

Traditional healing with animals (zootherapy): medieval to present-day Levantine practice

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Abstract

Animals and products derived from different organs of their bodies have constituted part of the inventory of medicinal substances used in various cultures since ancient times. This article reviews the history of healing with animals in the Levant (the Land of Israel and parts of present-day Syria, Lebanon, and Jordan, defined by the Muslims in the Middle Ages as Bilad al-Sham) throughout history.

Intensive research into the phenomenon of zootherapy in the Levant from early medieval to present-day traditional medicine yielded 99 substances of animal origin which were used medicinally during that long period. Fifty-two animal extracts and products were documented as being used from the early Muslim period (10th century) to the late Ottoman period (19th century). Seventy-seven were recorded as being used in the 20th century.

Seven main animal sources have been exploited for medical uses throughout history: honey, wax, adder, beaver testicles, musk oil, coral, and ambergris. The first three are local and relatively easy to obtain; the last four are exotic, therefore, rare and expensive. The use of other materials of animal origin came to an end in the course of history because of change in the moral outlook of modern societies. Among the latter we note mummy, silkworm, stinkbug, scarabees, snail, scorpion, and triton.

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1. Introduction

Since ancient times animals and products derived from different organs of their bodies have constituted part of the inventory of medicinal substances used in various cultures; such uses still exist in ethnic folk medicine. This article reviews the history of healing with animals in the Levant (the Land of Israel and parts of present-day Syria, Lebanon, and Jordan, defined by the Muslims in the Middle Ages as Bilad al-Sham) throughout history.

The article offers a brief introduction to these features in the ancient world, and evidence of medicinal uses of animals in the epoch of the two superpowers of antiquity, Egypt and Mesopotamia, is presented. However, the focus of the article is data collected on these medicinal usages in the Levant from the Middle Ages to the present.

The 21st century is an era in which a great deal of effort and resources are being invested in the research of medicinal plants around the world. These studies are based mainly on historical, ethnic, and traditional sources of

information. Scholarly investigation and the study of the medicinal uses of animals and their products, as well as of inorganic materials, should not be neglected and should be considered as an important complementary body of knowledge.

This entails a better understanding of the full-scale picture of the historical, ethnic, and traditional aspects of medicine and *Materia Medica*. Future scientific projects and decisions based on a comprehensive body of knowledge will lead to better understanding and, therefore, better judgments concerning phytotherapy research, environmental studies, and rules of conservation.

Zootherapy is the healing of human diseases by use of therapeutics obtained or ultimately derived from animals (Costa-Neto, 1999). Prehistoric societies made intensive use of animals and their products. Primarily they were consumed as food; in addition, tools were made out of animal bones and teeth, and clothes out of animal skin and fur. Animals were also used for religious purposes, such as sacrifices, and they played an important part in magic rituals and mysticism (Holland, 1994). No clear evidence of the use of animal parts or products for medicine in prehistoric times has ever been found. But we may assume that they were exploited in

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that way, as stated by the scholar Marques: “All human cultures which present a structured medical system will utilize animals as medicines” (Marques, 1994).

1.1. Chronological review of zootherapy in the ancient world

The phenomenon of zootherapy is marked both by a broad geographical distribution and very deep historical origins. As some authors have shown, animal-based medicines have been utilized since antiquity (Anageletti et al., 1992; Weiss, 1947). Testimony to the medical use of animals began to appear with the invention of writing. Archives, papyruses, and other early written historical sources dealing with medicine, show that animals, their parts, and their products were used for medicine. Data have been found on such usages in ancient civilizations, such as Egypt and Mesopotamia, which left their mark on the various societies that later arose in the Levant. Historical sources of ancient Egypt mention the medicinal uses of substances derived from animals, for example, cattle milk, bee honey, lizard blood, ox organs, swallow’s liver, bat limbs, ambergris from the sperm whale, and the glands of the musk deer (Bryan, 1930; Estes, 1989, pp. 139–157; Nunn, 1996, pp. 148–151; Stetter, 1993, pp. 107–122).

Other evidence of zootherapy has been found in archives of several civilizations of ancient Mesopotamia, mainly the Assyrian and the Babylonian. These contain descriptions of fish oil, bee wax and honey, mongoose blood, turtle shell, goat’s skin, gazelle sinew and even sheep, deer, and bird excrement and animal fat (Powell, 1993, pp. 47–50; Ritter, 1965; Thompson, 1923). In ancient China, among many other substances of animal origin, the glands of the musk deer were used (Gordon, 1949, pp. 355–390; Kremers and Urdang, 1976, pp. 3–5). In India, the Hindu religion has used five products of the cow for purification since ancient times (Simoons, 1974).

The Bible and other Jewish sources, mainly the Mishna (1st–3rd centuries CE) and the Talmud (4th to 5th centuries CE), that is, the literature of the Jewish Sages, mention several animals and their medical uses: honey was used to treat bulimia and goat milk to cure coughing. Snakes, human urine, pearl, mammal’s glands, and several other substances were used for different medical conditions (Preuss, 1983, pp. 435–437).

Classical medical literature also indicates animals as remedies. In the 5th to 4th centuries BCE Hippocrates (Gillispie, 1973, VI: pp. 418–431) included among many other animal substances the use of cattle milk, chicken’s eggs, mammal’s horns, and sea sponge (Riddle, 1987, p. 60). About 10% of the substances mentioned in Dioscorides’s (1st century CE) *Materia Medica*; (Gillispie, 1972, V: pp. 119–122) were body parts and products of animals (Gunther, 1959; Riddle, 1985, pp. 146–147). Such uses on a smaller scale were common in the Byzantine Empire (Francis, 1846).

The neo-Aramaic medical tradition, which evolved in the Near East during the Byzantine period, conserving classical medical knowledge, made great medical use of animals (Budge, 1913; Mingana, 1935). This knowledge was conveyed further and translated, becoming an important part of the new Arab medical and pharmaceutical profession (7th century CE).

Arabic medieval literature has ample information about animals in general and their medical uses in particular. The ‘medicine of the prophets’ (*tibb al-nabawi*) indicates intensive medicinal use of chicken eggs, cattle cheese, and bee honey (Shabbir, 1986), for medicinal uses of foodstuff were common in the Middle Ages, as they still are in folk medicine (O’Hara-May, 1971). Early Muslim physicians, such as the 9th-century al-Tabari (Gillispie, 1975, XII: pp. 229–231) and al-Kindi (Gillispie, 1978, XV: pp. 261–267) describe the medical uses of several animals, in Iraq and Iran, such as bear, beaver testicles, camel, cattle fat, coral, crab, dog, fish stone, horse, lizard, medical skink, mouse, pearl, pigeon, rabbit, rhino and goat horns, scorpion, snake, squid, turtle, and wolf, and animal products, such as honey, wax, milk, and eggs. Together these comprise about 7% of all medicinal substances (al-Sidiqi, 1928, pp. 420–440; Levey, 1966). More information on such uses can be found in general encyclopedias, such as that of the 13th-century al-Qazwini (Gillispie, 1975, XI: pp. 230–233; al-Qazwini, 1981; Stephenson, 1928). al-Damiri, the 14th-century Muslim zoologist (Gillispie, 1970, III: pp. 548–549), describes in his lexicon hundreds of animals (Jayakar, 1908), tens of which were used for remedies (Somogyi, 1957).

Some of the animals mentioned so far were wild and were sometimes hunted especially for remedial purposes, for example, the adder. Others were domestic animals, such as cows and chickens, whose products and body parts were readily available to humans and were also used for food, agriculture, and industry. The rarest and most expensive of these substances were the body parts of animals, such as the testicles of the beaver, which were imported from distant lands along the trade routes (Lev, 2002c). Various historical sources describe the use of human products, such as mother’s milk, male sperm, urine, and semen, which are commonly used in present-day traditional medicine as well.

The importance of animal parts in the history of pharmacy in general has been studied since the beginning of the 20th century (Tschirch, 1932, pp. 788–890); other works deal with groups of animals and their uses in medicine, for example, marine animals (Benoist, 1951). The present study takes a new approach to the use of animals in medicine in the Levant; as far as I know, it is the first comprehensive research on the topic of zootherapy in this region.

2. Methods and results

The medicinal interaction between humans and animals has been shown in indigenous as well as Western societies

throughout the world (Antonio, 1994; Branch and da Silva, 1983; Conconi and Pino, 1988; Costa-Neto, 1996; Gunder, 1925). Indeed, animals are therapeutic arsenals that play significant roles in the healing practices of people across the globe (Costa-Neto, 1999). As noted, this article limits itself to Levantine societies from the Middle Ages to present day.

2.1. Healing with animals in the Levant from medieval times to the 19th century

The information presented in Table 1 is the result of a survey of literature (primary as well as secondary) on the medicinal substances of Bilad al-Sham (the Levant) from the 7th century to the end of the 18th century (Lev, 2002a, pp. 61–82, 2002b). The data in Table 2 are the outcome of recent surveys of shops dealing in substances of folk medicine on the markets of several cities in Jordan, Syria, and Israel. Table 2 is also based on a survey of ethnopharmacological studies conducted among several ethnic groups in the Levant.

Because the accumulated data are varied and cover a span of several centuries, they are set forth here in two tables and the different periods are discussed separately. A small portion of the data, concerning the use of substances of animal origin from the 10th to the 18th century in the Levant, has recently been briefly elaborated and described (Lev, 2000).

2.1.1. Sources from the early Muslim and the Crusader periods (10th–13th centuries)

The early Muslim period (640–1099) did not produce any revolutionary changes in customs or culture from what had gone before. The Umayyad Caliphate (660–750) continued the previous style of regime in the conquered Byzantine domains, and this tendency, which among other things preserved the basic aspects of Byzantine medicine, extended into the early Abassid Caliphate (750–850 CE), and also into the Fatimid rule (850–1099) of the Levant. Those times, when knowledge was not typically conveyed in writing, seem not to have been auspicious for writers in general, and for physicians and pharmacologists in particular, so little medical knowledge was preserved. The main sources of this period, which have been used in the present work, are briefly described:

- al-Mas'udi [MS]: A 10th-century Muslim geographer whose travel accounts provide information about production and trade in medicinal materials, including substances of animal origin (al-Mas'udi, 1861–1877; Gillispie, 1974, IX: pp. 171–172).
 - al-Tamimi [TA]: This 10th-century Jerusalem physician is of special importance. All his works are lost except one, which has recently been studied (al-Tamimi; Amar, in press a). However, his writings are indirectly known through their citation by later authorities, such as Maimonides (Ben-Maimon, 1971, 1940) and Ibn al-Baytar (1874).
 - Genizah documents [GN]: The Cairo Genizah (depository) includes private and commercial correspondence and legal documents of the medieval Jewish communities of the Eastern Mediterranean. In this study, I made use of this material, especially the 11th-century correspondence of Jewish traders, most of which was published by Goitein (1967–1988), Gil (1983), and Isaacs (1994). These works contain important information about the trade in and the use of medicinal materials by the people of the Mediterranean in that period.
- The Crusaders (1099–1292) brought to the Levant no unknown medicinal substances and no innovative European medical tradition (Lev, 2002a, pp. 289–290). Therefore, their contribution to the inventory of substances in general and to the use of animals in particular was apparently minuscule. The sources concerning this period are these:
- Acre taxes [AT]: In the Middle Ages, as in other periods, the authorities customarily recorded commercial, legal, and administrative information concerning the movement of goods, taxation, and trade laws. This information was stored in the archives of cities, kingdoms, religious organizations, and commercial bodies. Among these sources we may note the *Assizes de Jerusalem*, which contain many documents related to various aspects of the Crusader governing system in the Levant. For example, there is a list of products traded in Acre, the main commercial city in the Crusader kingdom in the 13th century, and the taxes levied on them (Beugnot, 1841–1843, II: pp. 173–178).
 - Benevenutus [BN]: In the Muslim lands, as well as the Latin Kingdom of Jerusalem in the 12th and 13th centuries, some important physicians were active. Notable among them is Benevenutus (Benevenutus, 1474; Wood, 1929). Benevenutus Grassus was a Frankish ophthalmologist, who in his book on the subject names some of his prescriptions 'Jerusalemics' (Kedar, 1995).
 - Jacques de Vitry [JV] (1165–1240): Bishop of Acre, who published his knowledge accumulated through traveling and reading. His book contains some medical information (de Vitriaco, 1611, pp. 1047–1124; Stewart, 1896).
- The next two sources relate to the 10th–13th centuries, chronologically embracing the Ayyubid period (1187–1250), when the Levant was divided between the Christians (Crusaders) and the Muslims (Ayyubids). This period was characterized, among other things, by extensive contact between the Muslims and the Crusaders and is replete with many medical texts. The two sources of that period, presented below, exemplify dozens of physicians who practised medicine in the Islamic world, some as doctors of the Ayyubid sultans. Many medicinal substances known from earlier periods were now revived.
- Maimonides [MA]: Rabbi Moshe Ben-Maimon (1135–1204) was a Jewish physician and religious philosopher from Andalusia who worked mainly in Egypt, where he was the Sultan's personal physician (Gillispie, 1974,

Table 1
Substances of animal origin from the early Muslim to the late ottoman period

| Scientific name | Common name | Extract/product | Selective references and main uses—early Muslim and Crusader periods | Selective references and main uses—Mamluk period | Selective references and main uses—early Ottoman period | Selective references and main uses—late Ottoman period |
|--|---------------------|----------------------|--|--|---|--|
| <i>Angulus</i> sp. | Sea shell (Tallina) | Shell | IB—mild purgative; women's diseases | | | |
| <i>Ammoperdix heyi</i> | Desert partridge | Meat | | | | DS—strengthens the stomach |
| <i>Anser anser</i> | Goose | Oil | | | | DS—unknown |
| <i>Apis mellifica</i> | Honey | Honey | BN—skin, eye, and stomach diseases | HV, RM—hemorrhoids, burns, and wounds | DS—strengthens and cleans stomach and lungs | |
| <i>Apis mellifica</i> | Wax | Wax | GN, BN—hemorrhoids, burns, and wounds | | | DS—wounds |
| <i>Archispirostreptus syriacus</i> | | Body | | | HV—removes unwanted hair from the eyelids | |
| <i>Avicula margaritifera</i> | Pearl | Pearl | | | | FR, DS—eye, heart, and liver ailments |
| <i>Bombyx mori</i> | Silkworm | Cocoon, larva | | | AN—wounds, throat inflammation, hemorrhoids | |
| <i>Bos taurus</i> | Cow | Milk, cheese | | | AN, HV—eye diseases, hemorrhoids, leprosy | DS, FR—strengthens the stomach, cleans the blood; treats skin diseases |
| <i>Capra hircus mambrica</i> | Goat | Cheese | | | HV—cancer and skin diseases; fattens; enhances libido | DS—reinforces potency |
| <i>Chamydotis undulata</i> | Bustard | Body parts | | | AN—eye diseases; breaks up kidney stones | |
| <i>Castor fiber</i> | Common beaver | Testicles | BN, JV—eye diseases, animal bites and stings | | | FR, TB—cramp, epilepsy, hysteria |
| <i>Cimex lectularius</i> | Stinkbug | Body | IB—urinary tracts obstructions | | AN, HV—clears urinary tracts obstructions; jaundice | |
| <i>Coleoptera</i> sp. | Scarabees | Body | | | HV—hemorrhoids; enhances libido | |
| <i>Echis coloratus</i> | Adder, ter | Body | MA, JV, TA—basic component of theriac; snake bites | SU, FF, FS—basic component of theriac; snake bites | | FR—unknown |
| <i>Equus asinus</i> | Ass | Body parts | | | | HV—hemorrhoids, eye diseases, epilepsy |
| <i>Equus asinus</i> X <i>E. caballus</i> | Mule | Body parts | | | AN—rheumatism, eye diseases, internal diseases | |
| <i>Gallus gallus domesticus</i> | Hen | Egg parts | | | HV—all uses | DS, FR—reinforces potency and enhances libido |
| <i>Gazella</i> sp. | Gazelle | Horn | | | | DS—cleans the blood |
| <i>Helix</i> sp. | Snail | Body | | | HV—hemorrhoids and internal diseases | |
| <i>Hirudu medicinalis</i> | Leech | Body | | | | TB—bloodletting |
| <i>Homo sapiens</i> | Human | Urine | | | HV—sciatica, skin, internal diseases | TB—bladder stones, wounds |
| <i>Homo sapiens</i> | Mummy | Mummified body parts | | | AN—headache, skin, internal diseases | TB, FR—internal diseases, ulcer |
| <i>Homo sapiens</i> | Human | Bone | | | | FR—unknown |
| <i>Homo sapiens</i> | Human | Stone | | | | FR—unknown |
| <i>Lampyris</i> sp. | Firefly | Body | | | AN—breaking up kidney stones; hemorrhoids | |
| <i>Leiurus quinquestriatus hebraeus</i> | Scorpion | Body | | | HV—hemorrhoids; skin diseases; component of theriac | FR—unknown |

| | | | | | | |
|--|-------------------|----------------------|---|---|---|--|
| <i>Lumbricus</i> sp. | Earthworm | Body | | | HV—hemorrhoids; clears obstructions of the urinary tract | DS—earache, arthritis |
| <i>Lytta vesicatoria</i> | Spanish fly | Body | | | | BD, FR—raises a blister, counter-irritant |
| <i>Merops</i> sp. | Bee eater | Body parts | | | AN—colds and skin diseases | |
| <i>Mus musculus</i> | House mouse | Ash, body parts | | | HV—hemorrhoids, skin diseases, wounds, insanity | |
| <i>Moschus moschiferus</i> | Musk | Rectal gland | AT, GN, TA—purgative; eye diseases, headaches; reinforces potency | | | FR, DS—heart diseases; ‘cold’ ailments |
| <i>Muscicapa</i> sp. <i>Ficedula</i> sp. | Flycatcher | Body parts | | | AN—Skin, eye, internal diseases; jaundice and spleen inflammation | |
| <i>Ovis</i> | Lamb | Body parts | | | | DS—strengthens the body, increases weight, cleans the blood |
| <i>Paraechinus aethiopicus pectoralis</i> | Hedgehog | Skin, spines, blood | | | HV—expels fleas (<i>Pulex irritans</i>) | |
| <i>Pediculus</i> sp. | Louse | Body | | | HV—clears urinary tract obstructions | |
| <i>Physeter catodon</i> | Ambergris | Intestinal secretion | MS, TA—sore throat, heart diseases, paralysis | | | BD, FR—cough, cardiac diseases, hysteria |
| <i>Rana ridibunda</i> | Frog | Body | | | HV—hemorrhoids, wounds, bleeding, rheumatism | FR—unknown |
| <i>Sepia officinalis</i> | Cuttle fish | Skeleton | IB—skin and tooth diseases; clears obstruction of the urinary tract | | | FR—unknown |
| <i>Struthio camelus</i> | Ostrich egg shell | Egg shell | | | HV—eye diseases | |
| <i>Sus scrofa</i> | Hog, lard | Fat | | | | BD—base for ointments, emollient |
| <i>Titurus vittatus</i> | Triton | Body | IB—reinforces potency and enhances libido | UT—reinforces potency and enhances libido | AN—reinforces potency; enhances libido | |
| <i>Tubipora musica</i> or <i>Corallium rubrum</i> | Coral | Body | GN—eye diseases, bleeding; strengthens the heart | IT—eye diseases and bleeding; strengthens the heart | | TB, FR, DS—headache, eye diseases, cough rheumatism; kills worms |
| <i>Viverra civetta</i> | Civet cat (Zebed) | Gland secretion | | | HV—reinforces male potency; ear inflammation | |
| <i>Vulpes</i> sp. | Fox | Oil | | | | FR—unknown |
| Unidentified | Ant | Body | | | HV—jaundice | |
| Unidentified | Lizard | Secretion | | | HV—eye diseases | |
| Unidentified | Animal chorcal | Chorcal | | | | BD—treats hard breast, cancer |
| Unidentified | Kermes | Insect body | | | | TB, FR—unknown |
| Unidentified | Fish | Meat | | | | DS, FR—helps digestion, treats internal diseases, strengthens the nerves |
| Unidentified | Lacca | Secretion | | | | FR—unknown |

Sources: AN: Daud al-Antaki; AT: Acre taxes; BD: British dispensary; BN: Benevenuto; DS: David de-Silva; FF: Felix Fabri; FR: Franciscan lists; FS: Frescobaldi; GN: Genizah; HV: Hayyim Vital; IB: Ibn al-Baytar; IT: Italian trade; JV: Jacques de Vitry; MA: Maimonides; MS: Mas’udi; RM: Rafael Malki; SU: Suriano; TA: al-Tamimi; TB: Tobler; UT: Uthmani.

IX: pp. 27–32). Maimonides wrote many medical books (Ben-Maimon, 1940, 1965, 1971).

- Ibn al-Baytar [IB]: Abu Muhammad Abd Allah Ibn Ahmad Ibn al-Baytar (d. 1248), Andalusian physician and herbalist, who visited the Near East, especially Bilad al-Sham (Gillispie, 1970, I: pp. 538–539). In *The Compendium of Simple Drugs and Food*, among hundreds of remedies he mentions numerous medicinal substances of animal origin in use in Bilad al-Sham in his day (Ibn al-Baytar, 1874).

The medical literature used for this study, mainly for information about the medicinal uses of substances of animal origin, includes the works of some of the most renowned physicians of the age. The writings of the 9th-century Iraqi physician al-Kindi (Levey, 1966) were consulted, as were the works of the 10th-century physician al-Razi (al-Razi, 1967–1968), considered one of the most fruitful and original medical writers of the Middle Ages. I likewise perused the writings of the famous Persian physician Ibn Sina (Ibn Sina, 1877). Also consulted were the 11th-century al-Biruni (Said and Elahie, 1973) and al-Ghafiqi (Meyerhof and Sobhy, 1932–1940), a learned Muslim Andalusian physician. These personalities are regarded as experts on medicinal materials.

2.1.2. Sources from the Mamluk period (14th to 15th centuries)

Even though the Mamluk period is not as rich as its predecessors in medical texts, its sources, including chronicles and administrative manuals, are particularly abundant. Several authors who do mention medicinal substances are the following:

- al-'Uthmani [UT]: Shams al-Din al-'Uthmani, a 14th-century Muslim judge in the Safed region. al-'Uthmani wrote a description of Safed and the surrounding area containing information about local medicinal substances and their applications (Lewis, 1953).
- Suriano [SU]: Francesco Suriano (1450–1528), an Italian trader, scion of a wealthy Venetian merchant family. He became a Franciscan monk, serving his order for many years in the Levant. His unique knowledge was preserved in his *Treatise on the Holy Land*, which contains important information about medieval agriculture in the area and some details about the medicinal substances in use in the Levant at the time (Suriano, 1949).
- Italian trade [IT]: Venetian maritime trade documents provide us with information about medicinal materials exported from Acre to Europe by the Venetians. E. Ashtor conducted a number of studies on European trade in the Levant during the Crusader and Mamluk periods (Ashtor, 1987). His work is based on commercial documents from various archives, mainly Italian, which shed light on the trade in spices, agricultural products, and industrial raw materials. Since the Byzantine period the Levant has attracted pilgrims, some of whom published their memoirs.

This body of literature comprises over 1500 books, containing a wealth of information on numerous subjects, including the use of medicinal materials. Two of the most important authors are:

- Frescobaldi [FS]: An Italian traveler who visited the Levant, together with Gucci and Sigoli, in 1384. They published their travel accounts, which contain some information about the medicinal uses of plants and animals (Bellorini et al., 1948).
- Felix Fabri [FB]: A Dominican monk of Swiss origin who visited the Levant during the 15th century. He wrote an important work, with copious information about the country, its residents, their customs, and the goods that were available on the local markets (Stewart, 1893).

2.1.3. Sources from the early Ottoman period (16th to 17th centuries)

The Ottoman period offers a wealth of written medical sources that summarize common medical knowledge up to that time and describe many medicinal substances in use in the Levant, some of them not previously mentioned. The three main sources are presented below:

- al-Antaki [AN]: Daud Ibn 'Umar al-Antaki, a Turkish physician from Antioch (d. 1599). Though blind and crippled from birth, al-Antaki became a well-known physician and writer. His treatise on medicine (al-Antaki, 1935) contains useful information about medieval Islamic medicine and medicinal substances and their usage in the Levant (Plessner, 1962).
- Hayyim Vital [HV]: Rabbi Hayyim Vital (1543–1620), a Jewish scholar who worked as a physician in Safed, Jerusalem, and Damascus (Encyclopaedia Judaica, 1971, 16: pp. 171–176; Benayahu, 1987; Buchman, 2001).
- Rafael Malki [RM]: Rabbi Rafael Mordechai Malki (d. 1702), an Italian Jewish physician who went to Jerusalem in 1677 and became one of the heads of the Jewish community of the holy city and their physician (Benayahu, 1985).

2.1.4. Sources from the late Ottoman period (18th and 19th centuries)

This period witnessed the penetration into the Levant of advanced European medicine and pharmacology through Christian pilgrims, travelers, scholars, and representatives of welfare institutions. Some of the last-named, such as the Franciscan mission in Jerusalem and the British mission, were active in medical affairs. A unique Jewish medical source is found here as well. The data on the uses of animal extracts and products in the 18th and 19th centuries derive from five main sources:

- David de-Silva [DS]: Rabbi David de-Silva (1684–1740), a physician and one of the leaders of the Jewish community in 18th-century Jerusalem. He had studied medicine in Europe and practised in Jerusalem. His book *Peri Megadim* supplies us with information about the

medicinal uses of the contemporary *Materia Medica* at Jerusalem (Amar, in press b; de-Silva).

- Franciscan Lists [FR]: The Franciscan medical institution in Jerusalem, being a hospital and pharmacy, was well known in medieval and Ottoman Jerusalem mainly for its rich ‘modern’ stock of medicinal substances. Two lists of the medicinal materials in their pharmacy (1755 and 1798) were recently discovered, providing us with new information (Lev et al., in preparation).
- Titus Tobler [TB]: Dr. Titus Tobler, a Swiss physician who visited Jerusalem and the Holy Land at the mid-19th century. His books and articles describing the medical conditions of Jerusalem include a list of medicinal substances compiled in the city’s market. These important data are presented along with descriptions of traditional medicine practised in the city (Tobler, 1855; Amar and Lev, 2000).
- British dispensary [BD]: This source is a list drawn up by British physicians at their dispensary in Jerusalem in 1857. The British Society for Promoting Christianity Among the Jews was the first to supply modern Western medical treatment for the inhabitants of the holy city, mainly for the Jews (Lev and Perry, 2001, 2002; Perry and Lev, 2003).

Most of the sources of this period do not note the medicinal uses of the substances as they were drawn from lists and inventories. The main uses in these cases were copied from pharmacology books of the 18th and 19th centuries (Ferne, 1899; White, 1915; British Pharmacopoeia, 1880).

The second half of the 19th century witnessed much research activity. Research groups, writers, and travelers from Germany, Britain, France, and other European countries visited the Levant and published the information upon returning to their homelands. However, most of them were concerned with archaeology and a few even dealt with ethnobotany. Medicine and substances of animal origin were of no special interest for the European visitors; but for the local population such uses were self-evident.

The inhabitants of the Levant in the 18th and 19th centuries apparently made medical use of other animals, but unfortunately no records were made of these, so they cannot be found in the literature. We presume that some animals listed in Table 2 were used by the 19th-century inhabitants of the Levant, since they preserved the habits and traditional folk medicine of Eastern Mediterranean societies.

2.1.5. Discussion

Table 1 contains 52 animal extracts and products. However, from ethnopharmacological data on present-day uses of such substances (Table 2), it is clear that in the medieval and Ottoman Levant a larger number served for medical use. We presume that animals, such as pigeons and leeches, were not mentioned in the sources since they were associated with magic healing or traditional medicine. Some medieval and Ottoman sources mention these animals but with no direct connection to the Levant.

Analysis of Table 1 reveals that the great majority of the substances were easily available to the medieval and Ottoman physician, pharmacist, or patient as wild and domesticated animals or as parasites: adder, ass, cheese, eggs, firefly, frog, honey, louse, mouse, mule, scorpion, snail, stinkbug, and wax. Several substances were rare: ambergris, coral, triton, and squid. Others, such as musk and beaver, were exotic, usually brought from remote countries, so they were more expensive. These substances were applied to treat a wide range of symptoms and diseases, such as skin diseases, internal disease, hemorrhoids, and animal bites.

The British list of 1857 is the first evidence of the use of cantheridis and hog in the Levant. Earlier sources mentioning these substances have so far not been found (Lev and Perry, 2001).

At times the use of certain substances of animal origin was against the patient’s or the physician’s religious precepts (e.g. the internal use of snakes and scorpions by Jews), but they were used to save life.

2.2. Healing with animals in the Levant in the 20th century

Although considered superstitions, traditional medicines cannot be denied significance since they have become sources of drugs of modern medical science (Launet, 1993).

The data presented in Table 2 are the product of various market surveys covering shops dealing in substances used in folk medicine in several cities in Jordan [JR] (Amman, Irbid, Karak, Salt, and Zarqa) (Lev and Amar, 2002), in Syria [SY] (Damascus and Aleppo) (Sanagustin, 1983; Honda et al., 1990), and in Israel [IS] (Jerusalem, Acre, Shechem, Nazareth, Tel Aviv) (Lev and Amar, 2000).

Table 2 also contains data of the medicinal uses of animals among the Bedouins in Israel (Abu-Rabia, 1999) [AR] and the Sinai desert (Levey, 1978) [LE], and among Israeli Jews of Iraqi (Ben-Ya’akov, 1992) [BY], Yemeni (Riaa’ni, 1963, pp. 56–65) [RI], and Persian (Pikel, 1997, pp. 100–104) [PI] origin. These data are presented separately since at present the use of these substances is not proven.

2.2.1. Discussion

Table 2 sets out 77 medicinal substances of animal origin, most of which are of local origin; the rest are imported from Asia, Africa, and Europe. Presumably, few other local animals are used too; they are collected in the wild or are domesticated animals. These substances are not traded or recorded in the literature and, therefore, are not presented here. Forty-six substances out of the 77 listed in Table 2 provide us with new information, not contained in Table 1.

Fewer substances are apparently sold and used in Israel than in Jordan and Syria, a circumstance explained by the origin of the Israeli population. That society has a high percentage of citizens of Western origin, who usually do not have recourse to this type of folk medicine. Another

Table 2
Present-day medical uses of animals in the Levant

| Scientific name | Common name | Extract/product | Sources and main medicinal uses—ethnopharmacology | Sources and main medicinal uses—market surveys |
|---|--------------------------|---|--|---|
| <i>Acimonyx jubatus venaticus</i> | Panther | Skin and fur | | JO—unknown |
| <i>Anser anser</i> | Goose | Oil | | BY—improves hearing |
| <i>Apis mellifera</i> | Honey bee | Wax | AR, BY, RI—wounds, skin diseases | IS, SY, JO—purgative; eye inflammations and sore throat |
| <i>Apis mellifera</i> | Honey bee | Honey | AR, BY, RI, PI—eye inflammation, colds, high fever, madness, burns, etc. | IS, JO—burns, coughs |
| <i>Apis mellifera</i> | Honey bee | Body | AR—bee sting immunization | |
| <i>Avicula margaritifera</i> | Pearl | Pearl | BY, RI—strengthens the heart; eye inflammation | |
| <i>Bos taurus</i> | Cow | Cheese | | IS—health food, potency |
| <i>Bos taurus</i> | Cow | Hoof, legs, liver, oil, lungs, milk, bile, skin, secretion | AR, BY, RI—stomach pain, snake and scorpion bites, eye diseases, skin diseases, cancer, etc. | |
| <i>Bubalus bubalis</i> | Buffalo wax | Oil | | JO—treats the spinal cord |
| <i>Camelus dromedarius</i> | Camel | Milk, oil, urine | AR, BY, RI—snake and scorpion bite, liver diseases, ulcer, skin cracks, internal and skin diseases | |
| <i>Canis familiaris</i> | Dog | Secretion, bones, milk | AR, BY—abscess, caecum diseases, eye diseases, ear diseases | |
| <i>Canis lupus</i> | Wolf | Bone | | IS—intimacy and medical problems |
| <i>Capra hircus</i> | Goat | Horn, legs, hoof, skin, lungs, liver, oil, milk, wool, bile | BY, RI—eye inflammation, ulcer, kidney stones, madness, and all uses | |
| <i>Capra ibex nubiana</i> | Nubian ibex | Horn | | IS, JO—intimate relations |
| <i>Capreolus</i> sp. | Deer | Horn (burned) | BY—kills intestinal worms | |
| <i>Castor fiber</i> | Beaver | Testicles | | IS, JO—enhances libido |
| <i>Ciconia ciconia</i> | Stork | Dried flesh, egg | AR, BY, RI—snake bite, eye diseases | |
| <i>Columba livia</i> | Dove | Blood, burned feather | BY—hemorrhoids, leprosy | |
| <i>Corvus corax</i> | Black raven | Bile, bone, egg, brain | BY, RI—pain, eye diseases, impotence, broken bones | |
| <i>Cypraea</i> sp., or <i>Ungulus odoratus</i> or <i>Ornamentaria</i> sp. | Sea shell | Shell | | IS, JO, SY—wart removal, irritations |
| <i>Echis coloratus</i> | Viper | Skeleton | | IS—intimacy problems |
| <i>Equus caballus</i> | Horse wax | Oil | | JO—skin diseases |
| <i>Equus caballus</i> | Horse | Milk, secretion, urine | AR, RI—tuberculosis, burns, toothache | |
| <i>Erinaceus europaeus concolor</i> | European hedgehog | Skin and spines | | JO—intimate relations |
| <i>Erosaria</i> sp. | Sea shell | Shell | AR, BY—spider bite, syphilis, gonorrhea, eye diseases | |
| <i>Gallus gallus domesticus</i> | Hen | Body, liver, bile, egg, egg shell | AR, BY, RI—all uses | |
| <i>Gazella dorcas</i> | Deer | Eye secretion | RI—antitoxin | |
| <i>Gazella</i> sp. | Gazelle | Horn | BY—variola | IS—intimate relations |
| <i>Gazella</i> sp. | Mountain gazelle | Skin and fur | | JO—chest and throat diseases and inflammation |
| <i>Gorgonia nobilis</i> | Coral | Body | AR, BY, RI—eye inflammation | |
| <i>Hirudo medicinalis</i> | Leech | Body | PI—bloodletting | |
| <i>Homo sapiens</i> | Human | Urine, milk, mummy | BY, RI, PI—skin and eye diseases, diphtheria, wounds, ear inflammation | |
| <i>Hyaena hyaena syriaca</i> | Striped hyena | Flesh | AR—stomachache and diarrhea | |
| <i>Hyaena hyaena syriaca</i> | Striped hyena | Skin and fur | | JO—chest and throat diseases and inflammation |
| <i>Hystrix indica indica</i> | Porcupine | Blood | AR—increases women's fertility, treats high fever | |
| <i>Laceritlia</i> sp. | Lizard | Blood | AR, RI—toothache, warts | |
| <i>Larinus</i> sp. | Tegal fly | Cocoon | | IS—medicinal drink, internal uses |
| <i>Lepus capensis</i> | Rabbit | Heart, brain | BY—prevents miscarriage; pancreas | |
| <i>Lytta vesicatoria</i> | Spanish fly, cantheridis | Insect body | | SY—fertility |
| <i>Mantodea</i> sp. | Praying mantis | Secretion | AR—warts | |

| | | | | |
|---|-------------------------|--|---|---|
| <i>Meles meles canescens</i> | Badger | Skin, flesh | AR—snake and scorpion bite; abscess | |
| <i>Mus musculus</i> | Mouse | Body (ash) | BY—inguinal hernia | |
| <i>Moschus moschiferus</i> | Musk deer | Musk oil | | IS, SY, JO—medicinal drink, sugar in blood |
| <i>Moschus moschiferus</i> | Musk deer | Musk grain | | IS, SY, JO—headaches, reduces blood sugar level |
| <i>Musca domestica</i> | Fly | Body | BY—fly sting | |
| <i>Mylabris syriaca</i> | | Body | AR—rabies | |
| <i>Neophron percnopterus</i> | Egyptian vulture | Dried flesh | AR—snake, scorpion, spider bites | |
| <i>Ovis</i> | Lamb | Legs, skin, tail, oil, lungs, bile, liver, milk, testicles | AR, BY, RI—all uses | |
| <i>Paraechinus aethiopicus pectoralis</i> | Hedgehog | Skin, spines | AR—fever, malaria | |
| <i>Passer domesticus</i> | Sparrow | Flesh | RI—pertussis | |
| <i>Pediculus humanus</i> | Louse | Body | RI—jaundice | |
| <i>Physeter catodon</i> | Ambergris | Secretion | | IS, JO—reinforces potency; kidney diseases |
| <i>Procavia capensis syriaca</i> | Hyrax | Dried bile, flesh | AR—increases women's fertility | |
| <i>Rana ridibunda</i> | Frog | Body (ash) | BY—inguinal hernia, thins eyelashes | |
| <i>Scincus scincus</i> | Medical skink | Body | | IS, JO, SY—fertility of men and women |
| <i>Scorpiones sp.</i> | Scorpion | Body | AR, BY, RI—scorpion bite immunization, skin diseases, inguinal hernia | |
| <i>Sepia officinalis</i> | Cuttle fish | Skeleton | BY, RI—skin diseases, fissure, eye diseases, tooth disinfection | IS, SY, JO—skin diseases, mania |
| <i>Spalax leucodon ehrenbergi</i> | Mole | Oil | AR—abscess | |
| <i>Spongia officinalis</i> | Sea sponge | Body | | IS, SY, JO—unknown |
| <i>Strombus sp.</i> | Snail | Operculum | | IS, JO, SY—intimate relations, evil eye |
| <i>Struthio camelus</i> | Ostrich | Fat | | IS, JO—joint pains |
| <i>Struthio camelus</i> | Ostrich egg shell | Egg shell | | JO—unknown |
| <i>Sus scrofa lybicus</i> | Hog | Bone, oil, bile | BY—improves women's fertility; fissure, ear diseases | |
| <i>Testudo graeca</i> | Tortoise (turtle) shell | Egg | BY—inguinal hernia | JO—personal relations |
| <i>Tubipora musica</i> | Coral | Skeleton | AR, BY—nipple inflammation, pain in the heart | IS, SY, JO—stops bleeding; blue eye cosmetic |
| <i>Upupa epops</i> | Hoopoe | Blood | BY—strengthens the body | |
| <i>Varanus griseus</i> | Lizard | Dried skin, secretion | AR—spider bite; reduces fear; skin diseases, eye inflammation | |
| <i>Vulpes sp.</i> | Fox | Oil | BY—ear diseases | |
| Unidentified | Worm | Oil, body (ash) | BY—flatulence; thins eyelashes; back inflammation | |
| Unidentified | Snake | Skin (burned) | BY—inguinal hernia | |
| Unidentified | Bat | Flesh smoke, brain, blood | AR, BY—fever, eye disease, prevents hair growing | |
| Unidentified | Coccus cati | Cocoon | | SY—unknown |
| Unidentified | Snake slough | Skin | | JO—eye diseases |
| Unidentified | Spider thread | Thread | | SY—wounds |
| Unidentified | Deer | Horn | | IS, JO—general tonic; against drug addiction |
| Unidentified | Elephant | Tooth | BY—improves women's fertility | |
| Unidentified | Fish | Oil | PI—strengthen children bones | |

AR: Abu Rabia; BY: Ben-Ya'akov; IS: Israel; JO: Jordan; LE: Levey; PI: Pikel; RI: Riaa'ni; SY: Syria.

explanation is the strict nature conservation laws, which prohibit trade in and use of wild animals (dead or alive), local as well as imported. Syria and Jordan have more ethnic and Eastern populations, and in those countries the nature conservation laws are either non-existent or not enforced.

Most of these animals are also used in traditional medicine in other Middle Eastern countries. For instance, in Iraq 12 kinds of animals are described as medicinal sources, including sea sponge, cow, camel, bee for honey and wax, fish, squid, sheep, nacre, and silkworm; they constitute 5% of all the substances mentioned (Hooper, 1937, pp. 189–193). A rare observation of the markets of Cairo at the beginning of the 20th century was published by the physician Max Meyerhof, who spent many years practising medicine in Egypt. His research on medicinal substances on the city markets revealed 41 drugs of animal origin out of 640 substances (6.4%) (Meyerhof, 1918).

In a study conducted in Pakistan during the 1970s, 31 organic substances were listed (animal parts and products), constituting 9% of all the medicinal substances in the inventory of traditional medicines (Ali et al., 1984; Ali and Mahdihassan, 1984). Examination showed that these substances were similar to those used as remedies throughout human history, irrespective of geographical borders. They included amber, bee honey, beeswax, crab, earthworm, hedgehog, lizard, medical skink, nacre, pearl, sea sponge, silkworm, spider, and squid (Vahora and Khan, 1978, pp. 110–111; Fernie, 1899).

3. Discussion

Our data yielded information on 99 substances of animal origin used in the Levant throughout ages: 47 of them were first ascertained in the 20th century, only two were first mentioned in the 19th century; 11 were first detected in 18th-century sources, 23 came to our knowledge from 16th-century sources, and only 14 were in use from 10th to 15th century.

An obvious methodological gap exists regarding this information owing to our use of different sources. Historical sources were used for the medieval, Ottoman, and 19th-century substances, while ethnopharmacological surveys were used as the main source of data for the 20th-century table. Since the main goals of this research were to study the phenomenon of using animals and their products as medicinal substances, to discover the different animals used throughout history, and to reveal trends, we disregarded this factor. Naturally, on this account no statistical conclusions have been drawn.

Two substances were introduced into the region as medical substances in the 19th century. The main one is oil of the hog (*Sus scrofa lybicus*), mentioned in the 1857 British list for the first time. Hogs were obviously not popular animals among the Muslims and the Jews (Rosen, 1966), although they were eaten by the Christian population of the land. This

usage seems to reflect the European Christian influence on the Levant in general and on the Land of Israel and Jerusalem in particular.

From a commercial point of view, we readily observe that some of the substances of animal origin were the usual goods traded within the Levant and in international commerce throughout history. Most of the imported products, such as musk, mummy, beaver, coral, and ambergris, were brought from Asia and Africa by sea and land. The majority of them were goods in transit at the Levantine cities and ports, having been sold to Western traders, primarily Italians, who shipped them on to Europe. Some substances of local animal origin, such as the triton and the adder, were exported, according to the historical sources, to Egypt and other Mediterranean countries (Amar, 1996–1997; Lev, 2002c).

4. Conclusions

The use of animal extracts, products, and even secretions is a worldwide phenomenon, starting far back in prehistory. It co-evolved with human evolution, reached its peak in medieval medicine, and still exists in folk medicine across the globe.

The beginnings of the medicinal uses of animals in human history are clear: animals and their products were part of the primary resources that ancient peoples could use as food or for treating their illnesses (O'Hara-May, 1971). Some of the Levantine aspects of this global feature have been presented in this article.

The animals mainly exploited for medical uses in the Levant throughout history are seemingly few. Their derived products pertain to seven major substances, namely honey, wax, adder, beaver testicles, musk oil, coral, and ambergris. The first three are locally available in the Levant, while the last four are exotic, therefore, rare and expensive. Many of these animals, which have been exploited since the Middle Ages, are still put to ancient and medieval medicinal use.

The use of several materials of animal origin came to a halt in the course of history owing to a change in the moral outlook of modern societies. These materials include mummy, silkworm, goat products, stinkbug, scarabees, snail, scorpion, and triton.

Knowledge about animals that were used for remedial purposes in the past and are still used as such to the present day is part of traditional and ethnic medicine. This knowledge is relevant to science and human society, even though it does not offer any future profit or the development of new drugs. Its importance lies in its fostering better understanding of this phenomenon from historical, economic, sociological, anthropological, and environmental viewpoints throughout bygone centuries. Issues, such as trade, beliefs, magic, and the like, could be explored and learned as well.

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