

# sofw journal

Home & Personal Care Ingredients & Formulations

powered by **SOFW**



## Invisible Yet Indispensable, the Skin Microbiota Needs to be Properly Supported

I. Montaña

# Invisible Yet Indispensable, the Skin Microbiota Needs to be Properly Supported

I. Montaña

Billions of microorganisms colonize the human skin at various sites and constitute the skin microbiota. They form complex communities that function together with the host immune system to defend against pathogens and to maintain skin health. Since having a well-balanced cutaneous microflora is important for a healthy and beautiful skin, protecting its balance and its recovery represents a winning strategy for skin care products. The active ingredient Black BeeOme™ that results from the fermentation of honey from the rare wild dark bee *Apis mellifera mellifera* with the bacteria *Zymomonas mobilis*, has been designed to harmonize the skin microflora after stress to ensure a healthy and pure skin. The fermentation eliminates the basic sugars glucose, fructose and sucrose in the honey. As a result, the carbon source for unwanted bacterial growth on the skin is removed. On the other hand, the ferment of *Zymomonas mobilis* contains factors that may help to control the growth of microorganisms on the skin. Black BeeOme™ has been shown to efficiently exert its prebiotic effect to restore the healthy skin's natural microbiota following daily stress.

## Introduction

### The Cutaneous Microbiota

The human microbiota comprises all microorganisms – the commensal bacteria, viruses, yeasts and fungi, – that consider human bodies to be home. The human body microbiota is mostly found in the gut, the nasal and oral cavity, and on the skin surface [1]. Most of these microorganisms can vary throughout life, based on lifestyle, diet, the environment and – in the case of the skin – by the local ecosystem [2]. While estimates vary, there could be over 1,000 different species of microorganism making up the human microbiota. All the genes of these microbial cells in their environment are what constitute the microbiome [3].

Traditionally, the pathogenic potential of microorganisms hosted on the human skin has put the medical emphasis on how to remove these organisms. However, research in recent years through microbiome studies has revealed that the microbes on the skin are a vital part of the host–microbiota symbiotic system, which suggests that skin commensals play important roles in terms of maintaining skin health and proper function [4]. This new view appeals for a paradigm-shifting acknowledgment of the functions of the skin microorganisms in skin health and new treatment strategies for microorganism-associated skin diseases.

The most recent research has revealed the complexity of this field as the amount and type of microbes varies significantly between different subjects, and between different skin areas within one person. A disruption of this skin ecosystem may not only influence diseases such as psoriasis or acne, but also skin ageing, barrier function and wellbeing.

### The Fermentation of Black Bee Honey

Honey has been used since ancient times as food and subsequently in cosmetics. However, the production of honey has been endangered lately as bee populations have significantly decreased because of diseases. In tune with the valleys of Switzerland, the dark bee *Apis mellifera mellifera* has adapted to survive adverse conditions. It is only this very special breed that is resistant to varroa (the mite that attacks bees), which is one of the reasons identified for the worldwide bee population decline. The honey made by these special wild dark bees has been used by Mibelle Biochemistry as a fermentation substrate in the new active Black BeeOme™. For more than 1,000 years *Zymomonas mobilis* was used by the Aztecs to make the Mexican 'drink of the Gods' pulque. This ancient drink is the forerunner of mezcal and tequila. All three drinks come from the same family of plants, but pulque is made by fermenting – as opposed to distilling – the sap of the agave with *Zymomonas mobilis* (amongst other ingredients). These bacteria can ferment only sucrose, glucose and fructose, leaving the complex sugars intact. The black bee honey is fermented with *Zymomonas mobilis* to eliminate the basic sugars (glucose, fructose and sucrose), thereby eliminating a carbon source for glycation and un-

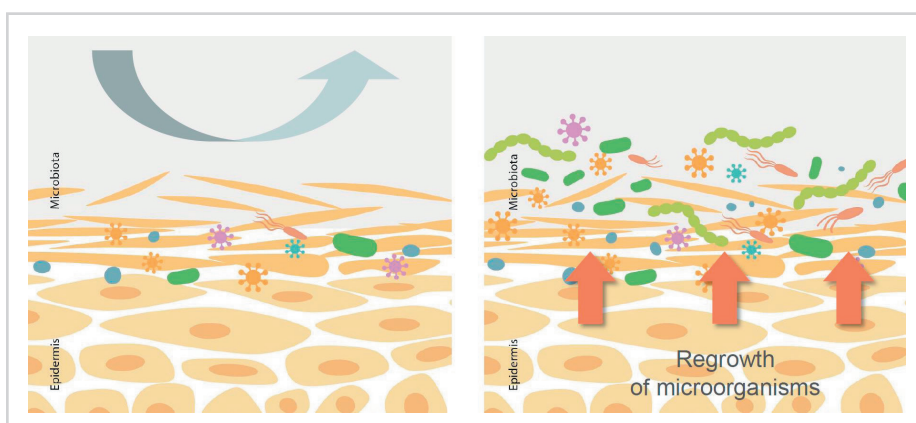


wanted bacterial growth on the skin. The ferment of *Zygomonas mobilis* also contains factors that may help to control the growth of bacteria, yeast and fungi on the skin. (Fig. 1).

### The Prebiotic Action of Black BeeOme™

Under normal conditions, the microbiotic film protects the skin against other harmful bacteria or pathogens. As it is the first barrier, this film is constantly stressed not only by factors such as UV light, pollution and domestic chemicals, but also by cosmetic products or treatments. This dynamic creates an imbalance in the skin microflora and their niches may later be colonized by transient, harmful bacteria. Frequent washing of the skin, for example, can reduce and unbalance the skin's ecosystem. Therefore, the skin microbiota must recover from these threats daily. A healthy barrier should not require

extensive treatment but should support an innate ability to bounce back to normal homeostasis after being challenged. Black BeeOme™ has been shown to efficiently exert its prebiotic effect: incorporating nutrients and generating conditions to restore the healthy skin's natural microbiota following daily stress.



**Fig.1** The skin microflora ecosystem. The typical microflora of each person is best for its skin's health. The fermented black bee honey active supports and improves the conditions for the regrowth of existing microorganisms.

## Methods and Study Results

### Recolonization of the Skin Microflora after Washing

A placebo-controlled clinical study was carried out on 7 volunteers (aged between 17 and 38 years) with normal skin conditions. Immediately after washing the skin with an 4% SDS/ 50% Ethanol mixture to strip the skin of the microflora, the volunteers applied a standardized single application of water spray containing 2% Black BeeOme™ pwd. To determine the number of microorganisms, skin surface samples were taken with contact plates before and immediately after the washing, and then after 6 hours and after 24 hours. Results showed that harsh washing had an unfavourable impact on the skin microflora layer. Nevertheless, the skin treated with 2% Black BeeOme™ pwd was able to recover quicker from the washing than the placebo. The restoration of the skin's natural microflora was realized sooner following the use of Black BeeOme™ pwd (Fig. 2).

### Skin Barrier Enhancing Effect and Improvement of Skin Impurities

The skin integrity recovery effect of Black BeeOme™ was evaluated in a double-blind placebo-controlled clinical study. The volunteers, 23 Caucasian women aged between 19 and 57 years, presented oily and uneven skin. The tested products, a gel containing 1% Black BeeOme™ pwd or the placebo, were applied twice daily to the face (one side) and to the inner side of the forearm. In addition, a daily washing stress was induced on the forearms by washing daily with a non-hydrating shower gel. The parameters determined were TEWL

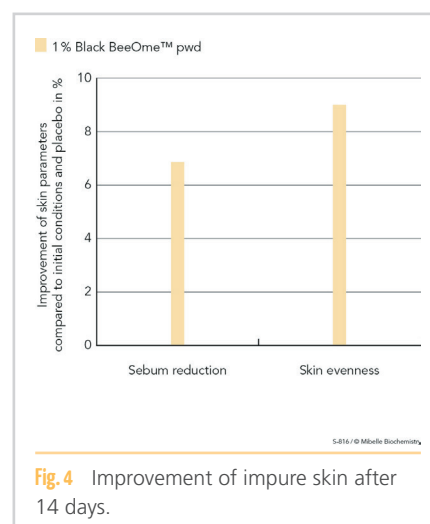
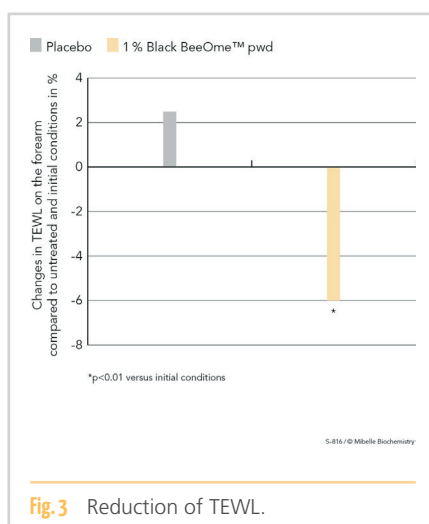
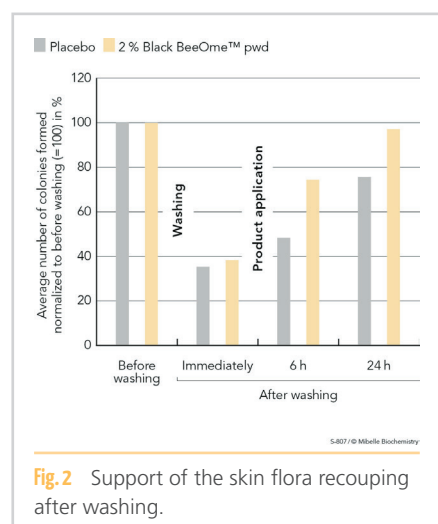
on the inner side of the forearms (Tewameter), the sebum level and skin evenness on the face (by Sebumeter® SM 815 and clinical grading of color face pictures respectively) at the beginning of the study and after 14 days were.

After 14 days of treatment with 1% Black BeeOme™ pwd, an improvement of TEWL compared to the placebo was observed on the inner forearms, despite the daily washing stress. In comparison to initial conditions, the improvement in TEWL was significant (Fig. 3). The results revealed that the use of the active ingredient protected and reinforced the recovery of the skin barrier. The faster recovery of the skin ecosystem had a positive influence on the skin barrier regeneration as seen by the reduction of TEWL compared to the placebo.

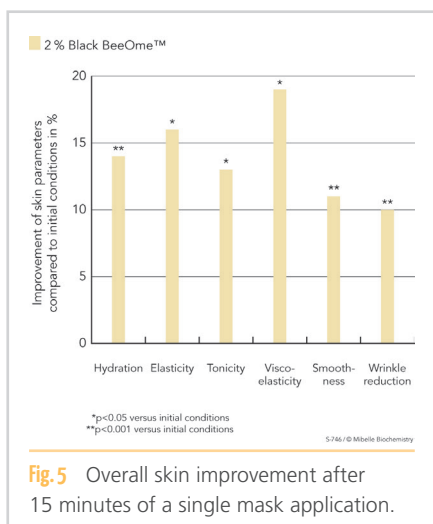
As shown in Fig. 4, it was additionally achieved a reduction in sebum production and an increase in skin evenness compared to the placebo and to initial conditions (6.8% a 9% respectively).

### Improvement of Various Skin Parameters in Urban Areas

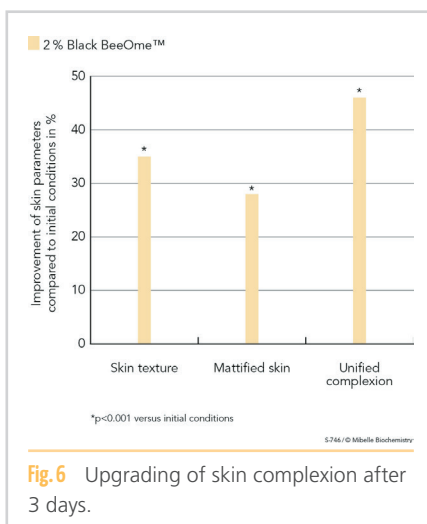
A clinical study was conducted in Bangkok on 22 female volunteers (aged between 19 and 41 years) with impure and oily skin. The volunteers applied a sheet mask containing 2% Black BeeOme™ for 20 minutes, once daily over a period of 3 days. The measured parameters were skin hydration (on the cheek), tonicity and elasticity (on the temple) and skin relief parameters (roughness, wrinkle depth) on the cheek, at the beginning of the study and 15 minutes after the first application. Clinical grading of skin texture, mattified skin, unified complexion and the number of lesions were determined at the beginning of the study and after 3 days of treatment.



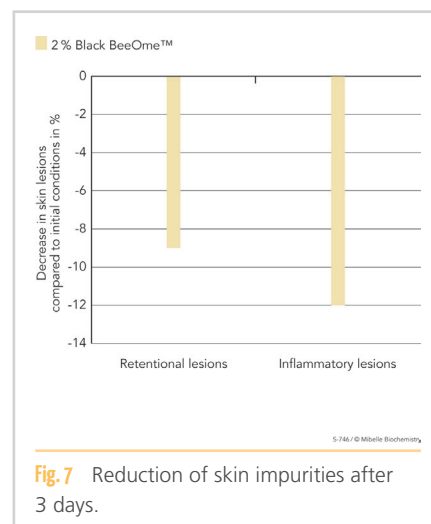
visit our new website [www.sofw-journal.com](http://www.sofw-journal.com)



**Fig. 5** Overall skin improvement after 15 minutes of a single mask application.



**Fig. 6** Upgrading of skin complexion after 3 days.



**Fig. 7** Reduction of skin impurities after 3 days.

Results showed that 15 minutes after a single treatment with 2% Black BeeOme™, a significant improvement was achieved in all parameters compared to initial conditions (Fig. 5).

After 3 days of applying the mask containing 2% Black BeeOme™, a significant improvement was observed in the clinical grading: 35% improvement in skin texture, 28% improvement in mattified skin aspect and 46% improvement in unified complexion (Fig. 6).

The parameters that characterise impure and oily skin associated with urban and polluted living areas were reduced after 3 days using the sheet mask: 12% reduction in inflammatory lesions and a 9% reduction in retentional lesions (Fig. 7). Skin redness was reduced by 2% after 15 minutes and by 5% after 3 days (Fig. 8). Therefore, Black BeeOme used in a sheet mask at 2% contributed to ameliorate the skin impurities and skin redness of the volunteers living in urban areas.

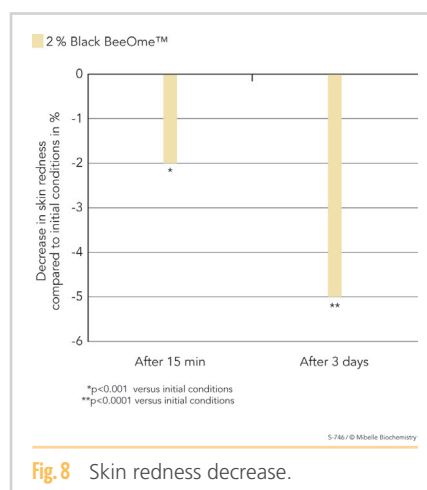
## Sum Up

Black BeeOme™ is a fermented honey made by a special black bee in Switzerland which restores the skin's natural microflora. *In vitro* and clinical studies have shown that Black BeeOme™ promotes a faster skin flora recovery after washing as well as skin barrier recovery. In addition, the fermented black bee honey diminished the sebum production and improved the uniformity of oily and uneven face skin. When applied on a sheet mask, Black BeeOme™ showed a clear improvement of impure skin of volunteers living in urban, polluted areas after only 15 minutes of a single application. Air pollution has been

recognized as a key factor for impure, oily and irritated skin. This can be because of, among other things, the negative impact of the pollution on the skin microbiota.

## Bibliography

- [1] The Human Microbiome Project Consortium, Structure, function and diversity of the healthy human microbiome. *Nature* 486(7402): 207-214.
- [2] Costello, E. K., C. L. Lauber, et al. (2009). "Bacterial community variation in human body habitats across space and time." *Science* 326(5960): 1694-1697
- [3] Kong, H.H. and J.A. Segre, The Molecular Revolution in Cutaneous Biology: Investigating the Skin Microbiome. *J Invest Dermatol*, 2017. 137(5): p. e119-e122.
- [4] Sanford, J. A. and R. L. Gallo (2013). "Functions of the skin microbiota in health and disease." *Semin Immunol* 25(5): 370-377.



**Fig. 8** Skin redness decrease.

contact

Irene Montañó, PhD

Mibelle Biochemistry

Mibelle AG

Bolimattstrasse 1

5033 Buchs | Switzerland