

Ancient Amber Reveals Prehistoric Times

By Dr. Reese Halter

Trees and their ancestors have been on our planet for more than 350 million years. It seems rather fitting that both tree scientists and jewelers treasure their fossilized parts.

Amber is fossilized tree resin or pitch that was once deliberately exuded from conifers or cone bearing trees. Sticky resin is a protective mechanism allowing trees to seal wounds, such as branch or bark breaks, or insects that attack by boring into the tree. Not only does the resin seal the wound, it also has potent antiseptic properties that protect trees from air borne diseases.

Some trees produce a lot of resin, particularly from cracks in the bark or broken branch stubs. The resin is released in blobs or stalactites, which drip and flow down the trunk of the tree. Often as the resin flows insects, other organisms, and plant parts become trapped and engulfed in the gooey material. They also become well preserved, creating prehistoric time capsules.

There are only two types of living trees today that produce resins stable enough that could, over time, become amber: Kauri pine (*Agathis australis*) of New Zealand and a species of legume *Hymenaea* in East Africa and South and Central America.

So how does resin eventually become the prized amber? It's a process called amberization. Once the tree exudes resin it begins to harden. Resins contain oils, acids, alcohols and other aromatic compounds like frankincense and myrrh. They begin to undergo change when the organic molecules join together to form larger ones.

The hardened resin is called copal. Copal becomes a part of the soil where it remains long after the tree dies. The molecules inside the copal continue to grow in size and eventually all the volatile oils disappears. When that occurs copal becomes amber. This process is dependent upon the type of sediment in which the resin is deposited. It takes at least two and up to 10 million years for copal to become amber.

Amber allows tree and insect scientists a glimpse as far back into time as 280 million years. The first amber bearing insects appeared about 145 million years ago.

Human fascination with the beauty of ancient amber as jewelry dates back to about 10,000 years ago. Amber comes in all colors: yellow, orange, red, blue, green and black. It's about as hard as a fingernail and can easily be scratched. Sometimes amber contains water or air bubbles or water in air bubbles. And it is always warm to the touch. It's prized as jewelry, especially if an insect is trapped inside. Amber is valuable and unfortunately often faked.

Fake amber comes from copal, glass, phenolic resin, celluloid, casein (which is made from cheese) and modern plastics. Often insects are fraudulently added to increase value. If insects are longer than a couple of millimeters, you're probably dealing with a fake. Similarly, most insects trapped in amber are extinct so if an encased critter looks like a modern housefly, it is likely a fake.

A four-part test determines genuine amber. Place a drop or two of alcohol (isopropanol or ethanol) on the polished surface of the specimen and allow it to evaporate. It will make copal sticky and there will be no reaction to amber or other fake materials. If the sample scratches with a pin it's amber as glass won't scratch. Heat a wire or needle until red hot, allow it to slightly cool, then press it against the edge of the sample. It will produce a puff of smoke. If the puff smells slightly acrid resinous it's amber, if on the other hand the smell is sweet resinous, then it's copal. A word of caution: celluloid is flammable and other plastics can give off potentially harmful vapors. Finally, place seven teaspoons of table salt into 12 inches (300 milliliters) of water and stir until salt is dissolved. If the sample floats it's either copal or amber all other materials will sink.

Amber can be carved and makes exquisite jewelry like pendants, necklaces, earrings, brooches and rings. Throughout the ages it has been cherished from rosaries of medieval times to snuff boxes and tobacco pipe stems. The most ornate display occurred in 1701 when Frederick of Prussia commissioned an entire room to be paneled and decorated in amber. He gifted it to Czar Peter the Great of Russia in 1717 and it was moved to the Palace in St. Petersburg. It moved again in 1755 to Ekaterininsky Palace in Tsarskoye Selo. In 1941 the Nazi's looted and dismantled the room moving it to Koenigsberg castle. To this day, the exact whereabouts is unknown. Although in 1997 one panel showed up at auction.

Amber occurs in many parts of the world but mostly in small deposits. The two main commercial regions occur in the Baltic and the Dominican Republic. The main insect bearing amber comes from the

Baltic region, Dominican Republic, Burma, Mexico, Lebanon, Siberia, Canada, New Jersey and Sicily.

The molecule DNA (deoxyribonucleic acid) contains the genetic blue print of life. In 1992 scientists found DNA from an extinct bee preserved in amber. In fact the blockbuster science fiction movie Jurassic Park was, in part, based on this discovery. Although there are no known insect-bearing Jurassic amber (208-146 million years ago) it is possible to extract DNA from blood sucking insects.

Scientists can manipulate and make copies of DNA and someday they will likely be able to grow it into an animal. If it's a prehistoric animal it will be because trees, the timeless survivors of the ages, have kept an intact museum of the past.

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