

Ethnoacarology: the cultural importance of Acari around the world

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ABSTRACT

Ethnobiology is the science that identifies, describes, and classifies organisms with a cultural importance that are utilized by a particular human group. The term ‘cultural importance’ refers to the way people perceive an organism either as food or ornament, the role they play in the myths and legends in a region or even their usage in religious and civic ceremonies. Despite the high biological diversity of Acari, their cultural importance has been poorly studied, with information scarce and scattered. In this paper, I define ethnoacarology as the branch of acarology that compiles, documents, and analyzes the cultural values given to mites and ticks by a particular human group. I conducted a bibliographic search in databases with a combination of words: articles were classified according to the cultural values given to Acari. Thirty articles were recovered: most of them focused on the traditional knowledge and management of Acari and tick-borne diseases and other acarosis. I recognized five categories for the cultural value of Acari: 1) vernacular and autochthonous names; 2) management of pests and diseases; 3) Acari in oral and written tradition; 4) Acari and toponymy, and 5) entomophagy and traditional medicine. Citizen science represents an opportunity for acarology to obtain this type of data faster. Making people part of an acarological community could derive in faster data obtention, alternative techniques for the management of pests and diseases, the revalidation of traditional knowledge, and the participation of society in decision-making that can open the door to obtaining financing, among other benefits.

Keywords citizen science; ethnobiology; traditional knowledge

Introduction

Ethnobiology is the science that identifies, describes, and classifies organisms with a cultural importance for a particular human group (Maldonado Koerdell 1940; Albuquerque and Alves 2016). The term ‘cultural importance’ refers to the way people perceive and use an organism either as food or ornament, the role they play in the myths and legends of a region, or even their usage in religious and civic ceremonies (Maldonado Koerdell 1940). This descriptive approach was addressed in the early days of this science, but currently ethnobiology is regarded as an interdisciplinary approach, with a greater cooperation among research from different areas to handle more complex problems where biological and cultural diversity are engaged (Sobral and Albuquerque 2016). Similar to biology, ethnobiology is divided according to the group of organisms studied, and accordingly ethnozoology is the field that studies animals at different levels such as the following: folk taxonomy, presence and importance of animals in tales, myths and legends, their ecological and cultural aspects, and the practices related to the usage, management and conservation of fauna resources (Santos Fita *et al.* 2009). With near 55 000 species (Zhang 2011) Acari are ubiquitous in every sort of aquatic, terrestrial and arboreal ecosystems; they can establish a broad range of interspecific relationships with vertebrates and invertebrates, and they are a major component of biological diversity (Walter and Proctor

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2013). In addition, Acari have agricultural, medical, and veterinary importance: they are pests, but they could be also used in biological control (Krantz 2009). Despite the high biological diversity of Acari, their cultural importance has been poorly studied with information on the subject scarce and scattered. Due to the above, the aim of this work was to compile the usage and cultural importance given to Acari around the world through a bibliographic search.

Material and methods

I conducted a bibliographic search on several databases such as BioOne, Google Scholar, and ResearchGate with the following combination of words: ‘Acari’, ‘mites’, ‘ticks’, ‘cultural’, ‘entomophagy’, ‘traditional knowledge’, ‘art’, ‘representation’, and ‘myths’. Articles were then classified according to the cultural values given to Acari. Inclusion criteria were set as follows: valid vernacular and autochthonous names were considered if the name was published in a dictionary, compendium book or an article resulting from a study with semi-structured questionnaires; names coined by a single person were excluded from the database. I constructed a word cloud to highlight the most frequent Acari taxonomic categories (order, family, and genus) that were referred to in the articles reviewed. For this purpose, I listed the implicit and explicit taxonomic categories of the articles; for example, for ‘ticks’ I only recognized the order Ixodida unless the authors mentioned the family or genus. Larger words in the word cloud indicate words that are more frequently mentioned. The word cloud was constructed with the Wordle™ software (Feinberg 2014).

Results and discussion

I introduce for the first time the term ethnoacarology defined as the branch of acarology that compiles, documents, and analyzes the cultural values given to these organisms by a particular human group. As a new developing field, ethnoacarology can be classified within the cognitive approach of ethnobiology (Albuquerque and Alves 2016), where the acarologist is concerned with how cultures perceive and know the Acari. This approach also includes the traditional knowledge that exists about their biology, management and even the prevention of Acari-transmitted diseases.

For this work, I analyzed 30 articles, the majority of them focused on the traditional knowledge and management of Acari and tick-borne diseases and other acariasis. The most frequent orders found in these articles were Ixodida, Trombidiformes, and Sarcoptiformes (Figure 1). I recognized five categories for the cultural importance of Acari: 1) vernacular and autochthonous names, 2) management of pests and diseases, 3) Acari in oral and written tradition, 4) Acari and toponymy, and 5) entomophagy and traditional medicine.

Vernacular and autochthonous names

In ethnozoology, there is a strong correlation between an animal with a given name and its cultural use: the most known/used/abundant animal will be given a name (Santos Fita and Costa Neto 2009). Most Acari are barely perceptible, and unfortunately for many people, they only become visible and known when they produce damage as pests or produce diseases (Walter and Proctor 2013). As might be expected, Acari that are locally named are those that are visible to the naked eye and produce some type of damage. In Mexico, ticks receive several local and autochthonous names according to their geographical location (Table 1). In Trinidad and Tobago, the local names ‘Garrapat’ and ‘Cayenne’ are used for the ticks *Rhipicephalus microplus* (Canestrini 1888) (Ixodida: Ixodidae) and *Amblyomma cajennense* (Fabricius 1757) (Ixodida: Ixodidae), respectively (Wanzala 2017). A similar case is found in Yucatan, Mexico where Mayan people have the word ‘peech’ for ticks in general, but they can differentiate ‘Sojolpeech’ (*Amblyomma* spp.) from ‘Bu’ultal peech’ (*R. microplus*) (Dzul-Rosado *et al.* 2020). In northern Tanzania, the Maasai tribe recognize the names ‘Armaheripus’



Figure 1 World cloud with the most frequently Acari taxonomic categories (order, family, and genus) referred in the articles reviewed. Larger sizes indicate words that were more frequently mentioned.

for *Amblyomma variegatum* (Fabricius 1794), ‘Endenuri/ Armaherikima’ for *Rhipicephalus decoloratus* Koch 1844, and ‘Armaheriodo’ for *Rhipicephalus appendiculatus* Neumann 1901 (Kioko *et al.* 2015).

Chiggers (Trombidiformes: Trombiculidae and Leeuwenhoekiidae) are known as ‘tlalzahuates’ (from Nahuatl language ‘tlalli’ that means ‘ground’, and ‘zahuatl’ that means ‘mange’), ‘aradores’ ‘baiburines’, ‘check’ech’, ‘güinas’ and ‘coloradillas’ in Mexico (Hoffmann 1990, 2003). In Paraguay, they are known as ‘piques’; while in Venezuela they are known as ‘sicotú’ and ‘niguas’ (Sánchez Silva 2011), and as ‘isangos’ in Peru (Beltrán *et al.* 2009). In Europe, the name ‘Herbstgrasmilben’ (which means ‘harvest mite or autumn chigger’) is reported from Germany for the species *Trombicula autumnalis* (Shaw 1790) (Trombidiformes: Trombiculidae) (Hoffmann 1990). Spider mites (Trombidiformes: Tetranychidae) are known as ‘aradores’ and ‘ácaros’ by farmers in Patzún, Guatemala (Morales and Perfecto 2000).

Table 1 Vernacular and autochthonous names given to Acari around the world.

Country	Vernacular or autochthonous name	Taxa referred	Language	References
Germany	Herbstgrasmilben	<i>Trombicula autumnalis</i> (Shaw 1790) (Trombidiformes: Trombiculidae)	German	Hoffmann 1990
Guatemala	Aradores, ácaros	Spider mites (Trombidiformes: Tetranychidae)	Spanish	Morales and Perfecto 2000
Mexico	Tlalajes	<i>Ornithodoros talaje</i> (Guérin-Méneville 1849) (Ixodida: Argasidae)	Spanish	Hoffmann 2003; Guzmán-Cornejo et al. 2019
	Turicatas	<i>Ornithodoros turicata</i> (Dugès 1876) (Ixodida: Argasidae)	Spanish	Hoffmann 2003; Guzmán-Cornejo et al. 2019
	Tostoneras, plateadas, conchudas	<i>Amblyomma mixtum</i> Koch 1844 (Ixodida: Ixodidae)	Spanish	Hoffmann 2003; Guzmán-Cornejo et al. 2019
	Pinillo	Larvae of ticks found on cattle	Spanish	Hoffmann 2003; Guzmán-Cornejo et al. 2019
	Peech	Ixodida	Mayan languages	Dzul-Rosado et al. 2020
	Sojolpeech	<i>Amblyomma</i> spp. (larvae) (Ixodida: Ixodidae)	Mayan languages	Dzul-Rosado et al. 2020
	Bu'ul'tal peech	<i>Rhipicephalus microplus</i> (Canestrini 1888) (Ixodida: Ixodidae)	Mayan languages	Dzul-Rosado et al. 2020
	Chipoti	Ixodida	Nahuatl from north Puebla	Zamora Islas 2016
	Kutgu	Ixodida	Hñāñhu (known also as Otomí language) from Hidalgo	Hernández Cruz and Victoria Torquemada 2010
	Tlalzahualt	<i>Eutrombicula alfreddugesi</i> (Oudemans 1910) (Trombiculidae)	Nahuatl from central Mexico	Hoffmann 1990
	Corucos or garrapatillas	<i>Dermanyssus gallinae</i> (De Geer 1778) (Mesostigmata: Dermanyssidae)	Spanish	Cruz-Reyes and Camargo-Camargo 2001; Hoffmann 2003
	Arador de la sarna	<i>Sarcoptes scabiei</i> De Geer 1778 (Sarcoptiformes: Sarcoptidae)	Spanish	Cruz-Reyes and Camargo-Camargo 2001
Paraguay	Piques	Trombiculidae (larvae)	Spanish	Sánchez Silva 2011
Peru	Isangos	Trombiculidae (larvae)	Spanish	Beltrán et al. 2009
Tanzania	Armaheripus	<i>Amblyomma variegatum</i> (Fabricius 1794) (Ixodida: Ixodidae)	Maasai	Kioko et al. 2015
	Endenuri, Armaherikima	<i>Rhipicephalus decoloratus</i> Koch, 1844 (Ixodida: Ixodidae)	Maasai	Kioko et al. 2015
	Armaheriod	<i>Rhipicephalus appendiculatus</i> Neumann 1901 (Ixodida: Ixodidae)	Maasai	Kioko et al. 2015
	Garrapat	<i>Rhipicephalus microplus</i> (Canestrini 1888) (Ixodida: Ixodidae)	Spanish from Trinidad and Tobago	Wanzala 2017
	Cayenne	<i>Amblyomma cajennense</i> (Fabricius 1757) (Ixodida: Ixodidae)	Spanish from Trinidad and Tobago	Wanzala 2017
Venezuela	Sicotú or nigüas	Trombiculidae (larvae)	Jirairan languages/ Spanish	Sánchez Silva 2011

Contrarily, the term ‘arador de la sarna’ is related to the species *Sarcoptes scabiei* De Geer 1778 (Sarcoptiformes: Sarcoptidae) in Mexico (Cruz-Reyes and Camargo-Camargo 2001). Fowl mites [Mesostigmata: Dermanyssidae: *Dermanyssus gallinae* (De Geer 1778)] are known as ‘corucos’ or ‘garrapatillas’ in Mexico (Cruz-Reyes and Camargo-Camargo 2001; Hoffmann 2003) (Table 1).

Management of pests and diseases

Several orders of Acari are implicated in crop damage and in the transmission of some devastating diseases in animals and humans. For this reason, people have sought traditional methods for the management of these pests and diseases. The use of medicinal plants has been reported against scabies (Sarcoptiformes: Sarcoptidae) (Wanzala 2017; Akram *et al.* 2019) and ticks on livestock (Habeeb 2010; Magwede *et al.* 2014; Wanzala 2017; Dhital 2018). Seven families of plants are used worldwide to control and prevent tick infestations (Pavela *et al.* 2016), and some species of grass have been used to avoid the host-seeking ticks by pastoralists (Wanzala 2017). Other local materials for tick control include salt water and soap water in Nepal (Dhital 2018).

In Colombia, the U’wa (Tunebos) people reported the use of a resin called ‘ótova’ or ‘otiva’ to heal the scars produced by trombiculid mites, as well as the use of ground tobacco to treat the local inflammation and pruritus (Sánchez Silva 2011).

In Morocco, berber-speaking beekeepers smoke the colonies with plants such as thyme and artemisia to control *Varroa* mites (Mesostigmata: Varroidae) (Roué *et al.* 2015).

Vernacular names for ticks are important to know in order to recognize them in semi-structured interviews and to elaborate management proposals and control measures. In some regions of Africa, tick-borne diseases receive a specific name: for example, ‘kukojowa damu’ which means ‘urination of red urine’ in Kurya language is used for babesiosis; ‘chintura’ and ‘amasiyo’ are names used for the East Coast Fever in Tanzania and Uganda, respectively, and ‘mageka’ for heart water disease in Tarime, Tanzania (Chenyambuga *et al.* 2010).

Acari in oral and written traditions

Acari appears in some proverbs around the world. In Mexico ‘más viejo que la sarna’ (older than mange) makes reference to the antiquity of the knowledge of this disease to make reference to something old (Hoffmann 2003). In Brazilian folklore, the riddle ‘Qual é o animal que consegue atravessar um rio com um boi na boca? O carrapato!’ (What animal can cross a river with an ox in its mouth? A tick!) is documented by Ribeiro *et al.* (2008). The answer refers to a tick that is attached to an ox while the latter crosses a river, as if the tick were carrying the ox in its ‘mouth’ (hypostome). The Chupacabra is an urban legend that was transmitted orally in a widespread manner in America in the 1990’s; the myth mentioned a canid-like animal that attacked goats in rural areas. Some authors argue that this mythical creature was in fact coyotes or feral dogs that suffered severe scabies (Cano and Palomo-Muñoz 2017). In Yucatán, Mexico, Mayan people associate the day of St. Francis of Assisi (October 4) with the appearance of ticks in the region (Dzul-Rosado *et al.* 2020). ‘Paper mites’ is a term used to describe various skin conditions among office workers that are convinced that they and their workspace are infested with dust mites (Sarcoptiformes: Pyroglyphidae), when in fact they are not (Mullen and OConnor 2019).

Despite their small-sized bodies, mites and ticks appear in the title of some books, for example ‘Allí te comerán las turicatas’ [There you will be eaten by the turicatas] by Rivera Garza (2013) or they have a main role in the development of the story as in the novel ‘Doctor Death’ by Kaaberbøl (2010). In this novel, the mite *Pneumonyssoides caninum* (Chandler & Ruhe, 1940) (Mesostigmata: Halarachnidae) was a key to solving a crime.

Acari and toponymy

Acari can also be used to name locations such as states. For example, in Mexico there are some locations such as Turicato, Michoacán and Garrapatas, Guerrero which are named after ticks. The Mexican state of Campeche means ‘place of snakes and ticks’ since the Mayan word ‘peech’ means ‘tick’ (Herrera Mares and Serrano González 2018). The name of the town San Simón Zihuatlán in Oaxaca State means ‘a place with scabies’ (Hoffmann 2007).

Entomophagy and traditional medicine

Although entomophagy is related to the study of edible insects, the term has been also used for other groups of arthropods (Mitsuhashi 2008). Evidence of Acari consumed by humans include a coprolite found in a cave from Utah, U.S.A. that contained a well-preserved tick, which was determined as a member of the genus *Dermacentor* (Ixodida: Ixodidae). The taphonomy found near the coprolite suggests that people consumed the ticks from the hunted hosts, which were apparently rabbits (Johnson *et al.* 2008). In caves of the Ozark Mountains located between Arkansas and Missouri, USA, some groups of insects, ticks and mites were also isolated from coprolites (Mitsuhashi 2008). The mite *Tyrophagus casei* Oudemans 1910 (Sarcoptiformes: Acaridae) is employed during the traditional production of Milbenkäse cheese, and this same species has a memorial in Würchwitz, Germany (Ribeiro *et al.*, 2009).

In Indian traditional medicine, the oil from the red velvet mite *Trombidium grandissimum* (Koch 1867) (Trombidiformes: Trombididae) is used against paralysis but also as an aphrodisiac and is known as “the Indian Viagra” (Mahawar and Jaroli 2008). There is a record of the use of powdered ticks to “attract and attach” love and lovers in Central Mexico, just like this group of Acari attaches to their hosts (Herrera Mares and Serrano González 2018).

Final considerations

Most Acari are conspicuous only to acarologists. This review shows that they acquire cultural importance in the moment when they become pests or produce damage. However, what if other groups of Acari are culturally important to a group people but we have not yet asked them? Are Acari really mostly invisible to non-acarologists? Citizen science and crowdsourcing have been popular in many scientific areas such as astronomy and ornithology (Dickinson *et al.* 2010), but others such as botany, mycology and arachnology have been explored recently (Dickinson *et al.* 2010; Wang *et al.* 2018). These tools are beneficial for scientists and society: as scientists, we get access to data that would not have been attainable through individual research, while citizens get the satisfaction of being involved in science (Welvaert and Caley 2016). A good example of citizen science power is the description of new species based on observations in social media, including oribatid mites (see Collins *et al.* 2011; Clause *et al.* 2020; Pfingstl *et al.* 2021), and the use of citizen science databases has helped to estimate the distribution areas and geographical expansion patterns for poorly known taxa (Wang *et al.* 2018). It is time for acarology to implement ethnoacarological and citizen science approaches in the development of projects. Making people part of an acarological community could derive in faster data obtention, alternative techniques for the management of pests and diseases, the revalidation of traditional knowledge, and the participation of society in decision-making that can open the door to obtaining financing, among other benefits.

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