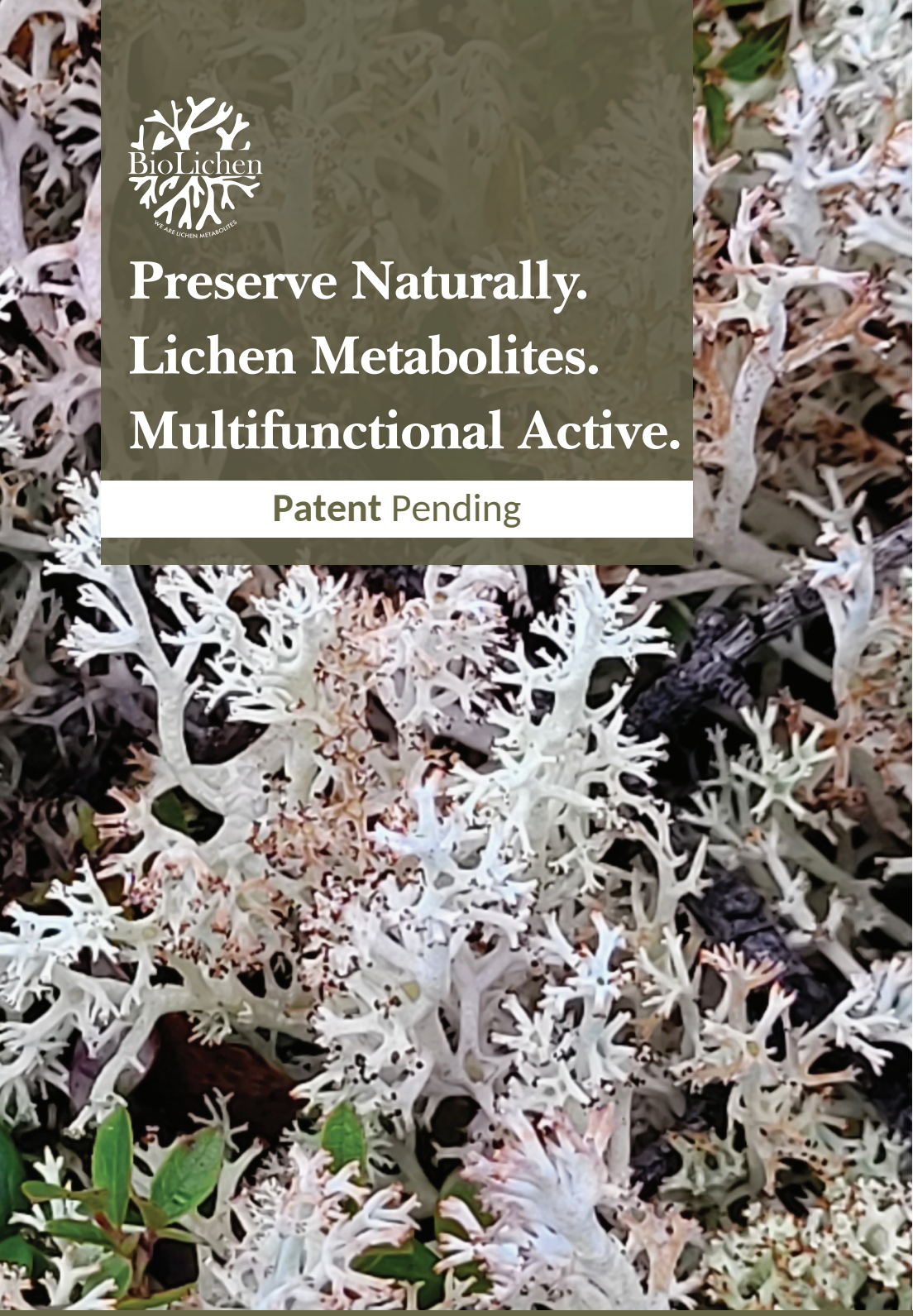

BioLichen
WE ARE LICHEN METABOLITES
Preserve Naturally.
Lichen Metabolites.
Multifunctional Active.
Patent Pending

Introducing CosmosPreserve™

Biolichen products cover many cosmetic functions.

Biolichen products are natural active ingredients carefully developed for cosmetic formulations. **Biolichen** products draw from the benefits that arise from symbiotic lichen metabolic exchanges that are manifested in nature. Lichen metabolites are potent natural molecules that allow lichens to survive in harsh environmental conditions. Lichen metabolites are natural complex molecules comprehensively studied and validated for their therapeutic values. In cosmetic applications, lichen metabolites contribute antimicrobial, antioxidant, wound-healing, anti-inflammatory, cytoprotective, and anti-erythema activities.

Product Features:

- ✓ Antimicrobial active
- ✓ Antioxidant activity
- ✓ Anti-inflammatory activity
- ✓ Wound-healing activity
- ✓ Cytoprotective activity
- ✓ 100% Natural – certified COSMOS
- ✓ Performance tested



The Science Behind CosmosPreserve™

Overview:

CosmosPreserve is an active ingredient to replace synthetic preservatives.

CosmosPreserve is a multifunctional active ingredient based on a mixture of 100% natural components: Triethyl Citrate and Cladonia (Rangiferina/Stellaris) Extract. The broad-spectrum antimicrobial efficacy of **CosmosPreserve** is optimized for use in cosmetics, so that formulators can protect cosmetic formulations naturally. **CosmosPreserve** contains standardized potent anti-microbial lichen metabolites such as Usnic acid isomers, Atranorin, and Fumarprotocetraric acid. The mixture of the natural components in **CosmosPreserve** contributes to an excellent antimicrobial effect, thereby protecting against microorganisms. Constituent actives in CosmosPreserve work synergistically to effectively preserve cosmetics from microbial growth.

Application & Characteristics:

CosmosPreserve is a transparent yellow liquid and liposoluble liquid that is preferably applied in O/W emulsions and surfactant systems. The pH usage recommended is pH 3 to 7. **CosmosPreserve** is typically dosed at 1-4% for antimicrobial and rejuvenating effects.

Characteristics of CosmosPreserve	
Appearance	Transparent yellow liquid
INCI Name	Triethyl Citrate, Cladonia (Rangiferina/Stellaris) Extract
Recommended Dosage	1-4%
pH Range	3-7.0
Analytical Assay (HPLC)	Usnic Acid isomers > 4.0 mg/g, Atranorin > 0.2 mg/g, Fumarprotocetraric acid 0.2 mg/g.
Application Guide	- In emulsion: Preferably applied during the cooldown phase <45°C. - In cold emulsion: Preferably applied in the lipid phase. - In surfactant system: Applied in the final step.

Anti-microbial effectiveness testing results.

Typical Preservative Effectiveness testing results: 1% CosmosPreserve (pH 5.5):

Strain	*E.coli*	*P.aeruginosa*	*S.aureus*	*C.albicans*	*A.brasiliensis*
Inoculum (10^5)	$4.5x10^5$	$4.5x10^5$	$4.5x10^5$	$3.0x10^5$	$3.0x10^5$
CFU Day 7	50	<10	<10	<10	10
Reduction (log)	3.95	>4.65	>4.65	>4.48	>4.48
CFU Day 14	<10	<10	<10	<10	<10
Reduction (log)	>4.65	>4.65	>4.65	>4.48	>4.48
CFU Day 28	<10	<10	<10	<10	<10
Reduction (log)	>4.65	>4.65	>4.65	>4.48	>4.48

At pH 5.5, CosmosPreserve 1% satisfies preservation efficacy testing USP <51>.

Typical Preservative Effectiveness testing results: 1.5 % CosmosPreserve (pH 6.5):

Strain	*E.coli*	*P.aeruginosa*	*S.aureus*	*C.albicans*	*A.brasiliensis*
Inoculum (10^5)	$4.5x10^5$	$4.5x10^5$	$4.5x10^5$	$3.0x10^5$	$3.0x10^5$
CFU Day 7	400	80	<10	30	20
Reduction (log)	3.05	3.75	>4.65	4.00	4.18
CFU Day 14	<10	<10	<10	<10	<10
Reduction (log)	>4.65	>4.65	>4.65	>4.48	>4.48
CFU Day 28	<10	<10	<10	<10	<10
Reduction (log)	>4.65	>4.65	>4.65	>4.48	>4.48

At pH 6.5, CosmosPreserve 1.5% satisfies preservation efficacy testing USP <51>.

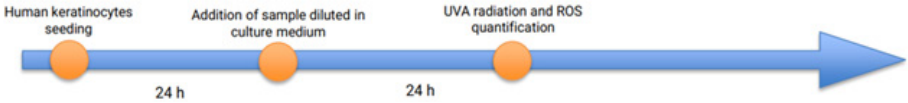
Multifunctional Active Ingredient

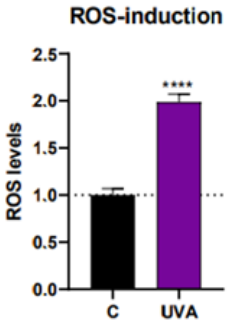
CosmosPreserve contributes antioxidant, wound-healing, anti-inflammatory, and cytoprotective effects.

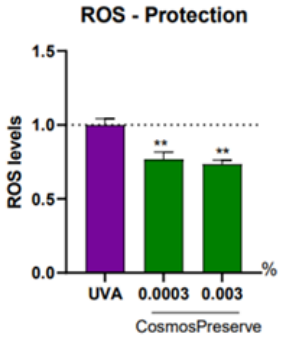
Lichen metabolites found in Cladonia (rangiferina/stellaris) spp. have been studied for their therapeutic benefits for decades. Many peer-reviewed published scientific studies have demonstrated that lichen metabolites, Usnic acid, Atranorin, and Fumarprotocetraric acid manifest antioxidant, wound-healing, anti-inflammatory, and cytoprotective activities. As well, **CosmosPreserve** components have interesting UV screening effects. The combination of these activities and effects compounds the value of **CosmosPreserve** to protect against harmful environmental conditions.

In vitro Study: Antioxidant effects through the protection of ROS after UVA induction on Human keratinocytes.

ROS quantification

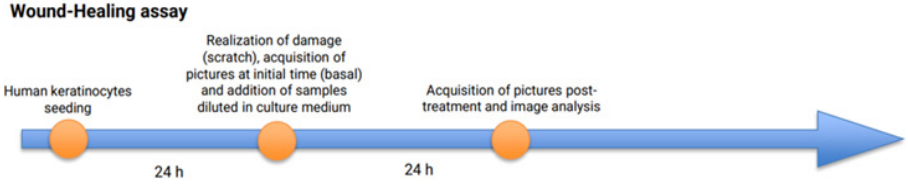




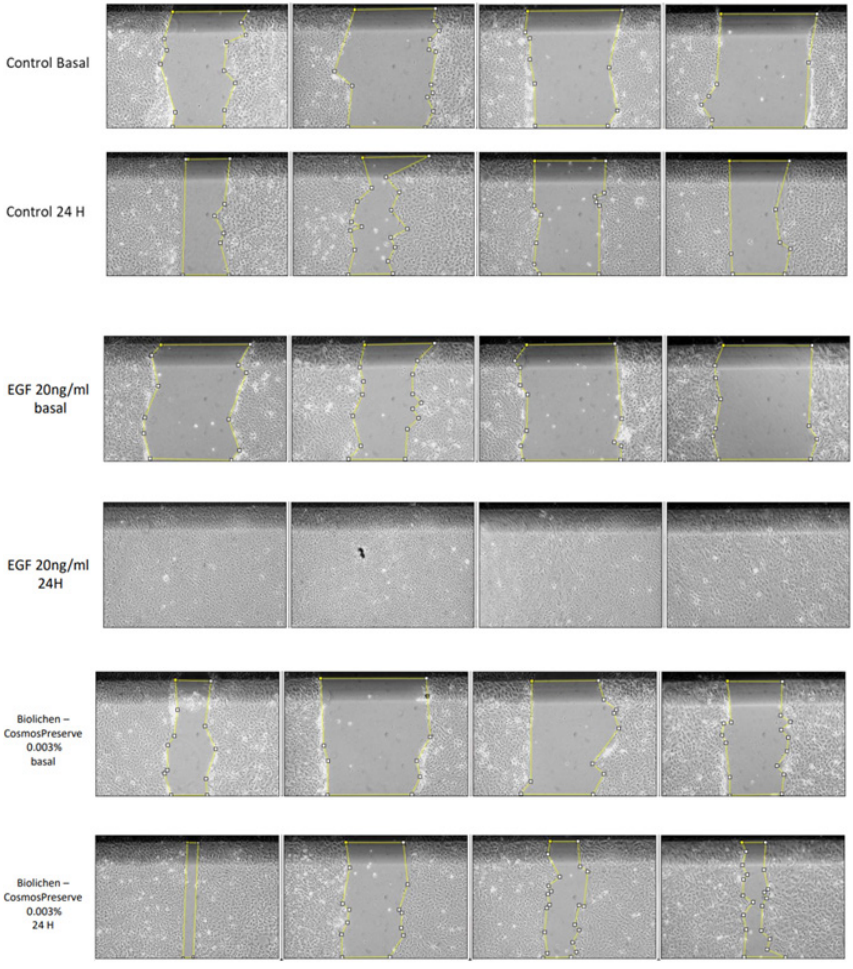


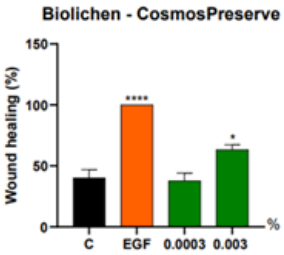
Result: Treatment with CosmosPreserve shows antioxidant potential by decreasing UVA-induced ROS levels in human keratinocytes by 26 %

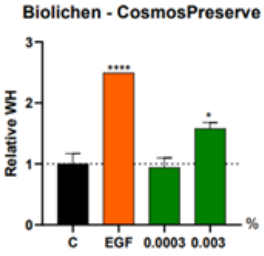
In vitro study: Analysis of the regeneration potential using the Wound-Healing (Scratch) Assay on Human keratinocytes.



Control - Untreated cells	**Positive Control -** Epidermal Growth Factor (EGF) 20 mL	**Treatment CosmosPreserve -** 0,003 %



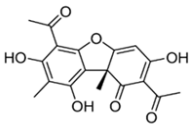


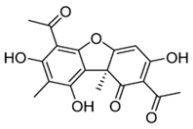


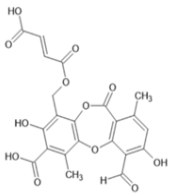
- Positive control (EGF) resulted in significant Wound Healing after 24h, with a value of 149.1 ± 17.9%.
- Treatment with Biolichen - CosmosPreserve exhibited regenerative effects in human Keratinocytes after 24 h when used at 0.003% (57.8 ± 19.3%).

Result: Treatment with CosmosPreserve shows wound-healing regenerative potential of human keratinocytes of 57.8% after 24 hours

Lichen Metabolite structures in Cladonia spp.

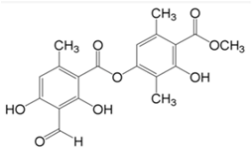




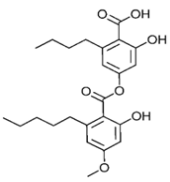


Fumarprotocetraric acid

Usnic acid Isomers



Atranorin



Perlatolic acid

Biological Activities published in Scientific Journals for Usnic acid & Atranorin:

- Anti-microbial
- Anti-oxidant
- Wound-healing
- Photoprotective
- Reduces ROS stress
- Cytoprotective
- Anti-inflammatory
- Anti-Age (mTOR signaling & anti-glycating)
- Anti-Cancer
- Neurotrophic
- Anti-neurodegenerative
- Anxiolytic/Antidepressant
- Anti-viral
- Anti-parasitic
- Anti-infective
- Anti-biofilm



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