

## A PARADOX IN COLONIALISM AND TECHNOLOGICAL CHANGE

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### **Abstract**

Scholars who study technological change have shown that indigenous people in the Americas had ideas of practicality that were different from those of European colonizers. Still, indigenous people have come to adopt many technologies that we associate with European expansion, such as metals for cutting, machines for grinding, draft animals, the wheel, etc. This is the paradox of narratives of technological change: practicality is culturally defined, yet many people have ended up adopting the same technologies. I attempt to explain this paradox by focusing on economic variables. Specifically, I focus on access to the means of production among indigenous people in central Mexico, and how having access to raw materials, tools, and the products of labor shaped the continuation of the use of chipped-stone tools well into the colonial period. I also focus on how changes in labor and the environment can explain the abandonment of hand-held tools for grinding maize in the late 20<sup>th</sup> century in Xaltocan, Mexico. These case-studies point to the potential and limitations of the use of economic variables to explain technological change.

### **Resumen**

#### *Una paradoja en el colonialismo y el cambio tecnológico*

Los investigadores que estudian el cambio tecnológico han demostrado que los pueblos indígenas en las Américas tenían ideas de practicidad que eran diferentes a las de los colonizadores europeos. De todos modos, los pueblos indígenas han llegado a adoptar muchas tecnologías que asociamos con la expansión europea, como metales para cortar, implementos para la molienda, animales de tiro, la rueda, etc. Ésta es la paradoja de las

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narrativas del cambio tecnológico: la practicidad es culturalmente definida, pero mucha gente termina adoptando las mismas tecnologías. En este trabajo intento explicar esta paradoja focalizándome en variables económicas. Específicamente, me concentro en el acceso a los medios de producción entre los pueblos indígenas en México central, y cómo teniendo el acceso a materias primas, instrumentos y productos de trabajo continúan con el uso de instrumentos líticos tallados en el periodo colonial. También me focalizo sobre cómo los cambios en el trabajo y en el ambiente pueden explicar el abandono de instrumentos manuales para moler el maíz a finales del siglo xx en Xaltocan, México. Estos casos de estudio señalan el potencial y las limitaciones del uso de variables económicas para explicar el cambio tecnológico.

## Résumé

### *Un paradoxe dans le colonialisme et le changement technologique*

Les chercheurs qui étudient le changement technologique ont démontré que les peuples autochtones des Amériques avaient des idées de l'utilisation pratique qui étaient différentes de celles des colonisateurs européens. De toute façon, les peuples indiens ont adopté beaucoup des technologies que nous associons à l'expansion européenne, comme des métaux pour couper, des meules mécaniques, les animaux de trait, la roue, etc. Voilà le paradoxe du changement technologique. Même si l'utilisation pratique d'une chose est déterminée par le contexte culturel, plusieurs peuples viennent à adopter la même technologie. Je tente d'expliquer ce paradoxe en me penchant sur des variables économiques. Spécifiquement, je me concentre sur l'accès aux moyens de production parmi les peuples autochtones au centre du Mexique, et la façon que l'accès aux matières premières, aux outils et aux produits du travail influencèrent la continuation de l'utilisation d'outils en pierre taillés pendant la période coloniale. Je porte aussi un regard sur comment les changements du travail et de l'environnement peuvent expliquer l'abandon d'outils manuels pour moudre le maïs à la fin du siècle xx à Xaltocan, Mexique. Ces études de cas démontrent le potentiel et les limites de l'usage de variables économiques pour expliquer le changement technologique.

## Resumo

### *O paradoxo do colonialismo e da mudança tecnológica*

Os pesquisadores que estudam mudança tecnológica tem demonstrado que os povos indígenas das Américas tinham ideias de praticidade que eram diferentes das dos colonizadores europeus. Mesmo assim, os povos

indígenas chegaram a adotar tecnologias europeias, como metais para cortar, instrumentos para moer, animais de carga, a roda, etc. Este é o paradoxo das narrativas da mudança tecnológica: a praticidade é culturalmente definida, mas muita gente acaba adotando as mesmas tecnologias. Neste trabalho pretendo explicar este paradoxo focalizando as variáveis econômicas. Especificamente, me concentro no acesso aos meios de produção entre os povos indígenas do México Central, que mesmo tendo acesso a matérias primas, instrumentos e produtos, continuam com o uso de instrumentos líticos lascados no período colonial. Também as mudanças no trabalho e no ambiente podem explicar o abandono de instrumentos manuais para moer o milho no final do século xx em Xaltocan, México. Estes estudos de casos mostram o potencial e os limites do uso de variáveis econômicas para explicar mudanças tecnológicas.

## Introduction

Decades of anthropological studies of colonialism have shown that indigenous people in contact with Europeans had their own cultural, cosmological, and social interpretations of technology, which were different from Europeans' cultural, cosmological, and social interpretations of technology. As a result, indigenous people did not necessarily see European technologies as superior or more efficient, and Europeans did not necessarily see indigenous technologies as superior or more efficient either (Rodríguez-Alegría 2008a, 2008b; Rozat 2004). This relativist view of technological change has much to offer to our understanding of technology and technological change, but it still has to contend with one broad historical pattern: today, most (but certainly not all) people in former European colonies have adopted what we perceive as European technologies, including metals tools for cutting, machines for grinding grains, the wheel, the use of draft animals, even cars and cell phones. This seems to confirm to some anthropologists, and certainly to the public at large, that European technologies are simply better or more efficient than indigenous technologies. This pattern also seems to confirm that even if indigenous people have religious, symbolic, or otherwise cultural reasons to preserve their "traditional" technologies, they can discard cultural blinders in favor of rationality, and come to accept European technologies as superior (Trigger 1991). Even if we believe in cultural relativity, and even if we are willing to accept that there are many different technological solutions to everyday problems, the historical pattern seems to support the competing idea that some technologies (in this case European technologies) are more efficient, more practical, and more rational than others.

This is the paradox of narratives of technological change: there is no such thing as a superior technology, but different groups of people have adopted the same technologies and come to view them as superior to other technologies. In other words, many indigenous people have adopted technologies that we associate with European expansion, including metal tools for cutting, mills for grinding grains, glazed ceramics, draft animals, cellular phones, cars, etc., even if we say that those technologies are not necessarily superior or better than indigenous technologies, such as stone tools for cutting, hand-held grinding tools, unglazed pottery, etc. How can we explain this paradox?

To arrive at an explanation, I make a case for a renewed focus on economic variables to partially explain technological change. I argue that in the case of Central Mexico, having access to raw materials, techniques, and to the products of labor was a major factor in the adoption of technology. Our theoretical emphasis on technological efficiency and rationality has led us to ignore access to the means of production as an important factor in guiding

technological change. Two case-studies from colonial and modern Mexico help elaborate this point. First, I focus on the adoption of metal cutting tools among the people of central Mexico, and the continuation of use of obsidian tools for cutting even centuries after the introduction of metal tools by the Spanish. This example challenges the notion of a natural and immediate progression from stone tools to metal tools and it will help understand the role of access to stone and metals as a major factor in this long and slow transition.

Second, I focus on the continuation in the use of hand-held grinding tools for processing maize and other foods for centuries after the Spanish conquest, and the adoption of mills and store-bought maize flour and tortillas in the past thirty years in Xaltocan, Mexico. The persistence of hand grinding into the 20<sup>th</sup> century has puzzled scholars because it is hard, time-consuming work. I argue that the real surprise is the adoption lower quality maize flour and lower quality corn tortillas. Changes in economic patterns have made this transition necessary, as people have learned to view efficiency as more important than the quality of food, or the autonomy of households from the market economy. This example will show that technological change took place not just because there was a goal of saving time, but because the whole economic context of household production and consumption changed. The transition to buying tortillas rather than grinding maize in Xaltocan is part of broader ecological and economic patterns.

Access to the means of production is only one economic factor, out of many, that we have neglected in explaining technological change. A renewed focus on factors other than superiority, efficiency, and rationality is necessary to understand how colonialism has shaped technological change in the Americas.

### **The paradox explained**

Technological superiority, practicality, and efficiency are all cultural concepts, rather than objective categories independent of cultural interpretations. Still, historical patterns show that indigenous peoples all over the Americas have adopted technologies introduced by Europeans. Several scholars have noticed this paradox and tried to explain it. Their observations, although in some ways problematic, make important points of broad anthropological relevance.

Bruce Trigger (1991) examined how the adoption of European technologies among Native Americans is relevant to understanding different people and their capacity for rational thought. Briefly, he argued that many societies in different historical settings have given religious meanings to different materials and technologies, and they ultimately had different ideas

about efficiency and practicality. These societies emphasized symbolism and the cosmological importance of their technologies, and did not emphasize their practical usefulness as much. Still, Trigger argued, even societies that place a strong emphasis on symbolism and cosmology are capable of shedding what he called their “romantic” or symbolic view of the world and instead adopt a more practical, rational view. In the case-study that Trigger developed, he argued that Native Americans shed their cultural blinders and adopted more rational and efficient European technologies. Trigger used his case study to argue against the notion that some cultural groups are inherently irrational. We all have the capacity for rational thought, and today, as always, this remains an argument that anthropologists have had to emphasize repeatedly in the history of our discipline. Although I disagree that technological change is only a matter of shedding cultural blinders in favor of rational choice, Trigger’s point may be important if we consider anthropology’s role in providing information and insights to the public at large, a public that can sometimes resist the idea that all human beings possess the same capacities and potential.

Pierre Lemmonier (2002) has also addressed the question of the adoption of similar technologies all over the world, although he did not address the spread of European technologies directly. Instead, he focused on the question of multiple independent inventions of the same technologies in different parts of the world, such as stone axes, ceramic containers, etc. His observations are useful. He asks whether the adoption of similar technologies everywhere could mean that there is truly cultural progress and evolution, two categories that have fallen out of favor among most anthropologists. Lemmonier poses the question instead of providing a clear answer. At the core of his ideas about technology is the concept of technological choices, and how many of these choices are apparently arbitrary. For him, it is social factors, and not just physical factors, that are at stake in technological choices (Lemmonier 2002:5). In other words, it is not practicality that guides technological change, but socially guided decisions. He argues that even if humans initially adopt technological choices that are not efficient and do not denote progress, eventually, they tend to get it right: they often abandon inefficient technologies in favor of more efficient ones if society makes those choices available. Lemmonier’s position, then, is similar to Trigger’s in the belief that there are certainly more efficient technologies and everyone can learn to recognize them eventually.

The value of Trigger’s and Lemmonier’s positions is the affirmation that all human beings have the same capabilities. Still, I find their solution to this question troubling, in the sense that it either creates a difference between Europeans (rational, advanced) and indigenous people (irrational, lagging behind), or it places different people in different evolutionary paths. It doesn’t question our own irrationalities, or the irrationalities of the modern Western

world, and it does not take into account the cosmologies that shape how we view the world. By now, we have enough work in anthropology that has shown that there are varied cosmologies that shape capitalism and modernity, and that describing ourselves as rational and practical is merely a Western fantasy (Rozat 2004).

Bruno Latour (2002) offers some insights that can help explain the technological paradox. He argues that we consider a particular technological solution to a problem to be right because it is the answer we gave, not because it was right. The technology we adopted solved the problem and therefore we think it must be the best or most efficient technology. The definition of truth, he argues, is the result and not the cause of scientific work (Latour 2002:374). In other words, thinking that a solution is practical is the result, and not the cause of technological innovation. This, in a way, takes us closer to the answer because it makes it easier to see that our solutions may not be the most practical, and that we have only historical ways of defining practicality. Still, it does not answer the question of why so many different societies adopted the same technologies. To resolve this paradox, we need to look beyond rationality, practicality and cultural blinders. Other factors are important in mediating processes of technological change.

### **Access to the means of production**

Studies that focus on practicality, efficiency, and technology have certainly been productive. These studies have enabled anthropologists to understand the complex relationship between practical reason and culture. In addition to evaluating the performance characteristics of tools, we should also study the relationship between technologies and access to the means of production. By access to the means of production, I mean the ability to procure the materials needed to make tools, having the knowledge to make and repair tools, being able to obtain the materials that will be transformed with the tools, and having ownership or at least access to the finished products of one's work. The concept also implies the ability to organize production, the availability to determine who can work on different tasks, the ability to determine who can teach and learn different aspects of the technology, when to schedule the work, etc. It is unnecessary to define this concept narrowly, and the factors mentioned above are not an exhaustive list of traits implied by the concept. Furthermore, one must avoid creating a binary opposition between having complete access and not having access to the means of production, although such extremes may exist in the case, for example, of slaves and slave owners. It is better to study people's relationships to all the different factors mentioned above, rather than simply trying to determine whether they have full access to the means of production or no access at all.

I argue that people in Central Mexico were more likely to adopt certain technologies if they could own the tools, if they could own the products of their work, if they could have access to raw materials, and if they could retain some control over how they organized their production. Rather than focusing just on the moment when someone uses a tool and determines whether it does a better job, we need to consider the economic and social context in which that tool becomes available, people use it, and people can benefit from the results of the more or less efficient action enacted with the more or less efficient tool. The moment in which a tool or a machine is used is but one step in a chain of events, or a process that made the tool available to the person, and all of the steps in that process are useful in evaluating why people adopt technologies or abandon them.

The following examples illustrate and help elaborate my point. They are related to technologies that have been examined by archaeologists and considered important technological changes: the adoption of metal cutting tools and the abandonment of chipped-stone tools, and the adoption of mills and machines to grind grains and the abandonment of grinding stones. These two examples imply the end of the Stone Age, but was this merely a matter of progress and efficiency?

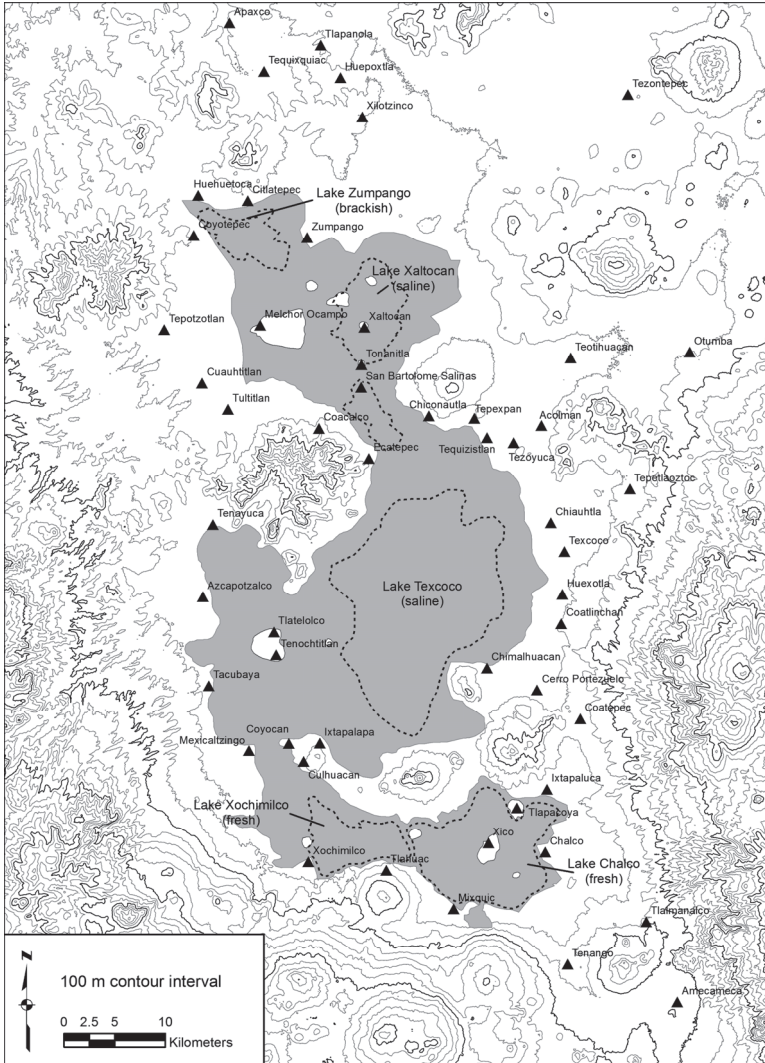
## Blades

The first case study is the continuation of obsidian tool production in colonial Xaltocan for centuries after the Spanish introduced metal tools, including knives and swords, in Central Mexico (Figure 1). Xaltocan is a small town in the northern Basin of Mexico that has been occupied since the eleventh century. It was conquered by the Aztecs in 1428, and it formed part of the Aztec empire until it was conquered again by the Spanish in 1519. It is still occupied today. Elizabeth Brumfiel conducted archaeological and ethnohistorical work in Xaltocan starting in 1987 (Brumfiel 2005). Her work, as well as John Millhauser's (2005) study of chipped stone tools in Aztec Xaltocan, provide the background for my study of the continuation of use of chipped stone tools and the slow adoption of metal tools in post-conquest Xaltocan (Rodríguez-Alegría 2008a, b).

Indigenous technologies in Mexico before the Spanish conquest included the use of metal for making bells, religious objects, and a variety of other artifacts, but they did not include the use of metal tools for cutting (Hosler 2003). Instead, indigenous people relied on obsidian for making a variety of cutting tools, scrapers, weapons, and projectile points (Figure 2) (Clark 1997 and 2001a, b). Given the lack of metal cutting tools in central Mexico before the Spanish conquest, an analysis of the process of adoption of metal cutting tools in the post-conquest period can provide insights on this process of



technological change. This analysis benefits from archaeological data that can help evaluate whether the use of obsidian tools changed after the Spanish conquest, and whether metals were adopted. The analysis also benefits from historical sources that record instances of the adoption of some metal goods for display.



**Figure 1.** Map of the Basin of Mexico, including the ancient lake system and several Aztec sites.



**Figure 2.** Variety of colonial obsidian artifacts from Xaltocan.

Archaeological data on metals and obsidian from colonial contexts in Xaltocan are discussed in greater detail elsewhere (Rodríguez-Alegría 2008a, b, 2009). The data were surprising in several ways. First, there is scant evidence of the adoption of metal tools after the Spanish conquest. I did not expect to find many metal artifacts, in part because of recycling of metals, and because metal tools tend not to break as easily as obsidian tools or ceramics. Even if there had been an adoption of metal tools, the frequency of metal tools was expected to be low. Still, it was surprising that the metal artifacts found in the excavations consisted mostly of nails, religious medals, and rusty pieces of scrap. None of the artifacts could be recognized as knives or blades or any kind (Figure 3). Perhaps the interest in adopting metal tools was mainly not for use as cutting tools, but rather as adornment, symbolic items, or nails (Rodríguez-Alegría 2009, 2010).

A second surprise in the data is that indigenous people apparently increased production of obsidian tools after the Spanish conquest, and they used more obsidian than during the late Aztec era (Rodríguez-Alegría 2008a, b, 2009). Millhauser (2005) observed that obsidian tool production declined drastically in Xaltocan after the Aztec conquest, and that the abundance of obsidian in archaeological contexts associated with the Aztec era declined in comparison with previous contexts that were associated with Xaltocan's period as an autonomous city state. Even though the people of Xaltocan had apparently abandoned obsidian tool production under Aztec domination, and used chipped-stone tools that they purchased in markets, in the colonial period they resumed production of obsidian tools.



**Figure 3.** Variety of metal artifacts from Xaltocan, including nails, scrap metal, and jewelry.

This finding is surprising if we expect steel to be a better cutting tool than obsidian, and if we assume a natural progression from stone to steel. One could argue that the continuation of use of chipped stone tools was due to cultural blinders that kept the people of Xaltocan from recognizing the superiority of metal knives. Nicholas Saunders (2001) provides an aesthetic and religious explanation for the continued use of obsidian after the Spanish conquest. However, in addition to symbolism and aesthetics, two other factors can explain the continuation in the use of chipped-stone tools. First, obsidian tools were very good for cutting, and indigenous people were not particularly searching for metal alternatives. In fact, Spanish colonizers sometimes expressed an admiration for the sharpness of obsidian tools, and even preferred them over steel tools for shaving and other cutting needs (Linné 1934:145-146). Obsidian is widely known to have very sharp edges, sometimes sharper than steel. Indigenous people had used chipped-stone for centuries to hunt, wage war, scrape fibers from plants, and perform all sorts of daily activities and household tasks. Obsidian was not a deficient material by any means. Indigenous people could obtain finished tools and obsidian cores and make, repair, and replace their own tools as needed.

Second, Spanish colonizers tried to monopolize access to metals, and to the knowledge needed to produce and repair metal tools. They also passed laws prohibiting indigenous people from carrying swords and knives or dressing like Spaniards (Rodríguez-Alegría 2002:98-101). There was some flexibility in these laws, in the sense that Indians could petition the

government for permission to carry swords and daggers. Historical documents from many areas all over Mexico provide a record of these petitions (Bauer 2001:54; Gibson 1964:155; Haskett 1991:161-162; Wood 2003:49), and most often, indigenous people asked for permission to wear Spanish clothing, ride horses, and carry swords and daggers. In Xaltocan, there are several petitions by people (especially men) who call themselves elites to carry swords and daggers as ornament (Rodríguez-Alegría 2010). These petitions demonstrate an interest in metal objects for display, but they do not indicate whether such objects were ever used as cutting tools or weapons. The petitions also show that even though local Indians sometimes obtained metal knives, they did not have ready access to metal tools, and they apparently had little access to the raw materials, and the techniques needed to make such tools. They clearly had limited access to the production or use of metal tools, in contrast with the increased access that they had to obsidian tools as seen in the archaeological record.

This example is a good reminder of the problems of evaluating technologies from our limited experience and perspective. If we think that metal cutting tools are better, and they must be better simply because that is what we use, then we can conclude that the people of Xaltocan took a long time to adopt metal tools simply due to cultural blinders that prevented them from seeing the superiority of metal over stone. However, the data indicate that obsidian was an excellent material for making cutting tools, and indigenous people in central Mexico had used it for centuries. Furthermore, Spaniards recognized that obsidian blades could be very good cutting tools, and sometimes even requested obsidian blades for their own use. Thus, the first factor in the continued use of chipped stone tools is that they were excellent cutting tools. In keeping with Latour's (2002) observation that our technological solutions seem better only because they are the solutions that we have adopted, the use of metal cutting tools in Xaltocan today only proves that people have in fact adopted metal, but it does not prove that metal is in all ways superior to obsidian as a cutting tool.

A second factor in technological continuity was the differences in access to raw materials and finished goods. Indigenous people had access to obsidian from outcrops and marketplaces in different places in Central Mexico (Braswell 2003; Millhauser *et al.* 2011), and Spanish colonizers had very little interest in obsidian because they considered it a stone of little commercial value. The Spanish, however, were more interested in metals and in monopolizing the production and ownership of metal tools and precious metals, a main driving force of Spanish colonialism. The wide availability of obsidian, and the ability to make, repair, and reuse obsidian tools accounted for the continued use of obsidian in Xaltocan for centuries after the Spanish conquest (Rodríguez-Alegría 2008a, b). The interest in metal knives for display is no surprise: they were hard to obtain, and they

could make for flashy ornaments that were associated with powerful conquistadors (Rodríguez-Alegría 2010). Metal artifacts had been used and traded before the arrival of the Spanish as religious and sumptuary goods (Hosler 2003), and the interest in using metals for display after the Spanish conquest is a continuation of such uses. Metal knives and swords were not, however, tools that could easily be obtained or repaired. Thus, efficiency, symbolism, and access to the means of production provide compelling explanations for the continuation in the use of obsidian tools in central Mexico after the introduction of metal knives.

### Grinding stones

While the first example focused on the continuation of indigenous technologies, the question still remains: why have indigenous people ended up adopting technologies mostly introduced by Europeans? Is it simply a matter of learning to recognize superior technologies? A second example addresses the transition from the use of hand-held grinding tools to the use of machinery for milling grains in 20<sup>th</sup> century Xaltocan. This example can help us understand the complex reasons for the adoption of new technologies. Maize grinding is time consuming and difficult labor; therefore, the abandonment of grinding tools and adoption of mills seems upon first look to be related only to the higher efficiency of mills, and to an interest in saving time and effort. A close look at the historical and economic context behind the abandonment of grinding tools shows that efficiency was but one of many factors that mediated technological change. The observations presented in this example are based largely on interviews with the women of Xaltocan who lived through the change from grinding corn to buying machine-made tortillas at the store. A detailed version of this discussion may be found elsewhere (Rodríguez-Alegría 2012).

Indigenous people in central Mexico used two main tools for grinding maize: stone *manos* and *metates*. *Manos* are long oval shaped stones used for grinding maize and other produce against *metates*, which are flat or concave stones placed on the floor to be used as a surface against which the maize would be ground with the *mano*. Grinding maize with these tools is a time consuming task, often taking an individual between four and eight hours every day (Biskowski 2000; Lewis 1963:99; Redfield 1930:87). Spanish colonizers brought with them mills and milling technologies but indigenous people continued using stone tools for grinding well into the 20<sup>th</sup> century and still today for many reasons. A first reason for the continued use of *manos* and *metates* had to do with the quality of the flour. Mills and other machines for grinding maize worked well with wheat and other grains, but tended to get clogged with maize and did not grind the flour into the desired consistency.

Aside from problems related to the operation of machinery, people today say that maize ground with *manos* and *metates* tastes much better than machine-milled maize. Machines have not been able to produce flour of the same quality as the flour produced with *manos* and *metates* by Mexican cooks (Pilcher 1998). The importance of a delicious meal weighs heavily against the desire for efficiency in the cooking process.

A second reason for the continuation of the use of stone tools was the lack of reliable supporting technologies for mills. The first mills introduced in Xaltocan were powered by electricity, which was prone to long power outages. When there was no power for the local mills, people could still grind maize at home with their *manos* and *metates* (Rodríguez-Alegría 2012).

A third reason for not adopting milling technologies is more directly related to access to the means of production: the cost of having maize milled, as well as the problem of ownership of mills. First, the people of Xaltocan commented that having maize milled was expensive. The town was a very poor town in the late colonial period and well into the 20<sup>th</sup> century (Bejines Juárez 1999; Roush 2006:251), and people could not always afford paying for work that they could potentially do at home. Redfield (1930) reports a similar situation in early 20<sup>th</sup> century Tepoztlán, where the cost of milling maize made grinding a preferred option among indigenous women.

In the historical literature one may find indications that some indigenous people saw mills as a source of exploitation rather than a technological advance. Some Spanish colonizers had hydraulic mills built in their lands, and they used Indian labor to build them. But mills were most useful for grinding wheat and barley, cereals that did not particularly interest indigenous people who maintained their rich diet of maize and other products. In Cuernavaca, for example, hundreds of indigenous men worked for over six months to build a mill for Hernán Cortés, and they were not rewarded for their labor in any form. This resulted in official complaints from the Indians, who felt exploited and did not benefit from their hard labor (Escalante Gonzalbo and Rubial García 2004). Even when mills were present in early 20<sup>th</sup> century Tepoztlán, most of the maize consumed in the village was ground with stone tools in the house (Redfield 1930:49). The women of Xaltocan did not report seeing the mill as exploitation. Still, the men of 16<sup>th</sup> century Cuernavaca complained about having no access to the results of their labor, and not getting compensated fairly, and the women of 20<sup>th</sup> century Xaltocan wanted to avoid having to pay too much for labor they could do. These two situations are simply two different problems that result from not owning the machinery necessary to do the work. They are different aspects of limited access to the means of production.

In Xaltocan, women continued grinding the maize for their daily meals by hand into the late 20<sup>th</sup> century. But most of them have switched to buying store-made tortillas. If the quality of hand ground tortillas is superior to the

quality of machine made tortillas, and if it was more expensive to have maize ground than to process it at home, there must have been compelling reasons to abandon the use of manos and metates and start buying tortillas from the store. What factors made purchasing tortillas acceptable, in spite of their lower quality and price? Was technological change mediated only by efficiency? To understand the changes in maize processing in Xaltocan, one must look at broad economic factors that affected the town's economy, and in turn, its technological choices.

Starting in the first decades of the 20<sup>th</sup> century, the economy of Xaltocan underwent major changes. At the end of the 19<sup>th</sup> century, most men in Xaltocan were fishermen. They obtained their fish in Lake Xaltocan, the lake that surrounded their town, and one of five lakes located in the central Basin of Mexico. At the beginning of the 20<sup>th</sup> century, the men of Xaltocan changed from being fishermen to being journeymen or merchants (Bejines Juárez 1999:115). Lake Xaltocan was drained as part of efforts initiated by the Spanish in the 16<sup>th</sup> century to control flooding in Mexico City. By the 1950's, fishing had stopped entirely in Xaltocan, and locals went to markets outside their town, bought fish, processed it, and took it back to markets for sale (Roush 2005). Under these conditions of drastic ecological change, access to the means of production changed. The people had to purchase the fish that they used to obtain from their lake. Changes in the ecology catalyzed economic changes as well. Children started to go to school, and to train for jobs that could take them into the labor market and for work for wages, rather than to be fishermen. The economy of households was no longer based on access to natural resources; instead, it was based on cash. Under such economic changes, the economy of households depended more and more on money and purchasing food and household goods in the market, rather than on household production of any goods. Soon, it made sense to purchase food, in this case corn tortillas, rather than spending hours every day to produce a meal. In a context in which everything was purchased in markets, buying tortillas was but one of many changes that households made to adapt to the new capitalist economy.

An interesting aspect of this example is that the technological change seems to confirm a Western notion of efficiency: the idea that grinding must be abandoned in favor of the higher efficiency of milling. But the idea that efficiency was the only factor that mediated technological change or even the main factor that did so, can only be sustained if we ignore the historical process of technological change and the ecological and economic conditions that surrounded it. We would have to ignore also that people preferred the flavor of hand ground tortillas, making the change in cooking technologies a matter of balancing advantages and disadvantages rather than an unqualified technological improvement. As has been observed in other cases, technological change is a matter of trade-offs, rather than progress or

cumulative advances (Bijker and Law 1992; Loney 2000). Technological change took place only after the people of Xaltocan stopped earning a living mostly from their natural resources, and started to work for wages. The effects of capitalism reached into the household, and it became acceptable to purchase tortillas, even if they were costly and of lower quality, rather than spending the time to make them at home by hand.

## Conclusion

The two examples from colonial and modern Mexico provide a partial answer to explain the paradox in colonialism and technological change: indigenous people in the Americas have adopted many technologies brought by Europeans not because they are superior or more efficient, but sometimes because indigenous people have become involved in economic systems that make these technologies more accessible and reliable. The continuation of the use of obsidian cutting tools for centuries after the Spanish conquest, and the continuation of the use of manos and metates for grinding were not due simply to cultural blinders or religious and symbolic beliefs that maintained inferior technologies in place. Stone tools cut very well, and they satisfied the needs of indigenous people for centuries. Spanish colonizers also recognized that stone tools were very sharp and useful. Grinding tools produced high quality maize flour, and the modern tortilla machines have not been able to reproduce the quality and flavor of hand-made tortillas. Thus, technological change and the adoption of technologies brought by Europeans should not be seen as unqualified progress; people made trade-offs as they adopted different technologies.

The data so far do not provide clear information on when and why obsidian tools were abandoned in Xaltocan, or perhaps I have not been imaginative enough to extract such information from the archaeological material. But interviews with the women who lived through the transition from grinding maize in the house to buying corn tortillas at the store provide a rich context for interpreting the abandonment of grinding tools in Xaltocan. The data indicate that the women of Xaltocan abandoned grinding because they entered an economic world in which the household economy was based on earning money and purchasing most goods and food in the market rather than making them at home. Higher efficiency may have been an effect of having abandoned grinding, but a desire for efficiency was not the only cause of its abandonment. Ecological and economic variables came into play and made efficiency attractive, even if it meant paying more money for food and even if it meant eating tortillas of lower quality.

To resolve the paradox of technological change, I have argued that we need to consider access to the means of production as an important factor



that mediates technological change: it is necessary to consider economic concerns, the availability of raw materials, the access to the products of technology, and other factors related to access. This does not mean that it is the only factor that comes into play in technological change. Dean Arnold (2008) presents an interesting case in which local potters in the Yucatan did not adopt the potter's wheel. Much like cutting tools and grinding tools, the use of the wheel has captured the imagination of archaeologists as an important technological difference between Europeans and indigenous people. Some have associated the wheel with higher production efficiency. Arnold (2008) has shown that the Mexican government tried to promote the use of the potter's wheel among local potters, even providing potter's wheels and teaching people how to use it. But locals did not adopt the wheel and after a brief period of limited use of the wheel, abandoned it altogether. In other words, they were offered access to the technology, and access to the tools of the trade. They were trained for a brief period of time in how to use this technology, yet they did not adopt it. Instead, they continued making pottery by hand rather than throwing it with the wheel. In this case, the potters were given access, but they did not take it.

It is clear that although access to the means of production is important, it is not in and of itself enough to create technological change. Other factors are necessary. Wheel throwing is difficult and it requires a lot of skill, training, and patience. Knowing how to use the wheel requires learning very subtle muscular patterns and movements. If the potters in the Maya area did not learn those patterns and movements to their satisfaction, their attempts at making pottery, and by extension, their possibility of making a livelihood, would be at risk. This is part of the kinds of sensual and bodily practices that Marcia Ann Dobres (2000) has emphasized as being crucial in understanding technology and technological change.

If it is true that access to the means of production is related to technological change, then does that mean that access can cause changes in technology, but technology cannot cause changes in the means of production? Is one of these factors always dependent on the other? Causal relationships are certainly more complex than the examples I have developed can illustrate, and I would argue that it is unnecessary to determine which of these factors creates changes in the other. It is better to examine how these two factors are interrelated, and the historical processes in which they interact. Given the presence of many variables that mediate technological change, it seems counterproductive to reify one factor and try to explain causality based on that factor alone. Many factors are involved in technological change, and although efficiency and cultural and symbolic aspects may jump out as seemingly logical explanations, we need to dig deeper and involve other variables, including historical, ecological, and embodied variables.

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## COLONIAL ARCHAEOLOGY APPLIED TO THE SPANISH FOUNDATIONS OF “TIERRA FIRME”

**Adriana ALZATE GALLEGO\***

Colonial archaeology as a specific type of research into cultures in contact is necessary in order to retrieve information from the material culture of societies impacted and/or destroyed by processes of conquest and colonization. This material culture, represented principally by ceramics, metal and stone artifacts is characterized by chronologically diffuse information and unclear sources written by the early chroniclers. Colonial archaeology is a tool to consider from another perspective, the historical moment corresponding to the contact between the European and Native American societies. To this end, this study takes as an example the case of 16<sup>th</sup> century Spanish settlement Santa María de la Antigua del Darién in the region known as “Tierra Firme”, the present-day region of Colombia and Panama.

### **Resumen**

*La arqueología colonial aplicada a las fundaciones españolas en “Tierra Firme”*

La “arqueología colonial” como línea de investigación específica en el campo de las culturas en contacto se hace muy necesaria para recuperar información de la cultura material de sociedades impactadas y/o arrasadas por procesos de conquista y colonización. Dicha cultura material representada en cerámica, metal y piedra principalmente, se caracteriza por tener una información difusa en el tiempo y poco clara en las fuentes escritas por los primeros cronistas.

La arqueología colonial, sin ser redundante en sí misma, ofrece una “herramienta” para abarcar desde otra perspectiva, el momento histórico correspondiente al contacto entre las sociedades amerindias y las europeas. Por lo tanto, se tomará como ejemplo el estudio de caso de la fundación

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española del siglo XVI llamada Santa María de la Antigua del Darién, en la región conocida como “Tierra Firme”, hoy día en territorio de Colombia y Panamá.

## Résumé

*Archéologie coloniale appliquée à l'établissement espagnol de “Tierra Firme”*

L'archéologie coloniale, une branche spécialisée de recherche sur les cultures en contact, est essentielle pour récupérer des informations à partir de la culture matérielle des sociétés en contact et/ou disparues suivant la conquête et la colonisation. Cette culture matérielle est représentée principalement par des objets de céramique, de métaux et de pierre. Elle est caractérisée par une information chronologique diffuse et pauvre en sources écrites produites par des premières chroniqueurs.

L'archéologie coloniale nous offre un outil pour observer, d'un autre point de vue, le moment historique du contact entre les sociétés européennes et amérindiennes. A cette fin, nous utiliserons comme exemple l'étude de la l'établissement espagnol du siècle XVI Santa María de la Antigua del Darién, dans la région connue sous le nom «Tierra Firme», aujourd'hui le Colombia et le Panama.

## Resumo

*A arqueologia colonial aplicada a fundações espanholas em “Tierra Firme”*

“Arqueologia colonial”, como linha de pesquisa sobre o estudo de culturas de contato é necessário para recuperar informações da cultura material das sociedades impactadas ou destruídas pelos processos de conquista e colonização. Esta cultura material, representada principalmente por cerâmica, metal e pedra é caracterizada por ter informações difusa no tempo e pouco claras nas fontes escritas dos primeiros cronistas. A Arqueologia Colonial nos oferece uma “ferramenta” para abordar de outra perspectiva o momento histórico correspondente ao contato entre as sociedades europeias e indígenas. Portanto, este estudo toma como exemplo o caso da fundação espanhola do século XVI chamada Santa María de la Antigua del Darién na região conhecida como “Tierra Firme”, hoje em dia região de Colômbia e Panamá.

## Introduction

Historical archaeology in the Americas has been developed as a discipline with strong anthropological basis as a line of research within the field of archeology.

In Europe, however, found huge differences between archeology and social anthropology. Some universities, placed archeology as a tool “technique” of history, separating it from social anthropology which does not seem to fit into the academic programs of studies related to ancient societies.

Fortunately, many universities in America have found a balance between the study of ancient societies and their continuity or fade over time. This is due to the presence of societies that survived European contact and today retain some ancestral cultural practices. Moreover there is the presence of other societies that despite their obvious cultural transformation in these 500 years, even vague retain elements of their deepest roots, but sometimes they themselves are unaware. This is where American anthropology and archeology have made important contributions by identifying the elements that survive and supporting various cultural groups to conserve these roots, maintaining contact with others, within the framework of a globalized and westernized.

Historical studies for the period archaeological ranging from 1492 to the “Industrial Revolution”, is known in some academic circles in Europe as “post-medieval archaeology”. In America they have proposed other more specific names, but included in the context of historical archeology and therefore more often heard from related research lines as “colonial archeology”, “urban archeology” and “industrial archeology” mainly.<sup>1</sup>

In this regard, we find that often used the term “historical archeology” in a manner analogous to the “colonial archaeology” to designate those early years of contact between Spain and America, corresponding mainly to the time of discovery, conquest and establishment of the Colonial period.

In the last decade has arisen interesting work on the line of Historical Archaeology, covering such diverse topics covering other disciplines such as restoration, heritage, architecture, museology, transatlantic trade, migration, populations, slavery, urbanism, cultural mixing, production of goods, etc.

In this way, the historical archeology is taken and in this particular case, the archeology colonial as a tool that describes and analyzes a lapse defined time, a period of cultural contact between two continents and its later historical, social and cultural consequences.

<sup>1</sup> David Watters believes that: “Beyond these broad categorizations, one finds phrases ethno-specific and Afro-Caribbean archeology and phrases restricted in terms of temporal and contact period archeology” (Watters 2006:127).

In this brief presentation will be addressed as a case study ceramics contact the Spanish founding of Santa María de la Antigua del Darién through its typological classification and more relevant features.

## State of arts

From Alaska to Patagonia, to all the Caribbean Islands, have conducted research related to the settlement of the American continent, the origin of Amerindian populations, their establishment and spread over 43 million km<sup>2</sup>. These issues are attracting the attention of archaeologists in the region. But in recent decades there has been an academic interest in investigating this period of American history had always been studied only from written sources. It is a relatively “recent”, but marked by contact with Europe and which has been given as a starting point the year 1492.

Because of heritage restoration processes mainly, the need to use the method of archaeological sites in the colonial context, to explain that only processes from architecture or just from the chronicles did not permit complete some historical gaps.<sup>2</sup>

Many structures and buildings from the 16<sup>th</sup> to the 19<sup>th</sup> centuries were incomplete on one side and on the other, historical chronicles sometimes disagreed on his account or had contradictions. As they advanced the restoration work in the American colonial buildings are visible to the presence of a hidden log for centuries, it was not written in the official accounts. Some cases were related to such burial patterns that architects-restorers often found in churches, lots, houses or extensions of land that had been sugar or coffee plantations (Fournari 1996; Cabrera *et al.* 2006; Rodríguez and Quevedo 2001; Roura 2002). Evidently to carry out a proper survey and archaeological record in these situations, an archaeological historical training of personnel involved in the work required. Do not always have this resource.

When starting a deeper investigation, teams of restorers were finding objects that dark episode of recorded slave population, population living cloistered convents, or indigenous people in shelters and parcels. Many of them at the time of death, they were accompanied by elements of everyday life that were not documented in the official chronicles, as amulets, scapulars, rosaries, rings, crucifixes, glass beads, some semi-precious stones, shackles, rattles, pipes or any property being of the deceased or his family. Often knew data from some elite forgotten, recovering objects that were part of layettes unknown, were discovered hygiene practices that have become

<sup>2</sup> For example, some data gaps related to that had to do with smuggling from the first moment of the Conquest and the Colony, or for example the amount of people who embarked in the ports of Seville, Cádiz and the Canary Islands and the total of individuals I really came to America. These are just two examples to illustrate the problem.



obsolete or just recovering ordinary household objects used for table or kitchen. So on are increasingly required to present archaeologists-historians who were interested in playing better these records retrieved.

### **Geographic delineation**

The name Tierra Firme was known in the early 16<sup>th</sup> century, the continental coasts that ranged from the Cabo de la Vela in Colombia to Cabo Gracias a Dios in what is today the border between Honduras and Nicaragua.

Over the years the Spanish were dividing and distributing the territory in governors and one of them was La Gobernación de Castilla de Oro, with its capital at Santa María de la Antigua. For a long time it remain tradition of called Tierra Firme this part of the coast of Darién between Colombia and Panama remained.

In this vast stretch of land there were several failed attempts at Spanish foundations. Many disappeared due lurking indigenous people defending their territory from foreign presence, their continued looting and attempts to stay permanently.

San Sebastián de Urabá was one of those attempts to settle in this coastal region of the continent. Today is north of Antioquia near the town of Necoclí. Meanwhile Santa María de la Antigua del Darién was the second attempt to found in the area when the Spaniards fled from San Sebastián. They crossed the Gulf of Urabá and settled in the lands of Cacique Cemaco. Today is located west of the Department of Chocó very far from any urban center and within the jurisdiction of Unguía.

### **Some notes on the historical archaeology and the colonial urbanism**

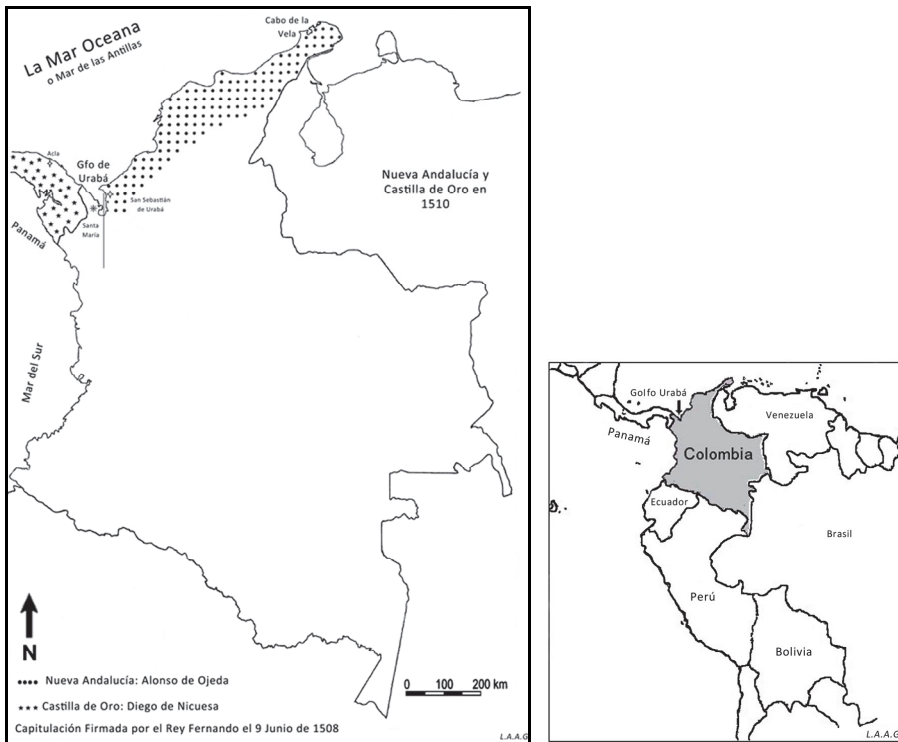
Studies of urban Caribbean colonial fortifications mainly,<sup>3</sup> sugar plantations of coffee,<sup>4</sup> Indian missions,<sup>5</sup> churches and monasteries,<sup>6</sup> among others, have supported the development of historical archeology as a line of research on the continent. This symbiosis between urban planning and archeology allows us to better understand the evolution of European foundations in America and especially the Spanish ones, which are the most numerous, for obvious

<sup>3</sup> La Florida (USA), La Habana (Cuba), La Isabela (Haiti), Dominican Republic, Puerto Rico, Mexico, Guatemala, Colombia and Panama, among others.

<sup>4</sup> As in Cuba and the Dominican Republic initially and then in Colombia, Venezuela and Brazil.

<sup>5</sup> As in Paraguay, Brazil and Argentina mainly.

<sup>6</sup> Of religious orders like the Dominicans, Poor Clares, Franciscans, Jesuits, etc.



**Figure 1.** General geographical situation.

reasons. These studies range from the first foundations Spanish, Portuguese, English and French, to the consolidation and transformation of the city.<sup>7</sup>

Many cities have emerged as precarious Spanish settlements of the early years of the Conquest, which seemed more defensive palisades. Other Spanish settlements came to awaken the greed for gold and other riches, which forced them to move from site to its inhabitants as these supposed riches dried up, as in the case of Santa María de la Antigua del Darién in Colombia or Acla in Panama. Other foundations born of standards and measures taken by the Crown as La Encomienda and Las Misiones. The “encomenderos” usually grouped by force indigenous from different regions, which were in the service of the Spaniards to indoctrinate change in the Christian faith. Missions began with the arrival in a region of a religious Order, Franciscan or Jesuit preferably. Such was the case of the missions of Durango, Chihuahua and Sonora in Mexico today; Guaraní missions in the

<sup>7</sup> Good model of this has been the Urban Archaeology studies that have been advanced in Argentina, at the University of Buenos Aires.

region Argentina, Bolivia, Paraguay and Brazil, or the encomiendas of Indian villages in Tunja, Santafé or in Pamplona Colombia. Other settlements reached into villages that grew around a chapel, a fortress, a farm and so on until the new settlers occupied extensive territories.

The colonial historical archaeology or has been supported by extensive information on urban-related research in America, its history and development. Have been useful studies Chueca Goitia Balbás and Torres (1981), the researcher Jorge Hardoy (1991), or the architect Ramón Gutiérrez (2002), among many others.

There are several qualifying categories depending on the discipline you are studying the colonial urban heritage. For example the researcher Jorge Hardoy (1991) proposed a classification of historic cities according to their location, organization and territorial hierarchy:

- I. Management Centres: As Santafé de Bogotá or Buenos Aires.
- II. International Ports: As Veracruz–México (Nueva España), El Callao–Lima (Virreinato del Perú), Portobelo–Panamá and Cartagena de Indias–Colombia (Nuevo Reino de Granada) o La Habana–Cuba.
- III. Mining Centres: As Potosí–Bolivia, Marmato–Colombia, Baja California–México.
- IV. Indigenous Centres: As doctrineros peoples of Colombia and Perú.
- V. Agricultural Centers: As the farms of the Peruvian Andes, Chilean farms, ranches Argentine, Brazilian plantations and estates in México and Colombia, among others.
- VI. Religious Centers (Missionaries).
- VII. Prisons and Military Frontier Centers.

Other researchers such as Chueca Goitia and Torres Balbas (1981) propose the following types American city: Cities irregular, semiregular, regular and fortified.

### ***Irregular cities***

Refers to the oldest settlements erected in the early years of the American conquest of the Caribbean Islands and Tierra Firme. The first settlements had no pre-established plan. Dwellings were constructed so perishable materials such as wood and straw, imitating the indigenous model. It was the native population who know the most suitable materials in their environment to build the first houses they would use the Spanish. These features lead us to places similar Fuerte Navidad in Haiti, Caparra and Tavara (San Germán) in Puerto Rico, Nombre de Dios and Acla in Panama, San Sebastián de Urabá in colombian coast, Santa Cruz in Venezuela o San Miguel de Guadalupe in Florida (USA).

### ***Semiregular cities***

Do not follow a rigid plane, but neither one elemental. Some were based on irregular settlements and cities had grown up without a previous layout. Its streets are lined with a tendency to the squad. Sometimes the topography of the site could be a factor determining the shape and location of Spanish settlement, as required as they sought places surrounded by water sources, some surrounded by mangroves, others on hills, some in the jungle and so successively.<sup>8</sup>

Some settlements reached to make a date “Spanish foundation” and were consolidated during the colonial period and the Republic, like San Germán in Puerto Rico y Nata de los Caballeros in Panama. Others simply disappeared without trail apparent because their persistence over time was so short, they were not able to build civil or religious structures in durable materials that give testimony of their presence in certain places as was the case of La Isabela Dominican Republic or Nombre de Dios in Panama. In the worst case the settlement was moved to a new foundation and the people were moving with their belongings as was the case of Santa María de la Antigua del Darién who came to the capital of the Government of Castilla de Oro and also known as “Tierra Firme”. The site was abandoned and their residents gradually moved everything that could drag on through the jungle to get to Nuestra Señora de la Asunción de Panama, the other side of the Highlands, and not the Caribbean but on the newfound Mar del Sur.

Some of these early settlements fleeting 16<sup>th</sup> century have been studied in the Caribbean Islands and the band corresponding to Costa Rica, Panama and the Colombian Caribbean.

### ***Regular cities***

Scheme is the simplest type chess, with a clear north-south east-west. The facade of the church looking west on the main square. The convents, hospitals and cemeteries, often located at the extreme boundaries of the city. Cities were organized administratively and legally, with maps in many cases in their respective countries and at the Archivo General de Indias in Sevilla.

<sup>8</sup> The topography and geographical environment were important factors in raising medieval fortresses, but it was not an exclusive European thought, because in the pre-Hispanic societies, like other societies in the East for example, had the same criteria when choosing defensive construction sites.

## **A case study**

As I said earlier, is also currently pursuing their material culture from that is recovered in the archaeological heritage sites or national monuments. This material culture is composed of fragments and various objects made of ceramics, metals, stones, paintings, murals, glass, wood and textiles that despite the time, some have kept in contact with the ground, others in private collections others have passed from generation to generation and others have found in stores like forgotten objects without apparent interest.

Having identified the line of investigation as “colonial archaeology”, now we limited space as a case study where a colonial foundation is established in Tierra Firme.

This brief presentation case study shows how the Spanish founding of Santa María de la Antigua del Darién, which can be classified as a settlement that is born and dies as a city of type semi-irregular and the foundation of San Sebastián de Urabá which was so fleeting that barely mentioned in the chronicles. Although not achieving the title of city as in the case of Santa María, it may be said that it is a type irregular settlement, according to the characteristics proposed by Chueca Goitia and Torres Albás. They have not been visible surface structures or foundations of their buildings in any of the two sites. However they have been found in surface collections and archaeological prospection, variety of objects that physically document the European presence in the area.

## ***Geographical position***

Santa María de la Antigua del Darién was a Spanish foundation in 1510 in the coastline continental near what is today the border between Colombia and Panama. Today is an archaeological site located in the jurisdiction of the Department of Chocó, municipality of Unguía, west of Colombia, with access even difficult by geographical conditions.

It is located between 5 and 7 km from the Caribbean Sea on a journey that is in the midst of a very humid climate and stretches of jungle vegetation. The Spanish foundation was located in the area between the River Cuti and River Tanela, hills and mountains to the north, the Bay of La Gloria, Tarena Island and Beach Tanela the east, the marshes near the Atrato-lying areas to the south and the old river channel of the former as a guideline. (Arcila 1986:48; Romoli 1987:21; Alzate 2006b:17).

## ***Some Historical Data Site***

The Spanish Diego de Nicuesa and Alonso de Ojeda had been exploring the coast of Tierra Firme since 1508 and had tried to settle down in places where

the native population fiercely defended their territories. One of those places was San Sebastián de Urabá (Colombia). After they abandoned this place, crossed the Gulf of Urabá and founded Santa María de la Antigua del Darién at the end of 1510 according to the chronicler Fray Bartolomé de las Casas in 1509 according to the accounts of the chroniclers Oviedo and Cieza de León. The grounds where he founded Santa María de de la Antigua were dominions chief's Cémaco of ethnic Indian Cueva, the Chibcha linguistic group. Its fertile lands supplied of provisions large part of the Darién region.

Apparently the Spanish considered to Santa María as a place to consolidate possible routes that allowed them to explore inland in search of gold and continue its expansion process in the new territories.

Santa María de la Antigua was the capital of the Government of Castilla de Oro and was Governor Pedrarias Dávila (Romoli 1987:21). After the discovery of the South Sea in 1513, Vasco Núñez de Balboa was tried and executed by order of Pedrarias with penalty of "Garrote".<sup>9</sup> The replacement was taken by Francisco Pizarro who later became the conqueror of the Inca Empire (Peru). In 1519 Pedrarias Dávila founded the city of Panama, and so began the gradual abandonment of Santa María de la Antigua del Darién.

### **Some archaeological data**

Apply techniques in the archaeological site of early Spanish foundation has allowed the historical memory of the Darién region and the Gulf of Urabá is recovered.

After the abandonment of Santa María de la Antigua, the exact location of the site was forgotten, therefore leans on chronic and to use the archaeological techniques, has been essential in the search for sites, to giving an important place in the current historical maps.

Furthermore, the analysis of both local and foreign ceramics, description and typological identification, provide data on production techniques, raw materials, decorative styles, exchange goods, and domestic tastes and uses a number of key elements to better understand those intimate aspects that were not recorded in written documents of these societies contact the 16<sup>th</sup> century.

As superficial physical remains of structures at the sites of San Sebastián de Urabá and Santa María de la Antigua del Darién, no news yet excavated foundations, this does not mean they do not exist. In this aspect have appeared only some fractions of paved or unpaved ground, well as the presence of bricks and tiles, timidly arising due to erosion or casual

<sup>9</sup> The site and the exact year of death of Vasco Núñez de Balboa is uncertain, as some historians supported in the chronicles, proposed date of 1516 or 1517 and the site varies between Acla (Panama) or Santa María de la Antigua (Colombia).

exploration sites. Nonetheless written sources discussed the presence of civil and religious buildings, such as: a cabildo, one indigenous school, a chapel to San Sebastián, a charity hospital, a Franciscan convent and cathedral among other (Arcila 1986; Mesa 1986; Ballesteros 2002).

According to the excavations conducted by the anthropologist Graciliano Arcila Vélez, until now only been determined some contact areas for the presence of Spanish and indigenous material in the same cultural layer, some stains ovens, and makes supports houses. The mortuary patterns are not clear and we unknown what direction and distance is the city cemetery.

In Apart from geographically locate the Spanish sites on the strip from Darién, one of the most significant achievements have to do with the identification of the ceramic material that had not been done before.

### ***Classification of material***

Checked again the archaeological material recovered at the site of Santa María de la Antigua, which corresponded to different excavation campaigns carried out mainly in the 1970's and 1990's by the anthropologist and archaeologist Graciliano Arcila Vélez. Has been studied and classified material non-indigenous manufacturing which was not described typologically because during these years of research, there was no access to the means appropriate reference information, which would classify the objects of European origin. Only just was called "material of Spanish", in general and "type material Sevilla" in particular.

The fragments considered for this case study, in his great majority belong to the 16<sup>th</sup> century. In the group stand of Spanish manufacture fragments known as common pottery, majolica, fragments of containers, some tiles, bricks for construction and crucibles for melting gold. With regard to metal objects can be identified that are mostly, but have not been studied in depth yet. Are expected to access them in future research.

European pottery fragment center known as "Stone-ware" was identified. Although not a representative sample is a single piece of semi-industrialized pottery, it is very important to support the argument as the site continued being a place of passage of other European. Indeed written sources mentions are recurrent in the presence of Scottish and Irish in the region of Colombian and Panamanian Darién (Romoli 1987; Baquero and Vidal 2004).

The following table summarizes and briefly explains the recognized ceramic types and forms identified in the Spanish pottery found in the excavations of Arcila Vélez from site of Santa María. The classification is based on proposals made by American researchers like Goggin (1968), Lister and Lister (1987) and Deagan (1987) mainly.

**Table 1**  
**Types and Shapes of Site SMAD**

Type	Shape												Total	
	Bacín	Lebrillo	Plato	Escudilla	Botija	Tinaja	Albarel	Azulejo	Cuenco	Lavatorio	Indeterminate	Adobe		Crisol
Columbia Liso (1490-1690)			14	3							119			136
Isabela Polícroma (1490-1580)			1								7			8
Sevilla Azúl/Blanco (1530-1650)											4			4
Yayal Azúl/Blanco (1490-1625)			1											1
Caparra Azúl (1490-1600)				22			4				3			29
Cerámica De Contacto (1509-1524)											1			1
Stone Ware (1530-1600)											1			1
Olive Jar-Unglazed (1490-1570)					49	2					20			71
Vidriado Verde (1490-1600)	2	16			81		3		1	2	197			302
Vidriado Polícromo (1490-1550)								1			1			2
Melado (1490-1550)				4			11		2		17			34
Vidriado Café (1490-1550)	3	1			21		1				74			100
Sin Vidriar (1490-1750)											10	15	52	77
Indeterminate (1492 - ****)											2			2
<b>Total</b>	<b>5</b>	<b>17</b>	<b>16</b>	<b>29</b>	<b>151</b>	<b>2</b>	<b>19</b>	<b>1</b>	<b>3</b>	<b>2</b>	<b>456</b>	<b>15</b>	<b>52</b>	<b>768</b>



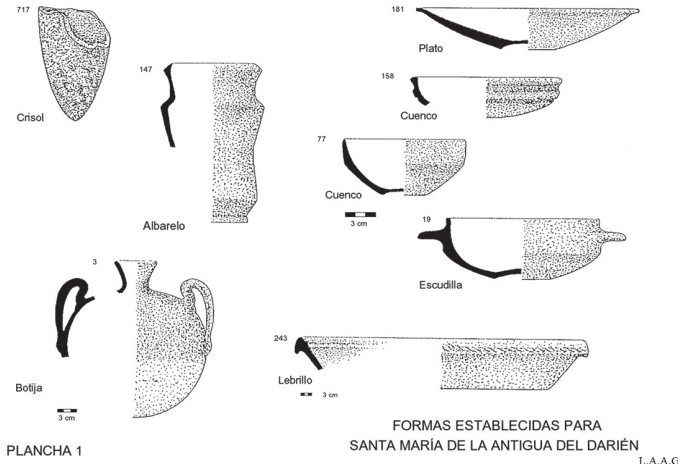


Figure 2. Pottery Shapes of Site SMAD.

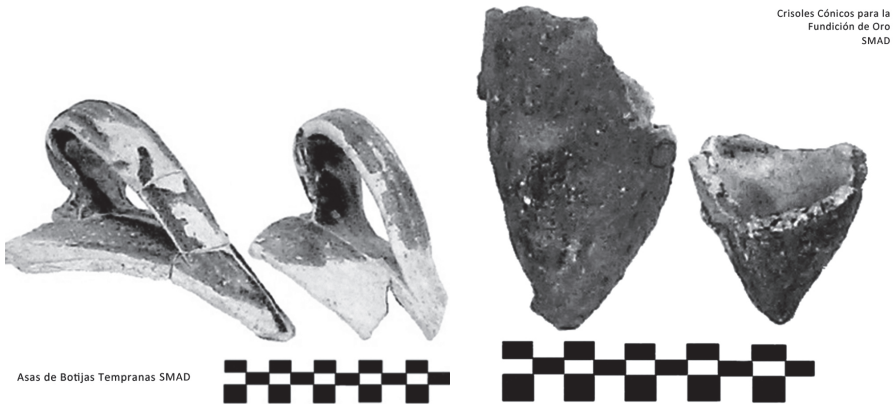


Figure 3. Spanish and Native Pottery.

### Final remarks

1. Some faculties of Social Sciences, the scientific value have cultivated with interdisciplinary studies like ethnohistory and archeology within the same academic program. This has allowed their future researchers can provide more precise information to understand in

an integral way change processes in different societies throughout the American continent from the time of the Spanish conquest.

- II. In the late 16<sup>th</sup> century and almost to the present day, other powers “capitalist” emerging different to Spanish empire, called under the euphemism of “overseas territories” to the territories under the dominion English, Dutch or French. Those domains were taken in the Caribbean islands and it is there we find another part of the non-Hispanic American history, almost whole to study at the level of archeology in general and historical particular.
- III. The contact between natives and foreigners caused a significant decrease in the indigenous population in the Darién area, caused by spread of diseases “imported” and the ongoing massacres. Despite the efforts, the foundation of Santa María did not the Spanish Crown gave the expected results, since the search for gold did not quell initial expectations and they decided to move to the Panamanian Isthmus in 1519. From the Pacific Ocean could control trade and plunder from the Inca Empire, then displace it overland to the Caribbean and then to Spain. Thus, and according to the chronicles, Santa María begins its gradual decline and abandon in 1524.
- IV. Can be regarded that the development of the research of historical archeology has opened more possibilities in other areas of work such as in colonial urban studies and has posed a greater challenge for all social sciences: “The re-write the history that we were told officially and compare it with the findings of material remains and human remains recovered in archaeological records of the earlier American colonies”.
- V. One of the most gratifying results of ceramic classification has been ratify the pottery Sevilla that was being done almost in a “craft” in the Peninsula, had changed to a “pre-industrial” due to high demand of dishes and jars primarily for transportation and distribution of products in the mainland. There was to satisfy local demand but continental type, demand for which Santa María de la Antigua was receiving directly during their occupation.
- VI. Studies of ceramic Santa María has left see decorating techniques and surface finishes common in pottery that was produced in the late Middle Ages particularly in Sevilla. For example stretch marks identified in the transport containers despite erosion fragments. In majolica, especially fragments of dishes scarred surfaces, a feature that appears for the use of certain tools within the furnaces were found. Regarding glazed jars, we have it is the earliest, used late 14<sup>th</sup> century and throughout the 15<sup>th</sup> century.

- VII. The indigenous production did not disappear immediately, it is possible that groups transform their customs and traditions pottery and at some time the European supplier the needs with the indigenous vessels. Is likely to continue to develop in ceramics and slowly transformed according to the tastes and impositions of the Spanish. Evidence of this is the presence of other ceramic reviewed in Panama, known as “Criolla” (Lineró 2001).
- VIII. Overall the analysis of archaeological ceramics from Santa María de la Antigua del Darién has helped not only to detect these delicate technological changes on local and imported material manufacturing. The ceramic classification has allowed take a look at the domestic life from Spanish foundations and collated the reports of chronic, which we are challenged of re-writing leaning on the historical and colonial archaeology.

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