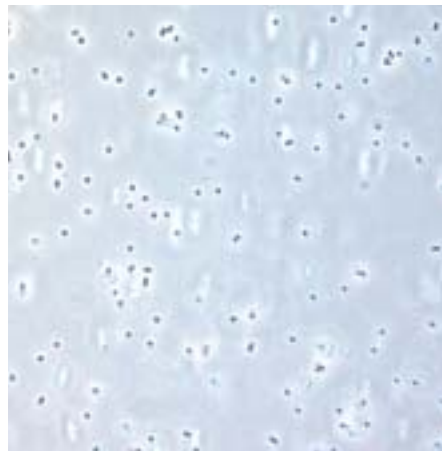
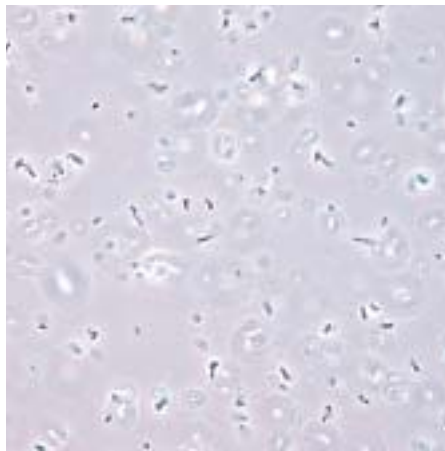


Perfect skin



Natural help for blemished skin: Ginseng promotes the multiplication of useful bacteria while inhibiting that of harmful bacteria.



Cultures of *Propionibacterium acnes* (left) and *Staphylococcus epidermidis* (right) as phase-contrast micrographs

Flawless, glowing skin is universally associated with youth, health and well-being. It is not surprising that many men and women of all ages are unhappy if their skin is marred by impurities. They often feel that their quality of life is seriously impaired.

Nutrients that promise a healthier and better life are already a trend. In other words, everyone is talking about probiotic substances. Yogurts and fitness drinks are extremely popular. Something that is good in foods cannot be bad for the skin. Henkel researchers' took up this idea in their quest for new concepts for the care of blemished skin. However, rather than probiotics, that is, the utilization of living bacteria, they were more interested in finding substances that promote the multiplication or metabolic processes of useful bacteria – i.e. prebiotics.

Prebiotics for the skin

The idea of applying the principle of prebiotics to the skin was a totally new approach to the treatment of skin impurities. A start was made toward its realization in the fall of 2002.

The aim of the project team was to find substances that selectively promote the multiplication of beneficial bacteria and simultaneously inhibit the growth of harmful bacteria. The team achieved success within a remarkably short development period. The researchers screened about one hundred substances and found that Ginseng and Epica have the desired effect. After just one week, the skin flora of volunteers showed improvement. These active ingredients restore the protective function of the skin flora and decrease the undesirable inflammation associated with impure skin.

Delicate balance

A variety of types of bacteria protect the skin by preventing harmful bacteria from establishing themselves and multiplying. A balance in the number of individual types is, however, essential. Two species of bacteria, in particular, maintain this balance on facial skin: *coagulase-negative staphylococci* and *Propionibacterium acnes*.

Coagulase-negative staphylococci prevent harmful strains of bacteria from populating the skin. *Propionibacterium acnes* produces antibacterial fatty acids which protect the skin. If this bacterium is present in excess, however, it produces too much fatty acid, causing inflammation of the skin. “Blackheads” serve as a breeding ground for *Propionibacterium acnes*. In this enclosed habitat, the microorganism can multiply especially profusely, as *Propionibacterium acnes* depends on sebum as a source of nutrients. The consequence is unsightly, pimply skin. Not only adolescents suffer from this. Men and women over 20 also have to fight blackheads and pimples. Many of those who are affected experience blemished skin as a serious problem.

Until now, the bacterial flora of impure, greasy skin have been treated with antibacterial substances. However, these substances disrupt the balance of the skin's natural flora. Possible skin irritation is ameliorated by the inclusion of soothing ingredients in such products.

The cooperation between Research, Marketing and Product Development was outstanding. The idea of “prebiotics for the skin” resulted in a product in just eighteen months. The research results have already been channeled into several product lines.

The prebiotic technology constitutes a breakthrough in the care of blemished skin. April 2004 marked the start of the international rollout of the Diadermine Purity series. This line has also been on the market in Russia since October 2005. The Aok Pure Balance product line is available in Germany and Austria and is designed for impure skin in people over 20. German teenagers, too, have also been able to benefit from prebiotic active ingredients since September 2005, through “Pure soft” from Aok First Beauty. This technology is also to be utilized in other projects in the future.

These products also make it easier for people with sensitive skin to maintain a flawless complexion. This is because, in contrast to conventional purely anti-bacterial products for treating impure skin, the prebiotic active ingredients are better tolerated by the skin. Their action is more targeted, and their effect is long-lasting. Researchers are therefore working hard to transfer the prebiotic principle to other cosmetic applications in body care.



Cosmetic products with prebiotic ingredients

In December 2004, the prebiotic team received the Research/Technology Invention Award for outstanding research achievements at Henkel.

New techniques accelerate research

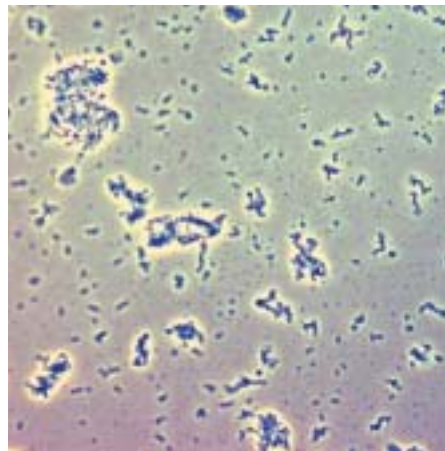
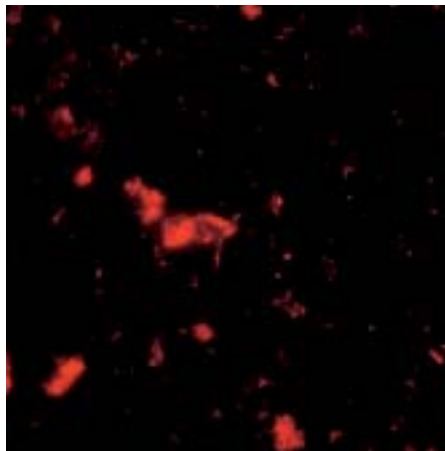
At one time, it took weeks to demonstrate the effects of a substance on the skin. Thanks to new techniques, researchers can now do this much faster and more accurately. One such method is

fluorescence in situ hybridization (FISH) from Vermicon AG in Munich (see box on opposite page). Today it is possible to identify bacteria that were previously undetectable with traditional methods, such as cultivation in nutrient media. Henkel researchers can now observe the bacteria right on the skin and thereby reveal hitherto unknown interactions.

About one trillion bacteria live on the human body. Despite the many



With the help of natural substances, they help to make skin healthy and glowing: (l. to r.): Myriam Bekkar, Dr. Dirk Bockmühl, Dr. Marianne Waldmann-Laue



The FISH method makes it possible to specifically mark certain bacteria (left) among the many that can be seen under the phase-contrast microscope (right).

similarities, the exact composition of the microflora is equivalent to a genetic fingerprint. Moreover, the composition of the bacteria changes in response to internal and external influences such as age, hygiene, environmental conditions and hormones. The more researchers learn about the basic relationships between skin microflora, the more directly they will be able to solve individual skin problems in the future. There is enormous potential here.



Fluorescence in situ hybridization (FISH):

In situ hybridization (ISH) is the name given to methods that make visible the genetic information – RNA and DNA sequences – in tissue, cells, cell nuclei and chromosomes. They can therefore be used to localize DNA and RNA directly in biological preparations – in situ, i.e. on site.

The FISH method for identifying bacteria is a special form of in-situ hybridization. It makes use of tiny DNA probes which carry a fluorescent label. The DNA probes bind only to the RNA sequences of the target bacteria. These bacteria glow when the sample is exposed to UV light, and can therefore be localized under a microscope.

The FISH method for applications in the cosmetics sector was developed for Henkel by Vermicon AG.

Prebiotic active ingredients have been incorporated into Henkel's skin care lines on an international scale.