

# Cultural aspects of ants, bees and wasps and their products in sub-Saharan Africa


Arnold Van Huis (✉ [Arnold.vanhuis@wur.nl](mailto:Arnold.vanhuis@wur.nl))

---

## Research

**Keywords:** Ant, bees, entomophagy, ethno-entomology, traditional medicine, honey, Islam, proverbs, superstition, wasps

**DOI:** <https://doi.org/10.21203/rs.3.rs-33219/v1>

**License:**  This work is licensed under a Creative Commons Attribution 4.0 International License. [Read Full License](#)

---

## Abstract

**Background:** The order Hymenoptera has about 117,000 known species of which about 20,000 in the Afrotropical zone. The families covered are ants, bees, and wasps. They belong to the suborder Apocrita, characterized by a constriction between the first and second abdominal segments. The purpose of the study was to make an overview of how ants, bees and wasps and their products such as honey are utilized, perceived, and experienced in daily life across sub-Saharan Africa.

**Method:** Ethno-entomological information on ants, bees and wasps in sub-Saharan Africa was collected by: (1) interviews with more than 300 people from about 120 ethnic groups in 27 countries in the region; (2) library studies in Africa, London, Paris and Leiden.

**Results :** Of the order of the Hymenoptera only queens of the ant *Carebara vidua* are deliberately eaten. Often unintentionally bee larvae are eaten with honey and sugar ants with sugar. Apart from honey being a food item, it is also widely used to treat numerous medical problems, as a stimulant (for the memory) or as a cosmetic. It is also used in naming or wedding ceremonies. In the Qur'an, the medical value of honey is recognized. Seed stores of ants maybe harvested by humans. In the Sudan bee stings are used to cure arthritis; bee venom having bioactive properties. Wasp nests are used to cure inflammations such as mumps. The properties of certain insects are used to convey these treats to persons it is employed to, such as nasty stinging wasps to make dogs vicious. Some stories seem to make no sense like the snake-trapping ants in Madagascar, but a scientific explanation is provided. The looks of certain insects may inspire people to construct stories or have proverbs such as the very narrow waste of wasps, suggesting sterility. Bee swarms and driver ants are feared all over and believed to be employed (by witchdoctors) to punish. Not all stories of events with bees or ants are similar across sub-Saharan Africa. These insects, being social, are also used to stimulate cohesion between people.

**Conclusion:** Ants, bees and wasps in sub-Saharan Africa maybe feared because of their bites and stings. However, the insects or their products are often employed for medical reasons, honey having numerous applications. They are also many stories and believes in which the characteristics of these insects play a role.

## Background

The number of insect species in the world are estimated to be 1,013,825 while the number of species in the Hymenoptera are 117,000 (11.5%) (1) of which about 20,000 in the Afrotropical zone (2). The group of Hymenoptera that will be covered in this article are ants, bees, and wasps. They belong to the suborder Apocrita, characterized by a constriction between the first and second abdominal segments called a wasp-waist (petiole). The number of species of ants and bees in the Afrotropical region are 1,705 (3) and 2,783 (4), respectively. In the wasp category there are many families, which often could not be distinguished by my informants. Therefore, we deal with the wasp families often find in houses: 1. Vespidae (worldwide about 5000 species)(5), in particular potter wasps of the subfamily Eumeninae; and 2. Sphecidae (worldwide 789 species) (6), which are characterized by a very long, slender waste.

The honey bee *Apis mellifera* (Hymenoptera: Apidae) seems to have 24 subspecies in Africa, corresponding to geographical or ecologically distinct regions (7). However, the classification into well-defined sub-species seems to be complex and for the purpose of this article it is not relevant to go further in detail. The species, occurring worldwide, originated in Africa (8).

Adult females of the solitary wasps in the families Vespidae and Sphecidae, capture prey that they paralyze with a sting (the venom acting as preservative) and place the prey in a closed cell along with an egg (9, 10). The larva that hatches feeds on the enclosed prey until fully developed. Species specialize on different prey and construct different kinds of cells. Sphecid wasps such as mud daubers build their mud nests in attics, carports, and porches (11). These wasps are often clearly visible around nesting sites as they make frequent trips carrying mud to build their nests.

In this article we often deal with ants of the genus *Dorylus*, also called driver ants, safari ants, soldier ants, or siafu (Fig. 1). I will use the name 'driver ants' in this article. *Dorylus* spp. have the largest queen of all ants capable of laying 1 to 2 million eggs in a month. A colony such as those *Dorylus wilverthi*, may have 22 million workers (12). During migration they form a bivouac, a nest that measures a meter across constructed out of the living ant workers' own bodies to protect the queen and larvae and is later deconstructed as the ants move on. During their migratory phase, the ants set up bivouacs at new sites each night. In the morning, the bivouac dissolves into raiding columns that travel up to 20 metres per hour with lead workers laying a chemical trail for other workers to follow. Smaller workers lead the column, while larger, formidable soldiers protect the flanks. They defend themselves fiercely when being attacked. They are able to wipe areas clean of insects and small mammals (13).

A part of the results dealing with medicine have been published in van Huis (14). Sometimes the boundary between medicine and superstition is not clear and arbitrary decisions are then made. In this journal similar articles were published that deal with the Isoptera

(termites) and Lepidoptera (butterflies and moths) (15, 16).

## Methods

The information was collected by reviewing the literature and by personal interviews. The interviews were conducted in the years 1995 and 2000 in Africa and concentrated on the traditional, nutritional and medical uses of arthropods and their products as well as on their role in religion, witchcraft, art, song, music, dance, children's games, mythology and literature. A part of the results obtained in 1995 on insects has been published (17), as well as the part on edible insects over both years (1995 and 2000) (18).

The total number of people interviewed was 304 from 27 different countries in sub-Saharan Africa of whom 22 were resource persons (experts without recorded ethnic affiliation) (Table 1). Of 5 other respondents, the ethnic group was unknown. The total number of ethnic groups was 121, excluding Zanzibar and Madagascar where the ethnicities were not recorded. Names of ethnic groups were checked, mostly in Wikipedia (19) and the Joshua project (20).

Table 1  
The number of respondents (N) per country and ethnic group.

Country	Ethnic group - N	RES <sup>1</sup>	N
Benin	Bariba-1, Fon-4, Goun-1, Nagot-6, Popo-1, Tori-1		14
Burundi	Hutu-2		2
Burkina Faso	Mossi-4, Fula-1		5
Cameroon	Bafia-1, Bakoko-1, Bakossie-1, Bamileke-14, Banen-1, Bani-Pahuin-1, Bassas-2, Beti-Eton-1, Beti-Ewondo-1, Bolous-1, Matha-1, Tikar-1, Wimboum-1, Yambassa-1	2	28
CAR <sup>2</sup>	Gbaya-1, Kari-1		2
DRC <sup>3</sup>	Mbochi-1, Teke-1		2
Chad	Arabe-1, Goulaye-2, Kanembou-1, Mbaye-2, Ngambaye-7, Sara-Kaba-1, Sara-Niellim-1, Tupuri-1, Wadai-1		17
Gambia	Jola-1, Mandinka-1		2
Guinee-Bissau	Balanta-1		1
Kenya	Kalenjin-1, Kamba-4, Kikuyu-2, Luo-4, Meru-1, Somalian- 1		13
Madagascar	-		24
Malawi	Chewa-1		1
Mali	Fula-1, Mande-Malinke-1, Mande-Mandinka-1, Sarakolé-1, Senufo-2, Songhay-3, Tuareg-1		10
Mozambique	Bitonga-1, Makua-1, Nchope-1, Shona-1, Tsonga-Rhonga-2, Tsonga- Shangana-1, Tsonga-Tswa-1		8
Namibia	Damara-1		1
Niger	Djerma-1, Hausa-9, Kanuri-1, Songhai-4	1	15
Nigeria	Ebibio-1, Ebir-1, Yoruba-15, Unknown-1		18
Rwanda	Kiga-Toro-1		1
Senegal	Bainuk-1, Diola-4, Fula-1, Halpulaar-2, Lebu-1, Serer-3, Wolof-5		17
South Africa	-	6	
Sudan	Dongolawi-1, Fula-1, Gaalien-3, Kambari-Abadi-1, Kawahla-1, Kuku-1, Mahas-1, Nubian-1, Nubian-Mahas-1, Rubatab-2, Tunyur-1, unknown- 4	5	18
Tanzania	Chaga-7, Digo-1, Iraqw-3, Iramba-1, Mwarusha-2, Pare-1, Rangi-1, Sukuma-2, Zanaki-1	1	19
Togo	Akebu-1, Ewe-5, Cotocoli-1, Kabye-1, Mina-1	3	9
Uganda	Acholi-1, Banyankole-1, Bunyoro-1, Busoga-1, Ganda-7, Langi-1, Luo-2, Nyoro-1		15
Zambia	Bemba-1, Ila-1, Lovale-1, Lozi-2, Lunda-1, Namwanga-2, Nyanja- Chewa-1, Tonga-10, Tumbuka-1	2	20
Zanzibar	-		9
Zimbabwe	Ndebele-1, Shona-9, Zezuru-1	2	11
<b>Total number of resource persons and respondents</b>		<b>22</b>	<b>282</b>
<sup>1</sup> Resource persons			
<sup>2</sup> Central African Republic			
<sup>3</sup> Democratic Republic of Congo			

Most of the people interviewed were scientists or technicians trained in entomology. The interviewees were identified by visiting entomological groups of universities and (inter)national agricultural research institutes, plant protection services, museums, and crop protection projects. The author tried to interview most of the staff of these organizations (often arranged by the responsible officers). The

age of the persons interviewed varied between 25 and 65. Most of the respondents were male reflecting the gender composition of the organizations. A few times people were interviewed in villages who had no entomological background. This proved to be a challenge because of language and confusion about the insect species. Twenty-two of the respondents acted as resource persons on special subjects (for example experts on termites or insects as food or medicine) or had special positions (professors, heads of organizations, shamans, museum directors, and priests). In these cases, the ethnic origin of the person who provided the information was not considered relevant.

The author used a list of issues to be covered in the interviews. Several respondents got this list before the country was visited. Often, they questioned elders, grandparents, family members and acquaintances before my arrival. This information was then passed on to me. Respondent from rural areas had more information than those from urban areas. Considering the rapid urbanization and the fact that older people often had to be consulted is a sign that this type of information is rapidly disappearing. Therefore, although the information was collected some 20 years ago, the information is not only valid, but probably more difficult to be obtained now.

Vernacular names and their meaning were double checked with the respondents and sometimes by literature search. The national libraries and university libraries in London and Paris, the library of the African Studies Centre in Leiden, the Netherlands, and some libraries of the countries visited were consulted. The literature consulted was mainly of anthropological nature. Findings for a country or a certain tribe were only reported if information was received from more than one respondent, or if the information given during interviews was confirmed in the literature. The respondents' countries and tribes are mentioned to specify the sources of information. They cannot be used for establishing correlations between ethnicity and information provided. The qualitative character of the information provided is emphasized.

## Results And Discussion

Which insects or their products are eaten?

Bees and honey

Bee larvae are sometimes eaten together with the honey. Beer brewing from honey is particularly common in West Africa [Burundi: Hutu; Cameroon: Wimboum; Guinea-Bissau: Balanta; Kenya: Kalenjin (21), Kamba, Kikuyu, Luo, Meru; Sudan: Kuku; Tanzania: Chaga, Iraqw, Mwarusha, Pare; Zambia: Bemba, Lozi, Tonga, RES].

Ants

The nutritious alates (queens) of the thief or black ant, *Carebara vidua* (Hymenoptera: Formicidae) (Fig. 2) are collected during their nuptial flight, when these ants emerge in large numbers from the termitaries in which their nests are concealed (22). Only the abdomens are eaten, either uncooked or roasted (23, 24). They are consumed in Kenya (Luo) (23), Uganda (Ganda and Nyoro), Zambia (Tonga, Nyanja, RES) and Zimbabwe (Shona), often by frying or roasting the abdomen. They emerge from holes near the termite hill and for preventing them to fly, the head is often crushed. The small ants (workers) are irritating as they come out from the holes at the same time. The females are over 2 cm long, while the tiny yellowish workers are less than 2 mm long. They build their nests in close association with the nests of termites on which they prey (25).

Sugar ants (*Camponotes* spp.) are also eaten, mainly because it is difficult to remove them from the sugar, but at the same time it is believed that they are good for the stomach (Mozambique: Bitonga, Macua, Rhonga, Shangana), Zambia (Bemba, Luunda, Tonga, RES), and Zimbabwe (Ndebele, Shona). The San from the Kalahari in southern Africa, hand-collect some *Camponotes* ants which are then pounded and mixed with salad, giving it a sweet-sour flavour, because of the formic acid (26).

Weaver ants, popular food in south east Asia (27), are not eaten in Africa, except for turning sauces acid (CAR: Kari). Only the Bamileke in Cameroon mentioned that they eat the eggs of the driver ants.

Wasps

Larvae or adults of wasps are not eaten, except for their use as medicine. I only came across a story mentioned by the Hausa in Niger, that they break the wasp into two and that from the tube of the abdomen (it must have been sphecid wasp) they suck a sugary substance.

Beneficial ants and wasps

Driver ants clear the house of cockroaches, mice, snakes, scorpions, and termites (Cameroon: Bakossie, Bamileke, Bassas, Bolous, Beti-Ewondo; Kenya: Kalenjin, Kamba; Tanzania: Chaga, Iraqw, Mwarusha, Zanaki; Togo: Ewe). During the occupation, the occupants need to be absent. If you want snakes to come out of a hole, collected driver ant soldiers should be poured in (Nigeria: Yoruba). Contrary when ants are

present it is believed that there are no snakes (Tanzania: Chaga). However, how to protect or clear your house and your animals from driver ants? Fire was mentioned (Benin: Nagot; Nigeria: Yoruba), salt (Cameroon: Bamileke; Nigeria: Yoruba), ashes (Cameroon: Bakossie, Bamileke; Tanzania: Iraqw, Pare; Togo: Ewe), kerosine (Cameroon: Bakossie; Uganda: Ganda) or petrol (Cameroon: Bamileke, Banen).

In the north of Cameroun, the Mofu collect a thousand *Dorylus* soldier ants and put them in a calabash with leaves of *Ficus abutilifolia*. Using some rituals they release the ants in order to clear houses of termites such as *Trinervitermes* spp from the straw of the roof, and *Macrotermes subhyalinus* from the sorghum stems protecting the walls, as well as snakes or other vermin (28). They can even direct the driver ants by means of an ochre (natural clay earth pigment) trail to parts of the house where infestations of vermin or termites are most severe.

Wasps in orchards prevent not only mango's being stolen (Cameroon: Banen; Mozambique: Changana; Tanzania: Sukuma), but they also protect bird nests being raided by egg poachers (Tanzania: Sukuma; Chad: Sara-Niellim; Zimbabwe: Shona).

People at the borders of the Sahara, such as the Tuareg, collect grass seeds from ant nests (29). This was also mentioned by informants from this region (Chad: Goulaye, Kanembou, Ngambaye, Tupuri; Mali: Songhai, Tuareg; Niger: Hausa, Songhai; Senegal: Wolof; Sudan: Gaalien, Mahas). One of those seeds are from *Panicum turgidum*, a stiff desert grass with smooth and solid stems (30). Also, the Nama people of southern Africa systematically and regularly collect from the stores of grass seeds collected by certain black ants.

## Medicine

### Bees and honey

In Sudan (Dongolawi, Kambari-Abadi, Kuku, Kawahla, Rubatab, RES) bee stings are widely used as a cure against rheumatic arthritis [see for a review of bioactivities of bee venom: Azam, Ahmed (31), Lee, Son (32) and Aliyazicioglu (33)]. This is also practiced in other countries (Burkina Faso: Mossi; Mozambique: Shona; Tanzania: Mwarusha). In Benin, a powder or decoction of the bee *Apis mellifera*, mixed with certain plant species, is used against dizziness, tiredness, asthma, stomach-ache, and myopia (34).

### Honey

The use of honey in medicine is very well know, as indicated by several review articles (35–37). To use honey as a medicine is general practice in sub-Saharan Africa and was so recurrent in my interviews, that countries and ethnic groups need not to be mentioned. In the Arabic and Islamic world one has to take into account that the prophet Mohammed considered a drink of honey as one of the methods in curing an illness (38). It seems to cure most ailments and the following were mentioned: allergy, anaemia, chest pain (often with eggs), bad cough (used with lime), whooping cough, asthma, flu, high fever (as ointment), influenza, tonsillitis, earache [also mentioned as remedy in the Qur'an (39; p. 89)], hiccup, tetanus, measles, as an ointment for dermatological problems (such as boils, sores, scabies, ulcers, leishmaniasis wounds, insect bites), jaundice, eye problems, cancer, epilepsy in Sudan (40), tiredness, stomach problems, (amoebic) dysentery, colic, constipation, diabetes, hypertension, palpitations, haemorrhoids, intestinal worms, poisoning (as antivenom), to purify the blood. Several times it was mentioned that it should be mixed with certain herbs. In Zanzibar it is often mixed with raw eggs against cough. Besides curing health problems, it was also considered to prevent diseases and therefore used as a sweetener instead of sugar. It is also used as a carrier for other medicines. In West Africa honey is often prescribed by marabouts (Muslim religious leader and teacher). It can also be used as a cosmetic (e.g. face masks by women), but also for cuts, scars, and (circumcision) wounds as an anti-septic. Very common is the use against burns, which frequently occurs as the use of open cooking fires in homesteads is common.

Honey can also be used as a stimulant: aphrodisiac, to obtain vital sperm, to facilitate child delivery, for babies who have difficulties in getting their teeth and for stimulating the intellect and the memory for babies and young children. Babies even during the first day of their lives, specifically in West Africa, receive a drop of honey in the mouth. In Nigeria (Yoruba), it is used at wedding ceremonies as dowry (e.g. beer from honey as marriage is as sweet as honey) and naming ceremonies (honey put in the mouth of babies). It was also several times mentioned that pregnant women should not take it as it provokes an abortion (Cameroon: Bamileke; CAR: Gbaya; Chad: Goulaya; Kenya: Kamba; Niger: Hausa; Sudan: Kuku;). It is also used as offers for the ancestors (Madagascar).

For all these uses of honey mentioned above, a pot of honey seems to be present in all African households.

### Bee wax

Bee wax is used for closing holes in containers (Cameroon: Beti-Ewondo; Burundi: Hutu; Kenya: Kamba, Luo; Togo: Akebu; Zambia: Lovale, Tonga), for making candles (Cameroon: Bamileke; Zambia: Tonga) and for treating music instruments such as drums (DRC: Teke; Zambia:

Luvale) hand pianos (Cameroon: Bamileke; Zambia: Tonga), and string instruments (Cameroon: Bamileke; Kenya: Luo). Bee wax in Sudan is used as a cosmetic, mixing it with sesame oil for the hair (Fulani, Mahas, RES) or the skin (Nubian; RES).

## Ants

Weaver ants of the genus *Oecophylla* construct nests in trees by weaving together leaves using larval silk. In Australia and south east Asia these ants are used as biological control agents (41). But this was only once meant by one informant from Pemba Zanzibar, whose father used it. The African species is *Oecophylla longinoda*. Mostly it was mentioned that it is used as aphrodisiac (Cameroon: Bafia, Beti-Eton, Beti-Ewondo, Bamileke) and as medicine to cure asthma/cough (Cameroon: Bani-Pahuin; Zanzibar, Pemba), or rheumatism (Togo: RES), often by boiling the nest with ants and adding some medicinal plants. In Benin, a powder or concoction of *Formica* spp. with certain plants is used against ulcers, malaria, jaundice, enuresis, and memory loss (the last one also mixed with honey which is generally believed to stimulate memory) (34).

To cure children of about 4–5 years old from bed-wetting, they are put in a disturbed ant nest (of *Myrmecaria opaciventris*); it seems to be more than just a punishment (Cameroon: Bamileke, Wimbound; Tanzania: Sukuma). The ants can also be put in the bed of the child (Cameroon: Bakossi; Zambia: Sekeseke, REF). To stimulate children to walk, the powder of crushed ants is smeared on scars made in the legs (Zambia: Tonga). When a baby receives the very painful bite by the ant species *Brachyponera sennaarensis*, the child will walk precociously (Cameroon: Bamileke).

When ants are going to where people have urinated, it is a sign that the person is diabetic (Zanzibar).

## Wasps

Wasp nests are often used as medicine, but several informants did not know for which problem (Mali: Minka; Niger: Huasa, Songhai; Tanzania: Iraqw; Togo: Ewe, Kabye). In Central and West Africa often the cure of mumps (viral infection causing swelling of the salivary glands) was mentioned (Benin: Bariba, Fon, Goun, Nagot, Popo, Tori; Cameroon: Bafia, Bakossie, Bamileke, Bassas; Chad: Sara-Kaba; Nigeria: Yoruba; Togo: Ewe). The earthen nest is crushed, mixed with water and the paste is put on the cheeks of children. Not only in sub-Saharan Africa but also in the Amazon this is practised by ethnic groups to relieve symptoms (killing pain and lowering fever)(42). Minerals in the mud function probably act as pharmaceuticals (43). This probably also explains the practice for other problems such as rheumatism (Nigeria; Sudan: Kuku), quicker closing of the fontanel of babies (Togo: Cotocoli), throat infections (Mali: Sarakolé), sinusitis (Mozambique: Bitonga, Tsonga-Rhonga), boils, ulcers and other inflammations (Burkina Faso: Mossi; Cameroon: Bamileke; CAR: Kari; Togo: Ewe; Zambia: Tonga), and a headache (Mali: Tuareg; Mozambique: Shona). Like termite soil it is also used as a plaster (Mali: Tuareg), see also van Huis (15).

## Religion and superstition

Social insects are sometimes used in marriages such that the man comes always home. For example, giving the husband a drink made from a wasp nest (Zambia: Nyanja). Probably because the wasp always returns home.

## Bees

When a swarm attacks people, it is generally believed that the bees have been sent by an enemy, often with the intend to kill somebody [Benin: Fon, Goun, Nagot, Popo; Burkina Faso: Mossi; Burundi: Hutu; Cameroon: Bamileke, Banen, Bulu-Doula, Matha; Chad: Goulaye; Mali: Songhai; Niger: Songhai; Nigeria: Ebibio, Yoruba, Unknown; Senegal: Diola, Serer; Rwanda : Kiga-Toro; South Africa: Xhosa - Hirst (44); Tanzania: Chaga, Mwarusha; Togo: Akebu, Ewe; Uganda: Ganda, Busoga; Zambia: Lunda, Tonga]. Witchdoctors are involved, either to send the bees if you wish to punish somebody or to find out what is wrong and what you should do to deal with the problem. In Cameroon wild bees are sent to kill somebody who has sworn a false oath (45; p. 166). The Sara-Niellim in Chad have an accused person to put the hand in a beehive and when not stung he is not considered to be guilty (45; p. 116). In Senegal (Diola) for the independence of Casamance (Senegal) in 1980 (46; p. 305), there was a rumour that all persons being allochthones would be attacked. Therefore, they advised the Diola to tie a red string around the wrist. Although everybody was wearing the red string the bees eventually were not sent. Bees are also applied in warfare [Cameroon: Bolous; DRC: Mbochi, Teke; Nigeria: Tiv (47)], e.g. in Tchad when there was a war between the Moundang and the Foulbé or in Kenya when there was a fight between the Kamba and the Masai.

When a swarm of bees comes to the house it is mainly perceived as a bad omen showing that a terrible thing is about to happen to the family [Cameroon: Bassas; Kenya: Luo; Nigeria: Ngwa (47); Tanzania: Chaga, Mwarusha; Togo: Cotocoli]. However, some indicated that it could also be a sign of luck or richness (Kenya: Kikuyu; Tanzania: Chaga, Sukuma).

The arrival of single bee in the house who flies around somebody or which settles on somebody, is a sign of: 1) getting good news (Burkina Faso: Mossi; Cameroon: Bamileke; Chad: Goulaye; Madagascar; Mali: Mande-Malinke, Tuareg; Mozambique: Ronga; Niger: Hausa; Tanzania: Chaga, Iraqw, Digo, Mwarusha, Zanaki); 2) getting a visitor [Cameroon: Bamileke; Kenya: Kikuyu, Luo; Nigeria: Ibibio, Tiv - Dike and Onwuka (47); Rwanda: Toro; Senegal: Bainuk; Tanzania: Iraqw; Uganda: Bunyoro, Ganda, Busoga, Nyoro; Zambia: Tonga; Zimbabwe: Shona, Zezuru]; 3) or an ancestor (Burkina Faso: Mossi).

It was regularly mentioned that one must be careful with perfume as this agitates bees (Niger: Hausa, Kanuri; Sudan: RES). Also Ehrhardt (48) warned not to use perfumes and scented products that attracts and agitates bees and wasps.

Several ethnic groups in sub-Saharan Africa have the bee as their totem (45; p. 114), e.g. the Nandi in Kenya seem to be able to control the bees (49) or the Bakoanda in Zambia, who make beer from honey (50; p. 182).

I bought from a witch doctor at a local market in Lomé Togo a fetish which contained the powder of a bee and wasp. This was put in a small fetish called "Woanyinou" in Fon (Fig. 3). While conducting some rituals you must put it in your house as an assurance of two people (husband and wife) staying together (probably because it concerns social insects). The use of the bee as a fetish (amulet) was also mentioned in Benin (Goun).

## Honey

Honey is mentioned in the Qur'an mainly because of the many medicinal values (51). Honey was mixed with ink in Islamic writings (52; p. 705, 53), for example by writing the verses of the Qur'an in Arabic on boards. The ink is washed off when they have finished to write a new text on the board. Believers often drink the water used to wash the board as it brings spiritual and medicinal benefits. When it is about intelligence one should put honey in the water (Gambia: Madinka; Niger: Hausa, Kanuri, Songhai; Senegal: Halpulaar). This water with honey is called "Nassi" (54; p. 40) and according to an informant from Gambia the water should always be mixed with honey. In burials honey made be put in the graves or honey beer used in ceremonies for ancestors (Madagascar) (45; p. 111).

## Ants

Ants or ant nests are very much associated with witchdoctors, in particular when one is bitten (Benin: Fon, Popo; Burkina Faso: Mossi; Cameroon: Bafia, Bamileke, Bolous; Niger: Hausa; Senegal: Diola; Togo: Ewe; Uganda: Ganda; Zanzibar). It is either that the ants are sent by witchdoctors to do harm or that they transform themselves into driver ants. The ant nests are also associated with devils or ancestors (Mali: Tuarag; Niger: Djerma), also to expel demons (Niger: Songhai). Therefore, offers are made on the ant nest (Burkina Faso: Mossi; Mali: Senufo; Niger: Djerma; Togo: Cotocoli).

One informant from Togo (Mina) told me that when a baby is left in the shade under a tree and that the driver ants eat the baby that this is not an accident but that the driver ants were sent by somebody. In Chap. 16 of the book "Ants" by Hölldobler and Wilson (12) reference was made by somebody in Ghana who was told of an incident in which driver ants killed a baby left beneath a tree while its mother tilled the family garden. From Togo (RES) I was also told that wild animals also fear the driver ants. There is a proverb by the Yoruba in Senegal "if they unite, ants can kill an elephant" (55; p. 17). Another proverb indicates that a witchdoctor can eat everything except a driver ant (Togo: RES).

Driver ants maybe put on sensible places of the corps by witchdoctors as an ordeal to interrogate accused persons (56; p. 190). Driver ants are also used during circumcision in which soldier ants are up on the penis and the men must stay firm and not scream (Kenya: Kalenjin Tugen, Kamba). For female circumcision, Garnier and Fralon (56; p. 70) mention the use of ants.

Driver ants when coming to the house are considered a bad omen (Nigeria: Yoruba), e.g. a relative may die (Uganda: Busoga, Ganda, Nyoro; Zambia: Lozi) or a punishment (Kenya: Luo).

However, if you come across a trail of ants (driver ants or small ants), it may bring luck (Tanzania: Chaga) or fortune, in particular when they carry food or eggs (Chad: Goulaye; Tanzania: Iraqw; Togo: Akebu, Cotocoli; Zambia: Ila, Lunda, Namwanga, Tonga; Zimbabwe: Shona). In Nigeria (Tiv) when somebody encounters such an ant trail he will check whether they carry termites, because then his journey will be fortunate (57). In Zambia (Nkoya) when a hunter comes across a stink ant (*Megaponera* sp.) with booty, he knows he will soon bring back a lot of meat to the village (58; p. 27). It may also be a sign that the rain is coming (Burkina Faso: Mossi; Kenya: Kalenjin; Zanzibar). In Tchad (Ngambaye) it was mentioned that when the winged ants come out, that fishing will be excellent.

It was also mentioned several times in Niger (Hausa, Songhai) and Sudan (Gaälien) that the rainbow (snake) comes out of an ant nest and obstructs the rain. Rainbows are often associated with stopping the rain, e.g. in Kenya by the Luhya (59; p. 77); this is a similar story told



for termite mounds (15).

Many of my informants in Madagascar mentioned a story of ants and snakes. The story goes that when a snake enters a hole in the ground that the ants narrow the opening such that the snake cannot escape. Then they feed the snake and when well-fed, they devour the snake. The story is confirmed by Anderson (60; page 105) who indicated that the story is universally believed by the Malagasy. Missionaries apparently dissected ant nest to verify the story, however they were not able to confirm or deny it. There is even a very early publication (61), which tell this story and which stresses that the local population firmly beliefs in it. My informants indicated that it relates to the following endemic snakes: the blonde hognose snake, *Leioheterodon modestus*; and the Dumeril's boa or the Madagascar ground boa (*Acrantophis dumerilii*). A recent scientific publication (62) may shed some light on the story. The ant *Aphaenogaster swammerdami* host the snake *Madagascarophis colubrinus*, in its nest and it is not being attacked. The likely reason is that the latter snake feeds on the blindsnake *Madatyphlops decorsei*, which is specialized in feeding on termites and ants. So, the ant protects their colonies against this blindsnake through symbiosis with *M. colubrinus*, which the Malagasy also call "the ant's mother".

In general, when you have tiny ants in the house it is good sign often in terms of money (Benin: Bariba, Nagot; Chad : Ngambaye; Mali: Songhai; Nigeria: Yoruba) while in Benin (Fon) associate this with twins and the ants are there to protect the house and one puts maize flour and red palm oil on their trail. Giving them grains is also a method to let them disappear (Senegal: Wolof).

The Bamileke in Cameroon practice "La Culte des Crânes," based on devotion to the skulls of ancestors (63). Descendants must fulfil traditional duties with the ancestral skull, as ancestors can help descendants or punish them with illness or other misfortunes. One of my Bamileke informants from Cameroon told me that after five years they dig the skulls out and put them in a special house. Rituals are carried out, among which the use of palm oils which is poured over the skulls. It is considered a bad sign if the oil is not removed by ants (likely *Myrmecaria opaciventris*).

In Cameroon, a driver ant (*Dorylus* spp.) called "Jaglavak" is considered by the Mofu the chief of the Mandara Mountains of northern Cameroon, while other ants constitute "local chiefs" (28, 64). While the panther the Mofu chief are one and the same, the Jaglavak is held the role of "prince of insects." A sub-ethnic group of the Mofu, the Movo, because of an ancient alliance, are like the Jaglavak and feared for their power to harm. The ant is believed to aid the Movo in times of trouble, including cleaning up their compounds by chasing out vermin-infested dwellings.

## Wasps

One mixes the ground up wasp or the nest with larvae in dog feed in order to make him more vicious (Burkina Faso: Mossi; Kenya: Kamba; Mozambique: Nchope, Tsonga-Changana; Rwanda: Toro; Uganda: Bunyoro, Ganda, Nyoro). Also it is believed that when a ground wasp is put on scars on the fist (Zambia: Lozi, Tonga; Zimbabwe: Ndebele, Shona, Zezuru) or to rub a wasp or the nest between the hands (Burkina Faso: Mossi; Niger: Hausa; Zambia: Lovale, Namwanga; Zimbabwe: Shona), that one can really hit somebody hard.

Women use wasp nests (in a drink) when they cannot become pregnant or when wanting to prevent an abortion (Togo: Ewe; Zambia: RES), to facilitate delivery (Zimbabwe: Shona) or against menstrual pain (Togo: Res).

In Madagascar it was generally considered that when a dauber wasp starts constructing his nest in the house that this is a good sign such as: a wife becoming or being pregnant (also mentioned in Burundi: Hutu), richness and prosperity. Informants from several other countries mentioned that you should absolutely leave a wasp nest in the house, as it protects the house and the owner against evil persons and against witches (Senegal: Bainuk, Diola; Cameroon: Bamileke, Bassas, Bolous; DRC: Mbochi; Tanzania: Iraqw). However, for other ethnic groups in the different countries the information was very contradictory: some leave the nests as a sign of prosperity and others remove them as it is considered a bad omen.

## Tales and proverbs

### Bees

One of the myths about honey by the Masay is: When God gave cattle to man, the first woman, Naiterogob, gave birth to their first child, the son Sindillo, who later helped his father in keeping the cattle. One day, when looking at a bee swarm in a hollow tree, the son discovered the honey and brought it to his fathers' kraal. Since then honey is food for the Masai (45; p. 110).

In Nigeria, practically all the 200.000 traditional healers use honey in some of their medical preparations. This is rooted in the cultural history of the people. The medicinal and spiritual value of honey can be found in the spiritual literature called "Ifa" (65). The honeybee was sent by God from heaven to this earth. When the bee did not produce 'children' in the town Ile-Igbon she went to a place called Shaki where

she found many trees with holes in it. She settled in one of them and laid eggs. When the population increased, they swarmed to other trees and from there to other places of the earth. The second chapter of 'Ifa' is called 'Oyeke meji' and an excerpt:

They were coming from heaven for a life on earth

They all feared the eminence of disease and infirmity on earth

They were asked to make rituals of appeasement and sacrifice  
On getting to the earth

They were all free from disease and infirmity

As they were dancing in the home of Oyin (bee)  
They were drumming in the house of Ado (a type of bee)

The home of Fuun-Fuun (another type of bee) was not less joyous

Who does not know that the home of the bee is never bitter?

*No one puts honey in the mouth and frowns.*

The different San people from southern Africa all have different creation myths but always the praying mantis plays an important role (66; p. 75) such as in this story: Mantis was sent to find the purpose of life when earth was covered with water and asked the bee to guide and carry him. However, Mantis was heavy and finally he put Mantis in the heart of a white flower. The bee planted the first seed of a human being in Mantis and then died. This was the story of the birth of the first San (67).

Proverbs dealing with bee or honey:

- 'His words are as sweet as honey (hassel), but his deeds are like the smell of onions (Bassel)', so it rhymes for the Mahas in Sudan.
- "A newly born baby is given honey and Aloë in order to make it realize to meet both with sweet and bitter experiences in life" (Swahili) (68; p. 37)
- "The bee has not got two stings" (Kenya: Kikuyu) (69; p. 91). Greedy people who always want more.
- "Leave some honey for the honey bird who led you to it." (South Africa: Zulu) (55; p. 55). This bird is called "the greater honeyguide, *Indicator indicator* (Piciformes: Indicatoridae), only occurring in sub-Saharan Africa and which leads human honey-hunters to wild bees' nests (70). This to ensure that the bird can eat the eggs, larvae, and pupae and even wax (one of the few birds that can digest wax) left behind by the humans. Honey hunters always leave some honey for the honey bird. The bird is also mentioned by Seyffert (45; p. 24) and even encountered by Livingstone (71; p. 216) in 1855.
- "A little idleness caused the ruin of beehive" (55; p. 67). The Kikuyus hang beehives in the crowns of trees, but when you do not check in time, the unattended beehive loaded with honey may fall and the honey is lost.

## Ants

In Benin, Nigeria, James Inneh, seventy-nine years old, formerly a businessman, was in 1962, named commander of the royal guards, "isienwenro", by the king Akenzua. "Asako no s'oghionba" (ants sting the King's enemies), was how the royal guards responsible for the King's security, were called. During some rituals, they glide around the sovereign, completely enveloping him like an army of ants (<http://leconcurrent.over-blog.com/article-african-kings-47033015.html>).

Some proverbs dealing with ants from different countries:

- "It is not possible for the soldier driver ant to put on the trousers of a giant, but it is possible for the soldier driver ant to remove the trousers of a giant". Small things can cause severe damage (Nigeria: Yoruba).
- "I came across a long chain on the road but could not pick it up" (driver ants) (Swahili saying) (68)

## Wasps

There are many stories about why the wasps has such a slender waste (see also the information given in the background) (Fig. 4) and why they cannot reproduce. People seem to associate this with their incapacity to reproduce (Cameroon: Beti-Eton; Chad: Ngambaye, Mbaye; Uganda: Luo, Ganda). One is that the wasp had a normal waste, but when many people passed on the road talking, he came out of the nest

and placed his hands on his hips watching all this. He did it so long that his abdomen became constricted (almost two parts) (Nigeria: Yoruba). Another story from Senegal (Wolof) and Gambia: Jola. Mandinka) mentions that God was putting the soul in living beings and asked everybody to close the eyes during the event. But the wasp did not, reason that God took a rope and restricted the waist as a curse, so they could not get children anymore. Also mentioned by Ferry (72) in Senegal (Bedik, Mandinka) for the potter wasp *Delta emarginatum*. Therefore, the wasp must transform the insects brought to the nest to young wasps. Also, In Sudan (Rubatab) the restricted waste was mentioned as the cause of not being able to give birth, and that God therefore has given them as compensation the ability to collect caterpillars which can be transformed in wasps. In Burundi (Hutu) I was told that the wasp wanted to see the king, but the king refused, and the wasp started a hunger strike, reason that she is so thin. In Uganda: Bunyoro, Ganda, Nyoro) the resemblance with a wasp is also made when one adopts a child (not being able to have children of their own). In Uganda (Langi) there is also a story, that there was a feast in heaven. They had to fly and so the winged ones had to take the unwinged ones. So, the wasp got the elephant, but the weight of the elephant was so much that it caused the waste of the wasp to become restricted. The Bamileke in Cameroun (often mentioned that when parents are too occupied with their children: that they are like wasps, meaning that the children receive all the food they need but that the parents suffer (very thin). They (and the Toro in Rwanda) also call beautiful thin ladies, wasps.

There is a story of the Ila people from Zambia dealing with the mason wasp bringing fire from heaven (59; pp. 29–30, 73; p. 47). The birds and insects discussed how to get fire from heaven. So, a vulture, a fish eagle and a crow volunteered. However, only the mason wasp survived and rested after 30 days on a cloud. God observed and took pity on him, gave him fire, and told him to always build a house for his children near a fireplace, leave the eggs and return after several days to observe that the eggs change into wasps.

In Chad (Sara-Niellim) a story was told that the bee is intelligent, and that the wasp talks too much. The wasp did not have the patience to listen to the bee how he constructs the hive. The wasp only said, yes, I know. Therefore, the wasp knows how to construct a nest, but not how to collect honey. This to indicate people who do not have the patience to listen to somebody.

A proverb from The Fulani in Senegal: “The children do not exactly look like their parents, but they have their personality” (74). This corresponds with the story from Senegal at the beginning of this paragraph in which caterpillars are transformed in wasps.

## Art

In South Africa, there are many rock paintings depicting the activities of Stone Age honey hunters have recently been discovered and recorded, depicting bees, honeycombs, and bees’ nests or hives (75). Ladders were used and one shows a man with a bag on his shoulder climbing towards a cavity or nest from which many bees are flying.

In Cameroon (Bamileke, Beti-Eton) it was mentioned that *Oecophyla* ants are used by young girls to perform better the traditional dance.

In DRC (Mbochi) and in Nigeria (Yoruba) children trap a bee or bumblebee, put it a matchbox. When moving the box, the bee makes a buzzing sound, like music.

When San children from the central Kalahari caught a winged driver ant (*Dorylus* sp.), they put a twig in the anus and by the movements of the ant with its wings sing “let us take of the sister’s skirt and drink her urine together (26).

## Conclusions

The consumption of insects from Hymenoptera is mainly confined to that of the queen of the chief ant, *Carebara vidua*. This insect is eaten deliberately. Other hymenopterous insects maybe eaten but less intentionally such as bee larvae in honey or small ants in sugar, mainly because they are difficult to remove.

Bee stings in the Sudan are used for arthritis problems, as the venom seems to have bioactive properties. Honey is eaten all over sub-Saharan Africa, but the purpose of consumption is mostly medical (for numerous ailments), but it also used for its stimulating properties (e.g. improving memory), and in ceremonies. Bee wax is used as a cosmetic and for treating drums or strings of music instruments. The relation between the Islam and honey is shown for example by drinking a mix of honey and ink, with which religious texts are washed off from wooden boards. The medicinal action of honey is not only a traditional practice but has been proven in many scientific articles. In central and West Africa the use of wasp nest to cure mumps is very common, but in the rest of Africa it also used for other inflammations and this could be due to pharmaceuticals present in the mud of the ant nest.

I did not compare medicinal uses of these insects and their products with other parts of the world. However, reference to medical uses of ants, bees and wasps, can be found in review articles (76, 77), dealing with certain countries such as Brazil (78, 79), India (80, 81), China

(82), Japan (83) and the Republic of Korea (84) or concentrating on certain insects such as termites (85) and stingless bees and honey (86).

It is very difficult in traditional medicine to know whether a curative action is medical or whether a nonspecific psychological therapeutic effect of the substance or procedure (placebo effect) is involved. The distinction made in this chapter is arbitrary. The doctrine of signatures (*similia similibus curantur* - let likes be cured by likes) may be involved such as using fast running ants to encourage babies to walk or using painful stinging wasps to make a guard dog more vicious. It is also often difficult to know what is behind a widely believed story, such as the ants trapping a snake in Madagascar, but in this case a scientific explanation is provided.

Interesting is the behaviour or the appearance of the wasp which bring people to construct stories around it. One is that people see wasps bringing caterpillars to their nest and see emerging wasps afterwards, leading to stories about the sterility of the wasps, also expressed in proverbs. Or the very narrow waste of certain wasps which people try to explain by creating stories of how this happened.

Also, believes may not be the same all over Africa, such as whether a wasp nest in the house should be considered a good or bad omen. The same is true for a bee swarm entering the house, although when individual bees are entering a house it is generally considered a good omen. Bee swarms are feared all over Africa as they may have been sent by witchdoctors or people as a punishment. The same is true for the very much feared driver ants.

Ants, bees, and wasps are social insects and as such maybe employed to stimulate cohesion between people (such as between husband and wife).

The article shows that the appearance and characteristics of these insects are an inspiration for many stories, such as the narrow waste of the wasp. Also, it has been the inspiration to create proverbs which have an educational purpose.

## Abbreviations

CAR

Central African Republic; DRC:Democratic Republic of Congo; Lep.:Lepidoptera; RES:Resource persons; Sp(p):Species

## Declarations

## Ethics approval and consent to participate

Not applicable.

## Consent for publication

Not applicable.

## Availability of data and materials

The data that support the findings of this study are available from the author upon reasonable request. All data relating to the Hymenoptera generated or analysed during this study are included in this published article.

## Competing interests

The author declares that he has no competing interests.

## Funding

The funding for the study was provided by Wageningen University and Research.

## Author's contributions

The author is responsible for all parts of this paper. He conducted all the interviews personally, reviewed the literature, analysed the data, and wrote up the results.

## Acknowledgements

I gratefully acknowledge all the people who generously shared their knowledge with me.

## Author's information

Arnold van Huis is emeritus professor of Wageningen University & Research in the Netherlands. He worked as integrated pest management specialist for the Food and Agriculture Organization of the United Nations from 1974 to 1979 in Nicaragua, analysed and published the data collected in this country from 1997 to 1982 at Wageningen University, was leader of a Sahelian crop protection training project for the Netherlands' Ministry of Foreign Affairs from 1982 to 1985 in Niger, and worked afterwards as tropical entomologist at Wageningen University, the Netherlands. He is now fully engaged in the topic of insects as food and feed.

## References

1. Stork NE. How many species of insects and other terrestrial arthropods are there on earth? *Annu Rev Entomol.* 2018;63:31–45.
2. WaspWeb. Wasps, bees and ants of Africa and Madagascar  
WaspWeb. Wasps, bees and ants of Africa and Madagascar. [WaspWeb. http://waspweb.org/Afrotropical\\_wasps/index.htm](http://waspweb.org/Afrotropical_wasps/index.htm). Accessed 25 May 2020.
3. Robertson HG. Afrotropical ants (Hymenoptera: Formicidae): Taxonomic progress and estimation of species richness. *J Hymenopt Res.* 2000;9(1):71–84.
4. Coetzer W, Eardley C. Insights into 260 years of taxonomic research gained from the Catalogue of Afrotropical Bees. *Afr Invertebrates.* 2019;60:291–318.
5. Pickett KM, Carpenter JM. Simultaneous analysis and the origin of eusociality in the Vespidae (Insecta: Hymenoptera). *Arthropod Syst Phylogeny.* 2010;68:3–33.
6. Pulawski WJ. Catalog of Sphecidae sensu lato (= Apoidea excluding Apidae).  
[http://researcharchive.calacademy.org/research/entomology/entomology\\_resources/hymenoptera/sphecidae/number\\_of\\_species.pdf](http://researcharchive.calacademy.org/research/entomology/entomology_resources/hymenoptera/sphecidae/number_of_species.pdf). Accessed 25 May 2020. 2019.
7. Hepburn HR, Radloff SE. Honeybees of Africa. Berlin: Springer Verlag; 1998. p. 35.
8. Whitfield CW, Behura SK, Berlocher SH, Clark AG, Johnston JS, Sheppard WS, et al. Thrive out of Africa: ancient and recent expansions of the honey bee, *Apis mellifera*. *Sci.* 2006;314(5799):642–5.
9. Weseloh RM. Predation/Predatory insects. In: Resh VH, Cardé, TT, editors. *Encyclopedia of Insects.* Amsterdam: Academic Press; 2003. pp. 945–7.
10. DeLong DM. Man in a world of insects. *Ohio J Sci.* 1960;60:193–206.
11. Akre RD, Reed HC. Ants, wasps, and bees (Hymenoptera). In: Mullen G, Durden L, editors. *Med Vet Entomol.* San Diego: Academic Press; 2002. pp. 383–409.
12. Hölldobler B, Wilson EO. *The Ants.* Cambridge: Mass Harvard University Press; 1990.
13. Mahar R. Effect of varied disturbance types on *Dorylus (Anomma) molestus* defensive behavior in the West Usumbara Mountains, Tanzania. Independent Study Project (ISP) Collection 2349 [https://digitalcollections.sit.edu/cgi/viewcontent.cgi?article=3379&context=isp\\_collection](https://digitalcollections.sit.edu/cgi/viewcontent.cgi?article=3379&context=isp_collection) Accessed 25 May 2020. 2016.
14. Van Huis A. Medical and stimulating properties ascribed to arthropods and their products in sub-Saharan Africa. In Motte-Flora E, Thomas JMC, editors *Les insectes dans la tradition orale - Insects in oral literature and tradition.* 2002.
15. Van Huis A. Cultural significance of termites in sub-Saharan Africa. *J Ethnobiol Ethnomed.* 2017;13:8.
16. Van Huis A. Cultural significance of Lepidoptera in sub-Saharan Africa. *J Ethnobiol Ethnomed.* 2019;15:26.
17. Van Huis A. The traditional use of arthropods in Sub Saharan Africa. *Proc Exp Appl Entomol (NEV Amsterdam).* 1996;7:3–20.
18. Van Huis A. Insects as food in sub-Saharan Africa. *Insect Sci Appl.* 2003;23:163–85.
19. Wikipedia C. Ethnic groups in Africa by country. [https://en.wikipedia.org/wiki/Category:Ethnic\\_groups\\_in\\_Africa\\_by\\_country](https://en.wikipedia.org/wiki/Category:Ethnic_groups_in_Africa_by_country). Accessed 25 May 2020.

20. Joshua project: countries. <https://joshuaproject.net/countries/>. Accessed 25 May 2020.
21. Ogutu MA. Sedentary hunting and gathering among the Tugen of Baringo District in Kenya. *Sprache Geschichte in Afrika*. 1986;7:323–38.
22. Bequaert J. Insects as food. How they have augmented the food supply of mankind in early and recent years. *J Am Mus Nat Hist*. 1921;21:191–200.
23. Ayieko MA, Kinyuru N, Ndong'a MF, Kenji GM. Nutritional value and consumption of black ants (*Carebara vidua* Smith) from the Lake Victoria Region in Kenya. *Adv J Food Sci Technol*. 2012;4:39–45.
24. Wheeler WM. *Ants: their structure, development and behaviour*. New York: Columbia University Press; 1965.
25. Lepage MG, Darlington JPEC. Observations on the ant *Carebara vidua* F. Smith preying on termites in Kenya. *J Nat Hist*. 1984;18:293–302.
26. Nonaka K. Ethnoentomology of the Central Kalahari San. *Afr Study Monogr (Supplementary Issue)*. 1996; 22:29–46.
27. Van Itterbeeck J, Sivongxay N, Praxaysombath B, Van Huis A. Indigenous knowledge of the edible weaver ant *Oecophylla smaragdina* Fabricius Hymenoptera: Formicidae from the Vientiane Plain, Lao PDR. *Ethnobiol Letters*. 2014;5:4–12.
28. Seignobos C. Jaglavak, prince des insectes chez les Mofu du Nord-Cameroun. In: Baroin C, Boutrais J, editors. *L'homme et l'animal dans le bassin du lac Tchad. Actes du colloque du reseau Mega-Tchad*. Orleans 15–17 octobre 1997. Paris: Editions IRD; 1999. pp. 299–304.
29. Bemus E. Graines sauvages Encyclopédie berbère, document G69 <https://journalsopenedition.org/encyclopedieberbere/1773> (consulted 7 January 2020). 1999.
30. Irvine FR. Supplementary and emergency food plants of West Africa. *Econ Bot*. 1952;6:23–40.
31. Azam MN, Ahmed MN, Biswas S, Ara N, Rahman MM, Hirashima A, et al. A review on bioactivities of honey bee venom. *Annu Res Rev Biol*. 2019;30:1–13.
32. Lee JA, Son MJ, Choi J, Jun JH, Kim J-I, Lee MS. Bee venom acupuncture for rheumatoid arthritis: a systematic review of randomised clinical trials. *BMJ Open*. 2014;4:e006140.
33. Aliyazicioglu R. Therapeutic effects of bee venom. *Chem Sci Int J*. 2019;26:1–5.
34. Loko LEY, Medegan Fagla S, Orobiyi A, Glinma B, Toffa J, Koukoui O, et al. Traditional knowledge of invertebrates used for medicine and magical–religious purposes by traditional healers and indigenous populations in the Plateau Department, Republic of Benin. *J Ethnobiol Ethnomed*. 2019;15:66.
35. Abeshu M, Geleta B. Medicinal uses of honey. *Biol Med*. 2016;8:279.
36. Basa B, Belay W, Tilahun A. Review on medicinal value of honeybee products. *Apitherapy Biol Med*. 2016;8:2.
37. Rana S, Mishra M, Yadav D, Subramani SK, Katare C, Prasad G. Medicinal uses of honey: a review on its benefits to human health. *Prog Nutr*. 2018;20:5–14.
38. AlRawi SN, Khidir A, Elnashar MS, Abdelrahim HA, Killawi AK, Hammoud MM, et al. Traditional Arabic & Islamic medicine: validation and empirical assessment of a conceptual model in Qatar. *BMC Complement Altern Med*. 2017;17:157.
39. Thanvi HMAA. Remedies from the Holy Qur'aan: an abridged translation of Al'maale Qur'aani. <https://issuu.com/cosmologer/docs/remedies-from-the-holy-quran-by-sha>. Accessed 25 May 2020. 2015.
40. Mohammed IN, Babikir HE. Traditional and spiritual medicine among Sudanese children with epilepsy. *Sudan J Paediatr*. 2013;13:31–7.
41. Van Mele P, Cuc NTT, Van Huis A. Direct and indirect influences of the weaver ant *Oecophylla smaragdina* on citrus farmers' pest perceptions and management practices in the Mekong Delta, Vietnam. *Int J Pest Manag*. 2002;48:225–32.
42. Rodrigues E, Lago JHG, Santos JdFL, Bitencourt ALV. Nests of “caba-leão” wasps (*Sceliphron* sp., Sphecidae) used in traditional medicine by riverine communities of the Jaú and Unini Rivers, Amazon, Brazil: ethnopharmacological, chemical and mineralogical aspects. *Rev Bras Farmacogn*. 2018;28:352–7.
43. Khurana IS, Kaur S, Kaur H, Khurana RK. Multifaceted role of clay minerals in pharmaceuticals. *Future Sci OA*. 2015;1:FSO6.
44. Hirst M. Dreams and Medicines: The perspective of Xhosa diviners and novices in the Eastern Cape, South Africa. *Indo-Pacific J Phenomenol*. 2005;5:1–22.
45. Seyffert C. *Biene und Honig im Volksleben der Afrikaner, mit besonderer Beruecksichtigung der Bienenzucht, ihrer Entstehung und Verbreitung*. Leipzig: R Voigtlaenders Verlag; 1930.
46. Williams VR. *Indigenous Peoples: An encyclopedia of culture, history, and threats to survival*. Santa Barbara: ABC-CLIO; 2020.

47. Dike O, Onwuka N. E. Entrepreneur perception and growth of beekeeping in Abia state, Nigeria. *Int J Phys Hum Geogr.* 2016;4:1–11.
48. Ehrhardt C. Bites: ants, arthropods and wasps. In: Colyar MR, editor. *Advancing practice: nursing procedures.* Philadelphia: FA Davis Company; 2015. pp. 20–4.
49. Ransome HM. Chapter I. Early times, p. 19–34; Chap. 22. Primitive peoples of today, In: Ransome HM, editor. *The sacred bee in ancient times and folklore.* Bridgwater: BBNO. 1986. p. 285–300.
50. Bodenheimer FS. *Insects as human food; a chapter of the ecology of man.* The Hague: Dr. W. Junk, Publishers.; 1951.
51. Purbafrani A, Hashemi SAG, Bayyenat S, Moghaddam HT, Saeidi M. The benefits of honey in holy Quran. *Int J Pediatr (Supplement 5).* 2014;2:67–73.
52. Meri JW. *Medieval Islamic civilization: An Encyclopedia.* Vol. 1. New York: Routledge; 2006.
53. Donaldson BA. The koran as magic. [https://www.nku.edu/~gartigw/teaching\\_files/Donaldson,%20Bess%20Allen%20\(1937\)%20-%20Koran%20as%20Magic.pdf](https://www.nku.edu/~gartigw/teaching_files/Donaldson,%20Bess%20Allen%20(1937)%20-%20Koran%20as%20Magic.pdf). Accessed 25 May 2020. 2020.
54. Dumestre G, Touré S. *Maléfices et manigances, chroniques maliennes.* Paris: Editions Karthala; 2007.
55. Korem AK, Abissath MK. *Traditional wisdom in African proverbs: 1915 proverbs from 40 African countries.* Accra: Publishing Trends Ltd.; 2004.
56. Garnier C, Fralon J. *Le fetichisme en Afrique Noire (Togo - Cameroun).* Paris: Payot; 1951.
57. East R. *Akiga's story: the Tiv tribe as seen by one of its members.* London: Oxford University Press; 1965. (first published in 1939).
58. Silow CA. Notes on Ngangela and Nkoya ethnozoology. *Ants and termites. Etnologiska Studier.* 1983. p. 36.
59. Parrinder G. *African mythology. Library of the world's myths and legends.* 1982.
60. Anderson T. *Reassembling the strange: naturalists, missionaries, and the environment of nineteenth-century Madagascar.* Lanham: Lexington Books; 2018.
61. Toy R. *Ants and serpents. The Antananarivo Annual and Madagascar Magazine.* 1875;1:125.
62. Jono T, Kojima Y, Mizuno T. Novel cooperative antipredator tactics of an ant specialized against a snake. *R Soc Open Sci.* 2019;6:190283.
63. Dumas-Champion F. *Le mort circoncis. Le culte des crânes dans les populations de la Haute Bénoué (Cameroun / Nigeria). Systèmes de pensée en Afrique noire.* 1989;9:33–73.
64. Seignobos C, Jean-Philippe D, Henri-Pierre A. *Les Mofu et leurs insectes. J Agric Tradit Bot Appl.* 1996;38:125–87.
65. Kolawole K. Medicinal value of honey in Nigeria. In: Sommeijer, MJ, Beetsma, J Boot, WJ, Robberts EJ, De Vries, R., editors. *Perspectives for honey production in the tropics, Proceedings of the symposium organised by the Netherlands Expertise Centre for Tropical Agricultural Resources (NECTAR) held in Utrecht, 18 December 1995.* 1997. p 138–148.
66. Leeming DA. *Creation Myths of the World: An Encyclopedia.* Santa Barbara: ABC-CLIO; 1937.
67. Anonymous. *The First Bushman / San. Tales and stories from Chrigi-in-Africa, Ranger of the San Clan.* [http://www.gateway-africa.com/stories/The\\_First\\_Bushman\\_San.html](http://www.gateway-africa.com/stories/The_First_Bushman_San.html). Accessed 25 May 2020.
68. Farsi SS. *Swahili sayings from Zanzibar. Vol. 1. Proverbs (52 pp), and Volume 2. Riddles and superstitions (37 pp).* Nairobi: Kenya Literature Bureau. 1999.
69. Barra G. *1000 Kikuyu proverbs (with translations and english equivalents).* Nairobi: Kenya Literature Bureau; 1991.
70. Spottiswoode CN, Begg KS, Begg CM. Reciprocal signaling in honeyguide-human mutualism. *Sci.* 2016;353(6297):387.
71. Livingstone D. *Missionary travels and researches in South Africa including a sketch of sixteen years' residence in the Interior of Africa. Volume II.* London: The Narrative Press; 2001.
72. Ferry MP. *Principaux invertébrés connus des populations du département de Kedougou (Senegal).* *Bull de l'IFAN.* 1980;42:502–23.
73. Allan T. *Stemmen van de voorouders: Afrikaanse mythen.* Amsterdam: Time Life Books; 1999.
74. Cabakulu M. *Dictionnaire des proverbes Africains.* 304 pp. Paris: Editions l'Harmattan; 1992.
75. Pager H. Rock paintings in Southern Africa showing bees and honey hunting. *Bee World.* 1973;54:61–8.
76. Meyer-Rochow VB. Therapeutic arthropods and other, largely terrestrial, folk-medicinally important invertebrates: a comparative survey and review. *J Ethnobiol Ethnomed.* 2017;13:9.
77. Costa-Neto EM. Entomotherapy, or the medicinal use of insects. *J Ethnobiol.* 2005;25:93–114.
78. Alves RRN, Neta RODS, Trovao DMdBM, Barbosa JEEdL, Barros AT, Dias TLP. Traditional uses of medicinal animals in the semi-arid region of northeastern Brazil. *J Ethnobiol Ethnomed.* 2012;8:41.

79. Costa Neto EM, Pacheco GM. Utilização medicinal de insetos no povoado de Pedra Branca, Terezinha S, Bahia, Brasil (*Medicinal use of insects in the county of Pedra Branca, Santa Terezinha, Bahia, Brazil*). Biotemas. 2005;18:113 – 33.
80. Zimian D, Yonghua Z, Xiwu G. Medicinal terrestrial arthropods in China. In: Paoletti MG, editor Ecological Implications of Minilivestock: potential of insects, rodents, frogs and snails New Hampshire: Science Publishers. 2005. p. 481–90.
81. Dutta L, Ghosh SS, Deka P, Deka K. Terrestrial edible insects and their therapeutic value in Moridhal Panchayat of Dhemaji district, Assam, Northeast- India. Int J Fauna Biol Stud. 2016;3:11–4.
82. Feng Y, Zhao M, He Z, Chen Z, Sun L. Research and utilization of medicinal insects in China. Entomol Res. 2009;39:313–6.
83. Mitsuhashi J. Traditonal entomophagy and medicinal use of insects in Japan. In: Motte-Florac E, Thomas JMC, editors. Les Insectes dans la tradition oral. Paris: Peeters-SELAF; 2002. pp. 357–65.
84. Pemberton RW. Contemporary use of insects and other arthropods in traditional korean medicine (hambang) in South Korea and elsewhere. In: Paoletti MG, editor. In. Ecological Implications of Minilivestock: potential of insects, rodents, frogs and snails. New Hampshire: Science Publishers; 2005. pp. 459–74.
85. Figueirêdo R, de REC, Vasconcellos, Policarpo A, Alves IS. RRN. Edible and medicinal termites: a global overview. J Ethnobiol Ethnomed. 2015;11:29.
86. Rao PV, Krishnan KT, Salleh N, Gan SH. Biological and therapeutic effects of honey produced by honey bees and stingless bees: a comparative review. Revista Brasileira de Farmacognosia. 2016;26(5):657–64.

## Figures





**Figure 1**

Dorsal view of ant *Dorylus gribodoi* (Hymenoptera: Formicidae) Source:

[https://commons.wikimedia.org/wiki/File:Dorylus\\_gribodoi\\_casent0172627\\_dorsal\\_1.jpg](https://commons.wikimedia.org/wiki/File:Dorylus_gribodoi_casent0172627_dorsal_1.jpg). Attribution: April Nobile / [www.AntWeb.org](http://www.AntWeb.org)



**Figure 2**

Dorsal view of ant *Carebara vidua* (Hymenoptera: Formicidae) Source: [https://commons.wikimedia.org/wiki/File:Carebara\\_vidua\\_casent0101463\\_dorsal\\_1.jpg](https://commons.wikimedia.org/wiki/File:Carebara_vidua_casent0101463_dorsal_1.jpg). Attribution: April Nobile. April Nobile / www.AntWeb.org



**Figure 3**

The amulet "Woanyinou" (Benin: Fon) containing powder of a bee and wasp (2.5 x 1 cm). Source: the author.



**Figure 4**

A wasp, a mud dauber, *Sceliphron* sp. (Hymenoptera: Sphecidae) with the narrow waste. Source: <https://commons.wikimedia.org/wiki/File:Sceliphron-mud-dauber.jpg>. Attribution: psionicman. Licensed under the Creative Commons Attribution 2.0 Generic license.