

Chemical Reaction



Killer Bees & Cold Cream

A look at the whole ball of wax. **BY STEVE HERMAN**

**"How doth the little busy bee
improve each shining hour
And gather honey all the day
from every opening flower!"**

—Isaac Watts, *Divine Songs
for Children* (1720)

QUICK—what's the connection between Pond's Cold Cream, the Roman Catholic Church, Marco Polo, and killer bees? Of course, the relationship must center on beeswax, one of nature's most intriguing creations.

The two biggest consumers of beeswax in 1956 were the cosmetic industry and the Roman Catholic Church (the third biggest users were beekeepers).

Canon Law specified the use of beeswax candles in church services, often 100 percent beeswax, but at least 51 percent. Problems with vandalism and fires have resulted in the replacement of most of the devotional candles with electric lights, and consequently the consumption of beeswax for religious purposes has declined significantly in the last few decades—but in 1956, beeswax candles were at their peak.

Beeswax is synthesized by honeybees in four pairs of glands located on the side of the abdomen. Bees use the wax as their primary building material for making combs. Beeswax is composed of monoesters, diesters, hydroxylated esters, hydrocarbons,

and free fatty acids. The wax is not soluble in water (or honey), and is not readily degraded or decomposed by moisture or microorganisms. Beeswax' stability also makes it an excellent wax for addition to cosmetics and skin products.

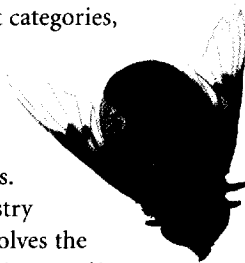
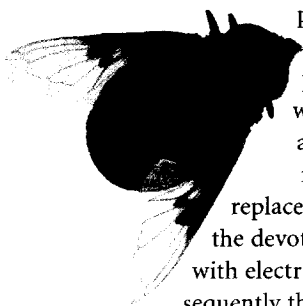
The chief cosmetic application of beeswax was in anionic emulsions, particularly cold cream. The use of beeswax for emulsification goes back to Galen, in formulations based on the absorptive properties of the wax. It was possible to get a crude emulsion by heating beeswax, olive oil, and rose water. Chesebrough-Pond's had (and has) the leading market product, Pond's Cold Cream. Pond's has outlasted the church's beeswax candles and is still the gold standard of cleansing creams. The CTEA Dictionary lists beeswax in a host of product categories, including hair dye, lipstick, mascara, hair conditioners, and depilatories.

A cottage industry application involves the use of beeswax in soap (See Figure 1).

Beeswax is dark and dirty in its native state, with great variations in color from one

source to another. The value of the wax increases as it is cleaned and processed to lighter shades. Some wax can be made almost pure white, while other sources produce various degrees of yellow and cannot be made totally white. The wax can be washed in water and bleached with peroxide or diatomaceous earth. The wax of some bee species can be bleached more successfully than that of others. The bees of Brazil produce wax that bleaches well but in small quantities.

African bees produce copious amounts of beeswax, but the product resists bleaching. What if the two bee species could be hybridized to produce copious quantities of easily bleached wax? In 1956, bees were brought from Africa to Rio Clara, São Paulo, Brazil. The bees already in Brazil had been imported from Europe, and were not as well suited for the tropics as the African bee. The new hybrid was named the Africanized honey bee (AHB). The AHBs defended their nests more vigorously, and swarmed more often, than the European species, earning the description "killer bee."



Without the demand for religious candles and cold cream, it is unlikely the killer bee would have been brought into existence.

The original Mr. Pond's never made cold cream. Thomas T. Pond was a chemist who isolated a "healing tea" from witch hazel in 1846 as a salve for wounds, dubbed "Pond's Extract." T.T.Pond Company was formed in 1849, and Thomas Pond soon divested his interest. Incorporated as Pond's Extract Company in 1914, the company needed new products when the price of witch hazel fell. Pond's Vanishing Cream and Pond's Cold Cream first hit the market around 1910. Advertising for Pond's Extract ceased in 1914, replaced by cream ads: "Every normal skin needs these two creams."

One cream was needed to cleanse, the other to protect the skin—and they were both necessary.

The creams were so modestly priced and widely used that prevailing wisdom questioned their value compared to imported and more costly products. An intense advertising campaign in 1924 caused sales to jump again, and leadership was maintained through the 1955 merger with Chesebrough Manufacturing Company. Unilever acquired the merged Chesebrough-Pond's in 1987, culminating a 150-year saga based on the labor of countless bees.

Cold creams were primitive

and unstable mixtures until mineral oil replaced oils that easily rancidified, and borax was added to neutralize the free fatty acids in the beeswax. Mineral oil was a product of the newly developed petroleum industry, but borax has a more colorful history. For centuries, borax was imported as tincal (from "tincana," the Sanskrit word for borax) along the trade routes used by Marco Polo's caravans. The source of borax, Tibet, and the method of production were kept a closely guarded secret by Venetian traders for four centuries, beginning in the 13th century.

Eventually borax was discovered in other locations, most famously in Death Valley in 1881. F.M. "Borax" Smith acquired the site and established Harmony Borax Works. During the Twenty Mule Team years, 1883-1888, borax was hauled in wagons by teams of 18 mules and two draft horses from Death Valley to the railway junction at Mojave, a journey of 165 grueling miles. In 1890, the Pacific Coast Borax Company used the "Twenty Mule Team" as the brand name for its "99½% Pure" borax. It was around this time that borax was used in cold cream, creating the product that has been a mainstay of the cosmetic cabinet for the last century.

Borax is officially hydrated sodium borate, $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$. The

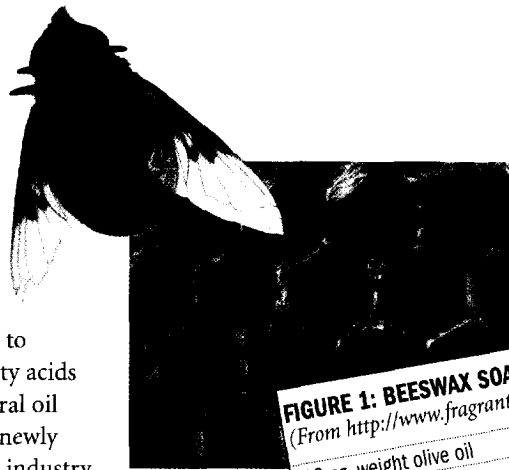


FIGURE 1: BEESWAX SOAP

(From <http://www.fragrant.demon.co.uk/makesoap.html>)

- 13 oz. weight olive oil
- 2 oz. beeswax
- 1 oz. palm oil
- 2.1 oz. lye
- 1 cup water (8 fluid oz.)

structure consists of interlocking $\text{BO}_2(\text{OH})$ triangles and $\text{BO}_3(\text{OH})$ tetrahedrons bonded to chains of sodium and water octahedrons. In nature, borax accumulates in playa lakes, which form only during rainy seasons from mountain runoffs.

Every product has a tale to offer, but few are as rich in history as the ancestor of every anionic emulsion to ever grace milady's beauty arsenal, beeswax-borax cleansing cream. **GCI**

References

For an exhaustive look at beeswax, see Mizrahi, A. and Lensky, Y., eds., "Bee Products: Chemical Composition and Application," Plenum Press, New York, 1996.

Beeswax-borax emulsions were considered in Kosmetikos, "Shake Before Using," *DCI*, September 1998.

For the history of the Pond's company, visit www.scriptorium.lib.duke.edu/eaaponds.html.

For borax history and chemistry, visit www.borax.com.

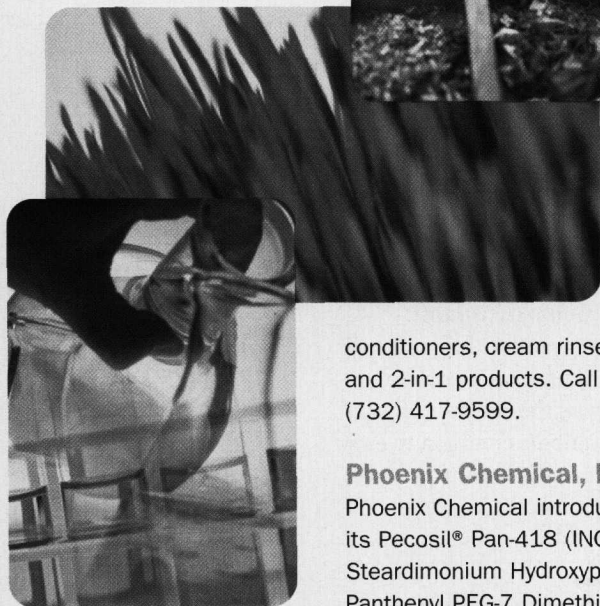
Steve Herman is director of R&D of AFF International. He has more than 30 years of experience in the industry, primarily in fragrance application. He serves as an adjunct professor in the FDU Masters in Cosmetic Science program, and has been active in numerous capacities with the SCC. He may be reached at (973) 244-5880, or by e-mail: GCISteve@aol.com.

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Main Ingredients

Croda

Croda announces the availability of INCROQUAT DCMC, a high-quality, low-color version of dicetyldimonium chloride. As a cationic agent, the product is economical and offers excellent conditioning effects. It is easily diluted in water and can be used in conventional



conditioners, cream rinses, and 2-in-1 products. Call (732) 417-9599.

Phoenix Chemical, Inc.

Phoenix Chemical introduces its Pecosil® Pan-418 (INCI: Steardimonium Hydroxypropyl Panthenyl PEG-7 Dimethicone Phosphate Chloride), a quaternized (cationic) version of Pecosil SPP-50 (INCI: Potassium Dimethicone Copolyol Panthenyl Phosphate). Pecosil SPP-50 combines the benefits of silicone and panthenol in a single molecule. Panthenol brings protective properties to hair-care products by enabling hair to withstand breakage. It also moisturizes hair as it builds body and volume. For nails, panthenol has been known to improve flexibility and reduce breakage. It also reduces scaling

and cracking associated with dry skin, making it suitable for skin-care applications. Pecosil Pan-418 increases moisturization, shine, and combability, and reduces static in hair-care formulations. Call (908) 707-0232.

Presperse, Inc.

Presperse announces the availability of a unique and patented material, Eurol BT, a pure olive leaf extract. The ingredient is extracted from the leaf of the olive tree by using an innovative chemical-free process, leaving the natural product characteristics unaffected. It contains oleuropeine, a diphenolic structure that is effective as an antioxidant. It has photoprotection and bacteriostatic activity. Being food grade, the product is safe and nontoxic. The extract is a highly concentrated, water-soluble product that has application in a variety of cosmetic and personal-care products, including skin, hair, sun, and baby products. Call (732) 819-8009.

Ciba Specialty Chemicals, Inc.

Ciba® releases its Salcare® Super 7 (INCI: Polyquaternium-7), a highly efficient hair and skin conditioner developed for use in rinse-off applications, such as 2-in-1 shampoos, transparent shampoos, conditioning agents, and bath and shower gels. The ingredient is supplied in a highly concentrated form (40 percent active substance), and is less viscous than a conventional polyquaternium-7. It offers ease of combing, substantivity, and conditioning action. At the usual concentrations

(between 0.1 and 0.3 percent), this polymer is compatible with a range of surfactants, which may be anionic (lauryl sulfates, laureth sulfates, sulfosuccinates, and sarcosinates), amphoteric (betains, hydroxysultanes), or non-ionic (coco-glucosides). Call +41 61 636 22 85.

Colonial Chemical, Inc.

Colonial Chemical's Colamid AVCO (avocamide DEA and avocado oil) is based upon natural avocado oil. It combines the benefits of natural oil with the functional properties of an alkanolamide. Due to its rapid skin penetrating and conditioning properties, and great after-feel, the ingredient has application in clear conditioning shampoos, hair rinses, mousses, creams, and lotions. Colamid imparts a smooth, silky feel to skin and hair and provides foam stabilization, viscosity, and lubricity. Call (423) 837-8800.

TRI-K Industries, Inc.

TRI-K launches naturally derived self-emulsifying bases, Emuliance and Xyliance, both produced from non-genetically modified wheat and palm oil. The natural, mild derivation of these products makes them ideal for use in skin-care products. Emuliance and Xyliance are efficient emulsifiers and provide excellent product stability at low concentrations without the aid of co-emulsifiers. In addition, they exhibit high tolerance to salt, pH extremes, and oils of varying polarity, making them suitable for applications that are difficult to stabilize. Call (201) 750-1055, ext. 205. 