

THE MYSTERY OF DRUGS AND PERFUMED OLIVE OIL: 'SAMIM' AND 'BESAMIM' IN INCENSE AND HOLY ANOINTMENT OIL

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1. Introduction

Ancient cultures discovered and utilized the medicinal and therapeutic values of plants as spices and drugs and incorporated the burning of incense as part of religious and social ceremonies. The usage of plant materials was based on experience and belief. The ancients didn't know the components in the plant and their function. Medical, pharmaceutical, cosmetic, psychoactive, ritual and social ceremonies usages of oil, spices and drugs are difficult to distinguish. Since plants bear perfumed medication naturally, their attributed qualities can be considered as healing due to their odor alone, namely aromatherapy:

The form of therapy in which body disorders are treated by aromatic oils which, apart from their perfume, have strong antibacterial properties, often with antispasmodic or spasmolytic, stimulatory, cicatrizing, antifermentative and hormonal properties (Wickens 2001: 317).

Our voyage back in time, using archeological data and written sources, began approximately in the third millennium BCE. Egyptian hieroglyphics, describe daily scenes using perfumes, incense and their preparation. Most of the information on the Egyptians life style derives from objects prepared in connection with death, which reflects their attitude to life (Manniche 1999: 127-128).

The Ebers papyrus, one of the oldest Egyptian medical papyri, c. 1550 BCE, already provided us medical prescriptions for ailments. Its prescriptions differentiate between the use of medications and perfumed anointing oil and the use of incense plants. These differentiations appear in the Israelite period, a later source, in the Bible. Despite the gap in time, additional data appears in the Mishnah, the Talmud and other Jewish literature. Data also appears in the Greco-Roman literature by Theophrastus (371-287 BCE), Plini (23-79 ED), and *De Materia medica* of Dioscorides (40-90 ED).

In this study, we present scientific data using biochemistry of botanical extracts that verifies traditional uses and identifies novel therapeutic applications. We conclude that if scientists had appreciated the ancient practices outlined in the old Egyptian papyri, as the use of mouldy bread, "...the world would not have had to wait until 1928 for Alexander Fleming's chance discovery of *penicillin*." (Ghalioungui 1963: 143; Wickens 2001: 317-318). Nowadays, most of the cosmetic products, perfumes and many medical substances are based on identifying bioactive plant materials and their utilization, by isolating and purifying the active therapeutic agents, or by their chemical synthetic imitations.

2. Health and longevity.

The olive is an evergreen tree, native to the Mediterranean coasts. It became symbol of health, fertility, longevity as well as a metaphor in prayer request:

[...]My old age is like a fresh olive tree¹[...] They shall still bring forth fruit in old age; they shall be fat and flourishing; (Ps. 92:10, 13-1)

To achieve 'old age like a fresh olive tree', it was necessary in ancient times as today, to maintain health, to prevent diseases, to heal the sick, to ensure the welfare of the body and delight the soul. Those were the duties of the Physician and the Perfumer.

2.1 The Olive Oil – The best nutrition

The olive oil was the primary source of oil in the Mediterranean diet, known to be one of the healthiest. The most frequent use of ritual oil in the Bible, was for individual meal offering, '*minhab*': Grain or flour baked in the oven, mixed with oil or spread with it (Lev. 2:4), which indicates a dietary pattern. The "pleasing odor to the LORD" (Lev. 6:21), was the mixture of oil and frankincense. Perfume, derived from fumar- to smoke, is rendered by sweet oil and good fine oil (smn htwb) (Weinfeld 1987: 192-195).

The customary high intake of olive oil, best fulfilled the need for nourishment, health and pleasure. It contained high mono-un-saturated fatty acid and minor components especially phenols, polyphenols and vitamin E., which are strongly bioactive, in a dose-dependent manner. These molecules are associated with a decreased risk of cardiovascular disease, obesity and type 2 diabetes. They improve blood pressure, reduce triglycerides and increase high-density-lipoprotein (HDL-cholesterol). They show anti-inflammatory and antioxidant properties (Lopez-Miranda et al 2008: 1-11).

Virgin olive oil (VOO) had also a strong bacteriocidal activity against a broad spectrum of microorganisms and food borne pathogens like *Listeria*, *Salmonella* and *Shigella* (Dysentery). Consequently, these results open up the possibility of using olive oil as a food preservative to prevent the growth of food borne pathogens or to delay the onset of food spoilage (Brenes, et al, 2010: 1013-1019). In antiquity, without the use of cooling techniques and sanitation, no wonder, as we learn from the laws about meal offerings, that in addition to cooking with oil they used to immerse in oil or cover the food with it. Maybe to prevent its spoilage?

2.2 Cosmetic Uses

VOO is the primary crushed oil, which must be delicate as possible without breaking the pits. According the Talmudic sources, one can even press the olives directly on the body and then embrocates himself (Yerushalmi, Maaseroth 4:1; Preuss, 1978: 370, 537). Moreover, "Oil of myrrh that *enpikinun*. Is oil of olives not a third grown. Why is it used for smearing? Because it removes hair and makes the skin soft", hence the high quality of cosmetic oil. Therefore it was used to melt the precious myrrh resin in the *enpikinun* ('*omphacium*') olive oil (Babylonian, Megillah 1:13; Dioscorides 1959: I-73). Plini (15, 2) advises to use for medicinal purposes, oil "obtained from the raw olive and when it has not begun to ripen".² In scientific words: Phenol compounds in the fruits continue to be oxidized with time and lose their efficiency. Moreover, during the blossoming and the fruit ripening period, the growth activity of the tree almost stops and most of

1 I strongly agree with the interpretation of Loewenstamm (1999: 178-184) following LXX, Vulgate and some Botanists interpreting the Hebrew word "balloti" as "my old age". (cf. Gen. 18:12) They translate the verses in full compliance with the image of the olive and its features. cf. Feliks (1992: 291- 298) (Hebrew)

2 cf. Dioscorides, (1959: I 29-30) ; Theophrastus (IV.15) about the '*omphacium*' oil : " The olive-oil which is most used is that which is pressed from 'coarse olives' in the raw state, since this is thought to be the least greasy and the least coarse.."

the metabolites that created are transferred for the benefit of the plant's reproduction—flowers and fruits. Towards the end of this period, the tree begins to renew its growth. The production of the phenol compounds concentrate now in the young leaves and branches. Even compounds which are accumulated in the fruits begin to be absorbed back. Oxidation and concentration decrease of the phenols reduce the bioactive efficiency of the oil in the fruit (Alagna et al 2012: 1-2).

The range of evidence about using olive oil for cosmetic purposes is perhaps the most varied and impressive. There are two liquids, said Pliny (14,150), that are especially agreeable to the human body, wine inside and oil outside.

The oil was used as protection, part of personal hygiene and cosmetics that helped maintain the health of the people in the open dry air of the scorching desert and the heat in Israel from birth (Ez.16:10-11) to old age.

Anointing feet (Deut. 33:24), head and beard were essential for hygienic, customs that had become a blessing and was symbolized luxury:

Let your garments always be white; do not let oil be lacking on your head. [...] all the days of your vain life that are given you under the sun [...] (Eccl. 9:7-10) ³

A similar blessing was found in feast scene painting on a tomb of a wealthy man from the 18th dynasty in Thebes, Egypt. It also emphasis white garments, anointing fine oil on the shoulders, for life and health (Manniche 1999: 95). Here, as well as in the scriptures, the perfumed oil is defined as 'fine oil', perfumed with frankincense and myrrh, a sign of wealth and opulence.

The word oil specifies olive oil as the refreshing sensation of oil on skin was as familiar to Bronze Age as to latter day users, in skin care and protection such as dryness, eczema, free-radicals scavenging, anti-inflammatory and delaying aging effects of the skin cells. Olive oil can activate the cutaneous metabolism and therefore induce emollience and hydration, has anti UV photo protection and anti-aging properties. The olive oil oleic and linoleic acids, which nowadays can be found almost in every medical and cosmetic product, can also induce suppression of the skin pigmentation (Boardman et al. 1976: 193).

Essential oils when incorporated into olive oil, create a synergistic effect impart many benefits such as: a pleasant aroma in perfumery and incense, shine and conditioning effects in hair care, emolliency and improving the elasticity of the skin, slowing the formation of wrinkles in sun exposed skin (Aburjai and Natsheh 2003: 987).

Olive oil and especially its Oleic acid, act as a percutaneous absorption enhancer of several drugs, allowing their permeation. Then, both can develop their therapeutic activity at the surface of the skin, continue to deeper histological layers by diffusion, and even enable drug access to the blood. They can also be absorbed through the hair follicles, the sebaceous and the sweat glands (Ruiz et. al, 2010:1133-1252).

Dioscorides in *De Materia Medica* (2000: I: 30-31, I-81, I-75.), includes a large number of medicinal uses in fragrant spices when added to oil as an ointment. The ointment treated and tranquilized burns and cold blisters, stopped bleeding and bruising.⁴ Now, these can be explained as the plants' tannins connecting with proteins, transform, and precipitate them. Thus shrinking damaged tissues and turned them into scars.

Modern studies of topical applications of VOO, have shown, that the polyphenols in olive oil exhibit protective activity against inflammation and anti-edematous effects, which plays a significant contributory role in the majority of dermatologic disorders. Olive oil also contains Oleocantal with analgesic properties as the non-steroidal anti-inflammatory drug—Ibuprofen (Alagna et. al. 2012: 1-2; Beauchamp et. al. 2005: 45-46; Ruiz et. al. 2010:1135).

³ New Revised Standard Version

⁴ Cf. Theophrastus(35VIII): " The Megalion perfume to relieve the inflammation caused by any wound, as is composed of oil, cassia cinnamon and myrrh, and all these have astringent and drying properties".

“R. Hanina said: The warm baths and the oil with which my mother anointed me in my youth have stood me in good stead in my old age”(Babylonian, Hullin, 24b).

2.3 Seduction

In addition to hygiene, when females used perfumed oil their main intention was, seduction. It enhanced the female’s sexuality which was usually intended for conception and birth.

Plini (XIII 20) argued that “The highest recommendation on perfumes is when a woman passes by, her scent may attract the attention even of persons busy doing something”.⁵

In the book of Ruth, Naomi said to Ruth:

Now wash and anoint yourself, and put on your best clothes and go down to the threshing floor; [...] When he lies down, [...]; then, go and uncover his feet and lie down; and he will tell you what to do (Ruth 3:3-4) ⁶

The Aramaic version of Ruth (Brady 2002:v. 3:3; Levin 1973: v.3.3)⁷: “Wash yourself *with water*, anoint yourself *with perfumed oil*, put on your jewelry [...]” clarifies even more, since the meaning of the swk (*sukh*-סוּכַּ) in the Bible is: “To anoint with oil only for the cosmetic treatment of the body, usually after bathing”(Gesenius 2005). Although the text may use the simple term ‘oil’ (*shemen* שֶׁמֶן) for the oil itself, it makes clear by description that this oil is perfumed.⁸

In ancient Persia: “The turn came for each girl to go in to King Ahasuerus, [...], since this was the regular period of their cosmetic treatment, six months with oil of myrrh and six months with perfumes and cosmetics for women”(Est. 2:12).⁹

The perfume herbs where immersed in olive oil for extracting the smelling substances, various types of fragrant aromatic, essential oils. In the plant, their main role is to act as smelling substances that attract, namely seduce pollinators and seed distributors. Similar to this role of smell for the plants, bathing in oil and aromatic herbs and smoked in herbal vapors, which would have also hygienic and therapeutic value, prepared the girl for the conjugal bed.¹⁰

On the second millennium BCE, long before the stories on Ruth and Esther, the Hurrian myths knew already this seduction secret: “Istar, the Queen of Nineveh...washed herself...She anointed herself with fine perfumed oil”... And the expected result was: “Hedammu sees the beautiful goddess, and his penis springs forth. His penis impregnates...”!!! (Ayali-Darshan 2011: 128-131).¹¹

For Homer’s heroes and women, a bath was a matter of a good wash with water, followed by a rub with oil leaving the body glistening. Hera, preparing to seduce her husband Zeus:

5 Cf. “Because the daughters of Zion are mincing along as they go, tinkling with their feet’ (te’akasnah) (Isa.3:16). ..R. Isaac ...said: This teaches that they placed myrrh and balsam in their shoes and walked through the market- places of Jerusalem, and on coming near to the young men of Israel, they kicked their feet and spurted it on them, thus instilling them with passionate desire like with serpent’s poison” (Babylonian, Shabbath, 62b).

6 Ibn Ezra (Abraham Ben Meir) on the verse: Oil that smells good. And see: “Inanna, as her mother told her, Bathed herself in water, anointed herself with good oil, Covers her body with the grand qweenly garment”(“The Marriage of Inanna and Dumuzi”, col. II lines12-14; Y. Sefati, 1998: 291)

7 'וְהִתְחַלְלֵי בְּמִיָּא וְתִסְכִּי בּוֹשְׂמִין וְתִשְׂוִיאַי תִּכְשִׁיטֶיךָ'

8 But the anointment of God’s elected (priests and kings) is described by the term *mashaḥ* (מִשַּׁח) (Green2011: 67; Milgrom1964: 53-55; 517-519)

9 Cf.: Theophrastus (42X): “ the best for women are myrrh-oil, megaleion...and spikenard: for these owing to their strength and substantial character do not easily evaporate and disperse, and a lasting perfume is what women require”. And so. Cant., 4:13-14; Pro.7:17. Albright (1974: 28-29) compared the preparations to the custom of the semi-nomadic Arabs of the eastern Sudan, also using myrrh, frankincense, and cinnamon..

10 The preparation rite of bathing, anointing and adornment characterize the sacred marriage (Fidler 2012: 262-264 [Hebrew;] A. Rofe 2009: 152; Sefati 1998: 98).

11 “The Song of Hedammu” lines: 10-17; 24-26.

anointed herself with the delicious olive oil she uses. It was perfumed, [...], for its scent to spread through heaven and earth. With this she rubbed In her lovely skin (Iliad 14, 171-175).¹²

Surely, goddesses and women were aware to the result of washing and anointing themselves with fine perfumed olive oil, when they prepared to seduce Gods or men.

The awareness of a special fragrance emanating from a body ready for lovemaking was also highlighted in similar description but on the Egyptian god Amon. He anointed himself with a perfumed oil unguent in such a way that the queen's palace was completely inundated by the divine scent. The queen tempted, felt in love, and from their union in the sacred marriage, Hatshepsut was born. Here also dominant the temptation via smell, and the perfume is used as an aphrodisiac: "Is the scent with which the god announces his presence and the real sign of his divine sexual virility" By Egyptian definition (Manniche 1999: 92).

Whether they are added to bath, or massaged into the skin, inhaled directly or diffused to scent an entire room, these natural aromatic oils have been used for thousands years to relieve pain, care for the skin, alleviate tension and fatigue, invigorate the entire body, and to produce a sense of relaxation (Aburjai and Natsheh2003: 994; Dioscorides 200: I-52).

So it seems that, when Proverbs (27:7) states: "oil and perfume make the hart glad" it refers to anointment rather than consumption (Kottek1996: 46; Preuss 1978: 371).

3. Drugs and Perfumes

It remarkable to note that the same ingredients of scented oil and perfumes used for enticing in ancient medical Egyptian papyri, were also recommended in the gynecology section, for fumigation with incense and anoint with fresh oil in the vagina area. We find this again, after over 2000 years, in Dioscorides prescriptions: An ointment containing fresh oil of unripe olives or as incense, with similar ingredients like myrrh, calamus, mastic, styrax, spikenard, frankincense, stacte (liquid myrrh) and cinnamon. These to be used in treating ailments in the vulva area , and infertility problems (Dioscorides 2000: 1-81, 1-62, 1-18, 1-17 etc.; Manniche, 1999: 114-115)¹³ Ebers Papyrus offers a perfumed oil treatment with acacia leaves that are used as a poultices to covered the chest for treating heart and blood vessel problems. The prescription points out that the aromatic substances penetrate into the bloodstream through the pores of the skin by diffusion (Manniche 1999: 114).¹⁴

Medical Egyptian papyrus, c. end of the 2nd millennium BCE, recommended fumigation with scented compounds for treating mental state of a patient. Additionally, as a magico-religious mean of communication between the various spheres, the earth, the divine and the Hereafter (Manniche 1999: 125).

Theophrastus describes the effects of the rose-perfume:

Being very delicate and acceptable to the sense of smell, by reason of its lightness it penetrates and fills up the passages of the sense, so that being entirely taken up and filled with it, it is unable to judge of others [.] the sense may be preoccupied with the superior odour, so it is not easy to introduce after it what is inferior, since the sense of smell refuses it (Theophrastus: 45-48).

12 Boardman et al. (1976: 193) also: Hymn to Aphrodite 61-63; cf. "Anat Cleans Her Palace and Herself: Warrior-blood is wiped [from] the house, oil of peace is poured in a bowl" And she sings on love and passion. (Parker 1997: 108-109).

13 Also for women's baths and perfumes to make them smell sweeter. See below Ex.30, on the same ingredients.

14 Theophrastus (59) also mentioned the effects of plasters on the surface, but also on the interior parts when using aromatic oil on the abdomen and chest.

Modern studies describe the effects of odors on memory and mood, since the fragrance compounds in the oil, which absorbed into the body or by inhalation are able to cross the blood-brain-barrier and interact with receptors in the Central Nervous System (CNS) (Aburjai and Natsheh 2003: 995). Some drugs act as competitive inhibitors by binding to the active site of an enzyme or receptor. They prevent substrate entering the active site and therefore lowering the reaction rate; inhibit the transporter reuptake of a neurotransmitter from the synapse. These increase the extracellular concentrations of the neurotransmitter, increasing the neurotransmission. Various drugs utilize reuptake inhibition to exert their psychological and physiological effects, including many antidepressants and psychostimulants.

Components such as those, were discovered in the etheric volatile oils of the incense plants, which are referred to as drug incense (*ketoret samim*). They have a psychoactive effects and hallucination factors. For example, *Acorus calamus-'qneh besem'*, the fragrant cane in the 'holy anointing oil' (Ex. 30:22), contains β -*asarone*, which has hallucinogenic properties. There are wide variations in the psychoactive effects of these drugs, depending on the type of the plant used, preparation, method of administration, dosage, personality of the user, social and cultural background (Wickens 2001:281,406).

Deoscorides already had warned that the use of incense for healing and pain relief is efficient but "taken [...] by those who are healthy it brings madness, and taken [...] with wine, it kills" (Dioscorides 200: 1-81).¹⁵ Pain relief and some effects of drugs are two processes that take place in the brain in the same manner. "Sola dosis facit venenum" only the dosage creates the poison (Phillipus Aureus Paracelsus in: Wickens 2001: 406). Thus, the insertion of these compounds into oil and the use of them for anointing, like we recognize from the 'holy anointment oil', made of perfumes, creates a partial and slow release of the psychoactive fragrance molecules but allows the enjoyment of the perfume and its pleasant effects. While preparing the perfume oil, the chosen fragrance component, is added last. The oil has absorbed first a relatively large amount of less powerful spices to thicken the oil, allowing better absorption of the desired fragrance which his odor had to be imposed. The last inserted always dominate even if it is in a small quantity. One can control the dominant component, its concentration and the time it is soaking for choosing the desired effect- healing or temptation (Middeke-Conlin 2014:14; Theophrastus: 17; Plini: 13.19).

4. The Holy Anointing Oil and the Sacred Incense

The perfumed oil was something of luxury. Expensive aromatic substances, were imported into Israel along the old spice-caravan routes: "Frankincense comes from Sheba and the sweet cane from a distant land" (Jer. 6:20). While others, like '*tzori*' exported to Egypt and the Mediterranean as "...the choice products of the land" (Gen. 43:11). No doubt that the caravan trade which followed spices routes through Israel, carried with them strong cultural influences from all over the ancient world (cf. Gen 37:25; Ezek 27:17 ; Jacob 1993: 30).

The Bible is a religious document, glorifying the Lord as the source of healing. Therefore, a little indication is given about the depth of knowledge on drugs, opiates, narcotics, hallucinogens, their uses and their medicinal qualities. But, all the procedures mentioned above, regarding the preparation of perfumes, are expressed in the sole Israeli prescriptions available today, those that instruct the composition of the 'holy anointing oil' and the 'sacred incense' in Exodus 30. They emphasize the need for a "work of a perfumer" (*roqeah*)¹⁶, because much skill was requires to

¹⁵ On the Frankincense gum-resin.; cf. According to Rabbinic interpretation: "for the unqualified, the incense offering holds a deadly poison.. (Ginzberg, 1911: 293; 305-306)

¹⁶ Ex.30:25, 35. Revised Standard Version (R.C.V.), New Revised Standard Version, New American Standard Bible. But: "apothecary" in Authorized Version (A.V), King James Version

A Holy Anointing Oil Blended as by the Perfumer
(Exodus 30:22-30)

Take the finest spices (perfumes):

| <i>The ingredients</i> | <i>Weight/Volume</i> |
|-----------------------------|----------------------------------|
| 4. Liquid Myrrh* | five hundred shekels |
| 3. Sweet-Smelling Cinnammon | half as much = two hundred fifty |
| 2. Fragrant Cane | two hundred fifty |
| 1. Cassia | five hundred |
| Olive Oil | A hin |



Details of Preparation

You shall make of these *a holy anointing oil, a perfume mixture, the work of a perfumer*; It shall be *a holy anointing oil*.

Figure 1. The Holy Anointing Oil Prescription

produce a high quality mixed product and was also a type of medical professional (Middeke-Conlin 2014: 15). Both of these formulas are clear indication that the Israelis knew the art of the pharmacist's chemistry, composition of drugs, perfumes and how to use them. These prescriptions are remarkably similar to medical texts in the Egyptian Ebers Papyrus and to the Greco-Roman literature as in De Materia Medica of Dioscorides (Crown 1969:30- 33; Castel, et. al. 2009: 327, 329-333; Harrison 1966: 52-53).

4.1 The Holy Anointing Oil (Ex 30:22-26)

In the Hebrew Bible description of the ingredients for the holy anointing oil (fig.1) '*Rosh Mor Dror*' is the first on the list. The Hebrew meaning of the word '*rosh*' (which the English translations of the bible omitted) is: head, first, most important. Appearing with myrrh means that myrrh is the most important perfume in the list (see also: Ez. 27:22; Dori 2001: 81). It is the one that provides the dominant, spicy and most intense smell of the 'holy anointing oil, a perfume mixture'. The olive oil was the basis, the vehicle of perfumes, which has the least odor of its own and making the fragrant odors last for a long time (Middeke-Conlin 2001:11-14; Theophrastus: 14 IV-16). The Cassia, Fragrant Cane and Sweet-Smelling Cinnamon, are the spices which were used as intermediate in the synthesis of the perfume substances, binding, thicken and fixative agents to prolong the effects of the fragrant¹⁷. But, they had been widely used themselves or in other combinations as fragrances in cosmetics, flavoring food additives, active ingredients in drugs and as aphrodisiac (Jamshidzadeh et al. 2006: 209-214).

In a notable similarity, which confirm the 'anointing oil' compounding order that proposed above, Theophrastus *megaleion* perfume is compounded of cassia, cinnamon and myrrh mixed in oil.

17 Especially because chemical fixation abilities of the cinnamon's cinnamic acid. (Wickens 2001: 287,301). Manniche (1999:63) argued based also on Theophrastus, that "ten years or more would be the life of myrrh unguent, with cinnamon and cassia a close second. Obvious similarity for the anointing oil composition. See below.

The order in which the ingredients are introduced into the oil gradually builds the features of the perfume. "The Cassia exceeds the Cinnamon and the myrrh in heat, pungency and stringency. The Cinnamon has a fair amount of pungency and heat and, the Myrrh is hot, has a biting quality and astringency" (Theophrastus: 29-30).

4.2 The instructions for preparing the Sacred Incense: ketoret samim- Drug Incense (Exodus 30: 34-38)

[...] Take sweet spices, stacte (*nataf*)¹⁸, and onycha (*Sehelet*), and galbanum (*Helbenah*), sweet spices with pure frankincense (an equal part of each), and make an incense blended as by the perfumer, [...] (Ex. 30:34-35)

The translation of '*sammim*' as 'drugs' seem more appropriate than 'spices' and remind the association with medicinal herbs as the Akkadian *šammu*. (Green 2001: 66-67). This, in a different meaning of perfumes or spices—'*besamim*', when regard to the 'holy anointing oil' which its ingredients may be used as spices literally. Most of the perfumes are spices and even nowadays there is a connection between the two terms. But, it is doubtful if the incense components described as drugs, were actually used as spices. For example, the *helbena*-galbanum, identified with the Israeli plant *ferula*. Its gum-resin has unpleasant odor and bitter taste, repulsive even herbivores, which made it most unsuitable to be used as a spice (Dioscorides 2000: 3-97; Feliks 1968:276; Milgrom 1994:35-36). Plini (12.61) mentions that it will drive away snakes by its smell when burned.

Four of the spices are explicitly mentioned in the Torah: They are *nataf*, *Sehelet*-onycha, *Helbenah*-galbanum and *Lebhonah*-frankincense. The others were communicated as halachah communicated to Moses at Sinai: Myrrh, cassia, spikenard and saffron, costus, cinnamon and *Kilufab*-Ceylonese cinnamon (Babylonian, K'rithoth 6a).¹⁹

The Bible refers to 'sacred incense' only as part of the ritual, but the word *ketoret*- and *ktr*, suggest its real role: Burning of the incense, is a fumigation process. The incense used as deodorant for expelling the sacrificial stench and as disinfectants to help maintain the health of the people (Brim 1936: 13; Maimonides 1995: 3:45). That could be done only due to the chemical properties of the incense substances.²⁰ From the worshiper's point of view, incense acts like a narcotic drug, affects people's mind, elevating the senses and altering one's mood (Frazer 1923: 52, 54; Nielsen 1992: 405).

The Hebrew text of Sirac (Ecclesiastics) 38:4, from the Cairo Geniza, use for the Aramaic word 'sammin' (drugs), the Hebrew word '*terufot*' (medications) (also: Ez. 47:12 '*leterufab*') (Crown 1969: 35-36).

18 *Nataf* mentioned only once in the Bible. It usually identified as storax, a balsam from the trunk of *Styrax officinalis* (*libneh*), growing in the Near East and one of the Israeli flora. Rather than balm (*tzori*) or stacte, the oil of myrrh (Dioscorides 2000: 1-73). See discussion: Crown 1969: 36-37; Milgrom, 1994:1027-1028; Nielsen 1986: 62, 65.

19 The Talmudic Sages and Maimonides (Mishneh Torah, Kli Hmikdash, 2:1-3), gave also details of weight but they had some differences of opinion over the particular plants which was used as the source of the incense: *Nataf*-balm, stacte, but more common *styrax* which Maimonides attributed to *Helbenah*-galbanum. *Kilufab*-Ceylonese cinnamon in Maimonides and aromatic rind tree in *k'erithoth*.

20 For extensive details of the chemical properties of the incense substances see: Brumer, 2011: 218-222

4.2.1 The Spikenard –Nard

Nard, a plant of the Valerian family (Valerianaceae). It mentioned as part of the ingredients for the 'sacred incense' (*ketoret*) in the Talmud but not in the Bible. The Nard was used for manufacture an aromatic essential oil which obtained as a luxury in the ancient world. In light of the physiological evidence for the connection between scent, memory and erotic arousal, it can be understood both descriptions in Song of Songs (1:12; 4:13) as erotic connotations: Perfume which used as a passion drug and aphrodisiac. Moreover, like other species of the Valerianaceae, Nard oil has been used as sedative drug, CNS depressant, medicine to fight insomnia, anxiety, birth difficulties, pain and emotional distress which may occur during menstruation and menopause (Crown 1969: 40; Dalby 2000: 86-88; Green 2011: 86-87). The Nard oil could be used as perfumed drug ('*sammim*') and as Valerian medicine ('*terufah*') like the modern psychoactive drug Benzodiazepine, demonstrating the functions of the incense ingredients.

4.2.2 The Frankincense- Lebonah

'*Lebonah*' (*Boswellia*), the fourth item in the incense ingredients (Ex 30:34), is not included in the drugs category. She has a sweet and pleasant aromatic smell when burned, used as incense by itself and consumed in the temple with showbread (Lev. 24:7), and with olive oil (lev.2:1; 2:15 etc.) as individual meal offering (*minbah*).

Dioscorides (I-81), mentioned it was used as an internal and external remedy, but can also causes madness. Theophrastus (21) also included the frankincense with myrrh and perfumes in general, as spices because "almost all spices and sweet scents, [...], are dry, hot astringent and mordant". Current research discovered the effects of incense on the brain. Frankincense (*Boswellia* sp.) is now understood to possess marked analgesic property, sedative effects, provoke psychoactivity, entheogenic effects and even addiction, when the resin is burned and produced pyrochemical modification. The addition of other substances, would obviously synergize and potentiate the effects with inhalation. They were appreciated in religious rituals as they exert a profound effects on human consciousness, emotions and cognition. Moussaieff et al. (2008: 3024-3034) isolated *Incenole Acetate* (IA) as a major bioactive component of *Boswellia* resin. IA showed an anti-inflammatory properties, as well as several CNS-associated activities that causes anxiolytic-like and antidepressive-like behavioral effects and may play a role in emotional regulation. IA is known as a macrocyclic diterpenoid, considered to be a biomarker of *Boswellia* species (see also: Dannaway 2010:485-497; Menon and Kar 1971: 333-341).

4.3 The secular use of incense and anointing oil

Papyrus Ebers offers a deodorant by fumigation recipe as: "substances to use in order to make pleasant the smell of the house or the clothes" without indication of the quantities. Among the ingredients were: Dried myrrh, Incense (probably Frankincense), resin of aloes, 'calmus-from-the-land-t'ahi-in-Asia', mastic (*Pistacia lentiscus*), and styrax. After preparations it instructed to put on the fire (Bryan 1991:164). This recipe known in many more details in other ancient Egyptian sources as Kyphi: 'incense substance' to sanctify the environment when burned (Manniche 1999: 47-55; see: Maimonides on the incense role §4.2). Dioscorides (I-24) listed it as a 'perfume welcome to the Gods' but gives various medical uses in the most complete list of ingredients, amounts, and preparations.

These definitions and the ingredients list are very similar to the 'sacred incense' and secular erotic descriptions in the Bible like: The aroma of seduction that rises from the beloved (Cant.4:14); The king's clothes which perfumed with myrrh aloes and cassia before the royal wedding (Ps.45:8-12);

The pathway of the harlot to attract boys for copulation is also the mixture of myrrh, aloes and cinnamon which she sprinkled her bed with (Pro.7:17-18). These detailed descriptions does not leave any doubt that the biblical writers knew the power of these mixtures of aromata as an aphrodisiac, in awakening love and sexual excitation (Brumer 2011: 214-215).

The Ebers medical prescriptions are much more accurate on the mode of preparation, very similar to the structure of the 'holy anointing oil' instructions. Rubric 282 gives the aim of the recipe, a list of ingredients and their relative proportions by fractions painted in red, details of preparation and administration. The 'sacred incense prescription is of the type of Rubric 283 where the ingredients followed by vertical red strokes signify of equal proportion (Carpenter et al. 1998:18-21). The time of administration is also important as the detailed instructions for burning incense in the temple (Ex. 30:6-10; Ghalioungui 1963: 144- 145).

Tzori, was a certain plant-resin name, likely of local origin, *Styrax officinalis* (LXX-styrakion: Gen. 30:37-39; Feliks1968: 118,246; cf.n.18). In Hebrew, it became synonymous with healing as it was so prized for its medicinal values (Jer. 8:22; 46:11; 51:8). Mastic, it the *Pistacia lentiscus* resin, which Dioscorides (I-91) identified "as surpasses all other resins". The resins were part of the ancient Israeli export. They used for incense, medicine and embalming (Brumer 2011: 215-217; 220-221). Styrax and mastic mentioned several times together with Frankincense and often with myrrh, calamus, spikenard, cinnamon etc. by Ebers Papyrus and Dioscorides as part of remedies, deodorants and ointments. Why almost the same mixture of resins, arriving from allover the world, had to appear together in varied ancient prescriptions?

5. A few scientific answers

The olive oil and the aromatic plants contain various secondary metabolites, some of them toxic and dangerous. Plants produce them for their survival, as protection against variety of pests. Microorganisms outbreak in the plant, causes an increase biosynthesis of phenols. It creates a type of "plant immunizer" focuses on the damaged location, using the phenols, as biocides. Phenolic enzymes transform them into lignin at the end of the biochemical pathway. The lignin, as part of the cell walls, can bind poisonous substances to avoid damage of the plant metabolism as one way of detoxification (Brumer 2000: 10-24; 31-36; 217-218). The Phytoalexins as another example are only produced *de novo* or are activated by the host plant when they come into contact with pathogen (Wickens 2001: 338, 345).

A substance or enzyme in a certain plant can also alter and/or activate inactive dangerous molecules in other herbs. This could may explain the need for combining different herbs, some locals, even with unpleasant smell (which is one of plants warning signs for dangerous substances. as galbanum-the Israeli Ferula), and those that arrive from afar. Several of these blend processes accelerate and empowered by burning, constituted psychoactive and/or hallucinogenic drugs which potentiate the effects with incense inhalation The frankincense under similar conditions can activate in certain path, some neurotransmitters like dopamin, serotonin, epinephrine, norepinephrine (Dannaway 2010:485-486; cf. §4.2.2). In the anointing oil, this process is slowed down.

6. Conclusions

The extensive space the Bible devotes to describe the use of incense and oil, testifies that their usage were daily practice for various purposes as in the entire ancient world. The holy rituals utilization was derived from the secular one where the substances exploited almost in the same manner. The priestly sources, attempted to appropriate the use of the incense and the anointing

oil only for praising the Lord. They forbade the use of them for secular purposes, as they wanted to control by the power of odors as drugs the believers' senses and awareness. This attempt didn't succeed, not in the religious sense and definitely not in its day-to-day usage.

Paleoethnobotany, as a subfield of ethnobotany is concerned with elucidating human-plant relations in the past through study of archeological plant remains (Merlin, 2003: 297-298). In this paper I tried to explain the wide range of bioactive components which help us to understand some of the uses of olive oil and incense plants by the ancient people in a scientific way. These, in comprehension, that the biological warfare of the plant is actually utilized by us. Natural molecules derived from plant extracts offer a particularly exciting avenue for further research. Logical use of botanical evidence, with the varied range of archaeological evidence, could reveal identification of many ethnobotanical uses of many plants. New plants extracts and oil significance features will be proven to fined higher quality products by multidisciplinary cooperation.

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