

Anthropo-entomophagy in Guaycurú linguistic groups from Argentina: past and present

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Abstract

This work is a brief outline of the consumption and use of several insect taxa and products taking into account historical sources of the 18th century for the Gran Chaco region and more recent ethnographic data. The Meridional and Central Chaco subregion of Argentina is a vast semi-arid plain in the north-east of the country between the Pilcomayo river and the Salado river basin. The subregion forms part of the South American Gran Chaco area. During the 18th century, the linguistic families Guaycurú and Mataco-Mataguayan resided in the Central Chaco subregion. The Guaycurú linguistic family includes the current languages Toba-Qom, Pilagá, Toba-Pilagá, Mocoví, as well as the Caduveo language from Mato Grosso do Sul, Brazil. The report focuses on the Guaycurú groups to illustrate the diversity of insects significantly involved in their cultural practices, which have been sustained over time up to the present, and are presumably oldest. Jesuit chroniclers have provided abundant evidence about Guaycurú groups from the Argentine Chaco region. They fostered Catholic missions in the region and lived in reductions with the Guaycurú populations. The relationship of Chaco indigenous groups with insects and other species is a reflection of their deep identification with the environment. The relationship with the territory goes beyond the idea of a land where to settle. Rather, it refers to feeding and using the land conceived as an organic structure full of energy, the same energy that forms part of the entities of nature and, naturally, of insects as well.

Keywords: edible insects, ethnoentomology, nutraceutical

1. Introduction

In human societies, food is more than a biological nutritional phenomenon associated with organic subsistence. Food, gestures and manners at the table, tastes and commensals are ingredients of a universal recipe that has been part of culture since the beginning of humankind. Feeding is at the same time a repository of traditions and customs, forming part of the structure of group identification (Montanari, 2004). Thus, a complex world of meanings surrounds every aspect of feeding.

Since ancient times insects are likely to have been part of the food spectrum of humans around the world. The consumption of insects in the Western world compared to the culinary practices of non-Western societies is not significant, excepting some derived products such as honey.

This work is a brief outline of the consumption and use of several insect taxa and products taking into account historical sources of the 18th century for the Gran Chaco region and more recent ethnographic data. The report focuses on the Guaycurú groups to illustrate the diversity of insects significantly involved in their cultural practices, which have been sustained over time up to the present, and are presumably oldest.

The Meridional and Central Chaco subregion of Argentina is a vast semi-arid plain in the north-east of the country between the Pilcomayo river and the Salado river basin. The subregion forms part of the South American Gran Chaco area. The name Gran Chaco comes from the Quechua word *chaku*, meaning hunting done by circling the prey (Censabella, 1999: 60).

During the 18th century, the linguistic families Guaycurú and Mataco-Mataguayan resided in the Meridional and Central Chaco subregion. Our study will only deal with some groups of Guaycurú native speakers (Figure 1), whose descendants presently self-identify as indigenous and have in the last decades migrated to rural and peri-urban settlements in the provinces of Santa Fe, Chaco and Formosa, as well as to cities in the Greater Buenos Aires conurbation, searching for new opportunities.

Curiously, insects are still insufficiently investigated by anthropologists, with the exception of some authors as those cited in this work (Arenas, 2003; Medrano and Rosso, 2010; Rosso and Medrano, 2013). Insects are regarded as marginal elements in studies about the economic use of the resources available in the region and, if mentioned, their native names are used, reason why it is difficult to know their taxonomic identity. Meyer-Rochow (2010) considers the convenience and necessity of multidisciplinary studies for the treatment of entomophagy and its impact on world cultures.

Ethnographic data on the practice of anthropo-entomophagy in Latin America date back to the 16th century; the information was provided by chroniclers, explorers and naturalists who made the first records of the rich biodiversity and the indigenous peoples living in these territories (Costa Neto, 2015).

The Guaycurú linguistic family includes the current languages Toba-Qom, Pilagá, Toba-Pilagá and Mocoví. We should also include the Caduveo language from Mato Grosso do Sul, Brazil. According to Censabella (1999),

Caduveo comes from the Mbayá language; it is already extinct – the same as the Abipone language – and also part of the Guaycurú linguistic family.

Fortunately, a large body of ethnographic evidence is available for the Guaycurú groups of this region (for an extended revision, see Tola, 2013). However, in the popular imaginary of the Americas, the Gran Chaco is a geographical and cultural region overshadowed by the Andes and the Amazonia (Lowrey, 2006: 25).

In the 17th century and the first half of the 18th century, a vast region formed by missions located in the Guaycurú and Guaraní reductions was named 'Paracuaria' by the Jesuits. The Guaraní reductions, placed in the provinces of Misiones and Corrientes, and those in Southeast Paraguay, specifically Encarnación, were also included in the region. The role of 'Paracuaria' was clear: to expand, or even impose, the Jesuit pastoral programs in all the activities meant for ethnic groups residing in the disputed territories.

Missionary activities in the Gran Chaco increased from the 18th century onwards, giving rise to various reductions. The extensive works of Paucke (2010) and Dobrizhoffer (1967, 1968) about Mocovíes and Abipones are among the most relevant sources of information to study the colonial period. Reports of other Jesuit missionaries (Lozano, 1941; Sánchez Labrador, 1910) as well as letters of Jesuits compiled by Furlong (1938, 1953) also mentioned the Guaycurú groups. Most of these accounts were written in Europe after the expulsion of the Society of Jesus from America in 1767 (Medrano and Rosso, 2010).



Figure 1. Distribution of Guaycurú groups in the Central and Meridional Chaco regions of Argentina (dotted line). Abipones are now an extinct population.

Paucke and Dobrizhoffer noticed the tendency to compare the Guaycurú groups with ancient pagan peoples from Europe. The authors highlighted similarities and, by doing so, they could reduce their bewilderment at the indigenous cultural practices. Both referred to the strain between the positive and negative appraisals performed by the Jesuits (Citro, 2006) as well as to some emerging ideas of the Enlightenment that were used to erroneously represent indigenous peoples as ethnocentric.

Sustainable feeding resources of the Chaco forest were viewed not only as subsistence but also as something related to changing identities through history. The days of grandparents or ancient people were associated with a particular lifestyle, where the relation with the forest was tight and necessary to obtain the fundamental things for living, as compared with the current wretched conditions, similar to those of Creole people (López, 2007). This relationship with the forest naturally involved the food obtained from gathering and hunting. That is why an agreement with powerful forces controlling animals and plants was needed, according to an animistic ontology (Descolá, 2012; Tola, 2013). At the same time, indigenous peoples needed power to carry on such delicate tasks, and Shamans were in charge of this particular role, which required particular lifestyle habits and feeding; here we can find the origin of the food-nature concept (López, 2007). From this perspective, we will establish the relationship between indigenous communities, Guaycurú groups particularly, and insects.

2. Anthropo-entomophagy and nutraceutical insects in Guaycurú groups

Insects are appreciated as a healthy source of food. At the same time, they have become complex symbols and prominent elements of social action. The term anthropo-entomophagy describes the human consumption of insects and products as food (Costa Neto, 2015). It was coined by Costa Neto and Ramos Elorduy (2006) to better demarcate the human use of insects as food, since other animals, including insects themselves, also feed on these organisms. Edible species are eaten in their immature stages (eggs, larvae, pupae and nymphs), sometimes as adults, either as whole insects or in parts, and as insect by-products such as honey and wax. Insects are an excellent source of fat and were a staple food for the diet of ethnic groups.

From a scientific point of view, it is important to know other potential benefits of using insects as food, such as their immunological, analgesic, diuretic, antibiotic, anaesthetic, anti-rheumatic and aphrodisiac properties (Ramos Elorduy, 2009). In this sense, the use of insects as food and/or medicine has led to postulate the hypothesis of nutraceutical entomofauna (Costa Neto *et al.*, 2006). According to this hypothesis, some edible insect species are

sources of functional foods which improve the consumer's health by providing medical services or utilities, preventing and/or treating certain diseases (Costa Neto, 2015).

Willink (1969), promoter of Argentinian entomology, reported that Jesuit priests provided the first news of colonial times related to the entomological fauna of Argentina, either from their own observations or from inhabitants of the region. Lozano (1941), Sanchez Labrador (1910), Dobrizhoffer (1967, 1968) and Paucke (2010) are among the authors who left a wealth of observations. The analysis of chronicles and contributions from other authors (Arenas, 2003; De Santis, 1964; Medrano and Rosso, 2010; Noli, 1999; Rosso and Medrano, 2013; Vuoto, 1999; Vuoto *et al.*, 1999) permitted to collect information about edible insects, their products and Guaycurú groups.

3. Taxonomic diversity of edible insects

Gathering and consumption of orthopterans

Locusts, grasshoppers and crickets belong to the Orthoptera order of insects. They are abundant and common in almost all latitudes, excepting the coolest regions. They are among the most voracious herbivores. These insects are heterometabolous and can be found on trees, shrubs and other vegetation, in soil, underground and in caves. Orthopterans are consumed in all stages of development, i.e. eggs, nymphs and adults. Among Orthoptera of the Acrididae family, species belonging to the genus *Schistocerca* Stål form swarms that can migrate helped by storms and winds, devouring all vegetation in their path. Studies performed in the '30s of the 20th century to know the cycles and routes of locust swarms in order to control them, showed that *Schistocerca* had a specific path through the northeast of the province of Tucumán, crossing to Santiago del Estero (Ministerio de Agricultura de la Nación, 1936).

Ethnographic and ethnohistoric data indicate that locusts were frequently consumed, but there is no information as to when they were incorporated into the diet of prehispanic groups. Archeological studies performed in the northeast region of Argentina report the existence of locust heads, legs and wings in a cave on the right side of Corrales in Infiernillo River (Province of Tucumán, 3,000 meters above sea level) (Caria and Oliszewski, 1997). Locust consumption in the months of June and July during the early centuries of the European conquest was registered in the calendars of indigenous peoples living at the foothill and plains of Tucumán and Santiago del Estero (Noli, 1999).

Another interesting record of the use of locusts as food in the same area is a letter sent to the king of Spain by governor Ribera, describing how locusts were cooked and passing

down to the present time a recipe of the indigenous cuisine: roasted/broiled locust:

Los indios que biven en sus pueblos pasan grandes necesidades de ambre y muchos años andan por la campaña comiendo rayces y pescado y langosta y esta le suele dar grandes enfermedades por que las comen con eceso assada en hornos y tostada en cacuelas y ollas de varro al fuego y se husa tanto el comer langosta que la comen muchos criollos y criollas y dicen de que es de muy buen gusto.

Noli, 1999

Jesuit chroniclers have provided abundant evidence about Guaycurú groups from the Argentine Chaco region. They specifically mention that locust gathering was performed by women and children. Paucke (2010) reported in great detail how Mocovíes captured and roasted nymphs, sharing them with the community members. The remaining nymphs were taken in bags to their huts and eaten later. Nymphs were also fried, smashed after toasting them under the sun, or prepared as grilled brochettes. In the case of eggs, they were boiled:

Los indios cazan de la siguiente manera las langostas nuevas que aún no pueden volar sino que sólo saltan por el campo: ellos cubren un sitio grande con paja, las mujeres y los niños se colocan en derredor, desde una distancia comienzan a arrear las langostas hasta que todas han llegado a la paja extendida; encienden luego la paja por todos lados y asan las langostas. Luego se sientan ahí al lado y las devoran completamente o medio quemadas cuantas pueden [comer], juntan las restantes, las llevan en bolsas a sus chozas y se mantienen con ellas mientras tienen existencia.

Paucke, 2010: 297

An iconography by Paucke clearly depicts this form of gathering (Figure 2).

Below is a literal transcription of locust preparation among Guaycurú families:

Ellos comen también las langostas, tanto jóvenes como viejas como también los huevos que éstas entierran (...). Ellos colocan una tras otra en una ramita delgada las langostas crecidas que tienen la misma figura como en nuestros países, la pasan algunas veces por el fuego y comienzan a comer. Otros matan las langostas y las tuestan al sol, así reseca son machacadas a un polvo que se echa en una olla con agua y se cuece para papilla. Cuando las langostas ponen huevos, hacen pequeños agujeritos en la tierra donde colocan sus huevitos; ahí van las *indias* con sus hijos, excavan los huevitos, los cuecen en una olla con agua y cuando

están bastante cocidos, ellas se ponen a la mesa.

Paucke, 2010: 296

Abipones, another group of Guaycurú indigenous peoples, also included locusts in their diets. They caught insects while they were flying with long sticks and then roasted them over low heat. Abipones preferred locusts crispy rather than boiled. According to Dobrizhoffer (1968) only women prepared and cooked the insects:

Los abipones prefieren comerse las langostas antes que sumergirlas o quemarlas. Las derriban al piso utilizando unas varitas muy largas mientras vuelan, y las asan a fuego lento y las comen con la misma voracidad con que nosotros podríamos comer perdices o gallinas; pero no lo hacen todos juntos, ya que las mujeres sólo se encargan de cocinarlas apartándose de los hombres.

Dobrizhoffer, 1968: 356

Arenas (2003) reported that the group of Toba-Nachilamole#ek indigenous peoples mostly consumed locusts of the genus *Schistocerca*. Indigenous peoples from the Central Chaco region preferred female locusts laying their eggs; insects were grilled and eaten as brochettes. They very much liked boiled locust egg pods, particularly nymphs that were emerging from their eggs near crops surrounded by protective trenches. As they could not fly, great amounts of nymphs fell into these trenches, and Toba-Nachilamole#ek either used them as bait or ate handfuls of raw nymphs.

In the case of Toba-Qom groups from Formosa, Vuoto (1999) remarked that locust or 'sigikjowe' gathering is very common nowadays. Based on his collection of aboriginal oral histories, the author mentioned that these groups also consumed young locust specimens and eggs. In this regard, the efforts made in the Mocoví community of Berisso,



Figure 2. Locust hunting for food (Banco de Imágenes Florián Paucke, 2006).

Greater La Plata, Province of Buenos Aires, to transmit the native indigenous language to children have been successful (UNLP, 2013). For instance, locusts are remembered with the name 'ka'atek' (A.V., personal communication) as an essential feeding practice of indigenous origin. On the other hand, lice ('pagat') (A.V., personal communication) are also part of a memory inherited from their ancestors of insects taken as food.

Hair free of lice

Dobrizhoffer (1968) and Paucke (2010) described the consumption of lice (Phthiraptera) by Guaycurú groups, particularly sucking lice of the Pediculidae family. As mentioned by Dobrizhoffer in his chronicles (1968: 339):

Apenas hay lugar entre los abipones fuera de los cabellos para aquellos bichitos blancos que reciben el nombre de piojos. Las mujeres indias se comen todos los piojos que encuentran en sus cabezas.

In Paucke's words (Paucke, 2010: 298):

Con permiso del lector: ellos comen también los piojos tanto de sus propias cabezas como de cabezas ajenas. Por lo común usan de este *confite* después de comer. Ahí uno toma la cabeza del otro, busca hasta que encuentra; el piojo cazado debe ser mordido en seguida debajo de sus dientes, al cuero lo tira fuera de la boca.

Lice are small, depressed, wingless insects that develop as ectoparasites of birds and mammals. They present sucking or chewing mouthparts and their legs have strong claws to apprehend the host. Immature nymphs are clearer and similar to adults.

Chronicles have different perspectives about lice as food. Paucke (2010) reported that they were probably used to discard scalp. However, they would rather be a strategy of indigenous people to kill these parasites by crushing them with their teeth.

Beetle bark larvae and palm grubs

Coleoptera, commonly known as beetles, constitute the largest group of insects in terms of number of species. They can be found in a wide range of habitats and have a variety of eating habits, from herbivores to predators. Consequently, many species constitute agricultural pests, thus interfering with the economy. The Toba-Qom communities consumed larvae collected under the bark of some trees (Vuoto, 1999).

De Santis (1964) mentioned that indigenous communities living in the Gran Chaco region consumed fried grubs (*Rhynchophorus palmarum* L., Curculionidae) collected

from Caranday palm trees, *Trithrinax campestris* (Burm.). Although larvae from these weevils cause heavy damage to palm plantations, they are an excellent source of proteins, vitamins A and E and minerals, and have been consumed as food by local populations for centuries (Cerdá *et al.*, 2001).

The search for hymenopterans (bees, bumble-bees, ants and wasps)

This is a large order of holometabolous insects. They are mostly beneficial as parasites, predators of insect pests, and pollinators. They are consumed at different stages of development (larvae, pupae and adults), and their products are more frequently used.

Amongst others, the family Apidae contains several species of highly social bees commonly referred to as honey bees and bumble-bees. In America, melipone bees, for instance, live in colonies in tropical and sub-tropical regions. They are stingless and store honey in wax pots, while domestic *Apis mellifera* L. bees do so in honeycombs.

Honey or 'meleo' gathering along with products (wax, larvae and a bitter substance produced by bees) was an important subsistence activity among hunter-gatherer peoples of the Gran Chaco. This biogeographical region is home to a remarkable diversity of honey bees and wasps, which rises to nearly 20 species on our own site collections (Kamienkowski and Arenas, 2013)

Chronicles from Jesuit priests suggest that indigenous peoples were aware of the diversity and biology of native bees and could differentiate bees nesting underground or on tree trunks.

Medrano and Rosso (2010) recorded species in the Gran Chaco region that would belong to the group of bees nesting underground: *Geotrigona argentina* Camargo and Moure, known as 'alpamiski' or 'alpamiske' (Arenas, 2003), which means 'tapezuá de bajo tierra' and 'dulce de la tierra' in Quechua language, and *Paratrigona glabella* Camargo and Moure. On the other hand, *Melipona orbignyi* (Guerin), *Plebeia molesta* Puls, *Plebeia catamarcensis* (Holmberg), *Scaptotrigona jujuyensis* (Schrottky) and *Tetragonisca fiebrigi* (Schwarz) would nest in tree trunks and, according to these authors, they are still used by indigenous communities for the breeding of stingless bees.

Nowadays, Toba-Nachilamole#ek communities consume honey and pollen manipulated and accumulated within the nest from *G. argentina* melipone bees. These bees nest underground, whereas *M. orbignyi*, *S. jujuyensis* and *T. fiebrigi* ('señorita') nest in tree trunks (Arenas, 2003). Apparently, indigenous communities preferred honey from *S. jujuyensis* because of its quality. This high-performance feeding resource was also known as 'yana' in the Central

Chaco region, 'hairdresser' in the South Chaco region, and 'tapezuá' near Paraguay. They also consumed larvae and the bitter substance they produced which, after mixing with water, becomes a sweet and milky beverage.

Information about the consumption of larvae from the *M. orbigny* species is less clear. Some records state that Toba-Ñachilamole#ek peoples consumed it, whereas other reports mention their consumption was prohibited. Larvae were not destroyed; instead, they were placed into the hollow trunks again, and bees looked for another trunk where to live. Elderly people recommended not to destroy them; otherwise the owner or lords could be offended. Honey, the bitter substance and larvae from *P. molesta* and *P. catamarcensis* were used to a lesser degree because of their scarcity. Besides, Tobas believed that their consumption could cause pregnant women to have a dumb baby.

Another species consumed by indigenous peoples was Carpenter bees (*Xylocopa ordinaria* Smith; Apidae: Xylocopinae). They are very aggressive and nest in hollow trunk trees. Toba-Ñachilamole#ek consumed the bitter substance of this species.

The family Vespidae contains solitary and social wasps that use their stingers for self-defense; several species have a social behaviour and some of them build their nests by chewing vegetable fibres forming a soft paste similar to paper, reason why they are called paper wasp nests. Wasp native species from Argentina produce honey (genus *Brachygastra* Perty and *Polybia* Lepeletier), such as 'lechiguana' or 'lechehuana' – *Brachygastra lecheguana* (Latreille) – and 'camuati' – *Polybia scutellaris* (White). Indigenous communities identified them because they built their nests as hanging globular structures. Lozano (1941) erroneously uses the term 'lechiguana' to refer to the generic classification of wasps: 'Lechiguana' is a wild genus that produces abundant honey in wide hives hanging from tree branches.

Arenas (2003) reported that Toba-Ñachilamole#ek also liked *Polybia ignobilis* (Haliday) honey, another species of the family of *B. lecheguana* wasps. These frequently nest underground and are aggressive, reason why indigenous peoples used smoke and other resources to frighten them away. These wasps did not make much honey, but their larvae were consumed grilled, boiled or even raw. Arenas described the species *Polybia ruficeps* Schrottky and *P. sericea* (Olivier), both nesting in hanging nests. The Toba-Ñachilamole#ek communities collected nests with a stick and hook very carefully and at a good distance to be able to throw wasp brood combs directly into the embers. Once fire partially consumed the honeycomb, it was removed and hit to take the larvae. *Polistes cavapita* (Saussure) and *Polistes versicolor* (Olivier), of the Polistini tribe, were also described. As they both built open nests,

Toba communities associated them with sunflowers. These wasps did not make honey or the bitter substance; their larvae were consumed either boiled or grilled. Pieces of their nest were placed on embers and once scorched, nests were hit on a pot and larvae were ready to be eaten. The rest of the nest was discarded.

Ant species from the Formicidae family were also consumed at different stages of development (larvae, pupae and adults). Adult female ants were caught during their breeding season and consumed due to their tasty flavour as a result of the fat reserves and eggs stored in the abdomen (Lopez Riquelme, 2011). They have a fatty white substance in the abdomen, used as butter after melting. Dobrizhoffer remarked that Abipones preferred adult ants, and newly arrived conquerors seemed to be lured by such a 'delicacy'. Probably, they were leaf-cutting ants of the *Atta* Fabricius genus, presently used as ingredients of exquisite recipes in Mexico and Colombia:

Sería injusto que después de exponer los perjuicios que ocasionan las hormigas callara los beneficios que prestan, hay unas de gran tamaño que llevan en la parte posterior del cuerpo un glóbulo lleno de una sustancia grasosa, muy blanca y que recogida y derretida al fuego, era ocupada por los españoles y por los indios a manera de manteca, con gran placer. Yo a menudo la he visto, pero nunca apetecí ni envidié ese manjar.

Dobrizhoffer, 1968: 340

4. Insects products

Stingless bee beverages and honey

Jesuit priests provided evidence on the use of honey in the Gran Chaco area. They fostered Catholic missions in the region and lived in reductions with the Guaycurú populations. Chroniclers report that honey was basically edible, and there are references about honey-based alcoholic beverages (Rosso and Medrano, 2013). 'Guaycurú mbyás take advantage of honey, more to prepare the beverage they get drunk with than to eat it', states Sánchez Labrador (1910).

Abipones also collected honey as food and to prepare beverages. Dobrizhoffer described how they found nests with honey, commenting on their good eyesight. He further noted that Abipones plucked their eyebrows and eyelashes to have a clear view and be able to find bees while flying; thus, they could determine the places where they could find honeycombs (hollow trunks, cracks in the ground, treetops). Interestingly, honey was named differently according to the place, season, taste and plant where bees extracted the nectar from:

A los Abipones no les cuesta el menor trabajo buscar y retirar los panales ocultos en la selva.

Cuando hay buen tiempo y el sol brilla con claridad, cabalgan hacia el campo. Como ellos tienen una vista increíblemente fina, observan a las abejas en su vuelo de acá para allá, dejan a la entrada del bosque sus caballos y las siguen de a pie hasta descubrir el árbol donde las abejas tienen su depósito.

Dobrizhoffer, 1967: 523

Según la diferencia de los lugares, estaciones y abejas, la miel se diferencia también en su denominación y sabor. Los Abipones la llaman Nahérek, la escondida debajo de la tierra. En algunos lugares es agria, pero en otros completamente dulce.

Dobrizhoffer, 1967: 521

Indigenous peoples believed that during the months of June, July and August (winter in ancient Paracuaria), honey was not healthy; therefore, they refrained from consuming it (Dobrizhoffer, 1967). Once they found nests, they opened holes in trees with different instruments until they reached the honey reservoir. Honey fermentation to obtain alcoholic beverages is also explained in detail:

Ellos trepan por el árbol tan ágilmente como los monos, ensanchan con el hacha la abertura por donde entran y salen las abejas diligentes, retiran la miel y la cera y la llevan en un recipiente de cuero a casa donde sus amigos, hijos, esposas se deleitan ya lamiéndolas cual ambrosía y sorbiéndolas cual néctar en cordial alegría de este plato de dioses. Cuando entre los hombres se ha anunciado un beveraje en común, se mezcla la miel con agua fría y se revuelve con cualquier palo más a mano. Después de algunas horas, comienza a fermentar de por sí sin otro agregado, forma espumas, llega a semejar a vino y embriaga a los Indios cual el vino más fuerte aún si ellos lo beben con parsimonia.

Dobrizhoffer, 1967: 523

Paucke (2010) discriminated honey produced by wasps and bees as 'country' and 'wild' honey, respectively. In the following text, he briefly explains honey fermentation to obtain the beverages used in festivities:

En seguida de comenzar la primavera que comienza en el mes de agosto se ocupan los indios con sus mujeres en juntar la miel para hacer de ella la bebida que entre las bebidas es la más fuerte, los emborracha pronto y causa fuerte dolor de cabeza. Para ello toman ora miel campestre ora silvestre. La miel campestre no es tan suave como la miel silvestre por lo cual también la bebida es más fuerte y más dañina. La miel campestre se junta por avispa amarilla y negra y no por abejas, tampoco tiene cera sino que todo el tejido en el cual está la miel es de la misma materia de la cual es el tejido de las avispas; pero

la miel silvestre se junta por abejas y el tejido es de cera. Poco trabajo y arte se precisan para fabricar la bebida. Ellos toman un cuero crudo [y] seco de tigre o ciervo que ellos cuelgan con las cuatro puntas de cuatro varas de manera que el cuero forma entre estas cuatro varas cual una bolsa. Ahí adentro echan la miel junto con la cera vuelcan agua por encima hasta arriba y dejan fermentar así bajo el calor del sol; en tres o cuatro días la bebida tiene la suficiente fuerza.

Paucke, 2010: 307

Another iconography by Paucke illustrates honey harvest by Mocoví peoples (Figure 3).

With regard to Melipone beekeeping, Mocoví communities apparently ignored the breeding of stingless bees (Medrano and Rosso, 2010). Vuoto *et al.* (1999) stressed that honey harvest among Abipones was not strictly a female task, since both men and women participated jointly.

Toba-Nachilamole#ek communities dissolved lechiguana honey to sweeten water when brewing mate. They selected lechiguana honey because it was thick, pasty and did not leak; it could be kneaded to form 'buns' that were wrapped with grass or leaves to keep 'buns' clean. At the time of consuming, they took small pieces and sucked them little by little (Arenas 2003).

Below we present data about edible insects and their products consumed by Guaycurú groups (Table 1).

Honey and good health

Dobrizhoffer (1968) stressed that Abipones believed they were healthy, vigorous and lived longer because they consumed bee honey. Apparently, they used bee wax to prevent insect and reptile bites:



Figure 3. Honey harvest (Banco de Imágenes Florián Paucke, 2006).

Table 1. Edible insects and by-products consumed by Guaycurú groups.

Common name	Guaycurú language family original name	Taxonomy	Search site
Grasshoppers	aorkañi (Abipone language), ko'heikio Goe'chyo!, 'kyol,'chyo! (Toba-Ñachilamole#ek language), ka'atek (Mocoví language)	Orthoptera: Acrididae: <i>Schistocerca cancellata</i> (Serville)	ground, trees, shrubs, soil, caves
Lice	pagat (Mocoví language)	Phthiraptera: Pediculidae: <i>Pediculus humanus</i> (L.)	heads
Grubs	q'o'Ce'l (Toba-Qom language)	Coleoptera: spp.	trunk bark
Carnauba palm grubs	not found	Coleoptera: Curculionidae <i>Rhynchophorus palmarum</i> L	trunks
Ants	ochega (Abipone language)	Hymenoptera: Formicidae: <i>Atta</i> spp.	nests
Wasp larvae	waGa'to, pe'gela, ñi#e'hala (Toba-Ñachilamole#ek language)	Hymenoptera: Vespidae: <i>Polybia rufipes</i> (Schrotky), <i>P. sericea</i> (Olivier), <i>P. ignobilis</i> (Haliday)	nests
	ko:yetaGañi (Toba-Ñachilamole#ek language)	<i>Polistes cavapita</i> (Saussure), <i>P. versicolor</i> (Olivier)	
Wasp honey	katek (Toba-Qom language), qa'tek (Toba-Ñachilamole#ek language)	Hymenoptera: Vespidae: <i>Brachygastra lecheguana</i> (Latreille)	nests on plants or tall grass
Carpenter bee pollen	'ho'poleo (Toba-Ñachilamole#ek language)	Hymenoptera: Apidae: <i>Xylocopa ordinaria</i> Smith	hollow tree trunks
Bees (larvae and honey)	alpamiske o tapezuá (Mocoví language), nehe:'dek (Toba-Ñachilamole#ek language)	Hymenoptera: Apidae: <i>Geotrigona argentina</i> Camargo & Moure, <i>Paratrigona glabella</i> Camargo & Moure	underground nests
	teesak, da'apik (Toba /qom language), qo#na'y aq (Toba-Ñachilamole#ek language)	<i>Melipona?</i> , <i>Melipona orbignyi</i> (Guerin)	hollow tree trunks
	not found, pinoGo'daq (Toba-Ñachilamole#ek language)	<i>Plebeia molesta</i> Puls, <i>P. catamarcensis</i> (Holmberg)	
	'ñie#e,ma#age (Toba-Ñachilamole#ek language)	<i>Scaptotrigona jujuyensis</i> (Schrotky)	
	ha'ma (Toba-Ñachilamole#ek language)	<i>Tetragonisca fiebrigi</i> (Schwarz)	

Los abipones suelen beber la miel que abunda en todas las selvas, y poseen tanto vigor como larga vejez.

Dobrizhoffer, 1968: 63

Los abipones, los mocobies y los tobas así como los habitantes de otros pueblos ecuestres de Paracuaria, cuando son atacados por algún reptil, aplican sobre la herida cera virgen, pues afirman que este producto atrae el veneno.

Dobrizhoffer, 1968: 319

Vuoto (1999) reported that Toba-Qom communities used honey to heal their wounds and as a hair cosmetic product. Nowadays, honey is used to prevent and cure diseases that threaten Mocoví populations (Medrano and Rosso, 2010). Melipone honey, *S. jujuyensis* or 'peluquera' and *G. argentina*, '[abeja] de bajo tierra' was used as a laxative to treat digestive problems, and in the presence of whooping cough and colds. Toba-Qom communities residing in the east of the province of Formosa fetched honey from *S. jujuyensis* ('tapezuá'), and placed it in the gums of children to ensure healthy and long lasting teeth.

Other essential uses of wax and dyes

Bee wax was also used by Guaycurú peoples as an exchange product with Spanish people and other indigenous communities that finally carried the product to the city of Asuncion. Sánchez Labrador noted: 'recogen la cera y la venden ahora a los españoles, y antes a los Payagúas infiles' (Sanchez Labrador, 1910: 239).

Among Toba-Qom communities, bee wax was useful as glue. It lengthened the life of arrows, allowed to refurbish the caps of pots and other pottery, and was also used to seal holes in pumpkin rattles and vessels (Vuoto, 1999: 255). Bee wax was never used to make candles, since the stove was burning constantly on the floor of huts, replacing the need for light, heating and cooking.

Dyeing was very important for these indigenous groups. Cochineals (Hemiptera: Dactylopiidae, *Dactylopius* spp.) were collected from a variety of cactus hosts in cladodes of tuna and processed by Abipone women for colouring fabrics and painting objects. However, it is unclear whether

this was a cultural practice among Abipones or done on request of Spanish conquerors (Vuoto *et al.*, 1999).

La cochinilla o, como escriben otros, la cochinnelle, es un tinte conocido que los Abipones llaman cachil... La cochinilla paracuaria proviene de unos insectos alados que se asientan en ciertas plantas de cardos que los Españoles denominan tunas pero otros, higos indios y que se alimentan de su jugo. Hay varias especies de estos cardos que se diferencian en su figura y frutas. Entre los Abipones algunas se llaman laká, otras Roayami, Kakce Nanaprahéte, pero todas dan frutas comestibles. El cardo sobre el cual se encuentra la cochinilla es denominado por los Españoles tuna, por los Brasileños jamacará, por los botánicos opuntia.

De estas plantas recogen las mujeres en la mayoría de los campos, la cochinilla, que consiste en unos granitos muy pequeños, blancos, flotantes y mucosos. Se juntan diversas partículas de ellas, se forman laminitas redondas y éstas se colocan al aire donde se tornan rojas y duras. Con esto ya sirven para pintar y teñir.

Dobrizhoffer, 1967: 508

5. Nutraceutical myriapods, insects and their products used by Guaycurú groups

Furlong (1948), a Jesuit priest from Santa Fe, Argentina, referred to the documents written by Sánchez Labrador (1910) and emphasised the use of myriapods and insects for the treatment of diseases (Table 2). Chilopoda (centipedes) were used dry. After grinding, they were dissolved in water and applied on the cheeks twice a day to alleviate toothaches. Diplopoda (Millipedes) were processed similarly and used on skin hurt by thorns or other elements, allowing easy removal.

Among Orthoptera, crickets (Gryllidae) were crushed, dissolved in water and used to treat urinary disorders:

Los cientopies planos secos, molidos y desleídos en agua, se aplican a las mejillas dos veces al día, quitan los dolores de muelas. El cientopies redondo molido y puesto sobre la parte en que hincó la espina, o flecha, la hace salir afuera.' 'En el Paraguay un inteligente los preparaba como ya digo: cocía levemente unos grillos, les sacaba las tripas, molía lo demás, y estos polvos daban un licor conveniente a los que padecían de la orina; fluía ésta y quedaba aliviado el paciente.' Otro tostaba dos grillos en una cazuela de barro, los molía y en un poco de vino o de agua bien cocida o de chicha (aloxa) de maíz les daba a beber al enfermo, que padecía de la retención de la orina, obraba luego el buen efecto. Por el contrario, si la enfermedad era de demasiado flujo de orina, le daba al enfermo un solo grillo sin tostar, machacado y en infusión de un poco de agua tibia.

Sánchez Labrador, 1910 in Willink 1969: 7

6. Insects and the indigenous cosmivision

Little is known about the link between the world of insects and religion, mythology or rituals in the American indigenous cosmology. Even though insects are frequent in ornamental designs of prehispanic pottery, there are no systematic studies of their precise meaning. For instance, Figure 4 illustrates two Inca pots with pictures of Lepidoptera, Plecoptera and Odonata (Vargas-Musquipa, 1995).

The number of records about indigenous cosmology in the Chaco region is scarce. The Jesuit sources available and ethnographic studies allow us to infer the presence of characteristics that define the Universe as an overlapping of interdependent worlds inhabited by entities capable of moving among the different levels (Tola, 2010). Those entities can communicate with humans, and can therefore negotiate and make alliances. Owners or lords of the different animals and plants fall into the animism ontology (Descolá, 2012) In the cosmivision of Toba

Table 2. Details of the medicinal use of insects and myriapods by Guaycurú groups.

Common name	Guaycurú language family original name	Taxonomy	Healing property
Centipedes	not found	Myriapoda: Chilopoda	relieve toothaches
Millipedes	not found	Myriapoda: Diplopoda	facilitate the elimination of thorns or arrows sticking in the skin
Crickets	Milik (Toba language)	Hexapoda: Insecta: Orthoptera: Gryllidae spp.	alleviate urinary disorders
Bee honey	Ko' yik (Toba language)	Hexapoda: Insecta: Hymenoptera: Apidae spp.	cures skin wounds; provides strength and longevity; relieves digestive and teeth problems, colds and coughs
Wax	Loapal (Abipone language)	Hexapoda: Insecta: Hymenoptera: Apidae spp.	draws the poison injected by insects or snakes

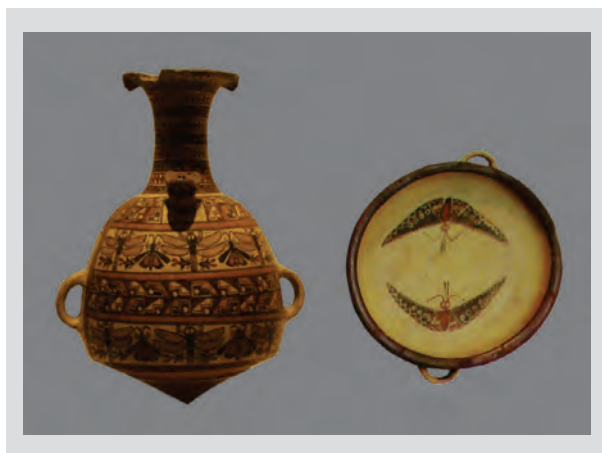


Figure 4. Aryballos with Odonata and Plecoptera designs (adults and nymphs) and an Inca plate with Lepidoptera designs (Larco Museum, Lima, Peru; photograph by Marco Giovannetti).

peoples, it is perfectly possible to exchange the ‘powers’ or attributes among men, animals and non-human beings through elements of animal origin. As, for instance, in the preparation of magical packages (*iyaGajk*) to obtain certain benefits, such as social, love or friendly relations, hunting or gaming. Likewise, spells to harm others may include parts of animals or whole bodies, especially insects, and here crickets are predominant (Vuoto, 1999).

Chroniclers mentioned in this manuscript have referred to the amount of this type of practices, even though not free of adopting prejudiced or ethnocentric categories.

Dobrizhoffer commented on Abipone sorcerers and their presumably deceptive practices to heal the sick as follows:

Que soplando y chupando exterminarán del cuerpo todo dolor, fiebre, tumor o molestia que padezca el enfermo. Los hechiceros alimentan con nuevos engaños esta credulidad de los naturales. Pues mientras se preparan a succionar al enfermo, se meten en la boca furtivamente espinas, escarabajos, gusanos: y escupiendo después de cualquier succión estas chucherías dicen al enfermo: he aquí la causa de tu enfermedad; y muestran al mismo tiempo el gusano o la espina que han arrojado de la boca. Viéndolo, el enfermo se tranquiliza y vuelve a tener esperanzas en recobrar la salud. Con frecuencia esta era la única opinión sobre el origen de la enfermedad o la conservación de la salud.

Dobrizhoffer, 1968

This last quotation is an example of what Europeans showed as tricks or delusions. However, that was not the case for the indigenous cosmovision. The Shaman played a key role in healing diseases through the contact with supernatural

entities. In many cases, the sick knew the procedures and accepted each object with a symbolic role, even insects.

In general, diseases were due to sorcerers' mischievous actions and to the breaking of social rules or taboos. Interestingly, there were restrictions on the amounts of insects or any other natural resource collected for consumption. Overexploitation might not please the owners of those animals; hence, neglect, disregard and cruelty would trigger punishment:

Asi si un niño muere prematuramente, las mujeres atribuyen la muerte a la intemperancia del padre. Ya sea porque no se abstuvo de vino mezclado con miel, o porque llenó su estómago con carne de puerco acuático, o porque cruzó a nado algún río con viento fresco, o porque fue negligente en rasurarse las cejas, o porque comió miel subterránea pisoteando a las abejas.

Dobrizhoffer, 1968

As can be seen in the previous example, the existence of precautions and punishment in honey consumption was ascribed to magical situations, a concept that other researchers also verified by other means (Medrano and Rosso, 2010). Dobrizhoffer referred to seasonal limitations, i.e. honey was not consumed in winter because it was unhealthy, whereas Arenas (2003) also reported a prohibition of consumption with respect to the menstrual cycle of women.

Among the Toba peoples, honey was extremely important in male initiation rites, warrior triumphs and annual meetings of the groups on occasion of the renewal of the world. Honey was prepared as an intoxicating beverage, the same as other drinks made with carob and other fruits (Vuoto, 1999). In this context, Dobrizhoffer refers to unidentified rituals, but it can be inferred that he referred to numerous rituals of dialogue and agreement with the powerful entities of the forest.

7. Final considerations

The treatment of diseases, the search for dyes and even the production of alcoholic beverages for festive occasions are examples that can be drawn from the habits of Guaycurú groups living in the Chaco region and account for their relationship with insects.

At present, Guaycurú groups are aware of the changes they are experiencing in their relationship with the forest, i.e. the strong, close and sacred bond for the sake of subsistence is shifting as a result of the pressure exerted by the Western Creole society. However, regardless of displacement, many practices continue in new spaces in the cities and, in some cases, the forest still provides them with wealth and symbols.

Food-nature (*sensu* López, 2007) is perceived as nourishing and vigorous. Probably, insects and their by-products could fit into this category. Some of them are clearly included according to the reports by the Jesuit priests and current ethnographic data. The nutritional value of insects did not exclude the sacred concept of indigenous people. In fact, it was part of the power granted to food-nature, which surpassed the nutritional aspect. This kind of supernatural essence restricted insect consumption around issues like menstrual cycle, maternity or seasons, and promoted their use as medicine around the notions of vigour and good health, as was the case of honey or crickets. On the other hand, the power that entered the body through food could leave it as an insect, if dangerous. This was not about tricks performed by trickster shamans, but about a scenography full of symbols representing the powers involved; the power of a disease and the power to counter it through a healer and his strategies.

In this way, it can be inferred that the relationship of Chaco indigenous groups with insects and other species is a reflection of their deep identification with the environment. Practical and empirical knowledge and the knowledge of a world full of forces and non-human but powerful entities expose the identities of the forest. The relationship with the territory goes beyond the idea of a land where to settle. Rather, it refers to feeding and using the land conceived as an organic structure full of energy, the same energy that forms part of the entities of nature and, naturally of insects as well.

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