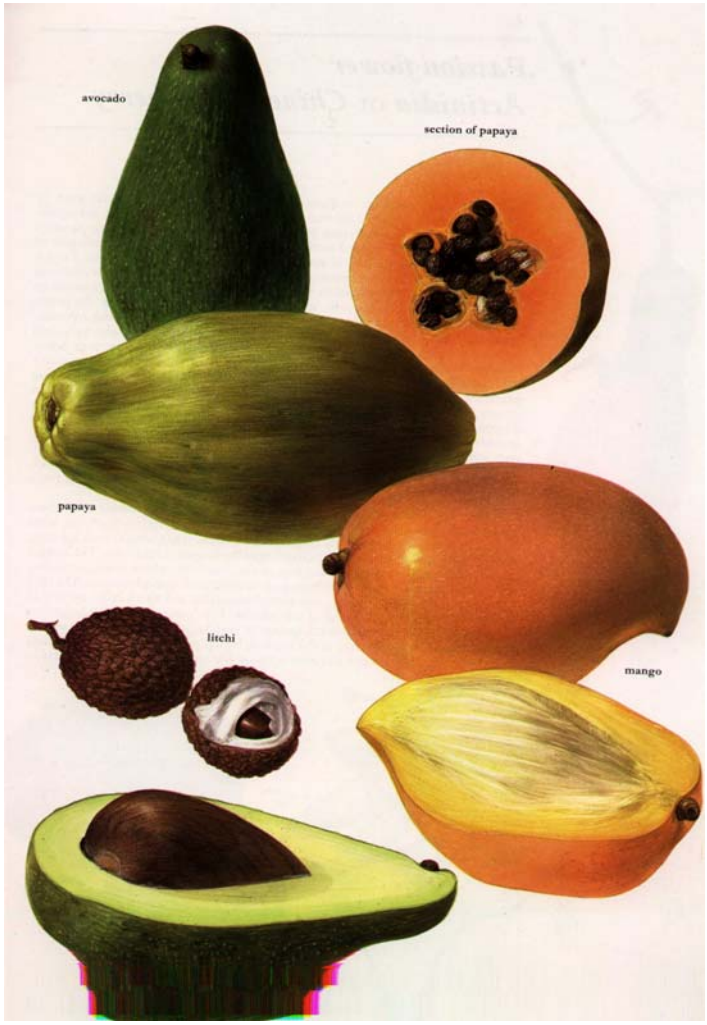
REFERENCES

AVOCADO
Persea americana

1. Hoffman in his book (B7) says that avocado oil is rich in selenium and vitamin E.

2. Leyel in her book (B9) tells us that the fruit is highly nutritious and contains vitamins A,D,and E and also a large proportion of phosphorus, sulphur and chlorine. The oil has greater penetration than other vegetable oils and is a good conveyor of vitamins and nourishment to the glands that lie behind the skin. It is particularly good for skin that has become lifeless owing to general debility or lack of vitality as a result of long or serious illness.



3. In a paper by Lamaud, Robert and Wepierre the biochemical effects of unsaponifiable lipidic components of avocado were administered percutaneously on the connective tissue components of hairless rat skin, where a modification of the dermal connective tissue was reported. They concluded that there had been an activation of the connective tissue metabolism.

4. In a data sheet from Jan Dekker International received on 7.11.89 we read that avocado oil is a monosaturated oil derived from the fleshy mesocarp of the Californian avocado by mechanical extraction. Highly complex the oil may be viewed as an amalgam of unusual polymeric substances, antioxidants and triglycerides whose fatty acid distribution is quite unusual. Recent work in skin biology suggests that POA is directly involved with increases in skin elasticity and collagen synthesis.

Technicalities aside the avocado oil does work. The skin becomes softer, the surface texture smoother and more velvety. In hair care products the benefits of the oil are immediately apparent. It is unusual for a natural product to exhibit the degree of bioactivity that avocado oil does.

With avocado you have a plant which has not been DNA arranged and the use of insecticides is unnecessary as the plant has its own array of defences. The micronutrients include sterols, unique

hydrocarbons, antibacterials, anti-carcinogens (fused ring heterocyclics).

5. Leung (B49) tells us that it is also known as alligator pear, avocato and ahuacate. The pulp contains a fatty oil (4-40%, depending on season, location and climate etc.), about 2% protein, 6-9% carbohydrates and sugars (glucose, fructose, D-mannoheptulose, a taloheptulose and an alloheptulose); two bitter substances (1-acetoxy-2,4-dihydroxyheptadeca-16-ene); and others. The pulp oil avocado oil consists mainly of glycerides of oleic acid; it also contains highly variable amounts of unsaponifiable matter (1.6-11.3%) consisting of sterols (b-sitosterol, campesterol, 24-methylenecycloartanol, citrostadienol, etc,) and hydrocarbons, volatile acids (propionic, butyric, valeric etc) amino acids and vitamin D (higher than in eggs or butter) among others. The reference goes on to describe the constituents of the seeds

Avocado oil is believed to have healing and soothing properties to the skin. 4,8''-biscatechin a condensed flavanol isolated from the seeds has been reported to have anti-tumour activity against Sarcoma 180 in mice and Walker 256 in rats. C17 oxygenated unsaturated aliphatics (especially 1,2,4-trihydroxyheptadeca-16-ene) isolated from avocado pulp and seeds have been shown to be highly bacteriacidal against Gram-positive bacteria, especially Stapphylococcus aureus.

Pulp oil used in massage creams, muscle oils, hair products and others. A pharmaceutical preparation containing the seed oil has been patented for use in the treatment of sclerosis of the skin, pyorrhea, arthritis and others. Folk medicine says that the pulp used as a hair pomade stimulates hair growth and hastens the suppuration of wounds, and as an emmenagogue and aphrodisiac.

6. Huxley (B17) says it is a tropical fruit which provides a rich nourishing oil which is used in cosmetics.

7. The Extracts from Nature book (B47) says that avocado is also known as midshipman's butter or butter pear for its richness. The oil is hard to obtain and much prized in skin care for its absorbability, fine quality and good supply of vitamins A and D.

8. In an article from Annabel (V43) we read that this fruit has long been used in its native Central America as a moisturising protection against the sun. It is perfect for dry skin moisturisers and face masks. Makes a luxurious hair conditioner.

9. In a feature article (JAOCS Vol.65. No.11 November 1988) we read that the avocado Persea americana is a fruit of unusually high oil content and a relatively high concentration of chlorophyll under the skin, giving the oil an attractive green colour. The avocado and its oil are now assuming the recognition due a unique fruit from the ancient Mayan and Aztec Indian civilisations of the "New World". Although the historical aspects of avocado are lost in the mists of time, these Indians of long ago had discovered its beauty secrets and it was known as an aphrodisiac or 'love food'. In the early 1500's the Franciscan priest Toribio de Motolinia recorded his observations in his History of the Indians of New Spain: "Among the fruits found in the mountains around Puebla (Mexico) is one they call 'ahuacatl' which hangs on the tree and looks like a large pear. The fruit is so wholesome that it is served to the sick. Water prepared from the broad green leaf is good as a remedy for the legs and even better for the face."

Since avocado is a fruit the oil should be described as a fruit oil. The oil content of California avocado is 15 - 30%, whereas the Florida varieties are 5 - 18%. The major fatty acid is always oleic followed by linoleic, palmitic, and palmitoleic. Trace amounts of linolenic and stearic are also present.

It has an emollient nature, its rapid absorption into the skin and its ability to act as a natural sunscreeen make it useful in cosmetics. A research paper by Vollette and Sobrin reported on the skin penetrating properties of a number of oils and it was found that avocado had a higher rate than corn, soybean, almond and olive oils.

Avocado oil is rated as safe for use on human skin.

10. Harry (B52) refers to the fruit as Alligator Pear oil as well as Avocado oil. The oil is emollient and innocuous possessing neither primary irritant nor, so far as is known, any sensitising effects. It is used for its special penetrating properties and because it contains vitamins A, B, D, phytosterol and lecithin. As regards penetrating properties, extensive investigations by the author did not confirm superiority of avocado against other vegetable oils. The vitamin content was found to be present in only small quantities.

11. D.J.Ricks: Functional natural oil. Cosmetics and Toiletries, vol106, p.77,Feb 1991. Avocado oil is a delicate oil derived from the fruit of the *Persica americana*. The most common varieties are the fuerte and Haas. Avocado oil has a fatty acid composition similar to olive oil, but avocado oil is also very high in vitamins. Tocopherol 3,700 ppm.

It is widely used as an emollient in cosmetic formulations, and it is receiving much attention because of its very high, free sterol-rich, unsaponifiable content. This unique unsaponifiable fraction of avocado oil apparently gives the oil penetration and sunscreening abilities which other triglyceride oils do not equally possess. It has a faster rate of skin penetration than corn, soybean, almond and olive oils. It had greater sunscreening effect than almond, persic, safflower, peanut, olive and coconut oils.

12. Genders (B78) says that it is a genus of about 150 species originally grown in swamplands, hence its name of Alligator pear. But it is in no way connected with the wild pear, being of the magnolia and Bay laurel family, though the fruit (a drupe) with a single seed or stone enclosed in aromatic flesh is almost pear shaped. This soft butter-like flesh is rich in vitamins A and E and contains up to 20% fat. The fruits have direct and indirect use as an aid to beauty. Avocado Oil is included in extra emollient skin creams. The tree is similar to the bay in habit.

13. SPC November 1990, p.59. Avocado pear oil is obtained from the fruit pulp of ripe fruits of the avocado tree, avocado pear oil functions as an emollient which is rapidly absorbed by the skin. Its unsaponifiable constituents, like those of other vegetable oils, consists of phytosterols, such as stigmasterol, sisterol and campesterol. It contains vitamins as well as ergosterol and phytine, a mixture of calcium and magnesium salts of inositol. Carotinoids, tocopherol and squalene are also present.

The topical application of the unsaponified fraction of the avocado oil has been shown to lead to an increase in the ratio of insoluble collagen in the skin of the hairless rats. Avocado oil is neither a primary irritant nor a sensitiser.

Clear avocado oil is red by reflected light and deep green by transmitted light. Avocado oil has been recommended as a base for preparation to treat wounds and a number of skin disorders including dermatitis. Because of its emollient effect and its ability to impart smoothness to the skin, it is recommended for inclusion in soaps, shampoos and shaving cream.

14. Crodarom Avocadin or avocado oil unsaponifiables are excellent skin care agents that can be added to all emulsions, especially those of w/o type where they have a positive effect on emulsion stability.

By saponification and extraction of a special grade of avocado oil having a high phytosterol content it is possible to produce an extract with a high saopnifiable fraction of avocado.

Crodarom Avocadin is such an extract and contains between 25-30% phytosterols.

Phytosterols is a large family of vegetable sterols which can be isolated from certain vegetable fatty oils and waxes. The most used oil for this are avocado, soja and corn oil. The sterols occur in their free form or as an ester or glycoside. They are part of the so-called unsaponifiables. Depending on the origin, quality and processing of the plant or fruit, the percentage of the unsaponifiables can vary between 3% and 10%.

These unsaponifiables can contain up to 65% phytosterols.
The chemical structure of ß-sitosterol, the predominant phytosterol in Avocadin is quite similar to cholesterol, the well known animal derived sterol from woolwax. Instead of an H-atom at the C-atom no. 24 there is an ethyl group. This also indicates that as with cholesterol, this ß-sitosterol has surface-activity.

Another phytosterol present in Avocadin, but in small quantities, is stigma sterol also used for hormone synthesis. In addition to phytosterols, Avocadin also contains small quantities of squalane, some saponified triglycerides and unsaponified avocado-triglycerides from the solvent.

The phytosterols are:-

ß-sitosterol, campesterol, stigmsterol, brassicasterol, delta5-Avenastenol, tocopherols and other unidentified sterols.

Phytosterols are found widespread in plants, and as are already mentioned, closely related to cholesterol. They form an important part of the natural lipid film on the human skin. The organism receives the phytosterols exclusively from exogenic sources. For cosmetic purposes phytosterols and especially those of avocado and soja are very interesting and valuable ingredients.

A number of clinical studies have been carried out on the effects of unsaponifiables from avocado and soja.

Winkler et al: tested a mixture of avocado and soja unsaponifiables in hexyllaurate. They proved to have a skin moisturising effect, resulting in a pronounced increase of moisture in the upper layer of human skin.

Chlebarov et al: tested changes in moisture and lipid content of skin surface in the region of cheek and neckline after treatment with an external containing phytosterols. This study was carried out under clinical supervisions on patients with atopic dermatitis. The results were significantly positive and important not only for diseased but also for healthy skin.

Weprierre et al: tested the unsaponifiable fraction of avocado and soja, demonstrated and explained the activity of non-saponifiables in several skin malfunctions induced by disorders of conjunctive tissue.

Lamaud et al: demonstrated the activation of connective tissue metabolism.

Conclusion: mobilises and increases soluble collagen of the connective tissue, keeps the skin moist and smooth. It has a positive effect when used as a treatment for minor skin disorders, like keratosis, dermatitis and skinatrophy.

In a further data sheet Art No. 1035/K

We read that the healing process of experimentally elicited ulcerations of skin was stimulated by the phytosterols of Avocadin. In event of senile atropy of the skin, vitiligo and after-treatment of scarring and other skin injuries good results have been obtained.

0.67 g unsaponifiable of avocado oil and 1.33 g unsaponifiable of soja oil produce, dissolved in a 1:1 basis of avocado oil and hexyllaurate, a statistically significant moisturising effect on the skin that can stiill be observed after a duration of 2 hours.

Non-toxic. LD50 lies by oral application at 12g/Kg body weight. Skin and eye test tolerance are excellent.

CTFA: Unsaponifiable Avocado Oil.

15. In a file from Dr Stephen Greenburg (Lipo Chemicals Inc.) entitled "Ethnic Botanical Literature) author anon.

Negritos in the Philippines use the fresh pulp of avocado as a dressing for suppurating wounds, helping to draw out the pus as well as to promote more rapid healing. (ref. Eduardo Quisumbing. Medicinal Plants of the Phillipines. Manila: Dept of Agriculture and natural Resources, Bureau of Printing, 1951.)

Throughout Africa, avocado oil is used to soften rough, dry skin and give it more resilience and smoothness, and is sometimes rubbed into the hair and onto the scalp. (ref. Watt, J.M. amd M.G. Breyer-Brandwijk. The Medicinal and Poisonous Plants of Southern and Eastern Africa. London: E & S Livingstone Ltd, 1962.)

Natives of Trinidad, Jamaica, and Exuma and Long Islands in the Bahamas use the leaves as a poultice for reducing the swelling and inflammation accompanying bruises, sprains, tendonitis; and as a lotion for skin inflammations. (ref. Edward S.Ayensu. Medicinal Plants of the West Indies. Algonac, Michigan: Reference Publications Inc. 1981.)

A pharmaceutical preparation containing the seed oil (nonsaponifiable fraction) has been patented for use in the treatment of sclerosis of the skin, pyorrhoea, arthritis, psoriasis, and others. Pulp is also used in face creams. (A.Y.Leung. Encyclopaedia of common natural ingredients used in Foods, Drugs and Cosmetics. New York: John Wiley and Sons, 1980.)

The pulp contains a fatty oil (4-40% depending on the season, location, climate, etc., but usually

about 16%); about 2% protein; 6-9% carbohydrates and sugars (glucose, fructose etc.); two bitter substances; and others. The pulp oil (avocado oil) consists mainly of glycerides of oleic acid; it also contains highly variable amounts of unsaponifiable matter (1.6-11.3%) consisting of sterols and hydrocarbons, volatile oils (propionic, butyric, valeric, etc.) amino acids, and vitamin D (higher than in butter or eggs), among others.

Avocado leaves from Mexico contain an essential oil, which by steam distillation consists of 95% estragole (found also in sweet basil) and 5% anethole (also found in sweet basil). The leaves also contain 0.5% of volatile oil, methylchavicol, d-pinene, wax, and traces of hydrocyanic acid and tannin.

16. The Lawrence review of natural products (April 1993) refers to Avocado as *Persea americana* Mill., Syn. *Persea gratissima* Gaertn. Also referred to as *Laurus persea***.** Also known as Alligator pear, ahuacate, avocato.

The avocado has been the subject of intense and varied use during the past, not only for food but also for medicinal purposes. The pulpp has been used to satimulate hair growth and to hasten the healing of wounds. The fruit has been purported as an aphrodisiac and emmenagogue. Native Americans have used the seeds to treat dysentery and diarrhoea.

The pulp of the avocado is rich in a fatty oil, and this can account for up to 40% of the composition of the pulp. In addition to sugars and carbohydrates, two bitter substances have been identified.

Avocado oil is derived from the fruit pulp and is composed primarily of glycerides of oleic acid and approximately 10% unsaponifiable compounds such as sterols and volatile acids. The vitamin D content of the oil exceeds that of butter or eggs.

The large seed contains a wide variety of compounds, including faty acids, alcohols and a number of unsaturated compounds with exceedingly bitter tastes.

The leaves of the Mexican avocado have been reported to contain approximately 3% of an essential oil composed primarily of estragole and anethole.

Pharmacology

Avocado oil has been used extensively for its purported ability to heal and soothe the skin. This use is based on the high hydrocarbon content of the pulp and oil, which is likely to be beneficial to the skin.

A condensed flavonol isolated from the seedd has been reported to have antitumour activity in mice and rats. Several of the unsaturated oxygenated aliphatic compounds in the pulp and seed have been shown to possess strong in vitro activity against gram-positive bacteria, including staphylococcus aureus.

Low density lipoprotein cholesterol and apolipoprotein B levels decreased significantly in an avocado-supplemented diet. The authors concluded that an avocado-supplemented diet rich in monounsaturates can benefit serum lipid levels.

The poisoning of grazing animals that have ingested avocado has been reported, and this toxicity has also been observed in species as diverse as fish and birds. Only a small number of adverse effects have been reported in the last 50 years.

Craigmill et al reported that feeding dried avocado seed in a 1:1 ratio with normal food rations killed all mice tested. The amount of avocado ingested ranged from10-14g. Signs of toxicity became apparent after 2-3 days and the animals generally died within the nexy 24 hours. Gross findings included haemorrhage to the brain, lungs and liver.

In cattle and goats, acute toxicity has been characterised by a cessation of milk flow and nonbacterial mastitis. Fish have been killed as a result of avocado leaves falling into a backyard pond.

A published case report suggests that the anticoagulant effects of warfarin may be antagonised by the avocado.

No significant toxicity has been reported in humans.

17. In a data sheet from Anglia Speciality oils: Oils of the world, we read:

REFINED AVOCADO OIL
CTFA Name: Avocado Oil
CAS NO. 8024-32-6
EINECS No. 232-428-0

The fruit of the avocado is rich in an oil containing both nutritionally beneficial fatty acids and natural sunscreen agents. Sourced in Africa and the West Coast of America the naturally pressed extract is deep green in colour when first produced and because of this is normally refined, increasing both stability and purity. The natural UV sunscreen agents found in the oil explain why it is so popular in suntan lotions. it is an ideal emollient and can form the foundation of tropical skin creams, body lotions and facial cleansers.