EMULIUM® MELLIFERA

Designed to delight

In-cosmetics Aisa
4~5 Nov’2014
Emulium® Mellifera

INCI: Polyglyceryl-6 Distearate (and) Jojoba Esters (and) Polyglyceryl-3 Beeswax (and) Cetyl Alcohol
Emulium® Mellifera

INCI: Polyglyceryl-6 Distearate (and) Jojoba Esters (and) Polyglyceryl-3 Beeswax (and) Cetyl Alcohol
All started with a simple question...

What is a beautiful texture?
What is a beautiful texture?

- Varied definitions to define a beautiful texture
- Depends on many parameters
  - Skin type
  - Climate
  - Cultural differences
Key factor: climate differences

- Needs of the skin strongly influenced by the environment
- Countries with seasonal weather (China) require different textures for each season
- Countries with tropical summers (Brazil, Asia) require textures with low residual film and greasiness
- Cosmetics must be adapted:
  - Protecting creams for dry climate and winters
  - Much lighter products in tropical conditions and summer
GENESIS

Influence of culture and beauty routine

• **Europe**
  - Naturality (PEG-free) & sensoriality
  - Moisturization, visible benefits on the skin

• **North America**
  - Daily use of SPF 15 and above

• **Japan**
  - Sophisticated beauty routine ⇒ six or seven products layered
  - High quality of sensory properties

• **China**
  - Seasonal extremes ⇒ varied textures
  - White, glossy emulsion / matte effect on the skin

• **Brazil**
  - Hot and humid climate ⇒ light textures with low greasiness and very low residual film
  - Wide ethnic mix and many skin carnations
There is no unique definition of a beautiful texture yet there are **common requirements**

- Whatever the formula type, whatever the viscosity, the sensory properties must **bring pleasure & satisfaction upon application**

- The texture must **hydrate, bring comfort and visibly improve the state of the skin**

- The formula must **be gentle for the skin and the environment**
• Need of a new **sensory ingredient**:
  
  – High texture **flexibility**: from sprays to butters
  
  – High **compatibility**: pigments, UV filters…
  
  – **Delightful sensoriality** adapted to varied climate and seasons
  
  – True **clinical activity** with visible results

⚠️ Use of our expertise in transforming natural waxes
A new sensory emulsifier

Emulium® Mellifera
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What is beeswax?

• Produced by bees to create honeycomb
• Used in cosmetics since Antiquity
  – Cleopatra
  – Cold Cream
• Unique composition
  – 71% of C40-C52 saturated esters
  – Long chain fatty acids
  – Hydroxyesters & natural hydrocarbons
• Properties:
  – Non occlusive, non comedogenic
  – Anti-inflammatory & anti-oxidant
  – Low irritation potential
SOURCING

Our grade based on a strong partnership

• Selection of a food grade
• Absence of synthetic additives
• Guaranteed composition
  – Use of beeswax from different areas (Africa, Australia, China,…)
  – Own mixture to strictly reproduce the same composition batch after batch
• Ethic & quality: strict specifications
  – Control of the origin, traceability
  – GMO-free, pesticide-free…
What is jojoba wax?

- Extracted from *Simmondsia chinensis* (45-60% of oil)
- Southern USA, Latin America and Middle East
- Used for centuries by Native Indian Americans for hair ointments, body oils and creams
- Only liquid plant wax at room temperature (MP: 10°C)
  - 98% long chain mono-unsaturated esters (C38-C44)
- Properties:
  - Excellent moisturizer & emollient
  - Non irritant
  - Non comedogenic

The golden yellow color is due to natural anti-oxidants that confer an excellent oxidative stability.
SOURCING

Strong & secure partnership

• Secure sourcing procedure with different suppliers
• Close relationship
• Ethic & quality: strict specifications
  – Control of the origin, traceability
  – GMO-free, pesticide-free…
Polyglycerols

- Polyglycerol-6 & polyglycerol-3
  - Plant origin
  - Hydrating molecule

- RSPO Book & Claim compliant

Polyglycerol-6

Polyglycerol-3
• Secure sourcing
• Strong partnership with the suppliers
• RSPO: Book and Claim compliant
• Support to bee’s protection research programs
Emulium® Mellifera

INCI: Polyglyceryl-6 Distearate (and) Jojoba Esters (and) Polyglyceryl-3 Beeswax (and) Cetyl Alcohol
**PROCESS**

**Flow chart**

- **Stearic acid**
  - Simple esterification

- **Polyglycerol-6**

- **Beeswax Jojoba wax**
  - Polyglycerolysis & esterification

- **Polyglycerol-3**

- **Cetyl alcohol**
  - Various steps
  - Final control
  - **Emulium® Mellifera**
Polyglycerol-3 reacts with free fatty acids of beeswax (most polar entities of the medium)

\[
\text{Polyglycerol-3} + \text{Beeswax free fatty acids} \rightarrow \text{NaOH} \rightarrow \text{Polyglyceryl-3 beeswax}
\]
At the same time, esters of jojoba wax react with esters of beeswax.

Esterification: formation of mixed esters

Combination of saturated chains from beeswax and unsaturated chains from jojoba wax.
PROCESS

Focus on the wax butter

• Obtained by simultaneous reactions
• Several entities
• Work on deodorization implemented

Amphiphilic

Polyglyceryl-3 beeswax

Jojoba esters

New sensorial properties
Focus on the wax butter

- Capacity to absorb up to 4 times its weight in water
**PROCESS**

**Completion of the emulsifier composition**

- Addition of a self-emulsifying entity: polyglyceryl-6 distearate

\[
\text{Stearic acid} + \text{Polyglycerol-6} \rightarrow \text{Polyglyceryl-6 distearate} + \text{H}_2\text{O}
\]

- Stabilization: cetyl alcohol

\[
\text{Cetyl alcohol}
\]
• **INCI name:** Polyglyceryl-6 Distearate (and) Jojoba Esters (and) Polyglyceryl-3 Beeswax (and) Cetyl Alcohol

• **Characteristics:**
  - Form: waxy solid in pellets
  - Drop point: 48.0-54.0°C
  - Odorless
  - Colorless

• **Regulation**
  - Worldwide approval for cosmetics applications
  - China: listed on IECIC 2003
Emulium® Mellifera

INCI: Polyglyceryl-6 Distearate (and) Jojoba Esters (and) Polyglyceryl-3 Beeswax (and) Cetyl Alcohol
1. Add Emulium® Mellifera to the oil phase and heat to 75°C
2. Once homogeneous, slowly add the oil phase to the heated aqueous phase under high shear (using rotor stator or dispersing mixers)
3. Maintain high shear mixing until the emulsion is homogeneous (approx. 10-20 minutes)
4. Cool under mixing

Use level: 2-4%

Use pH: 4-10

HLB: 10.5
## Formulation

### Compatibilities

<table>
<thead>
<tr>
<th>Component</th>
<th>Compatibility</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Oils</strong></td>
<td>All types up to 35%</td>
</tr>
<tr>
<td><strong>Consistency agents</strong></td>
<td>Most consistency agents (max. 1% of glyceryl stearate)</td>
</tr>
<tr>
<td><strong>Gelling agents</strong></td>
<td>Most gelling agents (max 0.2% of acrylate polymers and copolymers that are not pre-neutralized)</td>
</tr>
<tr>
<td><strong>Actives</strong></td>
<td>Most actives at a pH between 4-10</td>
</tr>
<tr>
<td><strong>Mineral and organic UV filters</strong></td>
<td>Use of a co-emulsifier recommended (anionic emulsifiers such as potassium cetyl phosphate at 0.2%)</td>
</tr>
<tr>
<td><strong>Pigments</strong></td>
<td>All types of pigments</td>
</tr>
<tr>
<td><strong>Electrolytes</strong></td>
<td>Up to 2% NaCl in presence of a gelling agent</td>
</tr>
<tr>
<td><strong>Alcohol</strong></td>
<td>Up to 10%</td>
</tr>
<tr>
<td><strong>Preservative</strong></td>
<td>Most preservative systems (it is recommended to add acidic preservatives after emulsification)</td>
</tr>
</tbody>
</table>
FORMULATION

High flexibility

- Most flexible of Gattefossé’s natural emulsifiers
- Odor-free & color-free formulas

<table>
<thead>
<tr>
<th>Sprays</th>
<th>Lotions</th>
<th>Supple creams</th>
<th>Creams</th>
<th>Butters</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

Sensory analysis of 2 very different textures: a fluid formula and a thick butter

Emulium® Mellifera is highly flexible, allowing the creation of textures from light lotions to thick and creamy butters.
Emulium® Mellifera

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Genesis

Sourcing

Process

Formulation

Sensoriality

Clinical evaluation

Applications
Fine and light sensation on the skin

Auto-adaptation to climate & seasons

Pleasure upon application
• Principal sensory characteristics:
  
  – White and glossy appearance
  
  – “Transparency” on application
  
  – Easy spreadability

  – Particularly low residual film
    (lowest of all of Gattefossé’s wide range of emulsifiers)
  
  – Low greasiness
  
  – Smooth and comfortable afterfeel
  
  – Soft and non-occlusive
• Conclusions of climate study
• Influence of the weather on skin feel and preference
  – Winter ⇒ moisturization and protection
  – Summer ⇒ lighter skincare, less oily and more cooling

Hot & humid conditions: need of protection from the negative sensation of humidity

Cold & dry conditions: need of a soft and comfortable protecting veil

The perfect skin cream is one that is adapted, not only to skin type, but also to the conditions in which it will actually be used.
• **Emulium® Mellifera**
  - Functionalized natural waxes
  - Soft, barely perceptible film on the surface of the skin

• **In-house climate room:**
  - Hot and humid conditions: \( T = 29^\circ C \pm 1^\circ C \), \( RH = 70 \pm 2\% \)  
    \( \Rightarrow \) \( AH = 20 \text{ g/m}^3 \)
  - Temperate conditions: \( T = 21^\circ C \pm 1^\circ C \), \( RH = 40 \pm 2\% \)  
    \( \Rightarrow \) \( AH = 7 \text{ g/m}^3 \)
SENSORIALITY

Auto-adaptation to climate & seasons
3/ Stabilization of the skin feel in hot and humid conditions

- EM wax butter:

- Emulium® Mellifera:

3% Emulium® Mellifera
1241-2.01

Winter, summer, dryness or humidity, Emulium® Mellifera gives formulations perfectly adapted to the weather and the needs of the skin.
SENSORIALITY

Texture that delight

• **Use test**
  – 21 women, between 22 and 50 years, with all skin types: from very dry to oily
  – Guangzhou, China, end of October (average temperature: 24°C, AH: 15 g/m³)

• **After only one application**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experience of pleasure on application</td>
<td>100%</td>
</tr>
<tr>
<td>Fresh sensation upon application</td>
<td>95%</td>
</tr>
<tr>
<td>Quick and easy absorption</td>
<td>95%</td>
</tr>
<tr>
<td>The skin is moisturized</td>
<td>100%</td>
</tr>
<tr>
<td>The cream gives a healthy glow</td>
<td>90%</td>
</tr>
<tr>
<td>The skin is softer and comfortable</td>
<td>95%</td>
</tr>
</tbody>
</table>

• **After 3 weeks of use**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>The product is pleasing, both in texture and on application</td>
<td>100%</td>
</tr>
<tr>
<td>Fresh sensation upon application</td>
<td>95%</td>
</tr>
<tr>
<td>Quick and easy absorption</td>
<td>95%</td>
</tr>
<tr>
<td>The product does not leave my skin sticky</td>
<td>90%</td>
</tr>
<tr>
<td>Easy integration into my beauty routine</td>
<td>100%</td>
</tr>
<tr>
<td>The product matches well with my skin type (very dry to oily)</td>
<td>100%</td>
</tr>
</tbody>
</table>

Emulium® Mellifera brings immediate and lasting pleasure to all skin types.
Emulium® Mellifera

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Genesis

Applications

Sourcing

Process

Formulation

Sensoriality

Clinical evaluation
CLINICAL EVALUATION

Key benefits

- Long-lasting moisturization
- Skin appearance improvement
CLINICAL EVALUATION

Long-lasting moisturization

• Protocol:
  – Study in France, in November
  – Panel
    • 10 Caucasian female subjects
    • Dry skin on the forearm (inner side)
    • Between 22 & 68 years old (average: 47)
  – Application
    • Application on the forearm (inner side)
    • Emulium® Mellifera at 4% vs. untreated area
  – Corneometry test
    • Electrical capacitance of the skin
  – Evaluation method
    • Temperature = 21°C ± 1°C / AH = 8 g/m³
    • Measure at T0 (before application), T30 min, T4h, T8h
• Results:
  – Moisturization gain in % of treated zone in comparison with initial measurements and the values of the untreated area

<table>
<thead>
<tr>
<th>Product effect</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>T 30 min / T0</td>
<td>+42.8%***</td>
</tr>
<tr>
<td>T4h / T0</td>
<td>+41.2%***</td>
</tr>
<tr>
<td>T8h / T0</td>
<td>+39.9%***</td>
</tr>
</tbody>
</table>

*** p < 0.001 statistically significant variation

Formulations containing Emulium® Mellifera significantly improve the moisturization of the skin with an immediate and long-lasting effect.
CLINICAL EVALUATION

Skin appearance improvement

• Protocol:
  – Guangzhou, China, end of October (average temperature: 24°C, AH: 15 g/m³)

• Panel
  • 21 Asian subjects
  • All skin types (from very dry to oily)
  • Between 22 & 50 years old (average: 36.9)

• Application
  • Application on the face twice a day (morning & evening)
  • 21 days, under normal conditions of use
  • Emulium® Mellifera at 4%

• Acceptability ⇒ good

• Clinical scoring
  • Dermatological scoring
  • Self-assessment

• Use test
CLINICAL EVALUATION

Skin appearance improvement

1/ Clinical scoring: dermatological evaluation

- All criteria scored by the dermatologist using a 10-point scale

Dermatological scoring

% variation D0-D21

- Moisturized aspect of the skin: 45%***
- Complexion radiance: 35%***
- Skin texture fineness: 34%***
- Smooth aspect of the skin: 38%***
- Skin tonicity: 24%***
- Plumped / Fleshy aspect of the skin: 22%***

*** p < 0.001 statistically significant variation
Skin appearance improvement

2/ Clinical scoring: self-assessment

- All criteria scored by the panelists using a 10-point scale

**Self-assessment**

<table>
<thead>
<tr>
<th>% variation D0-D21</th>
<th>Moisturized aspect of the skin</th>
<th>Complexion radiance</th>
<th>Skin texture fineness</th>
<th>Smooth aspect of the skin</th>
<th>Skin tonicity aspect</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>89% ***</td>
<td>77% ***</td>
<td>68% ***</td>
<td>58% ***</td>
<td>35% ***</td>
</tr>
</tbody>
</table>

*** p < 0.001 statistically significant variation
Satisfaction questionnaire filled by the panelists

<table>
<thead>
<tr>
<th>Feature</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>The skin is moisturized</td>
<td>100%</td>
</tr>
<tr>
<td>The skin is comfortable</td>
<td>95%</td>
</tr>
<tr>
<td>The skin is smoothed</td>
<td>90%</td>
</tr>
<tr>
<td>The complexion is more radiant</td>
<td>90%</td>
</tr>
<tr>
<td>The skin is softer</td>
<td>100%</td>
</tr>
<tr>
<td>The complexion of the skin is more uniform</td>
<td>86%</td>
</tr>
<tr>
<td>The skin is more supple</td>
<td>95%</td>
</tr>
<tr>
<td>The skin is soothed</td>
<td>100%</td>
</tr>
<tr>
<td>The skin is revitalized</td>
<td>95%</td>
</tr>
<tr>
<td>The pores are less visible</td>
<td>67%</td>
</tr>
</tbody>
</table>

Formulations containing 4% Emulium® Mellifera visibly improve the appearance of the skin: complexion radiance, skin texture fineness, smoothness, moisturized appearance, skin tonicity, replumped appearance.
CLINICAL EVALUATION

Claims

- Skin visibly more moisturized
- More radiant complexion
- Refined skin texture
- Skin visibly smoother
- Skin toned up
- Visibly more plumped skin
- Long-lasting moisturization
Emulium® Mellifera

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Applications
Genesis
Sourcing
Process
Formulation
Sensoriality
Clinical evaluation
APPLICATIONS

A wide range

- Fully flexible skincare textures
- Textures inspired by Asia
- Color capture cosmetics
- Ideal lightness in SPF formulations
- Natural and certifiable formulations
APPLICATIONS

Ideal lightness in SPF formulations

Daily moisturizer SPF 30 [1392-2.04]

I

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMULIUM® MELLIFERA</td>
<td>4.50</td>
</tr>
<tr>
<td>COCO-CAPRYLATE</td>
<td>4.00</td>
</tr>
<tr>
<td>ISOSTEARATE ISOSTEARYLE</td>
<td>3.00</td>
</tr>
<tr>
<td>COCOATE BG</td>
<td>1.50</td>
</tr>
<tr>
<td>BUTYL METHOXYDIBENZOYLMETHANE</td>
<td>3.00</td>
</tr>
<tr>
<td>ETHYLPHEXYL SALICYLATE</td>
<td>5.00</td>
</tr>
<tr>
<td>OCTOCRYLENE</td>
<td>5.00</td>
</tr>
<tr>
<td>HOMOSALATE</td>
<td>5.00</td>
</tr>
<tr>
<td>PRESERVATIVE</td>
<td>qs</td>
</tr>
</tbody>
</table>

II

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>WATER</td>
<td>qsp100</td>
</tr>
<tr>
<td>DISODIUM EDTA</td>
<td>0.10</td>
</tr>
<tr>
<td>MICROCRYSTALLINE CELLULOSE (and) CELLULOSE GUM</td>
<td>1.50</td>
</tr>
<tr>
<td>XANTHAN GUM</td>
<td>0.30</td>
</tr>
<tr>
<td>GLYCERIN</td>
<td>3.00</td>
</tr>
<tr>
<td>POTASSIUM CETYL PHOSPHATE</td>
<td>0.30</td>
</tr>
</tbody>
</table>

III

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>WATER</td>
<td>6.00</td>
</tr>
<tr>
<td>PHENYLENEDIAMINE/DIHYDROCHLORIDE</td>
<td>qs</td>
</tr>
<tr>
<td>SODIUM HYDROXIDE</td>
<td>qs pH &gt; 7.0</td>
</tr>
<tr>
<td>RED 4</td>
<td>qs</td>
</tr>
<tr>
<td>YELLOW 5</td>
<td>qs</td>
</tr>
<tr>
<td>DIMETHICONE (and) DIMETHICONOL</td>
<td>1.50</td>
</tr>
<tr>
<td>PERFUME</td>
<td>qs</td>
</tr>
</tbody>
</table>

Sensory analysis tests show that the introduction of UV filters to an Emulium® Mellifera formulation has little effect on the sensory properties. Using our unique ingredient, this SPF formulation is light, fresh, non greasy and non sticky.

The association of 4.5% of Emulium® Mellifera and a co-emulsifier (potassium cetyl phosphate) guarantees a perfect stability.
• PEG-free, 100% natural origin ingredient

• Fully complies with Gattefossé’s very high standards of quality and sourcing

• Compatible with most ingredients used in natural or organic formulations

• ECOCERT\(^{(1)}\) and COSMOS\(^{(2)}\) compliant

• NPA™ certified

Due to its high flexibility and sensoriality the natural textures obtained are diverse, surprising and delightful

\(^{(1)}\) The product has been validated by ECOCERT Greenlife according to the Natural and Organic Cosmetics Standards.

\(^{(2)}\) The product has been validated by ECOCERT Greenlife according to the COSMOS standard of Organic and Natural cosmetics.
Emulium® Mellifera

- Allows the formulation of a wide range of textures suitable for all skin types and climates
- Creates natural emulsions with white and luxurious appearance
- Shows significant moisturizing properties and visibly improves skin texture