I COLONIALI, ANCIENT REMEDIES ELEVATED BY MOLECULAR SCIENCE TO TRAVEL DEEPER INTO SKIN FOR A NEW AWAKENING OF BEAUTY
‘Spice-up’ the Beauty Industry: a synthesis of the collaboration between I Coloniali and Pavia University to bring to life a new generation of skin care treatments fusing the proven powers of herbs and spices with the most modern scientific knowledge.

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“He, who controls the Spice, controls the Universe!”

This is a famous quote taken from ‘Dune’, an epic science fiction novel wrote in 1965 by Frank Herbert and subsequently adapted into a movie by David Lynch in 1984. The symbolistics associated with this short and deep saying can be easily used to metaphorically compare the real Spice Trade since ancient times to present day. To explain this analogy, some concepts have to be firstly introduced. Dune, tells a story, taking place 21,000 years in the future, about the adventures of a young man whose noble family accepted the stewardship of a desert planet, the only source of spice, the most important and valued spice in the Universe.

Immensely desirable goods

The author used this story to address more the politics of humanity, rather than the future of technology. Traveling back from the Future to the Historical Past, one can find evidence that spices represented a valued product even since millennia ago. Considering that human evolution had been linked with the eating habits of ancestral people (Jew et al., 2009), it is reasonable to think that the addition of spices (intended as ‘any of a variety of aromatic vegetable substances used as flavorings’, Collins English Dictionary) to their diets had a significant value for both nourishment and health benefits. Aside being a source of food, herbs and spices were used in many rituals as well as for body painting, thus drawing a connection with the beginnings of embellishment customs.

Spices and herbs have played a dramatic role in the development of many civilizations throughout history. From a legendary perspective, the first recorded use of a spice comes from an Assyrian myth illustrating the Assyrian Gods drinking sesame wine the night before they created the Earth (Mackenzie, 1915). On the other hand, the first real evidence of spice use derives from archaic artworks and writings, such as the hieroglyphs in the Great Pyramids or Bible references. Ancient philosophers and physicians had been preoccupied with the study of herbs too, as for example Hippocrates, who listed more than 400 medicines extracted from spices, many of them being still used in present days. The first evidence of spice trade organization came from the Egyptians, back in the 3rd millennium BC (Majovits, 2004). By the 1st millennium BC, the spice trade was as important as gold and precious stones. Trade routes like the Silk Road, The Incense Route, or the Trans-Saharan Trade Routes, had been
subsequently set in motion. Since then, the spice trade has become the world’s biggest industry. Throughout history, it established and destroyed empires, led to the discovery of new continents, and paved the foundation for the modern world. Hence, the quote at the beginning of this story is quite appropriate.

The story of young Paul Atreides, the protagonist from Dune, can be also linked with the stories of many real-life explorers. Such is the case of young Marco Polo, whom too set off to a great adventure that led him to the discovery of a world of Spices. His story took place in the Middle Ages, when, with the development of the European culture, the demand for spices held a key position. Big European cities at that time, traded directly with the countries where these miraculous plants were growing. One of such cities was the 13th century renascent Venice, which had a crucial role to play in this part since it was one of the wealthiest cities in Europe, a major maritime power and an essential center of commerce, with merchandise like spices, silk and grains, arriving from all over the world. Within this context, Marco Polo, was born in 1254 into a wealthy Venetian merchant family.

He started his fabulous journeys by the age 17, when his father and uncle took him China by land, following what later became the Silk Road. As his father had previously kept contact with the mogul Emperor Kubilai Khan, Marco Polo was set to work at his court as a tax collector. This task took him to many places in China and the surrounding areas of India, Tibet, and Persia. After 24 years in the service of the great mogul Emperor, and many adventures, Marco Polo returned to Venice with a vessel full of many riches, among which also the spices. Soon after he returned, the war between Venice and Genoa had started and Marco Polo was captured and imprisoned. During this time, he met Rustichello of Pisa, a passionate writer to whom Marco related his travels and adventures across Asia. So, Marco Polo’s adventures at the mogul court were immortalized in a great book, known as “The Travels of Marco Polo” or simply “The Travels”, which depicts in great detail the life and traditions at the Khan’s palace, along with descriptions of paper money, sailing vessels, the use of coal and petroleum, postal service, eyeglasses and many other innovations that had not yet emerged in Europe. He also told stories about the warfare, commerce, geography, and the intrigues at the court of the great Mogul ruler. As spices were a big part of the Asian tradition and commerce, he described many of the herbal products that were ardously desired by the western world as well. He told stories about the pleasing flavor of the sesame oil of Afghanistan and the ginger of Kain-du, the capital of Kubilai Khan, where people drank a savory wine made of rice and spices. When describing the people’s eating habits, he said that the rich ate meat pickled in salt and flavored with spices, while the poor had to be content with hash steeped in garlic. He also illustrated with great details the vast plantations of pepper, nutmegs, cloves, and other valued spices that he had seen growing in Java and in the islands of the China Sea, and the abundance of cinnamon, pepper, and ginger on the Malabar Coast of India.

When relating about the commercial activities, he spoke about the great sailing vessels that were bringing daily more than 5,000 kilos of pepper into the big city (Rosengarten, 1969). When the Venetian-Genoese peace treaty was signed in 1299, Marco Polo returned to Venice where he lived the rest of his life as a merchant. Marco Polo died in January 1324, having helped to inspire the next generation of explorers, including Christopher Columbus, who, was said to have been traveling with copy of Polo’s book. The information in his book proved vital to European geographic understanding and future commercial routes. Rustichello of Pisa honors Marco Polo in this book, by saying: “I believe it was God’s will that we should come back, so that men might know the things that are in the world, since, [...] no other man, Christian or Saracen, Mongol or pagan, has explored so much of the world. Saffron (Crocus sativus) is considered the most expensive spice worldwide, having a myriad of uses, from cooking to medicine and cosmetics.
world as Messer Marco, son of Messer Niccolo Polo, great and noble citizen of the city of Venice.” (The Travels of Marco Polo, 1928).

Further on, Marco Polo’s description of herbs and spices encouraged the diversification of uses of these miraculous plants also on the European continent. Aside food and medicine, herb mixes had been used for embellishment even since ancient times. This also had various purposes throughout history, from intimidation of the enemy to the attraction of lovers, masking the effects of advancing age, and compensation for exterior defects. Venice, as a focal trading point and high society development, played a key role in the evolution of the beauty industry. Starting from the 16th century, Italy and France rise as important emerging centers of cosmetic manufacturing, with Venice as the Italian hub in perfume and cosmetic development. Venetian Ceruse, or Spirits of Saturn, was a 16th century cosmetic used as a skin whitener. It was in great demand and considered the best available at that time, but because it was made of lead, it caused serious poisoning over long time use. Back then, Venice was considered the Capital of Perfume because of its famous preparation of perfume mixtures containing exotic ingredients brought by ships from all over the world. In 1555, a compendium (Notandissimi Secreti de l’Arte Profumatoris, Giovanventura Rosetti) containing more than 300 different perfume recipes was printed in Venice.
Nowadays, the herbal ingredients are preferred by the consumers because plants have many natural beneficial properties and as compared with the synthetic products, the herbal products have low toxicity profiles, are biodegradable and have a mild, gentle contact with the skin (Joshi and Pawar, 2015). To this purpose, I Coloniali invested deeply in research to develop formulations based on ancient treatments using mixes of herbal ingredients known to offer a wide range of advantages to various types of skin. By exploring the Molecular Sciences, at the interface of Biology, Chemistry and Physics, they offer new perspectives for the advancement of modern cosmetic products. Taking advantage of the natural molecules present in plant extracts combined with an ideal molecular weight, these formulations are able to deeply penetrate and nourish the skin.

**Deeper Penetration into Skin**

Evidence-based studies have pointed out that diffusion through skin can be modeled on the basis of the molecular shape and size of these biomolecules, showing a correlation between the use of low molecular weight biologic compounds and better skin penetration, and hence higher moisturizing properties (Abbott, 2012). Within this scientific context, a complex collaboration between I Coloniali and the Department of Biology and Biotechnology, University of Pavia, has been set in motion. The research topics covered by experts from the Plant Biotechnology Lab fall in the area of Molecular Biology and span from DNA damage and repair to plant antioxidant properties. These subjects represent points of high interest for the Cosmetic Industry as well, since biomolecules extracted from plants serve as primordial material for the production of beautification products. The Laboratory has developed techniques to monitor DNA damage and DNA repair kinetics. It is well-known that many plant species have an innate antioxidant potential, and the group has extensively worked to develop ways to monitor and measure it, providing cost-effective kit-like approaches valued by partners from Industry. Based on their expertise in plant sciences, the Plant Biotechnology group provided an overview on the general scientific background presented in this dossier.

Moreover, because of their experimental approaches and common interests, current and future collaborations between the University of Pavia and Perfume Holding involves the experimental design of methods to test plant extracts and biomolecules for potential use in the Cosmetic Industry.
I COLONIALI: A MOLECULAR APPROACH TO SKIN CARE

Most of the ingredients that compose cosmetic products must be able to cross the outer surface of the epidermis (stratum corneum) until its deepest layer (basal layer). This skin penetration is guaranteed by several “roads” that the ingredients can take depending on the characteristics of their molecular structures. I COLONIALI skin care products contain special selected low molecular weight ingredients that drive other larger ingredients and act as “carriers” of carefully selected plant extracts toward the lower layers of the skin in order to improve their bioavailability and where they can release their energy and relative bioactivity.

This passage has been assessed by dermatological experts in order to ensure a greater bioavailability of active natural ingredients, improving the efficacy of the cosmetic product.

To spice-up the Beauty Industry, this report brings a collection of historical and scientific data on selected species with high potential in cosmetic formulations. Aside the scientific data supporting the use of these extracts, we also gathered a collection of historical images representative for each plant species. The images were gathered from a collection of antique Herbariums, spanning throughout the 18th and 19th centuries, highly preserved and cherished at the University of Pavia’s own Library.
EMPOWERED BEAUTY REMEDIES

BLACK RICE AND ANGELICA ROOT

The combination of Black rice and Chinese Angelica root has a unique profile as a recipe for *deep moisture, aging prevention and radiant skin*. The Chinese Angelica is often referred to as the ‘women ginseng’ because it possesses the crucial activity of balancing the hormone levels, giving an overall harmonizing effect and vital energy. As it had been used by women since ancient times to treat a wide array of pains, from the menstrual symptoms to heart soreness, it is quite indicated to be use also for the beautification purposes.

Since the extract from Angelica roots contains many beneficial substances, among which phytosterols, ferulic acid, vitamins and minerals, it is endowed with high antioxidant, anti-inflammatory, anti-coagulant and radio-protective properties. Because of its natural chemical ingredients and their characteristics, the use of Angelica root provide invigorating, calming, radiant and detoxifying advantages at the skin level. Especially the Angelica ferulic acid component contributes to the antioxidant and sun-protective skin benefits while enhancing the stability of topical applications of vitamin E (Zhang et al., 2010). These characteristics, when combined with the highly nutritive properties of the rice extracts, enhances even more the nourishing potential of cream formulations containing the two ingredients. The Black Rice extracts in particular, are extremely rich in antioxidants like flavonoids and anthocyanins, substances that also give the specific color of the grains. The seed coat, or bran, is used to extract essential oils, denominated as rice bran oil, which is an excellent ingredient in cosmetics because it easily penetrates the skin, thus providing a deep-moisturizing effect. Another beneficial outcome of the Black Rice bran oil is its anti-aging activity manifested through the stimulation of cellular metabolism which, in turn, improves skin softness, elasticity and tone. One of the most valued components of the oils extracted from rice is gamma-oryzanol (Scavariello and Arellano, 1998), defined as a mixture of sterols and ferulic acids, which protects the skin lipids from oxidation, being used to prevent freckles, age spots, and darkening of the skin. Because gamma-oryzanol is oil soluble, it is easily absorbed into the skin and stimulates blood circulation, thus improving the skin tone. Gamma-oryzanol also has a stimulatory effect on the sebaceous glands, its topical application being indicated for dermatitis and dry skin conditions. In association with this particular activity of the gamma-oryzanol, the high quantity of squalene present in the bran oil also adds to its deep-moisturizing capacities. Squalene stimulates the healing process, with positive effects in the skin regeneration process, thus being a highly desired anti-aging component (Sugihara et al., 2010). Because of all the above-mentioned characteristics, the mixture of compounds present in both Chinese Angelica root and Black Rice bran do possess specific health benefits for skincare and will benefit a broad class of consumers.
SAFFRON AND MYRRH

Saffron and Myrrh are two of the most highly valued spices since ancient times. Their history of use goes far back in time and their names are associated with valued people, from religious clerks and high nobility to Emperors and Queens. Hence, both Saffron and Myrrh are associated with luxurious products which bring higher performances and expectations. The Saffron and Myrrh oil cream formulation is intended to deliver transcendent benefits as an extremely effective anti-aging and re-nutritive composition, perfectly suited for mature women (40+).

With its high content of oleoresin gums rich in health-giving substances, Myrrh has the perfect rejuvenating and re-nutritive qualities. In addition, it is also a powerful antiseptic, astringent, carminative and anti-inflammatory product. Myrrh gums retain beneficial properties as skin protectans, particularly at inflamed regions. Moreover, the elevated amount of volatile oils offers a deeply pleasant fragrance. Among the main bioactive components of Myrrh resins are the guggulsterones which exerts controlling functions over some molecular targets including the transcription nuclear factors (TNF), with known functions in cell proliferation and regeneration (Shah et al., 2014). At the other side, Saffron also possesses the same range of qualities observed in Myrrh oils, thus enhancing even more the alleged properties that this formulation is bringing. Its more than 150 volatile compounds emanate a divine perfume, while the main bioactive molecules, safranal, crocins and picroconins, are responsible for its high antioxidant potential. Topic applications of Saffron extract aid in skin oxygenation and detoxification, offering a desired glow, color and luminosity. The roles played by safranalns and crocins in anti-aging, skin rejuvenation and skin moisture were broadly investigated (Vyas et al., 2010; Akhtar et al., 2014b). Hence, the combination of Saffron and Myrrh oils in this cream formulation result in an exclusive array of alluring attributes, with intense, luxurious and sensual fragrances to bring a youthful bloom and an overall healthy fitness to facial skin.

MYRRH AND RICE BRAN OIL

A different combination between the Myrrh and Rice bran oils is envisioned to promote skin nourishment and regeneration. Oils derived from rice bran are often use for massage purposes because it can easily penetrate the skin and, due to its rich nutritional components (minerals, vitamins, amino acids, and omega fatty acids) it provides the skin with all the beneficial substances needed for its nourishment.

Using Rice bran oil in combination with Myrrh resins is quite beneficial for the skincare as this combination can both soften and smoothen the skin. Besides, due to the presence of the Rice lanolin and Myrrh guggulsterones, this combination is helpful to reduce inflammation as well as soothing the irritable skin. Myrrh resins vitamins, especially vitamin E, added to the gamma-oryzanol content from Rice oils, provide a more effective skin nourishment, regeneration and protection against the UV rays from the sunlight.
LOTUS AND SOPHORA JAPONICA

The formulation containing Lotus and Sophora japonica extracts is envisioned to bestow a sense of perfect pureness and detoxification. The Sacred Lotus (Nelumbo nucifera), with its spiritual and artistic emphasis, rejoice both the body and the soul. The Lotus flower is the universal symbol for elegance, beauty, purity and perfection. Being both beautiful and magical, Lotus gives equal freshness and vitality to the skin. The Lotus flowers are packed with a wide array of beneficial bioactive compounds, including alkaloids and flavonoids with antioxidant properties, minerals and vitamins with nourishing attributes, and saponins with antibacterial and anti-inflammatory effects. Natural products infused with Lotus can aid in sebum control, balancing the skin oil content, while in the same time, improving skin hydration and elasticity. The purifying characteristic of Lotus extracts comes from its ability to act on pore shrinking, providing a fresh and vibrant feeling. To the same purpose, its natural organic acids help to exfoliate the dead skin cells, improve skin regeneration and moisture to restore a youthful look. Still related to the perfect pureness, the Lotus extracts have calming anti-inflammatory properties that help to reduce the redness and acne outbreaks, while repair proteins are working to restore the skin's structure, strength and elasticity (Mahmood and Akhtar, 2013). At the other end, the cosmetic research on Sophora japonica extracts have proven its high potential as an effective anti-irritant, antioxidant and anti-aging compound. Due to its biologically active flavonoids, kaempferol, sophoricosides and phenolic acids, compounds with antioxidant properties, S japonica extracts can restrain skin inflammations and slow-down the aging process. The rutin extracted from S. japonica can regulate the capillary wall permeability and reduce vascular fragility, being highly useful in creams and lotions for sunscreen, freckle, and acne treatments. Moreover, its high content in mineral elements and amino acids promote skin nourishing, and stimulates skin regeneration to prevent wrinkles, while the presence of the flavonoids also helps to regulate the skin lipid balance (Wang et al., 2006). Hence, the combine antioxidant competences of Lotus and Sophora japonica makes this formulation perfect for detoxification purposes, while the other components act on several other skin plans offering hydration, increased elasticity, wrinkle reduction, and an overall fair and pure skin.

BAMBOO AND GINSENG

By bringing together the overall well-being and all-healing attributes of Bamboo and Ginseng, Morris Perfume developed a strong skincare formulation proposed to have high moisturizing and revitalizing effects. The elegance, longevity and resilience of Bamboo plants are well-known, and these representative characteristics makes it highly desired in many industries, including the Cosmetics. Extracts from Bamboo leaves and stems, generally known as Bamboo saps, are rich in sugars, proteins, vitamins and minerals, making it a primary material for intensive hydrating and nutritive benefits. The presence of other chemical compounds, such as germacronin and sterols, provide additional characteristics like anti-aging, antioxidant and antibacterial properties (Tanaka et al., 2016). On the other side, Ginseng’s all-healing qualities complement very well the Bamboo’s potentials. Ginseng, known as a longevity-promoting medicine with anti-aging benefits, promotes overall well-being and provides the skin with essential antioxidant s. The mineral-rich Ginseng is a healthy source of energizing, fortifying minerals resulting in increased skin energy and vitality. With its high content of ginsenoside saponins, Ginseng extracts provide an elevated restorative effect on the skin by stimulating the production of hyaluronic acid, known to control skin aging and increase moisture retention (Lee et al., 2012). Overall, both Bamboo and Ginseng are characterized as highly multi-functional extracts with proven potential for skincare.

HIBISCUS AND GINKGO

The combination between the Hibiscus flower and Ginkgo leaf extracts is intended to have a deeply tonic and elastizing effect on the skin, targeting powerful and sensual women across the globe. Ginkgo became popular for its reputation of improving memory and blood flow, but it also has many benefits in skincare products. The main promise for cosmetics is represented by its elevated antioxidant potential, due to its high content in extremely powerful flavonoid compounds, carotenoids and sterols. This property is responsible for skin protection against damaging factors such as exposure to sunlight and pollution, while it also contributes to the reduction of wrinkle formation. Ginkgo enhances the skin’s ability to produce fibroblasts, known to be involved in collagen production, thus helping to preserve skin firmness and elasticity (Kim et al., 1997). The antibacterial and anti-inflammatory properties are attributed to the presence of specific substances called ginkgolides, found only in the Ginkgo plants; these chemical compounds are also responsible for an improved blood circulation under the skin, providing a tonic effect. On the other side, the Hibiscus flower is a symbol of passion and sensuality, inspiring exotic beauty. Hibiscus flowers are used in skin-
care products to provide the skin with an even tone and texture. It cleanses, soothes, protects against acne, and softens the skin. The flower extracts are high in antioxidants (anthocyanins, organic acids, flavonoids), amino acids, and oligopeptides, shown to have wrinkle-smoothing properties (Benoit et al., 2004). The saponins and organic acids present in the Hibiscus flowers have a natural cleansing effect on the skin, promoting the shedding of dead skin cells. Hibiscus flower extract is also used as a powerful firming agent, with properties comparable with the Botox effect, but having the benefit of being a natural product (Rival et al., 2009). Moreover, its high content of volatile compounds also gives a beautiful, refreshing fragrance. Because of all these properties, the Hibiscus and Gingko extracts put together, can provide essential benefits to all body-conscious women.
DEEPER PENETRATION INTO SKIN

CONCLUDING REMARKS

NEW PERSPECTIVES FOR THE ADVANCEMENT OF MODERN COSMETIC PRODUCTS

The concept of beauty and cosmetics is as ancient as mankind and civilization. Plants had been the main source of all cosmetics well before the use of synthetic substances with similar properties. Nowadays, the novel trend of using plant extracts in skincare products is highly emphasized by the consumer demand, with more and more people being increasingly concerned with sustaining eco-friendly products.

As shown throughout this report, the use of herbal bioactive extracts from a variety of botanicals can influence the biological functions of the skin, and in the same time, provide the necessary nutrients for a healthy skin.

By exploring the Molecular Sciences, at the interface of Biology, Chemistry and Physics, I Coloniali offer new perspectives for the advancement of modern cosmetic products. Taking advantage of the natural molecules present in plant extracts combined with an ideal molecular weight, these formulations are able to deeply penetrate and nourish the skin.

Overall, natural plant extracts can be efficiently and sustainably used to obtain novel natural cosmetic formulations with increased antioxidant, nourishing, lightening and anti-aging properties, maximizing the number of underexploited or even unexplored herbal principles.
Angelica sinensis (Dong Quai, Danggui)

“In the ancient time, a lady failed to get pregnant for years because of her menstrual problems. Her husband was so angry and left home. The lady was very sad and went to see a doctor. The doctor gave her the herb Gang gui. She started taking it every day. After a while, her menstruation got back to normal. She was told by the doctor she was ready to get pregnant. The smart lady wanted her husband to come back. She did not know how to write, so she asked somebody to send a piece of Dang gui to her husband as a message for her. The husband saw the herb Dang Gui (Should return). He understood it was the time for him to go home. They had children soon after he went home. The whole family was living together happily for the rest of their life.”

Chinese Legend (source unknown)

Angelica sinensis root, in its Chinese name mostly known as dong Quai or danggui, it is often referred to as the ‘women ginseng’ due to its alleged role as hormone balancer. It is widely grown in China, Korea, and Japan and has an extensive history of use in the Traditional Chinese Medicine. The Chinese Angelica has been long used as a remedy for menstrual related problems because it enriches the blood and promotes blood circulation. Because of its tonic influence on blood circulation, it also provides a nourishing, warm and restorative effect. Scientific research has shown that the Dong Quai extract contains a large amount of volatile oils, vitamins, organic acids and other organic elements responsible for its high antioxidant potential which in turns contributes to a high invigoration and detoxification of the body.

History. Angelica sinensis, translated as Chinese Angelica, with other popular names such as Dong Quai or Danggui, is one of the most extensively used medicinal herbs in China, having quite a millennial tradition. Its European counterpart, A. archangelica, is known since the 17th century as the fleshy root of the wild celery plant, which is proposed to have stimulatory roles on the digestive system. Many legends had been woven around the story of A. sinensis beneficial attributes. One of these legends portrays the story of this miraculous plant in connection with a married couple, merchants of medicinal herbs. As the young husband set off to gather herbs and did not return in the three years as promised to his wife, she remarried; but when he finally returned, she felt sick of broken heart and the lost husband managed to cure her using a plant that he gathered during his search. Since then the plant was named dong Quai. The meaning of the Chinese words is translated to ‘should come back in time’ or ‘lost husband’, while the plant’s properties were mostly considered to heal women pains (Foster and Chong, 1992). In the ancient Eastern culture, the plant was also used as a spiritual totem to ward off evil, bring good luck, prosperity, peace and health. Some people even kept the roots anointed with oils near the baby’s cradle for protection. Stepping out from the legends to the real life, the Oriental Materia Medica compendium, described Dong Quai as a mean to harmonize the vital energy (Chi) and restore the body’s ‘proper order’ (Hsu, 1986).

Biology. Angelica sinensis or Angelica polymorpha var. sinensis, is part of the Apiaceae (Umbelliferae) Family, together with other economically important species such as carrot (Daucus carota), parsley (Petroselinum crispum), parsnip (Pastinaca sativa) and caraway (Carum carvi). It is a biennial or perennial herb originating from Gansu and Shanxi provinces of China. It grows in cold, damp, forest mountain terrains with rich, deep, sandy soils. It also is commonly found in riverbanks and damp meadows in countries like the United Kingdom, Lapland, and Iceland. It grows up to 1-2 meters, has white to greenish-white flowers that bloom from May to August, and in
the fall it bears a seeded fruit. The root is branched, thick and fleshy, the main root being short (approximately 15-25 cm long) with additional roots branching. The outer surface of the root is brown with irregular wrinkles and yellow flesh (Zheng et al., 1997).

Bioactive molecules. Due to its archaic use in the Chinese medicine, the chemical composition of Angelica plant was extensively studied using high-tech approaches like gas chromatography-mass spectrometry (GSC-MS) or high performance liquid chromatography (HPLC). These studies indicated that Angelica extracts contain alky phthalides (ligustilides, angelicide, butylphthalide), furanocoumarin (archangelicin, bergapten, imperatorin), coumarins (angelol G, angelicine), terpenes (cadinene, carvacrol), phytosterols (beta-sitosterol, stigmasterol), organic acids (ferulic acid, succinic acid, myristic acid), as well as immune stimulating polysaccharides (Shi et al., 2006). Other active constituents of dong quai include the vitamins A, B, E, numerous phytochemicals and minerals, such as calcium and magnesium. Overall, more than 70 different chemical compounds have been identified in A. sinensis root extract (Chao and Lin, 2011). The biological activity of extracts from dong quai was linked to the ferulic acid content which varies depending on the extraction method. Ferulic acid has numerous biological activities among which antioxidant, anti-inflammatory, anti-thrombotic, anti-coagulant, cardio-protective, and radio-protective (Budavari, 1996). The efficacy of Dong Quai is also associated with its various polysaccharides which possess anti-tumor and immuno-modulatory effects (Shang et al., 2003; Ma and Ding, 2006). Moreover, the low molecular weight molecule, fucoidan, was shown to stimulate the restoration of blood circulation in neurons after trauma (Lei et al., 2014). The reported biological activities of ligustilides include inhibition of uterine contractions, vasodilatation, analgesic, anti-inflammatory, anti-depressant and neuro-protective (Shi et al., 2006). As for its toxicology, the LD50 values for dong quai in mice was reported to be 100 g/kg for root extract in ethanol/water, while acute toxicity studies indicated that its administration produced no detrimental effects at a dose up to 5000 mg/kg (National Toxicology Program, 2008).

Medicinal uses. Angelica sinensis has been used for thousands of years in traditional Chinese, Korean, and Japanese medicine. Historic uses of dong quai include treatment of a great number of conditions among which menstrual related problems like dysmenorrhea, amenorrhea, or menopausal syndromes, and pain-related disorders such as migraine, headaches, and abdominal pain (Shi et al., 2004). Dong quai has also been used in association with acupuncture to treat painful injury, neuralgia, angina, and arthritis. A study from the World Health Organization recognized its uses to treat dehydration, lumbago, hypertension, and nervous disorders (WHO, 2004). Other studies showed that it can be beneficial as a mild laxative, as well as to treat some levels of insomnia, and as blood pressure stabilizer in both men and women (Raintree Nutrition, 1996). The proposed pharmacological activities of A. sinensis root extracts cover a broad range of responses including cardiovascular effects (Wang and Ou-Yang, 2005), neuro-protective effects (Huang et al., 2008), immuno-modulatory effects (Yang et al., 2006), anti-inflammatory activities (Chao et al., 2010), anti-cancer effects (Tai et al., 2006), estrogenic activities (Amato et al., 2002) and gastrointestinal effects (Cho et al., 2000). Additional activities associated with dong quai extracts and its constituents include modulation of enzyme activity, cellular proliferation, modulation of gene expression, and antioxidant activity (Yang et al., 2007). An interesting study showed that the polysaccharides extracted from A. sinensis in conjunction with Tai Chi (Chinese alternative training associated with improved fitness, relaxation and mood state) exercises decreased the oxidative stress-like injuries in middle-aged women.
and promotes a healthy life style (Juan et al., 2009). Furthermore, a recent study reported that some peptides extracted from A. sinensis roots were able to delay senescence through the activation of antioxidant defense in model organisms (Wang et al., 2016). Due to all its potential health benefits investigated so far, Dong Quai has been marketed around the world as a dietary supplement (US FDA, 2003).

**Cosmetic usage.** Alongside with the utilization as dietary supplements, Dong Quai is also widely used by the Cosmetic Industry. The Chinese Angelica root extract is among the most frequent used herbs in China since long time ago when early herbalists from the Tang Dynasty (618 to 907 AD) found about its skin whitening effect, a property proved further on by modern scientists, based on its strong inhibitory effect on melanin formation (Wang et al., 2000). Nowadays, extracts from different parts of the plant (root, seeds) or whole plant are recognized as safe to use in skincare, according to Section 409 of the Food, Drug, and Cosmetic Act (US FDA, 2003).

So far, 19 cosmetic products containing Dong Quai root extract are available on The Skin Deep Cosmetic Safety Database. Less the 1% root extract is advised for sunscreen products (Natural Standard Research Collaboration, 2008) while some formulations can contain additional ferulic acid (Wei et al., 2000). Aside creams, Dong Quai is also being used in certain bath and body products (Grossman, 1999), as banishing essence, and beauty capsules. Among its properties it is worth to point out the invigorating effects, skin nourishment, and strong detoxification ability which help women maintain a youthful and blooming skin state. These attributes are further enhanced by the presence of the low molecular weight molecule fucoidan, which is highly recommended as a therapeutic agent to prevent and treat skin photoaging (Moon et al., 2008).

**Bambusa vulgaris (Bamboo)**

*“The bamboo that bends is stronger than the oak that resists.”*  
*Japanese proverb*

Bamboo (Bambusa vulgaris) plants are the highest grasses currently growing on our planet. It is quite an amazing species, both from the point of view of its countless uses all over the world, as well as its beauty, biology and puzzling history. The plant’s origin is in China, but it is also encountered all over the world, except the frozen Poles. Due to its longevity and resilience, the Bamboo tree has gained increasing interest over time, with ancient civilizations associating it with devotional meanings and symbology. For instance, in China it symbolizes honesty and integrity while in India it is used as the symbol of friendship. It has a wide array of uses from ecological, animal feed and ornamental plant, to several industrial applications such as the textile, construction, food and agriculture, as well as medicinal and cosmetic remedies. Bamboo shoots have a high nutritional value containing many proteins, sugars, minerals, fibers, vitamins and antioxidant components with great value for natural therapies. Shoot-based cosmetics like the bamboo bath salts are being broadly used in Asia as a cleansing and anti-microbial agent.

**History.** Bamboo history interweaves with the traditions of rural and tribal population across Asia as it represents an integral part of their culture, society and economy. Throughout history, the bamboo tree has been tagged as ‘The Cradle to Coffin Plant’, ‘The Poor Man’s Timber’, ‘Friend of the People’, ‘Green Gasoline’, ‘The Plant with Thousand Faces’, or ‘The Green Gold’, all because of its miscellaneous uses, being also linked to poverty alleviation (Tewari, 1988). Bamboo trees, with more than 1500 different documented traditional uses, provide
EMPOWERED BEAUTY REMEDIES

BAMBUS.

BAMBUS, BAMBOU, MAMBO SIVE ARBOR TAKHIN, Monstch, hochzoll, in einigen armenischen TabaksSorten Sachehr Bambo anbringung man in Bank, Pia, 2m. Tabnak foha oder foh, "Hab, Band, anno damo amasko coromite quattuor Horomin, Cumaring, Form, Forme, in Bamboo Number, Lax, Coume, oder Ronse, dos amak, Corm, Bamboo, Natt, splat der 15sale Blatteten.

Character: Ein arando avromo, prama, ignominia, saudita, eratta, nodotia, alipcia, pecoria, beno carv, veuloraen, doma, modula, repula; folk haben edivavan, folk normale amalma, folk devagoria, studium percut fahamen; hine hertiner al saghul bestin.


S A M A R I N D I A N D I N A S T Y.

Clarkes. III. Cendrav, ODOR I. Monogra. GENTIL, cas a. gretam, FERRAS & RIVIERA, che a de novo elc. dos a. dolus.

PHARMACUTICA PARS. Tamarindus fruteti et pulpa.

OMNES FRUITES, tamarindus, cum pulpa, est raro.

VIRUS, michuca, micoptica, autoclitica, simon coracina, acharina, liam cecina, aqua per aqua.

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food, shelter, medicine, raw materials for construction, wood substitute, and other daily-use articles (Shrestha, 1999). In many Asian cultures, it is believed that humanity appeared from a bamboo stem. For instance, the Philippine mythology narrates that the man and woman materialized from a split bamboo on an island after the battle between the Sky and the Ocean. Another story in the Malaysian folklore depicts the first man uncovering the first woman inside a Bamboo tree. In the Japanese and Vietnamese cultures, the Bamboo trees are related with the manifestation of many Gods and Goddesses. In China, during Tang Dynasty (618 to 907 Ad) the Bamboo shoots were considered a treasure dish, while the Japanese people called it 'The King of Forest Vegetables'. The Chinese considers Bamboo, along with Orchid, Pus Blossom and Chrysanthemum, as 'The Four Gentlemen' in relation with the behavioral models of the society. Many texts from the Chinese literature, praising the Bamboo trees as elegant, strong and upright, are intended as metaphors describing people holding these characteristics. Aside its style-related etiquette, Bamboo also played a significant role in the history of Buddhism, as the monks were the first ones to introduce it as a food source. Many Buddhist temples are surrounded by Bamboo forests, as the plant is also considered a barrier against evil spirits. In Vietnam, the Bamboo is linked to the story of 'Vo Vinam', the Vietnamese martial arts representing their straightforward life style (Laws, 2010).

**Biology.** *Bambusa vulgaris* belongs to the Genus *Bambusa* of Bambuseae Group from the **Poaceae** (*Gramineae*) family. It is a woody, perennial, evergreen plant, originating in the Indo-Burmese region and spread throughout the tropics and subtropics (Grosser and Liese, 1971). The highest diversity is found in Southeast Asia and South America, while, fewer bamboo species are found in Africa, with the exception of Madagascar which is rich in endemic species. Bamboo is found at latitudes from 51°N in Japan to 47°S in South Argentina and from the sea level up to 4000 m. It was one of the earliest tropical species introduced in Europe by the 17th century, from where the Spaniards took it to North America. Altogether, there are 119 genera and more than 1,500 different species of bamboo, found in various climates, from cold mountains to hot tropical regions (Panda, 2011). Although Bamboo is a grass, its appearance is very tree-like, reason why they are sometimes called 'bamboo trees'. *B. vulgaris* grows in clumps of yellow, lemon-like stems with green stripes, and has dark-green, narrowly lanceolate leaves. The stems are strong, thick-walled, formed of several nodes. It can grow up to 10–20 m in height with 4–10 cm in diameter. Bamboo shoots, the young part of stems, are 20-30 cm long, tender, soft, crispy, of an ivory-yellow color. At harvesting time, the bamboo shoots can weigh up to 1 kg. Flowering is rare, every 30-40 years, hence same is valid for the fruits, also because of low pollen viability caused by irregular cell division; no seeds are formed. At the interval of several decades, the whole population of an area blooms in the same time. bamboo spreads mostly through vegetative propagation by rhizomes, stem and branch cutting, layering, and marcutting (Grosser and Liese, 1971).

**Bioactive molecules.** A variety of ingredients such as proteins, carbohydrates, acids, starch, fat, dietary fibers, vitamins and minerals have been analytically examined and reported in the Bamboo plants (Nirmala et al., 2008; Sun et al., 2015). Bamboo shoots are low in calories, high in dietary fiber, and very rich in nutritive sources. Out of the 17 amino acids present in the Bamboo shoots, 8 of them, namely serine, methionine, isoleucine, leucine, phenyalanine, lysine, and histidine are essential for the development of the human body. The fat content is relatively low (0.26% to 0.94%) with good levels of essential fatty acids. The average 2.5% total sugar content is lower...
than that of other vegetables, while the water content is reported to be around 90% or more (Choudhury et al., 2012). Importantly, Bamboo shoots contain several vitamins, like vitamin E (α-Tocopherol), C (ascorbic acid), B1 (thiamin), B2 (riboflavin), B3 (niacin) and B6 (pyridoxine), essential for human diet. The fresh shoots also have a good profile of minerals, containing high quantities of potassium (K), calcium (Ca), manganese (Mn), iron (Fe), zinc (Zn), chromium (Cr), copper (Cu), phosphorus (P) and selenium (Se) (Chongtham et al., 2011). The abundance of vitamins and minerals can add a rejuvenating effect on the skin. Shoots of some Bamboo species contain a cyanoxylic acid termed taxiphylin that can result in both acute and chronic toxicity, but the compound degrades rapidly by boiling in water. More interestingly, the germaclinium present in shoots has anti-aging properties (Sarangthem and Singh 2003). Some antioxidant substances like flavones, phenols and steroids can be extracted from the shoots, but higher amounts of these compounds has been reported to be present in leaves (Sun et al., 2015). Compounds such as flavonoids, glycosides, phenolic acids, coumarin, lactones, benzoxquinones and anthraquinones, stigmasterol and brassicasterols, are responsible for the antioxidant and antibacterial properties of Bamboo extracts (Tanaka et al., 2013). Apart from bioactive compounds like flavonoids, glycosides and polyphenols, Bamboo leaves contain a large amount of active low molecular weight oligosaccharides, like feruloylated arabinoxylans and xylooligosaccharides, highly regarded as emerging prebiotics (Aachary and Adhikari, 2008). The low molecular weight xylooligosaccharides, derived from xylans, have high skin absorption rates and offer plenty beneficial biological activities, among which anti-microbial, anti-inflammatory and antioxidant effects (Kumar et al., 2012).

**Commiphora abyssinica (Myrrh)**

"Perfume and incense gladden the heart."

**Proverbs 25:9**

Myrrh (Commiphora abyssinica or Commiphora myrrha) is a shrubby desert tree native to the Eastern Meditterranean, Arabian Peninsula, Ethiopia and Somalia. *Commiphora abyssinica*, also known as the Abyssinian Myrrh, produces a specific resin called myrrh, hence the name of the plant. Depending on the place of origin, it is also denominated as Guggul or Didin. This highly valued aromatic gum resin has a bitter, pungent taste and a sweet, pleasing aroma. In the ancient Egypt, aside its many medicinal uses, the Myrrh was highly valued used as a perfume. It had been used for embalming purposes in funeral ceremonies and is considered sacred in many religions. The Myrrh extract is an oleo-gum resin, mainly containing resin and gum associated with volatile oils, bitter principles, enzymes, amino acids and flavonoids with high antioxidant potential. Due to its chemical composition, it has several properties as astringent, anti-septic, anti-spasmodic, and antitumor. Myrrh is used as a fragrance in cosmetics and as a flavoring agent in foods and beverages.

**History.** The word ‘myrrh’ derives from the old Aramaic and Arabic languages and is being translated as ‘bitter’. Myrrh, as a highly prized and valuable plant, has been used since ancient times in incense, perfumes, and holy ointments. The Indian Sushruta Samhita, an ancient Sanskrit book of medicine dating from the 6th century BC, mentions the use of myrrh as an herbal medicine. Guggul-gum resins have been prescribed in the Ayurvedic folk medicine as anti-obesity, anti-inflammatory, antibacterial, anti-cosulant and anti-atherosclerotic agent. In China, the first historical text with the medicinal properties of myrrh (moyao) recorded during the Tang Dynasty, specify that it was utilized to treat arthritis, rheumatism, uterine disorders, wounds, improve circulation and menstrual pain, and relieve painful swelling. From China, the Myrrh took the Silk Road and arrived to Persia, where King Ahasuerus gave a royal decree to be regularly used by women during their beautification rituals consisting of six month treatments with myrrh oil and six months with spices. The Greek philosopher Herodotus (5th century BC) categorized the Myrrh as disinfectant, incense, and medicine. The ancient Egyptian Ebers Papyrus (2nd century BC) talk about myrrh being used as embalming compound, medicinal herb and insect repellent. Archaeological evidence from Egypt also pointed out that myrrh used to be carried in cloth packets or small bottles around the neck to improve body fragrance. Later on, Pliny the Elder (1st century AD) mentioned that myrrh was the royal perfume in the Parthian Empire, spread where Iran, Iraq and neighboring territories stand today. In the antique Rome, the price for myrrh was comparable with that of gold. Stories tell that Nero burnt vast quan-
tities of myrrh and cinnamon for his wife’s funeral. In later Roman times, the herb was traditionally mixed with wine and offered to prisoners prior to execution to ease pain. With the start of the AD period, the Myrrh balm gain considerable significance in Christianity, when it was brought as a birth gift to Jesus, a moment referred to in the Bible as the Pilgrimage of the Magi. During Marco Polo’s journey in Asia, it is said that he visited the burial grounds of the three Magi who bare the gifts of gold, as a symbol of kingship on earth, frankincense, as a symbol of deity, and myrrh, as a symbol of death, to the baby Jesus. Myrrh was then used to embalm Jesus’ body after Crucifixion. Myrrh, as a high valued product for commerce on the ancient spice routes, is woven into legend and myth. In a Syrian legend, the Myrrh tree is named after the daughter of the Syrian King’s Thess because she was transformed by the Gods into a Myrrh tree to escape her father’s murderous rage (Hanrahan, 2005).

**Biology.** Commiphora abyssinica is a member of the Burseraceae Family, consisting of approximately 700 species and 18 genera of both trees and shrubs with tropical and subtropical geographical distribution (Langenheim, 2003). *C. abyssinica* or *C. myrrha*, native to Yemen, Somalia, Eritrea and Ethiopia, is abundant in arid savannas, while its relative *C. gileadensis* originates from the Eastern Mediterranean and Arabian Peninsula; both species are highly productive in balm resin. The genus name *Commiphora* originates from the Greek words ‘kommi’, meaning ‘gum’ and ‘pherei’, meaning ‘to bear’, thus species bearing the fragrant oleo-gum-resin which is extracted upon damage to the tree bark (Miller et al., 1996). Another common name for *Commiphora* species is ‘orkwood’, originating from the African ‘lannedood’, which is translated as ‘cannot die’ and represents an indication of the sustainability and rapid growth of the plant. The Myrrh tree can grow up to 2-3 meters tall, is thorny, and free of foliage most of the year, with ash-colored papery bark that flakes off revealing the green bark producing fragrant resins. The oil distilled from the myrrh resin is thick, pale yellow to orange-brown, with a warm, balsamic, sweet, spicy, and sharp aroma. The tree bares small, brown to pink, unisexual flowers, which, after pollination, develop into red drupe fruits consumed by birds during the hot dry seasons (Langenheim, 2003).

**Bioactive molecules.** The gum resins of *C. abyssinica* are important commercial products as fragrant oils in many regions around the world, having a high economical value in African countries (Demissew, 1993). As its name indicates, the Myrrh extracts contain mainly resins and gums, composed of terpene and terpenoid aggregates. These are associated with volatile oils, and other active principles like pinene, dipentene, limonene, cuminaldehyde, cinnamic aldehyde, eugenol, heerabolene, sesquiterpenes, formic acid, acetic acid, myrrholic acid and palmitic acid (Sivas et al., 2005). The oleo resins comprise 32% gum and 1.45% essential oils. The extracts also contain amino acid, camphorene, cembrene, allycembrol, flavonoids and ellagic acid. The main essential oils within the Myrrh extract are myrcene, dimyrcene and polymyrcene. Some of the products commercialized throughout India also contain mericyl alcohol and β-sitosterol (Poonia et al., 2014). Chemical analyses of extracted solvent, hydrolysis and column chromatography of the Myrrh resin identified additional compounds like Z-guggulsterone, E-guggulsterol, guggulsterol-1, guggulsterol-11 and guggulsterol-III, cholesterol, sesamin and camphorene (Jain and Gupta, 2006). Among these compounds, the Z-guggulsterone and E-guggulsterol were shown to be responsible for lowering the cholesterol levels in human blood (Singh et al., 1994). Resins extracted from *C. abyssinica* were described to contain 15 amino acids and several sugars, among which galactose, arabinose, and glucuronic acid (Wang et al., 1995). The characteristic odor of Myrrh gums is given by specific hexane-soluble viscous oils identified with GC/MS as furanosesquiterpenoids, isofuranogermacrene and lindestrene (Ubbilas et al., 1999). Among Myrrh’s essential compounds, low molecular weight molecules like camphene, α-pinene and β-pinene or eudesmol, are also of great value for medicinal, pharmaceutical and cosmetic products (Dias et al., 2012).

**Medicinal uses.** In the Indian traditional Ayurvedic medicine, various formulations of Guggul gum are used to treat a variety of ailments. For instance, Yogaraj Guggul is used to treat obesity, joint pain, arthritic conditions, muscle aches, rheumatism, and gut, while Punawadi Guggul is used for detoxifying the kidneys, eliminating fluid, helping heart conditions, and inflammations (Poonia et al., 2014). Research studies aimed to validate the practice of these oils from the traditional medicine have revealed that, indeed, the Myrrh extracts are efficient to support the treatment of several conditions. For instance, the hypolipidemic activity of Myrrh, responsible for anti-obesity and a healthier circulatory system, is due to the presence of the guggulsterones, esters and alcohols (Jain and Gupta, 2006). Guggulsterones were also shown to have anti-cancer properties, acting to induce apoptosis and suppress the proliferation of cancerous cells (Xiao et al., 2008). Other guggulipids were shown to act as anti-dementia remedies and have cognitive enhancing activities (Chaudhary, 2012). Ethanolic extracts from the resin of several *Commiphora* species were demonstrated to have hepato-protective and thyroid-stimulatory effects (Al-Howiriny et al., 2004; Panda and Kar, 2000), anthelmintic and antibacterial activities (Hassan et al., 2003; Ishnava et al., 2010). Additionally, lipids extracted from the Guggul gum have also been reported to be effective in the treatments of nodulocystic acne (Thappa and Dogra, 1994).

**Cosmetic usage.** Products containing Myrrh resin, marketed as dietary supplements, pharmaceutical and cosmetic preparations, are declared as safe by the Federal Food, Drug, and Cosmetic Act (Masten, 2005). A number of patents, assigned to Parfums Christian Dior (France), Elizabeth Arden Co. (USA), and Hindustan Lever Limited (UK), have been released for the use of Guggul gums in cosmetics. Extracts of *C. mukul*, acting as pigments agents, were tested in melanocyte cultures and used to manufacture several cosmetic compositions (Andre et al., 1999). Anti-sebum and antioxidant formulations were made using *C. mukul* or *C. wightii* gugglipid components (McCook et al., 1997), while cosmetic compounds for skin lightening and anti-wrinkle were manufactured from other *Commiphora* species (Andre et al., 1997; Zhang et al., 2001). Natural resins, bio-active triterpenes and flavonoids have been long studied for their antioxidant effects in cosmetic and pharmaceutical preparations. Within this frame, Assimopoulou and colleagues (2005) have shown that *C. myrrha* displays antioxidant and anti-inflammatory activities. Another study showed that essential oils extracted from the same species offer protection against oxidative stress during sun exposure, mainly through the peroxidation of sebum squalene (Auffray, 2007). Other recent scientific reports revealed that extracts from Myrrh are widely included in micro-encapsulated essential oils in cosmetic and personal healthcare products and are quite effective in eliminating the body malodorous also due to their antibacterial properties and good fragrance (Carvalho et al., 2016; Kan-layavattanakul and Lourirh, 2011). The presence of low molecular weight molecules like camphene, pinene and eudesmol, increase the absorption of other essential oils, providing a better skin nutrition (Dias et al., 2012). Moreover, the low molecular weight guglipids are highly appreciated for their anti-sebum and antioxidant properties in cosmetic products as it was shown to prevent sebum secretion and offer protection from free radicals (McCook et al., 1997).
Crocus sativus (Saffron)

"In saffron-colored mantle from the tides of Oceans rose the Morning to bright light to gods and men." Iliad, by Homer (approximate dating 762 BC)

Saffron (Crocus sativus) is considered the most expensive spice worldwide, having a myriad of uses, from cooking to dying, medicine and cosmetics. Aside its abundance of uses, one of the main reasons why Saffron is so costly is that the flowers are being handpicked and dried to collect the stigmas, and estimates say that about 100,000 flowers are required to make one kilo of pure dried saffron. The origin of the plant, though unclear, it is considered to be in Iran and Greece, while it is largely cultivated in Southern Europe and Asia. Since its first documentation in the 7th Century BC, the long and interesting history of Saffron spices traces back over 3000 years, passing through many civilizations, countries, and cultures from the Babylonians to Egyptians, Hindus, Greeks, and Romans. It began to be used in the Middle East and then branched out to conquer the world. Plenty cooking recipes using saffron, from the Indian to Mediterranean cuisines, add an alluring aroma to preferred foods. One of the special features about saffron is that it contains more than 150 volatile and aroma yielding compounds among which carotenoids, responsible for the deep orange and golden hues, safranal, responsible for the rich fragrance, and flavonoids with antioxidant properties. As health benefits, it enhances the overall well-being of a person, and is used as a traditional treatment of depression, heart and digestive disorders, as well as many forms of cancer. Apart from these remarkable qualities, saffron provides lots of beauty benefits as well, as a natural toner and skin lightening agent, giving a glowing, bright skin effect.

History. Saffron, the stigma of Crocus sativus flowers, has been appreciated for its intrinsic value since far back in time, being considered both a luxury and medicinal plant. The word ‘saffron’ derives from the Arabic languages and it translates to ‘yellow’, giving a reference to the color of the plant stigmas. On the other hand, the word ‘crocus’ comes from Greek, designating the same property, and the Latin word ‘sativus’ stands for the cultivated species. Both the etymological significance and origin of the plant are quite debated by scientists, and one of the reason is that Crocus domestication dates far back in time to the Minoan period (1900 – 1600 BC) in the Late Bronze Age (Negbi, 1999). However, a recent study that had evaluated the genetic diversity and phylogenetic relationships in Crocus species suggested that the plant is native to the Mesopotamian region (Alavi-Kia et al. 2008). Even since the old times, saffron was treasured as much as gold. The nobility considered it an extravagant product, with Kings, Queens, Pharaohs and Monks, using it as perfume for bathing and bed sheets, cloth dye, spice for foods and beverages, as well as offers to the Gods. The earliest indication of saffron use dates as early as 2300 BC, when the great King Sargon of Akkad, ruler of the Akkadian empire, referred to the city of Azupiranu as the Saffron City. In the ancient Egypt, saffron was used in medicine, as mentioned in the Ebers Papyrus dated 1600 BC. The history also mentions that Queen Cleopatra (69-30 BC) took long baths in goat milk and saffron (Mousavi and Bathaie, 2011). Memorable frescoes discovered in Greece, dating back to 1600 BC, depict the rituals of saffron harvest and offerings to worship divinities, because it was believed that the Goddess gave saffron to humanity as a gift with curative powers (Ferrence and Bendersky, 2004). Saffron was introduced in India by the Persians, where it was used by the rich people to parade their royalty and played a significant role during the wedding ceremonies. Moreover, it held a compelling role in all religions derived from Hinduism, being essential in many rituals to anoint Hindu deities and to be applied to the forehead of worshipers. Saffron was also used
t his the metallic symbol also in Buddhism. Aside its societal and religious attributes, the traditional Ayurvedic medicine nominates Saffron as a treatment for various illnesses, from the immune response to stress and anxiety reliever, as well as skin conditions (Bhargava, 2011). Coming to more recent times, during the 14th century Europe, Saffron played a significant role in history as being the reason behind the so-called ‘Saffron War’, a three-months long battle, burst out because a ship transporting the high valued spice had been hijacked (Mousavi and Bathaie, 2011). Aside the historical perspective, Saffron had served as inspiration for literature and arts. It has been specified in the Bible in Solomon’s Song of Songs, and praised in the writings of several Greek and Roman philosophers and poets like Hippocrates, Sophocles, Homer, Ovid, and Virgil. Saffron-derived paint was used in historical artworks, and recent studies aiming to detect these components by using scientific methods, identified the presence of crocin and safranal paints in a collection of drawings and maps exposed at the Royal Chancellery Archives in Granada, Spain (López-Montes et al., 2007).

Biology. Crocus sativus, commonly known as Saffron, belonging to the Iridaceae Family of monocotyledonous plants, is a perennial stemless herb widely cultivated in Iran, India and Greece. The domesticated Saffron, which does no longer grow into the wild, is an autumn-flowering perennial species. Saffron cultivation is mostly carried out onto well-watered, clay-calcareous soils with high organic content because they have friable, loose, and low-density properties (McGlynn et al., 1997). Since it is a triploid species bearing three sets of chromosomes, the flowers are sterile and do not produce seeds, hence it is propagated through the underground corms, which are bulb-like, starch-storing organs. The compact corms are small, brown globs that can measure as large as 5 cm in diameter, are shrouded in a dense mat of parallel fibers, referred to as the “corm tunic.” The plant grows to a height of 20-30 cm, and sprouts a couple of white, non-photosynthetic leaves which protect the true green leaves during their development. The buds appear in autumn, while the purple flowers, with sweet, honey-like fragrance, develop by October. Each flower possesses three crimson stigma of 25-30 mm in length, shaped as slender funnels, with dentate or fimbricate rims (Srivastava et al., 2010).

Bioactive molecules. The chemical composition of Saffron stigmas has attracted much interest throughout time. More than 150 volatile and 50 nonvolatile compounds have been identified (Winterhalter and Straubinger, 2000). The three main substances responsible for its bright yellow color, picrocrocins, the main substances responsible for its bitter taste, and safranal, the volatile oil accountable for the characteristic aroma (Winterhalter and Straubinger, 2000). Crocetin, as a low molecular weight carotenoid, has been demonstrated to have a myriad of pharmacologic and medical activities, among which improved functions of the circulatory and nervous systems (Giaccio et al., 2004). Saffron is less bitter than picrocrocic and it is accountable for up to 70% of the dry Saffron’s volatile fraction (Alonso et al., 1996). A second element underlying its aroma is liseron, a volatile pheromone which produces the dried hay-like scent, and some scientists say that this is the most powerful contributor to saffron’s fragrance despite its low concentration (Carmona et al., 2005). Several studies have found that the harvesting and drying processes can affect the taste and flavor of saffron (Tong et al., 2015), while the standards for good quality saffron were settled to 30% crocins, 5 to 15% picrocrocin, and up to 2.5% volatile compounds (Schmidt et al., 2007). Other chemicals with interesting properties from culinary, medical and cosmetic point of view include anthocyanins, flavonoids and vitamins (A, C, the B complex) as potent antioxidant compounds, amino acids, proteins, starch and minerals (Mn, Cu, K, Na, Fe and N) with high impact on food quality, and gums with other industrial applications (Ahammad et al., 2015). Aside the stigmas, also pollen, corms, and leaves from the Saffron plant were investigated from the perspective of their chemical composition and utility. These studies showed that pollen and corms have also great potentiality in medicine, possessing several new naturally occurring monoterpenoids classified as crocusatins (Baba et al., 2015).

Medicinal uses. Saffron, ‘The Magical Herb’ or ‘The Golden Spice’, has occupied a special place in many cultures, being widely used in Ayurvedic, Chinese and Unani traditional medicine. The Indian Ayurvedic belief considers it very potent and able to pacify all three doshas (vata, pitta, kapha), also known as mind-body types. Based on its innumerable value from the ancient times, the healing properties of Saffron extracts were tested also from the scientific point of view. Studies found that it is a safe and effective anti-depressant (Akhoundzadeh et al., 2005), and has positive effect on learning behavior and memory (Pitsikas et al., 2007). Other properties include anti-convulsing activity (Hosseinzadeh and Talebzadeh, 2005), amelioration of blood pressure and cardiovascular diseases (Khor et al., 2007), improvement of vision (Laabich et al., 2006), anti-cancer and anti-toxic properties (Megesh et al., 2005), and overall beneficial effects on the immune system (Haggag et al., 2003). The antioxidant properties of saffron extracts were also documented and it was shown that its components are able to bind to nucleic acids, proteins and lipids, conferring protection from the attack of free radicals (Kanakis et al., 2007). Treatment with C. sativus extract also resulted in significantly prolonged life span in cisplatin-treated mice (Nair et al., 1991a). Toxicity studies performed on animals showed that Saffron extracts are not toxic at doses up to 20.7 g/kg (Nair et al., 1991b).

Cosmetic usage. Saffron plays an essential role in the cosmetic industry, being one of the main ingredients in many cream formulations as it promotes fairness of complexion and removal of skin blemishes. In the Ayurvedic tradition, Saffron is called ‘Varnya gana’, meaning the one that gives fairness and glow to the skin. In early times in Europe, small doses of saffron were ingested orally and it had been stipulated that it produced tissue coloration. Similar uses were reported in Japan, where Saffron is used as ingredient in many cosmetic preparations for topical applications because it provides a good face color (Osbaldeston and Wood, 2000). Research has shown that the presence of active substances such as safranal and crocin (Dweck, 2001), with antioxidant and anti-aging activities, promote it as a suitable natural product for the cosmetic and perfume industries (Safrin, 1997; Assimopoulou et al., 2005). Moreover, the low molecular weight crocetins have the ability to enhance the oxygen diffusion through the skin while also improving the blood circulation throughout the multilevel skin layers (Giaccio et al., 2004). Cosmetic testing studies using saffron extracts in ethyl acetate/isopropyl alcohol/water (65:25:10) revealed that 0.3 % saffron had the maximum effect on skin rejuvenation (Vyas et al., 2010). Saffran extracts (1% and 0.5%) had been shown to be effective as sunscreen protection (Golmohammadjadzadeh et al., 2010). Recent studies had shown that emulsions of saffron water-oil extracts (3%), promotes human skin depigmentation and anti-erythema effects, providing useful tools for melanoma treatments (Akhtar et al., 2014a). The authors explain that this is due to the presence of strong antioxidant compounds. The same authors also tested the storage stability and moisturizing effect of creams containing Saffron extracts (3%) and found that the formulation had absolute physical stability within a range of temperature and humidity conditions while showing a significant increase in skin moisture content correlated with a decreased transdermal water loss (Akhtar et al., 2014b).
Ginkgo biloba (Ginkgo tree)

“The Gingko, that Eastern tree,
In my garden plot now grows.
In its leaf there seems to be
A secret that the wise man knows.”

Ginkgo biloba, poem by Johann Wolfgang von Goethe (1819)

Ginkgo biloba, also known as the ‘Maidenhair tree’ or ‘Autumn Gold’, is considered a living fossil within the vegetative kingdom, with a history spanning for more than 200 million years. Due to its resilience and antiquity, the Ginkgo tree has gained loads of symbolic meanings all over the world. It originates in China, and nowadays it spreads by cultivation in gardens and parks throughout all temperate regions of the world. The trees can grow up to 40 meters and have a long life cycle with some specimens reaching more than 2,000 years old. Because the male and female reproductive organs are situated on separate trees, it is associated with duality, the ‘yin and yang’ of plants. The uniquely two-lobe shaped leaves, responsible for the species name ‘biloba’, represent the most economically valuable part of the plant. Extracts from leaves, rich in flavonoid and terpenoid compounds with antioxidant properties, are widely used for medicinal purposes to prevent chronic oxidative damage associated with brain diseases. In fact, supplements containing Ginkgo extracts retail sales of over 90 million US$ annually. These remarkable healing virtues of Ginkgo extracts that have been recorded as far back as 2800 BC in the oldest Chinese Materia Medica. Other curative attributes include anti-inflammatory effects, blood flow improvements and allergy treatments. Because of its high antioxidant abilities, Ginkgo extracts had been also long associated with skin care, with the terpenoids being responsible for the improved blood flow while the flavonoids protect the skin from the damage caused by sunlight and pollution. The leaf extracts hold antibacterial properties and stimulating effects on skin collagen production, with tonic and rejuvenating actions. Furthermore, the tree seeds contain many nutritive and curative compounds, being considered as culinary delicacies in many Asian countries.

History. As it is a living fossil plant, the Ginkgo biloba tree survived essentially unchanged from the Jurassic period till now. For a long time it was believed that Ginkgo went extinct as many other plant and animal species from the Jurassic era (Royer et al., 2003). The tree’s incredible endurance throughout harsh conditions and remarkable resistance to disease and pests is responsible for its long life span. For this reason, Ginkgo is associated with the symbol of endurance and vitality, a representation widely demonstrated in the Chinese literature and art. Chinese monks highly revered the tree which was planted in the gardens of monasteries and considered sacred. The Buddhist monks introduced the tree to Japan, where the culture of its secularity continued to spread. In Japan, the Ginkgo tree has been considered a symbol of hope and peace and was attributed with the name of ‘hibaku’, translated as ‘something that has experienced a nuclear bomb’ because it survived the atomic blast of Hiroshima. The leaves and seeds of Ginkgo had been used for several centuries in the traditional Asian medicine, being mentioned in an herbal compendium published in 1350 during the Yuan Dynasty (Mahadevan and Park, 2008). In Europe, knowledge about the Ginkgo tree had been provided by Marco Polo upon his return from the 24 years long Asian adventure (Chen, 2009).

Biology. Ginkgo biloba belongs to the botanical family of Ginkgoaceae, being considered as an intermediate type
between ferns and conifers. It is native to China, from where it spread to Japan and Korea. Nowadays, due to its resilience and majesty, aside its economic value, it is present in gardens and parks throughout the world. Ginkgo is a relatively shade-tolerant species that grows best in well-watered, well-drained environments. In the wild, the trees are preferably found along stream banks, rocky slopes, and cliff edges (Royer et al., 2003). Ginkgo is a dioecious tree, meaning that the male and female reproductive organs are located on separate trees. The trees have a large trunk with a girth of about 7 m and a height up to 40 m. The leaves, uniquely shaped with 2 lobes resembling the maidenhair fern in shape and venation, grow in clusters and exhibit a golden-yellow color during senescence. These trees begin to reproduce after 20 years by developing fruits with an outer fleshy layer that have a considerable amount of butanoic and hexanoic acids, responsible for the rotting flesh-like odor (Mahadevan and Park, 2008).

Bioactive molecules. The main compounds encountered in the Ginkgo leaf extracts, responsible for its therapeutic actions, are flavonoids and terpenes. The flavonoids, accounting for 1% of the dry material, include biflavones, like ginkgetin, isoginkgetin, amentoflavone, sciadopitysin and bilobetin, glycosides and coumaric acid. The specific active constituents known as ginkgolides are diterepiper compounds, present up to 0.5% of the dry material, while the bilobalide sesquiterpenes are present in proportions of 0.005 to 0.4%. Other phytochemicals include aliph aldehydes as volatile compounds, sterols (sitosterol, stigmasterol), organic acids (shikimic, chlorogenic, vanillic, protocatechic, quinic, ascorbic and pcoumaric), carbohydrates (glucose, fructose, saccharose), carotenoids and lecithin (Sun and Lia, 2007). The therapeutic effects of the leaf extract are due to the synergy between the various chemicals rather than to a single chemical constituent. The presence of multiple bioflavonoid compounds with a low molecular weight, add to the high value of ginkgo extracts by promoting effective skin nutrition (Farruk et al., 2011). The commercially available standardized Ginkgo leaf extract preparation known as EGb761 was developed by Beaufor-Ipsen Pharma (Paris, France) and Dr. Willmar Schwabe Pharmaceuticals (Karlruhe, Germany), and it contains 24% flavonoid glycosides, 6% terpene lactones, and less than 5 ppm ginkgolic acid (Smith and Luo, 2004).

Medicinal uses. The ancient Chinese medicinal writings evoke the use of Ginkgo biloba since 5,000 years ago. The earliest applications included treatments of asthma, age-related memory loss, headache, and dizziness. At present, the ginkgo leaf extract EGb761 is administered mainly orally and prescribed as a plant-drug. The main action responsible for the therapeutic action of Ginkgo leaf extract comes from its antioxidant properties, able to enhance the activity of several detoxifying enzymes (Song et al., 2000). Scientific research had shown that Ginkgo extracts are effective for the prevention of neurodegenerative disorders and can improve memory, also due to its high content in lecithin and bilobalide, able to prevent DNA fragmentation (Ahlemeyer and Krieglstein 2003; Walewsik et al., 2005). Other therapeutic indications for the Ginkgo leaf extracts include cardio-protective effects (Mahady, 2002), chemo-protective action during cancer treatments (Sagar et al., 2006), improved cellular tolerance to oxidative stress (Smith and Luo 2004), and an overall effect on stress and anxiety reduction (DeFeudis and Drieu 2004).

Cosmetic usage. The same principles that support the use of Ginkgo leaf extracts in medicinal practices are applicable for the benefits encountered through the use of these products in the cosmetic industry. Hence, the main beneficial activity of these extracts comes from its antioxidant superpowers. Research showed that its potent flavonoid antioxidants can improve blood flow (Boelsma et al., 2004), therefore it is often included in anticellulitic formulations. Moreover, the presence of multiple low molecular weight bioflavonoids advocate for a healthy cell metabolism and effective skin nutrition (Farruk et al., 2011). Other studies carried out with healthy volunteers showed that Ginkgo extracts were more effective than β-carotene and vitamin E to reduce UV-induced oxidative stress in epidermal cells, thus protecting the skin against oxidative damage (Dal Belo et al., 2011). Antibacterial, anti-fungal and anti-inflammatory effects, due to the presence of flavonoids and ginkgolides, were also reported (Bajpai et al., 2015; El-Beltagi and Badawi, 2013; Chen et al., 2013). Ginkgo extracts were shown to have certain roles in increasing the skin moisture and stimulating cell regeneration, reason why these are also used in anti-wrinkle formulations (Chuarienthong et al., 2010).
Hibiscus sabdariffa (Roselle)

‘Hibiscus Flowers, where ever I look. 
Reds and blues and the pretty chile. 
Freshe taken from a picture book. 
They fill me with great delight. 
Indoor Hibiscus Flowers delicate yellow. 
Potted plants in my snug flat. 
Great beauty that turns me wellis. 
To all Gardeners I take off my hat. 
The hibiscus is a flower to please. 
Grown in a warm and temperate clime. 
Reds, blues and whites do tease, 
With glowing colours so sublime.’

Hibiscus Flowers, poem by Bernard Shaw (1949)

Hibiscus sabdariffa, also known as Roselle or Sorrel, is a widely cultivated perennial plant growing in tropical and subtropical regions. It represents an ideal crop for developing countries because it is easy to grow and has plenty of uses in the food and fiber industries. Hibiscus plants are famous for their bright colored flowers which caught the eyes and stimulated the inspiration of many famous poets and artists. Nowadays, Hibiscus flowers are gaining interest from the food and beverage manufacturers, as well as for pharmaceutical and cosmetic concerns. The flowers are exploited as natural colorants to replace various synthetic dyes, while in many Asian and African countries both the flowers and seeds are consumed as food as well as used for medicinal purposes. Nutrition studies have evidenced that Hibiscus flowers contain high levels of vitamin C, B, iron and calcium, while the main bioactive constituents, as anthocyanins, polysaccharides, flavonoids and organic acids, are responsible for their antioxidant properties and healing abilities. Infusions with Hibiscus leaves, calyces or flowers are believed to have curative effects on feverish states, it lessens the blood pressure by decreasing blood viscosity, and has an overall stimulatory influence on the whole digestive process. As beauty products, Hibiscus extracts are indicated for softening the skin as it acts like an emollient, as well as skin toning and detoxifying agent due to its antioxidant properties.

History. Roselle is believed to be native to India and Malaysia, from where it spread to Western Africa. Because it grows easily in tropical and subtropical regions its current cultivation stretches also to Central America, where it is regarded as the national flower of Haiti (Lawton, 2004). Other Hibiscus species are representatives of other nations; for instance H. syriacus is the national flower of South Korea while H. rosa-sinensis represents Malaysia. Hibiscus is also the Hawaii’s state flower, and Hawaiian girls wear it behind the year to point out if they are single or married. In India, the Hibiscus flowers gain a spiritual dimension because it represents the main offering to the Hindu Goddess Kali, as it is frequently depicted in many art forms throughout the Bengali states. Besides its history and symbolism, all the above-ground parts of the Roselle plant are highly valued in Ayurvedic, shamanic and tribal native medicine traditions. The edible parts of the plants are representative for several culinary traditions around the world. For example, in Egypt the calyces are used to make ‘Cacody tea’ and fermented drinks,
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while in Sudan and Nigeria they are boiled with sugar to produce a drink known as ‘Karkade’ or ‘Zoborodo’. In Mexico, a similar drink is called ‘agua de Jamaica’, while in the West Indies the calyces are used as flavoring in ingredient in rum. Aside herbal drinks and beverages, the Hibiscus calyces are also used to prepare jams, jellies, ice cream, chocolate, puddings and cakes (Plotto, 2004). In the Philippines, Hibiscus is used in many local dishes and among the most famous one is the native chicken soup (Lubuag or Sapinit) from the Visayan area.

Biology. Hibiscus sabdariffa is a member of the Malvaceae Family, a prolific family of plants which includes more than 300 species of herbs, shrubs and trees. Its native distribution is somewhat uncertain, with most scholars believing that is from India or Saudi Arabia, while some evidence of its domestication in western Sudan, dating back to 4000 BC, was also proposed (Murdock, 1959). Nowadays, it is widely cultivated in both tropical and subtropical regions, spanning many countries among which India, Saudi Arabia, China, Malaysia, Indonesia, The Philippines, Vietnam, Sudan, Egypt, Nigeria and Mexico. Hibiscus sabdariffa var. sabdariffa is an annual, erect, bushy, herbaceous subshrub that can grow up to 2.4 m. The leaves are alternate, long, and green, with reddish veins. The flowers are yellow or pale-yellow-brown with a rose or maroon eye, and turn pink as they wither at the end of the day. The typically red calyx consists of 5 large sepals with a collar of 8 to 12 slim, pointed bracts around the base. The calyx, stems, and leaves have an acid taste and closely resemble the cranberry in flavor. The plants have a life cycle of 4-8 months, depending on the cultivation region. A single plant produces about 1.5 kg (8 t/ha) of fruit while the yields of leaves are around 10 t/ha (Plotto, 2004).

Bioactive molecules. Research studies aiming to investigate the reasons behind all the positive attributes of Hibiscus components in diet, medicine and cosmetics, revealed a list of bioactive chemical constituents responsible for its effects (Da-Costa-Rocha et al., 2014). Among them, several organic acids like citric acid, hydroxycitric acid, hibiscus acid, malic and tartaric acids are major compounds, while oxalic and ascorbic acid are minor (Ismail et al., 2008). Anthocyanins, a group of flavonoid derivatives and natural pigments, are present in the dried flowers and are responsible for their color. Hibiscin, chrysanthemin, gossypianin are some of the anthocyanins present in the Hibiscus flowers and the reported content in various varieties reach from 1.7% to 2.5% of the dry weight (Alarcon-Alonso et al., 2012). Among the flavonoids, compounds with strong antioxidant activities such hibiscitrin, sabdaritrin, gossypitrin, gossytrin, quercetin, luteolin, chlorogenic acid, protocatechuic acid, pelargonidic acid, eugenol, and the sterols b-sitosterol and ergosterol, were reported (Williamson et al., 2013). Low molecular weight polysaccharides, like arabinose, galactose, glucose, rhamnose, galacturonic acid, glucuronic acid, manose and xylose, represent another key group of chemicals present in large quantities in various parts of the Hibiscus plants (Sengupta and Banik, 2011). Additionally, more than 25 volatile compounds responsible for the plant’s aroma were identified, among which many unsaturated hydrocarbons, alcohols and aldehydes (Ramirez-Rodrigues et al., 2011).

Medicinal uses. The Ayurvedic practices were the first to recognize Hibiscus as a medicinal plant. Commonly known as ‘Gongura’ in Hindi, it was used to treat a wide range of maladies among which hypertension, liver disorders and poisoning (Sastri, 1959). Research intended to prove the roles assigned to Hibiscus by the Eastern alternative medicine, showed evidence that it has antibacterial, anti-fungal and anti-parasitic activities (Olaleye, 2007), hepato-protective (Wang et al., 2000) and nephro-protective (Wang et al., 2011) actions, anti-anemic (Falade et al., 2005), anti-obesity (Alarcon-Aguilar et al., 2007), anti-diabetic (Peng et al., 2011) and anti-cancer
effects (Tseng et al., 2000). The antioxidant activity of Hibiscus water and ethanolic extracts was extensively studied and it is indicated that they act as free radicals scavengers, inhibiting damaging enzymatic activities, having a protective action against oxidative damage and lipid peroxidation, and an overall optimization of the liver detoxifying activities (Usoh et al., 2005). Clinical trials were also performed to assess the hyperlipidemic effects (Gurrola-Díaz et al., 2010), anti-hypertensive efficacy (Mozaffari-Khosravi et al., 2013) and anti-diabetes action (Mozaffari-Khosravi et al. 2009), with some encouraging results.

**Cosmetic usage.** Hibiscus flowers, as feminine symbols of beauty and sensuality, are of great relevance to the cosmetic industry. Since long time, oily extracts from Hibiscus had been used by Asian women to confer a glowing aspect to their skin and hair. Even in the present times, these oils are still used to prepare scrubs and soaps in Malaysia (Ismail et al., 2008). Extract of Hibiscus are quite alluring due to the Botox-like effects. This powerful firming agent has a proven calming effect that smoothen the wrinkles, giving a youthful, healthy glow (Rival et al., 2009). Hence, Hibiscus is considered a noninvasive anti-aging alternative to the intensive skin lifting and skin firming procedures. Additional properties include skin whitening, anti-acne, anti-microbial, as well as the much-desired purifying and cleansing properties (Wong et al., 2010). In addition, a recent report has shown that low molecular weight compounds existent in Hibiscus flower extract can inhibit melanoma growth (Goldberg et al., 2016).

*Nelumbo nucifera* (Lotus)

“As a lotus flower is born in water, grows in water and rises out of water to stand above it unsoiled, so I, born in the world, raised in the world having overcome the world, live unsoiled by the world.”

**Gautama Buddha**

*Nelumbo nucifera*, commonly known as Indian Lotus, Sacred Lotus or Chinese water lily, is one of the most revered plants in the world, being at the heart of both Hinduism and Buddhism religions. As it symbolizes attributes such as beauty, perfection, and purity, it also inspired a fare share of artistic movements throughout time and space. With its spiritual and artistic emphasis, the Lotus flower exult beneficial influences on both the body and the soul. Ancient medicinal practices place it among the top specimen with high curative powers, while the antique Indian, Chinese, and Egyptian cultures used it both as a prestigious food and beautification source. Even in the present days in the Asian cultures, all the parts of the plant are edible, but the most highly consumed are the rhizomes and seeds, rich in starch, sugars, proteins, lipids, vitamins, minerals, alkaloids, flavonoids and other biochemical substances. Its countless curative properties include antioxidant, anti-cancer, anti-fungal, antibacterial, antiviral, anti-inflammatory, anti-obesity, anti-diarrheal, lipolytic, hypocholesteremic, hepatoprotective, and diuretic activities. As for beautification purposes, the flowers are mostly used to extract its essential flavonoids with antioxidant and highly regenerative properties. Flower extracts hold a powerful anti-aging potential, promoting younger-looking, smoothing, soft and silky skin aspect.

**History.** The Lotus flower is included among the most beautiful and sacred plants on Earth. Ancient texts from the Old Testament, Chinese Book of Songs, and Old Legends of Japan, illustrate the Lotus as a primordial flower, bloomed at the beginning of time. As it possesses a tremendously rich symbolism, the Sacred Lotus is most encountered in the Hinduism, where it is widely cited in the Puranic and Vedic texts. Lord Vishnu, The Supreme God, portrayed as the ‘Lotus-Eyed One’, and his wife Lakshmi are often drawn on a pink Lotus flower, while...
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Nymphaea čærulę. 

Nymphaea cærulę. 

La Nymphaea cærulę est une espèce de plante aquatique, souvent utilisée dans les jardins et les bassins d'eau. Elle est connue pour sa beauté et sa résilience. La Nymphaea cærulę a des feuilles grandes et épanouies, formant un tapis sur la surface de l'eau. Les fleurs blanches ou rose pâle s'ouvrent à la tombée de la nuit et ferment au lever du soleil. Ces plantes sont souvent utilisées en装饰和治疗目的。

**Utilisation médicinale**

La Nymphaea cærulę est connue pour ses propriétés médicinales. Elle est utilisée depuis des siècles en traditionnelle pour son effet calmant et apaisant sur l'esprit et le corps. Les feuilles de Nymphaea cærulę sont riches en sels minéraux, en vitamines et en oligo-éléments, ce qui en fait une plante riche en nutriments.

**Histoire**

La Nymphaea cærulę a été découverte par les Romains et a été utilisée en tant que remède médical. Les Romains l'ont utilisée pour traiter une variété de maladies, y compris les troubles de l'appareil digestif, les maux de tête et les troubles du sommeil. À l'époque moderne, la Nymphaea cærulę est utilisée en médecine naturelle pour ses propriétés calmantes et apaisantes.

**Culinaire**

La Nymphaea cærulę peut également être utilisée en cuisine. Elle est typiquement consommée crue, mais elle peut également être utilisée pour faire des marmelades ou des confitures. Elle a une saveur douce et légère, ce qui en fait une plante intéressante pour les cuisiniers.

**Environnement**

La Nymphaea cærulę est une espèce aquatique qui a besoin d'un environnement propice pour pousser. Elle préfère les eaux douces et les rivières pour sa croissance. Elle a besoin de beaucoup de lumière pour fleurir, donc elle est souvent cultivée dans des étangs ou des bassins d'eau en plein soleil.

**Réalisation**

La Nymphaea cærulę est une plante qui nécessite de l'entretien. Elle doit être arrosée régulièrement et les feuilles mortes doivent être retirées pour éviter l'infection. Elle est également sensible au froide et doit être protégée des gelées.

**Résumé**

La Nymphaea cærulę est une plante aquatique qui a été utilisée depuis des siècles pour ses propriétés médicinales. Elle a été découverte par les Romains et est utilisée en médecine naturelle pour ses propriétés calmantes et apaisantes. Elle peut également être utilisée en cuisine et nécessite un environnement propre et un entretien régulier.
the Goddess Saraswati floats on white Lotus flowers. The unfolding petals of the Lotus are associated with the expansion of the soul; hence, the Lotus is embraced as the perfect position in yoga practices, an ancient discipline that converges the physical, mental and spiritual realms of humanity. The Buddhists, inspired by the Hindu beliefs, also embraced the Lotus flower as sacred. The Buddha itself metaphorically described the Lotus flowers like the purity of the body and soul, as it floats above the muddy waters of attachment and desire. Drawn from its religious symbolism, the Lotus flowers have gained momentum also in the daily lives of Asian cultures. Lotus is the national flower of India, Bangladesh and Vietnam. As it represents elegance, beauty, perfection, purity and grace, it is often associated with the ideal feminine attributes. In India, beautiful women are often compared to a lotus flower, and are called ‘Padmin’, meaning the “Lady of the Lotus”. Many Sanskrit words derived from lotus, are being used to name girls all throughout India, Nepal, Sri Lanka, Thailand, Cambodia, Indonesia and Laos (Mukherjee et al., 1996). From Asia, the Lotus culture spread out to Africa and Europe. The Egyptians worshiped the Lotus flower as well, with evidence of their devotion being depicted in many architectural designs. Sir Joseph Banks brought the Lotus seeds from India to Europe in the 17th century and it rapidly became a popular flower in the modern herbal gardens. This was possible because the Lotus seeds are quite resilient, with the oldest recorded germination of a seed older than 1,300 years (Shen-Miller et al., 2002).

**Biology.** *Nelumbo nucifera* belongs to the *Nelumbonaceae* family and the genus *Nelumbo*, which has only 2 species: *N. nucifera* with pink, red or white flowers, distributed in Asia and Oceania, and *N. lutea* with yellow flowers, distributed in North and South America. Lotus is a perennial, aquatic plant which produces edible rhizomes, very popular as vegetables. In addition, the leaves, stems, seeds and other parts are edible and many organs of the plant are thought to have multiple medicinal properties (Wang and Zhang, 2004). The plant can grow up to a height of about 2 m. Its roots are firmly planted in the mud beneath the water surface. It has long stems and big circular leaves, reaching up to 90 cm in diameter, floating on the surface, while the flowers grow above the water level. The solitary, large and perfumed Lotus flowers, with more than 20 pink-red-carmine petals, can reach 15 to 25 cm in diameter. The center of the flower has a cone-shaped receptacle on which the fruit develops. The fruit is an aggregate of indehiscent nutslets, ovoidally shaped. They have hard, black seeds arranged in whorls (Shen-Miller et al., 1993).

**Bioactive molecules.** With all parts of the Lotus plant having an economical value, from the food to pharmaceutical and cosmetic industries, the composition of Lotus extracts has been widely investigated. The rhizomes, regarded as essential vegetable in Asian countries, mostly contain fibers, sugars, proteins, and starch of a quality comparable with the starch present in potatoes and maize. Moreover, they are rich in calcium, asparagus-like amino acids, and several vitamins like riboflavin (vitamin B2), niacin (vitamin B3) and ascorbic acid (vitamin C) (Mukherjee et al., 1995). As the seeds are also edible, they were found to have a high content of asparagin, fat, protein, starch, saponins, alkaloids, phenolic compounds and many minerals such as chromium, sodium, potassium, calcium, magnesium, copper, zinc, manganese and iron (Wu et al., 2007). A combined approach of gas/liquid chromatography - mass spectrometry has shown that the leaves are rich in a number of alkaloids among which nuciferine, roemerine, anonaine, pronuciferine and normuciferine are the most frequent (Luo et al., 2005). Extracts from Lotus flowers typically contain low molecular weight flavonoids like hyperoside, quercetin, isorquercetin, myricetin, kaemferol, luteolin, quercitin, andisorhamnetin glycosides (*nelumboside A* and *B*) are most encountered. The volatile fraction, responsible for the flower odor, is most abundant in hydroquinone, carophyllene, pentadecane, and terpinene (Paudel and Panth, 2015).

**Medicinal uses.** For its highly curative attributes, the Indian Ayurvedic and Chinese traditional medicine practices have used Lotus plants as treatments for both the body and the mind. In traditional Chinese medicine, embryos of lotus seed were used to overcome nervous disorders and insomnia (Chen et al., 2007). Currently, it is still used in Ayurveda as a diuretic and anthelmintic, as well as for the treatment of vomiting, hemorrhoids, skin diseases, and nervous exhaustion (Kessler et al., 2013). Several research studies have shown that *N. nucifera* possesses many pharmacologic and physiologic activities, among which antioxidant, antiviral and immune-modulatory effects (Arjun et al., 2012; Yuan et al., 2014). Recent studies have shown that extracts from Lotus leaf inhibits the proliferation of breast cancer (Zhang et al., 2015), improves lipid metabolism (Velusami et al., 2013), and relieves liver damage resulting from a high fat diet (Yuan et al., 2014). Recently, Lotus leaves became popular in Taiwan as ingredients in health-related beverages for weight loss. Its anti-obesity potential has been demonstrated in mice, and it was shown that it works via increased lipolysis at the level of adipose tissues, attributed to the presence of flavonoids like quercetin, isorquercetin, catechin, hyperoside, and astragalin (Ohkoshi et al., 2006).

Moreover, other phytochemicals like dauricine and neferine extracted from Lotus seeds were shown to have a cardiovascular effect by regulating the rhythms of the heart beats (Quan, 2002). Another report also indicated that Lotus extracts from leaves, seeds and flowers have inhibitory activities on the development of atopic dermatitis (Kariki et al., 2012).

**Cosmetic usage.** Because of its beauty and pureness, the Lotus flower has gained considerable regards in the cosmetic industry. Lotus flower extracts can be adapted into formulations for any kind of cosmetic product with specific action on the skin and hair moisturizing. The flavonoids, as primary constituents of Lotus petals, are known to have great antioxidant and antibacterial bioactivities. The antioxidant activity of flavonoids results from the combination of their ion chelating activity and their ability to scavenge aging-inducing free radicals (Jung et al., 2003). Moreover, the cell regeneration activity is attributed to the carbohydrates present in the Lotus flower extracts. Aside flowers, also the seed and leaf extracts have been used for the production of cosmetic formulations. It was demonstrated that seed extracts contain anti-aging agents with beneficial effect in reducing symptoms like the loss of elasticity, acne, wrinkles, fine lines, or blemishes (Mahmood and Akhtar, 2013). A patent for the use of Lotus extracts to treat the aging skin was developed (Riley and Babcock, 1999). Recently, the anti-aging benefits were tested in vivo and were correlated with the antioxidant potential of Lotus leaf extracts (Lee et al., 2015). Other study showed that creams containing Lotus extracts (4%) from rhizomes, leaves, flowers, and stems, are stable for 30 days under various temperature conditions, does not cause any skin irritation, and have strong whitening and anti-wrinkle functions (Kim et al., 2011). Even the ingestion of tea made from Lotus seeds, was proved to have beneficial effects on the skin. A study focused on the skin protective property of this tea, revealed evidence of increased skin moisture content and epidermal thickness, which safeguards the skin against ultraviolet exposure (Kim and Moon, 2015).
Oryza sativa (Rice)

“Give a bowl of rice to a man and you will feed him for a day. Teach him how to grow his own rice and you will save his life.”
Confucius (551-479 BC)

Oryza sativa (rice) is among the most cultivated plants on Earth, holding a humongous economical value in agriculture and food production. It is grown mostly in the Asian countries where it represents the staple food, but rice cultivation spread out through other continents as well, though at a lower production rate. Wild rice was domesticated over 10,000 years ago in China. Since then, thousands of rice varieties had been developed through breeding and natural selection. Rice is now widely grown and studied from the point of view of agriculture as well as biotechnology, since it holds huge potential in dealing with poverty alleviation. All the parts of the plants are used for various aspects, from food for both humans and animals to domestic tools and appliances, medicine, cosmetics and mystical rituals. Clinical studies even suggest that certain chronic diseases are present at a lower incidence in rice-consuming regions and this had been associated with the high antioxidant content of rice grains. Among the four types of rice grains ranked by color, the black varieties have the highest antioxidant potential, followed by red and brown varieties. The substances possessing high antioxidant activity, like phenolic acids, flavonoids, anthocyanins, tocopherols, and oryzanol, are mostly present in the rice bran (seed coat), a part of the seed that is usually removed by polishing before human consumption. Hence, rice bran is often used to extract these substances for pharmaceutical and cosmetic purposes, while other research studies are aiming to biotechnologically increase their content in the rice grains.

History. For many people living in Asia rice equals life and it shaped their culture and ways of living since ancient times. Regarding its place of origin, recent genetic evidence shows that Oryza sativa was domesticated from the wild grass Oryza rufipogon, originated in China, around 10,000–14,000 years ago (Molina et al., 2011). The two main subspecies of rice, indica predominant in the tropical regions, and japonica, from the subtropical and temperate regions, derives from the same domestication event, while another cultivated species, O. glaberrima, was later on domesticated in West Africa. A previous theory has proposed that O. sativa has been domesticated at least twice, with the indica variety originating in India, Myanmar and Thailand, and the japonica variety native to China and Vietnam (Londo et al., 2006).

The oldest archaeological evidence of rice use by humans has been found in the Yangzi River Valley surrounding regions in China. The archaeological sites at Xianrendong and Dianzonghuan date back to 11,000 – 12,000 BC. In India, archaeologists uncovered a Neolithic site at Lahuradewa, located in the Ganges Valley, with evidence from this site dating to 7,000 – 5,000 BC (Sweeney and McCouch, 2007). The journey of rice around the world has been slow, but once it took root it became a major agricultural and economic product. Rice is treated with high respect in Asia, where loss of crops can give rise to famine-like situations. In accordance to its enormous economic value as the main food supply, rice is an integral part of the Asian folklore, with many superstitions being tied to its use and origins. The legends of Myanmar say that the rice seeds came directly from the center of the earth and found thriving conditions in their country. The Chinese tales link the origin of rice with animal symbols, being said that after a catastrophic flood destroyed all plants, a dog ran through the flooded fields with rice seeds hanging from its tail. In the Hindu community, it is believed that Lord Vishnu, the Supreme God, is responsible...
for the birth of rice, while Indra, the Lord of the Rain, has taught the people how to cultivate it.

**Biology.** *Oryza sativa* belongs to the *Oryzaceae* Tribe of the *Poaceae* Family. The genus *Oryza* include 22 species among which 2 are cultivated species (*O. sativa* – the most widely grown- and *O. glaberrima* – african rice-) while the rest are wild species (Vaughan, 1994). *O. sativa*, originating in China, is now grown worldwide, from Asia to North and South America, Europe, Middle East and Africa. It is a semi-aquatic plant cultivated in five different ecosystems, namely rainfed low- and upland, controlled irrigated conditions, deepwater and tidal wetlands, with the water supply being the major environmental determinant (Vaughan, 1994). Rice is an annual grass with a fibrous root system, erect stems forming nodes and internodes, and long flat leaves. It grows in a clump of upright stems that can reach up to 2 m, depending on species, with the deepwater rice species being the tallest. The flowers form in spikelets within panicles emerged at the edge of the upper stem node. Each spikelet has a single flower which bears a single-seeded dry fruit (McDonald, 1979). The harvested kernel, known as a rice paddy, is enveloped in a hull or husk which is removed during milling. Based on the different grain color, size, and shape, as well as environmental tolerances and seasonality, *O. sativa* is divided into thousands of different varieties. Based on their life cycle, all these rice varieties can be categorized into two main groups: the short-duration varieties which mature in 105-120 days, and the long-duration varieties which mature in 150 days (Vaughan et al., 2003).

**Bioactive molecules.** As the rice grains represent the staple food of more than half of the world’s population, it has been widely studies from the point of view of its chemical composition and nutritional qualities. With the increasing amount of research and technologies, at the beginning of the 21st century a positive relation had been established between the low incidence of cancers and cardiovascular diseases in the Asian population, attributed to the high rice consumption and the high antioxidant properties of rice grains (Hudson et al., 2000). As concerning the nutritional facts, the rice grains have high amounts of carbohydrates and proteins, but very low amounts of fat and fatty acids, making it a healthy and highly caloric food. Rice grains also contain essential minerals like calcium, selenium, magnesium, manganese, phosphorus, potassium, sodium, zinc, iron and copper, and vitamins (E and B complex) (USDA Foods Fact Sheet, 2012). As for the rice antioxidant research, the amount of investments in this field had exponentially increased over the past ten years, with more than 1000 articles published between 2000 and 2013, as reported in a new study on Food Science and Nutrition (Goufo and Trindade, 2016). In this study the authors consulted more than 300 recent publications that dealt with the identification and quantification of rice antioxidant compounds, and classified the rice antioxidants into six classes: phenolic acids, flavonoids, anthocyanins and proanthocyanidins, tocopherols and tocotrienols, gamma-oryzanol, and phytic acid. The amount of these compounds varies between the different species and extraction methods used to evaluate their contents. The highest amount of phenolic acids is found in the rice endosperm and bran, most likely represented by ferulic, p-coumaric, sinapic, gallic, vanillic and syringic acids, alongside of minor constituents like caffeic, chlorogenic, cinnamic and elagic acids. Among flavonoids, tricin is the major compound, followed by luteolin, apigenin, quercetin, isorhamnetin, kaempferol and myricetin. The most common anthocyanins in rice are chrysanthemin, peonidins and antirrhynins. The rice tocotrienols and tocopherols, collectively known as vitamin E, were quantified in the different parts of the seed and shown to be present in the highest amount in the rice endosperm and bran fractions. As for gamma-oryzanol, it is predominant in the rice bran and it was shown that, among the cultivated cereals, rice has the highest content of oryzanol derivates (Goufo and Trindade, 2014). Moreover, phytosterol and oryzanol are considered low molecular weight organogelators (Bot and Flöter, 2011).

**Medicinal uses.** Aside its high value in the food supply, rice is also known as a medicinal plant, with ancient texts praising its healing properties. In China, the medicinal value of rice was known since 2800 BC, when the royal Chinese physicians used it to restore tranquility and inner peace. The old Chinese believed that rice strengthens the spleen and stomach, increases appetite, and cures indigestion. In the traditional Malay medical writings, boiled rice mixtures were prescribed as eye lotions while in Cambodia, rice hulls were used to treat diarrheic disorders. With its high content in vitamin B, rice bran was indicated for the treatment of beri-beri symptoms in The Philippines (Vir et al., 2005). In India, the ancient Ayurvedic medicinal practices prescribe rice water as a balm to treat inflammations. Moreover, in specific states of India, some particular cultivars of rice (Alocha, Laicha, Baisour) are grown for healing purposes (Oudhia, 2008). Because of its low-fat, low-cholesterol, and low-salt contents, rice represents the best diet for hypertension, while the low fiber content aids in digestive system disorders (Dikeman et al., 2006).

**Cosmetic usage.** The oil extracted from rice bran is a well kept beauty secret of many Asian ladies since ancient times. Geishas used leftover water where the rice was washed for bathing purposes believing that it gave a soft, smooth and luminous skin. With all its natural components, rice bran oil is considered an anti-aging secret in Japan. Rice bran extracts contain high amounts of antioxidants among which gamma-oryzanol (2%), ferulic acids and tocopherols are the most potent (Rattanapiboon and Jinda, 2012). Additionally, the rice bran wax is used as a substitute for Carnauba wax in cosmetics (Orthoefer, 2005). Being a potent source of vitamin B and E, antioxidants, and moisturizing proteins, rice bran oils have an overall nourishing effect and deep-moisturizing capability. As the rice oil is light and easily penetrates the skin, it is indicated for all types of skin. The natural vitamins E and B help increase elasticity while maintaining hydration and reducing the appearance of fine lines and wrinkles. Rice bran oil also contains squalane, a natural organic compound produced by the human skin cells, which helps with the synthesis of cholesterol and vitamin D. By replenishing the supply of squalane, rice bran oil provides natural skin regeneration (Sugihara et al., 2010). Extracts from rice bran also protect the skin from external aggressions such as wind, cold, polluted city environment and harmful sun damage, working as natural sun block (Cefali et al., 2016). Aside the bran extract, rice powders have been used as cosmetic products in China and Japan and other Asian countries well before it became available in the Western world. Recent studies evidenced that rice powders have a high derma-compatibility and are indicated to treat dry and delicate skin tones (McDougal, 2015). Moreover, because of the gritty aspect for rice bran, it is also used as an exfoliating agent, with a plus effect on skin renovation. The low molecular weight peptides obtained from rice seed proteins represent an efficient alternative for skin and hair care products.
Panax ginseng (Ginseng)

“The root which is dug from the earth and strengthens the nerves. The strength of the horse, the mule, the goat, the ram, moreover the strength of the bull is bestowed on him. This herb will make thee so full of lusty strength that thou shalt, when excited, exude heat as a thing of fire.”

Emperor Shouzong (221 BC); citation took from The Ginseng Book, Nature’s Ancient Healer, by Stephen Fulder (1996)

Panax ginseng, known better as simply Ginseng, is highly acknowledged in the traditional and western medical practices. Its powers can be already sensed from the name of the plant itself, with the Greek word ‘panax’ meaning ‘all-healing’, given by Linnaeus in the 18th century because he was already aware of its wide use in the Chinese medicine. The English word ‘ginseng’ derives from the Chinese ‘rénshēn’, where ‘rén’ means ‘person’ and ‘shēn’ means ‘plant root’, hence one of the common names for the Ginseng plant is ‘The Man-root’, associated with male potency in the Chinese tradition. The Ginseng root has been used in the traditional Chinese medicine for more than 2,000 years, and, in the present time, it is known worldwide as an ‘adaptogen’, that is a plant containing many substances recognized as helpful for the body to better cope with both mental and physical stresses. Besides, the shamanic practices with the ‘man-shaped root’ include it as a magical amulet for good fortune, prosperity, longevity and fertility. Aside the panacea of uses for medical purposes, Ginseng is also utilized in day-to-day products, from the culinary use to spice-up recipes, to toothpaste, cosmetic products, soft drinks, tea, candies, and chewing gum. The ‘magical’ powers of the Ginseng roots are attributed to its chemical composition, containing more than 25 saponins, generically called ginsenosides, alongside with other potent antioxidants. These ingredients are key components of the use of Ginseng roots in the cosmetic industry, where several existing formulations are dedicated to function as skin-conditioning agents, emollients, astringents and fragrance ingredients.

History. The Asian Ginseng originated over 5,000 years ago in the mountains of Manchuria province of China. Originally used as a food, it became revered by the ancient Chinese who believed that its human-shaped root was a powerful symbol of divine harmony on earth and that the herb had strength-giving and rejuvenating abilities; hence, its extensive use in medical practices. The first recorded evidence of Ginseng’s use in the traditional Chinese medicine comes from an herbal compendium written 2,000 years ago, the Shennong Bencao Jing or Shennong’s Herbal Classic (Park et al., 2012), that describes it as the “essence of the earth in the form of man”. Marco Polo himself reported its use as early as 1213, revealing the ginseng was highly treasured at the court Khubilai Khan (Taylor, 2006). Because of its highly-regarded attributes, in ancient times the Chinese valued Ginseng more than gold. Above all, the old roots, reaching nearly a century, were particularly valued because it was claimed that their longevity can be transferred to the person who consumes them. In Korea, Ginseng gatherers used to practice purifying rituals and remain chaste before they would pursue in the search of the revered root. Stories tell that bandits called ‘The White Swan’ used to rob the Ginseng gatherers, and when caught by the law they were punished by death. By the 3rd century AD, the Ginseng trade spread around the world, with the main exporters being China and Korea. But because of over-harvesting, the wild Ginseng became nearly wiped out in Korea by the 16th century, when the Koreans successfully developed methods to cultivate it. The high trading requests from the western world, lead to an important historical event know and ‘The ginseng trade war’, a battle between Korea and North America in the 1730s (Waters, 2003). Nowadays, the Ginseng cultivation
is predominantly held by South Korea, China, Canada and US, with the world ginseng market being estimated to worth 2.000 million US$ (Baeg and So, 2013).

Biology. Panax ginseng is a perennial herb belonging to the Araliaceae Family. It natively grows in remote forests of Manchuria, and is cultivated in Korea, China, and Japan for export and use as a medicinal herb (Yun, 2001). Another species, Panax quinquefolius, or the American Ginseng, is native and cultivated throughout the North American continent. The Asian Ginseng is a shade-loving, deciduous plant with five-fingered leaves, tiny white flowers, red berries, and a thick, human-shaped, yellowish-brown root. The root represents the most valued part of the plant, and, depending of the processing method which influences the pigment composition, the Ginseng roots are classified as red or white. The white Ginseng is produced by harvesting the root and drying it in the sun, while the red Ginseng is steamed after harvest and subsequently dried (Weiss, 1988). The un-branched stem is 20 - 40 cm high, ending in a single curl of 1-5 palmate leaves. The tiny flowers are produced in a single, ball-like cluster. The flowers bloom from late June to mid July, and have 5 white or greenish-yellow petals, which produce a scent similar to the Lotus flower. The fruits, formed when the plant reaches maturity (usually after 3 years), are composed of bright red drupes of 1 cm in diameter (Proctor and Bailey, 1987).

Bioactive molecules. Because of it historical use and essentiality throughout time and culture, the ginseng beneficial properties are being extensively studied. Since Petkow’s (1959) scientific report on the pharmacological properties of Ginseng, more than 6,000 articles concerning the traditional uses, chemical and biological effects had been published (Shin et al., 2015). Many of the Ginseng’s attributes, among which the restorative, tonic, and revitalizing properties, are believed to be due to the presence of an elevated number of saponins, chemical compounds belonging to the triterpene glycosides group, commonly referred to as ginsenosides. A recent review summed-up the information available on the Asian ginseng chemistry and revealed a total number of 112 saponins identified so far, with 80 of them isolated from raw processed Ginseng, while the others are acid/ base hydrolysates and semisynthetic saponins (Shin et al., 2015). Around 30-40 ginsenosides had been deeply characterized by advanced chemical methodologies (e.g. thin layer chromatography - TLC). These were classified in two major sub-types, namely protopanaxadiol and protopanaxatriol, according to the arrangement and number of sugar residues glucose, rhamnose, xylose, and arabinose – on the ginsenoside. The ginsenosides content was also found to vary in the red and white Ginseng extracts due to different processing methods that affect deacetylating enzymes within the raw plant material (Lee and Park, 2005). Aside ginsenosides, many other active compounds can be found in all parts of the plant, including amino acids, alkaloids, phenols, proteins, polypeptides, and vitamins B1 and B2 (Kim, 2012). The presence of the low molecular weight sugar molecules like aglycone, confer higher hydrophobic properties (Lü et al., 2009).

Medicinal uses. Panax ginseng had been used for thousands of years in China, Korea, and Japan for its adaptogen and restorative tonic attributes, reason why it became the lead herbal treatment in both the traditional Chinese medicine as well as Western herbal preparations (Duke, 2000). Among the proposed properties of the Ginseng roots, the beneficial effects on infertility, liver diseases, amnesia, colds, menopause, and erectile dysfunction, had been highly investigated (Lakshmi et al., 2011). According to the World Health Organization (1999) report, the ginsenosides present in the Ginseng roots have an effective response in decreasing serum prolactin, which in turn improves sperm count and mobility, and increases male libido. In vitro studies had proposed that Panax
ginseng extracts can act on the carcinogenesis process, having anti-cancerous effects (Surh et al., 2001). On the other hand, clinical trials had proven that Ginseng roots have a beneficial effect in the treatment of the common cold as well as a positive impact on the mental health (Scaglione et al., 1996). Moreover, it was also shown that ginseng helps with the sport performance by improving the aerobic capacity in individuals who do not usually exercise, but offers no benefit in those who exercise regularly (Cherdruangsi and Rungroeng, 1995). Interestingly, another clinical study revealed an overall enhancement of the quality of life, manifested by improved mood, well-being, vigor and psychophysical performance, in people who used ginseng as a nutritional supplement (Caso Marasco et al., 1996). Toxicity evaluation performed in mice, rats, chickens, and dwarf pigs, have shown that ginseng is non-toxic in both the short-term and long-term uses (Blumenthal et al., 2000).

Cosmetic usage. With the Ginseng's panacea of uses in the traditional medicine, its utilization in cosmetics, since it is a science quite related to pharmaceutics, had also became rather popular. The chemical composition of Ginseng extracts provides a wide range of benefits in skin care, mainly because it is a multifunctional ingredient (Yeomans, 2012). After reviewing 13 Panax species, the Cosmetic Ingredient Review Expert Panel had concluded that Ginseng extracts do not have phytoestrogenic activity, hence are safe to use at concentrations accessible in the safety assessment. The indicated concentrations were up to 0.04% in leave-on, 0.0003% in rinse-off, and 0.00009% in diluted products based on white Ginseng, while for the red Ginseng the reported concentration was up to 0.003% in both leave-on and rinse-off products (Becker, 2012). The same study also evaluated the number of cosmetic products based on ginseng extract available on the market and revealed that, by the time the report was published, there were a total of 196 leave-on products, 77 rinse-off products, and 4 diluted products, with concentrations ranging between 0.000002% – 0.5%. The array of effects that the Ginseng formulations can have on the skin includes cleansing, tonic, moisturizing, preservation of skin elasticity, improvement of skin luminosity, and antibacterial effects. The multi-functionality provided by the ginseng components in the beautification industry is a consequence of the presence of low and high molecular weight molecules that give an elevated antioxidant and anti-inflammatory effect (Kim et al., 2012). Formulations containing red Ginseng extracts are recommended to treat acne, excessive sebum accumulation, and the black circles around the eyes (Eberlin et al., 2009). A recent study showed that Ginseng application is highly efficient to reduce inflammation and stimulate hair regeneration (Rondanelli et al., 2015).

Sophora japonica (Pagoda tree)

“Under the shadow of pagoda trees
I sit in a tea shop made of pure meal
and take off-my face
and wipe accumulated years of sweat.”

Sophora japonica, also known as Japanese Pagoda Tree and Huai Hua MI, is a tree with edible parts, often used in the traditional Chinese medicine as a cooling herb to stop bleeding. All the parts of this tree, including the flowers, buds, leaves, bark, and seeds, are still being used as medicine remedies in Asia, with higher prevalence in China, Japan, and Korea. The benefits of pagoda tree stretch further than its medicinal uses, as its flowers can be used as yellow dye, the seeds as industrial oil, the fruits as a source of sophorose and rutin drugs, and the trunks for construction of buildings, shipbuilding, farming implements and furniture. Besides, it is also planted in gardens and city parks as a shade tree because it has a rapid growth rate, attractive appearance and big size. The allure of the tree inspired many artists, with poems and paintings being dedicated to the pagoda tree enchanting aspect. The cosmetic manufacturing started to show increasing interests in the attributes of Pagoda tree flower extract which is thought to act as an anti-irritant, antioxidant and anti-aging agent.

History. Sophora japonica has a plethora of names derived for all the cultures where it spreads. For instance, in China it is known as the Chinese scholar tree, with the Chinese actual name of “zhong guo huai,” or “huai shu”, in England and Japan is most encountered as the Japanese pagoda tree, while in Korean it is called Hoe-who-na-moo (Orwa et al., 2009). Because of its medicinal value, the dry flowers, known as Huaihua or Flos Sophorae, and the flower buds, also known as Hualmi or Flos Sophorae Immaturus, are included in both the Chinese Pharmacopoeia and European Pharmacopoeia (Han et al., 1996). The Japanese pagoda tree is surrounded by significant legends and serves as a cultural and historical reference in the Asian countries from which it originates. It was elected the official tree of Beijing, as it incorporates the aesthetic beauty shared between the Eastern and Western worlds. As it is native to China, the Pagoda tree was initially planted mostly around the Buddhist temples, but due to its grace and elegance, it spread out to many parks and gardens. In Buddhism, the Japanese pagoda tree was also used to mark the graves of Buddhist monks, though it had been also associated with some negative connotations as it was believed to be inhabited by demons. The tree gained this disgraceful status from an event related with the legend of the death of Chongzhen, the last emperor of the Ming Dynasty, who hanged himself from a pagoda tree when his palace was overtaken by peasants during the revolution in 1644 (Wakeman, 1986).

Biology. Sophora japonica is a member of the Sophoro genus from Fabaceae (Leguminosae) family. It is native to China, widely distributed in the Liaoning, Shaansi, Shansi, Shandong, Hebei, Henan, Jiangsu, Guangdong, and Guangxi provinces, but it can be also found in Japan, Korea, and Vietnam, while it has been naturalized in the United States, Europe, and other parts of the world. The Pagoda tree is a medium-sized deciduous tree with wide-branching, which can grow to a height of 15-25 meters. The bark of the trunk is generally composed of alternating ridges of light-brown and gray-brown layers, giving it a textured, striated appearance. The branches tend to take on an olive-green color, with glossy-green leaves during the growing season, which become light-green to yellow in autumn. The shape of the leaves is ovate, pinnately veined, with sharp points at their ends, with a
**SOPHORIA** Occidentalis.
S. foliis pinnatis; foliis ovatis subtomentosis, comatis; fascie, subae leaves, ramosae. N.

**SOPHORIA d'Amérique.**
S. à feuilles ailes ; à foliolo ovales et serré.

S. foliis pinnatis; foliis ovatis, petiolaris, serratis, comatis; S. argent. Lob. Sp. pl. 165.

S. foliis pinnatis; foliis ovatis, subcordatis. Tav. Chin. 97, t. 59.


En anglais, *Occidentale Sophora*.

En allemand, *Westindische Sophora*.


**EREBIT.** Au commencement de l'été.

**HARVEY L'Amérique septentrionale et méridionale.** Swarts l'a décrit à la Jamaïque, et M. Michaux l'a rapporté du nord de cette partie du monde. Il n'a été introduit en Angleterre qu'en 1758.

**SOPHORIA du Japon.** Tab. 52.

**SOPHORIA du Japon.** Pl. 51.

S. foliis pinnatis; foliis ovatis, glabros; fructus carnosus; stylus pennis.


Veuillez noter, le Sophora de la Chine.

En anglais, *Swinningia d'Estelle Sophora*.

En allemand, *Japanische Sophora*.

Arbre élevé à soixante ou quatre-vingt pieds de hauteur. Tige droite, cylin-
length of 15–25 cm. The flowers have a creamy-white or slightly yellow color, and grow in long panicles composed of individual flowers. The Pagoda trees bloom between July and August, and the fruit ripens from August to October. The fruits are yellow or brown in color and resemble the typical garden peas pods (Panthathi et al., 2012).

**Bioactive molecules.** Chemical investigations of *S. japonica* metabolites have led to the isolation and identification of about 150 constituents. These include flavonoids (kaempferol, quercetin, rutin), isoflavonoids (genistein), triterpenoids (sophoradiol), alkaloids (matrine, sophocarpine), mineral elements (Mg, Fe, Ca, Mn, Zn, Cu, Cr, Se, Sr), and amino acids (lysine, asparagine, arginine, serine, aspartic acid, glutamic acid, threonine, alanine, proline, tryptophan, valine, phenylalanine, leucine, isoleucine). Other more uncommon compounds are represented by few phenols, phenolic acids, and glycosides (He et al., 2016). The low molecular weight tannins, flavonoids, terpenes and some saponins, enhance the biological activity of Sophora extracts. Out of the plethora of secondary metabolites present in the Pagoda tree plant parts, the flavonoids and isoflavonoids are believed to be the major bioactive components, with the flavonoids mainly found in the flowers and buds, while the isoflavonoid glycosides present in the fruits and seeds (Govrenova et al., 2007). Rutin extracted from *S. japonica* flowers and enriched with vitamin C represents a valued nutritious supplement, and was approved for clinical use by the Chinese Food and Drug Administration. Rutin and sophoricoside, another important compound with elevated biological effects among which anti-inflammatory, estrogenic, and antioxidant, are being used as standards for the evaluation and quality control of *S. japonica* and its preparations (Chinese Pharmacopoeia Commission, 2015).

**Medicinal uses.** Extracts from *S. japonica* were used since the times of ancient China, when it was believed that it can eliminate “heat” and purge “fire”, interpreted as cooling the blood and stop the bleeding (Tian, 2002). With these beliefs in mind, the modern medicine and pharmacology had started to pursue the scientific investigations behind these effects. Research had proved that fruit extracts can promote blood coagulation and reduce the permeability of blood vessel walls, effects attributed to the presence of glucosides (Wang et al., 2002). Other studies had shown that genistein and many of the sophoricosides present in the Pagoda tree, have high anti-inflammatory properties (Kim et al., 2003). The ethanol extract from flower buds of *S. japonica* exhibits high antibacterial activity against many harmful bacteria strains (Park et al., 2009). Seeds of the Pagoda tree having a high content of genistein and kaempferol, proved to be efficient to treat osteoporosis because of the high estrogenic proliferative activity (Abdallah et al., 2014). The kaempferol, genistein, and sophoricoside isolated from Pagoda fruits possess anti-fertility effects, as demonstrated by studies made on laboratory animals (Qu et al., 2014). *S. japonica* extracts were also used to control body weight and obesity-related metabolic diseases, because its total flavonoid content can help to decrease the cholesterol levels (Wang et al., 2009). Many studies have investigated the antioxidant and radical scavenging activities of *S. japonica* extracts attributed mainly to the phenolics and flavonoids compounds (Kim et al., 2004; Zhang et al., 2011; Li et al., 2013). Toxicology studies had been also conducted and it was agreed that a root exact dose up to 5–10 g and 6–9 g of the fruit extract did not have any harmful effects (Chinese Pharmacopoeia Commission, 2015).

**Cosmetic usage.** The traditional herbal preparations with their potential in medical practices had also encouraged the development of new skin-care cosmetics for the use of the modern society (Kiken and Cohen, 2002). An increasing interest had been recently shown towards the use of the Pagoda tree flower extracts in anti-irritant, antioxidant and anti-aging formulations. This extract with its biologically active flavonoids, kaempferol, sophoricosides and phenolic acids, can restrain skin inflammations by inhibiting the Tumor Necrosis Factor-α, a cell signaling protein involved in the systemic inflammatory response (Zhang et al., 2011). By doing so, it slows down the aging process, thus being highly effective in anti-aging formulations. As the Pagoda tree flower extract is a source of antioxidants and free radicals (Zhang et al., 2011), it also protects the skin against harmful factors, such as pollution and sun rays. The high content in rutin, sophorin, and tannins makes it a valuable hypotensive agent. Additionally, its high content in mineral elements and amino acids promote skin nourishment, and stimulates skin regeneration to prevent wrinkles, while the presence of the flavonoids helps to regulate the skin lipid balance (Wang et al., 2006). *S. japonica* extracts are being used to develop skin-whitening formulations because it was shown to have a tyrosinase and melanogenesis inhibitory effect (Lai et al., 2014). Several Sophora flower extracts had been tested in human epidermal melanocytes and the experimentations concluded that the product is non toxic (Lo et al., 2009), thus being advised for applications in skin-care and whitening products.
List of Figures: courtesy of Biblioteca Universitaria di Pavia

- Figure 1. Angelica sinensis; retrieved from Plenck, Joseph Jacob von [1738-1807], Josephi Jacobi Plenchi Icones plantarum medicinalium secundum systema Linnaei digestorum, cum enumeratione virium et usus medici, ... Centuria t. IX-2. - Vien- nae: apud Rudolphum Graefleri et Soci., 1788-1803. - 7 v.: ill.; 2º.

- Figure 2. Bambusa vulgaris; retrieved from Weinmann, Johann Wilhelm, Phytanthoza iconographia, sive conspectus alii- quot millium, tam indigenarum quam exoticarum, ex quatuor mundi partibus, longa annorum serie indefessuque studio, a Joanne Guilielmico Weinmanno ... collectarum plantarum, arborum, fructicum, florum fructicum, fungorum. &c. ... Centuria t. VII-2-4. - Vien- nae: apud praenominitos pict. & calcogr. Augustae viennae, Augustae viennae, 1737-1745; 4 v.: ill.; fol.

- Figure 3. Commiphora (Bdellium spp.) abyssinica; retrieved from Weinmann, Johann Wilhelm, Phytanthoza iconographia, sive conspectus aliiquorum millium, tam indigenarum quam exoticarum, ex quatuor mundi partibus, longa annorum serie indefessuque studio, a Joanne Guilielmico Weinmanno ... collectarum plantarum, arborum, fructicum, florum fructicum, fungorum. &c. ... Centuria t. VII-2-4. - Vien- nae: apud praenominitos pict. & calcogr. Augustae viennae, Augustae viennae, 1737-1745; 4 v.: ill.; fol.

- Figure 4. Crocus sativus; retrieved from Plenck, Joseph Jacob von [1738-1807], Josephi Jacobi Plenchi Icones plantarum medicinalium secundum systema Linnaei digestorum, cum enumeratione virium et usus medici, ... Centuria t. IX-2. - Vien- nae: apud Rudolphum Graefleri et Soci., 1788-1803. - 7 v.: ill.; 2º.

- Figure 5. Ginkgo biloba; retrieved from Kaempfer, Engelbert [1651-1716], Amoenitatum exoticarum politico-medicarum fasciculi 5, quibus continentur variae relationes, observationes & descriptiones rerum Persicarum & ulterioris Asiae, multa attentione, in peregrinationibus per universum Orientem ... Leydeniae: typis & impensis Henrici Wilhelmi Meyeri, Aulae Leidiae typographi, 1712. - 20, 912, [32] p., [16] carte di tav. ripieg.: ill., 1 antip. ; 4º, pp. 811 e 813


- Figure 7. Nymphaea caerulea, close relative of Nelumbo nucifera; retrieved from Ventenat, Etienne-Pierre [1757-1808], Jardin de la Malmaison, par E. P. Ventenat, de l'Institut national de France ... - A Paris: de l'imprimerie de Crapelet, 1803-1806. - 2 v. : fol.

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- Figure 10. Sophora japonica; retrieved from Duhamel du Monceau, Henri Louis, Traite des arbres et arbustes que l'on cul- tive en France en pleine terre par Duhamel. Tome premiere - septieme, A Paris: chez Didot aine, au Louvre; Michel, rue des Francis-Bourgeois n. 699; et Lamy, Quai des Augustins n. 26, <1800>1819, 7 v. : ill.; fol.
EMPOWERED BEAUTY REMEDIES

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