AquaCacteen
Designed to soothe and hydrate
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Highly Effective Moisturizing and Soothing Active
AquaCacteen is an ultra-refined elixir from prickly pear (Opuntia ficus-indica). This cactus is rich in flavones, vitamins, antioxidants, minerals and piscidic acid – an iron chelator.

AquaCacteen blocks the release of stress markers from sensory nerve cells in the skin and calms and soothes irritated skin.

Furthermore, AquaCacteen has excellent hydrating properties due to its high content of water-binding compounds.

AquaCacteen is an exceptionally soothing and hydrating active – for all your skin care formulations.

Claims with AquaCacteen
• Soothes and calms irritated skin
• Protects against environmental stress factors
• Hydrates deeply with long-lasting effect
• Firms skin

Applications
• Face care
• Body care
• Sun protection creams
• Bath and shower gels
• Men’s care

Formulating with AquaCacteen
• Dermatological tolerance: the dermatological tolerance of AquaCacteen has been carefully proven in healthy volunteers with an occlusive photo-patch test.
• Recommended concentrations: 0.5 – 2%.
• Manufacturing of products: AquaCacteen can be formulated in emulsions (O/W, W/O) and gels. Dissolve AquaCacteen in the aqueous phase. Homogenization and temperatures of up to 60°C for short periods do not affect the stability of AquaCacteen.

INCI/CTFA-Declaration
Opuntia Ficus-Indica Stem Extract (and) Glycerin (and) Phenoxyethanol (and) Aqua/Water.
Opuntia Ficus-Indica
Long tradition in soothing skin care

Opuntia Ficus-Indica
Opuntia ficus-indica is a succulent cactus native to Mexico and also known as prickly pear, nopal or Indian fig. The shrub or tree-like plant grows to about 2 to 4 m in height.

Adapted to Extreme Environmental Conditions
Like other cactuses Opuntia ficus-indica has adapted to extreme environmental conditions. The “leaves” of the plant are actually modified stem segments, often called pads or cladodes, and can store large amounts of water. The original leaves have been transformed to spines, the cuticle is thickened and coated with a waxy layer to help prevent water loss and to shield the stems from intense sunlight. A biochemical protection against solar radiation is provided by flavonoids. They trap detrimental radicals that are generated by strong UV-radiation.

Opuntia is a rich source of insoluble and soluble fibers including lignin, cellulose, hemicellulose, pectin, mucilages and gums. Moreover, it contains the vitamins A, B1, B2, B3, and C, the minerals potassium, calcium and magnesium. Of specific interest is piscidic acid, an excellent iron chelator.

History and Today’s Use of Opuntia in Skin Care
The use of Opuntia as a food and medicine dates back to the Aztecs of pre-Hispanic Mexico who revered Opuntia as a sacred plant (900 – 1521 AD). At that time, the Aztecs used many more herbal medicines than the Europeans. Over many generations, they built up a wealth of knowledge and, in fact, many of the remedies they first discovered are still being used today. The Aztecs extracted the sap from Opuntia and mixed it with honey and egg yolk to make an ointment to treat burns.

Piscidic Acid in AquaCacteen
AquaCacteen has a high concentration of piscidic acid, a chelator that binds free Fe2+/Fe3+ ions. In skin tissue Fe2+ is normally bound to ferritin but UV-exposure can decompose this complex. The liberated Fe ions initiate the formation of OH radicals through the Fenton reaction. Thus AquaCacteen can prevent the formation of reactive oxygen species in skin.

Structure of Piscidic Acid
Molecular formula = C$_{11}$H$_{12}$O$_{7}$
AquaCacteen
Study results

Soothing and Protecting
In a study with 20 volunteers AquaCacteen was found to protect skin against irritation. At the beginning of the study, skin areas on the forearms were treated with occlusive SDS patches for 24 h. Six hours after removing the patches, skin redness was determined.

During the following days, the skin sites were treated with a hydrogel containing 2% AquaCacteen or a placebo. After 9 days, the occlusive SDS treatment was repeated. Again 6 hours after removing the patches, skin redness was measured.

After the first SDS treatment, the decrease of skin redness on the skin areas treated with the product containing AquaCacteen was slightly faster than the control. After the second irritation, the control areas again turned red whereas the redness of the skin areas pre-treated with the hydrogel containing AquaCacteen was only marginal.
Soothing Activity in a Cell Culture System

Sensory nerve cells (neurons) were cultured together with keratinocytes. With capsaicin, a strong irritant from chilli pepper, neurons and keratinocytes were stimulated. To quantify the reaction of the cells, the release of calcitonin gene-related peptide (CGRP) from neurons into the culture medium was measured. This neuropeptide is part of a process that leads to inflammation and itching of the skin. CGRP stimulates mast cells to release histamine that then triggers the inflammation process. Lidocaine, a local anaesthetic that blocks the release of CGRP in neurons, was used as positive control.

Stimulation of the cells with capsaicin resulted in a large release of CGRP. Lidocaine (10^{-6} M) reduced cell response by 61% and AquaCacteen (0.33 %) by 42%. This result shows that AquaCacteen can block the release of stress factors and therefore adds soothing properties to cosmetic formulations.
Skin Firming with AquaCacteen
In a study with 20 volunteers, the firming effect of AquaCacteen was confirmed. After a pre-treatment time of two weeks, a clear improvement of skin firmness could be measured. The test sites were then radiated with 1 MED. Three days later, skin firmness was found to be reduced in the area treated with the placebo emulsion whereas firmness in the zone treated with 2% AquaCacteen remained unchanged.

Skin Moisturizing with AquaCacteen in a Shower Gel
AquaCacteen was tested for its moisturizing properties in a shower gel. After an application time of one and two weeks, the rinse-off formulations increased skin hydration in a clearly dose-dependent manner.

![Graph showing skin firming results](image1)

![Graph showing skin moisturizing results](image2)
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