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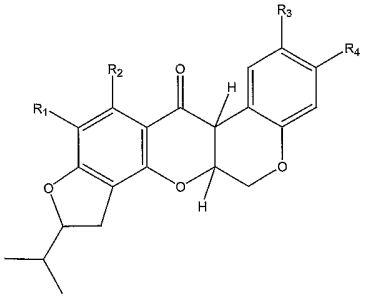
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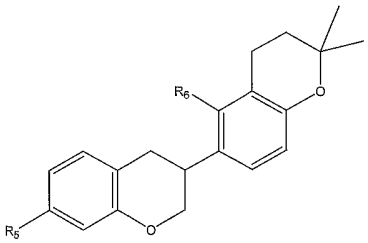
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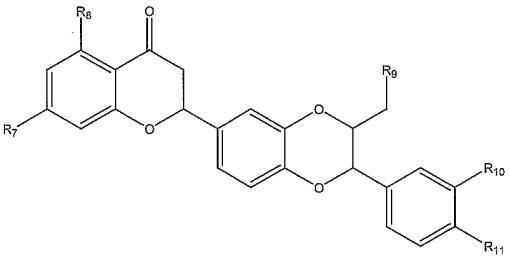
(54) Title: HAIR AND/OR SCALP CARE COMPOSITIONS INCORPORATING TERPENOID COMPOUNDS



(I)



(II)



(III)

(57) Abstract: The invention provides a hair and/or scalp care composition comprising a terpenoid compound of formula (I), (II) or (III) in which R_1 to R_{11} are each, independently, -H,-F,-Cl,-Br,-I,-OH, lower alkyl (e.g. C_{1-6} alkyl) or lower alkoxy (e.g. C_{1-6} alkoxy).

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HAIR AND/OR SCALP CARE COMPOSITIONS INCORPORATING TERPENOID COMPOUNDS

This invention relates to hair and/or scalp care compositions incorporating certain selected terpenoid compounds. The invention also relates to the use of these terpenoid compounds for the treatment and/or prevention of inflammatory skin conditions such as the scalp skin itching and flaking associated with dandruff.

Background

It is widely believed that *Malassezia* yeasts, such as *Malassezia furfur*, are the main cause of dandruff. However, it is unclear why some people suffer from this condition while others do not. What is known is that increasing the level of *Malassezia* on the scalp does not automatically lead to dandruff. This suggests that *Malassezia* is necessary but not sufficient to cause the condition.

Recent studies have demonstrated that dandruff is associated with changes in scalp skin condition. Dandruff scalp skin has been shown to have decreased levels of stratum corneum lipids such as ceramides, an increased susceptibility to application of topical histamine and a perturbed balance in the levels of inflammatory cytokine markers in the stratum corneum. These findings clearly demonstrate that dandruff is associated with changes in scalp skin condition and that dandruff is multifactorial. It is believed that the weakened scalp skin barrier and perturbed condition of the

scalp skin renders an individual susceptible to challenge by factors such as *Malassezia*.

The main, if not only, intervention strategy used on the market currently for the treatment of dandruff is the topical application of antifungals such as zinc pyrithione (ZnPTO), octopirox and ketoconazole which are normally delivered from a shampoo. These antifungal agents remove (or at least reduce the level of) the *Malassezia* from the scalp, and provide effective treatment of the dandruff condition.

Although clinically proven to be effective in treating the clinical symptoms of dandruff over a two to four week period, there remains a need to treat the main symptoms of dandruff more effectively and rapidly. The main symptoms of dandruff are visible skin flakes in the hair and on the shoulders and scalp itch. Scalp itch is perceived as being a particular problem in certain parts of the world, for example it is the main symptom of dandruff in China, South-East Asia and India.

As well as treating the clinical signs of dandruff, therefore, there remains a need for providing rapid relief from scalp itch for dandruff sufferers.

WO04/00085 describes how cannabinoid receptor (CBR) activators may be useful in hair treatment compositions for the treatment and/or prevention of symptoms of dandruff such as scalp skin itching and flaking.

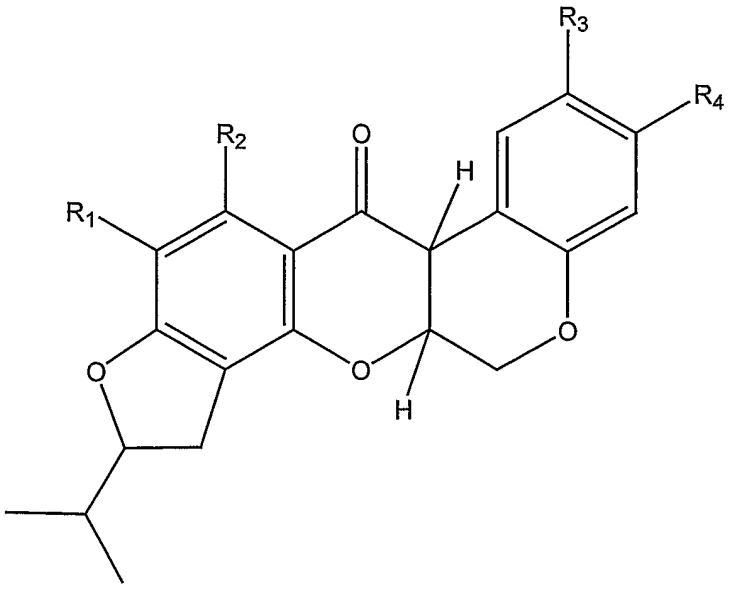
The present inventors have found that certain selected terpenoid compounds are capable of acting as CBR activators, and therefore may be used for the treatment and/or prevention of symptoms of dandruff such as scalp skin itching and flaking.

The terpenoids, sometimes referred to as isoprenoids, are a class of naturally occurring chemicals derived from five-carbon isoprene units assembled and modified in thousands of ways. Most are multicyclic structures which differ from one another not only in functional groups, but also in their basic carbon skeletons. Terpenoids of different sizes and composition are found in all classes of living things, and are the largest group of natural products. Plant terpenoids are extensively used for their aromatic qualities.

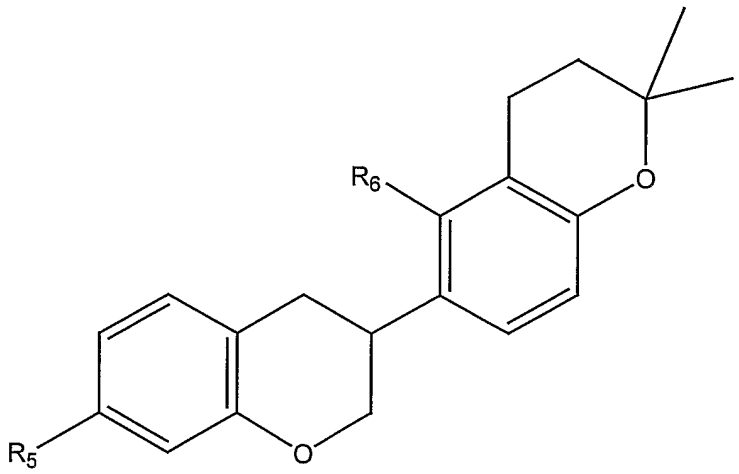
There is no suggestion in WO04/00085 that terpenoid compounds (of which over 23,000 have been chemically isolated and reported) would possess such activity. Furthermore it has been observed that the selected terpenoid compounds of the invention are significantly more hydrophilic (with a ClogP < 4.5) than those compounds which have generally been documented in the literature as exhibiting CBR activation.

Summary of the invention

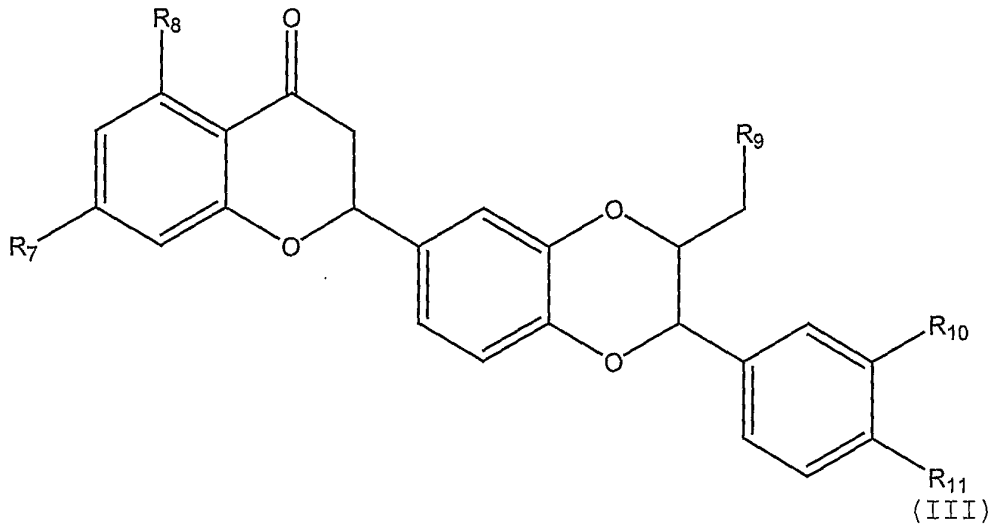
According to the invention there is provided a hair and/or scalp care composition comprising a terpenoid compound of formula (I), (II) or (III):



(I)



(II)



(III)

in which R_1 to R_{11} are each, independently, -H,-F,-Cl,-Br,-I,-OH, lower alkyl (e.g. C_{1-6} alkyl) or lower alkoxy (e.g. C_{1-6} alkoxy).

In another aspect, the invention provides a method of treating and/or preventing inflammatory skin conditions such as the scalp skin itching and flaking associated with dandruff, which method comprises topically applying a composition according to the invention to the hair and/or skin, preferably to the hair and/or scalp.

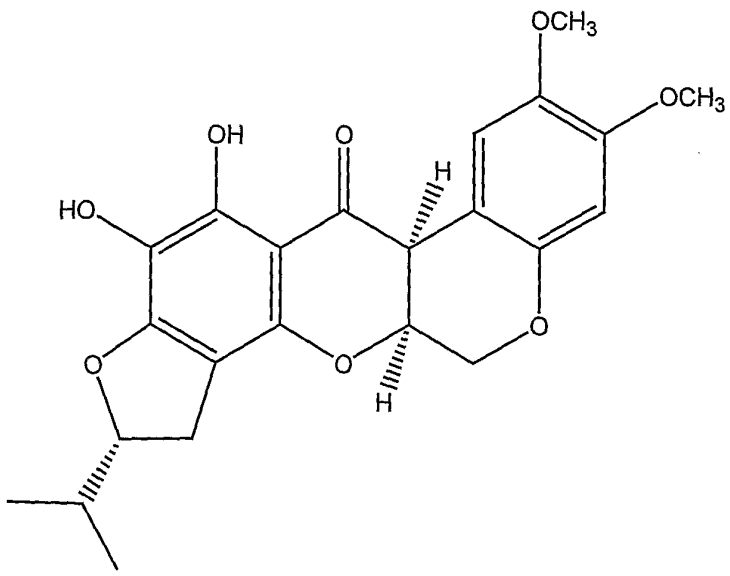
Detailed Description of the Invention and Preferred Embodiments

Preferably, R_1 to R_{11} in general formulae (I) to (III) are each independently selected from -OH and $-OCH_3$.

Specific examples of suitable terpenoid compounds of formula (I), (II) or (III) are:

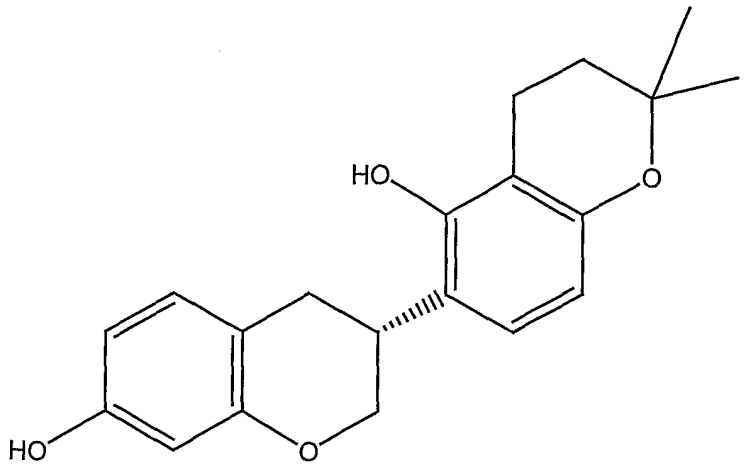
a compound which has the structural formula (IV) (termed 6-hydroxysumatrol):

(IV)



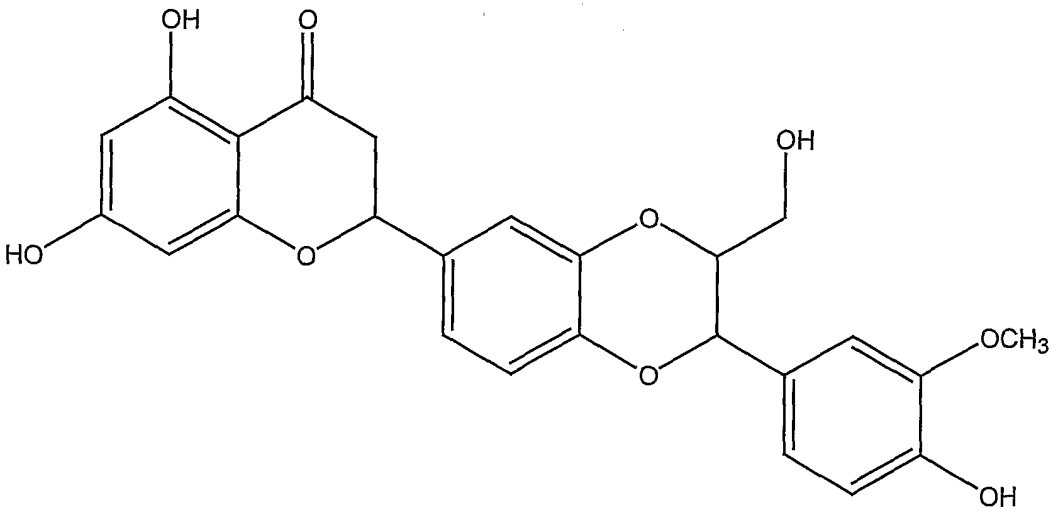
a compound which has the structural formula (V) (termed isophaseollin):

(V)



a compound which has the structural formula (VI) (termed silandrin):

(VI)



Preferred is a compound which has the structural formula (V) (isophaseollin). The inventors have found that this compound can activate both of the two similar, but distinct, types of membrane receptor which have been termed Cannabinoid Receptor 1 (CB1R) and Cannabinoid Receptor 2 (CB2R) (Matsuda et al, Nature 346, 561-564 (1990), Munro et al, Nature, 365, 61-65 (1993)). CB1R is by far the predominant form in the central nervous system, whereas both CB1R and CB2R are located in the peripheral tissues, including the skin. Herein a reference to a CBR activator includes either or both CB1R and CB2R activators.

The above terpenoid compounds of formula (I), (II) or (III) are natural products and may be obtained from suppliers such as Apin Chemicals Limited (Oxon., UK)., Sigma-Aldrich and Interbioscreens.

Mixtures of two or more terpenoid compounds of formula (I), (II) or (III) may also be used in compositions of the invention.

The amount of terpenoid compounds of formula (I), (II) or (III) in the compositions of the invention is preferably selected in the range of from 0.05 to 20%, more preferably from 0.1 to 10%, most preferably from 0.25 to 5wt% by weight based on total weight.

Preferably, compositions according to the invention comprise from 0.01% to 30% by weight, more preferably 0.1% to 10%, most preferably 0.5 to 2% by weight of an antidandruff agent. By "antidandruff agent" is meant a different compound

from the terpenoid compound of formula (I), (II) or (III). Antidandruff agents are compounds that are active against dandruff and are typically antimicrobial agents, preferably antifungal agents.

Suitable antidandruff agents include compounds selected from zinc pyrithione, climbazole, ketoconazole, octopirox and mixtures thereof.

The preferred antifungal agent is zinc pyrithione (ZnPTO) which, on account of its relative insolubility in aqueous systems, is generally used in hair treatment compositions as a particulate dispersion. The zinc pyrithione may be used in any particle form including, for example, crystalline forms such as platelets and needles and amorphous, regularly or irregularly shaped particles. If zinc pyrithione is present in the composition, a suspending agent is preferably used to prevent or inhibit the settling of the particles out of the composition. The average particle diameter of the zinc pyrithione particles (i.e, their maximum dimension) is typically from about 0.2 to about 50 μm, preferably from about 0.4 to about 10 μm, more preferably from 0.4 to 1μm.

Antifungal agents typically display a minimum inhibitory concentration of about 50 mg/ml or less against *Malassezia*.

If the antifungal agent is soluble in aqueous systems, it may be present in solution in a composition used in the invention.

If the antifungal agent is soluble in aqueous systems, it may be present in solution in a composition used in the invention.

Product Forms

Compositions of the present invention are typically for topical application to the hair and/or scalp and may be formulated as transparent or opaque emulsions, lotions, creams, pastes or gels.

Hair and/or scalp care compositions of the invention may be rinse off products or leave on products. Rinse off products are intended to be substantially rinsed off the hair and/or the scalp of the user with water after use. Leave on products are intended not to be rinsed off the hair and/or the scalp of the user immediately after use (ie, within at least the first 2 hours, preferably at least four hours, after application of the composition). Leave on products include, for example, lotions, creams and hair oils that are intended for topical application to the hair and/or the scalp. Rinse off compositions include shampoos and hair conditioners, as well as hair and/or scalp treatment products which are intended to be left on the hair and/or scalp for up to 2 hours (eg, 5 minutes to 2 hours) before being rinsed off.

Preferred product forms are shampoos, conditioners, hair oils and lotions.

Shampoo Compositions

Shampoo compositions according to the invention will typically comprise one or more anionic cleansing surfactants which are cosmetically acceptable and suitable for topical application to the hair.

Anionic Cleansing Surfactant

Examples of suitable anionic cleansing surfactants are the alkyl sulphates, alkyl ether sulphates, alkaryl sulphonates, alkanoyl isethionates, alkyl succinates, alkyl sulphosuccinates, N-alkyl sarcosinates, alkyl phosphates, alkyl ether phosphates, alkyl ether carboxylates, and alpha-olefin sulphonates, especially their sodium, magnesium, ammonium and mono-, di- and triethanolamine salts. The alkyl and acyl groups generally contain from 8 to 18 carbon atoms and may be unsaturated. The alkyl ether sulphates, alkyl ether phosphates and alkyl ether carboxylates may contain from 1 to 10 ethylene oxide or propylene oxide units per molecule.

Typical anionic cleansing surfactants for use in shampoo compositions of the invention include sodium oleyl succinate, ammonium lauryl sulphosuccinate, ammonium lauryl sulphate, sodium dodecylbenzene sulphonate, triethanolamine dodecylbenzene sulphonate, sodium cocoyl isethionate, sodium lauryl isethionate and sodium N-lauryl sarcosinate. The most preferred anionic surfactants are sodium lauryl sulphate, sodium lauryl ether sulphate(n)EO, (where n ranges from 1 to

3), ammonium lauryl sulphate and ammonium lauryl ether sulphate(n)EO, (where n ranges from 1 to 3).

Mixtures of any of the foregoing anionic cleansing surfactants may also be suitable.

The total amount of anionic cleansing surfactant in shampoo compositions of the invention is generally from 5 to 30, preferably from 6 to 20, more preferably from 8 to 16 percent by weight of the composition.

Co-surfactant

Shampoo compositions according to the invention can optionally include co-surfactants, to help impart aesthetic, physical or cleansing properties to the composition.

A preferred example is an amphoteric or zwitterionic surfactant, which can be included in an amount ranging from 0 to about 8, preferably from 1 to 4 wt%.

Examples of amphoteric and zwitterionic surfactants include alkyl amine oxides, alkyl betaines, alkyl amidopropyl betaines, alkyl sulphobetaines (sultaines), alkyl glycinates, alkyl carboxyglycinates, alkyl amphopropionates, alkylamphoglycinates, alkyl amidopropyl hydroxysultaines, acyl taurates and acyl glutamates, wherein the alkyl and acyl groups have from 8 to 19 carbon atoms. Typical amphoteric and zwitterionic surfactants for use in shampoos of the invention include lauryl amine oxide, cocodimethyl

sulphopropyl betaine and preferably lauryl betaine, cocamidopropyl betaine and sodium cocamphopropionate.

Another preferred example is a nonionic surfactant, which can be included in an amount ranging from 0 to 8, preferably from 2 to 5 percent by weight of the composition.

For example, representative nonionic surfactants that can be included in shampoo compositions of the invention include condensation products of aliphatic (C_8 - C_{18}) primary or secondary linear or branched chain alcohols or phenols with alkylene oxides, usually ethylene oxide and generally having from 6 to 30 ethylene oxide groups.

Other representative nonionic surfactants include mono- or di-alkyl alkanolamides. Examples include coco mono- or di-ethanolamide and coco mono-isopropanolamide.

Further nonionic surfactants which can be included in shampoo compositions of the invention are the alkyl polyglycosides (APGs). Typically, the APG is one which comprises an alkyl group connected (optionally via a bridging group) to a block of one or more glycosyl groups. Preferred APGs are defined by the following formula:

$$RO - (G)_n$$

wherein R is a branched or straight chain alkyl group which may be saturated or unsaturated and G is a saccharide group.

R may represent a mean alkyl chain length of from about C_5 to about C_{20}. Preferably R represents a mean alkyl chain length of from about C_8 to about C_{12}. Most preferably the value of R lies between about 9.5 and about 10.5. G may be selected from C_5 or C_6 monosaccharide residues, and is preferably a glucoside. G may be selected from the group comprising glucose, xylose, lactose, fructose, mannose and derivatives thereof. Preferably G is glucose.

The degree of polymerisation, n, may have a value of from about 1 to about 10 or more. Preferably, the value of n lies in the range of from about 1.1 to about 2. Most preferably the value of n lies in the range of from about 1.3 to about 1.5.

Suitable alkyl polyglycosides for use in the invention are commercially available and include for example those materials identified as: Oramix NS10 ex Seppic; Plantaren 1200 and Plantaren 2000 ex Henkel.

Other sugar-derived nonionic surfactants which can be included in shampoo compositions of the invention include the C_{10}-C_{18} N-alkyl (C_1-C_6) polyhydroxy fatty acid amides, such as the C_{12}-C_{18} N-methyl glucamides, as described for example in WO 92 06154 and US 5 194 639, and the N-alkoxy polyhydroxy fatty acid amides, such as C_{10}-C_{18} N-(3-methoxypropyl) glucamide.

A preferred blend of cleansing surfactants is a combination of ammonium lauryl ether sulphate, ammonium lauryl sulphate, PEG 5 cocamide and cocamide MEA (CTFA designations).

The shampoo composition can also optionally include one or more cationic co-surfactants included in an amount ranging from 0.01 to 10, more preferably from 0.05 to 5, most preferably from 0.05 to 2 percent by weight of the composition. Useful cationic surfactants are described hereinbelow in relation to conditioner compositions.

The total amount of surfactant (including any co-surfactant, and/or any emulsifier) in shampoo compositions of the invention is generally from 5 to 50, preferably from 5 to 30, more preferably from 10 to 25 percent by weight of the composition.

Cationic Polymer

A cationic polymer is a preferred ingredient in shampoo compositions according to the invention, for enhancing conditioning performance of the shampoo.

The cationic polymer may be a homopolymer or be formed from two or more types of monomers. The molecular weight of the polymer will generally be between 5 000 and 10 000 000, typically at least 10 000 and preferably in the range 100 000 to about 2 000 000. The polymers will have cationic nitrogen containing groups such as quaternary ammonium or protonated amino groups, or a mixture thereof.

The cationic nitrogen-containing group will generally be present as a substituent on a fraction of the total monomer units of the cationic polymer. Thus when the polymer is not a homopolymer it can contain spacer non-cationic monomer units. Such polymers are described in the CTFA Cosmetic Ingredient Directory, 3rd edition. The ratio of the cationic to non-cationic monomer units is selected to give a polymer having a cationic charge density in the required range.

Suitable cationic conditioning polymers include, for example, copolymers of vinyl monomers having cationic amine or quaternary ammonium functionalities with water soluble spacer monomers such as (meth)acrylamide, alkyl and dialkyl (meth)acrylamides, alkyl (meth)acrylate, vinyl caprolactone and vinyl pyrrolidine. The alkyl and dialkyl substituted monomers preferably have C1-C7 alkyl groups, more preferably C1-3 alkyl groups. Other suitable spacers include vinyl esters, vinyl alcohol, maleic anhydride, propylene glycol and ethylene glycol.

The cationic amines can be primary, secondary or tertiary amines, depending upon the particular species and the pH of the composition. In general secondary and tertiary amines, especially tertiary, are preferred.

Amine substituted vinyl monomers and amines can be polymerized in the amine form and then converted to ammonium by quaternization.

The cationic conditioning polymers can comprise mixtures of monomer units derived from amine- and/or quaternary

ammonium-substituted monomer and/or compatible spacer monomers.

Suitable cationic conditioning polymers include, for example:

- copolymers of 1-vinyl-2-pyrrolidine and 1-vinyl-3-methyl-imidazolium salt (e.g. chloride salt), referred to in the industry by the Cosmetic, Toiletry, and Fragrance Association, (CTFA) as Polyquaternium-16. This material is commercially available from BASF Wyandotte Corp. (Parsippany, NJ, USA) under the LUVIQUAT tradename (e.g. LUVIQUAT FC 370);

- copolymers of 1-vinyl-2-pyrrolidine and dimethylaminoethyl methacrylate, referred to in the industry (CTFA) as Polyquaternium-11. This material is available commercially from Gaf Corporation (Wayne, NJ, USA) under the GAFQUAT tradename (e.g., GAFQUAT 755N);

- cationic diallyl quaternary ammonium-containing polymers including, for example, dimethyldiallyammonium chloride homopolymer and copolymers of acrylamide and dimethyldiallylammonium chloride, referred to in the industry (CTFA) as Polyquaternium 6 and Polyquaternium 7, respectively;

- mineral acid salts of amino-alkyl esters of homo-and co-polymers of unsaturated carboxylic acids having from 3 to 5 carbon atoms, (as described in U.S. Patent 4,009,256);

- cationic polyacrylamides(as described in WO95/22311).

Other cationic conditioning polymers that can be used include cationic polysaccharide polymers, such as cationic cellulose derivatives, cationic starch derivatives, and cationic guar gum derivatives. Suitably, such cationic polysaccharide polymers have a charge density in the range from 0.1 to 4 meq/g.

Cationic polysaccharide polymers suitable for use in compositions of the invention include those of the formula:

$$A\text{-}O\text{-}[R\text{-}N^{+}(R^{1})(R^{2})(R^{3})X^{-}],$$

wherein: A is an anhydroglucose residual group, such as a starch or cellulose anhydroglucose residual. R is an alkylene, oxyalkylene, polyoxyalkylene, or hydroxyalkylene group, or combination thereof. R^1, R^2 and R^3 independently represent alkyl, aryl, alkylaryl, arylalkyl, alkoxyalkyl, or alkoxyaryl groups, each group containing up to about 18 carbon atoms. The total number of carbon atoms for each cationic moiety (i.e., the sum of carbon atoms in R^1, R^2 and R^3) is preferably about 20 or less, and X is an anionic counterion.

Cationic cellulose is available from Amerchol Corp. (Edison, NJ, USA) in their Polymer JR (trade mark) and LR (trade mark) series of polymers, as salts of hydroxyethyl cellulose reacted with trimethyl ammonium substituted epoxide, referred to in the industry (CTFA) as

Polyquaternium 10. Another type of cationic cellulose includes the polymeric quaternary ammonium salts of hydroxyethyl cellulose reacted with lauryl dimethyl ammonium-substituted epoxide, referred to in the industry (CTFA) as Polyquaternium 24. These materials are available from Amerchol Corp. (Edison, NJ, USA) under the tradename Polymer LM-200.

Other suitable cationic polysaccharide polymers include quaternary nitrogen-containing cellulose ethers (e.g. as described in U.S. Patent 3,962,418), and copolymers of etherified cellulose and starch (e.g. as described in U.S. Patent 3,958,581).

A particularly suitable type of cationic polysaccharide polymer that can be used is a cationic guar gum derivative, such as guar hydroxypropyltrimonium chloride (commercially available from Rhone-Poulenc in their JAGUAR trademark series).

Examples are JAGUAR C13S, which has a low degree of substitution of the cationic groups and high viscosity. JAGUAR C15, having a moderate degree of substitution and a low viscosity, JAGUAR C17 (high degree of substitution, high viscosity), JAGUAR C16, which is a hydroxypropylated cationic guar derivative containing a low level of substituent groups as well as cationic quaternary ammonium groups, and JAGUAR 162 which is a high transparency, medium viscosity guar having a low degree of substitution.

Preferably the cationic conditioning polymer is selected from cationic cellulose and cationic guar derivatives. Particularly preferred cationic polymers are JAGUAR C13S, JAGUAR C15, JAGUAR C17 and JAGUAR C16 and JAGUAR C162.

The cationic conditioning polymer will generally be present in compositions of the invention at levels of from 0.01 to 5, preferably from 0.05 to 1, more preferably from 0.08 to 0.5 percent by weight of the composition.

When cationic conditioning polymer is present in a shampoo composition according to the invention, it is preferred if the copolymer is present as emulsion particles with a mean diameter ($D_{3,2}$ as measured by light scattering using a Malvern particle sizer) of 2 micrometres or less.

Hair Conditioner Compositions

Compositions in accordance with the invention may also be formulated as conditioners for the treatment of hair (typically after shampooing) and subsequent rinsing.

Hair conditioner compositions according to the invention will suitably comprise a cationic conditioning surfactant that is cosmetically acceptable and suitable for topical application to the hair.

Cationic Conditioning Surfactant

Examples of suitable cationic conditioning surfactants are those corresponding to the general formula:

$$[N(R_1)(R_2)(R_3)(R_4)]^+ (X)^-$$

in which R_1, R_2, R_3, and R_4 are independently selected from (a) an aliphatic group of from 1 to 22 carbon atoms, or (b) an aromatic, alkoxy, polyoxyalkylene, alkylamido, hydroxyalkyl, aryl or alkylaryl group having up to 22 carbon atoms; and X is a salt-forming anion such as those selected from halogen, (e.g. chloride, bromide), acetate, citrate, lactate, glycolate, phosphate nitrate, sulphate, and alkylsulphate radicals.

The aliphatic groups can contain, in addition to carbon and hydrogen atoms, ether linkages, and other groups such as amino groups. The longer chain aliphatic groups, e.g., those of about 12 carbons, or higher, can be saturated or unsaturated.

Preferred cationic conditionings surfactants are monoalkyl quaternary ammonium compounds in which the alkyl chain length is C16 to C22.

Other preferred cationic conditioning surfactants are so-called dialkyl quaternary ammonium compounds in which R1 and R2 independently have an alkyl chain lengths from C16 to C22 and R3 and R4 have 2 or less carbon atoms.

Examples of suitable cationic surfactants include: cetyltrimethylammonium chloride, behenyltrimethylammonium chloride, cetylpyridinium chloride, tetramethylammonium chloride, tetraethylammonium chloride, octyltrimethylammonium chloride, dodecyltrimethylammonium chloride, hexadecyltrimethylammonium chloride, octyldimethylbenzylammonium chloride, decyldimethylbenzylammonium chloride, stearyldimethylbenzylammonium chloride, didodecyldimethylammonium chloride, dioctadecyldimethylammonium chloride, tallowtrimethylammonium chloride, cocotrimethylammonium chloride, PEG-2 oleylammonium chloride and salts of these where the chloride is replaced by halogen, (e.g. , bromide), acetate, citrate, lactate, glycolate, phosphate nitrate, sulphate, or alkylsulphate. Further suitable cationic surfactants include those materials having the CTFA designations Quaternium-5, Quaternium-31 and Quaternium-18. Mixtures of any of the foregoing materials may also be suitable. A particularly useful cationic conditioning surfactant is cetyltrimethylammonium chloride, available commercially, for example as GENAMIN CTAC, ex Hoechst Celanese.

Salts of primary, secondary, and tertiary fatty amines are also suitable cationic conditioning surfactants. The alkyl groups of such amines preferably have from about 12 to about 22 carbon atoms, and can be substituted or unsubstituted.

Particularly useful are amido substituted tertiary fatty amines. Such amines, useful herein, include

stearamidopropyldiethylamine, stearamidoethyldiethylamine, stearamidoethyldimethylamine, palmitamidopropyldimethylamine, palmitamidopropyldiethylamine, palmitamidoethyldiethylamine, palmitamidoethyldimethylamine, behenamidopropyldimethylamine, behenamidopropyldiethylamine, behenamidoethyldiethylamine, behenamidoethyldimethylamine, arachidamidopropyldimethylamine, arachidamidopropyldiethylamine, arachidamidoethyldiethylamine, arachidamidoethyldimethylamine, diethylaminoethylstearamide. Also useful are dimethylstearamine, dimethylsoyamine, soyamine, myristylamine, tridecylamine, ethylstearylamine, N-tallowpropane diamine, ethoxylated (with 5 moles of ethylene oxide) stearylamine, dihydroxyethylstearylamine, and arachidyl behenylamine. These amines are typically used in combination with an acid to provide the cationic species. The preferred acid useful herein includes L- glutamic acid, lactic acid, hydrochloric acid, malic acid, succinic acid, acetic acid, fumaric acid, tartaric acid, citric acid, L-glutamic hydrochloride, and mixtures thereof; more preferably L-glutamic acid, lactic acid, citric acid. Cationic amine surfactants included among those useful in the present invention are disclosed in U.S. Patent 4,275,055 to Nachtigal, et al., issued June 23, 1981.

The molar ratio of protonatable amines to H^+ from the acid is preferably from about 1:0.3 to 1:1.2, and more preferably from about 1:0.5 to about 1:1.1.

In the conditioners of the invention, the level of cationic conditioning surfactant is suitably from 0.01 to 10,

preferably from 0.05 to 5, more preferably from 0.1 to 2 percent by weight of the total composition.

Fatty Materials

Hair conditioner compositions according to the invention preferably additionally comprise fatty materials.

By "fatty material" is meant a fatty alcohol, an alkoxylated fatty alcohol, a fatty acid or a mixture thereof.

Preferably, the alkyl chain of the fatty material is fully saturated.

Representative fatty materials comprise from 8 to 22 carbon atoms, more preferably 16 to 22. Preferred fatty materials include cetyl alcohol, stearyl alcohol and mixtures thereof.

Alkoxylated, (e.g. ethoxylated or propoxylated) fatty alcohols having from about 12 to about 18 carbon atoms in the alkyl chain can be used in place of, or in addition to, the fatty alcohols themselves. Suitable examples include ethylene glycol cetyl ether, polyoxyethylene (2) stearyl ether, polyoxyethylene (4) cetyl ether, and mixtures thereof.

The level of fatty material in conditioners of the invention is suitably from 0.01 to 15, preferably from 0.1 to 10, and more preferably from 0.1 to 5 percent by weight of the composition. The weight ratio of cationic surfactant to

fatty material is suitably from 10:1 to 1:10, preferably from 4:1 to 1:8, optimally from 1:1 to 1:7, for example 1:3.

Hair conditioner compositions of the invention can also contain a cationic polymer. Suitable cationic polymers are described hereinabove in relation to shampoo compositions.

Hair Oils and Lotions

Hair oils are also suitable product forms according to the invention. Hair oils predominantly comprise water-insoluble oily conditioning materials. Lotions are aqueous emulsions comprising water-insoluble oily conditioning materials. Suitable surfactants can also be included in lotions to improve their stability to phase separation.

Other Optional Ingredients

Compositions of this invention may contain any other ingredient normally used in hair treatment formulations.

Suspending Agents

Hair treatment compositions according to the invention such as shampoos suitably comprise from 0.1 to 5 wt% of a suspending agent. Suitable suspending agents are selected from polyacrylic acids, cross-linked polymers of acrylic acid, copolymers of acrylic acid with a hydrophobic monomer, copolymers of carboxylic acid-containing monomers and acrylic esters, cross-linked copolymers of acrylic acid and acrylate esters, heteropolysaccharide gums and crystalline

long chain acyl derivatives. The long chain acyl derivative is desirably selected from ethylene glycol stearate, alkanolamides of fatty acids having from 16 to 22 carbon atoms and mixtures thereof. Ethylene glycol distearate and polyethylene glycol 3 distearate are preferred long chain acyl derivatives. Polyacrylic acid is available commercially as Carbopol 420, Carbopol 488 or Carbopol 493. Polymers of acrylic acid cross-linked with a polyfunctional agent may also be used, they are available commercially as Carbopol 910, Carbopol 934, Carbopol 940, Carbopol 941 and Carbopol 980. An example of a suitable copolymer of a carboxylic acid containing a monomer and acrylic acid esters is Carbopol 1342. All Carbopol (trade mark) materials are available from Goodrich.

Suitable cross-linked polymers of acrylic acid and acrylate esters are Pemulen TR1 or Pemulen TR2. A suitable heteropolysaccharide gum is xanthan gum, for example that available as Kelzan mu.

Further Conditioning Agents

Hair treatment compositions according to the invention such as shampoos and conditioners suitably contain further conditioning agents such as silicone conditioning agents and non-silicone oily conditioning agents.

Suitable silicone conditioning agents include polydiorganosiloxanes, in particular polydimethylsiloxanes which have the CTFA designation dimethicone. Also suitable for use in compositions of the invention (particularly

shampoos and conditioners) are polydimethyl siloxanes having hydroxyl end groups, which have the CTFA designation dimethiconol. Also suitable for use in compositions of the invention are silicone gums having a slight degree of cross-linking, as are described for example in WO 96/31188. These materials can impart body, volume and stylability to hair, as well as good wet and dry conditioning. Also suitable are functionalised silicones, particularly amino-functionalised silicones.

Suitable non-silicone oily conditioning agents are selected from hydrocarbon oils, fatty esters and mixtures thereof.

The further conditioning agent is suitably present in shampoo or conditioner compositions at a level of from 0.05 to 10, preferably from 0.2 to 5, more preferably from about 0.5 to 3 percent by total weight of further conditioning agent based on total weight of the composition.

Hair treatment compositions of the invention may contain other optional ingredients for enhancing performance and/or consumer acceptability, such as fragrance, dyes and pigments, pH adjusting agents, pearlescers or opacifiers, viscosity modifiers, preservatives, and natural hair nutrients such as botanicals, fruit extracts, sugar derivatives and amino acids.

The invention is further illustrated with reference to the following, non-limiting examples, in which all percentages are by weight based on total weight unless otherwise specified.

EXAMPLES

Examples 1 to 3

Terpenoid compounds of formula (I), (II) or (III) above were evaluated for their ability to activate Cannabinoid Receptor 1 (CB1R) and Cannabinoid Receptor 2 (CB2R). Their ClogP values were also measured.

CB1R experiments were performed using membranes from HEK293 cells over-expressing human recombinant CB_1, as described by the manufacturer (Perkin-Elmer) and using [3H]CP-55,490 as the radioligand.

CB2R experiments were performed using membranes from HEK293 cells over-expressing human recombinant CB_2, as described by the manufacturer (Perkin-Elmer), and using [3H]CP-55,495 as the radioligand.

Data of active compounds are expressed in K_i (mM) and are means±SEM of n=3 determinations.

The values that are stated for each of the compounds is an EC50 value. This is defined as the molar concentration of an agonist, which produces 50% of the maximum possible response for that agonist. The values documented are in micromolar units.

The absence of a value in the table indicates that greater than 25 micromolar concentration was required for 50% binding of the ligand to the receptor.

Also, the ClogP values of the compounds were calculated using SYBYL v6.8 (Tripos Inc., Missouri).

The results are shown in the following Table:

Example	Terpenoid	CB1R Activity	CB2R Activity	ClogP
1	6-hydroxysumatrol	17.10	-	4.06
2	isophaseollin	15.50	22.30	4.49
3	silandrin	22.00	-	3.03

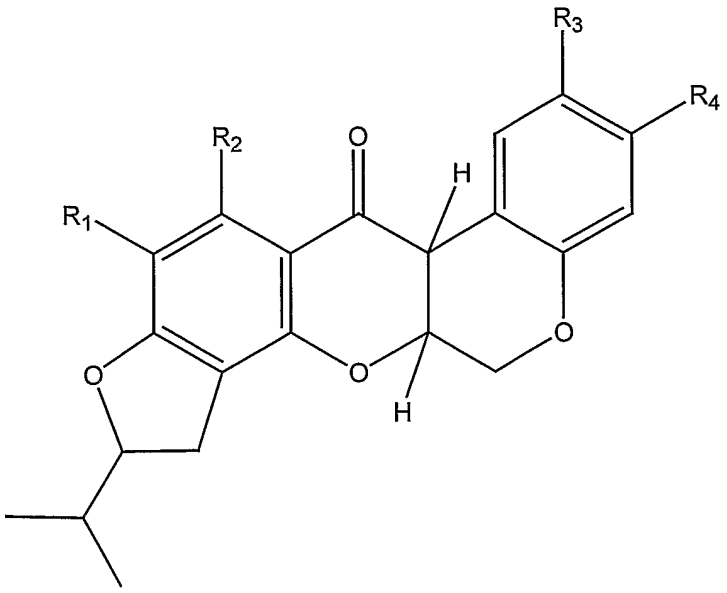
Example 4

The following is an example of a shampoo composition according to the invention:

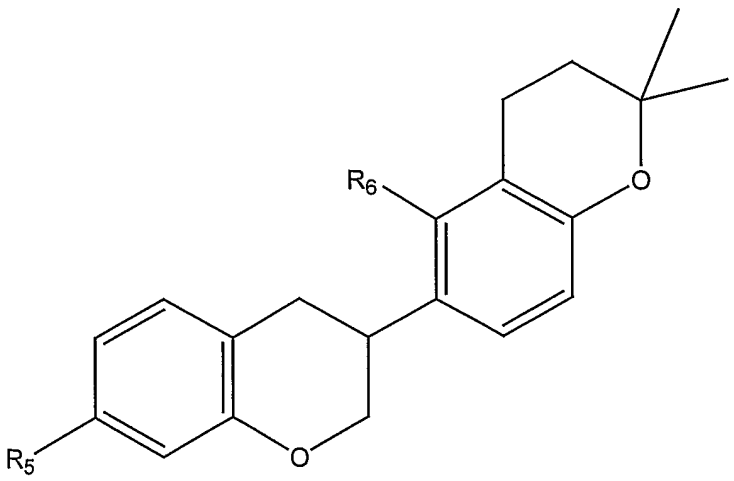
Ingredient	**Example 4**
Chemical Name	**a.i. weight %**
SLES 2EO	14
Cocoamidopropylbetaine	2
Guar hydroxypropyltrimonium chloride	0.1
Dimethiconol	1
Crosslinked polyacrylic acid	0.4
Zinc pyrithione	0.5
Isophaseollin	0.6
Mica + titanium dioxide	0.2
Sodium benzoate	0.5
Water	to 100

Claims:

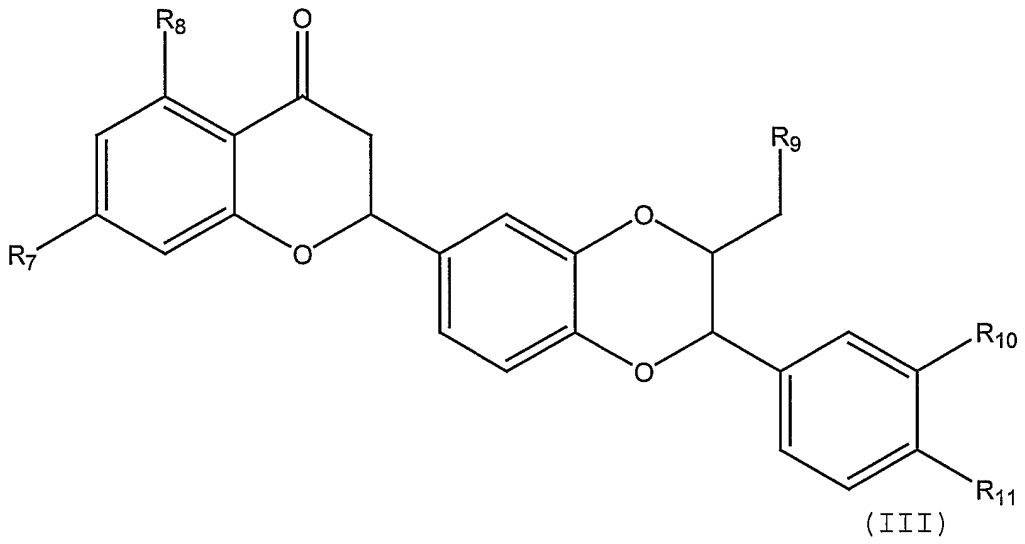
1. A hair and/or scalp care composition comprising a terpenoid compound of formula (I), (II) or (III):



(I)



(II)

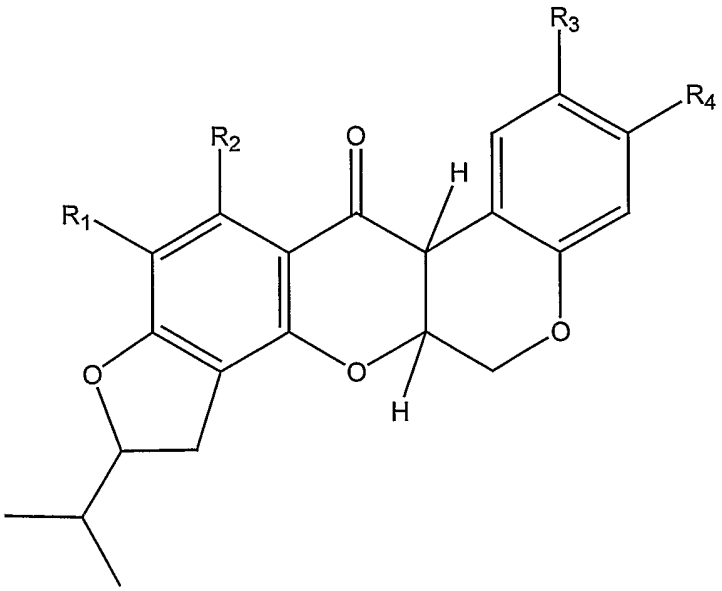


(III)

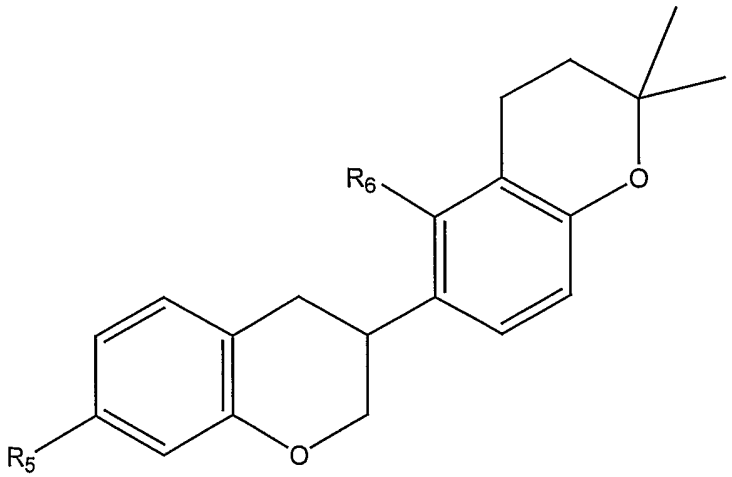
in which R_1 to R_{11} are each, independently, -H,-F,-Cl,-Br,-I,-OH, lower alkyl (e.g. C_{1-6} alkyl) or lower alkoxy (e.g. C_{1-6} alkoxy).

2. A composition according to claim 1 characterised in that the terpenoid compound of formula (I), (II) or (III) is selected from 6-hydroxysumatrol, isophaseollin, silandrin and mixtures thereof.

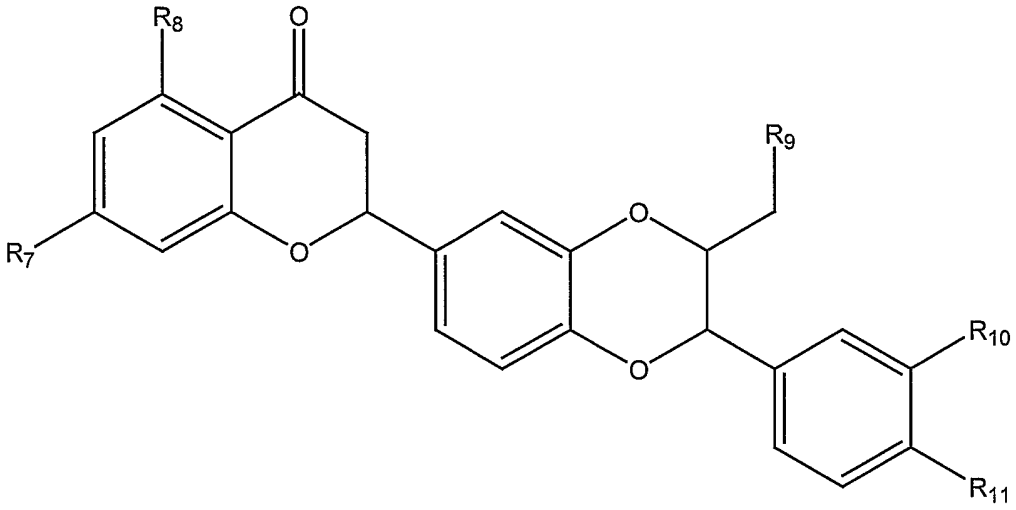
3. A composition according to claim 2 characterised in that the terpenoid compound of formula (I), (II) or (III) is isophaseollin.



(I)



(II)



(III)

4. A composition according to any preceding claim characterised in that it comprises from 0.01 to 30% by weight of an antidandruff agent.

5. A composition according to Claim 4 characterised in that the antidandruff agent comprises a compound selected from zinc pyrithione, climbazole, ketoconazole, octopirox and mixtures thereof.

6. A composition according to any preceding claim characterised in that it is a shampoo composition comprising an anionic cleansing surfactant in an amount of from 5 to 30wt%.

7. A composition according to any one of claims 1 to 5 characterised in that it is a conditioner composition comprising a cationic conditioning surfactant in an amount of from 0.01 to 10wt%.

8. A composition according to any one of claims 1 to 5 characterised in that it is a hair oil or lotion.

9. A composition according to any preceding claim characterised in that the amount of terpenoid compound of formula (I), (II) or (III) is from 0.05 to 20% by weight and preferably from 0.1 to 10% by weight.

10. A method of treating and/or preventing inflammatory skin conditions such as the scalp skin itching and flaking associated with dandruff, which method comprises topically applying a composition according to

any one of claims 1 to 9 to the hair and/or skin, preferably to the hair and/or scalp.

11. Use of a terpenoid compound of formula (I), (II) or (III) in the manufacture of a composition for treating and/or preventing inflammatory skin conditions such as the scalp skin itching and flaking associated with dandruff.

12. Use as claimed in claim 11, wherein the composition is a composition according to any one of claims 1 to 9.

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2006/001683

A. CLASSIFICATION OF SUBJECT MATTER
INV. A61K8/49 A61Q5/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A61K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, CHEM ABS Data, MEDLINE, EMBASE, BIOSIS

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 802 111 A (IRWIN IRVILLE LUBOWE) 1 October 1958 (1958-10-01) page 1, line 87 - page 2, line 1; claims 1,3,22	1-12
X	FR 2 677 223 A (GUEYNE JEAN; SEGUIN MARIE CHRISTINE) 11 December 1992 (1992-12-11) page 3, line 11; claims 1,10	1,3,8,9
X	FR 2 696 318 A (SINCHOLLE DANIEL) 8 April 1994 (1994-04-08) page 4, line 3; claims 1,3	1,3,8,9

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
12 May 2006	10. 08. 2006

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Beyss-Kahana, E

INTERNATIONAL SEARCH REPORT

International application No.
PCT/EP2006/001683

Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. [X] Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

Although claim 10 is directed to a method of treatment of the human/animal body (Article 52(4) EPC), the search has been carried out and based on the alleged effects of the compound/composition.

2. [ ] Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:

3. [ ] Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. [ ] As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.

2. [ ] As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. [ ] As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:

4. [X] No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-12 partially

Remark on Protest

[ ] The additional search fees were accompanied by the applicant's protest.

[ ] No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: partially: 1-12

   A hair and/or scalp care composition containing a compound according to formula (I)

   ---

2. claims: partially: 1-12

   A hair and/or scalp care composition containing a compound according to formula (II)

   ---

3. claims: partially: 1-12

   A hair and/or scalp care composition containing a compound according to formula (III)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2006/001683

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB 802111 A	01-10-1958	NONE	
FR 2677223 A	11-12-1992	DE 69216826 D1	27-02-1997
		EP 0588857 A1	30-03-1994
		ES 2099260 T3	16-05-1997
		WO 9221242 A1	10-12-1992
		GR 3023135 T3	30-07-1997
FR 2696318 A	08-04-1994	NONE	