enviromedica™

TERRAFLORA™ | Broad Spectrum Synbiotic

Terraflora™ is a professional grade synbiotic formula featuring Ribospore™ (*Bacillus pumilus*) and Bacillus megaterium EM144™, combined with supporting select Bacillus strains and a microbiome-accessible prebiotic complex to optimize gastrointestinal health.

AN INNOVATIVE APPROACH TO GUT HEALTH

- **Helps** protect strict anaerobic bacteria in the gut from oxygen stress via modulation of the gastrointestinal redox state
- **Significantly increases** abundance of Faecalibacterium prausnitzii, a key commensal gut microbe; supports healthy inflammation response in the GI tract
- **Produces** bioavailable, gastric-stable, antioxidant carotenoids within the GI tract
- **Promotes** intestinal barrier function, reduces epithelial permeability and supports the integrity of the gut lining
- **Inhibits** fungal and yeast strains associated with compromised digestive function; increases overall microbiota richness

MULTI-STRAIN BACILLUS COMPLEX:

Terraflora™ bridges the lost connection to our natural environment, with a sophisticated probiotic bio-complex of specific, commensal bacillus strains. Selected for their unique characteristics, Bacillus are gram-positive bacteria that can exist in two forms. Under favorable conditions the bacteria grow in a vegetative form, but when starved of nutrients they differentiate into a dormant life form known as an "endospore" or simply a "spore". These spores come alive when introduced to an ideal environment, like the human gut.

In addition to our proprietary new Ribospore™ (*Bacillus pumilus*) and Bacillus Megaterium EM144™—Bacillus subtilis, Bacillus clausii, and Bacillus coagulans complete Terraflora's multi-strain probiotic bio-complex.

BACILLUS CLAUSII

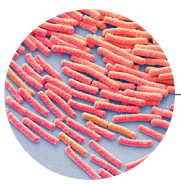
- Supports immune function
- Supports GI homeostasis during antibiotic therapy

RIBOSPORE™ (*BACILLUS PUMILUS*)

- Substantial producer of Riboflavin (vitamin B2)
- Produces bioavailable antioxidant carotenoids

BACILLUS SUBTILIS

- Produces vitamin K2 and the enzyme Nattokinase
- Supports healthy GALT function



BACILLUS MEGATERIUM EM144™

- Supports gastrointestinal homeostasis
- Produces bioavailable antioxidant carotenoids

BACILLUS COAGULANS

- Produces L+ optical form of lactic acid
- Supports immune function

RIBOSPORE™ (*BACILLUS PUMILUS*) & BACILLUS MEGATERIUM EM144™

Ribospore™ (*Bacillus pumilus*) and Bacillus megaterium EM144™ are novel, spore-form, commensal probiotic microorganisms with FDA GRAS affirmed (Generally Recognized as Safe) status, as well as QPS (Qualified Presumption of Safety) designation under the European EFSA criteria. Both strains have been fully genome sequenced and have undergone a comprehensive safety and toxicology review by an independent scientific panel with international repute.

Selected for their unique genetics and health-promoting potential, both Ribospore™ (*Bacillus pumilus*) and Bacillus megaterium EM144™ are scientifically proven to effectively produce antioxidant carotenoids in the gastrointestinal tract. Bacillus produced carotenoids are gastric stable,[1] and are more bioavailable than that of lycopene or astaxanthin.[2] Carotenoids, also called tetraterpenoids, are organic pigments (and potent natural antioxidants) produced by all organisms capable of conducting photosynthesis, including certain phototropic bacteria and fungi. Research has shown a positive correlation between adequate levels of serum carotenoids and a decreased risk of a number of human health conditions.[3]

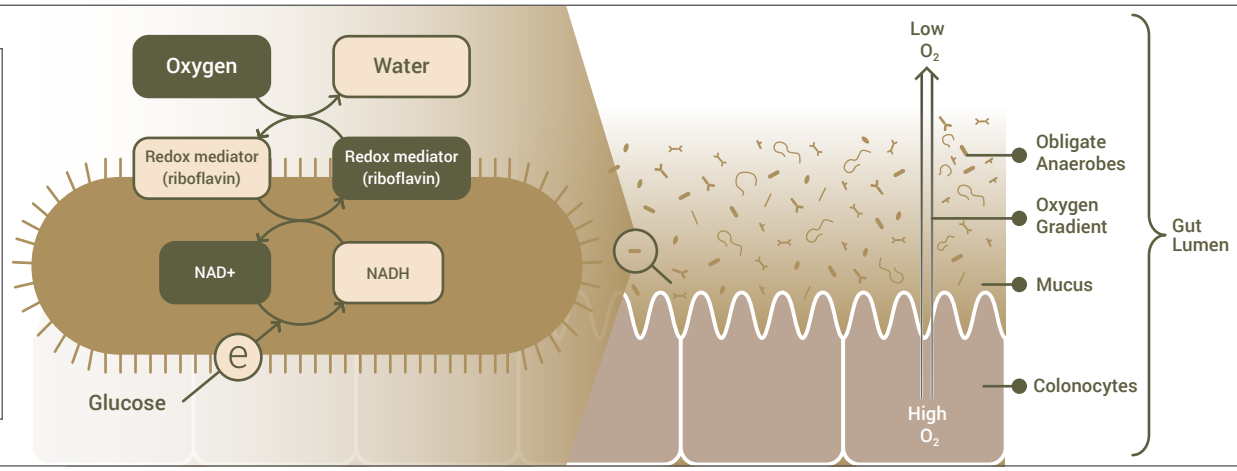
Notably, Ribospore™ (*Bacillus pumilus*) is a significant producer of riboflavin (vitamin B2). Riboflavin is one of eight B vitamins essential for human health and plays a critical role in a number of key biological processes. As it relates to GI health, riboflavin has been studied as a novel prebiotic[4]; although it does not provide a direct substrate for microbial fermentation, riboflavin may beneficially modulate the gut microbiota composition by altering the gastrointestinal redox state.[4] Specifically, riboflavin mediates the oxygen gradient at the gut lumen to be more hospitable to strict anaerobic bacteria.[4]

THE IMPORTANCE OF STRICT (OBLIGATE) ANAEROBIC BACTERIA:

Oxygen is one of the main stressors for strict anaerobic bacteria such as Faecalibacterium prausnitzii, Akkermansia muciniphila, and Roseburia spp.; oxygen and reactive oxygen species oxidize their sensitive enzyme systems.[5] It has been suggested, therefore, that oxygen tension at the gut lumen and related redox conditions are important in determining microbial composition, and thus the relative health and function of the gut microbiota.[6,7]

Terraflora™ has been shown to significantly increase populations of Faecalibacterium prausnitzii in vivo. F. prausnitzii is one of the most abundant commensal bacteria in the human gut microbiome, comprising approximately 5–20% of the total microbiota in stools of healthy individuals,[8] and plays an important role in intestinal homeostasis. Conversely, decreased populations of F. prausnitzii have been associated with intestinal dysbiosis and inflammatory bowel disorders.[9,10,11] F. prausnitzii has been shown to produce anti-inflammatory peptides,[9,12] improve gut barrier function, and is an important supplier of butyrate to the colonic epithelium.[13,14]

This diagram represents the function of riboflavin as a redox mediator, which acts as a carrier for NADH freed during the glycolysis of carbohydrates. Using glucose as a carbohydrate example, we show the process whereby electrons reduce the mediators and finally oxidize electron receptors from the epithelium, such as oxygen. In the presence of riboflavin, obligate anaerobic bacteria like F. prausnitzii are able to reduce the oxygenated environment, thus reducing oxidative stress.



BACILLUS SPORES & ANCESTRAL BIOLOGY:

Bacteria are incredibly ubiquitous, highly adaptable ancient life forms that evolved relatively unchanged over nearly 4 billion years. Bacillus, in particular, is arguably Earth's most resilient bacteria—the oldest of which having been cultured and identified from the abdominal contents of extinct bees preserved in amber for 25 to 40 million years.[15]

Through diet and lifestyle, our earliest ancestors were routinely exposed to bacillus spores found in healthy soils[16] and our natural environment. Yet we no longer have routine exposure to bacillus spores due to the hyper-sanitization of our post-industrial civilization. Terraflora's unique probiotic + prebiotic bio-complex of commensal bacillus strains reconnect humans with their ancestral environment.

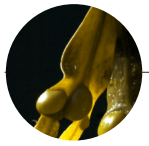
ADVANCED PREBIOTIC BIO-COMPLEX

Terraflora™ contains a prebiotic blend of certified organic, wild-harvested seaweeds, mushroom extracts, and humic acid.

These ancient, food-based prebiotics support commensal microbiota with a diverse spectrum of naturally-occurring polyphenols and polysaccharides designed to strengthen healthy intestinal flora.

LARCH ARABINOGALACTAN

- Solvent-free water extract that retains all bioactive polyphenolic flavonoids present in Larch, including taxifolin and quercetin; Larch arabinogalactan is a densely branched, non-starch polysaccharide consisting of galactose and arabinose molecules.
- Shown to increase production of critical short-chain fatty acids (SCFAs) such as butyrate in the gut; butyrate is the principle fuel for intestinal cells and supports healthy tight junctions in the gut lining.
- Enhances beneficial gut flora and increases levels of beneficial intestinal anaerobes, particularly Bifidobacterium longum.[17]



FUCUS VESICULOSUS (BLADDERWRACK) & UNDARIA PINATIFIDA (WAKAME) EXTRACTS

- Certified organic; solvent-free water extract; wild-harvested from clean ocean waters of Patagonia and Nova Scotia.
- Rich in marine polyphenols and complex, sulfated, fucose-rich polysaccharides called fucoidans. Fucoidans are found in edible brown seaweeds and are shown to have multiple bioactivities including the support of healthy inflammation response in the GI tract.
- In vitro studies show that fucoidan effectively inhibits adhesion of pathogenic bacteria Helicobacter pylori and Escherichia coli to human cells.[18]
- Increases abundance of beneficial bacteria and significantly decreases inflammatory response and antigen load of gut microbiota[19]; may also help maintain levels of beneficial bacteria in the gut during antibiotic use.
- Increases the integrity of tight junctions in the gut lining.[20]

NORDIC CHAGA EXTRACT

- Certified organic; traditional hot water extraction; exclusively from mushroom fruiting body.
- Sustainably wild-harvested in the Arctic (Finnish Lapland forest), contains a diverse spectrum of polysaccharides and polyphenols.
- Shown to help protect against acute colonic inflammation[21]; shown to decrease Firmicutes-to-Bacteroidetes bacterial ratios.[22]

RED REISHI EXTRACT

- Certified organic; traditional hot water extraction; exclusively from mushroom fruiting body
- Contains a diverse spectrum of polysaccharides and polyphenols that have been shown to increase microbiota richness and regulate intestinal barrier function[23,24]; supports health of the gut lumen.[25]
- Shown to decrease Firmicutes-to-Bacteroidetes ratios and endotoxin-bearing Proteobacteria levels; decreased Firmicutes-to-Bacteroidetes ratios are significantly associated with lower body mass index (BMI).[26,27,28,29]

HUMIC ACID

- Water extracted from ancient freshwater humate deposits.
- Shown to increase overall concentration of colonic microbiota.[30]

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