DIPLOMA IN DERMATOLOGICAL SCIENCE
BOTANICALS IN COSMETICS & TOILETRIES

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Introduction

I challenge anyone to find a plant that has no benefit in herbal medicine.

Introduction slide

Please do not think of plants as a "quack" system of medicine, because I hope to prove to you that all plants are complex pharmaceutical factories, producing a wide array of sophisticated pharmaceutical materials that can and do act with benefit on the human skin.

The Medicines Control Agency does not like herbal medicine, because it is chemically complicated, subject to variation depending on time of harvest, particular climate conditions and geographical location.

It does not work as quickly as synthetic pharmaceuticals, it is far less aggressive, but on the other hand it can be used for longer periods of time, unlike hydrocortisone. Hydrocortisone will eventually cause a change in the profile and balance of the skin with the epidermis becoming thin, transparent and fragile.

I also ask you to remember that many of today's most sophisticated drugs were first produced from plant sources.

Galanthamine from *Galanthus nivalis* (or Snowdrop),
Vincamine and vincristin from the Madagascan Periwinkle (*Vinca major*) for the treatment of leucaemia. Taxol from the
Yew (*Taxus baccata*) for the treatment of ovarian and breast cancers.

If you think that 0.05% of a dilute botanical extract is sufficient to make claims, then think again. For there to be any chance of an effect, you have to use at least 2% of the fresh plant equivalent and levels as high as 5% are probably more realistic.

From the very beginnings of time Man has been using botanical materials for the treatment, beautification and care of the skin.

In this slide we can see the process of drug preparation being used from a scene from one of the Theban tomb paintings.

A natural solution for problem skin

Today we are going to do some theoretical work on products for very dry and desquamatous skin. The problems for this patient might be skin erythema (redness), pruritus (itching), desquamation (flaking) and occasional slight oedema (swelling). I will consider also consider products to treat radiotherapy patients, post surgical trauma (such as lumpectomy or mastectomy patients) and the treatment of oncology patients who are probably suffering oedema.

Let me say at the outset, that the goal of achieving a 100% natural product is not achievable with the raw materials currently available "off the shelf", and we will also have to use materials that are either nature identical or naturally derived in order to fully achieve our objectives. We may also decide that cost and inefficiency will lead us to the conclusion that synthetic compromises must be made.

Sources of information

In many cases the supplier data sheets are not reliable, and one cannot always trust what they say.

The use of Pharmacopoeias, Herbal Medicinal texts, Herbal Pharmacopoeias, Folk lore, Ethnobotany will provide a great deal of data, as will searching of data bases such as EMBase, and Medline.

The level of plant material to be used

There are a sequence of points that should be followed in all uses of plant material, and I will use grape juice as my illustration.

- Who produced it (the Mondavi Winery)
- Where was it grown, Iceland is not renouned for its vintage wines
- Which part is used for the benefit required - Imagine a wine made form vine roots or leaves
- Is the fresh or dried plant used? A wine made from raisins is called sherry!
- When was it harvested? Imagine a wine fermented from immature sugarless grapes
- How was it harvested? Suppose that the grapes were slashed out together with the leaves and stems using a combine harvester, so that the extracted grape contained leaf and woody materials as well.
- How was it processed? What sort of wine would you obtain by using a hydroglycolic extraction to replace the traditional method of pressing
- How much of the plant was used to produce the final product. It is an easy question in wine making, since 100% grape juice makes the wine, but suppose that the pressed juice was diluted with other solvent materials.
- How was it stored? Wine stored in open vats exposed to large volumes of air would quickle turn vinaigre - fine for fish and chips, but not for drinking.

Thus, be sure that you know which part of the plant is used for the purpose that you require, i.e. the leaf, flower, whole herb, stems, roots, rhizomes, fruits (seeds), the bark or the sap. Find out whether it is the aqueous or oil soluble fractions that have the benefical ingredients. Then find out how much of the plant needs to be used in

order to achieve the effect that you require. It is of no use at all to use an extract of unknown concentration and you should make it your practice to work in fresh plant equivalents. Thus if a supplier uses one part of fresh plant to one part of solvent by weight, then you may assume that when you use one gramme of that extract it will contain at least half a gramme of the plant. If the extract was made from dried plant material, then as a rule of thumb, multiply your figure by a factor of eight.

TYPICAL NATURAL RAW MATERIALS USED IN COSMETICS AND TOILETRIES AND APPLICABLE TO HERBAL MEDICINE

1. Formulation of creams and emulsions

The first consideration in an emulsion product would be the excipients, i.e. the oils and the waxes.

Natural waxes
There are a multitude to chooose from:-

Carnauba or *Copernicia cerifera*
This is a high melting point wax most commonly found in lipsticks, but it can be emulsified into emulsions when used in combination with lower melting point waxes as a co-solvent.

Winter Melon or *Benincasa cerifera*
Not available in commerce

Sunflower seed wax
Bayberry or *Myrica cerifera*
Now available in commerce

Candelilla or *Pedilanthus pavonis* Boiss.
A wax similar to carnauba in all respects, but of lower melting point.

Beeswax or *Cera alba*
Widely available and extremely useful in emulsions. Can be used with borax to form a beeswax/borax water-in-oil emulsion, some other mineral salts will also work as an emulsifier in place of borax.

Lanolin Wax
Produced as a fraction of lanolin from the higher melting point components, is widely available in commerce.

[Slide AC39/AC40] Jojoba or *Simmondsia chinensis*
A fascinating material, which theoretically one would expect to be a solid wax, but in reality is a liquid wax. Well known and respected, widely available commercially.

[Slide A27] Lavender Wax or *Lavandula angustifolia*
[Slide AK49] Jasmine Wax or *Jasminium officinale*
[Slide K9] Orange Wax or *Citrus aurantium*

These three waxes are available commercially, but are very expensive. They are produced from the sludge left behind after distillation of the essential oils from the flowers of these plants.

[Slide Z2] Hops or *Humulus lupulus*
This is not commercially available at the moment, but is part of the by-product thrown away by the hop oil producers.

[Slide U41] Coconut Wax or *Cocos nucifera*
Widely available as coconut butter and as the wax.

Babassu Palm Fat or *Orbygnia martiana*
Oil Palm or *Elaeis guineensis*
I have not been able to find good commercial sources of these materials.

[Slide BC31] Rice Bran Wax or *Oryza sativa*
A lovely white wax, that has excellent properties and is just about commercially available.

[Slide U37] Avocado Wax or *Persea americana*
Another wax that is now becoming commercially available.

Natural oils

There are so many natural oils available that we a spoilt for choice!
Coconut or *Cocos nucifera*
Avocado or *Persea americana*
Wheat germ oil or *Triticum aestium*
Jojoba or *Buxus chinensis* (formerly *Simondsia chinensis*)
[Slide AJ6/AJ11] Sweet Almond oil or *Prumus dulcis*
Arachis oil or *Arachis hypogaea*
Apricot kernel oil or *Prunus armeniaca*
[Slide AC7] Blackcurrant seed oil or *Ribes nigrum*
[Slide AD23] Borage seed oil or *Borago officinalis*
[Slide D12] Brazil nut oil or *Bertholettia excelsa*
[Slide U36] Camellia oil or *Thea sinensis*
[Slide P27] Castor oil or *Ricinus communis*
[Slide Z32] Cotton seed oil or *Gossypium herbaceum*
[Slide B13] Evening Primrose seed oil or *Oenothera biennis*
Grapeseed oil or *Vitis vinifera*

This list is by no means conclusive and I am sure that you could name many more.

[Slide T10 spacer]

Natural fats

There exists in nature an intermediate material to waxes and oils and these are the butters, which by virtue of their blends of different molecular weight fatty materials are soft, spreadable pastes at ambient temperatures.

Cocoa butter or *Theobroma cacao*
Illipe butter (Borneo Tallow) or *Shorea stenoptera*
Coconut butter or *Cocos nucifera*
Shea Butter or *Butyrospermum parkii*

[Slide AA43] Mango Butter or *Mangifera indica*
Recently available commercially, this is a sweet and clean smelling buttery wax.

These are widely available, often have a distinctive odour which may be a problem if used at high levels in the product.

Moisturising agents of the aqueous phase

We now turn our attention to those materials that will act as humectants. Normally we would immediately think of sodium PCA, propylene glycol or other glycols. It is on the idea of glycols that we could turn to glycerine, which is available from natural vegetable sources.

Another naturally occurring material is sorbitol, which is a sugar isomeric with mannitol and dulcitol.

[Slide X35] It is most commonly found in ripe mountain ash or rowan berries, the name sorbitol is derived from its Latin name *Sorbus aucuparia*, cherries, plums, pears and apples etc.

It might be, that we would prefer to use ground up fruits such as:-

Cucumber or *Cucumis sativus*
[Slide O24] Avocado or *Persea americana*
[Slide M18/Z29] Banana or *Musa paradisica*
Oatmeal or *Avena sativa*
[Slide B1] Strawberries or *Fragaria vesca*

[Slide AD25] Or we might prefer to use the leaf sap of a plant like Aloe vera or *Aloe barbadensis* Miller. I am going to talk in more detail about this excellent plant later.

There has been a great deal of research carried out on this plant across the world, especially at the Churchill Hospital in Oxford.

[Slide T11 spacer]

Emulsifiers

We hit our first major problems when we come to consider what to use as an emulsifier, since the availability of effective materials, though technically feasible, in commercial reality is almost impossible.

The use of beeswax and borax has already been mentioned, but where do we find replacements for our normal pallette of materials to produce oil-in-water emulsions?

For anionic, I can think of none, unless we can produce our own natural soap, i.e. by reacting natural fatty acids with caustic soda or potash. However, most sodium and potassium hydroxide is made synthtically and there is no commercial source that I know of, where the material has been extracted from wood ashes. The extraction of caustic potash from wood ash is probably one of the most ancient ethnobotanic traditions (e.g. Quiapo or *Pistia stratiotes* one of the Araceae family, Water Hyacinth or *Eichhornia crassipes* one of the Pontederiaceae family,
[Slide AK39] the Royal fern or *Osmunda regalis*, the fruit of the Prickly Chaff-flower or *Achyranthes aspera* of the Ameranthaceae family.

Amongst the cationic emulsifiers are lecithin (obtained from soya) and casseine (which can be obtained from milk). This is a promising avenue of research, though the types of emulsion obtained are limited in their scope.

Nature does not appear to have nonionic emulsifiers, though I recently discovered a source of plant derived betaine from
[Slide AL44] sugar beet or *Beta vulgairs*, which would have amphoteric properties.

Thickeners

Nature is a prolific provider of thickeners and though none of them are as versatile as our trusty friend the carbomer, one can produce every viscosity increase from a slight thickening to a gel for a face mask.

[Slide AR12] One of the most recent to hit the commercial market is a branched polysaccharide (arabinogalactan) which has been obtained from larch or *Larix occidentalis*, the properties are said to be similar to guar gum.

Most cellulose gums are naturally derived as an unwanted part of the wood pulp process to produce paper.

There are also a host of natural gums, which include
[Slide S21] Locust bean gum from the carob seed or *Ceratonia siliqua*,
Xanthan gum which is an exocellular biopolysaccharide obtained from a fermentation of *Xanthomonas campestris*

[Slide AC16] Alginate and carragheenan gums from various seaweeds
guar gum which is obtained from the Indian Cluster bean or *Cyamopsis tetragonolobus*

Other gums include: Karaya or Indian Tragacanth or *Sterculia villosa*, Tragacanth from *Astragalus gummifer*, and

[Slide AI17] Gum Arabic from *Acacia senegal*

Preservatives

The subject of natural preservatives is one on which I have lectured on many occasions, and I am afraid to say that it is so complex, that it is a subject in its own right. I can only summarise this topic by saying that there are no commercial sources of plant derived natural preservatives, but there is a mimic of a preservative technique used in nature, which is Myavert C.

Benzoic acid and benzyl alcohol both occur in plants and are also on the permitted list of preservatives, thus may be used as 'nature identical' preservatives.

[Slide Q42] Myrrh (*Commiphora molmol*) is one of the balsamic resins that contains this material, others would be Tolu and Peru Balsams.

In a similar vein, sorbic acid occurs in nature, particularly in the rowan berry and so if one could react that with potassium hydroxide to form potassium sorbate, then one would have a naturally derived preservative.

[Slide AA24] Another commercially available preservative is derived from grapefruit seed, and though the active material was never identified in the literature, it was almost certainly naringenin, a molecule that occurs widely in *Citrus* spp., and is closely related to hesperidin, which also occurs widely in plant materials.

Antioxidant

[Slide U5] What is an antioxidant? It is a chemical that absorbs or 'mops up' free radicals caused by the dissociation of a molecule by photons of UV light, and prevents these extremely potent and reactive species from reacting with cell components. The result of free radical attack can be cell mutation, cell death or (in the worst scenario) the formation of cancer cells. Free radicals can attack fibroblasts, epidermal cells and dermal cells, they can interfere with the tyrosinase/DOPA pathway to interfere with melanin production and its deposition within melanocytes. The end result can be formation of melanomas, breakdown of collagen synthesis, destruction of elastin and premature skin ageing.

Antioxidants important and though the most publicised antioxidant is vitamin E, which occurs quite abundantly in nature, especially in wheatgerm oil, it is of course, mostly available as a synthetically derived form.

There are numerous materials to choose from which have antioxidant properties and these will work when taken internally or applied externally:-

[Slide U36] Green tea or *Thea viridis* also called *Camellia sinensis* in some texts, this effect is mainly attributed to a flavonoid called quercetin

[Slide BC31] Rice Bran produces a powerful antioxidant called ferulic acid.

Propyl gallate and gallates in general, occur quite widely in a number of species of plants.

[Slide L18] *Polygonum multiflorum* or He Shou Wu or Shou Wu Teng
[Slide L36/37] *Hamamelis virginiana* or Witch Hazel
[Slide L25] *Rheum palmatum* and other *Rheum* species, such as Chinese Rhubarb
[Slide L26] *Rheum tanguticum*, which contain a tannin-like derivative (-)-epicatechin gallate
[Slide S27/28/36] *Arbutus unedo* or Strawberry tree, which contains ethyl gallate

The list is almost endless.

Chelating agent

A chelating agent has two functions physiologically. It helps to attack the cell membrane surrounding various microbiological organisms, such as Gram –ve and Gram +ve bacteria, so aiding in their destruction. It also absorbs metal ions by incorporating these cations into its structure.

[Slide U4] The most commonly used chelating agent would be of the ethylene diamine tetraacetic acid form or EDTA and its sodium salts. In nature, phytic acid (from Rice bran) is also a very good chelating agent, with its cyclic six membered ring, each with a phosphate group at each point..

Sunscreens

Sunlight produces skin damage, which I have already discussed earlier under the topic of free radicals. It also has sufficient intensity to cause thermal burns, extensive tissue damage and in its mildest form erythema. Gentle exposure to the sun will cause melanosis and give a safe but healthy tan.

There are a number of options, we can either protect the skin using a superfine titanium or zinc oxide, which effectively reflect away incident light. (The BP grade of zinc oxide does not work well!), or we can use a chemical sunscreen.

The chemical sunscreens are broken down by sunlight, and effectively use the absorbed energy to break down into more simple molecules, or alternatively, they absorb the damaging wavelength, because the molecule vibrates at the same frequency.

The hydroxycinnamates and methoxycinnamates are good at absorbing the damaging wavelengths of UV light, and as one might expect, they are found quite widely in the plant kingdom. After all the plant has to stand out in the sun all day long!

There are so many plants, that it would be inappropriate to try and list them all: *Borojoa sorbilis*,
[Slide C27/34] *Chenopodium bonus-henricus* or Good King Henry, *Butyrospermum parkii* or Shea Butter, would be good examples.

Skin whitening

In the Far East, there is a great desire to look white or have as pale as possible a complexion. In the old days, the solution used to be the use of hydroquinone, which effectively interfered with the melanocyte function and prevented the deposition of melanin. Today, it is recognised that this use of hydroquinone (quite often at a high level) is not without associated and unacceptable risks.

The Japanese have come up with a solution, which is to use a material called arbutin (hydroquinone-*beta*-glucopyranoside), which they extract from Bearberry [Slide BB37/38] (*Arctostaphylos uva ursi*), and is typically used at about 3%.

Another solution that is used is Kojic acid (which I think is extracted from a species of mushroom)

Skin darkening

There are, of course, conditions where it desirable to darken the skin, especially in cases of vitiligo or piebald skin, where there is a lack of pigmentation to the epidermis compared to normal surrounding tissue. Most of the herbal treatments involve painting the skin with a plant material and then exposing the skin to UV light. The reaction is a phototoxic phenomenum, and in normal skins, this reaction is totally unacceptable. There is a classic case where the oil of bergamot (*Citrus aurantium bergamia*) was used in a sun tan preparation as the fragrance component (hence the brand name Bergasol). Untreated bergamot oil contains a furocoumarin or psoralen (5-methoxypsoralen to be precise or 5-MOP) called bergapten, which on the skin and irradiated with UV causes the skin to darken more readily. However, in a number of individuals, this reaction produces not only an initial irritation but also a sensitisation, that produces a photosensitisation that can last for the rest of that patient's life, and effectively excluding them from going into the sun again.

Other materials that contain these derivatives include *Ammi visnaga* or Bishop's Weed
and *Ammi majus* or Ammi, where the seeds (4-6 g) are given internally and a tincture of the drug applied externally and then exposed to UV or sunlight (in Egypt the drug is sold under the name Meladinine).

The natural world is full of the psoralen derivatives, and giant hogweed (*Heracleum giganteum*) and related species such as *Heracleum laciniatum* have been used as well.

On a more local note in Europe,
[Slide H21/22/24 M42] St. John's Wort or *Hypericum perforatum* has been used in much the same way, being taken internally and applied externally, prior to exposure to UV.

There are non-physiological methods to correct vitiligo, but the technique is one of camouflage, in this case a "fake tan" is produced using materials like Walnut (*Juglans regia*), Henna (*Lawsonia inermis* or *Lawsonia alba*) which contain a chemical called

lawsone. The effect is similar to DHA or dihydroxy acetone, which reacts with the amino acids in the skin to produce a brown colour. The colour fades after about two days and will have totally disappeared after 8-14 days. Up to 5% DHA can be used, but it is better to apply little and often, otherwise the result can be patchy.

Perfume

The product will need to be perfumed and here one should concentrate on the use of essential oils. There are literally hundreds of fragrant materials derived from nature, most of them are extremely expensive and on their own seem rather crude to the nose of the consumer who expects a sophisticated smell to their product.

[Slide H42] Rose
[Slide J15] Lemon
Grapefruit or
[Slide AK47] Geranium
Lavender
[Slide AQ43] Neroli
[Slide BC32] Lemongrass or *Cymbopogon citratus*
[Slide BC27] Lemon verbena or *Alloysia citriodora*
[Slide BC36] Myrrh or *Commiphora myrrha*
[Slide BC33] Patchouli or *Pogostemon patchouli*

2. Formulation of astringent preparations

An astringent product, for the treatment of greasy and acne-prone skin requires a few extra details to be considered.

[Slide Q14] Natural fermentation alcohol is widely available, but will require the customs and excise duty to be paid on it, nor will the customs and excise officer allow you to use quassia as a denaturant (which used to be one of the natural denaturants allowed), to provide a tax exemption.

[Slide BB6] Of course, you may want to consider Witch Hazel or *Hamamelis virginiana* as a source of natural alcohol, and incidentally as a source of some very beneficial properties. The benefits include anti-inflammatory, healing and antipruritic.

It is a standard treatment for haemorrhoids and very soothing.

3. Cleansing preparations

The normal material used for cleansing the skin is derived from coconut fatty acids. The coconut oil is first sulfated and then ethoxylated to produce sodium lauryl ether sulphate, the mildest is 3 mole ethoxylate, the most commonly used is 2 mole. There are many preparations used in the pharmaceutical industry which use sodium lauryl sulphate (no ethoxylation), which is strange, since this is a well known irritant used to induce irritation in human subjects in order to then measure anti-irritant preparations!

I wondered whether natural saponins might be helpful, here we have

[Slide BD37] Soapwort or *Saponaria officinalis* and
[Slide AI33/AI15] Indian Soapnut or *Sapindus indica* but since it is not possible to obtain pure triterpenoidal saponins commercially and because these saponins are haemolytic in nature at high concentrations, I drew a blank. My recommendation would be to go for a toning milk or alternatively allow the product to be slightly hazy.

Another natural agent obtained from
[Slide AL44/45] Beet (*Beta vulgaris*) is betaine, a trialkyl derivative of glycine. This material is a quaternary compound with a central nitrogen, which gives it a number of interesting properties. Firstly it should produce a cleansing foam, second it should have some antibacterial activity (because quaternary cmpounds in general have this property), and lastly it should also have some skin and hair condtioning properties.

4. Products for oedema of the tissue

Cancer patients in particular suffer from oedema, especially where there has been surgical removal of the lymph system, which is a common residence for cancerous cells. We often spend more time thinking about the positive aspects of the circulatory system, the delivery of benefit to the tissue, and forget that the waste disposal system or lymph drainage network is equally important.

When this fails, the tissue accumulates water. In some cases the administration of diuretics can be helpful, anything with a high potassium level and/or specific flavones will help. Traditional remedies include
[Slide A7] Dandelion (*Taraxacum officinalis*), Parsley (*Petroselinum crispum*) and Bearberry (*Arctostaphylos uva*-ursi) are a few of many dozens.

Topically, we need to look at two important aspects. The first is massage, which will help to stimulate the tissue, in some cases this manipulation has to be quite brutal, especially if there a fatty deposits in the adipose tissue (the cause of cellulitis).

From the herbal point of view we need to add powerful stimulants to the product applied. There are two major players:

[Slide J31-35 K1/2 W50 BD29] Butcher's Broom (*Ruscus aculeatus*) and source of a compound called ruscogenin
[Slide AC31/32] Ivy (*Hedera helix*) and a source of a similar structured molecule called hederagenin
Seaweeds (certain species) are a source of a theophylline derivative, which is a little dubious in its action.

It is also useful to 'soften up' the tissue and this can be achieved by the use of proteolytic enzymes such as papaine from paw paw fruits or from bromelaine from pineapple. These help to break down the fatty deposits and stimulate drainage.

Another useful additive is caffeine, the traditional source is from
[Slide L2/3 AA33/34 AP24] Coffee (*Coffea arabica*), but there is a much more fun source called "Zoom" from the Amazonian rainforest or Guarana (*Paullinia cupana*).

Products for the treatment of varicose veins

A popular remedy for varicose veins is the
[Slide W24 AB37/38 AC3/4/5 BC37/38] HorseChestnut (*Aesculus hippocasanum*), which is a rich source of a compound called aesculin (a glycoside with the structure 6,7-dihydrocoumarin-6-glucoside).

There are again dozens of alternatives, such as
[Slide AI 18/19] Cypress (*Cupressus sempervirens*), Witch Hazel (*Hamamelis virginiana*), and
[Slide C30 AE14] Calendula (*Calendula officinalis*)

Beneficial additives

We said at the beginning that we were looking for plants that would have anti-inflammatory, soothing and healing properties on the skin. There are a vast number to choose from and again I must apologise for not being able to cover this is in any great detail in the one hour allocated to my talk.

Seaweeds

The growth of thallasotherapy and "From the Sea" type products warrants a quick mention, since there a large and impressive number of marine derivatives now available on the market. These materials provide an outstanding number of benefits, from simple moisturising to increasing fibroblast activity and free radical scavenging effects.

[Slide AR15] Sea Lettuce or *Ulva lactuca*
[Slide AR16] Dulce or *Palmaria palmata*
[Slide AR17] Coral Seaweed or *Corallina officinalis*
[Slide AR18] Bladderwrack or *Fucus vesiculosis*
[Slide AR19] Kelp or *Laminaria digitata*

I have already mentioned the importance of adding enough plant material to be of benefit, now I would qualify that remark still further by adding the requirement of firstly knowing what is the active material in your plant responsible for the effect that you are seeking and secondly ensuring that the plant extract that you buy has this chemical standardised in that extract.

5. Products with vulnerary and healing effects

Thus if we were looking at
[Slide AH38] Comfrey or *Symphitum officinale*, then we should be concerned about the level of allantoin that is contained within the extract. Allantoin is excellent for wounds and ulcers and is defined in Merck as vulnerary or wound healing.

[Slide AR33] Allantoin

[Slide H31] If we were looking at the Common Plantain or *Plantago lanceolata*, then we should concentrate perhaps on the level of aucubin, which is soothing, anti-inflammatory and anti-erythema.

[Slide AR32] Aucubin

[Slide B27] With Sage or *Salvia officinalis*, we should be concerned with the level of tannin present in the extract, which would be responsible for the skin firming effects and astringency that we might want in our preparation.

[Slide AR31] Tannin

[Slide AD1] With German Chamomile or *Matricaria recutita*, we should be concerned with whether we are using an aqueous extract or the essential oil, since in the aqueous extract we are looking at the flavonoid level of apigenin and apigenin-7-glucoside, whereas in the oil we could either be concerned with the α-bisabolol content, or indeed, with the chamazule content, since both entities have beneficial effects. Those effects are soothing, healing and anti-inflammatory.

[Slide AR27] Bisabolol
[Slide AR28] Apigenin
[Slide AR29] Chamazulene

[Slide AL20] In the Aloe vera or *Aloe barbadensis* Miller, we should be interested in the barbaloin content (i.e. not too much) and also in the mannose and mannose-6-phosphate levels. I wish you luck, because nobody who sells aloe vera seems to have the slightest interest in the chemistry of what they sell! The effects are to stimulate fibroblast activity and improve the rate of wound healing.

[Slide AR24] Barbaloin
[Slide AR25] other ingredients

One plant that has showed extremely interesting results in the treatment of cheloids, poor cicatrisation, cases of hyperpigmentation (particularly where two tissue surfaces have been joined together) and lack of tissue elasticity is
[Slide E42-46 H46/47] Rosehip seed oil (*Rosa rubiginosa*) harvested from the foothills of the Chilean Andes. This contains linoleic and linolenic acid as *alpha* and *gamma*-linolenic acid (GLA) and according to some sources it also contains Retin A, though the studies carried out at King's College London (Chelsea department of Pharmacy) do not verify this finding. Maybe they did not have a good source of the oil? The trials that I personally carried out in collaboration with a number of oncology centres was very heartening.

6. Products for acneic skins

The pharmaeceutical industry like benzoyl peroxide, I don't! The favourite choice at the moment is
[Slide AM39-41 AN15/16] tea tree oil (*Melaleuca alternifolia*) where the levels of tannins, terpenes and sesquiterpenes are important.

[Slide AR26] components of Tea Tree

Other useful plants for the treatment of acne include Hawthorn (*Crataegus monogyna*), but take care, because it also contains cardiac glycosides, which should not be ingested.

Another great favourite is
[Slide BD15 AA7 AP13] *Mimosa tenuiflora* bark, which is wonderful for treating a whole range of skin conditions, especially burns, acne lesions, and skin infections (it is active against a vast number of organisms). It is also attributed as having analgesic properties and encouraging new fibroblast activity.

7. Products from eczematous skin conditions

The current major treatment is coal tar, which I find more archaic than witchcraft. This is an area in which I am still trying to separate the folk lore from the science and clinical data. There are so many different types of eczema and so many different causes that it would take a day to cover all the possibilities.

The Chinese hardly recognise eczema as a problem, and it is rare in that country, so one may postulate that diet may be a factor or that it is competely curable. However, in Chinese traditional medicine they have many recipes for eczema based on the evaluation of the patient as an individual, so that each formula could be different according to any specific needs. One or two materials are, however, normally common to all of these blends and that is often
[Slide V24/25] Liquorice (*Glycyrrhiza glabra* or *Glycyrrhiza uralensis*) and *Viola yedoensis* (to which our nearest equivalent would be
[Slide AL12 B15] Heartsease or *Viola tricolor*).

The liquorice contains glycyrrhizinates and glycyrrhetenic acid, which has well documented benefits in skin inflammation and skin healing, as well as a good track record in the treatment of dry pruritic eczema.

Heatsease is another excellent anti-inflammatory plant, and in addition to being useful in cases of dry eczema is also useful as an aid to healing of wounds, ulcers and sores.The exact component responsible for this action has not been fully determined and I suspect that this is a classic example of where a single chemical is not responsible, but the synergistic blend of methyl salicylate, viola-quercetin, saponin and tannins all act ‘in concert’.

8. Plants for psoriasis

There are dozens, ranging from banana skins, to burdock seed extract. The difficulty is that there has been very little research in this area. Perhaps it will be chickweed (*Stellaria media*) or
[Slide W6/7 AB32] Cleavers (*Galium aperine*) or maybe a high salicylic acid containing plant such as
[Slide K48] Meadowsweet (*Spiraea ulmaria*) or

[Slide L42/43] Willow (*Salix alba*).

Conclusions

The full armoury of natural products is far from available comercially, however, when I think back to what was available 25 years ago and what is available today, then I am encouraged by the prolific growth in this sector.

Ayurvedic medicine, traditional Chinese medicine, and African tribal medicine are all starting to be studied with interest by a number of enlightened physicians.
[Slide U42] The Gotu kola from Malaysia or *Centella asiatica* is looking like a promising skin treatment, and the old remedy of the native American Indians, the [Slide W30 AE3 BC6/28/29] Purple Coneflower (*Echinacea purpurea*) is showing interesting antibiotic effects that may stimulate the body's natural immune system.

Call me a romantic, but I believe that as Man was crawling out of the primordial swamp, there developed plants around him that catered for his every need. Where malaria is a problem, there are anti-malarial plants growing in that area (it is interesting that we have no such plants in temperate Europe). Where plants for washing are concerned, every country has its own foaming plant.

Before I finish though, I would like to leave you with one little verse, which summarises everything that I have mentioned today:

[Slide AR30]

> **"Used at significant levels, plants are meaningful to the body,**
> **Used at insignificant levels they are meaningless to anybody."**

Thank you for your very kind attention.