

# AMBER versus COPAL, and Inclusions Within

Summary by Terrance M. Allen

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*There has been some confusion and contention about what defines "fossilized" amber from copal (or copalite), especially from Colombia, South America. Resins with inclusions (mainly insects) have raised the level of interest and value of amber.*

## Definitions:

**Amber** is defined as a hard yellowish to brownish translucent fossil resin that takes a fine polish. Although the oldest recorded amber comes from the Late Carboniferous Period of the Paleozoic Era over 290 million years ago, insect-bearing amber is generally determined to be 20 to 140 million years old depending on the continent or location or stratigraphic layer where found.

**Copal** is defined as a recent or fossil resin from various tropical trees. Copal is considered by many to be very young soft solidified tree resin dating back only 200 to 400 years. Some researchers though, agree that copal may be up to 2 million years old with estimates ranging to about 20 million years. Ages of resins over 10,000 years old qualify them to be fossilized, and any inclusions, plant or animal, found within, qualify them to be true fossilized specimens. Copal, as well as Kauri-gum, can be young, soft and/or "gummy," having been more recently exuded from the araucariaceae trees from which it originates. But older resins, that bled out thousands or millions of years ago and which were buried under layers of clay or successions of strata, have had time to dissipate volatile liquids and polymerize; they became harder and more solidified.

## Similar Characteristics of Amber and Copal/Copalite:

Trees in South America have been producing resin for as long as other trees anywhere else on the planet. Older copal from Colombia, which is harder and sometimes darker (brownish) in color, is sometimes termed copalite; it has the "ite" ending from the Latin root "ites" meaning fossil and indicating that it comes from the earth. Buried copal is the nearest to amber in durability, and is in many cases virtually indistinguishable from it. Amber and copal are both polymerized tree "sap" resins. Amber and copal have the same specific gravity (about 1.1) and will float in salt water, compared to "fake amber" materials such as glass, phenolic resin, celluloid, casein, and many other plastics, which will sink. Amber and copal both give off a resinous aroma when touched with a hot needle. Amber and copal will produce static electricity if rubbed (the Greek name for amber was "electron" from which we take out the word "electricity").

## Dating Amber and Copal Resins:

Generally speaking, the age of different indigenous amber(s) and similar copal(s) cannot be determined by any direct analysis. Age may be estimated based on indicator or index fossils in the associated sediments where the buried resins are found, but there is no way of knowing exactly how long the resin in question took to become deposited in a defined layer of sediment.

It may be possible to estimate the age of particular amber or copal pieces by comparing inclusions (specific species of arthropods and botanicals) in the resin with the same inclusions in other more accurately dated pieces. Qualified entomologists may be able to separate extinct (no longer existing) species of insects from extant (currently living) species. Most species of plants and animals do not persist throughout evolutionary time.

But some species of insects found in amber and copal exhibit "perpetual longevity." That is, certain species have continually lived and reproduced for hundreds of millions of years with little or no significant change. These species reached an evolutionary plateau. They were so successful in surviving natural disasters, global temperature changes, predators and/or parasites, diseases, etc., that they no longer followed adaptation or mutational changes and no longer evolved; examples include cockroaches and snakeflies. These same species may be found throughout geological time ranges and on disengaged continents and islands. So these species may not be useful in separating or dating pieces of amber and copal.

Conversely, it may be possible to infer that a piece of amber or copal is of a particular age if it includes an indicator species that disappeared at a known geological time period. **Stellate oak tree or floral hair, Family: Fagaceae, Genus: Quercus sp., a microscopic branched plant hair often found in Baltic amber, is used as an indicator botanical species for authenticating Baltic amber (30-40 million years old). It is sometimes found in Dominican amber (20-23 myo) and rarely (recently) in Chiapas (Mexican) amber (20-30 myo). Based on the fact that microscopic plant hairs the same or similar to stellate oak hair were discovered in Colombian copal by this author [April 2010], it may be presumed that some Colombian copal/amber can be approximated to be a minimum of 20-million years of age and can be appropriately termed to be true fossilized "Colombian Amber."**

## Conclusion:

Amber provides us with rare glimpses of life from ancient tropical rain forests from continents and islands around the world during different time periods. Sometimes inclusions and their associations (plant parts, arthropods, including insects and spiders, other small animals and parts thereof, and other biologicals) became entrapped and preserved in the sticky tree sap which polymerized and hardened into amber. The same, similar, or different species found entombed in amber, separated by hundreds of miles or millions of years, are part of the Earth's fossil record. Termed "amber" or "copal," as long as it is qualified and recorded as to where the samples of prehistoric resins originate, the arthropod and other faunal and botanical inclusions and their associations are all valuable scientific specimens and are indicators and direct evidence as to the history and evolution of life on Earth.

## Additional References Consulted

### (apart from previous research):

**Amber, The Natural Time Capsule**

by Andrew Ross, c-2010, pp 7-15.

**Amber, Window to the Past**

by David A. Grimaldi, c-1996, pp 133-141.

**Cenozoic Fossils II, The Neogene**

by Bruce L. Stinchcomb, c-2010, pp 104-118

## New Definitions and Concepts Presented by this Author:

- **Stellate Oak/Plant Hair** (aka: SOH) (Family: Fagaceae, Genus: Quercus sp.) microscopic branched epidermal or floral plant hairs found in Colombian copal/amber; a new unreported find; using it as a dating tool. (T. M. Allen, April 2010).

- **Perpetual Longevity of a Species:** Species of animals and plants that have continually lived and reproduced for hundreds of millions of years with little or no significant change. (Term coined by T. M. Allen, May 3, 2010).

- **Dating of amber/copal:** identifying and using comparative analysis of inclusions embedded in amber/copal as indicator or index floral and faunal species. (T. M. Allen, May 3, 2010).

## Basic Notes from the Author:

The Colombian amber/copal/copalite sold to the public by Aragon Enterprises, Inc., specifically Marino and Beatriz Aragon, is 100 percent "nature made." It is true and authentic fossilized tree resin from Colombia, South America. The pieces termed "Colombian amber" containing floral and faunal inclusions are not manmade, altered, enhanced, heated or melted, or in any way tampered with.

Mosquitoes are rarely found in fossilized resins. Factually speaking, only a few dozen mosquitoes have ever been found in the world's supply of amber and copal pieces. A fossil buyer must consider himself "lucky" if an inexpensive piece of amber, copal, or copalite indeed includes a specimen of a mosquito!



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## History Summary for Terrance E. Allen includes:

**Northwestern School of Taxidermy:** Certificate & Diploma in completion of the Study of Taxidermy.

**Long Beach City College and California State University:** Associates in Science and Bachelor of Arts Degrees with a Major in Entomology.

**State of California Dept. of Health:** Certified Technician in Mosquito Control.

**California State Dept. of Food and Agriculture:** Certified as Economic Entomologist and Pest Management Specialist.

**Inventor:** Insect Collecting Allen Aspirator, Fruit Fly (Medfly) Fruit Collection/Detection Stacking Bucket, Intense-Biased-Survey Medfly Detection Program.