

# Terpenes Encyclopedia Article

## Terpenes

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# Terpenes

Terpenes (terpenoids) are a very large family of plant **compounds** that play a variety of roles in many different plants. All terpenes are constructed from isoprenoid units by biochemically unusual pathways involving highly reactive intermediates. The **hemiterpene** isoprene, which contains five carbons (one isoprene unit), is a gas emitted into the atmosphere by many plant species, where it plays a role in the chemistry of ozone production. A monoterpene (monoterpenoid) contains ten carbons (two isoprene units); a sesquiterpene, fifteen carbons (three isoprene units); a diterpene, twenty carbons (four isoprene units). Triterpenes (thirty carbons) are important structural components of plant cell membranes. Many plant **pigments**, including the yellow and red **carotenoids**, are tetraterpenes (forty carbons). Natural rubber is a polyterpene containing many isoprene units. The monoterpenes and sesquiterpenes are common components of the essential oils of herbs and spices (peppermint, lavender), of flower scents (rose), and of turpentine derived from the resin of evergreen trees.

The bark on a Western yew tree in Washington's Mount Rainier National Park. The cancer-fighting drug taxol was first isolated from yew bark.

These compounds have important uses as flavorings and perfumes, as well as intermediates in the production of other commercial products like solvents and adhesives. Many terpenes play roles as plant hormones and in the chemical defenses of plants against microbial diseases and insect **herbivores**; many others have important medicinal properties. Artemisinin is a sesquiterpene drug derived from traditional Chinese herbal medicine that is useful for treating malaria, and taxol obtained from yew trees is a diterpenoid that is highly effective in treating cancer. Recent advances in molecular biology have made it possible to genetically engineer terpene metabolism in plants for agricultural, industrial, and pharmaceutical purposes.

## See Also

Atmosphere and Plants; Flavor and Fragrance Chemist; Hormones; Medicinal Plants; Oils, Plant-Derived; Pigments; Poisonous Plants.

*Rodney Croteau*

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