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**FILE: ■Dragon's Blood**

**HC 030686-361**

**Date: September 30, 2008**

**RE: Review of Dragon's Blood Resins and the Various Source Plants**

Gupta D, Bleakley B, Gupta RK. Dragon's blood: botany, chemistry and therapeutic uses. *J Ethnopharmacol.* Feb 12, 2008;115(3):361-380.

Dragon's blood (*Croton* spp., *Daemonorops* spp., *Dracaena* spp., *Pterocarpus* spp.) resin has a long history of use as a traditional medicine the world over. Dragon's blood resin is obtained from several different botanical sources, including *Daemonorops draco*, *Dracaena cinnabari*, *Dracaena draco*, *Pterocarpus draco*, *Croton lechleri*, and *Croton gossypifolium*. *Dracaenas* spp. and *Daemonorops* spp. resins have been traditionally used in the Mediterranean basin and in China as coloring agents. Medicinal use of dragon's blood dates back to the Ancient Greeks, Romans, and Arabs. *Dracaena* spp. dragon's blood resin has traditionally been used to treat diarrhea, wounds, fevers, ulcers, hemorrhage, fractures, gonorrhea, and burns. In China, *Daemonorops* spp. dragon's blood resin has been used in Traditional Chinese Medicine to stimulate circulation, control bleeding, treat pain, promote tissue regeneration, and assist the healing of fractures. *Croton* spp. dragon's blood resin is a household remedy in Latin American countries, where it is used to treat diarrhea, bone fractures, hemorrhoids, and cholera.

The Mexican tree *C. lechleri* "is possibly the best-know source for dragon's blood." Research has indicated that *C. lechleri* sap possesses antibacterial activity, and *C. urucurana* has demonstrated antibacterial and antifungal activities. In addition, *Croton* spp. dragon's blood has shown antiviral activity against influenza, herpes simplex, and hepatitis viruses. The constituent SP-303 has demonstrated strong antiviral effects against several viruses in vitro. *Croton* spp. dragon's blood and its constituents have demonstrated antitumor effect in vitro. It has been postulated that antitumor activities attributed to *Croton* spp. sap and its constituents may not be mediated through cytotoxicity, but rather through other mechanisms such as immunostimulation. The sap of *C. palanostigma* has shown anticancer effects including induction of apoptosis and microtubular damage in vitro. *C. draco* and *C. urucurana* extracts have demonstrated activity against hemorrhage induced by snakebites, and *C. lechleri* has demonstrated immunomodulatory activity in vitro. Pre-clinical and clinical studies have indicated that *Croton* spp. dragon's blood resins and their constituents

have antiulcer and antidiarrheal effects. The compound SP-303 from *C. lechleri* has shown potential antidiarrheal effects in vitro and has been studied in clinical trials for the treatment of diarrhea in travelers and AIDS patients. SP-300, also isolated from *C. lechleri*, has shown potential anti-diarrheal effects. The Shaman Pharmaceuticals *C. lechleri* sap products, NSF and NSF-1B, are currently sold as antidiarrheal treatments. In vivo evidence has shown that the sap of *C. urucurana* has potential in treating secretory diarrhea associated with diseases such as cholera. Several compounds isolated from *C. urucurana* have shown analgesic effects and may have synergistic effects. *C. lechleri* has demonstrated antioxidant effects including scavenging peroxy and hydroxyl radicals. However, these effects were observed at high concentrations; at low concentrations, *C. lechleri* extracts have prooxidant effects. *Croton* spp. dragon's blood sap has also shown anti-inflammatory effects in vitro and in vivo. *C. lechleri* dragon's blood sap is traditionally used as liquid bandage in the Amazon, and pre-clinical research has indicated that it assists wound healing.

Indonesian dragon's blood is derived from the *Daemonorops* spp. fruit. *Daemonorops draco* resin has shown antimicrobial activity in vitro, which has been attributed to the compounds drachrodin and dracorubin. Dracorhodin perchlorate has been shown to induce apoptosis (programmed cell death) in cancer cells in vitro. A constituent of *Daemonorops draco* has shown antiplatelet activity via inhibition of thromboxane formation. *Dracaena cinnabari* dragon's blood resin has demonstrated antimicrobial activity against a variety of microorganisms and has demonstrated antiviral activity against herpes simplex and human influenza viruses. *Dracaena draco* has steroidal saponin constituents, including draconin A and B, that promote apoptosis. *Dracaena colchichinensis* has demonstrated analgesic effects though interference with pain messages in dorsal root ganglion neurons. Homoisoflavones from *Dracaena cinnabari* have shown antioxidant effects. *Pterocarpus officinalis* is also a source of dragon's blood resin, but it has not been well-studied.

There is a strong need for methods to identify the different botanical sources of dragon's blood resin and to identify substitutes found on the market, such as powdered red coral from the Indian Ocean. A Raman spectroscopy method has been developed for this purpose. There have been no reports of major toxicity attributed to dragon's blood, and the American Herbal Products Association has classified *Daemonorops draco* as safe when used appropriately, though other dragon blood source species are not included in the organization's *Botanical Safety Handbook*. Overharvesting has threatened *C. lechleri*, *Dracaena cinnabari*, and *Dracaena draco*, and the authors suggest the development of plant cell, tissue, and organ culture as alternative sources. The authors also state that more clinical research on the medicinal uses of dragon's blood is needed. A clinical trial on Cromfelemer, originally isolated from *C. lechleri* by Shaman Pharmaceuticals, is currently being conducted by Napo Pharmaceuticals.

—Marissa N. Oppel, MS

The American Botanical Council has chosen not to include the original article.

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