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Human intestinal parasites from a latrine in the 12th century Frankish castle of Saranda Kolones in Cyprus

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ABSTRACT

Saranda Kolones (Forty Columns) at Paphos in Cyprus was a mediaeval concentric castle built after King Richard I of England captured the island in 1191AD, during the Third Crusade. The aim of this research is to determine whether the garrison of the castle was infected by intestinal parasitic helminths (endoparasites). The analysis was undertaken on soil sediments recovered from a latrine inside the castle. The microscopic examination demonstrated the eggs of two species of parasites, the roundworm (*Ascaris lumbricoides*) and whipworm (*Trichuris trichiura*). Control samples were negative, confirming the parasite eggs seen were not due to contamination from later time periods. Both roundworms and whipworms are transmitted faecal-orally and thus their presence in Saranda Kolones reflects the poor hygiene conditions that prevailed in mediaeval castles. Past research suggests that 15–20% of crusaders in long expeditions died from malnutrition and infectious diseases. The discovery of these parasites highlights how mediaeval crusaders may have been at risk of malnutrition at times of siege and famine as these worms competed with them for nutrients. This research allows comparison with crusader period latrines from the mainland Levant and helps us reconstruct the health environment of a mediaeval castle.

1. Introduction

This paper presents the first paleoparasitological analysis of mediaeval period material from Cyprus, in the eastern Mediterranean. The investigation aims to identify which intestinal parasitic worms infected the inhabitants of the Frankish castle of Saranda Kolones. The use of the castle for less than three decades, from the end of the 12th century until 1222, presents a unique opportunity to assess the parasitic environment of Cyprus in a specific chronological period. Moreover, since the castle was built soon after Cyprus fell under the control of the Franks, the present study is invaluable in that it gives an insight into the health status and hygiene conditions that prevailed in Cyprus, soon after the arrival of new rulers into the island.

The Frankish Kingdom of Cyprus was established during the Third Crusade, when King Richard I of England captured the island from Isaac Comnenus, a renegade member of the Byzantine imperial family, who had illegally held control of Cyprus since 1183. Richard I was prompted to invade the island in May 1191 due to the hostile reaction of Isaac towards Richard's fiancé and sister, who both sought refuge in Cyprus when their ships were forced by a storm to moor at the island (Edbury, 1991a:5–12; Riley-Smith, 2002:125).

Soon after taking control of Cyprus, Richard the Lionheart sold the island to the Templars, who faced with a bloody revolt returned the island back to Richard I. In turn Richard sold Cyprus to the former King of Jerusalem, Guy de Lusignan in May 1192. Guy de Lusignan's brother and successor Aimery (1194–1205) established the Lusignan dynasty that ruled the island until 1489, when the Venetians took over Cyprus (Edbury, 1991a:12–22). The island remained under western control until 1571, when the Venetians were defeated by the Ottoman Turks (Riley-Smith, 2002:125)

With the transfer to Lusignan rule in 1192, Cyprus became intimately linked to the mainland Latin states (Kingdom of Jerusalem, County of Tripoli, and Principality of Antioch) through military and commercial ties, until they had been conquered by Muslim troops by 1291. Furthermore, the island came to play an integral role in the confrontation between West and Islam and later on between West and the Ottoman Turks until well into the 16th century (Edbury, 1991a:1).

2. Saranda Kolones castle

The Frankish rulers of Cyprus left their mark on the island by the construction of public and private buildings, such as churches, hospices, bathhouses, hospitals and fortifications. A number of castles

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Fig. 1. Map of Cyprus and aerial photograph of the castle of Saranda Kolones. The arrow indicates the geographic location of the castle in Paphos.

throughout Cyprus were built anew or altered from their Byzantine plan by the Franks, and were later reinforced by the Venetians. With the exception of the keep at Kolossi and of the fortress at Gastria that were controlled by the Hospitallers and the Templars respectively, the rest of the Cypriot castles remained a royal prerogative for the whole of the Frankish period. The Frankish castles in Cyprus belong in different architectural categories. Some are keeps, such as the keep at Kolossi in Limassol, others are hilltop castles, like the castle of St. Hilarion and of Kantara in the Pentadaktylos mountain range, while others such as the castrum in the harbour of Kyrenia belong to the enclosure castles (castra) category. The Saranda Kolones castle, which is the focus of this paper, is the only example of a concentric castle on the island (Boas, 1999:93–104; Megaw, 1977).

The castle of Saranda Kolones (Fig. 1), built in order to defend the harbour of Paphos, was one of the few new large castles constructed in Cyprus during the early Frankish period (Nicolle, 2007:27). Saranda Kolones is situated on a mound at the rear of the inland border of the Byzantine period's berthing area (Gertwagen, 1995:518). The mound of Saranda Kolones was first investigated in 1957 by A.H.S. Megaw, who realized that it was not a temple as many believed, but rather a concentric castle. Excavations followed in 1966–67 sponsored by the British School at Athens and in 1970–71 by the School in association with Dumbarton Oaks. In 1981, the excavations resumed with J. Rosser joining Megaw as Associate Director and continued until 1985 (Catling, 2007:5, 8–9; Rosser, 1985:81).

Based on the stratigraphic, typological and historical evidence the construction of the castle of Saranda Kolones has been dated after the occupation of the island by the Franks in 1191 (Rosser, 1985). The castle was occupied until 1222, when it was destroyed by an earthquake and never rebuilt. Since the various alterations and additions seen in the castle were made before the destruction by the earthquake in 1222, it is highly possible that work on Saranda Kolones started before the death of King Aimery in 1205 (Megaw, 1984:337). After the earthquake, the port of Paphos dried up and Saranda Kolones, now situated far away inland, lost its strategic location and could no longer function as a rampart against an attack from the sea. This change of events offers a plausible explanation of why Saranda Kolones was never rebuilt (Gertwagen, 1995:518).

Saranda Kolones (Fig. 2) had a number of latrines in the upper and lower floors. The latrines were built in the piers at the junction of three of the under-crofts that supported the vaulting. The pier at the junction of the east and north under-croft had no latrine, most probably because this pier accommodated a well shaft. The latrines that are arranged back to back in the three lower piers are separated by double partitions, where a drain shaft descends from above presumably connecting latrines on the upper and lower floor to the rock-cut sewer below. Although only the latrines on the lower

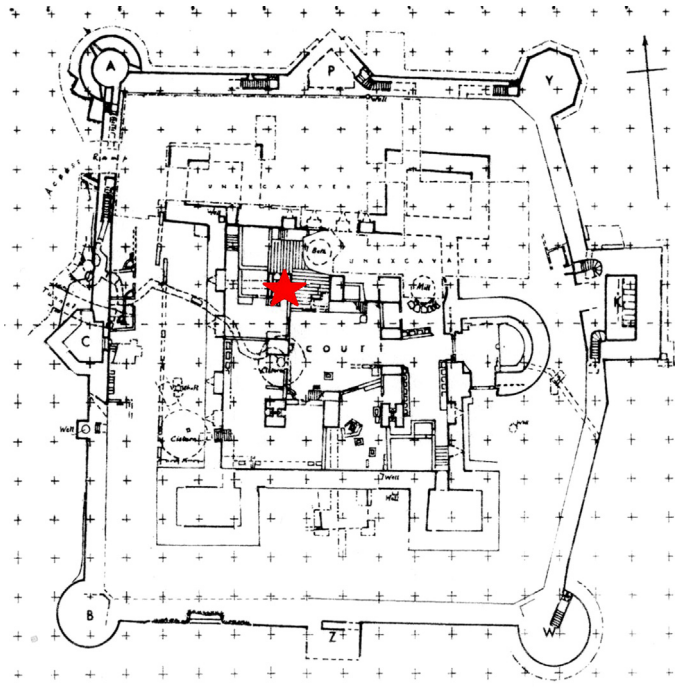

Fig. 2. Plan of the castle of Saranda Kolones (Fig. 1, Megaw, 1971:119). The star shows the position of the latrine used in parasitological studies. Reproduced with the permission of the Director of the Department of Antiquities, Cyprus.

floor survive, the drain shaft attests to the presence of latrines on the upper level as well (Boas, 1999:109; Megaw, 1971:119; Rosser, 1985:88).

3. Materials and methods

In order to examine whether any intestinal parasite species infected the garrison of Saranda Kolones, soil sediment was collected from the south latrine of the northwest pier of the castle (Fig. 3). The sample was taken 10 cm below the current surface of the soil within the latrine, to exclude soil that may have been blown into the latrine by the wind. Since only the seat of the latrine has been cleared of debris, and the cesspool beneath the seat has never been formally excavated, we were unable to take sequential samples down through the depth of the sediment within the cesspool. A control sample was also collected from surface soil in the area adjacent to the latrine, in order to control for the possibility of contamination due to later activity at the site.

For the paleoparasitological analysis, 1 gram of the soil sediment was suspended for 72 h in a 0.5% aqueous solution of trisodium phosphate, in order to disaggregate the sample and rehydrate the parasite remains (Araujo et al., 1998; Callen and Cameron, 1960). After its disaggregation, the sample was treated with micro-sieves and chemicals following the approach of Bouchet (Bouchet et al., 2003b). With the use of micro-sieves one can separate the parasite eggs, which depending on the species have diameters between 30 μm and 150 μm, from the soil particles that are smaller or larger than this range. For this study, the sample was sieved through three increasingly smaller micro-sieves of 300 μm, 160 μm and 20 μm. By doing so, it was ensured that all parasite eggs were concentrated on the smaller micro-sieve of the 20 μm. The material that remained on the 20 μm micro-sieve was then processed with 30% hydrochloric acid (HCl). The acid dissolved the calcium carbonates that the soil sample contained. The calcium carbonates can bind sand, parasite eggs, and other soil particles together and so they obscure the parasite remains from view under the microscope