Hair Care Feature
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John Woodruff

Ever since people had time to socialise with fellow cave dwellers hair they have cut, shaped and styled their hair. Pictures on coins and pottery illustrate the hairstyles of ancient civilisations. In the ancient Minoan civilization the women wore their hair long with elaborately fashioned locks. Egyptian hairstyles varied from one time period to another. During the Old Kingdom, hairstyles were usually short. During the New Kingdom Period, the style was to wear the hair longer and sometimes braided. The Romans had simple hairstyles; men originally had long hair, but later short hair became fashionable. Young girls wore their hair combed down to the neck, strengthened with ribbons and hairpins, plaited or tied into a bun. Married Roman women had their hair combed up into a hairstyle called a tutulus. Later, Roman women wore hairstyles with a parting along the middle of the head. Curly hair was rolled up into ringlets during sleep and striking and complex high hairstyles composed of curls arranged in steps above the forehead, so that they formed a rich headband came into fashion.

The hairstyles of Medieval women were first long and flowing and clearly visible then long plaits then came into fashion and hair was hidden from view under a wimple Hairstyles then changed and coiled buns were displayed on each side of the head then came smooth hair, parted in the middle and on display above the forehead but the remaining hair was hidden by a bonnet. In Victorian times hair was often severely damaged from the relentless use of hot irons and it was not uncommon to have ones hair reduced to a wool-like texture. Hair was never cut except in cases of serious illness.

The simplicity of the smooth, centre-parted styles worn by women in the Victorian era lasted until the 1870s, when the Parisian hairdresser M. Marcel Grateau created a new, natural-looking wave using a heated iron that imitated the natural curl of the hair. Hot tongs were applied to produce a curl rather than a crimp and it revolutionized the art of hairdressing all over the world and the Marcel wave remained popular for almost half a century.

What is apparent when studying historical hair styles is that in every era they changed as people chose to emulate the trend setters of their group. Even the means of achieving those styles has little changed with crimping irons, ceramic tongs, gums and resins and chemical styling still in common use and the formulator may be briefed to produce products for any method of hair styling,

What has changed is the bewildering array of product types and the steady improvements in styling polymers. A presentation by Trevor Baker, **Cornelius Produce Co**. showed how he created a classification system to clarify the range of product types used in products for today's styling market. He divided products into light and heavy and discussed the various compositions that fitted this classification. A modified form is tabulated as follows:-

Light	**Heavy**
Serums: low viscosity, usually clear liquids. Containing water or water free	Wax: waxy feel, little or no water
Liquid emulsions: opaque, viscous liquids with cream/ lotion texture. Containing some oil phase	Emulsion: less waxy more cream like
Gels: gelled liquid. Carbomer type,	Stick

modified gel type or micro-emulsions	
Mousse pump and aerosol	
Sprays; pump and aerosol	

The original serums were high molecular weight dimethiconol dispersed in cyclopentasiloxane. They spread very readily over the hair shaft, seal split ends together and give shine to the hair. Suppliers of silicone compounds simplify formulation by supplying prepared dispersions, which are then modified by the addition of further materials. More cyclopentasiloxane or low viscosity hexamethyldisiloxane may be added to thin the product or Pecosil G, **Phoenix Chemical, Inc**, a highly lubricious silicone gel comprising dimethicone cyclomethicone phenyltrimethicone and trimethylsiloxysilicate may be added to increase viscosity. Pelemol PTL, INCI: Pentaerythrityl tetralaurate is soluble in cyclopentasiloxane and may be added as a rheology modifier and phenyl trimethicone is added to improve gloss.

Although the material cost is high the method of application using a small pump container is very economical. Alternatively the silicone phase can be emulsified to give a serum-gel and **Wacker Chemie AG** produce three dimethiconol emulsions: DP6001 DP is a 60% active anionic silicone emulsion with a high viscous dimethiconol for improving reduction of wet and dry combing forces and provides soft hair grip.

Whatever the basis for liquid and gel-type hair styling products the two factors of paramount importance are hold and shine and it is in these areas where most advance has been made. Phenyl trimethicone has long been the silicone of choice for adding shine to hair but other materials with high refractive index such as polybutene are also suitable. **Luvitol Lite**, BASF, INCI: Hydrogenated polyisobutene, provides a smoothening function that provides a more even, softer and smoother hair shaft, resulting in a more intense shine when added to hair styling products.

Syntrans are a range of bimodal polymers based on polyacrylates from **Interpolymer Corporation** suitable for low VOC aerosol application of hair sprays. They claim to provide quick setting with high humidity curl retention, to be easily removable with minimum build-up and to provide excellent film flexibility combined with high gloss and good sensorial properties.

Dow Corning 5-7070 Si Amino Elastomer Emulsion is a combination of amino functionality to enhance conditioning performance and elastomer technology for styling benefits. INCI: Silicone quaternium-16 / glycidoxy dimethicone crosspolymer (and) trideceth-12 it is said to combine good curl retention with flexible hold and

Victorians styled their hair with heating irons, which were extremely damaging. Today's equivalents are ceramic tongs, which reach such high temperatures, up to 220°C, that water within the hair shaft reaches boiling point. The resultant steam causes blistering and raises the edges of the cuticle and also the strength of the hair is significantly reduced. The roughened hair requires an increase in combing forces, which results in cuticle loss and hair breakage.

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MiruStyle X-HP from **Croda** is designed to significantly reduce hair damage caused by thermal styling processes.

Submitted evidence to prove its efficacy shows the results of combing studies, 3-dimensional SEM imaging techniques, flexabrasion tests and curl retention studies as well as salon trials. Whereas a hair treated with a basic spritz before thermal styling showed an increase in cuticle height of about 80%, the addition of 0.5% sodium polystyrene sulfonate or of PVP/DMAPA acrylates copolymer halved this and 0.5% Mirustyle X-HP actually reduced cubicle height, thus smoothing the hair. This results in a significant reduction in combing forces required to style the hair and hair strength was also protected. Curl retention and salon trials also showed excellent results. MiruStyle X-HP, INCI Aqua, Sodium PEG-40 maleate/styrene sulfonate copolymer, is soluble in water and aqueous-ethanol up to 60% alcohol content. It is pH and temperature stable, not affected by electrolytes and forms clear gels with most gelling agents. Typical usage is 2% to 10% in styling products and shampoos

Particularly recommended for preparing styling mousse **Luviquat Supreme**, Polyquaternium-68 from **BASF** is claimed to provide a natural to strong hold plus added volume to even the finest hair. Hair treated with a 2% solution of Luviquat Supreme in combination with 1% panthenol is said to have an immense elastic ability so that no matter the force applied thee hair is able to retain its original hold, shape and volume. It has good stiffening ability and as little as 1.5% is needed in a hair styling mouse. It provides excellent curl retention and hair condition, even under high humidity adds more volume and natural, flexible hold to even the finest hair.

The hair styling stick is a solid, wax-like composition and contains from 30 to 55 percent by weight of one or more polyethylene glycols with a molecular weight of from 2500 to 5000 g/mol; from 15 to 35 percent by weight of one or more polyethylene glycols with a molecular weight of from 850 to 1600 g/mol, from 15 to 35 percent by weight of one or more ***liquid*** polyethylene glycols with a molecular weight of from 370 to 800 g/mol and additional cosmetic ingredients, as needed. The additional cosmetic ingredients can include an aqueous or organic solvent, emulsifier, perfume or fragrance, dye, preservative and/or pearlescence-imparting agent. **20020164298**

The hair shaft is made up of dead, hard protein called keratin in three layers. The inner layer is called the medulla and may not be present. The next layer is the cortex and the outer layer is the cuticle. The cortex makes up the majority of the hair shaft. The cuticle is formed by tightly packed scales in an overlapping structure similar to roof shingles.

Further reading about hair styles:

http://www.nbs.sk/BIATEC/BIA10_05/26_27.PDF

http://www.middle-ages.org.uk/middle-ages-hairstyles.htm

[http://www.hairarchives.com/private/victorian1new.htm]

http://www.ukhairdressers.com/history%20of%20hair.asp

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