

Meteorites of Campo del Cielo:

Impact on the indian culture

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Abstract

This work is a critical revision of the statements and deductions that have been taken as certain until the moment, about the impact on the indian cultures of the Chaco (Argentina), of the remarkable meteoric dispersion of Campo del Cielo (aprox. 4000-2000 BC.), confronting them with the modern ethnography and our own field work. It is also to specify the relationship degree between the toponymy of the area and the astronomical phenomenon in question

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/Introduction/

The Gran Chaco is located in the center of South America. It partially embraces the south of Bolivia, Paraguay and the northeastern Argentina. It is a sedimentary plain covered with parks and subtropical savannas. The soil, free of stones, is composed of layers of sand and mud. Inside the Gran Chaco, to the south of the Argentinean provinces of Chaco and Santiago del Estero, is the meteoric dispersion of Campo del Cielo. This was originated by the impact of big metallic meteoroid, probably about 5800 years ago. The peculiar characteristics that it presents (size and alignment of the craters, great mass and high content of iron of the fragments, etc.) have gotten the attention during a lot of time. The knowledge of this event that pre-Columbian inhabitants possessed is usually mentioned. This is acceptable if we consider the attraction that the celestial phenomenons have always exercised on the man, in particular one that as this should have had cataclismic proportions. For these reasons, it is important to settle down on firm bases the reaches of the impact of this dispersion on the indian cultures of the Chaco.

/The meteoric dispersion of Campo del Cielo/

Twenty-six are the craters documented in Campo del Cielo. The most outstanding is the crater Rubén de Celis (depth > 5.5 m). The known meteoric fragments are metallic (hexaedritas[1]), being the most important: Mesón de Fierro (~ 20 tn) and El Chaco (37 tn).

The expedition of Cassidy (1968) carried out gutters in the crater Rubén de Celis. Their study suggests that the original depth of the crater was of ~ 13.8 m under the local level of the land. Bags of vegetable coal were found at different depths. The age measured with ¹⁴C of this coal, was estimated in 5800 ± 200 years. The most probable thing is that this vegetable coal was wood burned in the forest fire caused by the fall of the meteorite. Therefore, the approximated maximum age of the formation of the crater (and probably their real age) it is the measure with the ¹⁴C.

/Historical antecedents/

The exploration of Campo del Cielo was impelled by the search of the Mesûn de Fierro -large table of iron- (expeditions of Mexîa de Miraval (1576), Maguna (1774), Francisco de Ibarra (1779) and Rubîn de Celis (1782)). It was believed that the Mesûn was the blooming of a silver vein, first, and one of iron later. After the expedition of 1782 their rake was lost. In 1803 Don Diego de Rueda came out in its search, but he was not successful. The expedition commanded by Don Fernando Rojas (1804) gave found a metallic fragment similar to a "standing dry log". In 1923, the Dr. N·gera carried out the first work dedicated to the craters of Campo del Cielo[2]. In 1962 and 1963 several scientists, headed by the Dr. Cassidy and accompanied by the Argentinean geologist Dra. Villar, carried out expeditions to the area [3][1].

/Ethnic groups of the area/

To determine what ethnic groups inhabited the region of the Chaco, and to try to describe their evolution in the last five thousand years is an arduous task[4][5]. The region has been a corridor among the Pampas and the Amazon area, on one hand, and between the Andean area and the Mesopotamia, for another. This darkens the information of the chroniclers. It is necessary to add the great confusion in the used denominations. The process inhabited began, seemingly, about 7000 years ago[6] when it stopped to be a marshy area to become a group of parks and savannas[7]. In the area of Campo del Cielo we can find, basically, /guaycur'es/ (/mocovîes/ and belatedly, /tobas/ and /abipones/), and /hu·rpidos/ (especially /matar·s/ and /vilelas/). There are references to a possible sporadic presence of /chiriguanos/. Rubîn de Celis (1783) mentions that the area was inhabited by meleros (harvester of wild honey), and tribes of wandering indians who look for a wild root called /koro/, that they only chew continually, being for them of first necessity. The cacique Marcos Gûmez related us that the dry root of the /koro/ (wild tobacco) it was chewed by the /mocovîes/. They think of it as a remedy and it intervenes in numerous occasions of importance. This (and their nomadism) makes us think that those wandering indians of Celis were /guaycur'es/.

/Mythical tales/

The works on the meteorites usually suppose that this impact had great influence in the ethnic groups of the area. In most of the cases there are not concrete sources, and no work is in charge of this aspect of the meteoric dispersion more than incidentally. Of all the works, that of Antenor ìlvarez[8] is the most precise in this respect, and probably the source of the other ones of this century. As an introduction it presents us a page dedicated to the indian' myths that, according to him, are related with the phenomenon. These mythical aspects were not his central interest, but in spite of it, he makes some very important statements:

- 1).The meteorite was /known from old/ by the indians of the area.
- 2).They had /pilgrimage paths/ to the place, covering a region of about 200 kms.
- 3).There it took place an "/indefinite" solar cult/ associated to the /Mesûn de Fierro/.
- 4).They believed this iron/mass detached from the sun/.

5).They believed in the /transfiguration/, to the dawn of certain day of the year, of the /meteorite/ in a /tree/ /of "radiant and brilliant iridescent, /that/chimed as a hundred/ /bells"/^3 .

ilvarez mentions, on purpose of the asseverations 1, 2 and 3, a work of J. Lubbock[9], which refers only, in general terms, to the solar cults of the primitive man. These opinions, together with some comments of Dobrizhoffer[10] on a possible solar cult among the /abipones/, could have him inspired. The precisions given by ilvarez about the supposed cult to the meteorite are very attractive. We believe we have found the source from which he builds his story: Father Guevara [11], talking about the /mocovïes/ says: "To the stars they have for trees whose beautiful branches knit of lucid rays and sparkling shines". Then he speaks to us of their beliefs regarding the fall of the Sun: "Second time the sun fell [...] Then it was when everywhere fire floods ran, and flames that all burned it". In these quotes we can find reasons that remind us the text of ilvarez, but in a different context. In particular, in the description that the latter carries out about the "metallic" tree, he uses words very similar to those of the first paragraph of Guevara. This paragraph also got R. Lehmann-Nitsche's attention[12]. He considers the text confused and he relates it with another paragraph of Guevara: "The mocobïes faked a tree that they called /nalliagdigua/ in their language, of height so limitless that it went from the earth to the sky. For him, of branch in branch winning bigger elevation always went up the souls to fish in a river"^4 [11]. Starting from this last one, Lehmann-Nitsche suggests that the first paragraph of Guevara lack some words and should be read: "The stars have are for flowers of the celestial tree, whose beautiful branches knit then of lucid rays and sparkling shines" (it would speak of the sky tree). We believe possible that ilvarez has joined together in a story these mentions of the sky tree with the references to meteoric fragments with trunk form [8]. ilvarez assumes that the meteorite was had by a detachment of the sun: "Also tell the tradition of this tribe (/toba/) that, one day the Sun had fallen from the sky , setting on fire the forests and that the tribes survived becoming caymans; borned legend, without a doubt, of the fall of the superb meteorite".

There are not in the descriptions of the explorers and chroniclers[10][11][13], on the indian beliefs any print about a cult to the meteoric masses as the one mentioned by ilvarez. According to the ethnographic works[14][7] although some tribes of the Chaco personifies to the celestial bodies and evidences of a celestial deity exist among the guaycur'es, there are not evidences of regular astral cults. Lehmann-Nitsche, when talking about the /mocovïes/[12][15], he makes a sole mention about the meteors, according to the one which when a fleeting star passes from north to south is indication of strong wind of the north; if she leaves a long splendor she announces misfortune. In the article on the vilelas[16] only mention that the meteors are considered as the fall of a star. Their only meaning is to announce north wind, unless it is specially remarkable, in which case it announces an or several deaths in the region toward which goes the meteor. Lastly, the article dedicated to the /chiriguanos/ makes mention that the meteors are excrements of stars (/yastarepoti/), adding that this voice also names[17] to kind of a mushroom, being so these would be seen once as meteors fallen to earth. The article points out that the voice /mbairËndi/ means comet (and that this acts like guide), similar to the voice /baerendi/ (of /mbae/, thing, /hendi/, to glow) that gives Nordenski^ld[18] for meteor (adding this last one that the fall of one points out the death of a capitanejo -minor chief-). Braunstein[19] mentions that /katËs/ /ihwelÏ/ (hang star) it is the toba voice for

comet, and that the meteors are seen as powerful shamanes when dying, being believed that they always fall with great noise on a palm (/fwic`k/). According to this work the voice for firefly is /fwicohnah/. MÈtraux[14] comments that the comets are taken in the Chaco like announcements of epidemics, and the fall of a meteorite like the death of a shaman.

In Campo del Cielo, some few establishments /mocovìes/ subsists, strongly acculturated. We carry out two visits (in January and April of 1999) to one of them: Tolderìa Cacique Cat·n, to some 35 kms of the city of Charata, province of Chaco. In general, the meteorites didn't seem to occupy a specially outstanding place in their beliefs. Nolzco, cousin of the Indian Chief Marcos GÙmez, referred us that /wokani/ /nahani/ was the name for the fleeting stars, of /wokani/: star (/mocovì/: /avaccanni/, Tavolini [20]; /wacani/, LÙpez [21]) and of /nahani/, to fall. He also commented that these phenomenons announced droughts or floods. And when landing, the fleeting stars got deep resulting in a mine. M. GÙmez confirmed this adding that when a star falls, "Luck falls" bringing luck to anyone. Both asociated the phenomenom, with some hesitation, to MesÛn de Fierro and Laguna de la Virgen (a possible meteoric crater). They described with the word /niaratik/ ("falls down and goes up") the movement of impact and arise of these "meteoric mines". They also said that both Laguna de la Virgen and MesÛn de Fierro have "a powerful". At least, through interviewed /mocovìes/, we have seen nothing in connection with ilvarez' ideas. The association of fleeting stars with misfortune, recorded by ethnographers at the beginning of this century still remains doubtful; standing out the idea of luck or fortune in connection with meteoric fragments

ilvarez[8] states that primitive settlers might have used meteoric iron for their weapons and instruments. For that, he quotes the book /L'Homme avant L'Histoire/[22], where we find no reference to that. ilvarez also makes reference to Zuberbuhler and Dr. Sohle's comments who afirm indians used meteoric iron to make arrow tips and boleadoras (putting everything together with wax). However, ilvarez admits that ethnographers who worked in this area didn't mentioned anything about the use of meteoric iron. Even today there is no evidence of any piece made in this material in archeological collections. When asking about iron instruments, our informers agreed in that the early indians made their boleadoras wrapping in leather a mass made up by bee wax and pieces of metallic pots. This procedure is remarkably similar to the one described by Zuberbuhler and might have been performed using little meteoric pieces. Nonetheless, we could get no confirmation of this through our informers .

/Tales about Cataclysms/

ilvarez asociates the mythical tales about the destruction of the world due to the Sun fall with the meteoric event. Taking into account that the rest of connections between indians and meteoric dispersion doesn't seem to be as evident as he supposed, the identification of the cataclysm tale and the latter is even more doubtful.

In the Chaco area four kinds of cataclisms are the most relevant: "fire", "cold", "darkness" and "flood". Each of this events causes the "death" and metamorphosis of human beings and animals[23][7]. In general, this ideas are supposed to be derived from high andean cultures, wich overlap in the Chaco area with the own view point of paleolithical hunters. According to Imbelloni[24], these andean apocalyptical ideas are related to the concept of the four ages of the

world held by those high cultures. On the other hand, Pettazzoni points out that long nights cataclysms are well known among many of the North and South American tribes.[25]. We're interested in the cataclysms due to fire, darkness, and cataclysm due to objects fallen from the sky. We will mention some of the most outstanding versions:

/Cataclysms due to fire/: /Matacos/[26]: 1)Earth destruction caused by a fire shower.2)Retelling of a big fire that covers the whole area of Gran Chaco. /Toba-pilag·/[27]: The moon is attacked by jaguars and gets reddish (bleeding), pieces in fire fall to the Earth producing a big fire. /Toba/:1)Big fire for Sun fall[14].2)Fire destroys all the Earth. Some are saved by going up to the sky and becoming constellations.[28]

/Cataclysms due to objects which fall from the sky/[27]: (/Pilag·/) The world is destroyed by stones shower (and hail) which falls from the sky. Nighth falls and everythin is cold.

/Cataclysms due to storm and deep darkness/[27] :(/Toba-Pilag·/) deep darkness, a cloud covers the sun. At last it clears away, moving to the North.

We must remember that the sequence: objects in fire which fall from the sky-Big fire-Darkness-Cold, summerizes the series of events after an impact. It's clear that the versions which most correspond to this are the ones of /Pilag·/, who, within the /guaycur'/' indians, are the ones who have remained stuck to old traditions for more time [14]. On the other hand, although the paralelisms between the Chaco and Andean tales are not few, the unity observed in the latter about the four ages and the four cardinal points is not present in the Chaco tales.

Even if the motive for the sun fall and other cataclysmic ones seem to have been very strong in the past, they have weakened considerably. Although we have asked our informers on many ocations about these motives, we couldn't get any retelling. The Indian Chief M. Gûmez, explicitly denied the fact that the sun had ever fallen, even when in his negation there was an implicit acceptance of the cataclysmic power an event of that nature would have: "The sun never fell, if that happened, all of us would die. The sun is very hard". After that he told us that stars could indeed fall, "when there is danger". As regards the other kinds of cataclyms, we can only point out a tale which could have been associated to destruction due to hail (which as we have seen, is related to the destruction due to objects which fall from the sky). Marcos Gûmez told us that the /mocovïes/ were stopped in their route to the south for a heavy and unpredictable hail. A "Powerful" who was in a "hole" prevented them from going on. Therefore, they went back to Chaco. Marcos places the episode at the begining of the century, coinciding with the Cat·n Indian Chief's draw back from Santa Fe. (after which they settled in the area they still are).

/Toponyms/

We consider that the the toponimic system of these tribes is on of the most resistant elements to European penetration and therefore is a really interesting reservoir of their culture[29]. Besides, their toponyms reveal, most of the time, deep connections with their cosmological ideas.

Most of the works on Campo del Cielo affirm (considering ilvarez's ideas) that since the XVIII Century the craters area is known as /Piguem Nonralt· / (translated as Campo del Cielo/Heaven's Field), and Rubïn de

Celis Crater as /Piguem NollhirÈ/ (translated as Pozo del Cielo/Heaven's Hole). From this, it is usually deduced that natives associated both places with meteoric dispersion. We find that the word /Piguem/ in /Guaycur' / languages names, certainly, the sky[21][30]. The terms most similar to /Nonralt·/ and /NollhirÈ/ we found, in the /Guaycur' / languages were: Field: /Nonorak/ -/toba/-[31], /Noennag·/ -/mocoVÌ/-[32], hole: /NollairÈ/ -/toba/-[31]. The ones Abreg' gives seem to be ones which are most like ilvarez's, specially /NollairÈ/. Thus, we can affirm that the names /Piguem Nonralt·/ and /Piguem NollhirÈ/ are in a /Guaycur' / language. However none of our informers could recognize the words /Nonralt·/ or /NollhirÈ/ as belonging to their language. Maybe for the degree of acculturation of the natives in the area. On the other hand, according to Abregu, the term /Nonr·/ means "big" in the /Toba/ language. Marcos GÙmez told us that in /MocoVÌ/ the Campo del Cielo area is named /Nohenah·/ /nondig'·/. The first of these terms seems to be equivalent to Tavolini's /Noennaga/ (field), the second should correspond to "big", due to the fact that Marcos told us the area had that name for being big. This could support the opinion which holds that the origin of the name Campo del Cielo is related to the big size of the area. GÙmez's sayings could illustrate a recent episode, retold by the Director of Sudoeste Chaqueño Museum, Oscar Gonzalez: an area nearby named Pampa del Cielo, might have received its name from European immigrants, after a big flood, because of the fact that only remained "water and sky". On the other hand, there are (even when works on the topic seem not to have taken notice about them) other places named Campo del Cielo in the Chaco area; for example Campo del Cielo in Formosa.

Early expeditions have given us other native names. Several chroniclers refer to the area where Campo del Cielo is as /Otumpa/ desert. Ibarra's expedition journal (1779) mentions a hole named by natives /Utumpa/ [8]. The word could be related to /atun/hatun /-big in /Quichua/- and /pampa/ -plain or field in /Aymara/-[33][31]; that is to say Big Field. It could also derive from the /quichua/ word /thutumpi/, "prairie, plain"[31]. Maybe, both denominations (/Otumpa//Utumpa/, and /Piguem/ /Nonralt·/) make reference in different languages, to the same prairie. Another name is /Uchu-Pallana/ which refers to a place (expedition 1779). We believe it could be related to the /quichua/ words: /uthku//hutqu/: Hole and /pallana/: name of children game which implies throwing stones in the air and picking them up while they're falling. It comes from /pallay/ (pick up from the ground with your hands) means thing to be picked up, or place where it will be picked up. On the other hand for Chaco inhabitants there exists a great connection between stars and harvest (specially algarrobas harvest).

/Conclusions/

The first conclusion we come to is the fact that there has been very little cross-information among anthropologists and ethnologists on the one hand, and the historians involved in meteorites research on the other .

Many of the commonly accepted affirmations, specially those referred to the "cult" which natives might have made to the meteorite, are highly speculative. We can't conclude that Chaco tales are doubtlessly the result of meteoric impact. However, we can't avoid pointing out that those tales have a structure that makes that interpretation possible. In fact, there exist tales of neighbouring ethnias built on natural phenomena which can still be recognized (due to their shorter age)[16]. On the other hand, the possible connections with andean tales do not leave out the possibility that both might have been built having the

same natural phenomenon as one of their sources.

To deepen the comparison of the area toponyms with other similar ones but not related with the meteoric dispersion, promises to be one of the best ways. This way has given us clues of the fact that the name Campo del Cielo is not necessarily related with the celestial phenomenon. In this area words from /guaycur'/, /lule-tonocotÈ/, /quichua/ and /aymara/ can be expected.

It is extremely necessary to carry out a more thorough field work in the Campo del Cielo area, both ethnological and archaeological. The former, to rescue the elements next to disappear in /mocovì/ and /vilela/ traditions, and to be able to set comparisons with Lehmann-Nitsche's works (this local tales are, besides, invaluable regarding the toponyms related to meteorites). Furthermore, archaeology in this region still is in an initial stage. New works could help to make more accurate relationships of these ethnias with meteoric iron.

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3 The italic they are our

4 Lehmann-Nitsche identify this river with the Milky Way.