Chapter 1

AROMATHERAPY
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Aromatherapy is an ancient art and science of using the healing power of aromatic essential oils distilled from plant sources. The term was coined by French chemist René Maurice Gattefosse in the 1928 to describe the practice of using essential oils taken from flowers, roots, seeds, resin, bark stem, grasses, stalks, and rinds of plants in healing. As early as 1946 another French scientist, Valnet, was using essential oils extensively as a part of his physical and psychotherapeutic treatments. Two modern founders of the Aromatherapy movement, Marguerite Maury applied his research to her beauty therapies and Robert Tisserand to massage therapy. The term is a bit misleading since the aromas of oils, whether natural or synthetic, are generally not themselves therapeutic (Evans, 1997).

The word Aromatherapy comes from two words: aroma, meaning fragrance and therapy, meaning treatment. It is a healing art based in nature and it affects the whole person—mind, body and spirit. Aromas are used to identify the oils, to determine adulteration, and to stir the memory, but not to directly bring about a cure or healing. It is the essence of the oil—its chemical properties that gives it whatever therapeutic value the oil might have. Furthermore, vapours are used in some but not all cases of aromatherapy. The word essential does not refer to nutritional value but to the volatile aromatic components that are the essence of the plant. Essential oils are said to be highly concentrated substances extracted from flowers, leaves, stalks, fruits, and roots, and also distilled from resins. Essential oils are mixture of saturated and unsaturated hydrocarbons, alcohol, aldehydes, ketones, terpenes and others. They are colourless pleasant smelling liquids with high refractive index. These oils are so potent and concentrated that they work on pressure points and rejuvenate. The essential oils are stored in special cells, glandular hairs, pockets and reservoirs or even in intercellular spaces varying from plant to plant. The evaporation of these essences from the plant surfaces shields the plant from the invasion of natural bacteria and is even considered to be the warming aura that surrounds and protects from temperature fluctuations. The oils are administered in small quantities through inhalation, massage or other applications to the skin. Occasionally, a product is
taken internally. Pleasant odours can be enjoyable and may enhance people's efforts to relax (Krishna et al., 2000; Svoboda et al., 1995; 1998).

Aromatherapy is a way of treating mental and physical imbalances through inhalation and the external application of essential oils in massage and baths. It can help to relieve stress, restore balance on all levels and contribute to the rejuvenation and regeneration of the individual. Essential oils act on the olfactory nerves, which lead from the nose to the brain. Essential oils have antibacterial properties and also may have antibiotic, antiviral, and other therapeutic properties. Aromatherapy is holistic therapy for our mind, body and spirit. Essential oils are organic compounds and act in harmony with the body, providing well being and balance (Farouqui and Srikant, 2000). It was found that the locomotor activity of mice increased significantly by inhalation of rosemary essential oils which is used in phytotherapy as an activating and refreshing remedy for exhaustion (Kover et al. 1987). Complete or holistic healing is ever-increasingly utilized in today's society. Aromatherapy is a fast growing therapy in holistic medicine (Berwick, 1994)

History

As far back as 18,000 B.C. flowers, plants and their essences had been used for healing, relaxation and energizing. Aromatherapy was used by the most ancient civilizations: Egypt, China and India and is reputed to be at least 6000 years old. One medical papyri (ancient Egyptian manuscript), dating back to 1555 BC from Egypt, contains remedies for all kinds of illnesses. The methods of application are very similar to the methods used in herbal medicine and aromatherapy today. The Egyptians used a method known as infusion to extract the oils from aromatic plants. Incense was probably one of the earliest ways of using aroma. Traditional Indian medicine known as Ayurveda has been practiced for more than 3000 years. One of its main aspects incorporates aromatic massage (Krishna et al., 2000; Manniche, 1999).

Ancient Egyptians used scents of specific plants for religious rituals, as certain smells could raise higher consciousness or promote a state of tranquility. Frank incense was burned at dawn as an offering to the sun and myrrh was offered to the moon. The Egyptians were experts at embalming and used aromatics in the mummification process. Egyptians understood the principles of aromatherapy and incorporated it into their
cooking as well. Specific herbs helped the digestive process, protected against infection, or built the immune system. After bathing, the Egyptians used to be massaged with fragrant oils (Evans, 1997; Manniche, 1999).

A major event for the distillation of essential oils came with the invention of a coiled cooling pipe in the 11th century. Persian by birth, Avicenna invented a coiled pipe which allowed the plant vapor and steam to cool down more effectively than previous distillers that used a straight cooling pipe. Avicenna's contribution lead to more focus on essential oils and their benefits (Svoboda and Deans, 1995).

The ancient Chinese were using aromatics at the same time as the Egyptians. The Chinese used aromatic herbs and burned aromatic woods and incense to show respect to God. Shen Nung's herbal book is the oldest surviving medical book in China which contains information on more than 300 plants (Evans, 1997).

The Greeks continued the use of aromatic oils. They used them for medicines and cosmetics. Aromatherapy came of age when they took medicine into a new light 2000 years ago. Hypocrates, who is commonly known as the Father of Medicine, was the first to study essential oils effects. He believed that a daily aromatic bath and scented massage would promote good health. Theophratus, a physician, wrote of the healing properties of "aromatic" plants. For at least 1200 years a book about herbal medicine, written by a Greek physician named Pedacius Dioscorides, was the Western world's standard medical reference. Many of the remedies he mentions are still used in Aromatherapy today (Manniche, 1999).

The Romans borrowed much of their medical knowledge from the Greeks. Rome became the bathing capital of the world after using and improving the abilities of aromatics. After bathing they would be oiled and massaged. When they opened the trade routes, the Romans started importing new aromatic products from East India and Arabia. During the crusades the knowledge of aromatic oils and perfumes continued to spread from India, Arabia, and the Far East. Crusaders quickly learned of these valuable medicines and brought them back to Europe. Avicenna, a physician, who died in A.D.1037, first used the process known as distillation to distil essence of rose. Around the same time, the
Arabs discovered how to distil alcohol. It was then possible to produce perfumes without heavy oily base (Evans, 1997).

At the beginning of the Renaissance and with the expeditions of the great explorers, there was a rise in bringing home new aromas. Oils were once again sought after, and herbs were back in demand. In Europe wigs were scented with oils, and nosegays were carried to help mask the stench of their unsanitary streets and bodies. In France, hospitals were fumigated with burned lavender and rosemary.

When the conquistadors invaded South America, they discovered more medicinal plants and aromatic oils. The Aztecs were well known for their plant remedies. The Spanish were amazed at the wealth of medicinal plants found in Montezuma's gardens. The North American Indians used aromatic oils and produced their own herbal remedies, too.

Within the 12th century, an Abbess of Germany, named Hildegard, grew and distilled lavender for its medicinal properties. Within the 13th century, the pharmaceutical industry was born. This event encourages great distillation of essential oils. During the 14th century, the Black Death hit and killed millions of people. Herbal preparations were used extensively to help fight this terrible killer. It is believed that some perfumers may have avoided the plague by their constant contact with the natural aromatics. Within the 15th century, more plants were distilled to create essential oils including frank incense, juniper, rose, sage and rosemary. A growth in the amount of books on herbs and their properties also begins later in the century. Paracelsus, an alchemist, medical doctor and radical thinker is credited with coining the term Essence and his studies radically challenged the nature of alchemy and he focused upon using plants as medicines. During the 16th century, one could begin purchasing oils at an apothecary, and many more essential oils were introduced. During the 16th and 17th centuries, perfumery started being considered as an art form, and it was more clearly defined as its own field. During the 19th century, perfumery remained a prosperous industry. Women would have their jeweler create a special bottle to hold their treasured perfume. The 19th century also was important scientifically as major constituents of essential oils became isolated. In this century scientists in Great Britain and Europe began researching the effects of essential oils on bacteria in humans. During the 20th century, the knowledge of separating the
constituents of essential oils was used to create synthetic chemicals and drugs. It had been believed that by separating the major constituents and then using the constituents alone or in synthetic form would be beneficial therapeutically and economically. These discoveries helped lead to modern medicine and synthetic fragrances. This actually weakened the use of essential oils for medicinal and aromatic benefit.

During the earlier part of the 20th century, a French chemist by the name of René-Maurice Gattefosse became interested in the use of essential oils for their medicinal use. Previously, he focused on the aromatic use of essential oils, but his interest in their medicinal use grew after an accident heightened his curiosity. While working, he burned his arm rather badly. By reflex, he plunged his burned arm into the closest liquid which happened to be a large container of lavender essential oil. The burn he suffered healed quickly and left no scar. Gattefosse is credited of using essential oils in their whole without breaking them down into their primary constituents. In 1937, Gattefosse wrote a book called Aromathérapie: Les Huiles essentielles hormones végétales that was later translated into English and named Gattefosse's Aromatherapy, 1993. It is still in print and widely read.

From the late 20th century and on into the 21st century, there is a growing resurgence to utilize more natural products including essential oils for their therapeutic, cosmetic and aromatic benefits. The use of essential oils never ceased, but the scientific revolution minimized the popularity and use of essential oils in one's everyday life. Today's heightened awareness regarding the use of synthetics coupled with the increased availability of aromatherapy information within books and the internet has refueled the use of essential oils for therapeutic, cosmetic, fragrant and spiritual use.

How Aromatherapy Works

The essential oils have been known for their fragrance and their curative effects on the body, mind and spirit for thousands of years. These aroma molecules are very potent organic plant chemicals that create an environment in which disease, bacteria, virus and fungus cannot live. They can be antibacterial, antiviral, anti-inflammatory; support the immune system; support all the systems of the body-hormonal, glandular, emotional, circulatory, nervous system, calming, memory enhancement, alertness, calming down and
helping us to sleep (Svoboda and Deans, 1995; Svoboda et al., 1998; Baratta et al., 1998a, 1998b; Colgate, 1993)

Essential oils, therefore, are considered very energy specific. In addition, they do not lose their potency with time, as do dried herbs when they age. Essential oils provide stimulation through hormone-like compounds-molecules that have a structure closely related to actual hormones. Most importantly, they have the ability to penetrate the skin, and treatments with these oils are facilitated to reach the subcutaneous tissues. Being extremely complex substances, chemically speaking, their effects on the body are both complex and subtle. It has now been proved that the aroma molecules of the essential oils are translated into a signal by the receptor cells in the nose when inhaled. This signal is then sent to olfactory bulb and then on to the limbic and hypothalamus parts of the brain. Brain uses neurochemical like serotonin, endorphin, etc, to communicate with our nervous and other body systems. The aroma signal causes release of a certain neurochemical, bringing about desired change and feeling of relief. The aroma of calming oil would cause release of serotonin. Similarly, euphoric oil will cause release of endorphin and a stimulating oil will cause release of noradrenalin, thus bringing in desired effect on the mind and body (Krishna et al., 2000; Buchbauer and Jirovetz, 1994).

Tools Used in Aromatherapy

Steam Inhalation

In inhalation 3-5 drops of essential oil are added to a bowl (one pint) of boiled water. Drap a towel over the head, breathe in the steam for 1-2 minutes only. Close the eyes otherwise the oils can irritate them. This is effective for respiratory complaints, including bronchial and sinus congestion, coughs, bronchitis, sore throats, colds and influenza.

Diffusers and Atomizers

These are the usual ways of putting an essential oil mist into the air for breathing. The most therapeutically effective means of dispersing essential oils into the air is through the use of an aromatic nebulizer. Because the oil does not require heating, its chemical components remain unaltered, and are subsequently of greater benefit.
Massage

This is the most effective mean of using the oils, combining their properties with the therapeutic power of touch. A lotion is made by diluting the oil with an odourless carrier oil, such as grape seed, sweet almond or peach kernel. Concentration of the essential oil should be 1-5% in relation to the carrier oil.

Bath

This is simple, effective and pleasant way to relax and receive the therapeutic effects. A nice aromatic bath should be no longer than 20 minutes. Water itself has therapeutic values, which enhances the power of the essential oils. Always apply the essential oil formula to the bath just prior to getting in the tub so as to utilize the full properties of the essential oils before evaporation begins. Essential oils are not water-soluble and hence need an emulsifier, i.e. bath salts, mineral salts, epsom salts, milk, cream or honey.

Compress

Depending upon the situation a compress can be hot or cold, wet or dry. Each situation should be assessed for the appropriate choice. A compress can be used on muscles for aches, pains, stiffness, and cramps. A hot, moist compress is used to soothe tension and cramping (cold conditions); use a cold compress for inflammation, swelling, headaches and sunburn (hot conditions).

Lotion and Oils

They can be applied directly to the skin. An oil base carrier is needed before applying them to skin. Application of concentrated oil can produce irritation on sensitive skin. Dilutions of the oil with carrier oil protect the skin from reaction, spread oil on to a greater surface area and thus stimulate a greater response. Essential oils tend to increase the circulation at the surface of the skin, opening up the pores. Some of the commonly used oil for dilution is jojaba oil, grape seed oil, sweet almond oil and apricot kernel oil, etc. Of these Jojaba oil is very heavy almost like liquid wax and grape seed oil is the lightest.
Vapourization

All essential oils are antiseptic and evaporate easily, so they make very good air fresheners. Different oils create different atmospheres. For example, sandalwood or Clary sage are good for parties or Peppermint to clear mind when one needs to work.

Perfumes

Perfumes are another way of practicing aromatherapy. Various combinations based on the aromatherapy effects can be experimented to suit an individual or collective need, which can be mixed with a carrier oil or non-fragrant alcohol.

Types of Aromatherapy

Cosmetic Aromatherapy

Cosmetic aromatherapy uses essential oils in facial, skin, body and hair care products. Essential oils can be toning, cleansing, drying or moisturizing. Certain oils are appropriate for various skin and hair types. An aromatherapy facial demonstrates the versatility of essential oils in promoting healthy skin. A full-body or foot bath is a simple way to experience cosmetic aromatherapy on a personal level. A few drops of the appropriate oil in a warm bath will create a rejuvenating, revitalizing experience.

Massage Aromatherapy

Essential oils supplement the healing touch of massage therapy with wonderful aromas. Add a few drops of oil to one ounce of pure vegetable carrier oil, such as almond, grape seed or jojoba, and apply liberally during massage.

Olfactory Aromatherapy

The benefits of olfactory aromatherapy are experienced when essential oils are inhaled. Direct inhalation or diffusion will enhance emotional wellness, calm, relax or rejuvenate. Pleasurable scents unlock odour memories, trigger our emotions and release stress. Essential oils bring the body back into harmony with itself by encouraging the natural forces within to realign. It is a complement to, not a replacement for, medical treatment.
Various plants used in aromatherapy are listed below (Maxwell-Hudson 1994; Price 1991, 1993):

Lavender

**Latin Name:** *Lavandula officinalis* Chaix.

**Family:** Lamiaceae

Lavender is a beautiful herb in the garden. The main constituents of lavender oil are linalool, linalyl acetate, 1,8-cineole, beta-ocimene, terpinen-4-ol, and camphor. Each of these can vary significantly in oils derived from different cultivars and species; differences also exist in the reported therapeutic uses for each species. Linalool and linalyl acetate are rapidly absorbed through the skin during massage. They are thought to be able to cause central nervous system depression. Linalyl acetate has narcotic actions and linalool acts as a sedative. These calming actions may be the origin of the use of a lavender pillow to help induce sleep, improve feelings of well being, improve sleeping patterns, increase alertness, decrease aggression and decrease anxiety. Lavender oil, is active against many species of bacteria and fungi. It has been suggested that lavender oil may be useful in treating bacterial infections that are resistant to antibiotics. The antimicrobial activity of lavender oil may not be related to the major constituents in it and little is known about possible synergistic relationships.

Used in aromatherapy as oil beneficial in burns, abrasions, headaches, stress, skin problems, promotes new cell growth, painful muscles, balancing mind and body and assist immune system.

Eucalyptus

**Latin Name:** *Eucalyptus globulus* Labill

**Family:** Myrtaceae

The Eucalyptus tree is a tall evergreen that grows upto 250 feet in height. It contains cineole (70-85%), pinene, limonene, cymene, phellandrene, terpinene and aromadendrene.
It is used in skin care for burns, blisters, cuts, herpes, insect bites, insect repellent, lice, skin infections and wounds, in circulation, muscle and joints for muscular aches and pains, poor circulation, rheumatoid arthritis and sprains, etc; in respiratory system for asthma, bronchitis, catarrh, coughs, sinusitis and throat infections; in genito-urinary system for cystitis and leucorrhoea; in immune system for chickenpox, colds, epidemics, flu and measles; in nervous system for debility, headaches and neuralgia (Maxwell-Hudson 1994; Price 1991, 1993).

Ylang Ylang

Family: *Cananga odorata* Hook. F. & Thoms
Family: Annonaceae

Ylang-ylang is a small tree which grows in Indonesia, Philippines and Madagascar. It contains linalol, farnesol, geraniol, geranial, benzyl acetate, geranyl acetate, eugenol, methyl chavicol, pinene, beta-caryophyllene, farnasene.

The most important property of ylang-ylang is its ability to slow down rapid breathing and rapid heart rate. It is especially useful in shock and trauma situations. It acts on the cardiovascular system. It lowers blood pressure and slows down an over rapid heart beat (tachycardia). It slows rapid breathing (hyperpnoea). It helps people suffering from depression. Its normalizing and euphoric properties lift the person mentally and emotionally. It is good for anyone who has low self-esteem and women suffering from post-menopausal syndrome (PMS). The calming and relaxing properties and exotic fragrance make it an excellent aphrodisiac. It is beneficial for both dry and oily skins. It is used in anxiety, depression, frigidity, hypertension, palpitations and stress (Evans, 1997).

Geranium

Latin name: *Pelargonium graveolens* L'Herit
Family: Geraniaceae

A perennial hairy shrub up to one meter high aromatic plant. Native to South Africa; widely cultivated in Russia, Egypt, Congo, Japan, Central America, Spain, Italy and France.
The essential oil is composed of various chemical constituents and like geraniol, geranic, citronellol, citronellyl formate, linalol (linalool), eugenol, myrtenol, terpineol, citral, methone and sabinene.

Geranium oil has been described as a natural perfume complete unto itself. It is often used to scent soaps and detergents because, unlike many other essential oils. Its aroma profile is not readily affected by the alkaline nature of soap products. The balancing effect that geranium oil has on our emotions is often utilized in aromatherapy.

It is used in dermatitis, eczema (may be helpful in the dryness), mature skin, fungal conditions, pruritis (itching), nervous tension and stress related conditions. The oil has some anti-bacterial action. It is a vital component in the treatment of endometriosis, it is very effective for menopausal problems, diabetes, blood disorders, throat infections, and as a nerve tonic, and works well as a sedative. It is reputed to help in cases of uterine and breast cancer and if nothing else, would certainly help the patient to relax and cope with the pain. It is employed as a flavoring agent in many major food categories, alcoholic and soft drinks. It also acts as an effective insect repellant.

Peppermint

Latin name: Mentha piperita Linn.

Family: Lamiaceae

Although up to 600 kinds of mints have been classified, most are probably variants and hybrids of around 25 well-defined species. The two primary cultivated mints are peppermint (M. piperita) and spearmint (M. spicata). Spearmint has a strongly sweet aroma, almost creamy and candy-like with a sharp menthol undertone.

Oil contains menthol, menthyl acetate, carvone, menthone, carvacrol and limonene. Menthol is the primary constituent of peppermint oil. Menthol components contribute almost entirely to the pharmacology of peppermint. Peppermint oil is standardized to contain not less than 44% free menthol. Components are sensitive to climate, latitude and maturity of plant. Menthol, which causes a physical reaction when inhaled or applied to
the skin. It is a warming oil, so it is found in most liniments to relieve painful muscle spasms and arthritic conditions.

Peppermint oil is analgesic, anti-inflammatory, antiseptic, anti-infectious, antimicrobial, antispasmodic, astringent, carminative, digestive, expectorant, febrifuge, fungicidal, nervine, vasoconstrictor, decongestant, stimulant and stomachic. Peppermint oil is well known for its ability to suppress symptoms of indigestion. The antispasmodic action of peppermint oil makes it useful in soothing menstrual cramps and it is often used to treat irritable bowel syndrome (IBS). Another medicinal action of peppermint oil is to ease headache when applied across the forehead and temples. It relieves the itching of ringworm infestation, herpes blisters, scabies, and poison oak and ivy and stimulates oil production in dry skin and hair. Many bacterial, fungal, and viral infections are destroyed by it and when inhaled or when a vapor balm is rubbed on the chest. It clears sinus and lung congestion (Tassou et al., 1995; Ravid et al., 1994a).

**Lemon**

**Latin Name:** *Citrus limon* Linn.

**Family:** Rutaceae

*C. limon* are 15 foot trees that produce highly scented lemon fruits and white blossoms year-round. The constituents of oil of lemon present in greatest abundance are the terpenes, d-limonene and l-limonene, together forming about 90 percent of the bulk of the oil. Traces of phellandrene, pinene and a sesquiterpene are present. The valuable portion of the oil is the remaining 10 percent consisting of oxygenated bodies, chiefly the aldehyde citral, to which the odor of the oil is largely due and of which there is from 3.5 to 5 percent present in the oil.

Like many essential oils, the constituents of lemon oil have antiseptic properties. For cosmetic purpose lemon oil act as astringent and detoxifying and is therefore great for blemishes associated with oily skin. Lemon oil also has rejuvenating properties and will brighten dull skin. Slices of fresh lemon placed upon the cheeks can lighten freckles.
Lemon essential oil has a number of very important properties, such as the ability to stimulate the immune system and to increase the production of white corpuscles. Lemon has the ability to counteract acidity and ulcers. The citric acid is neutralized during digestion, giving rise to carbonates and bicarbonates of potassium and calcium.

Clary Sage

Latin name: *Salvia sclarea* Linn.

Family: Lamiaceae

Clary Sage essential oil comes from a perennial herb with large hairy purple tinted green leaves. Not to be confused with its cousin, *Salvia officinalis* or, common sage, Clary Sage can be distinguished by the size of its leaves, which are much larger than the common variety, and by the bluish white blooms it bears in late summer.

It contains mainly linalool, linalyl acetate, alpha-terpinol, germacrene D, geranyl acetate. Clary Sage essential oil also contains seductive, aphrodisiac properties and works to regulate periods, ease tension and ease cramps. It is a wonderful tonic for the womb and uterus. As an extra boon to women, essential oil of clary sage possesses cell regeneration properties. It aids in controlling the production of sebum and can be used for both dry and oily skin. It is useful for acne, wrinkles and for controlling cellulite (Svoboda & Deans, 1992; Baratta et al., 1998b).

Tea tree

Latin Name: *Melaleuca alternifolia* Cheel

Family: Myrtaceae

Tea tree is a shrub with leaves that look like needles and yellow or purple flowers. It grows in the wild in marshy area, but it is mostly grown on plantations for commercial use.

The oil consists mainly of Terpinene-4-ol, a terpene alcohol. The alpha-sabines and the terpinene give it anti-viral properties. It is active against fungus and bacteria as well. It helps boost a person's immune system. Terpinene-4-ol is believed to be responsible for
the healing potential of the oil, while cineole lends its antiseptic qualities. Its essential oil has a fresh clean musty aroma. Tea tree is used for its antibiotic, anti-inflammatory, antiviral, insecticidal, and immune stimulant properties. In aromatherapy it is often mixed with blue gum, eucalyptus, clary sage, ginger, lavender, lemon, rosemary and scotch pine to prepare many different mixtures for many different ailments.

The oil is used in skin care for abscess, acne, blisters, burns, cold sores, dandruff, herpes, insect bites, oily skin; in respiratory system for asthma, bronchitis, catarrh, coughs, sinusitis, tuberculosis, whooping cough; in genito-urinary system for thrush, vaginitis, cystitis, pruitis; in immune system for colds, fever, flu, infectious illnesses such as chicken pox (Hammer et al., 2002, 2003a, 2003b; Koh et al., 2002).

Roman Chamomile

*Latin name:* *Anthemis nobilis* Linn.

*Family:* Asteraceae

The plant has daisy-like flower and has been prized for centuries for the apparent ability to calm and moderate strong emotions. It is a small and broad plant.

Major constituents of roman chamomile oil are esters of angelic acid, tiglic acid and 2-methylbutanoic acid. The bluish colour of the freshly distilled oil is due to the sesquiterpenoid chamazulene. It also contains pinocarvone, pinene, bisabolol, farnesol, pinocarveol, cineole, azulene, beta-caryophyllene, camphene and myrcene.

It is considered a very soothing essential oil and helps ease depression, anxiety, stress, worry, and helps calm an overactive mind. The oil is great to use in a bath before bed to help relax the mind and body and bring on sleep. Chamomile also encourages peace and spiritual awareness. It is used for treatment of nerve, headache, insomnia, menstrual disorders and a comforting essential oil during high pollen count.

When used in aromatherapy to address physical conditions, this essential oil is a nice choice for menstrual cramps and tension and can be applied to the lower abdomen and used in a bath or diffuser. It is also used quite frequently in the cosmetic industry.
because it is particularly good at decreasing inflammation especially of the skin, in conditions such as eczema, psoriasis, boils, cold sores and sunburn. Roman chamomile may also decrease the pain associated with arthritis, sprains, inflamed joints, headaches and stings.

Rosemary

Latin Name: *Rosmarinus officinalis* Linn.

Family: Lamiaceae

Rosemary is an evergreen herb growing to 90 cm high with small pale blue flowers. Flowering in late spring / early summer. There are variegated silver and gold striped varieties but the green leaved variety is the only one used for medicinal purposes.

The plant contains some tannic acid, together with a resin and a bitter principle and a volatile oil. The chief constituents of the oil are borneol, bornyl acetate and other esters, special camphor similar to that possessed by the myrtle, cineol, pinene and camphene.

The oil has a positive effect on the digestive system, helpful for indigestion, colitis and constipation. It is also good for hepatic disorders being a liver and gall-bladder tonic. The circulatory system also benefits from the oil. The oil normalizes blood pressure and help combat hardening of the arteries. It has a warming effect on cold limbs and is helpful in the winter for rheumatism aggravated by cold. It has a stimulating effect on the nerves and is beneficial for all nervous disorders including hysteria and paralysis. The other benefits of rosemary include a positive effect on menstrual cramps, an excellent skin tonic property, a stimulant for the scalp encouraging hair growth and providing treatment for dandruff and greasy hair. The oil is also used externally as a rubefacient and is added to liniments as a fragrant stimulant (Svoboda & Deans, 1992; Baratta *et al.*, 1996)

**Carrier oils used in Aromatherapy**

Almond—practically odourless, provides good "slip and glide" for massage helps to relieve itching, irritation and inflammation and soothes dry skin. It lubricates the skin well, but does not penetrate it quickly, which again makes it good for massage and for
protecting the surface of the skin however, it goes rancid quickly; it is helpful to blend it with 10% of wheat germ or jojoba oil for storage.

Apricot kernel—particularly helpful for dehydrated, delicate, mature, or sensitive skin; soothes inflammation and has a high vitamin A content. It has a lighter consistency than almond and characteristic smell. Its cost is also comparable to that of almond and is suitable for body oils and lotions.

Avocado—rich, heavy, deep green, with lots of skin-nourishing vitamins (A and E). It is good for dry and mature skin and also helpful in eczema and psoriasis. It is best blended with other oils.

Borage—high in gamma-linoleic acid (GLA) which stimulates cell activity, assisting in the regeneration and rejuvenation of the skin, good for skin which is dry and/or mature, or damaged by exposure to sunlight. However, it is quite expensive and goes rancid quickly.

Calophyllum inophyllum—rich and thick, with spicy smell. It stimulates cell regeneration, acts as antiseptic, helps wounds to heal, soothes inflammation, relieves pain, good for broken capillaries, eczema, burns, rashes and insect bites.

Camellia—very light, with just a touch of delicate flowery aroma, good for preventing the thickening of skin in scar tissue. The Japanese use it for hair care.

Evening primrose—another oil with a high gamma-linoleic acid content, good for dry and mature skin. It soothes inflammation, good for eczema and dermatitis but goes rancid quickly.

Flaxseed—rich, yellow in colour, smells a bit like butter, high in vitamin E, stimulates cellular regeneration, useful for preventing scarring and stretch marks but goes rancid quickly.

Grapeseed—light, odourless, easily absorbed, mildly astringent, tightens and tones the skin, which makes it useful for acne. It is always solvent-extracted, causing sensitivity in some individuals.

Hazelnut—light, easily absorbed, with a delicate aroma, tones and tightens the skin, strengthens capillaries, assists in cell regeneration.
Jojoba—similar in composition to the skin’s own oils, it is quickly absorbed, good for dry and mature skin and inflamed conditions, helps to control acne, oily skin and oily scalp. It is an antioxidant so does not become rancid and can prevent rancidity in other oils.

Kukui—very thin and light, with a strong smell, high in linolenic and inolenic acids. It is quickly absorbed into the skin.

Olive—has a strong, "foodsy" smell, but also good medicinal properties, soothing and healing the skin, especially when it is dry. It does not go rancid easily and can be stored without refrigeration for a year.

Rose hip seed—another oil high in gamma linoleic acid, which helps the skin to heal and regenerate. It can prevent the thickening of skin in scar tissue and is helpful in healing burns, scars and stretch marks. However, it can aggravate acne and it goes rancid quickly.

Sesame seed—thick, with a heavy odour, good for eczema, psoriasis and mature skin.

Soy—light and lightly scented. It contains linoleic acid, can be used for all skin types and is easily absorbed. However, it is often solvent-extracted and goes rancid quickly.

Wheat germ—very thick, honey-colored, smells strongly of dark bread, high in vitamin B, A and E. It is good for dry and cracked skin, mature complexions, eczema, psoriasis, scars and stretch marks.

Pharmacological Actions of Essential Oils

Anti-lice activity

Tea tree oil, otherwise known as Melaleuca oil, has been added to several preparations as an alternative treatment of head lice infestations. The insecticidal activity of Tea Tree oil was attributable, in part, to the anticholinesterase activity of tea tree oil (Mills et al., 2004).

Anti-dandruff activity

In a randomized, single blind and parallel-group study five percent tea tree oil shampoo was effective and well tolerated in the in patients with mild to moderate dandruff. The 5% tea tree oil shampoo produced 41% improvement(Satchell et al., 2002).
Insect/mosquito repellant activity

Essential oils of *Nepeta parnassica*, were tested on human health important insects such as the *Pogonomyrmex* sp. ants and the *Culex pipiens molestus* mosquitoes with promising results on insect repellency/toxicity (Gkinis et al., 2003).

Anti-inflammatory activity

Tea tree oil reduced histamine-induced weal and flare in human. Histamine diphosphate was injected intradermally and 100 % tea tree oil was applied topically. Application of tea tree oil was found to decrease the weal volume after 10 minutes (Koh et al., 2002).

Anti-tumor activity

In an in vitro study tea tree oil and terpenen-4-ol were able to impair the growth of human melanoma M14 WT cells and M14 Adriamicin-resistant cells. Both the tea tree oil and terpenen-4-ol were able to induce caspase-dependent apoptosis of melanoma cells. Geraniol, a component of plant essential oils, sensitizes human colon cancer cells to 5-fluorouracil treatment (Carnesecchi et al., 1998a, 1998b; Calcabrini et al., 2004).

Anti-oxidant activity

The essential oil of black cumin seeds, *Nigella sativa* L., possessed variable antioxidant activity when tested in the diphenylpicrylhydrazyl assay. They were also effective hydroxy radical scavenging agents. Manuka (*Leptospermum scoparium*) and Kanuka (*Kunzea ericoides*) and *Leptospermum petersonii* showed good antibacterial activity and variable antioxidant action (Sadrei et al., 2001).

The essential oil of *M. armillaris* exhibited a marked antioxidant effect, as it improved vitamin E, vitamin C and superoxide dismutase parameters. Thus it can be used as a free radical suppressor (Baratta et al., 1998b).

Spasmodic activity

Strong spasmogenic activity was shown by *Kunzea ericoides* (A.Rich.) J. Thompson, in contrast to a spasmyolytic action of *Leptospermum scoparium* J.R. et G.Forst and *L. petersonii*. *Ferula gummosa* essential oil and its various extracts are relaxant of isolated
rat ileum. As the inhibition of contractile over-activity of the ileum is the basis of the treatment of some gastro-intestinal disorders such as diarrhoea. *Ferula gummosa* may have clinical benefits for treatment of this condition (Sadrei *et al.*, 2001).

**Hormonal activity**

At high concentrations, estrogenic activity was detected for citral (geranial and neral), geraniol, nerol and trans-anethole, while eugenol showed anti-estrogenic activity. Citral, geraniol, nerol and eugenol were able to replace [3H]-17β-estradiol from isolated α and β-human estrogen receptor when studied in a specific bioassay using recombinant yeast cells expressing the human estrogen receptor.

**Antimicrobial Activity** (Deans *et al.*, 1987; Baratta *et al.*, 1998a, 1998b)

I. **Antibacterial Activity**

Basil essential oils, including basil sweet linalool (BSL) and basil methyl chavicol (BMC), were screened for antimicrobial activity against a range of Gram-positive and Gram-negative bacteria, yeasts and moulds. Both essential oils showed antimicrobial activity against most of the micro-organisms examined. Results with resting cells demonstrated that BMC was bactericidal to both *Aeomonas hydrophila* and *Pseudomonas fluorescens* (Wan *et al.*, 1998). When the antibacterial effects of essential oils were investigated on the oral bacteria such as *Porphyromonas gingivalis*, *Actinobacillus actinomycetemcomitans*, *Fusobacterium nucleatum*, *Streptococcus mutans* and *Streptococcus sobrinus*. Manuka oil, tea tree oil, eucalyptus oil, lavandula oil and romarinus oil inhibited the growth of the bacteria tested, while manuka oil being the most effective (Takarada *et al.*, 2004). The in vitro activity of *Melaleuca alternifolia* (tea tree) oil against 161 isolates of oral bacteria from 15 genera was determined. These studies indicated that a range of oral bacteria are susceptible to tea tree oil, suggesting that tea tree oil may be of use in oral healthcare products and in the maintenance of oral hygiene (Hammer *et al.*, 2003b). The essential oils from the leaves and flowers of *Hedychium gardnerianum* and from the leaves of *Pittosporum undidatwn* were tested against *Staphylococcus aureus*, *S. epidermis* and *Pseudomonas aeruginosa*, and those with the highest activities against *S. aureus* and *S. epidermis* were from *H.*
gardenrianum; none had activity against P. aeruginosa. Additionally, the essential oils from Pittosporum undulatum had good antithrombin activity (Medeiros et al., 2003).

II. Antifungal Activity

When the in-vitro antifungal activity of the components of Melaleuca alternifolia (tea tree) oil investigated, all tea tree oil components, except beta-myrcene, had antifungal activity. This study has identified that most components of tea tree oil have activity against a range of fungi (Hammer et al., 2003a).

The in-vitro activity of Melaleuca alternifolia (tea tree) oil against dermatophytes and filamentous fungi was determined. Comparison of the susceptibility to tea tree oil of germinated and non-germinated Aspergillus niger conidia showed germinated conidia to be more susceptible than non-germinated conidia (Hammer et al., 2002). The essential oils of fresh leaves of M. ericifolia, M. leucadendron, M. armillaris and M. styphelioides exhibited activity against Aspergillus niger.

III. Antiviral Activity

When the antiviral activity of essential oils of fresh leaves of M. ericifolia, M. leucadendron, M. armillaris and M. styphelioides were studied in African green monkey kidney cells (vero) by a plaque reduction assay against the Herpes Simplex virus type 1 (HSV-1). The volatile oil of M. armillaris was more effective as virucidal (up to 99%) than that of M. leucadendron (92%) and M. ericifolia (91.5%).
Chapter I

AROMATHERAPY

Aims and Objectives

In the present study attempts have been made in the following fields.

A. To evaluate the volatile oils of twelve medicinal plants used in Aromatherapy mentioned here under

1. *Cinnamomum camphora* (Lauraceae)
2. *Cymbopogon citratus* (Poaceae)
3. *Cymbopogon nardus* (Poaceae)
4. *Eucalyptus citriodora* (Myrtaceae)
5. *Jasminum grandiflorum* (Oleaceae)
6. *Jasminum sambac* (Oleaceae)
7. *Lavandula officinalis* (Lamiaceae)
8. *Melaleuca alternifolia* (Myrtaceae)
9. *Santalum album* (Santalaceae)
10. *Syzygium aromaticum* (Myrtaceae)
11. *Rosa rugosa* (Rosaceae)
12. *Vetiveria zizanioides* (Poaceae)

B. To evaluate the pharmacological efficacy of these volatile oils against bacterial and fungal species to support their claim of being used in aromatherapy.
Some Related Reference Books and Websites

11. National Association for holistic aromatherapy resources
15. Wealth of India, 1985. Publication and Information Directorate, New Delhi, India.
References


conference of national Association for Holistic Aromatherapy (NAHA), 25-28 Sep., Sat. Louis, Missouri, USA, 105-127.

