

## VIEWPOINT

The presence of coconut in southern Panama in pre-Columbian times: clearing up the confusion

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- *Background* The pre-Columbian presence of coconut on the Pacific coast of Panama is attested by a number of independent written accounts. However, recent papers question their accuracy and conclude that coconut was introduced to the region by the Spaniards after their conquests.
- *Scope* In order to examine the value of such claims, an extensive search was conducted of the relevant historical accounts of coconut in America and in the Orient.
- *Key Results* The Spanish chronicler Oviedo (1478-1557) is found to have effectively used fruit and seed size to distinguish coconut from other palms. In addition, it is shown that he has

been inaccurately faulted with incorrectly representing a cluster of coconuts. The original drawing, a cluster of a native *Bactris*, was in the marginalia and was only assigned to coconut after Oviedo's death. Finally, the location is identified of a coastal Panamanian site described by Pedro Mártir de Anglería and where tidal dispersal of coconuts was observed.

- *Conclusions* This previously overlooked evidence confirms the pre-historical presence of coconut in Panama. Genetic data indicate that it must have been brought there directly or indirectly from the Philippines. But when, where and by whom remains a subject of research. Further molecular marker studies, computer simulation of natural drift and archaeological research could contribute to this research.

**Key words:** Coconut, *Cocos nucifera*, New World flora, Panama, oceanic current dissemination, Spanish explorations, Central America, early trans-Pacific voyaging.

## INTRODUCTION

The presence of coconut on the Pacific coast of Panama is attested by a number of historical documents scattered over a 23-year period, from 1516 to 1539, mostly attributable to the chronicles of Pedro Mártir de Anglería and Gonzalo Fernández de Oviedo y Valdés (Oviedo). The complete work of the latter (Amador de los Ríos 1851) remained unpublished for three centuries. These testimonies were compiled with a number of shorter accounts in Patiño (1964, 2002 pp.241-270), which left no doubt about the presence of coconut in the Americas at the time of European contact (see Zizumbo and Queros 1998 for an English translation of significant extracts).

Yet, surprisingly, two recent papers (Harries 2012, Clement et al. 2013) claim that the presence of coconut at the time of contact lacks sufficient evidence and is unlikely. These

claims are based on little if any new evidence and rely on a strongly biased selection of texts. In reality, their thesis is based on two extremely strong suppositions: 1) the various witnesses were *systematically* mistaken when they claimed they had seen coconut palms in America. 2) Whenever a document unambiguously describes coconut, it *must* be in reference to the Orient. Neither of these papers actually proves these suppositions; at best they assemble a number of quotes tending to present Oviedo as an incredibly poor observer.

Oviedo's descriptions are not always perfectly accurate by modern standards. The dimensions or volumes he mentioned are rather approximate, partly because he wrote his account in Spain and he may have been betrayed by his memory, however, we didn't find any instance where he was obviously misidentifying coconut. For instance, both Clement et al. 2013 and Harries 2012 quote the following sentence in Oviedo's account: "After I wrote the report I have mentioned, I was in the province and headland of Borica, and I ate some of these cocos and carried many with me to Nicaragua, and came to loathe them, and others did as I did and said the same thing as well". The hypothesis of a misidentification (of some *Bactris* species) was cautiously suggested by Allen (1965) and the authors seem to hold it as established truth. They claim that Oviedo's cocos had little water because he says he *ate* rather than *drank* them. They apparently did not notice that Oviedo indicates the usual way of consuming coconut: coconut milk was incorporated to mazamorra (a porridge-like meal made with bread or corn). They add that "There are people who find coconut kernel indigestible, but it is not usually a group phenomenon". However, Oviedo makes it very clear that what his group was complaining about was *massive and continuous consumption* of coconut, not coconut itself. He concludes "Finally, it is food for men who work and who are very strong, but for the rest a little of this fruit is enough, or if eaten continually, as it was done there, it is not for all stomachs". Considering the recipe of coconut-based mazamorra, we believe that few nutritionists would disagree...

Starting with Patiño's work, we conducted an extensive search throughout relevant historical accounts of coconut in America and in the Orient. We have found evidence that specifically refutes the above suppositions: 1) A review of Oviedo's writings, including early editions of his manuscripts, demonstrates that he clearly distinguished between coconut and other smaller-fruited local palms; and 2) We have identified the location of a Panamanian coastal site that was described by Pedro Mártir de Anglería as containing coconut palms, with tidal dispersal of the fruits (a key indicator that the fruits in question were indeed coconut).

## THE EVIDENCE

### Fruit size as an effective classification criterion

Like everyone who had heard about coconut in his time, Oviedo knew that a coconut was the size of a human head and that it grew on a tall tree that looked like a date palm. Confusion with any other local palm thus seems highly unlikely because of the huge differences in fruit size. This is confirmed by what Oviedo says about the dozen palm species he describes in Book 9 chapt. 4 of his book (*Amador de los Ríos* 1851 – pp.332-337 of tome 1)). He extends the name “coco” to various palm seeds, which exhibit three apertures like the coconut (e.g., *Elaeis oleifera* or *Bactris.*), but he always makes clear that these “cocos” are small (like a walnut or like an olive) and thus different from the “big coco” he saw in the province of Cacique Chimán (Oviedo y Valdés 1526), which is bigger than a human head. Oviedo probably had a personal experience with the vessels made out of coconut shells that he mentions because such goblets were relatively common in European courts of his time (Tripps 2005). Most palm fruits of Central America are much too small for this kind of use. *Attalea cuatrecasana* has large fruits (14 cm. long) but, unlike coconut, it grows inland in the

rainforests of Colombia and has only a short subterranean stem. Its fruits do not contain any liquid and seeds with 2 or more kernels are not infrequent.

A drawing erroneously assigned to coconut

One of the most serious reasons for doubting of Oviedo's botanical ability was a drawing represented as Figure 15 of Plate 3 in Amador de los Ríos 1851. It is referred to in the coconut section, but is not convincing, because it mixes traits of coconut and of *Bactris*. Actually, the original drawing does not represent coconuts at all. It is found in folio 53v of manuscript HM177 conserved at the Huntington Library (Myers 2007) and represents *Bactris* fruits – recognized by their fused, shallowly lobed, calyces – borne at the end of spiny branches (Fig. 1). Contrary to most of Oviedo's illustrations, it is not located within the text but at the bottom of the right margin, partly embedded in a long marginal addition devoted to “pixabay” and “cañaspalmas”, two species of the genus *Bactris*. Thus, it represents one of these species. The error is due to Amador de los Ríos (he was not botanist and the drawing was in front of the coconut section) and to his engraver, who apparently felt he should make the fruits look more coconut-like and modified the calyces accordingly (see Fig. 1 b,c).

Coconut growing spontaneously in Aguadulce (Panama)

Our next line of evidence comes from Pedro Mártir de Anglería's *de orbe novo*. His accounts of coconut have been discounted because he never left Europe and thus they were second-hand testimony. However, his lack of expertise is precisely what would have made him unable to make a convincing description of the natural dissemination of coconuts by the oceanic currents if he was not repeating faithfully what was told to him. Close to Natá (a

historical city in the Coclé province of Panama), he says, “a great abundance of the cocos I mentioned earlier exist there, mainly in the austral region, where the tide penetrates widely in the neighbouring plains. *In one of them, they say that there is a two league space which is washed by the high tide and left dry at low tide.* Such places are those where they say that these trees sprout and grow spontaneously. In the other places, there are none unless they are transplanted when still young. Some think that the high tide leaves there the seeds of these trees from unknown regions” (Torre Ascensio 1892).

Here, we undoubtedly have the coconut palm flourishing in its natural environment, precisely close to the town of Aguadulce (Panama). The habit of sprouting where the high tide leaves them is a unique trait of coconuts and the sentence in italics refers to the mouth of the Santa María River, near Aguadulce, which was converted into a salt works centuries ago. The uncommon geographical feature described here matches perfectly with the place represented in figure 2 in terms of topography, size and location. Moreover, Mártir de Anglería’s anonymous informer would never have discovered a connection between the distribution of the coconut palm and the variations of the slope of the beach if he had not observed it on the spot. Likewise, he would never have added that “in the other places, there are none unless they are transplanted when still young” if he was referring to India because according to Varthema, coconut in India was exclusively cultivated (Teissier 2004). There is thus no way in which these three elements – coconut, natural dissemination and Aguadulce – can be dissociated and the above text shows that coconut grew spontaneously in America.

## DISCUSSION

Systematically tracking the sources of the documents has proved effective in confirming the pre-Columbian presence of coconut in America, which had been firmly established by VM Patiño. Coconut has a few unique features that even the poorest observer would not miss, and

the texts tell us that Oviedo noticed its uncommonly large fruit size and used it as a classification criterion. In addition, it is now clear that Oviedo was not responsible for incorrectly assigning Figure 15 of Plate 3 in *Amador de los Ríos* 1851 to coconut. Finally, we identified the site described by Mártir de Anglería as Aguadulce, Panama, a place where, five centuries later, JL Renard would collect one of the representative samples of the Panama Tall. It is significant that the populations from the Pacific coast of Panama, including this one, along with others from Costa Rica and from the north of Peru, can all be traced back to the same origin, a very small number of palms (effective population size estimated to have comprised between 2 and 5) originating from the Philippines.

Did coconut originate in America?

The hypothesis of an American origin of coconut was defended by Cook (1910). It is indisputable that its closest ancestors were American (Gunn 2004 and Meerow et al. 2009) and a putative *Cocos* fossil dating back 60 Mya; (Gomez-Navarro 2009) was found in Colombia. However, a permanent presence of coconut in America during the Holocene is extremely unlikely given the absence of linguistic, archaeological and ethnobotanical evidence (Patiño 2002, Clement et al. 2013). In addition, genetic studies do not reveal an American center of diversification (Gunn et al. 2011). To the contrary, they demonstrate that, while all of the alleles of the Panama Tall exist in the Philippines, the reciprocal is not true, which indicates a close relationship between the coconuts from both regions and the direction of the migration (Baudouin and Lebrun 2009). Finally, diagnostic features of *Cocos* could not be observed in the Colombian fossil due to incomplete preservation and its assignment to the genus *Cocos* genus is uncertain. Systematicians tend to place it at the root of the subtribe *Attaleinae* (Eisenhardt et al. 2011, Meerow et al. 2009). *Cocos nucifera* has American ancestors but its lineage probably became extinct on the continent until it was introduced during the late Holocene, but before Columbus.

Coconut grew spontaneously in America

The historical documents make it clear that coconut in America was not cultivated, with the possible exception – mentioned by Mártir de Anglería – of the Pearl Islands Archipelago, to the East of the Gulf of Panama. This is confirmed in Clement et al. 2013 and may be surprising because the size of the populations was such that the natives must have co-existed with coconut for at least four generations (Patiño 2002), without developing a tradition of growing or even using coconut. But Patiño (2002) cites a similar case two centuries later in the bay of Bocas de Toro (Atlantic coast of Panama). Anglería's description of natural dissemination gives us clues about the pre-historic distribution of coconut in Central America. It was abundant in a limited number of places, where the topography was favourable and absent elsewhere. Another factor inevitably played a major role: the direction of oceanic currents. Computer simulation studies of the same kind as those made in Ward and Brookfield 1972, but at a regional scale, could help understanding this distribution and (possibly by reversing time) give indications about the place where coconut first reached America.

From the Philippines to America

Yet, the Panama Tall no doubt is descended from cultivated populations. It must have been brought to the Americas, because the distance from the Philippines to Panama prevents unaided drifting. At the same time, it is clear that the tradition of coconut cultivation was not passed to the natives of Central America, maybe because those who brought it had little contact with them, because they did not stay long enough, or because they reached America in another region, possibly more to the south. It could be the Bay of Caráquez as proposed in Baudouin et al. (2009) or the Gulf of Guayaquil, one of the three regions highlighted by Jones et al. (2011) for pre-Columbian contact. The journey from the Philippines to America was not necessarily direct. An intermediate stage in the Polynesian triangle is unlikely because the

genetic structure of the populations is different (Gunn et al. 2011) but a more northern route, via the Polynesian outliers (whose coconut populations are yet to be characterized molecularly) can be envisaged. Further research in this area is needed.

## CONCLUSIONS

We show in this paper that at least part of the accounts of coconut in America resulted from genuinely local observation and that the hypothesis of systematic confusion between coconut and some undetermined palm species is contradicted by the evidence. The pre-historic presence of coconut is thus demonstrated beyond reasonable doubt. How precisely and when it was brought to the Americas and came to form spontaneous populations in Panama remains an open field of inquiry, although hypotheses can be proposed (Baudouin and Lebrun 2009).

A growing amount of evidence attests to the existence of ancient trans-Pacific travels from Polynesia to America (Jones et al. 2011) and in the reverse direction (Roullier et al 2013). A more detailed understanding of the conditions of these travels, of the dates, of the people who undertook them as well as of the consequences in the regions of arrival will require combining results of the application of various disciplines to different animal and plant species (in addition to artefacts and human features). Coconut fully deserves its place in the set of commensal models proposed in Storey et al. 2013.

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Legend of figures

Figure 1: a) Reproduction of folio 53v of Oviedo's original manuscript. The rectangular layout of the initial version (written in the 1540-1542 period) is clearly visible. The illustration is placed in continuity with a marginal addition made in the 1546-1549 period. b) Enlarged version of the original drawing, c) the 1851 interpretation, redrawn and inverted as a result of the lithography technique. Note the difference in the calyces. The original version represents *Bactris* fruits while the modern version was "improved" to make it look more like the coconut fruits it was supposed to represent. Sources: a) and b) ms. HM 177 (vol 2), the Huntington Library , c) from Amador de los Ríos 1851.

Figure 2 : The main salt work in Aguadulce. Located 8°9' N, 8°31'W, and 17 km southern from Nata. It is protected from the sea by a 5 to 10 m high dam (CD). Points A and B are located 7.5 km (approximately 2 leagues) from the sea and are only one meter above the sea level. Before the construction of the dam, the space between them and the sea was washed by the high tide and left dry at low tide, as said in the text. This phenomenon, not unlike what is observed in the the Bay of Mount St Michel (France), is rare enough to warrant that this perfect matching is not merely coincidental. In total, salt works stretch on a 32 km extent around Aguadulce. (Source: Google Earth.)





A

B

C

D

Google earth