

## Frankincense White Paper

Does *Boswellia frereana* come from Oman?

An old adage states, “Facts tell, stories sell.” Too often a company will tell the best story to market its product, but it may harm the integrity of the company if the story and the facts do not coincide.

Strangely enough, although one particular company liked the fact that the best frankincense in the world comes from the Southern Arabian kingdom of Oman, the frankincense it decided to purchase for resale, *Boswellia frereana*, actually comes from the African country of Somalia.

Unfortunately, the story has been widely spread that the frereana frankincense being sold by this company comes from Oman, which it does not. When we think of the great history and sacred significance of the precious oil that does come from Oman, *Boswellia sacra*, it is sad to see this kind of misinformation being promoted for financial gain.

To the world leader in essential oils, Young Living Essential Oils, it is a travesty to see people being deceived and misled as they search for truth and knowledge.

Young Living has a long history of research and discovery in the Middle East. D. Gary Young, company founder and president, has made 15 trips to Oman and surrounding countries in the past decade and a half. Through his efforts, Young Living is the first commercial frankincense essential oil producer in Oman after a thousand-year halt in the ancient production of this sacred essential oil.

Young Living exports Oman’s only frankincense species, *Boswellia sacra*. Gary Young is very aware that Omanis proudly state that the only frankincense species that grows in Oman is *Boswellia sacra* (*sacra* is Latin for sacred, thus the Young Living name Sacred Frankincense).

Young Living invests a significant amount of resources in its Research and Discovery department. Scientific studies from PubMed (the National Library of Medicine) are purchased [YL’s library contains over 6,000 essential oil studies, 63 on frankincense alone]; tests are run in the company’s analytical laboratories in Utah and Ecuador using GC-MS, GC, chiral GC, optical polarimetry, and IR spectrometry; and Gary Young was able to source the finest *Boswellia sacra* from Oman to complement Young Living’s African *Boswellia carteri*.

YL’s vast library of scientific studies and rare, costly botanical works confirms that *B. frereana* only grows in Somalia, NOT in Oman, so in December 2010 a White Paper was posted on the Young Living website substantiating this fact.

In addition, a brochure titled *Sacred Frankincense: An Ancient Gift Supported by Modern Science* was provided to distributors to document that *Boswellia sacra* is native to Oman and *Boswellia frereana* comes from Somalia. (See the link under Frankincense on the Young Living website or click [HERE](#).)

### Dueling Documentation

The other company became more insistent in its claims of selling “Omani frereana frankincense.” The Wikipedia article that for years stated this species grows only in Somalia was changed to state that

frereana also grows in Yemen and Oman. Documentation for this claim was from the *Encyclopedia Britannica* and the USDA.

Here is the quote from the *Encyclopedia Britannica*:

“Frankincense is obtained from trees from the genus *Boswellia* (family Burseraceae), and particularly from the varieties *B. frereana*, *B. bhaw-dajiana*, and *B. carteri* which are found in Somalia, the Hadhramaut region of Yemen, and Oman.”

This reference is vague and does not specifically state which species grow in which region. One might infer from the text that frereana grows in Somalia, bhaw-dajiana in Yemen, and carteri in Oman. It just is not precise enough to use as documentation.

The information from the USDA is actually contradictory to the claims it is supposed to support. It states that frereana is *cultivated* in Yemen, **but there is no mention whatsoever of Oman**. The term “cultivated” means “planted from another location.” Of the two references that mention Yemen, one of them does not name an actual location in Yemen where frereana is supposedly cultivated. The other reference clearly states the location is Aden, Yemen’s former capital.

It is most likely that citations of frereana being cultivated in Yemen refer to cuttings from Somalia collected by Col. Robert Playfair between 1862 and 1864 and planted by him in his botanical garden in Aden, Yemen.

In his paper “Dr. G. Birdwood on the Genus *Boswellia*,” physician and botanist Dr. George Christopher Molesworth Birdwood wrote the following about “*Boswellia frereana*, Birdwood, n. sp.”<sup>[1]</sup>

As I saw this plant in Playfair’s garden at Aden [Yemen] in September last, in young leaf and covered with bloom, I was much struck by its elegant singularity.

. . . It gave me the most lively pleasure to find the flowers which I had been so long seeking of so charming an originality, and in such a romantic spot; for Playfair’s garden is a mere angle in the shadow of two pumice rocks, which tower hundreds of feet above it, guarding in their shadows the store of water for the garrison and the town; and green leaves, shade, and water make Paradise in the east.”<sup>[2]</sup> [This garden was located at The Tanks also called the Tawila Tanks.]

M. Thulin and A.M. Warfa, in their paper, “The frankincense trees (*Boswellia* spp., *Burseraceae*) of northern Somalia and southern Arabia,” confirm the cultivating of a frereana cutting in Aden:

From northern Somalia Birdwood (1871) described three frankincense producing species: *B. carteri*, *B. bhau-dajiana* and *B. frereana*. Dried leaves and cuttings of these species, under the Somali names ‘mohr madow,’ ‘mohr add’ and ‘yegaar’ respectively, had been obtained from Somalia by Colonel Playfair. The cuttings were planted in gardens in Bombay and Aden. ‘Mohr madow’ and ‘yegaar’ subsequently flowered in Aden and ‘mohr add’ in Bombay and from these plants Birdwood prepared his descriptions.

#### **USDA Reference Articles on *Boswellia frereana***

You will see from the USDA references listed below (all 11 references were located and cited) that ***B. frereana* is found in Africa**. Nine of the 11 references given in the USDA article refer to *frereana* growing in Africa or Ethiopia.

Two references (No. 6 and No. 11) state that *frereana* may also be found adjacent to the Gulf of Aden and in Aden. Again, these references most probably refer to the botanical garden mentioned above where Col. Playfair transplanted a single *frereana* tree from Somalia to his private garden in Aden, Yemen. **Notice, there is no mention of *frereana* growing in Oman**. Also note the words in bold (this emphasis has been added):

1. Craker, L.E. & J.E. Simon, eds. 1986-1987. *Herbs, Spices, and Medicinal Plants*, Vol. 2, page 214: "*Boswellia frereana* Birdwood, Trans. Linn. Soc. London 27:146. t. 32. 1871: **African elemi** (Eng.), elemi frankincense (Eng)."
2. Cufodontis, G. 1953-1972. Enumeratio plantarum **aethiopiae**: Spermatophyta. (F.EthiopCuf).
3. Hedberg, I. & S. Edwards. 1989-. Flora of **Ethiopia**. (and Eritrea. 2000) (F. Ethiop).
4. Kunkel, G. 1984. Plants for human consumption. (L Edible Pl), "*B. frereana* Birdw. – **Eastern Africa**; resin used for chewing."
5. Porcher, M.H., et al. Searchable World Wide Web Multilingual Multiscript Plant Name Database (MMPND) (online resource). (PI Names). "*Boswellia frereana* Birdw. ENGLISH: **African elemi**, Elemi frankincense, Yigaar tree." (No habitat was cited other than the name "African.")
6. Schery, R.W. *Plants for Man*, 1972, 1952, Prentice-Hall, page 243, "Frankincense or gum olibanum comes from various species of *Boswellia*, Burceraceae, especially *B. carteri* and *B. frereana*. . . The species are small trees or shrubs of dry habitats in **northeastern Africa** and the **Arabian peninsula adjacent to the Gulf of Aden**. Collections are apparently from wild trees only." (Be aware that the Gulf of Aden forms a natural separation between Somalia and Yemen. Oman is not located on the Gulf of Aden.)
7. Thulin, M. & A.M. Warfa. 1987. The frankincense trees (*Boswellia* spp., *Burceraceae*) of northern Somalia and southern Arabia. Kew Bull. 43:494 (sic). [The Kew Bulletin volume actually is 42, the article is on pages 487 to 300.] On page 487, it states: "Hepper (1969) recognized four frankincense-producing species in the area: *B. sacra* Flückiger in Southern Arabia, and *B. carteri* Birdwood, *B. dhau-dajiana* Birdwood and ***B. frereana* Birdwood in northern Somalia**."
8. Thulin, M., ed. 1993-. Flora of **Somalia**.
9. Tucker, A. O. 1986. Frankincense and Myrrh. Econ. Bot. 40:426. [40(4), 1986, pp. 425-433.] On page 426 it states: "**In Somalia**, frankincense is collected today from the mohr madow tree (*B. carteri* Birdwood, the so-called Bible incense or olibanum) and the yigaar tree (***B. frereana* Birdwood, the African elemi, or elemi frankincense**). . . *Boswellia carteri* and ***B. frereana* often grow attached to marble rocks and rock crevices in East Africa** (Groom, 1981; Hepper, 1969; Howes, 1949)."
10. Uphof, J.C.T. 1968. Dictionary of Economic Plants, second edition, p. 82, "*Boswellia frereana* (Birdw. Elemi frankincense. (Burceraceae). – Tree. **Africa**. Stem is source of a resin, called **African Elemi**, Loban Maidi Loban Meti."

11. Zohary, M. et al. 1980–. *Conspectus florae orientalis*. For *frereana*, this nine-volume work states that the “chorotype” (distribution pattern within a territory) is Erit. (Eritrea a country in the horn of **Africa** on the Red Sea, directly across from Saudi Arabia and Yemen) and Arab., (Arabia.) The citation notes that “local distribution” in Arabia is Ad., which the accompanying map lists as “Aden.” Once again, referring to the Aden botanical garden of Col. Playfair as mentioned by Birdwood and Thulin and Warfa.

The Wikipedia article once again reads that *frereana* is sourced from Somalia, with solid documentation that has not been challenged.

### **The FACTS Simply Prove that *Frereana* Comes from Somalia**

Below are many references on this topic by botanists and scientists familiar with the different frankincense species.

A.O. Tucker, PhD, professor at the College of Agriculture and Related Sciences, Delaware State University, (as referenced in No. 9 above). “*Boswellia carteri* and ***B. frereana*** often grow attached to marble rocks and rock crevices **in East Africa**.”<sup>[4]</sup> (Emphasis added)

A reference in the *Food and Agriculture Organization of the United Nations*, (Chapter 9, “Flavours and Fragrances of Plant Origins”) reads:

“In Somalia there are up to seven grades of maidi (olibanum from *Boswellia frereana*). . . . **Somalia is the only source of maidi-type olibanum**, exports of which were estimated at 800-900 tonnes in 1987.”<sup>[5]</sup> (Emphasis added)

Addis Ababa University professor Ermias Dagne, in writing about *Boswellia sacra* Flueck, listed the six most common *Boswellia* species and noted this about *frereana*: “***B. frereana* Birdw. known only from Somalia**, Meydi (resin).”<sup>[6]</sup> (Emphasis added)

The following is from a paper written by Mats Thulin, Swedish botanist at Uppsala University, and Ahmed Mumin Warfa, a Somali scientist specializing in botany.

“Although frankincense, i.e. the resin of some species of *Boswellia* (*Burseraceae*), has been produced in northern Somalia and southern Arabia since ancient times (see Groom (1981) for the history of the frankincense trade) the botanical and taxonomic knowledge of the frankincense trees has remained inadequate up to the present day. In the latest revision of the group attempted, Hepper (1969) recognized four frankincense-producing species in the area: *B. sacra* Flückiger in southern Arabia, and *B. carteri* Birdwood, *B. bhau-dajiana* Birdwood and ***B. frereana* Birdwood in northern Somalia**.”<sup>[7]</sup> (Emphasis added)

Thulin and Warfa also write that “Birdwood based his description of *B. frereana* partly on a specimen with leaves only, which was sent to Kew by Playfair (the lectotype) and partly on a living plant in flower **which he saw in Playfair’s garden in Aden**.”<sup>[8]</sup> (Emphasis added.)

F. Nigel Hepper served as head of the Tropical African Section and as assistant keeper of the Herbarium at the Royal Botanical Gardens, Kew, England. In his “Arabian and African Frankincense Trees,” he writes:

“***B. frereana* grows in the coastal region of Somalia.**” He remarks about Kempthorne’s eyewitness description of *B. frereana* and then notes, “**The limestone region of Somalia to which these species are restricted**, is extremely arid with rain during only a short period of the year. . . .”<sup>[9]</sup> (Emphasis added)

In JSTOR, the archive for academic journals, in the entry for *BOSWELLIA frereana* Birdw. [family BURSERACEAE], it states that “***Boswellia frereana* is found in Somalia**,” with references to Thulin, Collenette, Thulin & Warfa.<sup>[10]</sup> (Emphasis added)

In the 2005 study, “A chemical investigation by headspace SPME and GC-MS of volatile and semi-volatile terpenes in various olibanum samples,” Hamm, Bleton, Connan, and Tchaplal write that “**The habitat of the *B. frereana* tree is restricted to North Somalia**, from near sea-level up to 1000 m.”<sup>[11]</sup> (Emphasis added)

Simla Basar’s often-quoted doctoral dissertation on *Boswellia* discusses the frankincense species *frereana* and *carterii* noting:

“The essential oil of *Boswellia frereana* was studied together with *B. carterii* for comparative reasons in earlier work since **they originate from the same region in Africa**. However, it was recognized that *B. frereana* has a very different monoterpenoid composition as the other olibanum resins.”<sup>[12]</sup>

### Frereana Does Not Grow in Oman

In the well-known reference book, *Plants of Dhofar: The Southern Region of Oman, Traditional, Economic and Medicinal Uses*, ***Boswellia frereana* is not listed as an Omani plant**. On page 78, the authors, Anthony G. Miller, of the Royal Botanic Gardens of Edinburgh and Miranda Morris, PhD, state:

Several species of *Boswellia* including *B. sacra*, *B. papyrifera* (from tropical NE Africa), ***B. frereana* (from Somalia)** and *B. serrata* (from India) produce an oleo-gum-resin which is exploited as the frankincense of commerce—the different species each producing a distinctive type and quality of resin. **Only one species, *B. sacra*, is found in Arabia**. This [species] also occurs along the north eastern coast of Somalia. In Arabia *B. sacra* extends from the Hasik area in Dhofar west to near Habban (46°30 E) in the eastern part of the Hadramaut.<sup>[13]</sup> (Emphasis added)

In *Plants for Consumption*, it reads: “*B. frereana* Birdw. – **Eastern Africa**; resin used for chewing.”<sup>[14]</sup> (Emphasis added)

The *Dictionary of Economic Plants* states: “*Boswellia frereana* Birdw. Elemi Frankincense. (Burseraceae) – Tree. **Trop. Africa**. Stem is source of a resin, called **African Elemi**, Loban Maidi Loban Meti.”<sup>[15]</sup> (Emphasis added)

The reference book *Herbs, Spices, and Medicinal Plants* lists Burseraceae species stating: “*Boswellia frereana* Birdwood, Trans. Linn. Soc. London 27:146. t. 32. 1871: **African elemi** (Eng.), elemi frankincense (Eng).”<sup>[16]</sup> (Emphasis added)

In *Perfumer & Flavorist*, January 1985, page 19, P. Maupetit of Roure Bertrand Dupont Research Center, Grasse Cedex, France, writes:

Olibanum, or frankincense, a well appreciated perfume raw material, is a gum resin produced by wild small trees growing in Arabia and Somaliland. . . . The gums from Arabia and Somaliland converge to Aden, the main trade place for olibanum; these gums usually result from two species of the genus *Boswellia carterii* Bird. (Arabia and Somaliland) and ***Boswellia frereana* Bird. (Somaliland)**. (Emphasis added)

There is one more reference regarding exports from the Yemeni port of Aden from 1877:

“Principal Articles of Commerce: Frereana, ‘Yegaar of **Somal.**’ Maieti or Maiti is obtained from the Yegaar tree.”<sup>[17]</sup> (Emphasis added)

*Boswellia frereana* grows in Somalia. There are only three documented references from 1870, 1980, and 1987 referring to a single frereana tree *cultivated* in a botanical garden in Aden, Yemen. There simply is *no* documentation that frereana is cultivated in Oman.

Some essential oil companies may increase sales by telling good stories—but integrity insists that the stories must be true, backed up by facts.

Young Living backs up with facts truthful stories of Sacred Frankincense extracted from *Boswellia sacra* growing in Oman. Stamped passports of its researchers’ visits are undeniable. Photographs of Young Living’s owner, D. Gary Young, and his researchers with *B. sacra* trees in Dhofar, Oman; of Young Living researchers with Mahmoud Suhail, MD—the only authorized producer of Omani frankincense essential oil in Salalah, Oman; and of Young Living researchers working with Omani botanists are additional evidence of the facts.

Most undeniable is the analytical evidence recently obtained by Young Living scientists using GC-MS, GC, chiral GC, and optical polarimetry to differentiate the essential oils of *B. sacra*, *B. carteri*, and *B. frereana* species by their unique biochemical composition and physical properties. This new data confirms the published research that the only frankincense resin collected in Oman is from native *Boswellia sacra* trees growing in the Dhofar Mountain region.

**Fact: Sacred Frankincense (*Boswellia sacra*) is the only frankincense essential oil that comes from Oman.**

#### Notes

1. Birdwell, G.C.M. “Dr. G. Birdwood on the Genus *Boswellia*,” *Trans. Linn. Society*, London, 27:143-148, 1871, p. 146.
2. Ibid, p. 148.
3. Thulin M. and Warfa A.M. “The frankincense trees (*Boswellia* spp., *Burseraceae*) of northern Somalia and southern Arabia,” *Kew Bulletin*, Vol. 42, Issue 3, 1987, p. 491.
4. Tucker A.O. “Frankincense and Myrrh,” *Economic Botany*, 40(4), 1986, pp. 425-433.
5. Food and Agriculture Organization of the United Nations, Chapter 9, “Flavours and Fragrances of Plant Origins,” <http://www.fao.org/docrep/v5350e/v5350e11.htm> (accessed June 16, 2011).
6. Dagne, Ermias, “*Boswellia sacra* Flueck. (Synonym: *Boswellia carteri* Birdw.),” <http://www.aritherbal.com/Article4.html> (accessed June 21, 2011).
7. Thulin and Warfa, op cited, p. 491.

8. Thulin and Warfa, op cited, pp. 494-495.
9. Hepper F.N. "Arabian and African Frankincense Trees," *The Journal of Egyptian Archaeology*, Vol. 55, 1969, p. 67.
10. JSTOR, "Entry for *Boswellia frereana* Birdw [family Burseraceae]" <http://plants.jstor.org/flora/flos000549> accessed June 16, 2011.
11. Hamm S, et al. "A chemical investigation by headspace SPME and GC-MS of volatile and semi-volatile terpenes in various olibanum samples," *Phytochemistry*, 66, 2005, 1499-1514.
12. Basar S. "Phytochemical investigations on *Boswellia* species: Comparative studies on the essential oils, pyrolysates and boswellic acids of *Boswellia carterii* Birdw., *Boswellia serrata* Roxb., *Boswellia frereana* Birdw., *Boswellia neglecta* S. Moore and *Boswellia rivae* Engl." PhD Thesis, Universität Hamburg 2005, p. 81.
13. Anthony G. Miller and Miranda Morris, PhD. *Plants of Dhofar*, Holmes McDougall Limited, Edinburgh, 1988, commissioned by Oman Sultan Qaboos Bin Said, p. 78.
14. G. Kunkel, *Plants for Human Consumption: An Annotated Checklist of the Edible Phanerogams and Ferns*, Lubrecht & Cramer Ltd., 1984. p. 57.
15. J.C. Uphof, *Dictionary of Economic Plants*, Lubrecht & Cramer Ltd., Second Edition, 1968, p. 82.
16. L.E. Craker and J.E. Simon, *Herbs, Spices, and Medicinal Plants*, Food Products Press, Vol. 2, 1986, p. 214.
17. F.M. Hunter, 1877, *An Account of the British Settlement of Aden in Arabia*, London, p. 113.