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# "CURANDERISMO": HISTORICAL ZOOTHERAPY AMONG *CRIOLLO* INHABITANTS IN RURAL AREAS OF CÓRDOBA, ARGENTINA

## *"CURANDERISMO": ZOOTERAPIA HISTÓRICA ENTRE HABITANTES CRIOLLOS DE ÁREAS RURAIS DE CÓRDOBA, ARGENTINA*

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**Abstract:**

This article presents a compilation and analysis of animal-based remedies included, in the chapter corresponding to Córdoba, in the category of "curanderismo" in the National Folklore Survey (NFS). NFS is a general survey carried out in 1920 with the explicit objective of recording the traditional knowledge of the Creole inhabitants of Argentina. In the NFS, we can releved the records of 37 animal species (7 of them domestic), animal parts or animal-derived products, with 66 different uses. Of these species, just 9 (3 domestic and 6 wild) continue to be used, reflecting a loss of knowledge and practice about the use of zooterapeutics. The species were classified into 14 use categories, with a prevalence of diseases of the digestive system and diseases of the musculoskeletal system or connective tissue, which would reflect the living conditions of the populations addressed by the NFS. The NFS reveals a complex ethnomedical system that included local biodiversity but also elements of cultural syncretism. Paying attention to them may enrich our view of the daily life of current and past rural communities.

**Key words:** Animal-based remedies; historical ethnobiology; traditional ethnomedical system; National Folklore Survey; ethnobiology

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**"CURANDERISMO": HISTORICAL ZOOTHERAPY AMONG *CRIOLLO* INHABITANTS IN RURAL AREAS OF CÓRDOBA, ARGENTINA**

Resumo:

Este artigo apresenta uma compilação e análise de remédios de origem animal incluídos, em o capítulo correspondente a Córdoba, na categoria de "curanderismo" na Pesquisa Nacional Folclórica. Esta é uma pesquisa geral realizada em 1920 com o objetivo de registrar o conhecimento tradicional dos habitantes crioulos da Argentina. Nela podemos destacar os registros de 37 espécies animais (7 delas domésticas), partes animais ou produtos de origem animal, com 66 usos diferentes. Destas espécies, apenas 9 (3 domésticos e 6 selvagens) continuam a ser usados, refletindo uma perda de conhecimento e prática sobre o uso de zooterapêuticos. As espécies foram classificadas em 14 categorias de uso, com uma prevalência de doenças do aparelho digestivo e doenças do músculo, sistema esquelético ou tecido conjuntivo, o que refletiria as condições de vida do populações abordadas pela Pesquisa Nacional Folclórica. A Pesquisa revela um complexo sistema etnomédico que inclui a biodiversidade local, assim como elementos de sincretismo cultural, que pode enriquecer nossa visão da vida cotidiana das comunidades rurais atuais e do passado.

Palavras-chave: Remédios de origem animal; etnobiologia histórica; sistema etnomédico tradicional; Pesquisa Nacional Folclórica; etnobiologia

## 1. Introduction

Animals have been used as medicinal sources since ancient times; indeed, there are documented records as ancient as *De Materia Medica* by the Greek physician Dioscorides (circa 1st century BC) and even the *Ebers Papyri* (Egypt, 1550 BC), which mention and describe the use of zootherapeutic products (animals, parts or derived products used as medicines) (QUAVE AND PIERONI, 2013). The use of zootherapy is ancient and involves a great diversity of species; for example, a literature review revealed that at least 584 animal species are used in traditional medicine in Latin America (Alves and Alves, 2011).

This importance of traditional medicine, both in the number of species involved and in its continuity over time, is especially evident in rural communities. On the one hand, in rural areas, access to modern medicine is limited, because the distribution of official healt personnel may be uneven, with most being found in cities or other urban areas, and therefore difficult for rural populations to access (WHO, 2002), added to the distance between rural and urban areas. This is magnified in historical stages, where isolation, the scarcity of transportation and health personnel were certainly greater. On the other hand, the close and continuous interaction of populations with the environment (and even economic dependence on it) encourages the acquisition of knowledge about useful resources (ALVES et al., 2008; ALVES and ALVES, 2011). For instance, according the WHO (2002) many populations in developing countries are reported as depending heavily on traditional medicine to help meet their health care needs.

**"CURANDERISMO": HISTORICAL ZOOTHERAPY AMONG *CRIOLLO* INHABITANTS IN RURAL AREAS OF CÓRDOBA, ARGENTINA**

We understand the traditional medicine of the rural areas of Córdoba –and of most of the mestizo populations of Argentina– as a complex system that combines treatment through the use of natural resources with magical elements and propitiatory rituals (ARIAS TOLEDO, 2006; HILGERT and GIL, 2007; MARTÍNEZ and PLANCHUELO, 2003), applied individually or in combination to maintain well-being, in addition to treating, diagnosing and preventing diseases" (WHO, 2003). This ethnomedical system, which includes home medicine, is commonly referred to as "curanderismo" (folk medicine is probably the closest expression in English) and as such appears in the NFS. Curanderismo, according Idoyaga Molina (2001) is based on the use of plants and, to a lesser extent, of animals and minerals, in addition to the symbolic manipulation of sacred elements, generally of Catholic origin. Curanderismo, which usually includes the participation of specialists who deal with the manipulation of sacred elements, considers illness as an imbalance of different types (organic, social, environmental, etc.)

In this sense, research about the species used in traditional medicine is very important. However, while the plant species of medicinal use are deeply known, zootherapeutic resources have been scarcely explored (e.g. ALVES and ALVES 2011), with knowledge being currently fragmented and potentially incomplete. In Argentina, data on the use of animal remedies are quite scarce: Martínez and Barboza (2010) and Martínez (2013) sudiyng zootherapy among *toba* communities, Rosso and Pautasso (2017) in *mocqoit* communities and Scarpa (2004), Zamudio and Hilgert (2011), Hernández et al. (2015), Borghi et al. (2017), Castillo and Ladio (2017), and Battistón (2017) in mestizo communities. These works are of great value to understand the role of animal-based products in traditional medicine. Specifically in Córdoba we only recorded two studies that incorporate information about the medicinal use of animals, a specific one about zootherapy (Arias Toledo and Trillo 2014) and an ethnoornithological study (Arias Toledo and Trillo, 2017) that includes information about the medicinal use of some birds.

Zootherapy, as part of Traditional Ecological Knowledge –in the sense established by Berkes (1999)– is fundamentally oral, with direct transmission and, as such, sensitive to loss or resignifications (TORRICO CHALABE and TRILLO, 2019). Thus, studying historical sources and comparing them with current data allows us to describe the uses and customs of past human groups, as well as to make a dynamic comparison with the current state of human-environment relations. In this sense, having a written historical source that recovers oral knowledge, as the National Folklore Survey (NFS) of 1921, has enormous potential.

NFS was commissioned by the National Government and conducted by the teachers of the Láinez Schools (Ministerio de Educación, Ciencia y Tecnología, 2017); the survey is the first systematic compilation carried out in Argentina (AROVICH de BOGADO, 2005). As described by Scarpa and Rosso (2018) in their central ethnobiological publication based on the NFS, its primary objective was to survey and document different folkloric manifestations of oral production, and diverse cultural practices and popular religiosity aspects associated with plants and animals in Argentina. To do this, the National Council of Education entrusted teachers of the Láinez schools with the task of conducting a survey –following a standard scheme– to record those folkloric manifestations.

This contribution aims to describe and analyze the knowledge about the use of zootherapeutic products made by *Criollo* inhabitants of rural Córdoba in 1921, within the framework of their ethnomedical system, and then compare such knowledge with that held by current populations.

## 2. Material and methods

### 2.1. Study site

Córdoba is a Mediterranean province, located in the center of Argentina, with varied geographical regions and an altitudinal range from 400 to almost 3,000 meters above sea level. It belongs to the Chaco phytogeographic region (CABRERA, 1976); a mountain range with various altitudinal belts crosses the central-west zone from north to south, the south is characterized by wooded plains and grass steppes, and the northeast has one of the largest and most diverse wetlands in the world. "Criollos" population is distributed throughout the province, with a greater concentration in the mountainous area and the north of the province.

### 2.2. Involved population

The involved populations, both the present and the one involved in the NFS from 1920, identify themselves as "criollos", i.e., Hispanic mestizo descendants. The defining identity condition of criollos is being livestock producers, mainly of goat and sheep (CÁCERESET al, 2006; TRILLO, ARIAS TOLEDO and COLANTONIO, 2016), and to a lesser extent of cattle and horses; despite the lower production of cattle and horses, these animals have a high symbolic and identity value (ARIAS TOLEDO and TRILLO, 2018). The family economy was always complemented with the sale of products derived from livestock (meat, hides, wool, etc.) and nowadays also with informal jobs.

### 2.3. Material

The National Folklore Survey (NFS) of 1921 consists of 3,224 manuscript files (SCARPA and ROSSO, 2018), microfilmed and deposited in the Instituto Nacional de Antropología y Pensamiento Latinoamericano, Buenos Aires city, Argentina. For the present study, the microfilm rolls corresponding to the province of Córdoba (rolls 10, 11, 12, 13, 14 and 15) were used; those rolls gather the information collected from 94 schools in the province created by Law 4874 (Ley Láinez, Ministerio de Educación, Ciencia y Tecnología, 2007). The number of people interviewed in each school is not explicit in the survey, we can only assume, based on what was described by the teachers, that they interviewed key informants.

Each microfilm gathers a set of files corresponding to the reports of several schools, and usually contains the school number, the town and the name of the teacher conducting the survey. Exceptionally, one of the questionnaires was conducted by a female resident, as indicated in the document. As described by Scarpa and Rosso (2018) for other provinces, in the rolls corresponding to Córdoba, the length of the files varies from one page to several dozens.

The NFS, explicitly aimed at surveying folklore of Criollo origin, reflects the cultural dynamics characteristic of our territory. In this regard, the NFS contains the testimony of the teacher Agenor Soria, head of the School No. 64 of Balnearia, who recounts the difficulty of the requested task, because the Criollos "have been displaced to the forests, and locals made fun of them, they are reluctant to share knowledge". Then, he adds that "pressed by a patriotic duty, demanded by the authorities, I have had the need to appeal to the knowledge they acquired during childhood" (our translation). Even so, the NFS turned out to be a very rich source of information about oral production (including songs, poems, dances, legends, etc.) and local ethnobiological practices. This contribution addresses the information related to animals and their parts or derived products used for health care.

### 2.4. Methods

In the rolls, the data referring to animals were classified by the teachers into the categories "curanderismo" (folk medicine) and "supersticiones" (superstitions). The present work is based on the information gathered under the category "curanderismo". Several species were usually mentioned more than once in each school; however, as the nature of the data made it impossible to determine if each mentioned animal corresponded to different informants, or if all the species were recorded based on the same criteria, we only listed each species once per school.

The data obtained was used to generate a matrix that consisted of the ethnospecies (culturally defined species), its use, the number of schools in which it is mentioned and school identification. Then, a list of animals used in folk medicine was generated from the data matrix, indicating the diversity of uses of each species and their popular name as it was recorded in the NFS. Also, whenever possible, we included the inferred scientific name, understanding historical data as a primary source of information, as described in Rosso & Scarpa (2012). Consequently, to infer the scientific name we considered species distribution, usual popular name of each species and the description of each species, when NFS included them.

Subsequently, a species consensus indicator was obtained for each species by dividing the number of times each species was mentioned by the total number of zootherapeutic products mentioned.

The diversity of animals used in zootherapy according NFS was compared with the present uses of zootherapy, using as reference the works of Arias Toledo and Trillo (2014, 2017), which are the only publications that were found to include information about zootherapeutic remedies in the study area.

Finally, the frequencies of the ailments treated by taxonomic class were obtained.

## 3. Results

The Table 1 shows the animal species mentioned in the NFS as zootherapeutic products used in "curanderismo". Moreover, the species that are mentioned in published works as of current use in the province of Córdoba are indicated. The table includes 37 animal species (7 of them domestic), parts or derived products, with 66 different uses from a total of 283 records. Of these species, 9 (3 domestic and 6 wild) continue to be used.

Table 1. Diversity of animal species used in zootherapy and their uses, as indicated in the NFS, consensus index and current continuity of use

| Phyllo/Clase<br><br>*Scientific name*<br><br>Popular name in English/Local name<br><br>Persistence (Current use - CU) | Indication | Part used | Modes of use |
|---|---|---|---|
| Annelida/ Clitellata | | | |
| earthworm / lombriz | Earache | Whole | Cooked in duck fat and eaten |
| Arthropoda/Arachnida | | | |
| ...<br><br>spider / araña | Toothache | Hairy fings used to make a "talisman"<br><br>Poultice of fried spider | Worn as a "talisman"<br><br>("mígala")<br><br>Applied on affected tooth/teeth |
| | Hemorrhage | Web | Applied as a bandage on the affected area |
| | Intestinal inflammation | Web | Smoked as a cigarette made of anise beans, tobacco and spider web |
| ...<br><br>tick / garrapata | "Pático" (according NFS, childhood disease characterized by internal granulation of the mouth and throat preceded by continuous salivary; possibly herpangina) | Whole | A blood-filled tick is popped in the mouth |
| | Cold sores | Whole | A blood-filled tick popped in mouth |

| | | | |
|---|---|---|---|
| | Callus | Split tick | Applied on the affected area |
| …<br>"te busco y no te hallo" (indeterminated cocoon) | Toothache (prevention) | Whole | Worn as a "talisman" |
| …<br>cockroaches / cucaracha | Whooping cough | Whole | Consumed as a paste (made of ground cockroaches and put in the open air to receive dew at sunset) |
| …<br>cricket / grillo | "mal de orín" or "orina atajada" (urinary infection) | Left leg | Consumed as tea |
| | Encourage children to walk | Whole | Placed on the insole |
| …<br>ant / hormiga | Earache | eggs | |
| | Learn to play the guitar | Whole | Hands pùt in the ant nest of red ants |
| | Pático (see tick use) | … | … |
| | Rheumatism | Whole | Rubbed with "lion" (puma – *Puma concolor*) fat and with ants in alcohol |
| | "Canchas" (discolored skin area | Whole | Scrubbed on affected area with negras de palo ants |
| …<br>fly / mosca | Sty | abdomen | Rubbed on the affected eye, and then released "to carry the evil away" |
| *Pediculus humanus*<br>louse /piojo<br>CU | - "nubes en los ojos" (Cataracts) | Whole | Applied on the eyes |
| | -"Tirisa" | Whole | Consumed alive |
| Chordata/ Mammalia | | | |
| *Equus asinus* | - Avoidance of child nightmares | Hide | Put on the bed |

| | | | |
|---|---|---|---|
| donkey /burro-asno | -"enfermedad del costado" (Pneumonía) | Dung | … |
| | -Postpartum bleeding | Dung | Applied in vinegar on instep as "poutice" |
| *Equus ferus*<br>horse-colt / caballo-potro<br>CU | -"Culebrilla" (Herpes zoster ) | Dung | Applied as "poutice" |
| | "penis bleeding" | Dung | Prepared as "poutice" (boiled with oregano) and applied on the navel |
| *Homo sapiens*<br>humane/persona | Snake bites | Feces | Consumed as tea |
| *Lama guanicoe*<br>Guanaco | Dropsy | Guanaco kidney bezoar ("piedra bezoar") | … |
| | Neck pain | Leg | Rubbed on affected area |
| | Heart disease | Guanaco kidney bezoar ("piedra bezoar" o "piedra del cuajo") | Consumed mixed with deer blood |
| *Felis silvestris catus*<br>cat/gato | Bronchitis | Fur | Placed on the chest |
| | Asthma | Meat (of black cat) | Consumed |
| | Toothache | Hair (of black cat) | Applied on the affected tooth as poutice prepared with olive oil |
| | Snake bite | Whole | Open a cat alive and apply it to the bitten part |
| *Puma concolor*<br>puma<br>CU | Rheumatism | Grease | Rubbed |
| | Warts | Meat | Consumed |

| | | | |
|---|---|---|---|
| | Asthma | Leather | Wearing puma leather insole in shoes |
| *Tolypeutes matacus*<br>mataco | "Aire" (see description of "aire" in Martinez and Planchuelo, 2003) | Shell | hot shell rubbed on the affected part |
| | "Ura" (or "ora", semi illegible) | Head and blood | … |
| *Equus africanus x ferus*<br>mule/mula<br>CU | … | Ear wax (of black mule) | Fried in oil with a "coco" seed ("coco" probably refers to *Zanthoxylum coco*) |
| *Canis lupus familiaris*<br>dog/perro | dog bites | Fur (of the dog that bit the person) | Applied on the affected area |
| | dog bites (avoidance) | Tooth | Worn as an amulet |
| | Teething discomfort | Tooth (necklace)<br>Fur ("woolly" dog "wool") | Worn<br>Worn |
| | Indigestion | Manure (dried) | Consumed as tea |
| *Chaetophractus* spp.<br>armadillo/quirquincho | Backache | Tail | Tied to the arm |
| | "Clouds" (cataracts) | Fat | Apply in the eyes |
| | Rheumatism | Fat | Rubbed |
| | Snake bite | Skin/tail (bracelet) | Worn |
| | Abortifacient | Tail | … |
| | Male aphrodisiac | Tail | … |
| *Bos taurus*<br>cow/vaca | Paralysis (possibly polio) | Whole | "Crippled" child put in the still warm stomach of a recently opened animal |

| | | | |
|---|---|---|---|
| … | Snake "repellent" | Hide | Hung on eaves or walls to prevent snakes from approaching |
| deer / venado | Heart disease | Blood | Drops of blood in orange blossom water |
| *Conepatus chinga* | Pneumonia | Stomach | Consumed as tea |
| zorrino | | Liver (dry) | Consumed |
| | Headache | Hide | Inhaled |
| *Pseudolapex gymnocercus* | Dislocations | Fat | Rubbed |
| fox/zorro | Toothache | Bone of the penis | Applied on the affected part with that bone |
| | Hemorrhoids | Fur | Worn on the saddle |
| Chordata/ Aves | | | |
| *Rhea americana* | Indigestion | Crop | Consumed as tea, acts as a purgative |
| rhea/"avestruz" – ñandú | Encourages the child to walk | Tendon | Tied to the foot (along with putting the child in the cow's belly) |
| | Rheumatism | Fat | Rubbed |
| | "Aire" | Feather | Burned and smoke inhaled |
| *Mimus saturninus* | Encourage children's speech | Brain | Head hung |
| calandra lark/calandria | | Meat | Eaten |
| *Myopsitta monachus* | "Aire" | Eggs | Consumed |
| cata | Perspiration | Eggs | Consumed |
| *Vultur* spp. | Heart disease | Heart | Used as preparation with bezoar stone, jet, coral, condor heart, burnt sugar, water, brandy and eau de cologne |
| condor/condor | | | |
| *Gallus gallus* | Mumps | Fat | Rubbed |
| hen-rooster / gallina-gallo | Coughs | Fat | Rubbed |
| | Rheumatism | Fat | Rubbed |
| CU | Fever | Dead | Putt on the head |

| | | | |
|---|---|---|---|
| | Antitussive | Manure | Consumed as tea |
| | Ripening boils | Manure | Consumed as tea |
| | Snake bite (avoiding poisoning) | Whole | Avoided by killing three roosters |
| | Heal burns | Blood | Applied topically |
| …<br>owl / lechuza | "Ora" (when the face is tilted, according to NFS) | Whole (killed) | Applied on the face |
| | Digestive | Genital organs | Prepared as an "owl sex" poultice mixed with *vizcacha* manure |
| | Alcoholism | Eggs | Beaten in wine and consumed. |
| | Warts | | Look for a white stone in an owl cave and pray the Lord's prayer while going to the house |
| | Warts | Nest | Put one's hands in the owl's nest and leave without turning one's head. |
| …<br>dove/paloma | Heart attack (not specified if cured or prevented) | White pigeon's heart | Eaten raw |
| …<br>duck/pato | Earache | Whole | Introducing into the ear drops of the oil resulting from cook an earthworm in duck fat |
| *Nothoprocta* spp.<br>partridge / perdiz<br>CU | Encourage the child to walk | Manure | … |
| | Scabs from smallpox (removal) | Fat | Applied as poultice |
| …<br>hummingbird / picaflor | Stimulating a child's hands to be skilled | Nest | Burned and smoke inhaled |
| Chordata/ Reptilia | | | |
| *Tupinambis merianae* | Disinfectant properties | Fat | Applied topically |

| | | | |
|---|---|---|---|
| lizard / iguana (lagarto overo)<br><br>CU | Relieves "romadizo" | Fat | Applied topically |
| | Relieves rheumatism | Fat | Applied topically |
| | Heals snake bites | Fat | Applied topically |
| | Skin conditions | Fat | Applied topically |
| | Heal "sunburn" | Fat | Applied topically |
| | Cure toothaches | Tail | Tail rings put on cordial toe |
| *Boa constrictor occidentalis*<br><br>lampalagua o ampalagua | Waist pain | Skin | Worn tied around the waist |
| | Hair growth | Fat | Applied as an ointment on the hair (but when it is about to rain, the braid moves by itself) |
| ...<br><br>snake/víbora | Headache | Skin (headband of dry skin) | Worn |
| | Goiter | Bones (necklace) | Worn |
| | Tootaches | Fat | Applied topically |
| Chordata/ Amphibia | | | |
| ...<br><br>toad/sapo<br><br>CU | Toothaches | Whole<br><br>Bone<br><br>Whole | Toad's belly rubbed on the cheek<br><br>Used to pick and heal an affected tooth<br><br>side of the belly<br><br>Rubbed on the, crosswise, on the painful side, then open the toad mouth, it spits inside and leaves taking care that it does not go into the water for two hours, because if it does, the healing effect is lost |
| | Goiter | Whole | Toad's belly rubbed on the cheek |

CU: indicates species with verified current use

The diversity and frequency of zootherapeutic uses mentioned in the NFS is observed in Figure 1. The 66 different uses mentioned in the NFS are classified into 17 categories, 14 according the International Classification of Diseases (ICD-11 - https://icd.who.int/en) from the World Health Organization, and 3 cultural ("pasmo", "aire") or indeterminated (pático) syndromes ("pático",), where the original notation was respected. All these uses are described in Table 1.

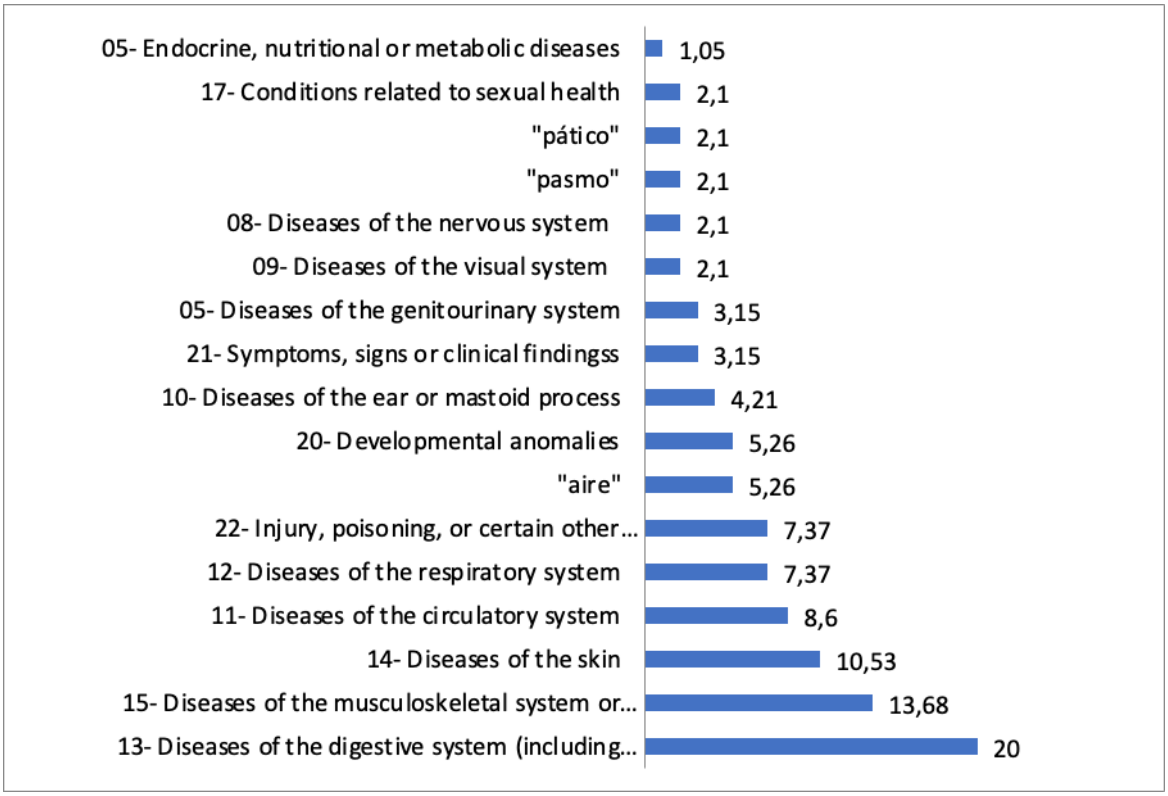


**Figure 1**. Frequency of conditions treated with zootherapic remedies according to the NFS

The description of the uses varies with some of them being clearly explained – including symptoms of the disease, parts used for its treatment, dosage, preparation and administration of the drug-, and others being briefly mentioned. However, a careful analysis is of great interest because the uses clearly reflect the health concerns of that time. Thus, the species used to treat toothache were found to present the greatest redundancy, with seven different species, of dissimilar phyla and classes, indicated for their treatment and/or prevention.

Regarding the frequency of used taxa, mammals are the most frequently mentioned (Figure 2), accounting for 37% of the records, followed by birds (29%), invertebrates (23%), reptiles (8%) and amphibians (3%).

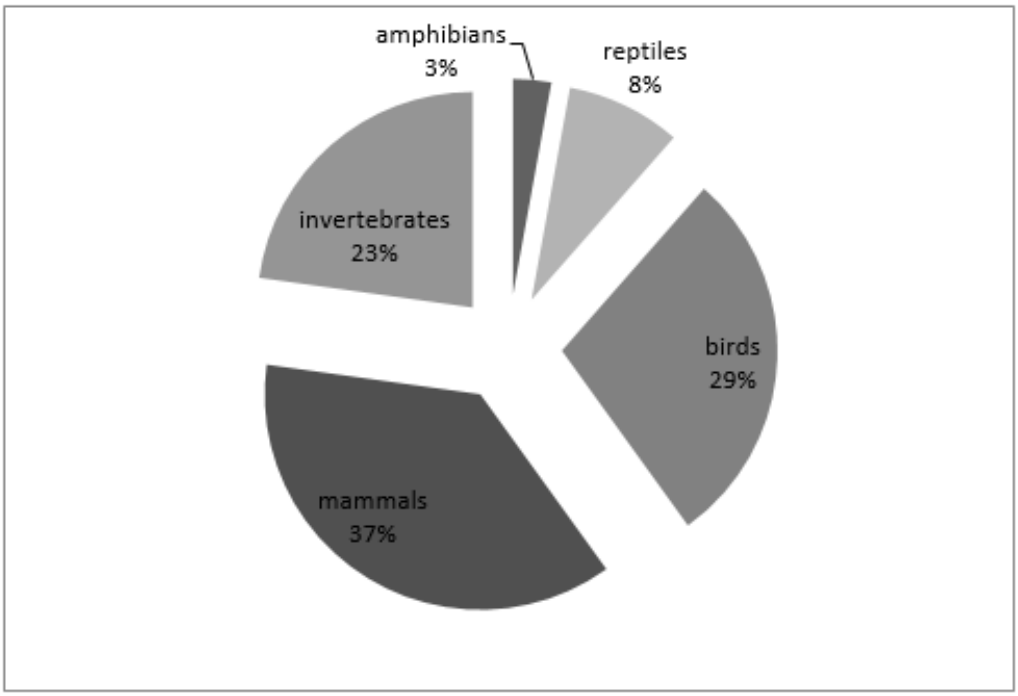


Figure 2. Frequency of use of each class

In this regard, interestingly, among the four species with the highest consensus –with two- or three-fold the number of records of the species immediately below in terms of number of citations (table 2) – there is only one mammal (domestic), followed by the only amphibian and two of the three reptiles recorded in the NFS.

Table 1. Number of diseases treated and Consesus index by specie

| Species in English/Local name | Number of diseases treated | Consensus index |
|---|---|---|
| horse-colt / caballo-potro | 11 | 0,0141 |
| cat/gato | 9 | 0,0424 |
| dog/perro | 8 | 0,1167 |
| hen-rooster / gallina-gallo | 8 | 0,0353 |
| iguana (lagarto overo) | 8 | 0,0777 |
| armadillo/quirquincho | 6 | 0,0177 |
| spider / araña | 5 | 0.0459 |
| ant / hormiga | 5 | 0,0177 |
| owl / lechuza | 5 | 0,0177 |
| donkey /burro-asno | 4 | 0,0106 |
| rhea/"avestruz" – ñandú | 4 | 0,0318 |

| | | |
|---|---|---|
| earthworm / lombriz | 3 | 0,004 |
| guanaco | 3 | 0,0106 |
| puma | 3 | 0,0424 |
| zorrino | 3 | 0,0282 |
| fox/zorro | 3 | 0,0177 |
| snake/víbora | 3 | 0,0706 |
| toad/sapo | 3 | 0,1167 |
| cata | 2 | 0,004 |
| tick / garrapata | 2 | 0.0353 |
| cricket / grillo | 2 | 0,0247 |
| louse /piojo | 2 | 0.007 |
| humane/persona | 2 | 0,007 |
| mataco | 2 | 0,0177 |
| partridge / perdiz | 2 | 0,0177 |
| hummingbird / picaflor | 2 | 0,007 |
| lampalagua o ampalagua | 2 | 0,0177 |
| "te busco y no te hallo" | 1 | 0.007 |
| cockroaches / cucaracha | 1 | 0.004 |
| fly / mosca | 1 | 0.0424 |
| mule/mula | 1 | 0,004 |
| cow/vaca | 1 | 0,0318 |
| deer / venado | 1 | 0,0247 |
| calandra lark/calandria | 1 | 0,0106 |
| condor/condor | 1 | 0,007 |
| dove/paloma | 1 | 0,004 |
| duck/pato | 1 | 0,004 |

However, also in table 2, we can observe that the species with which are treated the greatest diversity of diseases are, in first step, the domestic ones.

## 4. Discusion

The NFS explicitly states in its introduction that it is aimed at the survey of knowledge of Creole ("Criollo") origin, a social group that identifies itself as livestock producers (Arias Toledo and Trillo, 2018). This condition of ranchers probably models the selection of zootherapeutic remedies, incorporating livestock and domestic species in their preferences. About this, studies comparing groups of different ethnic origins (TRILLO et al., 2013; 2016; ARIAS TOLEDO and TRILLO, 2014) point out the condition of criollos as ranchers and highlight the diversity of uses of the environment that they carry out. These uses are mostly exclusive to Creoles (they are not carried out by other groups), including the use of zootherapy. Souto et al. (2011) point out that Latin American mestizo populations combine the use of domestic fauna of European origin –which was important during the occupation stage of colonized territories- with native species. The use of domestic animals as a source of medicines seems to be a constant feature in Europe, at least in the Mediterranean area, the origin area of most migrants from the study area. Quave and Pieroni (2013) suggest that such preponderance is due to the easy access to such products, and show continuity of certain practices, which were documented in ancient texts. In this regard, practices such as the treatment of dog bites with burned hair and the use of "talismans" of their teeth to prevent bites, or the treatment of snake bites with human feces were not only described for current Mediterranean populations (PIERONI and QUAVE, 2005), but also already part of Dioscorides' De Materia Medica (QUAVE and PIERONI, 2013). Likewise, the use of horse and donkey feces was mentioned for past and present populations in Spain (Vallejo and González, 2014), and was also related to the "Greek humoral theory", magical thinking and the ideological-symbolic system of Hispanic populations. However, González and Vallejo (2014) propose that the transfer of knowledge has been more related to healing techniques and treatments than to species. All this suggests continuity in time –throughout 2000 years of history– and European origin of some medicinal practices, probably those that involve domestic animals.

Of the zootherapeutic resources mentioned in the NFS for Córdoba and those currently used (ARIAS TOLEDO and TRILLO, 2014; 2017) in the province, 75% and 67%, respectively, are from wild animals (Table 1), showing that such knowledge combines both part of historical European origin, as previously described, with elements of Native American cultures (Idoyaga Molina, 2000). So, all the Annelida, Arthropoda, Reptilia and Amphibia are natives. Among mammals, the native species used as medicinal, are also used as food (i.e. *Tolypeutes matacus*, *Chaetophractus* spp., "venado") or are usually killed for control purposes or due to conflict (i.e. *Puma concolor*, *Pseudolapex gymnocercus*), resulting then that medicinal use is not the sole or primary objective of hunting the animal, in coincidence with Castillo and Ladio (2019), Albuquerque et al. (2020) and Alvares Oliveira et al. (2021). This diversification of uses, added to the redundancy use of same species, enhances the versatility of this resources (Alves et al. 2013). About this, we use the concept of redundancy in the sense established by Albuquerque and Oliveira (2007) and Nascimiento et al. (2015), who consider the multiple species used to treat the

same illness as a functional redundancy within the local medical system. This also demonstrates a system of adaptation or transmission of local knowledge.

Among the elements with origin in native cultures, interestingly, the practice of introducing a sick child into the still warm womb of a recently slaughtered cow coincides exactly with the treatment described for the "aicado" or "aicadura" in Andean medicine (Crivos et al., 2007). While the NFS did not provide a precise description of the ailment that required such treatment –it only indicated that it was applied to "tullido"(crippled) children–, in Andean medicine it is described in greater depth as a therapy applied to children who "become very skinny", usually accompanied by diarrhea and febrile syndromes (CRIVOS et al., 2007; ABELEDO, 2017) and with difficulties in walking (CHÁVEZ HERNÁNDEZ and RUBIO RIVERA, 2004) –which can be related to the term"tullido" used in the NFS. In turn, while for Andean medicine, the "aicado" is related to a misconduct of the pregnant mother or with an infant who passes near a cemetery, attends a wake or funeral, and causes a "mental" ailment to her child (CRIVOS et al., 2007; ABELEDO, 2017), for Western medicine this disease corresponds to severe malnutrition (CHÁVEZ HERNÁNDEZ and RUBIO RIVERA, 2004).

These examples show how these human groups adapted to the existing biological resources, generating valuable local ethnobiological knowledge, as proposed for other mestizo peoples in Latin America (SOUTO el al. 2011). Both the indigenous contribution and the use of local diversity were here confirmed in the 21 coincidences found in the uses in phytogeographically and culturally similar areas (DI LULLO, 2016 (reissue of the original from 1929)).

This dynamics of ethnobiological knowledge, which allows us to trace ancestral knowledge from other continents or other geographical areas, and to verify local adaptations, shows current continuity of uses, even in minor aspects such as the use of identical techniques for the treatment of toothaches with toads or chicken fat. Thus, we see continuity in the use of zootherapies for the same purposes, in the same area, by inhabitants of the same cultural tradition –both the NFS and the current articles address the "Criollo" culture– reflecting a continuity of certain medical practices.

Nevertheless, the amount of zootherapeutic products currently used in the province of Córdoba (see Table 1) is notoriously lower than that recorded in the NFS for the same area, unlike the amount of herbal remedies (Trillo et al., 2010; 2019). It could be argued that the current lower number of zootherapies may be due to a currently lower sampling than that carried out in the survey. However, studies carried out by our team (Trillo et al., 2019; Trillo y Arias Toledo, 2023) show that, in terms of medicinal plants, the current and past numbers are very similar (94% coincidence in the species used). This leads us to think that it is not a failure of the instrument but rather a real abandonment of the resource. Literature explains this phenomenon by several factors, from a current negative moral assessment of the use of animals –society perceives animals as "closer" to them (and even humanized) than plants–, which discourages their use, to under-registration of zootherapies, which have been scarcely addressed by ethnobiological research with respect to phytotherapeutics (ALVES and ALVES, 2011; SOUTO et al. 2011). However, none of these aspects seems to be an enough explanation in the studied populations, so directly addressing the reasons for abandoning the use of zootherapy is an important pending issue of local ethnozoology. We think that the environmental losses that entail the reduction of both fauna and rural tasks, play an important role in the notorious decrease in the use of animals as medicine.

Thus, it is possible that this is the current result of the processes of environmental loss that began a long time ago. The cultural loss as an effect of the advance of industrial agriculture has resulted in the loss of knowledge that is the product of thousands of years of interaction between man and his environment (TOLEDO, 2005). The profound effect of the loss of natural areas on traditional medicines has already been studied in the province of Córdoba (ARIAS TOLEDO et al., 2010; 2014) showing that, to the extent that access to traditional elements becomes difficult, they are replaced by others -which constitutes another clear sign of the dynamism of ethnomedical systems-. Similar effects have been documented among Mapuche communities in Argentine Patagonia (LADIO, 2001). These communities are abandoning the traditional practice of gathering wild foods due to the increasing difficulty in accessing the forest (which is now private property), and also due to drought and the deterioration of their lands due to overgrazing. In the same way, works carried out between Mbya aboriginals and missionary settlers affirm that the loss of the forest as a source of resources is, in part, a consequence of the progressive deforestation of the forest, which results in the loss of the fundamental conditions of the strategies of life in rural areas (CRIVOS et al., 2005). The advance of the agricultural frontier not only impacts on the natural environment and on the culture of the inhabitants through the erosion of traditional knowledge. It is possible that traditional forms of management, which are more sustainable than industrial monoculture, disappear from the collective memory of the inhabitants. This aggravates both the environmental situation of the region and the socioeconomic situation of the inhabitants.

The great diversity of ailments treated with zootherapeutic products is a clear example of the importance of these resources for these past populations. At the time of the NFS, the first steps were being taken to establish a public social assistance system (see VERONELLI and VERONELLI CORRECH, 2004, for a detailed historical review of the institutional origins of public health in Argentina), so access to biomedical medicine was very poor, at best. On the contrary, currently, each locality studied has a Primary Health Care Center, in addition to Regional Hospitals in the vicinity. So, in a time when access to official health care was difficult, especially in rural communities, people evidently developed close interactions with nature, often also associated with economic dependence on local natural resources, as proposed by Alves and Alves (2011). Thus, they developed alternative medicinal systems.

We can observe that there is a consensus in the population about the usefulness of certain wild species but, at the same time, those that are used in a greater diversity of situations are domestic. This could be showing the adaptability of the system, in which it is possible to use both the most valued species (high level of consensus) and species with a lower value, but with easy access and multiple applications.

Additionally, as is explained in Alves and Alves (2011), the possibility of using various remedies for the same ailment is popular because it permits adapting to the availability of the animals.

Among the treated ailments, the degree of redundancy of species used for the treatment of toothaches – that constitute 70% of the mentions included in the ICD-11 category 13- Diseases of the digestive system- stands out. The degree of redundancy of species indicated for the treatment of toothaches can be explained by considering that, while other ailments do not cause major discomfort (e.g. warts or "testes"), evolve even without treatment (e.g. gastrointestinal disorders, colds, etc.) or have a low prevalence

(e.g. animal bites), toothaches may have been highly frequent in populations with poor oral hygiene habits, are extremely painful and symptoms tend to become worse rather than relieved. A similar situation occurs with the diseases of the musculoskeletal system or connective tissue (basically rheumatism or various pains), which follow toothaches in terms of redundancy. Since toothaches and rheumatism are slow processes that do not pose immediate risk to life, their treatment may have allowed experimentation, and may have resulted in a considerable improvement of life quality.

It is also possible to relate both types of ailments, first, with a diet rich in products of animal origin, which can potentially cause digestive difficulties and joint discomfort due to the accumulation of uric acid. Second, due to the typical condition of ranchers in the populations studied, the diseases of the musculoskeletal system or connective tissue may constitute occupational ailments, as long as it is an activity prone to producing blows, make repetitive movements and adopt forced postures, and that implies great muscular effort. Similar results, where the prevalence of diseases of the musculoskeletal system is related to work activities, were described for rural and urban hunters in Brazil (Oliveira et al., 2021).

In the other hand, these diseases, as well as diseases of the skin –the following category- do not require a sophisticated examination nor elaborate diagnosis, facilitating self-treatment

Finally, mammals and birds were (according NFS) and still are (ALVES and ALVES, 2011; ARIAS TOLEDO, 2014; HANAZAKI, ALVES and BEGOSSI, 2009; MARTÍNEZ, 2013; ALVARES OLIVEIRA et al., 2021) the taxa that include the largest number of species mentioned as used. This result may be explained by the fact that most domestic animals are mammals or birds, and selection of species may have been related to the conspicuousness, abundance or accessibility of each animal group. Interestingly, although amphibians and reptiles are the taxa with the fewest species mentioned, they include three of the species with the highest use consensus. In the case of reptiles, fats are usually the main extracted medicinal product in South America (COSTA NETO, 1999; MOURA and MARQUES, 2008; HANAZAKI et al., 2009; CUNHA RIBEIRO et al., 2010; ALVARES OLIVEIRA et al., 2021; ALVARES OLIVEIRA et al., 2022). Hanazaki et al. (2009) state that the use of fats for medicinal purposes was originated in Europe, which would explain its persistence in populations of mestizo origin such as the one studied.

Besides their role in healing, zootherapy often have magical or symbolic significance, reflecting the different views of health and disease that exist within societies and times. The case of the toad is particularly interesting, since it is the only amphibian with symbolic/ritualistic uses (see table 1) and which, as indicated in the NFS, "is an animal that inspires a lot of respect, one could almost say a sacred animal" (our translation). The widespread use of the toad with magical/symbolic value, as well as of other animals or animal parts, such as cricket legs to help children walk, amulets of dog teeth to prevent bites, rhea tendons for children to walk, among others, is included in the ideological dimension (MARQUES, 2009) of zootherapy. This is part of the scope of the imitative magic, which assumed that certain qualities attributed to animals can be transferred to humans (ALVES and ALVES, 2011). Thus, as stated by Jones Sánchez (2019), popular knowledge is the result not only of cultural representations, but also of daily experiences and, in our opinion, also of historical processes; individuals elaborate knowledge in a process of multiple interactions with the environment, fueled by their own and other people's experiences.

## 5. Conclusions

The wealth of involved species of different origins, the heterogeneity of possible uses and the multiple dimensions involved reflect a highly complex ethnomedical system that is related not only to local biodiversity, but also to the history of the peoples. Thus, zootherapeutic practices can be considered key elements of cultural syncretism and a clear reflection of the indissoluble relationships of rural populations with their environment. The loss of knowledge about the use of animals as medicine can be an alert about the cultural transformations that occur as a consequence of environmental changes. Paying as much attention to them as has historically been devoted to the use of medicinal plants is likely to enrich our view of the daily life of current and past rural communities.

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