

# VETERINARY MEDICINE HISTORICAL APPROACHES

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## MEDICAL AND VETERINARY REPORTS FROM COLONIAL LATIN AMERICA

*Miguel CORDERO DEL CAMPILLO*

The Chronicles and *Relaciones de Indias* (Official Reports), together with the reports that missionaries sent from time to time to the superiors of their respective Orders, and the diaries of some of the *conquistadores* and colonists, contain a wealth of information about the Iberian (Spanish and Portuguese) settlement of the Americas. Generally speaking, studies of these documents have concentrated on military, economic and ethical matters, paying scant attention to the medical and veterinary information contained in some works, in which there is a predominance of news about the great epidemics (influenza, smallpox, measles, rickettsiosis, syphilis, etc.) (37).

In the veterinary field, there is a great deal of information about indigenous agriculture and on the introduction of plant and animal species from the Iberian Peninsula, subjects which have been widely and competently dealt with by several authors (6, 9, 36, 40, 66) from the standpoints of zootechny and botany (32, 34, 35). Less information exists, however, on veterinary medicine, so we shall concentrate on this matter, which we recently covered *in extenso* (22).

Although it is not, in the strict sense of the term, possible to speak of pre-Columbine veterinarians, it certainly may be said that the stories told by B. de Sahagún (c. 1499-1590) (21, 59), T. de Benavente "Motolinía" (1491-1569) (8), B. Díaz del Castillo (c. 1495-1584) (26), F. López de Gómara (1511-1562) (42) and others (30, 31) mention certain professionals who looked after the animals in Moctezuma's menagerie at Tenochtitlan in Mexico, where the *tecuanpixque* attended to the wild mammals and the *calpixque* took care of the birds. There are also reported to have been officials with the roles of technical and commercial inspectors working in the Aztec *tianguis* (markets), somewhat reminiscent of the *almotacenes* or *zabazoques* of the Arab and Christian kingdoms of Medieval Spain. The



application of simple remedies for people and horses in the Inca Empire is commented on by the Inca Garcilaso de la Vega (1539-1616) (33).

The veterinary activities of the first colonial period were connected with shoeing, supplying cities with meat (*camaleros* and *matanceros*) and the propagation of recently introduced species, that is with zootechny. Information about veterinary medicine and surgery is less abundant, probably because few *albéitares* (early veterinarians) went to the Americas in the initial period, owing among other reasons to the low demand for their services (except hippiatry) as the abundance of feral livestock (*cimarrones*) proliferating since the early stages of colonization, meant that food animals were much cheaper than in Spain, so all citizens were allowed to kill feral animals, although little more was used than the skins and the suet, the latter for making candles. Herrero Rojo (39), Sáiz Moreno and Serrano Tomé (60) have written about the blacksmith / *albéitares* of the early colonial period.

The first blacksmith/*albéitar* to arrive in the New World was Cristóbal Caro, who formed part of J. Aguado's expedition in 1495, looking after the livestock on board and setting up in Santo Domingo, returning finally in 1498 to Seville, where he carried on his profession. Among several others, mention may be made of Baltasar Hernández, from whom the governor of Cuba requested an expert report on the death of a horse that had been hit by an arrow; Juan Ruiz, who took part in Vázquez de Coronado's expedition of 1510-1549 in search of the Seven Golden Cities of Cibola; the anonymous *albéitar* who, there being no surgeon, successfully cured the skull injury of a soldier wounded in the Battle of Huarina in 1547 (57), and F. Gutiérrez, the first person to introduce cattle into Peru, in 1537, according to Cappa (11). Reports of other veterinarians are offered by Márquez (44) for Mexico, with especially interesting information about Juan Suárez de Peralta, the first veterinarian born in the Americas, and O.A. Pérez (53) for Argentina, but it was B. Cobo (18) who praised the work of veterinarians in general for the development of zootechny in the Americas. A particularly interesting personage was Brigadier Félix de Azara (7), the author of *Apuntamiento para la historia natural de los cuadrúpedos y pájaros del Paraguay y del Rio de la Plata* [Notes on the Natural History of the Quadrupeds and Birds of Paraguay and the River Plate] (1802), who has been considered a veterinarian (60).

The first great epidemic of European origin was of *influenza*, introduced by pigs shipped by Columbus from La Gomera in the Canary Islands and horses from Seville, which arrived ill on the island of Santo

Domingo in 1493, together with the Spaniards. The descriptions given by the expedition physician D. Álvarez Chanca (c. 1460- c. 1515) along with those offered by other writers like Hernando Colón (Christopher Columbus' son [Colón = Columbus]) (1488-1539), Mártir de Anglería or Anghiera (1457-1526) (5), Bartolomé de las Casas (1474-1564) (14, 15) and G. Fernández de Oviedo Oviedo (1476-1557) (49) bring out the seriousness of the epidemic, which killed half of the Spaniards and was a terrible scourge for the natives, who had no immune experience of what for them was a new illness. It was Álvarez Chanca who drew attention to the different responses of Spaniards and natives to the virosis, a phenomenon also observed for smallpox (Santo Domingo, 1518; Mexico, 1519, etc.), measles (Santo Domingo, 1495), epidemic typhus etc., which was an excellent example of what Pawlowski (51) called nidity of natural infection foci. Its zoonotic nature is borne out by the fact that pigs, equines and humans were equally affected. Given the types of *Influenza virus*, we may conclude that it was type A, which affects humans, pigs and birds, and was responsible for the great influenza epidemics of the 20th century (65).

Although there were native dogs in America, *rabies* was not known, nor was it introduced by the first dogs taken there by Spaniards, as Cárdenas states (1577) (12). The first report of rabies in continental America was made by Carrada Bravo (1978, cited by Guerra) (37). In Argentina, Azara says that this virosis was unknown, even among feral dogs, but, according to O. A. Pérez (53), it arrived with English ships around 1806-1807. This contrasts with Koprowski (1997, cited by Guerra) (37), according to whom, as early as the 16th century, the disease could have been transmitted by vampire bats (especially, according to Aguilar Setién (3), by *Desmodus rotundus*). Reports of attacks by such bats are given by many *chroniclers* *chroniclers* (Díaz del Castillo, López de Gómara, Friar Antonio de Ciudad-Real [1551-1617], Friar Pedro Simón [c. 1574- c. 1630], Friar A. Caulín [1719 - 177?], etc.) (16, 17, 26, 42, 62).

There were notable differences between the American and European forms of *epidemic typhus* of the period. The former is considered to be of murine origin, caused by *Rickettsia mooserii*, which is spread among mice by the louse *Polyplax spinulosa* and reaches humans via the rat flea *Xenopsylla cheopis*, and had a mortality rate of less than 1%. It was, then, a benign zoonosis. European typhus, transmitted by the human louse *Pediculus humanus capitis* and *P.h. corporis* is due to *Rickettsia prowazeki*, and caused epidemics with a mortality rate of 60%, being known in Mexico by the Nahuatl names *cocoliste*, *cocolixtli*, etc. ("thin face"). Christopher Columbus suffered a serious infection when he was sailing from Jamaica to Santo



Domingo in 1494, according to the description left by his son Hernando (1488-1539), by Álvarez Chanca and later by many others. Although there are doubts regarding its aetiology, most authors think in terms of rickettsias, while others think that it may have been paratyphoid fever.

Glanders was introduced with the equids that it affects. The first reports available are those of Juan Suárez de Peralta (1537-c. 1596) (64), the first veterinarian in the European sense to be born in the Americas and author of a *Libro de Albeytaría* (Book of Veterinary Medicine), written around 1570 in Mexico, in which he states that it is a very common illness in horses, can sometimes be mortal and that it can be dangerous for the veterinarians who are not familiar with it, which leads us to believe that he knew about its zoonosis. Likewise he mentions skin farcy, which in many cases is associated with glanders and in some with epizootic lymphangitis, the agent for which, *Histoplasma capsulatum* var. *farciminorum*, is found in South America. Furthermore, he describes equine strangles (caused by *Streptococcus equi*), unspecified fevers and abscesses or tumours of the hoof due to infection by *Fusarium necrophorum* (44).

Other infections also may have arrived with European livestock, although it is difficult to imagine that they were not already there in pre-Columbine days, for example, anthrax (*Bacillus anthracis*), known to have been there since the earliest days of the Spanish presence in Argentina, according to O.A. Pérez (52). This is probably the disease referred to by the Jesuit M. Dobrizhoffer (1717-1791) (27), who describes an epizooty linked with grazing land, reminiscent of Pasteur's *champs maudits* ("cursed fields"). On the other hand, according to Pérez, (52) blackleg (*Clostridium chauvoei*) was not diagnosed in the area until 1898.

Tetanus (*Clostridium tetani*), like other bacterioses, probably did not need to be imported from Europe, although the first reports of its existence linked it with the presence of equids. Guerra (37) offers the information originally given by J. de Melgarejo (1852), according to whom, among the diseases affecting man in San Juan, Puerto Rico, where horse breeding flourished, tetanus was one of the most dangerous, many babies dying of it in the first week of life through neonatal infection of the navel, whence its name "seven-day disease."

Texas fever was introduced with bovines from Spain, according to Curasson (24), Neveu-Lemaire (48) and Morgan and Hawkins (47). The piroplasm causing it, *Babesia bigemina*, was enzootic in southern Spain until

very recently, as is reported by Pittaluga (54) and Cordero, Castañón and Reguera (23). Other species of *Babesia*, *Theileria* and *Anaplasma* present in Spain are also likely to have spread to the Americas. Regarding disease-carrying ticks, especially the blue tick (*Boophilus annulatus*), it cannot be said whether it too came from Spain, where it is found, or was already present in America. The name "Spanish staggers" given to the disease in the USA indicates the attribution of a Hispanic origin to this parasitism, which had far-reaching effects when Texan longhorn herds were moved to other states (43).

Equine dourine, caused by *Trypanosoma equiperdum*, also spread to America, for Suárez de Peralta (64) mentions among horse diseases the *albarazos* (coin-like lesions) found in "the eyes, face, ears, anus and genitals under the tail". The cutaneous lesions of dourine had been known in Spain since the 12th century, thanks to the *Kitab al Felahah* ("Book of Agriculture") written by the Hispano-Arab Benalaguan of Seville (Abuzacaria Jahya Abenmohamed Behemed), who mentions the suffering of the "stallion in its member when it has covered a mare, in the nature of which there is illness". Also, Juan Álvarez de Salamiella, in the *Libro de Menescalía et de Albeytería et Física de las Bestias* ("Book of Veterinary Medicine") (1290) mentions the cutaneous lesions of dourine, so, along with Sanz Egaña (61), we consider the first European report of dourine to have been in Spain (20). Therefore, although studs were re-imported from France, as stated by Malone (43), this trypanosomosis had previously established itself in North America. This is borne out by the existence of an outbreak of the disease as recently as 1946 in the Papago reservation (47) in the State of Arizona, which borders the Mexican state of Sonora, where it has survived thanks to the isolation of the equine populations since the region was colonized by Spain.

Other diseases caused by trypanosomes came from Africa when zebus were shipped from Senegal to Guadeloupe, Martinique and French Guiana in 1828 (24). The agent was a variety of *Trypanosoma vivax*, described as *T. cazalbouii*. Other trypanosomes in the same group have probably arrived recently to have caused the diseases known in South America as *mal de caderas*, *peste boba*, *derrengadera*, etc. The transmission of trypanosomes of this group by insect bites, with no cyclic evolution of the protozoa, allowed them to become readily established in America. On the other hand, the possible arrival of trypanosomes of the *brucei* group, especially with the slave trade, did not lead to their establishment owing to the lack of flies of the genus *Glossina*.

Although there are reports of human leishmaniosis in Mexico, Peru, Brazil, etc., and even images on Mochica pottery (1st-3rd centuries CE), we have found no reference to leishmaniosis in animals. The same may be said for trypanosome infections, among which only Chagas's disease (*Trypanoxoma cruzi*) has been widely reported since the 16th century (13, 63), as have, though independently, its arthropod vectors.

Reports of animal helminthiasis are occasionally found. Friar Bernardino de Sahagún (59) describes different types of "worms", a term he also applies to the larvæ of muscids, but in his works he mentions a dog that expelled worms identifiable as *Toxocara canis*, along with an Indian defecating other worms that are *Ascaris lumbricoides*. López de Gómara (42) mentions some "little snakes" (probably roundworms – ascarids) expelled by a strange animal which he describes and is identifiable as a skunk, possibly *Conepatus mesoleucus* or *Spilogale* sp. (Mustelidæ.)

A special case is that of fascioliosis, or liver rot (*Fasciola hepatica*), which is also attributed European origin, although there are native words for it in Peru, Bolivia and Argentina (*saguaypé*, *suguaypé*, *alicuya*, *hallo hallo*, *kallu taca*, etc.), a fact which would lead one to think that it already existed there or was established in America early on. This would be confirmed by the anti-fluke treatment of goats suffering from what in Chile is called *irgiúines* disease with the plant known in the Araucanía-Pampas region as *pichi* (*Fabiana imbricata*) (50). Fasciolosis also affects alpacas and llamas (28). Whether pre-Columbine or European in origin, *Fasciola hepatica* and its intermediate hosts (*Lymnaea* spp., also of similarly doubtful origin) are a notable example of adaptation to extreme environmental conditions, as they are found today at altitudes of over 4,000 metres, where they affect animals and humans (45).

Parasitism by leeches is mentioned by Friar Bernardino de Sahagún (59).

Parasitoses and ailments caused by arthropods are widely mentioned, sometimes so exactly that it is possible to identify the agents.

Human scabies is documented in the pre-Columbine period on the anthropomorphic vessels of the Chimu and Mochica cultures, by the existence of remedies for it and by specific words for it (e.g., *carache*, in Quechua.)

It has been said that ruminant mange may have arrived with Spanish sheep but, even if it did, we know that the Incas had means of combating acarosis, including the immediate slaughter and burial of infected animals to stamp it out, and that they applied fat externally. Acosta (c. 1539-1600) (1) says that the disease can be fatal for alpacas, and that it is very catching, so the Indians buried the animals alive in order not to infect others, although after colonization they began to treat the affected areas with boiling lard, which they applied as soon as possible, before other areas became affected. Polo de Ondegardo (15??-1575) (55) comments that the disease was very harmful, very infectious and that the Incas had arranged that affected animals "should be neither eaten nor cured, but buried immediately and very deep, and this was done", and the Inca Garcilaso de la Vega (33) gives an accurate clinical description of an epizooty that affected llamas and other camelids in Peru in 1544, spreading to guanacos and vicunas, in which it was more benign, "because of the colder region they live in". The same author mentions another epizooty, which in 1548 affected vixens, causing deaths among them F. Montesinos, (29) in the 17th century, also mentions an epizooty affecting sheep and other animals, especially in the coastal area, which could only be treated with lard. The spread of mites from some species to others is rejected by J. de Acosta (1), who states that, despite "the plague being so widespread, it did not affect red deer, roe deer or fallow deer; it must have some other cause." In fact, even the mange of auchenids (New World camelids) is due to specific mites, like *Sarcoptes scabiei* var. *aucheniae* and *Psoroptes aucheniae* (28). Regarding the arrival of mange in the USA, Malone (43) states that the merino sheep belonging to President Thomas Jefferson, which had come from France, had the acarosis.

A rash affecting puppies is mentioned by Ulloa (1748), although he does not explain its aetiology. It may have been a viral exanthem or perhaps *Demodex* infestation.

Friar Antonio de Ciudad-Real (17), while commenting on a serious human case, tells us that the patient attributed it to having consumed "much milk from sick goats", which leads us to believe that the goats had mange and the friar admitted the zoonosis, although he was wrong about the pathway of contagion.

There are countless references to mosquitoes. According to Guerra (37), fossils have been found in America of Culicidæ, Cæstridæ and *Glossina*, spp., the last named being absent from the area at the time of Discovery. Anophelinæ and Culiciniæ are perfectly identifiable. Chironomidæ (Heleidæ)



are mentioned as *jejenes* (gnats) or *comijenes*, words still in use, and Phlebotominæ may be identified in such expressions as "they are very fine, like sand", which Friar Bernardino de Sahagún uses. Sometimes mosquitoes are distinguished by the time of day when they are active, some being diurnal and others nocturnal, or by their behaviour when they are bloated with blood, as is the case of the blackflies (Simulidæ). Control methods also vary: immersing oneself in water or sand, living in places high off the ground, shutting oneself in a hut and lighting a smoky fire, treatment with vegetable products (decoctions of calaminth or quassia, etc.), colouring with anatta, derived from *Bixa orellana* (the *achiote* of the Mexica, *bija* of Yucatán, *urucú* of the Tupí-Guaraní, etc.). A very interesting observation by López de Gómara (42) and P. Mártir de Anglería (5) on the role of certain "glowworms", *cocuyos* or *cucuyos*, as they are known in Cuba (*Pyrophorus noctrilocus*), as enemies of the mosquitoes is an allusion to the struggle for life, another good example being that mentioned by Fr. A. de Ciudad-Real (17), whereby ants could control certain flying bugs, identifiable as kissing bugs (Triatominae).

The specific myiasis of domestic animals introduced from Spain arrived with them, as Roncalli states (58). Therefore, species of Hypoderma, Rhinoceros, Cestrus, Gasterophilus, etc., originated from Spain. Other myiasis were native to America, like the one mentioned by Friar Bernardino de Sahagún (59) that affected the legs of mice and rabbits, implanted "in the flesh looking outwards" and more specifically those mentioned by the Inca Garcilaso de la Vega (33) in Florida, Friar Pedro Aguado (2) and Friar Pedro Simón (62) in Colombia, Friar A. Caulín (16) in Venezuela, Father L. Vale in Brazil (1563, cited by Guerra) (37), Lizárraga (1545-c. 1615) (41) in Argentina, etc. Many of these cases can be identified as attacks by *Dermatobia cyaniventris* (syn. *D. hominis*), *Cochliomyia hominivorax* and *C. macellaria*. For the treatment of these screw-worm infestations in Peru, leaves of *Agave* sp. were used (called *magüey* or *pita* by the Spanish and *chuchau* by Peruvians).

Friar P. Aguado (1577-1577) (2) tells us that, during the exploration of Veragua and Nombre de Dios in Panama, they had to eat their dogs and overcome their disgust at the mange and "maggots" (fly larvae) that one of them had two days after slaughter. Azara (7) explains that in Paraguay there were (and could be) no feral dogs, because whenever they fought over bitches on heat they would die "wormy." He says that in the same country, cows were rounded up twice a week from January to August, the calving period, to get rid of the larvae of muscids that invaded the umbilici of the calves. O. A. Pérez (53) says that the Abipone Indians did not dock horses'

tails, in order to avoid *bicheras* or *gusaneras* ("worminess", akin to screw-worm infestation) and restates Azara's information (7) on the twice-weekly roundups during the calving period to avoid umbilical myiasis in the calves. To the same preventive end, animals were painfully castrated at times when the blowflies were inactive.

During the exploration campaign of the Venezuelan province of Los Choques, undertaken by Spira (Hohermut), according to Oviedo y Baños (1671-1738) (49), the horses suffered serious illnesses owing to the bad quality of the grazing, which gave many of them tympanites ("they swelled until they burst") while others "had so many worms that they died coughing them up." These "worms" were probably the larvae of *Gasterophilus nasalis*. Another suffering of equids is described by Vázquez de Espinosa (1570-1630) (67) in New Spain (Mexico), where there were such dangerous "worms" in the fields that "if they bite a horse or mule, they make its hooves shatter." Another type of worm is useful for cauterizing", probably alluding to the cantharides (*Cantharis vesicatoria*).

On lice and fleas, much has been written, but without reference to attacks on animals. Especial attention was given by chroniclers to the jigger or *nigua* (*nigua* in Haiti, or *tunga* in Brazil), that is *Tunga penetrans*, its presence having been recorded in the West Indies, Central America, Venezuela, Peru and Brazil among other places, although no mention is made of attacks on animals, yet pigs can be infested. The infestation of birds by mallophagans is doubtless confirmed by Gómara's allusions to people "picking fleas off them."

Various bugs are reported in all the countries, but pride of place goes to the blood-sucking bugs (*texcan* in Nahuatl, *pech* in Maya, *yta* or *hita* in Quechua) of the family Triatominae, whose genera Triatoma, Panstrongylus and Rhodnius include, among the over 2,000 known, the major vectors of the agent of Chagas's disease (*Trypanosoma cruzi*). All the chroniclers record its bite as initially painless, followed later by a burning or caustic sensation. Ciudad-Real and Cárdenas (12, 17), Gumilla (38) and Cobo (1572/96-1657/59) (18) give accurate descriptions of these ectoparasites, but Lizárraga is particularly thorough in the morphological details given, the description of the way in which they attack, the consequences of the bite and the habits of these important bugs, which are also reported in Argentina by M. Dobrizhoffer (27) and F. de Azara (7).

Although there is less information available on the effect of poison arrows on animals than on man, it is by no means lacking. The first reports came from the West Indies but soon new reports would come from the continent, where the Indians knew the curarizing effects of different plants. López de Gómara (42), Fernández de Oviedo (49), Mártir de Anghiera (5), Aguado (2), Díaz de Guzmán (1558/63-1629) (25) and others describe the effects of decoctions of roots, bark or fruits of various plants of the orders Menispermaceæ (especially *Chondrodendrom tomentosum*) and Loganaceæ (*Strychnos* spp.), from which the Indians obtained curare (from *ourali* or *wourali* among other forms meaning "poison" in the language of the Macusi Indians of Guiana, a Carib dialect). Fernández de Enciso (29) comments that the "apples" that they call *maguillas* cause many worms to form in the bodies of those who eat them and that they experimented with their effect on a dog, with the same result (!?). Spaniards treated wounds with cautery and the immediate application of sublimate, but Vargas Machuca (1892) comments that they also learnt from the Indians to clean the lesion surgically and then to apply a mass of toasted maize flour, gunpowder, ash and coal or, better still, place a ball of suet and sublimate in the wound beforehand. Monardes (1512-1588) (46) recommended, after the surgical cleaning, that the wound be washed with wine, and tobacco juice applied. In the conquest of New Spain (Mexico), the Spanish made efficient use of dogs in their attacks, which the Indians repelled by firing arrows at them. In order to protect them, the Spaniards dressed them in padded cotton coats, which they called *escaupil* (From Nahuatl *itchcatl*, cotton and *huipilli*, shirt), with the drawback that their movements were impaired. There are also reports of the harmful effect of poison arrows on horses, during Ñuflo de Chaves' expedition (1558) in Argentina and Paraguay, Díaz de Guzmán saying of the wounds inflicted: "most of the horses [...] died shortly afterwards in throes from the poison" (curare.)

The shortage or even absolute lack of horseshoes was the frequent cause of hoof lesions, with serious consequences for the conquistadores at the beginning of colonization. A curious detail is that, owing to the lack of iron, during Gonzalo Pizarro's rebellion against Viceroy Blasco Núñez Vela, silver horseshoes are said to have been used, and even gold ones, according to López de Gómara and others. For dislocations of horse legs the Inca Garcilaso de la Vega recommends the grass or shrub called *chillca*, which, he says, has marvellous effects on human joints "where the cold has got in" (rheumatism?)

As was normal in human and veterinary medicine in Europe, bloodletting was habitually practised by blacksmiths and veterinarians, to

the extent that measures on hygiene were taken in some cities. Thus, on the 16th May 1524, the *Cabildo* of Mexico City banned bloodletting in the streets and squares of the city, stipulating that, should it be done, then the blood had to be washed away before it dried, those who broke the law being fined four gold pesos (44).

Friar Toribio de Benavente (8) tells us that the "wine" obtained from *metl* or *maguey* (*Agave*, sp.) made excellent poultices for horses, better than those made with normal grape wine because maguey liquor "is stronger, warmer and more suitable for this."

Among the customs of the Indians of the Bolivian Altiplano, and in other regions of the Inca empire, the use of aborted llama foetuses is reported, either in ritual sacrifices or for preserving potatoes in *piruas* (a kind of silo), or for magically refining the family silver, when they were offered with coca or with a guinea pig (*Cavia porcellus*), as we are informed by B. Álvarez (1540-1588?) (4). Today in Bolivia the *challa* rite is still practised, whereby a llama foetus is buried where a house is to be built, to bring good luck.

Other reports concern ailments linked with the nature of the pastures, like that offered by D. Díaz del Castillo (26) for the Chiapas region of Mexico, where the skulls of several horses were found, having died from "the weed that they had eaten", during Cristóbal de Olid's expedition. Writing about the Llanos (plains) of Venezuela, Lizárraga says that good cattle was bred there, yielding flavourful meat, but that in some areas, there was a certain plant that he describes as "like carobs but creeping over the ground", the fruit of which, when eaten by horses, made their tail hair fall out (!?)

Finally, reports also exist of various plagues. López de Gómara (42) informs us of a plague of mice that destroyed trees, fields of sugar cane and maize, vegetables and even clothes. Lizárraga (41) also describes one in the Venezuelan Llanos occurring together with one of crickets, which united their devastating effects to those of the mice. Friar A. de Calancha (1584-1654) (10) also mentions this double plague in 1638.

Lastly, B. de Sahagún (59) says that the Aztecs believed that when hens were incubating eggs, if anyone went shod into the place where they were kept, the chicks would not hatch and even if they did, they would be sickly and would soon die (21).



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