

## Hair Care Feature

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John Woodruff

Care of the hair involves one or more of the following processes: cleaning; conditioning; styling and colouring. Underlying these is a need to care for the health of the scalp and possibly treatment for dandruff, hair loss and the effects of ageing. An electronic presentation on Hair Care Trends available from **IFF-Lucas Meyer** records that to have beautiful hair it is necessary to have a healthy scalp and it recommends Defenscalp [INCI: Aqua, Epilobium angustifolium flower/ leaf/ stem extract]. This is a multifunctional plant-derived ingredient designed to naturally and gently regulate the *Malassezia* proliferation responsible for dandruff, while preserving the scalp microbiota ecosystem. Clinical trials show it to be effective in regulating sebum production and to reinforce corneocyte cohesion and modulate the scalp immuno-inflammatory defence system to maintain healthy, flake-free scalp and hair.

Also active against *Malassezia furfur* is Dermosoft decalact [INCI: Sodium caproyl/lauroyl lactylate] from **Dr Straetmans**. It is derived from sugar beet and palm oil and is effective against gram positive bacteria and yeasts with optimum efficacy against *Malassezia furfur* at acid pH. It is also effective against *Trichophyton* spp., the cause of athlete's foot, and is more effective than triclosan in combatting *Corynebacterium xerosis*, which causes body malodour.

Apiscalp from **Croda-Sederma** is a natural extract of *Apium graveolens* (celery) seeds obtained by the sustainable supercritical CO<sub>2</sub> extraction process. Supplied in solution in caprylic/capric triglyceride, it is claimed to provide scalp comfort by controlling the scalp microflora and by restoring the scalp epidermal integrity through regulation of epidermal differentiation and desquamation. Trials on volunteers show that it visibly reduces dandruff, soothes itchy scalp, and decreases sebum production.

Continuing the healthy scalp theme the main problems encountered are itchy scalps caused by chemical or microbial inflammation, over production of sebum

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that causes greasy hair, and impairment of the barrier function, leading to scalp dryness, irritation and flakiness. **Ajinomoto** recommends Ajidew ZN-100 [INCI: Zinc PCA], which has moisturising properties and is part of the NMF, to soothe itchy scalps and combat *Malassezia furfur* as well as other yeasts and moulds, and it also reduces sebum production.

**Rahn** reports that sensitive, hot and itchy skin is often caused by excessive inflammation, which affects skin barrier function and can eventually lead to accelerated skin ageing. It offers Defensil-Plus to alleviate stressed, sensitive and irritable skin. Based on *Ribes nigrum* (black currant) seed oil and *Cardiospermum halicacabum* (balloon vine) flower/leaf/vine extract in combination with *Helianthus annuus* (sunflower) seed oil unsaponifiables, it reduces inflammatory processes and replenishes the damaged skin barrier.

Also from **Rahn**, Defensil combines *Cardiospermum halicacabum* (balloon vine) flower/leaf/vine extract and *Helianthus annuus* (sunflower) seed oil unsaponifiables with *Echium plantagineum* seed oil to soothe irritated skin and scalps. *Echium* oil is very rich in stearidonic acid, an essential omega-3 fatty acid, which inhibits the 5-lipoxygenase enzyme and thus retards the inflammatory mechanism.

Gene expression studies by **DSM** show that its Pentavitin [INCI: Saccharide isomerate] stimulates key genes to improve skin barrier function and a variety of in vivo studies confirm its ability to strengthen the skin barrier and maintain deep hydration for 72 hours. This imparts a soothing action that, due to its unique binding mechanism to free amino groups of lysine within keratin, is not lost when contained in rinse-off products. It is recommended at 1 – 5% for scalp protection conditioners and at 0.2% for calming and hydrating scalp cleansers.

According to **BASF Care Creations** environmental pollution and damaging UV irradiation causes hair to lose volume and colour, to look dry and become

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more porous and less pleasant to the touch. Contrary to the skin, that has different mechanisms to fight against stress and to regenerate normal metabolism, hair is quite vulnerable, lacking such systems for self-protection. To protect hair against pollution effects and at the same time improve its aesthetic and mechanical properties, **BASF** developed Puricare.

Puricare is a peptide obtained by extraction of *Moringa oleifera* seeds in an aqueous-glycolic medium and tests show that it protects hair against environmental pollution by exhaust gases and UV radiation. Also when hair was treated with a shampoo containing 2% Puricare it was shown to protect hair against pollution by particle deposition and adhesion and it had a good strengthening effect on damaged hair. **BASF** produce a wide range of hair care actives and these are summarised in a newsletter available from **Kemcare**, now part of Safic-Alcan.

In the preamble to its brochure describing Vital Hair & Scalp Complex **Lonza** suggests that as people age, their hair begins to thin as a result of hair loss and reduction in the active anagen phase of hair growth. The subcutaneous fat layer of the scalp also thins and hair becomes more brittle. The ability of the hair cortex to absorb melanin begins to diminish and the hair starts to lose its youthful colour and shine.

Vital Hair & Scalp Complex comprises aqua, *Saccharum officinarum* (sugar cane) extract, *Citrus limon* (lemon) fruit extract, betaine, hexylene glycol, *Pyrus malus* (apple) fruit extract, *Camellia sinensis* leaf extract and hexapeptide-1. The combination of alpha hydroxy acids promotes cell renewal on the scalp by keeping follicles clear and open for healthier hair growth. On a cellular level, the follicles are energised by trimethylglycine (betaine) while a naturally derived peptide enhances the anchoring function of the follicle. Together with

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the protective qualities from the antioxidants present in Vital Hair & Scalp Complex, smoother feeling, stronger hair is achieved.

Stimulating hair growth is a much sought after property and many methods have been advocated, including enriching blood flow to the scalp and slowing down the transition from the anagen growing phase to the telogen resting phase. After screening different active molecules, **Symrise** found an extract of a micro-algae, *Isochrysis galbana*, to be the best candidate capable of increasing the number of hair follicles in the anagen phase while reducing the number of apoptotic cells. This active material cultivated in the South Pacific forms the basis of SymHair Force 1631 [INCI: Pentylene glycol, plankton extract] and testing shows a significant increase in the life of growing hair.

Capixyl from **Lucas Meyer Cosmetics** comprises the biomimetic peptide acetyl tetrapeptide-3 and an aqueous/glycolic extract from *Trifolium pratense* (clover) flower. It reduces damage caused by inflammation, thus giving fuller, thicker and healthier looking hair and has a direct action on 5- $\alpha$ -reductase, which modulates dihydrotestosterone (DHT) to help prevent hair miniaturisation. Tests show that Capixyl induces a visible increase in anagen hair density in comparison with results from a placebo.

SalSphere Natural Hair Growth Promoter from **Salvona** is a targeted delivery system that promotes hair growth and thickness through natural ingredients including shea butter derivatives and procyanidin B2 from *Pyrus malus* (apple) fruit extract. SalSphere is a proprietary technology comprising sub-micron spheres with a diameter of approximately 0.1 - 0.3 microns. The core of the sphere is infused with procyanidin B2 and the outer shell is hydrophilic. Procyanidin B2 enhances the proliferative capacity of hair epithelial cells, including stem cells and outer root sheath cells. It activates the reversion of the telogen to anagen phase by promoting growth of hair follicles from near the

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epidermis into the deeper dermal layers, resulting in an increase of both hair diameter and density. Procyanidin B2 also reduces inflammation via anti-oxidative and protease inhibition abilities to provide a healthy scalp for hair rejuvenation.

Nucleo Trico-Hyal from **IRA** is a transdermal delivery system based on cross-linked hyaluronic acid, polyphenols from olive oil and polynucleotides developed as an anti-hair loss and detoxifying agent for use in hair treatment products. The high anti-oxidant activity of polyphenols improves follicular activity, detoxifying cells and combating greying caused by ageing.

Polynucleotides stimulate cellular regeneration and multiplication, they penetrate the follicle optimising bulb oxygenation and increase cellular metabolism. This combination stimulates hair growth; improves cellular integrity through its anti-oxidant action and reconstructs the structure of the hair, providing an anti-ageing complex with essential active ingredients to protect hair from free radicals and oxidative stress.

A material launched at In-Cosmetics 2016 for promoting hair growth was Fuji Mulberry Root Extract from **FujiSangyo Co.** It is a 70% alcohol extraction of *Morus alba* root claimed to lengthen the anagen stage. A second hair growth promoting product from **FujiSangyo** is Fuji Banjiro Leaf Extract from guava leaf that stimulates the hair follicle and dermal papilla cell activity and has antiandrogen effects.

Over time, hair is subjected to many damaging influences, such as sun, pollution and chemical and thermal treatments. These processes can generate free radicals and result in lipid peroxidation and a considerable loss of protective oils. When hair is damaged, it is no longer soft and shiny but porous, dry and dull. Sunflohair [INCI: Phospholipids, *Helianthus annuus* (sunflower) seed oil] by **Lucas Meyer** has antioxidant properties and a strong affinity with

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hair. It is able to compensate for loss of natural oils by penetrating the hair fibre and restoring the lipid balance. It is also claimed to prolong and increase the colour intensity of dyed hair and aid pigmentation fixation and can be used with all types of semi-permanent and permanent hair dyes and is stable up to pH 12. Hair can become coarse with ageing however a conditioning agent trade named Crodazosoft DBQ [INCI: Quaternium-91, cetrimonium methosulfate, cetearyl alcohol] from **Croda** is shown to soften grey hair and protect artificial hair colour. Quaternium-91, consists of two vegetable derived behenyl C22 chains attached to an imidazoline backbone. The behenyl carbon chains are lipophilic and contribute the conditioning properties, while the imidazoline moiety promotes softness.

Another anti-ageing product from **Croda** is Keratec IFP PE [INCI: Aqua, keratin, hydrolyzed keratin], which is a patented keratin-derived active that helps protect the hair from environment stress. Capable of penetrating the cortex and creating a shield on the surface of the hair, it provides a nourishing and protective mechanism which is truly age-defying, claims Croda.

Loss of hair colour, whether through environmental factors or age is a cosmetic problem. **Sabo** is an Italian company that has long specialised in providing materials for hair colouring and protecting the hair against colour loss. It produces a range of Sabowaxes, which are self-emulsifying bases that can be used to prepare hydrogen peroxide creams, and a number of emollient esters for temporary hair colouring products, creams and oxidising bases. According to **Sabo**, an ideal hair colouring emollient should be stable in oxidative conditions, show ready solubilising of dye, be polar to help increase emulsion stability and be medium spreading to avoid hair build-up effects. Saboderm EDL [INCI: Hexyldecanol, hexyldecyl laurate] is said to meet these criteria.

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Melitane [INCI: Glycerin, aqua, dextran, acetyl hexapeptide-1] from **Lucas**

**Meyer Cosmetics** is a peptide agonist of the  $\alpha$ -melanocyte stimulating hormone). It is a natural photo-protector and inflammation modulator that stimulates pigmentation and melanin synthesis in hair in response to solar radiation. When used in hair applications at 0.5 – 5% Melitane helps reduce the greying of the hair bulb.

Blondes are said to have more fun! GoBlond [INCI: Aqua, Linum usitatissimum (linseed) seed extract, polyquaternium-7, sericin, fibroin, guar hydroxypropyltrimonium chloride, hydroxypropyl starch phosphate] from **Chemyunion** is said to provide active protection of the hair fibre during the bleaching process for improved smoothness, strength and shine. Composed of silk proteins, interlaced through a network of polysaccharides, GoBlond is added to the bleach and developer before applying to hair and it provides an efficient delivery system that allows the entire bleaching process to take place without compromising the integrity of the hair fibre.

Similar claims are made for Active Lite Hair from **Active Concepts**. It is a combination of polyquaternium-80 to provide conditioning benefits, hydrolysed pea protein rich in lysine that provides anti-oxidant protection, and Selaginella lepidophylla extract, which is a rich source of carbohydrates. It is said to provide a bio film of proteins, amino acids and polysaccharides that creates a complex supporting interwoven matrix. It is cationic so substantive to hair and it penetrates between uplifted scales to seal and close the cuticle while small molecules and hydrogen ions can still pass through its semipermeable facades. It is added to the bleach solution prior to application and it results in smooth, stronger hair.

Amino acids find particular applications in hair care; **Ajinomoto** propose the use of L-arginine as a partial replacement for ammonia in permanent waving

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and hair colouring and to replace triethanolamine or aminomethylpropanol to neutralise carbomer and other acidic polymers in styling products. It is very water-soluble and has a high affinity for hair, particularly if the cuticle is damaged, and has excellent moisturising properties. Also claiming to provide the benefits of amino acids to hair treatments ProdeW 500 from **Ajinomoto** is a mixture of sodium PCA, sodium lactate, arginine, aspartic acid, PCA, glycine, serine, valine, proline, threonine, isoleucine, histidine and phenylalanine in aqueous solution. It is recommended for colour protection after dye treatment and imparts lustre and brilliant appearance to hair.

There are various materials from **Croda** aimed at improving the process of hair colouring and for protecting the colour against fade. Crodafos HCE [INCI: Oleth-5 phosphate, diolethyl phosphate] delivers hair dyes deep into the cortex allowing the colour to fully develop in the hair shaft. Incorporating Crodafos HCE into hair dyes is shown to provide more colour uptake for richer, longer lasting colour. VibraRiche from **Croda** is a vegetable-derived quaternary ammonium compound [Rapeseedamidopropyl ethyldimonium ethosulfate, quaternium-96] that delivers shiny, more vibrant and longer-lasting colour to hair.

Parsol SLX [INCI: Polysilicone-15] from **DSM** is a polymeric UVB filter that protects hair from the effects of solar radiation including colour fade, structural damage and loss of mechanical resistance. From **Croda**, Arlasilk PLN [INCI: Linoleamidopropyl PG-dimonium chloride phosphate dimethicone] is shown to extend the life of artificial hair colour when used in after-dye conditioners. It is a broad spectrum UV absorber, offering UVA absorbance and giving proven colour fade protection for dyed hair. Also from **Croda**, ChromAveil is quaternium-95 in propanediol that is an alternative broad spectrum UV absorber to protect dyed hair from colour fade.

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The last process that hair undergoes is usually styling; this may be a simple combing, in which case good conditioning is essential to reduce combing friction and loss of cuticle. Quite likely it will entail spraying a styling product based on suitable polymers onto the hair.

Recent trends in hair styling was the subject of a presentation by Maryalice Belluscio of **AkzoNobel** at In-Cosmetics 2016. Apparently products for adding volume, stiffness, humidity and weather resistance are now expected to last for 24 to 72 hours. There is a trend towards shiny hair that can be associated with moisturising claims to make hair look and appear healthier and multifunctional styling products are expected to add additional benefits including conditioning, moisturising, UV protection, thermal protection and colour protection. In the last year, 15% of all styling launches were geared towards men with favourite formats being gels, creams, putty and waxes and 24% of recent styling launches were marketed as natural.

**AkzoNobel** supply a wide range of styling polymers to meet various claims. Biostyle polymers GGP and XH are both non-ionic maltodextrin/VP copolymers of different molecular weights that add volume to hair. They may be used to prepare crystal clear solutions and styling products with a naturally derived fixative polymer that provides exceptional gel clarity and robust carbomer compatibility. Celquat L-200 Polymer is a cationic cellulose derivative claiming to combine volumising and conditioning properties with superior hold. Thermal protection is offered by Amphomer Polymer [INCI: Octylacrylamide/acrylates/butylaminoethyl methacrylate copolymer] and DynamX H2O [INCI: INCI: Polyurethane-14, AMP-acrylates copolymer].

A number of styling polymers were launched at In-Cosmetics 2016: RevCare from **Revolymmer** is a sodium itaconate polymer that is freely soluble in water. It can be incorporated in alcohol-free sprays and gels to provide a weather-

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resistant strong hold for 48 hours. **Covestro** launched Baycusan C 1010, a dispersion of polyurethane-34 that forms a flexible and elastic film around the hair and protects it in any weather without stickiness. It provides the hairstyle with lasting curl retention and can be combed out without leaving any residue.

**Croda** markets hair styling products under its Mirustyle trade name: MiruStyle MFP PE is a biopolymer of hydroxypropyltrimonium hydrolyzed corn starch that is claimed to leave hair smooth and to deliver outstanding style retention benefits without dulling or altering the feel of the hair: MiruStyle X-HP [Laureth-40 maleate/styrene sulfonate copolymer] and Mirustyle X-HV [Sodium methoxy PEG-16 maleate/styrene sulfonate copolymer] provide defence against the intense heat generated by modern styling appliances, not only protecting, but also improving the condition of the cuticles: MiruStyle CP delivers curl memory benefits and holds without stiffness or dulling.

**Note:** In most cases only the principal active ingredients are identified in the INCI lists in this feature and those interested are urged to contact the supplier for further information.

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