciate it if they will send in their renewals promptly, without waiting to receive bills.