

Feature; Body Parts, the Outer Extremities
John Woodruff

Although, other than sun protection, most skin care regimes are aimed at the face and neck the body presents a much greater surface area and has its own problems, which may be alleviated by the topical application of cosmetic products. An obvious example is the hands, which may appear to age more quickly than the face. This is not surprising as the backs of the hands are exposed to sunlight, resulting in pigmentation disorders, and they are also the most frequently washed part of the body, so are subject to loss of barrier properties and excessive dryness.

Feet are a different problem; for much of the year those in Northern climes are encased in footwear, only making an appearance when the weather improves. This means they may sweat and develop a characteristic odour during winter months and then be dry during the summer. These problems may be helped by suitable foot baths, refreshing foot sprays and deodorants. Hard skin and cracked heels may be improved by skin removing compositions and moisturisers.

Moving upwards women may have problems with hair growth on the legs and cellulite on the thighs, stretch marks on the stomach and breasts may suffer loss of firmness and shape. Men are not usually bothered by their own body hair but do put on weight around the middle Add in tired legs and dry scaly knees and elbows and the possibilities for cosmetic applications are endless and, not surprisingly, there are products suggested for all these potentially problematical areas.

This feature is going to focus on ideas for hands and feet: starting with the hands; frequent exposure to soaps and detergents removes skin lipids and destroys their natural barrier properties. Barrier creams tend to be water-in-oil (w/o) emulsions, frequently with a high content of silicones. A simple formula from **Azelis** is a good example of this product type.

| Trade name | % w/w | INCI |
|---|-------|---|
| Phase A | | |
| DC 5225C Formulation Aid | 10.00 | Cyclopentasiloxane, PEG/PPG-18/18 dimethicone |
| Xiameter PMX-0345 | 10.00 | Cyclopentasiloxane, cyclohexasiloxane |
| Xiameter PMX-1501 | 10.00 | Cyclopentasiloxane, dimethiconol |
| Arlamol PM3 | 0.50 | PPG-3 myristyl ether |
| Phase B | | |
| Water, deionised | 61.75 | Aqua |
| Glycerine | 5.00 | Glycerin |
| Sodium Chloride (Pure) | 2.00 | Sodium chloride |
| Paratexin IU | 0.25 | Imidazolidinyl urea |
| Fragrance to suit | 0.50 | Parfum |
| Mixing Instructions: This is a cold mix. Mix phase A; mix phase B; add phase B slowly to phase A with fast mixing. Add phase C. | | |

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Kodasil Drytouch 701 from **Koda Corporation** is a combination of alkyl and other silicone compounds compatible with low to medium polar organic emollients such as triglycerides, esters, hydrocarbons, and waxes. It is said that the silicone content enhances skin feel and offers water repellent properties, making it of interest for hand creams and barrier creams. From the same company, Kodasil 171 is a silicone copolymer network comprising a C30-45 alkylated-silicone gel in cyclopentasiloxane that provides a dry tack-free skin feel with moisturising and water repellent activity. If silicones are to be avoided Kodanol D and Kodanol P may be suitable as replacements. They are described as ready-to-use moisture binding polymeric dispersions to enhance the texture, moisture and flexibility of formulations and they spread evenly without leaving a tacky after-feel.

Bimiol BSC 033 from **BSC Skin Care Developments GmbH** is a lamellar system that regenerates the lipid barrier of the skin because it imitates the skin's own barrier function. It is a ready to use mixture containing triglycerides, fatty acids, cholesterol and ceramides, all of which are present in the skin's natural defence system [Note 1]. Also forming lamellar liquid crystals and with a structure said to be identical to ceramide is **Eldew PS-203** from **Ajinomoto**. It is an emollient derived from glutamic acid and phytosterols with a high water binding capacity to provide an improved skin feel on the outer side of the hand without making the palm feel greasy.

Ingredients that form lamellar structures are a speciality of **Lucas Meyer**, which supplies Simulskin, a mixture of phospholipids and fatty acids that is designed to act as a second skin barrier and to enhance its moisture holding capacity. Lucas Meyer also supplies Hydroporine [INCI: Betaine, aqua, glycerin, hydrogenated lecithin, honey and pectin], which acts on the aquaporine channels, providing intense moisturising.

A problem with hand creams and lotions is they need to provide a high proportion of oils and humectants but must absorb and dry quickly and without stickiness. The trend in all skin care is to introduce natural materials and most ingredient suppliers have an extensive range from which to make a selection. Of particular interest may be the Lipobutter line of natural emollients derived solely from natural plant sources that are rich in essential fatty acids. Supplied by **Lipo Chemicals France**, Lipobutters are available in thirteen varieties, nine of which are validated by Ecocert [Note 2]. Of these Lipobutter Shea is recommended for its protective and moisturising properties and is rich in oleic acid and vitamins A and E.

The emulsifier plays an important part in the creation of highly emollient creams and there are new and interesting introductions that meet the natural trend criteria. An example is Beautyderm HP [INCI: Glyceryl stearate; cetearyl alcohol; stearic acid; sodium lauroyl glutamate] from **Dr. Straetmans**. It is of vegetable origin and is able to emulsify oils and fats of different polarity and viscosity, even if present in high percentage. It forms emulsions with very small droplet size and a liquid crystalline structure and it has a strong moisturising action, thanks to the presence of sodium lauroyl glutamate, which undergoes enzymatic degradation by the skin enzyme protease to release sodium PCA.

Urea is an intensive skin moisturising agent; however it is difficult to achieve stability in o/w emulsions due to potential drift of pH and release of ammonia. This problem

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may be solved by incorporating urea into a w/o system stabilised by an emulsifier called Neocare P3R [INCI: Polyglyceryl-3 polyricinoleate] from **Gova**. Not only is the urea emulsion stable but it also feels pleasant on application, providing emolliancy without stickiness or drag, making it very useful for hand and foot creams and for treatment of dry skin patches on elbows and heels.

An interesting emulsifier and rheology modifier from **Croda Europe** is ViscOptima SE [INCI: Sodium polyacrylate, ethylhexyl cocoate, PPG-3 benzyl ether myristate and polysorbate 20]. Described as a highly efficient rheology modifier it thickens immediately upon addition to water creating a viscous cream. It has the ability to self-emulsify and stabilise up to 30% oil phase such as natural oils, emollient esters and silicones, with the maximum level of oil dependent on the type used and the level of polymer. ViscOptima SE boasts shear thinning rheology and is non-thixotropic. This results in a reduction in viscosity when a force is applied to the formulation, such as pumping or spraying, and immediate recovery of the viscosity when the force is no longer applied.

Although at opposite extremities the hands and feet share many of the same problems and the Lipobutters and emulsifiers mentioned for hands find equal use in products for dry feet and cracked hard skin on elbows and knees where the need is for intense moisturising and skin softening. Panthenol is a favourite ingredient for adding moisture to hair; its oil-soluble derivative D-Panthenyltriacetate from **Induchem** is claimed to be more thermo-stable than panthenol and to have excellent skin compatibility, releasing its moisturising properties over an extended period. On application it is thought to undergo transformation to pantothenic acid, which is a precursor to co-enzyme A, and it is claimed to improve the moisture retaining capacity and smoothness of skin and to inhibit irritation and inflammation.

Age spots, also called liver spots and more accurately termed lentigines or lentigos, are sharply defined, rounded, brown or black, flat patches of skin. The epidermis is expanding with more pigment, developing what looks like a large freckle. One may appear by itself, or as a few clustered together. While liver spots may develop at an early age, even in childhood, they are more common in older people, especially those who have spent too much time in the sun. The spots are not cancerous, nor do they lead to cancer. However, on skin exposed to the sun, they may be accompanied by precancerous scaly, red elevations of the skin called actinic keratoses. Dark spots, which might be cancerous, may also appear to be lentigines so these blemishes should first be evaluated by a dermatologist [Ref 1].

A quick search on the web reveals the extent of interest in removing lentigines with treatments ranging from dermabrasion, chemical peels and the use of cryosurgery and lasers as well as the less traumatic application of fade creams. A commonly used method is to use glycolic acid or salicylic acid as a chemical peel but whatever method is used it is important to protect the affected areas from the sun or the spots will soon reappear. The approach suggested by **Malvern Cosmeceutics** is the application of its Lipodisq delivery system for controlled release of the active ingredients sodium ascorbyl phosphate and niacinamide, which will help to lighten areas of pigmentation, and also help to protect the skin and reinforce the lipid barrier.

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Lipodisq is a biodegradable particle system developed specifically to deliver oily or lipophilic active agents including fat soluble vitamins and botanical extracts into the outer layer of the skin. The structure of Lipodisq is based upon natural high density lipoproteins responsible for transporting fats around the body and like their natural counterparts, are biodegradable being formed from membrane phospholipids, surfactants and co-surfactants derived from vegetable sources that are broken down in the skin by enzyme activity. They are typically 10-40 nm in diameter, depending on the chosen actives, and *in-vivo* dye penetration studies indicate that they penetrate the stratum corneum to a depth of some 10-15 layers.

Gattefosse suggests either Malt Secrets or Synerlight to reduce the appearance of age spots. Malt Secrets is obtained from malted barley and is said to be rich in polyphenol derivatives with anti-oxidant properties that protect the skin from the damage caused by free radicals and fight against pigmentation disorders. Synerlight is described as a natural blend created from extracts of Kiwi and Sophora in butylene glycol of vegetable origin. *Sophora angustifolia* is claimed to possess anti-elastase and anti-hyaluronidase properties and Kiwi fruit extract shows a significant inhibiting action against tyrosinase and hyaluronidase enzymes. The combination of these two ingredients can be used to fight age spots as well as hyperpigmentation and will also help preserve the skin moisture content by protecting hyaluronic acid in the skin tissue.

Actiwhite from **Laboratoires Sérobiologiques** can be used in hand creams to fade the appearance of age-spots, hyperpigmented areas and freckles due to the inhibition of melanin synthesis. Its active ingredients are sucrose dilaurate and Pisum sativum (Pea) extract and it is available as a powder version with maltodextrin or in liquid form in aqueous/glycerine solution. Its suppliers claim that sucrose dilaurate was identified as a powerful melanogenesis inhibitor and that Pisum sativum extract, when combined with sucrose dilaurate, imparts a synergistic effect on reducing tyrosinase activity.

Whitesphere Premium from **Soliance** is a combination of magnesium ascorbyl phosphate, glabridin extracted from the roots of *Glycyrrhiza glabra* and a peptide extracted from a brown macroalgae, *Undaria pinnatifida*. These ingredients are encapsulated using Spherulite technology, to be delivered directly to the target melanocytes in the epidermis. They were selected for their effective whitening properties by inhibiting tyrosinase activity, and by preventing dopaquinone oxidation into melanin precursors. A panel of 17 volunteers with an average age of 60 years applied a cream containing 1% Whitesphere Premium on the upper side of the hand, twice a day for 56 days resulting in a visible fading of dark spots and a more even skin tone. [Note 3]

Gigawhite from **Alpaflor** is described as a synergistic mixture of Alpine plant extracts to fade age spots and to improve the complexion. The extracts include those from *Malva sylvestris* (Mallow), *Mentha piperita* (Peppermint) leaf, *Primula veris*, *Alchemilla vulgaris*, *Veronica officinalis*, *Melissa officinalis* leaf and *Achillea millefolium*. Illumiscin from **Rahn** contains stabilised vitamin C to increase collagen synthesis and also brighten the skin and zinc PCA to activate the transport of vitamin

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C within the skin. It also contains oleuropein, a polyphenol from olive leaves that helps prevent the formation of age spots and it also has antimicrobial properties.

Not all actives are of natural origin; Synvea HR [INCI: Hexylresorcinol] from **Syntheon** is said to be four-times more effective in lightening skin than hydroquinone and when used in combination with niacinamide results can be seen in 2 weeks. It effectively inhibits multiple sites in the melanogenesis pathway and competes with tyrosinase for active binding to reduce hyperpigmentation and age spots.

Returning to feet; foot odour and fungal infections are a common problem. **Dr Straetmans** suggest Dermosoft Decalact as an alternative to using fungicides.

Dermosoft products are multifunctional cosmetic ingredients with properties like hydrating, conditioning and masking combined with an antimicrobial profile.

Dermosoft Decalact is based on a synergistic mixture of middle chain acyl lactylates and its antimicrobial efficacy is optimised to act specifically against microorganisms that cause skin disorders like dandruff or athlete's foot and to avoid skin malodours.

Also from Dr Straetmans and aimed at deodorant applications is Dermosoft Decalact Deo; a mixture of acyl lactylate, triethyl citrate and sage oil. Sage oil has an antimicrobial effect as well as having astringent, anti-inflammatory and analgesic properties.

From **Sisterna** SP70-C [INCI: Sucrose stearate] and L70-C [INCI: Sucrose laurate] offer specific anti-microbial properties against athlete's foot which is mostly caused by *Trichophyton rubrum* and *Trichophyton mentagrophytes*. SP70-C and L70-C inhibit the growth of both and are also effective at reducing odour from perspiration caused by *Corynebacterium xerosis* and *Corynebacterium minutissimum*.

Other ideas for combating foot odour have been submitted by **Givaudan**, which suggests Sinodor [INCI: Citronellyl methylcrotonate] that works by bonding with odour volatile components, and **Tri-K** suggested Deosent. Deosent is described as a naturally derived material containing enzymes that provide bioconversion of a wide range of malodorous substances and is effective on amines, mercaptans, esters, aldehydes, thiols and alcohols. **Carrubba** offers Deoplex: [INCI: Sacharomyces ferment] as a vegetable-derived odour absorber to remove all mammalian body odours. **Symrise** suggests either SymDeo MMP [INCI: INCI: Dimethyl phenyl 2-butanol] or SymDeo B125 [INCI: Methyl cyclohexylpentanol], both of which act on the bacteria that cause malodours. Symrise publish the results of *in-vivo* sniffing tests, which must be one of the more specialised and unpleasant jobs in the cosmetic industry.

Feet encased in footwear can feel hot during the day; Questice Liquid from **Givaudan** is an alternative to using menthol as a cooling aid. Its cooling sensation is longer lasting than menthol and is less likely to irritate the skin.

Cracked heels are a common foot problem; when the water content in the stratum corneum is lower than 13%, the corneocyte cells lose their biomechanical properties and the skin becomes dry and loses elasticity and flexibility, the production rate of new corneocytes decreases and scaling and cracking of the skin enables more water evaporation. Dry hard skin may be exfoliated with scrub particles, of which there are numerous varieties available. They need to be incorporated in a suitable base such as a gel or a thickened mild surfactant system but in either case the particles may float to

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the surface or sink to the bottom of the container. Two articles by Elizabeth Connock of **A&E Connock** and available on line explore these problems and show how they can be overcome [Ref 2, 3].

Once the outer layers of hard, dead skin have been removed steps can be taken to soften the remainder and reduce the likelihood of subsequent build-up. Gatuline Skin Repair Bio from **Gattefosse** is based on an aqueous-alcoholic extract of the cotton thistle, *Onopordum acanthium*, a medicinal plant known for its stimulating and cardiogenic properties. The extract consists primarily of sugars, flavonoids with antioxidant and anti-free radical properties and sesquiterpenic lactones that possess biological properties, due to their particular chemical structure.

Clinical studies available from Gattefosse show that by stimulating keratinocyte differentiation, Gatuline Skin Repair Bio repairs skin damaged by burning, lesions or trauma and its dermo-protecting effects also benefit dry skin. The cohesion of the cutaneous barrier is strengthened, stabilising and regulating skin hydration, which maintains the flexibility and softness of the skin.

A natural biopolymer known as Tara Gum may be extracted from the seed endosperm of the *Caesalpinia spinosa*, a plant that grows in the Andes. Its fruits contain 4 to 7 seeds; 30% of each seed is composed of endosperm, which is itself composed of 80% mannose and galactose polysaccharides called galactomannans. **Provital** supply this material under the name Hydromanil, which is described as a novel hydrocolloidal three-dimensional matrix of galactomannans. It releases oligosaccharides into the stratum corneum in a sequential way, and its cumulative and long-lasting moisturising properties make it suitable for specific products to treat dry and damaged skin such as cracked heels and scaly patches elbows and knees.

Note 1 Many mixtures have too many components to list against trade names so generally only the principal active ingredients are shown. Refer to the supplier for complete details.

Note 2 Probably the majority of natural materials mentioned in this feature are approved by Ecocert. Contact the suppliers for confirmation.

Note 3 All materials mentioned by trade name in this feature have their claims backed by documentary evidence available from the suppliers.

Ref 1 <http://www.asds.net/LiverSpotsAgingHandsInformation.aspx> , cited 28/06/12

Ref 2 http://www.connock.co.uk/articles_particulates.htm, cited 03/07/12

Ref 3 http://www.connock.co.uk/articles_exfoliants.htm, cited 03/07/12

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