Hand in Hand with Nature: Conditioners Based on Silicone Wax

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Abstract

In nature, waxes excel at protecting surfaces and enhancing consistency – principles that find ready application in cosmetics. Hybrid materials of organic wax compounds and silicones help create conditioners with extremely diverse properties for hair and skin care. Low-melting waxes with high silicone content are noted for producing a soft feel. High-melting grades serve as thickening agents, keeping the skin and hair moist and enhancing comb-ability in shampoo applications. All hybrid grades have the ability to increase hair volume.

Introduction

It is with good reason that chemists increasingly look toward the principles of evolution. One issue is whether – and how – the syntheses found in Nature can be economically and ecologically harnessed. Another issue is trying, by trial and error, to optimize these natural syntheses. Throughout the ages, living organisms have evolved to cope better with their environment and the many influences affecting them. In this way, Nature has also produced various protective mechanisms and systems involving materials found in a wide variety of species – presumably because these materials are so effective. For example, virtually any plant or fruit on earth is protected by a waxy coat. This film of wax performs a vital role. It offers effective protection against drying out and also provides valuable natural protection against bacterial or fungal attack.

On closer observation, it can be seen that the wax film may appear smooth on a macro-scale but structured when looked at more closely. The much-quoted lotus effect, for example, is caused by intercuticular waxes in the polymer matrix of the cuticular and epicuticular waxes on its surface, with three-dimensional structures measurable in micrometers[1]. These contribute to an extremely efficient self-cleaning effect, protecting the surface and therefore the plant itself.

But waxes play a far greater role than this and can be found in the animal kingdom as well as the plant world. Beeswax, for example, demonstrates how. In addition to their protective role, waxes also act as building materials and structural components.

Early Cold Creams Were Based on Beeswax

Philosophers thought long and hard about the origin of beeswax: Aristotle maintained that beeswax came from flowers, an opinion which reigned until the Renaissance. It was not until 1744 that the naturalist Hornbostel[2] explained that the bees themselves made the wax with which they build their hives. Starting with a middle wall, bees build hexagonal cells to both sides. By choosing this honeycomb geometry, they make most efficient use of the available space and obtain a high degree of stability. Temperatures in the brood nest of between 32 and 36°C are optimum for shaping the wax into a building material and modeling the honeycomb.

It was long before the origin of beeswax was understood, however, that people began using it and experimenting with it. So it was inevitable that this material should make an early appearance on the cosmetic stage in the first classical skin creams. In ancient times, the Greek physician Claudius Galenus (129-199 AD) was already combining olive oil and water with melted beeswax to create a preparation which, despite its short shelf life, represents the forerunner of modern cold creams.[3]

"Fruitful" Apple Wax

Even today natural waxes are still of great interest in cosmetic applications. For example, a study of apple wax has shed light on the benefits of its ingredients.[4] The focus of the study was a half-side test, where one half of the apple was left in a natural state, while the wax film on the other half was removed with alcohol. This demonstrated how the apple's skin, with its water-repellent wax layer, effectively protects the sensitive contents of