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Crusaders, Venetians, and Sugar Cones

3 Yishay St.
Abu Tor
Jerusalem, Israel
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Mr. Peter Bird Martin
Institute of Current World Affairs
4 West Wheelock St.
Hanover, New Hampshire, USA

Dear Peter,

Professor Franz Maier and Dr. Marie-Louise von Wartburg of the University of Zurich may really be onto something important. The finds from their ongoing excavations at the site of Kouklia in southwestern Cyprus have already begun to shed new light on a long-overlooked facet of Cypriot archaeology. Theirs is one of the first investigations of the technology and economics of the Crusader period on Cyprus (1192-1489 AD), the period when the island became a family fief of the Lusignan "Kings of Jerusalem." And Maier and von Wartburg believe that they have found evidence of a profound change that took place during that era that would affect Cyprus' development for centuries to come.

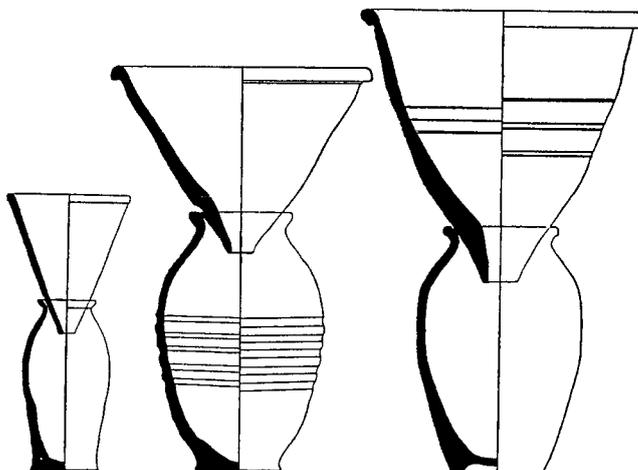
That change was the widespread cultivation of sugar cane, extensively documented in the medieval archives of the Lusignans and in the commercial records of the Venetians, who took over the island in 1489. For nearly 400 years-- until the Ottoman conquest in 1571-- "Cyprus" was synonymous with "sugar" in the eastern Mediterranean, and the impressive Crusader castles and cathedrals all over the island are clear evidence of the prosperity that the sugar cane industry brought.

Yet until the recent excavations at Kouklia, no archaeological remains of the island's medieval sugar industry had ever been thoroughly excavated and studied. And although this subject may at first glance seem to be no more than a brief historical footnote, Maier and von Wartburg have shown that the meteoric rise and catastrophic fall of medieval sugar production on Cyprus may offer a key to understanding the island's economic role in many periods of its history.

Crusader sugar was not, however, the original incentive for digging at Kouklia. For more than a century, the site has attracted a succession of excavators whose main interest was the famous Temple of Aphrodite, with its superimposed ruins of the Late Bronze and Iron Ages and of the Hellenistic and Roman periods. Few of the earlier archaeologists offered more than passing comments on the fragments of medieval pottery found in the uppermost levels of the temple ruins, or on the remains of a Gothic-style manor house nearby. And like all their predecessors, Maier and von Wartburg, experienced classical scholars, were initially interested in the temple when they began work there in 1973.

Yet as they cleared the surface of a previously unexcavated area of the ancient sanctuary, they quickly came upon masses of unusual and distinctive pottery vessels that gave an unexpected direction to their dig.

Scattered throughout the area were hundreds of clay bottles and funnel-shaped "sugar cones"-- containers into which the boiled syrup of sugar cane was poured and crystallized in a method of production extensively described in medieval texts. The previous explorers of the site had also found many examples in the temple, but in their haste to get down to the lower levels, they had failed to recognize the potential importance of this discovery, for the cones and bottles were evidence of a large Crusader sugar refinery.



Profile drawings of "sugar cones" and bottles found at Kouklia. From Antiquaries' Journal 63 (1983).

Maier and von Wartburg had unwittingly selected an excavation area where the medieval remains were impossible to ignore; they soon uncovered a kiln for the manufacture of the specialized pottery vessels, and nearby, even more obvious indications of intense industrial activity. A series of stone platforms-- previously identified as the bases for a Roman colonnade-- seemed actually to be the supports for the huge copper cauldrons in which the sugar cane syrup was boiled. And these hearth emplacements were clearly part of a larger system; a plaster-lined water channel linked the refinery building to a main aqueduct.

The discovery of the medieval sugar refinery in the ruins of the Temple of Aphrodite was just a beginning. As Maier and von Wartburg traced the line of the ruined aqueduct across the modern Limmasol-Paphos highway down toward the coastal plain, they began to recognize the full extent of the medieval sugar plantation at Kouklia. At a distance of nearly a mile from the manor house and main refinery, they discovered two ruined structures built into the steep slope, with thousands of sugar cone fragments scattered in the rubble and weeds. And as the excavation of these two structures proceeded, they provided some surprising evidence of the technological sources of the Cypriot sugar industry, its main product, and perhaps even the reason for its final collapse.

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In order to appreciate the significance of the finds at Kouklia, it's important to keep in mind just how exotic and unfamiliar sugar

was to most Europeans of the Crusader period. For them, honey was the main sweetening agent, and the products produced from the cane stalks of Saccharum officinarum-- a plant native to India and southeast Asia-- were almost entirely unknown.

Burchard of Mount Zion, a German monk who traveled to the Holy Land in the 13th century, provided one of the earliest European accounts of sugar manufacture, an account that is noteworthy for its mix of fascination and surprise. Enumerating the strange plants cultivated by the Palestinian peasantry, Burchard noted:

"... Sugar canes also grow there. These are like common canes only bigger. Within they are hollow, but full of a porous substance like that which one finds in rods of elder wood. This substance is very moist. The canes are gathered, cut in lengths of half a palm, and so are crushed in the press. The juice squeezed out of them is boiled in copper boilers, and, when thickened, is collected in baskets made of slender twigs.* Soon after this it becomes dry and hard, and this is how sugar is made. Before it dries, a liquor oozes from it, called honey of sugar, which is very delicious and good for flavoring cakes..."

For the confectioners and dessert lovers of the Islamic world, sugar's attractions were not nearly so surprising. By the 13th century AD, sugar refining was a major agricultural industry throughout the Middle East. Having first spread from India and Persia with the Muslim conquests, sugar had established an unrivalled reputation as a delicacy for both royal and common tables, and it was consumed in enormous quantities. By Burchard's time, it had become a standard feature of the feasts and public celebrations of the Mamluk sultans of Egypt. At that time, the court in Cairo alone-- according to the medieval Egyptian historian al-Maqrizi-- consumed nearly 300 tons a month.

This huge demand for sugar provided the economic raison d'être for extensive and elaborate irrigation systems, mills, and boileries throughout the Islamic world. Cultural and culinary barriers, however, initially prevented its spread to Europe; the Crusaders in the Holy Land merely taxed the sugar refineries they found already operating there without developing much of a sweet-tooth themselves. It was only after the destruction of the Crusader kingdom in Palestine in 1291 and the exile of the remaining princes and nobles to Cyprus that the Crusaders really began to get involved in sugar. And even then, it was apparently not because of their own craving for sweetness, but because of an unusually sweet business opportunity.

* In most parts of the Islamic world, however, the process was somewhat more sophisticated. Specially-manufactured "sugar cones" were used to mold the crystallizing sugar into standardized, conical sugar loaves. Matching bottles collected the dripping molasses-- or as Burchard called it, "honey of sugar."

"I came near a castle called Baffa*, in the lordship of the king of Cyprus," wrote the Italian traveler Marthono in 1394, "in which castle is made a great quantity of sugar." It was clear that by Marthono's time-- a century after Burchard-- sugar was no longer a strange and exotic substance to Europeans, but a well-known trade commodity. The Italian merchant guides of the same period described three distinct grades of Cypriot sugar, their value determined by the thoroughness of the refining process.

The most expensive type was known as "muccaro" (from the Arabic word mukarrar, or "refined"), produced from syrup that had been boiled three times. Slightly less expensive were the types produced from two boilings of syrup, among them "musciatto" (from the Arabic muwassat, or "medium" grade). And the cheapest of all was the simple, crushed crystal sugar, "polvere di zucchero" (in Arabic, gand-- the source of the English word "candy") that was boiled only once.

The production and sale of these various grades of sugar supported the splendor and pomp of the Lusignan court at Nicosia and its apparent profitability eventually brought the Venetians onto the scene. First merely serving as agents and shippers, Venetian merchants were later granted some of the vast Cypriot plantations as private concessions, and in that position, they came into direct conflict with the royal authorities. The most serious dispute, according to the legal archives of the republic of Venice, occurred in 1468, when the officers of King James II diverted the water supply from the plantation of the Venetian Cornaro family at Episkopi, resulting in the destruction of an entire year's crop, and in a continuing legal dispute. But as the medieval records also revealed, the Cornaros eventually got their revenge.

Barely a decade after the "sugar war" at Episkopi, the beautiful Caterina Cornaro married King James II of Cyprus and became, as it turned out, Cyprus' last queen. In 1489, after the death of her husband, she was persuaded by her Venetian friends and family to turn the island over to the Republic of Venice, and for the next century-- until the coming of the Ottomans in 1571-- Cyprus became little more than a huge Venetian plantation and sugar refinery.

It's not often that archaeologists have such a rich historical background to work with, and rarely do they have such a clear opportunity to deepen that background with abundant archaeological finds. For the story of Cypriot sugar, as recorded in the medieval chronicles and account books, left many questions unanswered. No scholar was ever quite sure how the Cypriot plantations operated, and no less important-- since European demand for sugar was still insignificant-- to whom the Crusaders and Venetians sold their Cypriot sugar loaves.

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Wild canes still grow on the coastal plain near Koukليا, and although most of the fields of the area are now planted with bananas,

* A corruption of the Greek name Paphos, in which district Koukليا lay.

papayas, and mangoes-- the Cypriot cash crops of the late 20th century-- it's possible to reconstruct the main stages of production in the Crusader sugar industry. This is due to the archaeological discoveries of Maier and von Wartburg; the two medieval structures they excavated in the locality known as "Stavros" proved to be specialized installations for the milling of sugar cane. Both had been built into the steep slope to maximize the power of the water flow from the main aqueduct, and both contained the remains of elaborate mill mechanisms.

It was hardly surprising to find water mills associated with the Crusader remains at Kouklia, for water power was one of the main factors behind the first great "industrial revolution" in Europe, from the 11th to the 14th centuries AD. All over the continent, from England to Italy, water mills began to be used to grind grain, pump water, work bellows, and pound or "full" freshly woven cloth. But the wheel mechanisms of the mills at Stavros were quite different from the water wheels of Europe; instead of being positioned vertically, they were of the characteristic, horizontal Near Eastern turbine type.

In sharp contrast to the Gothic-style architecture of the manor house farther up the slope at Kouklia, the mills at Stavros were thoroughly Near Eastern in plan. Their steep water chutes had obviously been copied from Syrian and Palestinian models, and the use of a large, subsidiary ox-driven grinding wheel was Egyptian in inspiration. Such wheels are still used in traditional Egyptian sugar refineries up to the present day. And in the larger of the two structures at Stavros, which also included a refinery, Maier and von Wartburg were able to reconstruct nearly the entire process by comparing the archaeological finds at the site to the treatise on sugar refining written by the Egyptian naturalist al-Nuwairi in the early 15th century.

After the cane stalks were harvested and cut into sections, they were pressed for the first time in the large ox-driven wheel to produce a moist mash. The mash was then squeezed in the water-driven wheel to extract the syrup, which was then collected in plaster-lined vats. From there, the syrup was poured into copper cauldrons and boiled to the desired thickness, after which it was poured into the sugar cones.

Initially, while the boiled syrup was still quite liquid, the openings at the bottom of the cones were plugged with pieces of cane. But when the evaporation and hardening of the raw sugar was almost completed, the plugs were removed and the cones were inserted in bottles to collect the thick molasses that dripped from the still-moist sugar loaves. This method of production, by which both molasses and crystallized sugar were manufactured, was well-known throughout the Islamic world. But from an archaeological standpoint, the finds at Stavros and Kouklia provided a new insight on the transfer of that technology across cultural barriers. The Frankish, and later, Venetian lords of the sugar plantation had apparently transplanted both the cane stalks and the time-tested processing technique.

The excavations revealed an even more surprising connection between the European sugar magnates of Cyprus and the world of Islam.

When Maier and von Wartburg counted and classified the thousands of sugar cones and matching bottles they recovered from the mill and refinery ruins, they were able to identify the main product of the Cypriot sugar industry. The three main types of cones and bottles, in graded sizes, apparently represented the once, twice, and thrice boiled sugar mentioned in the Italian merchant guides. And the most unexpected discovery was that the largest and crudest of the molds-- for the once-boiled sugar-- were by far the most common types.

This finding was unexpected, for from the prices quoted in the medieval merchant guides it might have been assumed that the Cypriot refiners would have taken the time and trouble to boil the bulk of their sugar more thoroughly. The fine "muccaro" and even the medium-grade "musciatto" were sold at substantially higher prices than the rough "polvere."

But wholesale prices alone apparently did not explain the economic role of Cypriot sugar, Maier and von Wartburg eventually realized, especially in light of the limited European demand. The concentration on the cheaper types had to be seen in a wider context of east-west trade relations, in response to a steep decline in the production of sugar in the Mamluk empire. Some Middle Eastern economic historians had already noted that in the 14th century the sultans of Egypt-- who reserved to themselves a monopoly on sugar production-- had concentrated increasingly on the finer types of sugar, leaving a vast gap in the market to be filled. And it's one of the most ironic discoveries of the excavations at Kouklia and Stavros that the Frankish knights and the merchants of Venice on Cyprus apparently amassed their enormous wealth by supplying cheap sugar to the bazaars of Cairo, Damascus, and Baghdad.

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One of the most intriguing mysteries that Maier and von Wartburg faced in the interpretation of the archaeological remains at Kouklia was the reason for the sugar industry's sudden end. According to the evidence of the latest pottery types discovered in the excavations, they determined that the mills and refineries were burned and abandoned in the late 16th century. This date is quite close to that of the Turkish conquest of Cyprus in 1571, and since travelers' accounts of the following centuries reported that Cypriot sugar production had declined to almost nothing, it seemed possible that there was a close connection between the two events.

Naturally the impact of the Ottoman conquest and the settlement of a substantial Turkish population on the island has significance for understanding the roots of the present inter-communal conflict. But Maier and von Wartburg have discovered that the Turks did not put an end to the Cypriot sugar industry. In fact, the decline of the sugar industry now seems to be one of the causes, rather than outcomes, of the Turkish conquest.

The investigation of the medieval sugar industry required that Maier and von Wartburg utilize some unfamiliar sources of historical

background, in addition to the chronicles of the Crusaders and the Venetians. And their review of some previous historical and archaeological studies of sugar in other parts of the world helped in every stage of the research. The identity of the stone bases in the Temple of Aphrodite came from a report on medieval sugar refining in Morocco; the manufacture and use of the sugar cones was understood through parallels from Palestine and Egypt; and the plan of the Stavros refinery could be reconstructed with the help of a 17th-century account of a French priest's travels in Brazil.

As far as I know, no Brazilian parallels have ever before been used in Cypriot archaeology, but then the study of the development of agricultural technology obviously requires a new approach. The rise and fall of Cypriot sugar was just one episode in sugar's spread from its original Southeast Asian homeland. And the pace and direction of that movement was determined by the ease of access to cheap plantation labor, water for irrigation, and fuel for the boileries. The peasants, springs, and forests of Cyprus were the keys to sugar success in the medieval period. But they were later severely-- even fatally-- challenged with the discovery of the New World.

The Portuguese may have been late in grasping the profitable possibilities of sugar, but when they went into the business in the late 15th century, they completely transformed the nature of the industry. First establishing plantations in the Canaries and the Azores, they were able to produce sugar with local labor that was far cheaper even than that produced by the Venetians on the backs of the hard-pressed Cypriot peasantry. And the final straw came in the early 16th century, when the Portuguese established their first plantations with slave labor from West Africa in the vastness of Brazil.

It was no coincidence that the 17th-century plan of a Brazilian sugar refinery was similar in layout to the ruins at Kouklia. The methods of milling and boiling, and even the forms of the "sugar cones" and bottles were transferred unchanged from the Old World to the New. Only the scale of production and demand were altered. With Brazil for a plantation and African slaves to grow, harvest, and process the sugar cane, the Portuguese realized that they should also cultivate a European demand.

Sugar had always been a high-prestige commodity in Islam, so why not in Christendom? In 1513, the king of Portugal presented the Pope with a life-sized sugar portrait-statue, surrounded by 12 sugar cardinals, and 300 sugar candles, each nearly 5 feet high. This promotion gimmick apparently succeeded. Where Cyprus' annual output had been at most a few hundred tons of sugar, the Portuguese plantations in Brazil were, by the mid-16th century, shipping out almost 2000 tons every year.

So the outside forces that put an end to the sugar industry of Cyprus began to be felt even before the Ottoman conquest. Cyprus' economic importance was soon buried in an avalanche of New World sugar that flowed onto the markets of both Europe and the Middle East. Maier and von Wartburg have therefore concluded that the abandonment of the mills and refinery at Kouklia was the result of economic, not political

or military change. The island's industry just couldn't compete with the shiploads of sugar-- a certain cheap grade still almost mockingly called "Cyprus" sugar-- from South America and, later, from the West Indies.

With the changing position of Cyprus in the European economy, a political realignment was probably inevitable. In 1571, despite desperate Venetian resistance, Cyprus fell to the Turks. The long rule of the island by Europeans ended soon after its profitability dropped. When the smoke had cleared and Ottoman officials were established in the manor house at Kouklia, new crops, like cotton, were raised. And by the following century, the agricultural transformation of the island was total; it was American, not Cypriot sugar that the rulers of the island sweetened their Turkish coffee with.

* *

The discoveries at Kouklia have already had an effect on other scholars working on Cyprus. Previously overlooked Crusader remains are now a subject of considerable interest. At the sites of Episkopi and Kolossi near Limmasol, where the great "sugar war" was waged in the 15th century, the remains of the competing Crusader and Venetian refineries are now being studied intensively. And at the Crusader castle of Saranda Kolones in the port of Paphos, the discovery of sugar cones and a mill from the early 13th century has prompted the excavators to pursue the question of how the Cypriot sugar industry began.

But beyond the specific questions of Crusader sugar, the work of Maier and von Wartburg at Kouklia has encouraged a number of scholars to investigate the same questions of agriculture, technology, and economics in other historical periods. Cyprus, as a natural geographical crossroads between Asia, Africa, and Europe, absorbed many influences and experienced several periods of great prosperity. Perhaps the impressive remains of the Late Bronze Age and the Hellenistic and Roman eras are-- like the Crusader castles-- merely symptoms of larger economic trends.

The main emphasis of Cypriot archaeology-- as in every other country of the region-- has long been directed toward uncovering evidence of artistic influences and political history. But that emphasis may be changing. In the coming decades, archaeologists working on Cyprus may find that the most useful clues to understanding Cyprus' historical development may be quite different from the aesthetically-pleasing museum pieces that diggers have always been looking for.

That isn't to say that irrigation systems, water mills, and broken sugar cones are likely to replace Hellenistic mosaics and Roman temples on the tourist postcards and posters of Cyprus. It's just that Franz Maier and Marie-Louise von Wartburg have demonstrated another way that archaeology can be useful: in exploring Cyprus' evolving role in the world economy.

Best Regards,

Neil

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