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AMBER

ITS PHYSICAL PROPERTIES AND GEOLOGICAL OCCURRENCE

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CARVED AMBER.

Amber

Its Physical Properties and Geological Occurrence

Amber is a fossil gum of trees of the genus *Pinus*. Normally it is yellow in color, varying in shade, however, from pale yellow to dark brown, and occasionally being whitish, greenish, or bluish. Very rarely, amber of a deeper green or blue color occurs. Such amber is always turbid or cloudy, the turbidity being due to the presence of numerous air-bubbles. The modification produced in rays of light by passing through the bubbles creates these colors.

In transparency all graduations may occur in amber, between that which is perfectly clear and that which is wholly opaque. Of the cloudy forms, several varieties are distinguished in trade, the most important being "bastard," "bony," or "osseous," and "frothy" amber. Bastard amber is a somewhat turbid form of amber, but takes a good polish; bony amber is opaque, relatively soft, and does not polish well.

The hardness of amber is 2 to 2.5. It therefore cannot be scratched by the finger nail, but easily and deeply with a knife. It is also brittle. Its specific gravity is scarcely greater than that of water, the exact specific weight being 1.05-1.096. It thus almost floats in water, especially sea-water. On being heated amber becomes soft at 150° C., and at 250° to 300° melts. It also burns readily and at a low temperature, a fact which has given rise to the name of *Bernstein*, by which the Germans know it, and to one of the Latin names for it, *lapis ardens*. Rubbed with a cloth



FISHERMEN FISHING FOR AMBER
FROM AN OLD DRAWING PUBLISHED IN 1677

it becomes strongly electric, attracting bits of paper, etc. Our word "electricity" comes from the Greek word *elektron*, which was their name for amber. Amber was one of the first minerals in which electrical properties were noted. Being a poor conductor of heat, amber feels warm rather than cold in the hand. In this respect it differs from most minerals. It is attacked but slowly by alcohol, ether, and similar solvents, a property by which it may be distinguished from most modern gums and some other fossil ones. In composition it is an oxygenated hydrocarbon, the percentage of these elements being in an average sample: Carbon: 78.94, Hydrogen: 10.53, and Oxygen: 10.53. The mineralogical name of amber is succinite, a word delivered from the Latin *succinum* ("amber"). One of its constituents is the organic acid called succinic acid.

The present source of most of the amber of commerce is the Prussian coast of the Baltic Sea, between Memel and Dantzig, although it is found as far west as Schleswig-Holstein and the Frisian Islands, and even occasionally on the shores of Denmark, Norway, and Sweden. From time immemorial pieces of amber have been cast upon the shore in these localities, and their collection and sale have afforded a livelihood to coast-dwellers. Such amber is called "sea stone," or "sea amber," and is superior to that obtained by mining, since it is usually of uniform quality, and not discolored and altered on the surface. Owing to its lightness, this amber is often found entangled in seaweed, and the collectors are accustomed to draw in masses of seaweed and search them for amber. Amber so obtained is called "scoopstone," because nets are sometimes used to gather in the seaweed. In marshy regions men on horseback, called amber riders, follow the outgoing tide and seek the yellow gum. It is also searched for by divers to some extent.

From the earliest times the title to this amber has vested in the State, and either its collecting has been done under State control, or, a tax is levied upon it. This tax is levied both on the amber that is mined, and that obtained from the sea, and brings a considerable revenue.

Up to 1860 the methods of procuring amber were largely confined to obtaining it in the manner above noted. As it was evident, however, that the sea amber came from strata underneath, and that if, either by dredging or mining, these strata could be reached, a much larger supply could be obtained, exploration was carried on by mining methods with successful results, and the principal amount of the amber of commerce is now so obtained. The strata, as shown in the mines of Sammland, the rectangular peninsula of East Prussia, where most of the mining is carried on, are: First, a bed of sand; below this a layer of lignite with sand and clay; and following this a stratum of green sand, fifty or sixty feet in thickness. While all these strata contain scattered pieces of amber, it is at the bottom of the green sand layer that the amber chiefly occurs, in a stratum four or five feet thick, and of very dark color. It is called the "blue earth." This stratum is of Tertiary age, and there can be no doubt that its amber represents gum fallen from pines which grew at this period, and whose woody remains are represented to some extent in the layer of lignite. It is probably true, also, that amber has been collected here from older deposits.

One of the most interesting proofs of the vegetable origin of amber is the occurrence in it of insects, sometimes with a leg or wing separated from the body, showing a struggle to escape. It is obvious that the insect must have alighted upon the gum when that was in a viscid state and was held until covered by later exudations. These insects include spiders, flies, ants,



INSECTS IN AMBER.

and beetles, and even feathers of birds have been found thus preserved. Remains of plants, such as needles of conifers, oak leaves and other leaves, buds and blossoms, are also found preserved in amber. Indeed the variety of forms preserved in this way is so large as to indicate that the forests which produced the amber had a rich flora and fauna. As compared with modern forms, these plants and animals are found to belong to existing genera, but the species, with few exceptions, are peculiar to the region and period. Through the remains thus preserved, the amber deposits have furnished important contributions to our knowledge of Tertiary life.

Inasmuch as pieces of amber bearing such remains are valued more highly than ordinary amber, unscrupulous persons have at times found profitable employment in boring cavities into pieces of amber, introducing insects or other small animals into them, and having then filled up the hole with some modern gum of the same color, or fused the opening over, have placed them upon the market. It is probable that all amphibious or marine animals seen in amber have been introduced this way.

Amber, often of greater beauty than that from Prussia, comes from Sicily. The beauty of the Sicilian amber consists in the variety of colors it displays, blood-red and chrysolite-green being not uncommon; and in the fact that these often exhibit a fluorescence, glowing within with a light of different color from the exterior. Chemically the Sicilian amber is not the same as the Prussian, as it contains less succinic acid, and it is somewhat more soluble. In other respects it is not essentially different. It occurs chiefly on the eastern and southeastern coasts of the Sicilian islands, being washed up in a manner very similar to the Prussian amber.

Amber has been found in several places in the United States, but little has proved of commercial value. It is mostly connected with the Cretaceous glauconitic, or green sand deposits of New Jersey, fragments being frequently found there. This amber is of yellow color, but not so compact or lustrous as foreign amber. Amber has also been reported from the marls of North Carolina, some of the coal-beds of Wyoming, and in connection with lignite in Alaska. In the latter region the natives are said to carve it into rude beads.

Besides Prussia and Sicily, amber occurs in small quantities in several other countries of Europe, such as near Basle, in Switzerland; near Paris, in France; and near London, in England. It is also found in many parts of Asia, these localities being a source of supply to the Asiatic countries, such as China and India. Occasionally amber is obtained from Mexico which has the beautiful fluorescence of the Sicilian article, but the exact locality whence it comes is in doubt.

Besides the counterfeiting of inclusions of amber there are several substitutes for the gum itself. These are chiefly celluloid and glass, the former being dangerous if used in the manufacture of smoker's articles, on account of its inflammatory character. Celluloid can be distinguished from amber by the fact that when rubbed it does not become as electric, and gives off an odor of camphor instead of the somewhat aromatic one of amber. Celluloid when dipped in hot water also gives an odor of camphor. It is also quickly attacked by alcohol, or ether, and when scraped with a knife, gives a shaving rather than a powder, as amber does. Amber, as already noted, is but slowly attacked by alcohol. Glass can be distinguished from amber by its cold feel and greater hardness and specific gravity.

Besides these substitutes, it has been found possible by heating and pressing scraps of amber not large enough for carving, to make them into a homogeneous mass, which is sometimes sold as amber and sometimes as amberoid.

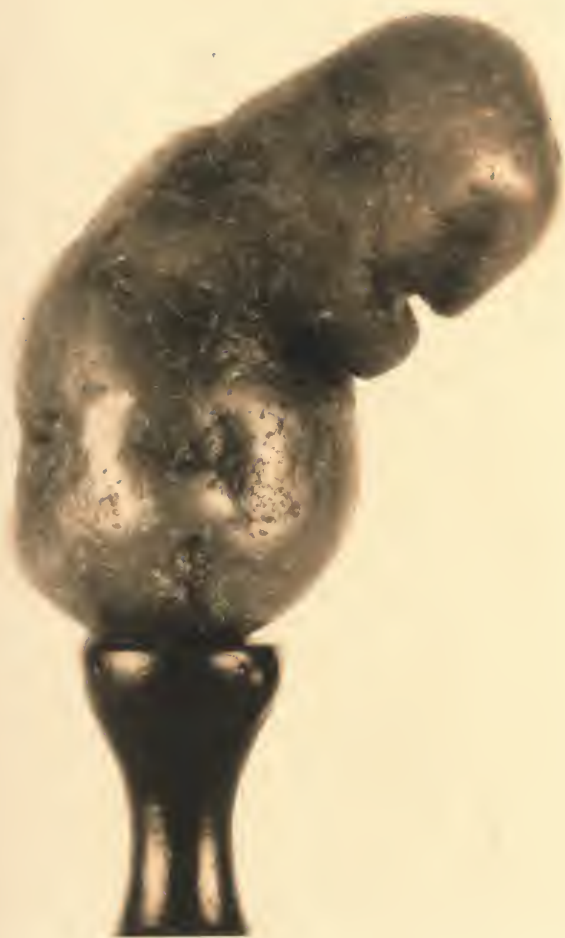
Amber is worked to desired shapes by turning it on lathes, or by cutting by hand. By heating it in linseed oil it becomes soft, so that it can be bent, and often all opaque spots can be made to disappear. It can also be colored during this treatment.

Nearly one-half of the total production of amber is devoted to the manufacture of articles for the use of smokers, such as cigar and cigarette-holders, mouth-pieces for pipes, etc. Ornamental objects in great variety are also manufactured from it, the commonest of such articles being beads, rounded or faceted and perforated so that they can be strung together for necklaces, bracelets, rosaries, etc. These find sale in all parts of the world, the tastes of people of different countries being said to vary as to the kind of amber desired. Thus in Russia and France, for example, the fine bastard amber is preferred, in Holland and China the clear variety is wanted, while in West Africa the demand is for the semi-osseous kind with a brownish tinge. Pressed amber is suitable for cheap, relatively bulky articles, but is not adapted for fine manufactures, since after a time it has a tendency to turn white. The use of amber for varnish is another important utility, impure or small pieces being chiefly employed for this purpose.

Specimens illustrating many of the features of amber enumerated in the preceding pages may be seen in Hall 34 of the Department of Geology of the Museum in a case located at about the center of the hall.

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CONGLOMERATE OF AMBER DROPS.

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