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The Ecology of Crusading: Investigating the Environmental Impact of Holy War and Colonisation at the Frontiers of Medieval Europe

By ALEKSANDER PLUSKOWSKI,¹ ADRIAN J BOAS² and CHRISTOPHER GERRARD³

THE CRUSADES IN the Near East, eastern Baltic and Iberian Peninsula (in the context of the Reconquest/reconquista) were accompanied by processes of colonisation, characterising the expansion of medieval Europe and resulting in the creation of frontier societies at the fringes of Christendom. Colonisation was closely associated with — indeed, depended on — the exploitation of local environments, but this dimension is largely missing from studies of the crusading frontiers. This paper, the product of a European Science Foundation Exploratory Workshop on ‘The Ecology of Crusading’ in 2009, surveys the potential for investigating the environmental impact of the crusading movement in all three frontier regions. It considers a diverse range of archaeological, palaeoenvironmental and written sources, with the aim of situating the societies created by the Crusades within the context of medieval colonisation and human ecological niche construction. It demonstrates that an abundant range of data exists for developing this largely neglected and disparately studied aspect of medieval frontier societies into a significant research programme.

The Crusades have been typically framed as a series of military encounters; a clash of medieval Catholic and non-Christian cultures. More recently, the states which arose in the various theatres of crusading — primarily the Near East, the eastern Baltic and Iberian Peninsula — have been interpreted as ‘frontier societies’ characterising the tumultuous expansion of Christian Europe.⁴ Crusader studies increasingly promote the comparison of these different regions; activities in each shared a comparable ideology of papal-sanctioned holy war.⁵ Moreover, while the character, chronology and cultural impact of the crusading movement in different regions could vary quite dramatically, in all cases it was accompanied by a process of colonisation. This impulse was not peculiar to the frontiers of Christendom; in fact, colonisation characterised a fundamental aspect of European societies from the 11th to 13th centuries AD.⁶ The expansion and movement of European populations was closely tied to the increasing exploitation of natural resources. This was more than just an economic or demographic expansion, however; the

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⁴ Berend 2005.

⁵ Referred to as the ‘pluralist’ school of thought, developed by Jonathan Riley-Smith.

⁶ Bartlett 1993.

centuries of the medieval warm period saw a new definition of the human ecological niche.⁷ People aspired to manipulate their local environments to suit their changing socio-economic and ideological requirements, a tendency that was most pronounced in colonised regions. An ecological perspective in this context focuses on environmental transformation arising from changing patterns of human activity, resulting in the creation of new ecological niches. As this transformation is framed within the broadest cultural context, it enables us to move beyond basic economic interpretations of human behaviour. Since the people creating these niches shared a broadly common, Christian European culture, we should expect to find consistent expressions of environmental exploitation reflecting specific mindsets and praxes — diverging as an adaptation or response to local variability. In this respect, the concept of ‘Europeanisation’, as a by-product of crusading activity in frontier regions can be scrutinised from a new angle. While scientific disciplines concerned with the study of plant and animal remains, soils, hydrology and climate, not to mention historical sources, are segregated fields, they should strive for an integrated understanding.

At present, it is not possible to present such integration and this paper clearly demonstrates the uneven regional distribution of data. Indeed, the archaeology of the societies created by the Crusades is a comparatively young discipline. Significant contributions have already been made to understandings of architecture, art, industry, trade and the development of settlement;⁸ however, the impact on local environments resulting from accompanying processes of colonisation has been largely neglected. This is partly due to a lack of broader scholarly interest and partly to the lack of available palaeoenvironmental data, which earlier excavations did not routinely collect or record.⁹ Nonetheless, as environmental archaeology increasingly contributes to our understanding of medieval European society, such a perspective would enable the impact of the crusading movement — as a colonising force — to be situated within a contemporary European context. Unlike the 12th-century Saxon colonisation of Transylvania or the Anglo-Norman colonisation of Ireland, settlement and landscape development associated with the Crusades were invariably tied to events framed in the discourse of holy war. But the extent to which this ideology resulted in different experiences, expressions and impacts of colonisation remains to be comprehensively studied at an inter-regional level.

This paper is the product of a European Science Foundation Exploratory Workshop that took place at Malbork Castle, Poland, in September 2009, where a group of archaeologists and historians debated the value of an ecological perspective on the Crusades. Recognising the complex relationship between the general concept of crusading and regional cultural and environmental nuances, it aims to illustrate the value and potential of investigating the societies created by the Crusades from such a perspective. It will survey key themes relating to environmental impacts resulting from the process of crusading in the three major frontier regions: the Latin East (focusing on the Kingdom of Jerusalem); the eastern Baltic; and the Iberian Peninsula (Fig 1). While this paper does not seek to revisit the debate on the Crusades as a ‘colonial’ process,¹⁰ it does aim to promote the importance of situating frontier societies, created by the crusading process, within the context of medieval European colonisation and human niche construction during this formative period.

⁷ From the perspective of environmental archaeology, this refers to the idea that human societies actively manipulate their environments and construct specific ‘niches’, reflecting their socio-economic as well as conceptual needs (O’Connor and Evans 2005, 246–50).

⁸ A good example of this range can be found in Boas 1999 and Rozenberg 1999.

⁹ This situation is changing, and this paper provides several examples.

¹⁰ For a useful debate effectively dismissing this definition of the Crusades, see Kedar 1992, 341–66.



FIG 1

Sites referred to in the text. (a) Near East. (b) Eastern Baltic. (c) Iberian Peninsula. The shaded regions indicate the crusading frontiers from the end of the 11th century in the Iberian Peninsula and Near East, and from the 13th century in the eastern Baltic. *Drawings by Aleks Pluskowski.*

THE LATIN KINGDOM OF JERUSALEM

By Adrian J Boas

Sudden occupation and the prolonged presence of a new population in a region is inevitably a catalyst for environmental changes. Although Frankish settlement in Syria/Palestine following the Crusades was of shorter duration (1099–1291) than Crusader involvement in the Baltic region and the Spanish *reconquista*, it nonetheless had a major impact on the urban and rural landscape. The establishment of the Latin states in the East following the First Crusade and the capture of Jerusalem saw new demands on natural resources, the effects of which are often still visible today, particularly in the major cities and their immediate vicinities.

URBAN GROWTH, CROWDING AND POLLUTION

For a variety of reasons the Frankish settlers preferred urban surroundings. The rationale for this preference was predominantly concerns for security. In the first decades of the 12th century the Muslim threat was a very real one and the security provided by large numbers of people and strong fortifications outweighed other considerations.

Another factor that contributed to urban growth was the establishment in the major ports of Italian mercantile communes.¹¹ The development of Acre and, to a lesser extent Tyre, as gateways for maritime commerce between the East and the West contributed to the success and expansion of these towns. Large numbers of merchants from Pisa, Genoa and Venice took up residence in the towns and the trade they carried out attracted other settlers who established services or took advantage of those provided by the communes.

A third factor in the remarkable growth of urban populations was Christian pilgrimage which, after a period of stagnation under Muslim rule, now developed on a large scale. Renewed pilgrim traffic would have had a twofold affect on the populations of those towns that served as points of arrival and departure (primarily Acre) and on all locations which had pilgrimage significance. As well as bringing about sporadic increases in Christian populations, pilgrimage provided a more general stimulus to urban economies, most notably in Jerusalem where merchants, manufacturers, providers of food, lodging and other services, took up residence. In Acre the pilgrim influx would occur at the time of the arrival and departure of pilgrim ships.¹²

The consequence of these developments in the towns was a rapid expansion of populations, a decrease in open spaces, expansion beyond former boundaries, the occasional need for new fortifications and, in some cases, overcrowding and quite serious pollution.

Overcrowding and expansion

Frankish Jerusalem may not have suffered greatly from crowding because for about 50 years it was making up for the slaughter and expulsions that took place during the Crusader occupation in 1099.¹³ There was no shortage of housing, even once the city was

¹¹ The Genoese were present in Acre from the occupation of the city in 1104, the Venetians from 1110 and they would have greatly increased when they received considerable privileges and concessions from the Crown in the famous *pactum Warmundi* of 1123. The Pisans followed suit in 1168.

¹² As with commercial shipping, pilgrim ships arrived during the twice-yearly *passagia* (brief periods when the currents and winds were favourable for shipping in the eastern Mediterranean).

¹³ On these events, see *Gesta Francorum et aliorum Hierosolimitanorum* cc 38–39 (Hill, 1962, 91–2); Fulcher of Chartres, *Historia Hierosolymitana* 1.27 (Hagenmeyer 1913, 301); Raymond of Aguilers, *Historia Francorum qui ceperunt Iherusalem*, in *Recueil des Historiens des Croisades, Historia Occidentaux* 3, Paris, 1866, 300; *Le Liber de Raymond d'Aguilers* (Hill and Hill 1969, 150–1); William of Tyre, *Chronicon* (Huygens 1986, 8.20); *The Chronicle of Ibn al-Athir for the Crusading Period from al-Kāmil fi'l-ta'rikh, Part 1. The Years 49–541/1097–1146. The Coming of the Franks and the Muslim Response* (Richards 2006, 281, 21), but see also (Kedar 2004, 15–75).

receiving large numbers of pilgrims. Peripheral open spaces within the walls were hardly built onto, remaining open until modern times.¹⁴ There was little need for building beyond the walls and, where this did take place, it was not for reason of a lack of space within them.¹⁵

In Acre the situation was quite different. According to the Spanish Muslim traveller, Ibn Jubayr, whose account dates to 1185, Acre's roads and streets were 'choked by the press of men, so that it is hard to put foot to ground'.¹⁶ Evidence for overcrowding in Frankish cities comes from other contemporary sources as well as archaeological remains. The natural tendency in thriving urban settlements was to expand up to the walls and, as became necessary, beyond them. In the medieval West many towns developed *faubourgs* (suburbs outside the walls) and eventually fortified them, sometimes spreading yet further and fortifying again. The use of the term *burgus novus* in reference to some Frankish cities in the East points to this type of expansion. The most pronounced case was Acre's suburb, Montmusard. A similar development on a smaller scale existed at Jaffa and Nablus.

In the West this type of expansion eventually declined in the late Middle Ages when the vitality of urban growth had somewhat abated, and was replaced by expansion in open spaces within the walls.¹⁷ The rapid pace at which Acre grew, promoted by commerce, pilgrim traffic and the loss of cities in the hinterland in 1187, resulted in these two types of development taking place simultaneously. At the same time that Acre was greatly expanding to the north and east, houses within the city were being added on to or having their courtyards occupied. In the ground floor of a house in the Genoese quarter (house 1:8) the process of expansion into the courtyard can be observed (Fig 2); and overcrowding would also explain the phenomenon of houses encroaching the area of the city ditch.¹⁸ Such makeshift measures were easier to carry out, cheaper and safer than constructing entirely new houses outside the walls. Unlike in Jerusalem, in Acre building spread into many open areas within the city walls. The area called 'Boverel' on the medieval maps, which David Jacob identifies as the Templar stables, was built over with houses soon after 1191.¹⁹ This process of expansion was uneven, however. As late as the second half of the 13th century there was an area occupied by tanners on the eastern side of Montmusard near the quarters of St Catherine and the Burgus Templi. Considering the nature of that industry, its filth and unpleasant smells, it would seem unlikely that this particular area of Montmusard was built upon.²⁰

Urban pollution

The effects of the rapid population increase in the larger coastal cities would have been considerable, in particular with regard to air and water pollution. Ibn Jubayr records

¹⁴ The area within the city wall north of Jaffa Gate was only built up in the 20th century and substantial parts of the open spaces to the south in the Armenian and Jewish quarters can still be observed today.

¹⁵ Most Frankish construction outside Jerusalem's walls in the 12th century is of monastic compounds at pilgrimage sites.

¹⁶ Ibn Jubayr, *The Travels of Ibn Jubayr* (Broadhurst 1952, 318).

¹⁷ See Chiara Frugoni, *A Day in a Medieval City* (McCuaig 2005, 3). In the Near East a similar development had occurred in the late Byzantine and early Islamic period in cities like Jerusalem and Beth She'an.

¹⁸ On the house in the Genoese quarter see Boas 2010, 71, 271–4. In a recent publication dealing with a neighbourhood on the old northern wall of the city near the Hospitallers' compound and adjacent to the Porta Boverie Templi it was noted that one of the houses is recorded as *protenditur in longum super fossatum civitatis*, that is, extending lengthwise above the moat of the city. See Arad 2006, n 6. Joshua Praver (1980, 240) notes that the Genoese quarter, which he estimated as covering an area of c 6.5 ha, was quite crowded with 64 houses recorded in the property list of 1249.

¹⁹ Jacoby 2005, 77–8.

²⁰ *Ibid.*, 83. Also, the reference on the early 14th-century maps of Frankish Acre to Saint Romanus in the Gardens suggests that at least part of the open land on the eastern side of the city near the walls remained open until the end of Crusader rule. For this map see Dichter 1973, 18–30.

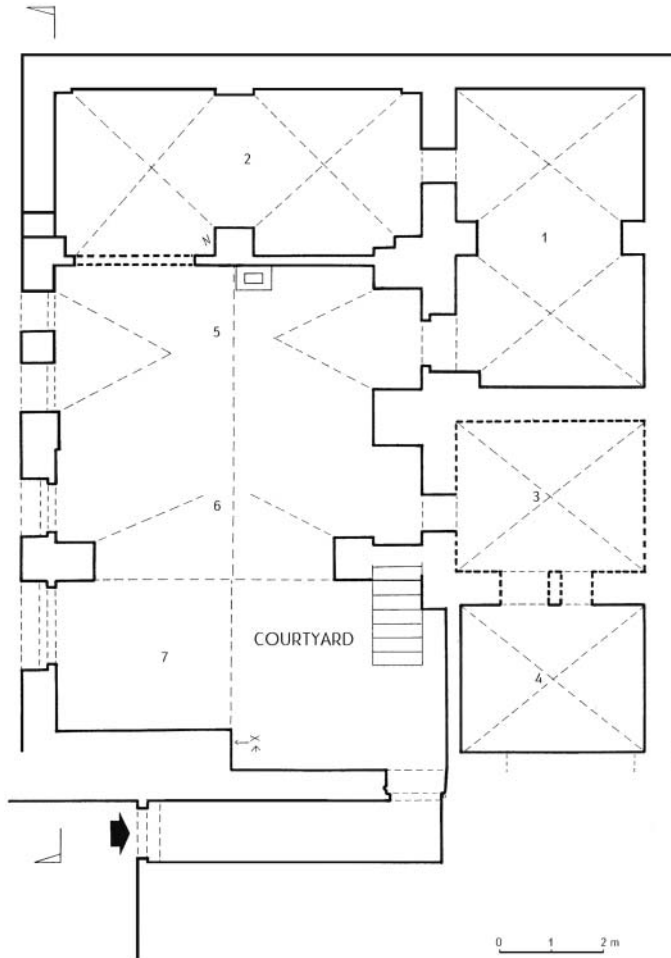


FIG 2

Plan of a house in the Genoese Quarter of Acre, within which the courtyard has been progressively built into (5–7).
Drawing by Adrian Boas.

that Acre ‘stinks and is filthy, being full of refuse and excrement . . .’.²¹ There was no organised removal of waste from the streets. This was probably left to individuals cleaning in front of their own properties or to the winter rains and domestic animals, which would have caused as much filth as they removed. It does not appear that the supervisor and regulator of the streets and public places, the *mathesep* (*muhtasib*), was very conscientious in carrying out his task.²² Konstantinos Manasses, a 12th-century Byzantine traveller, in a poem titled *Hodoiporikon* (‘Guidebook’), commented on Acre’s deserved ‘doom and gloom’, calling it a ‘suffocating town’ where the dead are daily carried out ‘by heaps for burial’.²³ In the second half of the 12th century John Phocas, a Greek pilgrim, had this to say about conditions in Frankish Acre: ‘Here the air being corrupted by the enormous influx of strangers, various diseases arise and lead to frequent deaths among them, the consequence of which is evil smells and corruption of the air and the misfortune of the city is beyond repair’.²⁴

²¹ Ibn Jubayr 1952, 318.

²² See Praver 1980, 147; and Scanlon 1970, 183.

²³ See English translation of the poem in Acerts 2003, 179, 209.

²⁴ Joannes Phocas, *Descriptio Terrae Sanctae* (Stewart 1892, 11). On diseases in Frankish cities see below, n 41.

Pollution of course extended to the city surroundings. David Jacoby has called attention to references to the 'filthy sea' (*lordemer* in French) or 'the sea called filthy' (*a mari quod dicitur immundum* in Latin), in a number of contemporary documents, and he has persuasively identified it with the area of the harbour.²⁵ This pollution was partly the result of the proximity of the royal slaughterhouse, butcher stalls and fish-market and it appears that sewage from the Hospitaller compound was also emptying into the port as, no doubt, was the sewage from private houses. The harbour's encircling walls meant this filth would have remained for some time inside it, adding to the difficult conditions of the city.²⁶

The increase in rural and urban-based industries such as the refining of sugar and manufacture of soap, salt, textiles, glass and pottery would have had caused a certain degree of atmospheric, water or land pollution. Consequently, many of these industries were located outside city walls, away from private housing and whenever possible downwind.²⁷ An increased volume of export resulting from growing industrial production would have necessitated the expansion of the ports themselves. Unfortunately, the extent of this expansion is impossible to estimate at present as we have hardly any information on the pre-Crusader ports.²⁸

CHANGES IN THE RURAL LANDSCAPE

The Frankish presence in the countryside also left a mark that is still very visible today. Surveys and excavations provide us with numerous examples of the impact of Frankish rural settlement and agricultural activity, many of which were different from what had preceded them.

Animal husbandry

Under Islamic rule there had been a marked decrease in certain agricultural activities that had formerly been dominant. Under the Franks some of these practices redeveloped or considerably expanded. For example, after the decline in pig meat consumption that followed the Islamic conquest of the Holy Land in the 7th century, the raising of pigs, as witnessed in the bone finds from sites such as Caesarea, Yoqne'am, Belmont and Red Tower, appears to have increased considerably in volume.²⁹ Pig bones from Crusader floor levels at Yoqne'am, although forming a small part of overall meat consumption, increased nearly fivefold from the quantity found in the Islamic levels. At Belmont they form 34.8% of all identifiable fragments of the animal bone specimens recovered (although this represents only 14.8% of actual meat consumed). By contrast, in the Ottoman period they represent a mere 5% of the animal bone specimens (3% of meat consumed).³⁰ To some extent in rural contexts and certainly in urban ones, the large

²⁵ See Jacoby 1993, 88–91. References to *Lordemer* include *Cart gén Hosp* no 1276; Desimoni, 1884, 216–17; See Jacoby's n 40 for the Latin reference in the Venetian Doge's charter of 1261, and comments on the necessity to seal the window in the apse of the church of St Demetrius to prevent the wind from projecting filth from the adjacent sea onto the altar.

²⁶ Jacoby cites the case of the church of Saint Demetrius in the Venetian quarter that had to have the main windows of its apse sealed off to prevent the wind from projecting filth from the sea onto the altar. See Jacoby 1993, 88–91; 2005, 82.

²⁷ Jacoby notes that the sugar refinery in Acre was dismantled by the Ayyubid conquerors after the occupation of the city in 1187, and its ovens were transferred outside the walls. See Jacoby 2005, 83, n 41.

²⁸ The only detailed description is in the account of Muqadassi who, writing in the 10th century, discussed how the harbour fortifications of Akko were constructed, but did not expand greatly on the nature of the harbour itself. See al-Mukaddasi 1896, 29–31.

²⁹ These are among the few sites for which animal bone finds from the later periods have been examined and published. See Cartledge 1986; Kolska Horwitz and Dahan 1996; Croft 2000, 174–5, 186.

³⁰ Kolska Horwitz and Dahan 1996, 248, fig XXII.2.

numbers of pigs would have affected the environment. For example, the presence of a piggery within the built-up area of Acre may have had a detrimental effect on the value of housing in its vicinity.³¹

Agriculture and technology

Another example of change in agriculture and agriculturally related industry is a substantial increase in the production of wine. Large numbers of wine presses are found in Crusader period sites, including occasionally an entirely new phenomenon: entire villages devoted to wine production. In Parva Mahumaria (al-Qubaiba) and al-Kurum, villages north-west of Jerusalem, wine-treading vats were found in nearly half of the houses that were excavated.³² There were also types of pre-Conquest agriculture and related industries that now developed and expanded beyond all comparison. New methods of raising livestock or growing crops may have been introduced from the West, Byzantium and neighbouring areas. For example, at Tartus in the County of Tripoli, a special method of pruning enabled the harvesting of three crops of grapes in a single year.³³

The best example of agricultural and industrial development is the expansion of cane-sugar growing along the Mediterranean coast and the Jordan Valley and the establishment of numerous refineries. What had previously been a household activity became under the Franks a highly organised and profitable industry involving major organisations in the Latin East, most notably the Hospitaller Order. Large tracts of land were devoted to cane growing along the coast from Tyre and Acre as far south as modern Tel Aviv (Tel Qasile) and, in inland, around Baisan (Bet She'an), Jericho and Karak.³⁴ Remains of the aqueducts carrying water from springs to the fields, and of sugar-refining installations, are still visible south of Tyre, at Khirbat Manot, Jericho and elsewhere. These are examples of technological advances made as the industry increased in volume and quality in the 13th century, later expanding into the Kingdom of Cyprus.³⁵

Western introductions

Some Frankish introductions were the outcome of the importation of western customs, such as the construction of installations inside buildings rather than in the open, as was formerly the case. Wine and oil presses were built in village and manor houses rather than in fields, for example. The Franks may have introduced wind-powered mills. They imported certain administrative elements of the western feudal system such as the institution of the lord's monopolistic right to construct communal installations. Household mills were replaced by large regional mills such as those built on the Yarqon River.³⁶ Another technological change introduced was the construction of western-type barns or byres that made their appearance as *boveria* (cattle sheds), numerous examples of which are found today, their identity preserved in the Arabic name, al-Babariyya.³⁷

A lesser-known impact on the landscape, and one that requires further examination, is the introduction of new species of plants and animals. We know that animals were

³¹ Between 1248 and 1250 a house next to the piggery in the Genoese quarter was rented for only 12 bezants per annum, that is, at the lowest range of rental in the quarter which included houses rented for up to more than 20 times that amount. See Boas 2010, tab 9.

³² See Bagatti, *Emmaus/Qubeibeh* (Bonanno 1993, 89–90); Boas 1996, 585 and figs 1, 8.

³³ Burchard of Mount Zion, *Descriptio Terrae Sanctae* (Stewart 1896, 101–2).

³⁴ On this industry, see Stern 1999; Peled 2009.

³⁵ For a discussion of the archaeological remains of sugar refineries in Cyprus, see Von Wartburg 1983; 1995; 2001.

³⁶ See Boas 2006, 74–5.

³⁷ On this, see Benvenisti 1982, 130–52.



FIG 3

The street village, al-Kurum, north-west of Jerusalem facing west. Photograph by Adrian Boas.

brought East in this period by pilgrims and merchants as food on their travels. In the 13th century, when the territory of the kingdom was shrinking under Mamluk attacks, food shortages necessitated the importation of livestock, grain and other produce. These were probably on the whole animals and crops already established in the East. Some new breeds may have entered the region in this manner, however, certain horse breeds perhaps. An example of this type of activity may be the planting of *Artemisia absinthium* (wormwood or woodbine), which is found on the northern slopes of Montfort Castle. Long considered to have arrived here in the Crusader period, one type of *Artemisia*, (*Artemisia abrotanum*, southernwood) is occasionally referred to as ‘Crusaders’ herb’ and was supposedly used for preventing and curing plague,³⁸ as a cure for stomach complaints, and a means of killing intestinal worms, an ailment many of the Franks suffered from.³⁹

A more profound change was in the design of villages established by Frankish settlers in the 12th century. In order to facilitate the setting up of new settlements, an entirely new form was introduced from the West: the street-village. Such settlements consisted of a number of simple dwellings and communal and administrative buildings (manor house, church and installations), built either side of a single street. The houses were constructed on narrow plots (tofts) with long, narrow fields behind them, the whole surrounded by the farmlands worked by the settlers (Fig 3). It was a simple process to divide the land into

³⁸ De Bairacli-Levy 1991, 167.

³⁹ See on stomach parasites from which people in the Latin East suffered see Mitchell and Stern 2001, 207–13.

roughly equal plots; and, because of the narrowness of the plots, such compact villagers were fairly easy to administer.⁴⁰

Hydrology

Other examples of changes to the landscape came about as a result of activities related to the Military Orders in building, defending and supplying their castles and in supplying the needs of their urban centres. This included the damming of streams for the running of mills, by both the Hospitallers and the Templars on the Naaman (Belus) River south of Acre, and by the Hospitallers on the Yarqon River further south.

Changes to the natural flow of streams could be the result of needs other than agricultural. It is possible that the Franks diverted the lower part of the Belus to an area to the north of its original position. There is a reference to the first (lowest) mill on the Belus being located next to the church of Saint Nicholas, which was in the cemetery to the east of Acre's walls. The river would naturally have emptied into the Mediterranean further south, probably where the mouth is located today, and we can speculate that it may have been diverted to flood the eastern moat of the city or to provide a convenient water supply outside the walls, and that it reverted to its natural position after the destruction of Acre in 1291.⁴¹

Deforestation

No doubt military activities sometimes resulted in the removal of forest around castles and towns, for at least three reasons: the need to supply wood for building of siege machines or for fuel; the desire to prevent timber outside city walls falling in enemy hands; and the requirement to clear space around fortifications in order to prevent the attacker from approaching the walls without being seen. Removal of trees outside of Jerusalem was carried out by the Fatimids on the eve of the siege in 1099 in order to deprive the Crusader army of badly needed timber. An example of clearance around a fortification for strategic reasons appears to have been the case at the Teutonic castle of Montfort in the western Galilee. Recent examinations show that when it was destroyed in 1271 the huge stones of the castle rolled some 200 m down the slopes to the north and south, something that would have been unlikely had these slopes been densely forested as they are today. Probably the garrison removed most of the trees on the slopes in order to prevent attackers from approaching the castle under their cover.

In conclusion, the contribution from the Latin East to an understanding of medieval conquest, frontiers and colonisation encompasses the expansion of urban centres, the

⁴⁰ On these villages and on the Rural Estate Centres see Boas 2003, 137–45. The limited number of these villages is due to the short duration of most rural settlement activities from the 1140s until 1187. After 1187 this design vanished as immediately as it had appeared, but its value as a convenient mode of organised and planned settlement proved itself when it was reintroduced to the Palestinian landscape, once again by European settlers, at the end of the 19th and through the 20th century in the German Templar villages and Zionist moshavs.

⁴¹ The suggestion that the Belus River may have been diverted to flood the moat was first raised by Richard Pockoke (1745, 53) who claimed to have seen in 1738 the remains of the channel with two bridges over it. If this is reliable, it is doubtful that such a channel would have been excavated after 1291 when the walls and moat were destroyed and after which the population of the town was no longer substantial until well after Pockoke's visit. Kedar (1997, 164, fig 7) noted that a *turris pontis* (tower of the bridge) is shown on the eastern city wall on medieval maps near this location and that what appears to be a tower overlooking the remains of a bridge can be seen in this area on the 1686 panorama of the city by É Gravier d'Ortières. The bridge appears at that time to have three standing arches. Whereas any of the city gates might have had a bridge across the moat, the specific mention of the bridge in the name of the gate tower and the gate itself — *porta pontis* — as well as the apparently substantial nature of the bridge as it appears on the panorama, may suggest that there was indeed water in this section of the moat. If such a diversion did take place, a late 12th-century document might suggest that it was carried out after 1193 in which year Henry of Champagne granted to the Hospitallers, part of the eastern city wall and land outside the walls as far as the river. See *Cart gen Hosp* no 938.

introduction of western rural settlements with specialised economies, and widespread adaptation to local conditions. The distinct role of the Military Orders, represented by their castles and large urban complexes, pervades all of these aspects in the Crusader principalities from the latter half of the 12th century. The dominant focus has been on urban centres, however, ongoing and future research promises to significantly expand our understanding of the environmental impact of rural colonisation, thereby linking trends in the expansion of the Frankish urban population with the reorganisation of natural resource exploitation in the countryside.

THE EASTERN BALTIC

By Aleksander Pluskowski

Crusading in the eastern Baltic began in earnest in the early 13th century, initially linked to the activities of missionaries and the protection of converted Christians. From 1231–83, the Teutonic Order led crusades against the Prussian tribes in the region corresponding to modern NE Poland, the Russian Kaliningrad Oblast and the SW tip of Lithuania.⁴² The Order took over these tribal territories and established a theocratic state (*Ordensstaat*), held as a papal fief. In 1309, the Order annexed Gdańsk (Danzig) and Pomerania (the eastern region of Pomerania), maintaining its expanded state until 1410.⁴³ Throughout the 14th century, the Order conducted hundreds of military expeditions (*reisen*) in the manner of an ‘eternal crusade’ from its Prussian and Livonian territories against pagan Lithuania.⁴⁴

Crusades in Latvia and Estonia, regions later known as Livonia, had begun earlier. Missionary efforts from 1180 led to conflict with local tribes and prompted the arrival of crusading armies. Bishop Albert, with the collaboration of tribal allies, organised sustained crusades in the early years of the 13th century. He formed a Military Order — the Sword Brothers — which would become the dominant political force in the region. In 1237, following a disastrous battle at Saule, the remnants of the Sword Brothers were incorporated into the Teutonic Order as an autonomous branch.⁴⁵ N Estonia and its islands were conquered by Danish armies and partitioned between King Valdemar and Bishop Albert in 1222, with the territory subsequently acquired and ruled by the Livonian Order from 1346.⁴⁶

The crusading period, which is seen as the transition from prehistoric to medieval societies in the Baltic region,⁴⁷ resulted in a patchwork of territories largely ruled by a German religious elite class — a somewhat tense balance of power between the Teutonic Order, individual bishops and towns that was sustained into the 16th century.

URBANISATION AS COLONISATION

The Crusades in the eastern Baltic are associated with the appearance of towns. The settlements of Riga and Chełmno (Kulm) had provided permanent bases for crusades,

⁴² For the sake of clarity modern place names have been used to refer to locations with their German equivalents in brackets after the first time they appear in the text.

⁴³ There is an extensive literature on the formation of medieval Prussia and Livonia. The most important and accessible works include Urban 1980; 1981; Biskup and Labuda 1986; Biskup 2008; Christiansen 1997.

⁴⁴ These expeditions became the main theatre of crusading for the European aristocracy in the 14th century (Paravicini 1989–95).

⁴⁵ Henceforth referred to as the Livonian Order.

⁴⁶ See n 44 and also works by Jensen (eg 2000) on Denmark as a crusading state.

⁴⁷ The use of terminology varies between different countries in the Baltic. The crusading period is also referred to as the ‘Conquest period’ in Estonia and Latvia, while the last phase of Prussian culture is often categorised as ‘early medieval’ in Polish scholarly literature.

but military successes were underpinned by the construction of castles, of which the larger became nuclei for settlement, stimulated by a deliberate policy of colonisation. From the 1230s into the 14th century, the Teutonic Order found 95 towns in Prussia, attracting colonists with privileges guaranteed by the Kulm and Magdeburg laws in exchange for military and economic services.⁴⁸ In annexed Pomerania, the administrative structure of many settlements was reorganised under the new regime. In Livonia, Riga developed from a small trading hub into a bishopric, while both bishops and the Livonian Order founded a number of towns in association with major castles such as Viljandi (Fellin) and Tartu (Dorpat). The Danish conquest of Estonia is associated with the development of a number of urban centres, most importantly Tallinn (Reval). By the end of the 13th century, these towns had become thriving centres of commerce and a number were members of the Hanseatic League. The wealth of these communities is attested by the abundance and diversity of material culture recovered after decades of excavations, including artefacts and structures made from wood, as well as leather, fur and even wax, preserved in the waterlogged soils of these cities. At the same time the inhabitants of these towns, as in the Near East and Iberia, were actively involved in crusading enterprises.⁴⁹

The emergence of towns in Prussia and Livonia would have had a significant impact on local and distant environments. The privileges granted by the Order to each settlement included precise details of access to diverse local natural resources.⁵⁰ Like towns in the Latin East, some of the major towns in the Order's territories outgrew their initial bounds, resulting in the growth of adjoining 'new towns', requiring increasing amounts of provisioning to sustain their burgeoning populations. This, in turn, would have required intensification in livestock breeding, evident from the relatively large quantities of animal remains that have been recovered from urban excavations.⁵¹ For example, in the town of Gniew (Mewe), which was officially given urban status by the Teutonic Order at the end of the 13th century, faunal assemblages reveal differences in meat consumption between different areas, with an overall reliance on meat from cattle brought in on the hoof. This was followed by a preference for pork, obtained from animals ranging in size, with some as large as wild boar. The amount of pig bones drops in the second half of the 15th century, perhaps reflecting changes in culinary preferences or reductions in nearby woodland.⁵² Environmental transformation in urban hinterlands appears to have varied across the eastern Baltic. In Pomerania, gradual deforestation around Gdańsk is already evident from the 11th century, while at Elbląg (Elbing) this process is related to the comparatively late development of the town. Here most botanical material has been recovered from undefined occupation layers relating to habitats outside the town. Represented species are indicative of meadows and pasture, highlighting the importance of animal husbandry and, despite the limited number of cereal remains (in contrast to Gdańsk), weeds associated with the cultivation of millet, root crops and gardens were frequent.⁵³

It is also very clear that towns would have developed their own distinct — quintessentially human — ecosystems, contrasting with those of rural settlements. The process of urbanisation in other regions of Europe can be linked with the rise of new communities of predators and scavengers, sustained by high concentrations of organic waste produced by urban populations.⁵⁴ It would be useful to incorporate the research of environmental aspects of urban pollution, already mentioned in the context of towns in the Latin East,

⁴⁸ Czaja 1999.

⁴⁹ Jensen 2001.

⁵⁰ Tandecki 2005, 47–50.

⁵¹ Makowiecka et al 1998.

⁵² Sobociński and Makowiecki 1992.

⁵³ Latałowa et al 2003, tab 2.

⁵⁴ Tyszkiewicz 1991; O'Connor 2000.

into studies of urbanisation in the Baltic.⁵⁵ The spread of towns in the eastern Baltic is closely associated with the construction of castles, and while both can be separated into distinct archaeological sites with discrete social and ecological profiles, their connected roles must ultimately be situated within the broader impact of colonisation.

CHANGES IN THE RURAL LANDSCAPE

The process of colonisation of lands neighbouring Prussia by German and Slavic settlers had begun before the 13th century, and had particularly focused on the Kulmerland, Kujavia and Pomerania. Following the military conquest of Prussia, settlement was encouraged by both the Teutonic Order and bishops, primarily represented by the foundation of towns along the lower Vistula, and subsequently by implanted peasant communities in the interior. This resulted in the reconfiguration of the ethnic map of Prussia by the 14th century.⁵⁶ Our understanding of environmental transformation in the Prussian countryside associated with the process of colonisation is currently dependent on a combination of historical and palaeoenvironmental studies.

Colonising, deforestation and wilderness

Deforestation, followed by an increase in pine trees taking advantage of the opening up of the landscape, is already evident in northern and western Poland (along the Vistula river basin, Greater Poland and Pomerania) before the crusading period, and from the 13th and 14th centuries becomes increasingly apparent eastwards, broadly paralleling the trend in rural colonisation. The first significant phase of anthropogenic hydrological modification in the Prussian interior, with the establishment of water-powered mills, corresponds to this phase of settlement development.⁵⁷ Eastern Prussia remained an active militarised zone between the *Ordensstaat* and pagan Lithuania throughout the 14th century; written sources suggest the region of Sudovia became a wilderness, a depopulated green desert that would not see settlement again until the 15th century.⁵⁸ Crusading from Livonia in turn prompted a partial depopulation of S Semigallia, as evident in the archaeological data.⁵⁹

The wilderness that emerged from this sustained military activity came to represent a source of wild prey for the Order, but perhaps more importantly supplied high quality timber. From the 13th century this was exported by the Order from Masovia via Gdańsk, Elbląg and Kaliningrad (Königsberg) to north-western Europe.⁶⁰ By the late 14th and early 15th century, following an increase in demand, the primary source of timber became the dense woodlands of eastern Poland, including what is today the most extensive stand of old growth forest left in Europe: Białowieża Forest (Masovia). Pollen studies in this area have revealed only limited evidence for vegetation disturbance in the early 15th century, however. This coincides with an increase in charcoal, most probably linked to the establishment of tar, potash and charcoal industries in the woods at this time.⁶¹ The restricted utilisation and settlement of these vast woods continued into the 16th century when they become established hunting grounds for Polish and Lithuanian rulers.⁶² In this respect,

⁵⁵ Studies of medieval towns in Prussia and Pomerania have benefited from well-preserved latrine deposits, which provide good evidence for levels of pollution and sanitation (see Czaja 2005).

⁵⁶ Biskup 2002.

⁵⁷ Karczewski 2008.

⁵⁸ Urban 1980.

⁵⁹ Jarockis 2003.

⁶⁰ Eg Haneca et al 2005; Wazny 2002; 2005.

⁶¹ Mitchell and Cole 1998.

⁶² Samojlik 2006.

the impact on rural eastern Prussia and its frontiers appears to have contrasted with the development of the western territories of the Teutonic Order.

In Livonia, there was no comparable process of colonisation although emerging towns attracted German, Scandinavian and Slavic migrants.⁶³ Instead, the process appears to be more comparable to the Norman invasions of England and Sicily, resulting in the replacement of the indigenous ruling class with a foreign elite. In fact, in Livonia the process was more subtle, with local aristocrats becoming incorporated into the new power structures rather than being completely excluded and isolated. While incoming colonists actively transformed the Prussian landscape, existing agriculture and pastoral farming in the Livonian countryside does not appear to intensify in the same way. Indeed, Evalds Mugurēvičs has argued on the basis of comparative material culture that, unlike towns and castles, rural communities were strikingly less affected by the cultural transformations initiated by the Crusades, a notion upheld by Heiki Valk's study of rural cemeteries in southern Estonia.⁶⁴

Palaeoenvironmental research is largely absent for the Middle Ages in Latvia. In Estonia, pollen studies demonstrate that the proportion of tree pollen remained high even during the period of intensive farming. Large-scale cultivation of rye commenced in some areas by the end of the 9th century,⁶⁵ in other areas from the 12th century,⁶⁶ but most significantly from the 15th–18th centuries.⁶⁷ Cornflower (*Centaurea cyanus*) characteristic of permanent rye fields, occurs in pollen sequences from southern Estonia from the 12th century, and has been interpreted as reflecting a rotating crop/fallow and slash and burn agricultural system similar to that in use until the 18th/19th centuries.⁶⁸ This data suggests no obvious correlation between the chronology of agricultural developments and the events of the Crusades, although future research focusing on castles and towns as the main sites of colonisation in Estonia may pick up nuances of intensification that can be related, in the first instance, perhaps, to changing regional provisioning networks in the 13th century.

The role of castles

Both Military Orders and bishops in Prussia and Livonia came to be defined by their castles. Fortified structures already existed in these regions, but the incomers introduced a diverse range of new buildings, constructed from a variable combination of timber, earth, stone and, particularly in Prussia, brick.⁶⁹ The number of castle forms attributed to the Teutonic Order is very diverse,⁷⁰ but within the hierarchical structure of the administration of the Order's territories the most important were fortified convents, encompassing the military and monastic requirements of their communities within a single space. The most impressive castle was at Malbork (Marienburg) in Prussia, the headquarters of the Order from 1309. The establishment of permanent castles resulted in new demands on local plant and animal resources, and the creation of new ecological niches.

⁶³ An exception is the immigration of Swedish peasants into the north-west districts of Estonia in the 13th century (Blomkvist 2005, 666).

⁶⁴ Mugurēvičs 1990; Valk 2001.

⁶⁵ Niinemets and Saarse 2007.

⁶⁶ Veski et al 2005.

⁶⁷ Ibid; Niinemets and Saarse 2006; 2007.

⁶⁸ Niinemets and Saarse 2007.

⁶⁹ The bibliography on the Order's castles is vast, but key readings include Arsyński 1995; Haftka 1999; Ose 2002; see also *Castella Maris Baltici* series.

⁷⁰ Poliński 2007.

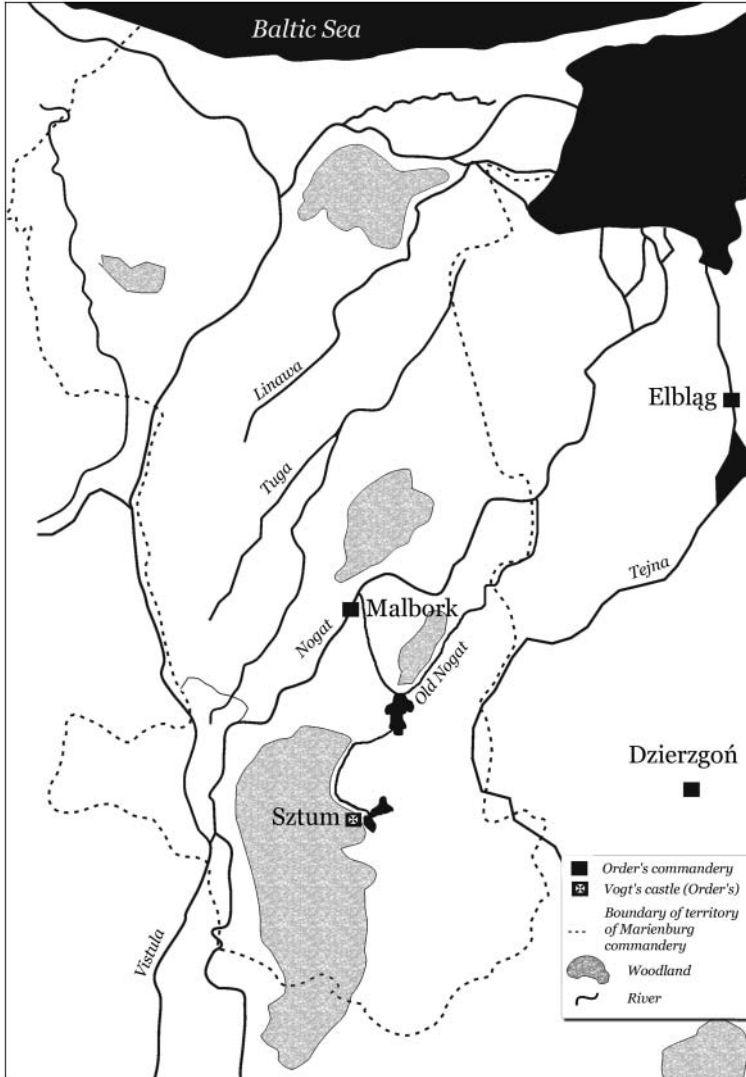


FIG 4

Natural resources within the commandery of Marienburg in the early 15th century. Drawing by Lisa-Marie Shillito, after *Długokęcki et al 2004, 12.*

Written sources indicate that castle communities became significant consumers of agricultural produce, intensifying existing farming regimes.⁷¹ The impact on nearby landscapes would have been considerable, although the effective extent of these hinterlands has yet to be determined. Malbork, for example, drew on resources from a commandery that stretched to the Baltic coast, encompassing two significant stretches of woodland for building materials and fuel (Fig 4).⁷² Pollen analysis from a peat bog a few kilometres south-east of the castle at the fringes of the forest of Sztum (Stuhm), has indicated significant deforestation and cereal cultivation from the late 13th/early 14th century.⁷³ In Livonia, a castle named Baznīcsala (Kirchholm) from the mid-13th century, constructed near the Liv village of Sala on the island of Mārtiņsala in the lower Daugava, has more

⁷¹ Józwiak and Trupinda 2007.

⁷² Chęć 2006.

⁷³ Brown and Pluskowski 2011.

diverse archaeological evidence for the intensification of agricultural activities. This is indicated by the relative representation of cultivated plants, as well as harvesting and milling equipment recovered from the castle and village. However, the intensification of agriculture, with surplus procured as taxes and tithes, was not simply aimed at provisioning castles. **By the mid-14th century, the *Ordensstaat* was producing enough grain to supply deficits in western Europe — a key indicator of the dramatic mobilisation of agricultural resources following the establishment of the new regime.**⁷⁴

Evidence for intensive animal exploitation brings the ecological transformations in castle hinterlands glimpsed in pollen profiles into sharper focus.⁷⁵ The quantities of data can vary dramatically between sites. For example, at Klaipėda Castle (Memel), built by the Order in 1252, 135 identifiable bones were recovered from 14th-century contexts, 255 from the mid-15th century, 152 from the first half of the 16th century, and 142 from 16th–17th-century contexts.⁷⁶ At Malbork, the majority of animal bones have been recovered during excavations in the last decade in various parts of the forecastle. From an industrial complex in the northern part of this precinct, 97 identifiable animal bone fragments came from 9th–13th-century contexts, 383 from the 14th and 15th centuries, 1586 from the 16th–18th centuries and 278 from modern contexts.⁷⁷ In Latvia on the other hand, three decades of excavation at Cēsis Castle (Wenden) directed by Zigrīda Apala have recovered hundreds of thousands of faunal remains that remain largely unpublished.⁷⁸ **These metric disparities aside, both Prussian and Livonian castles contain similar proportions of domestic and wild mammal remains to those of contemporary western and central European sites** (Fig 5).⁷⁹ But, while written sources suggest hunting

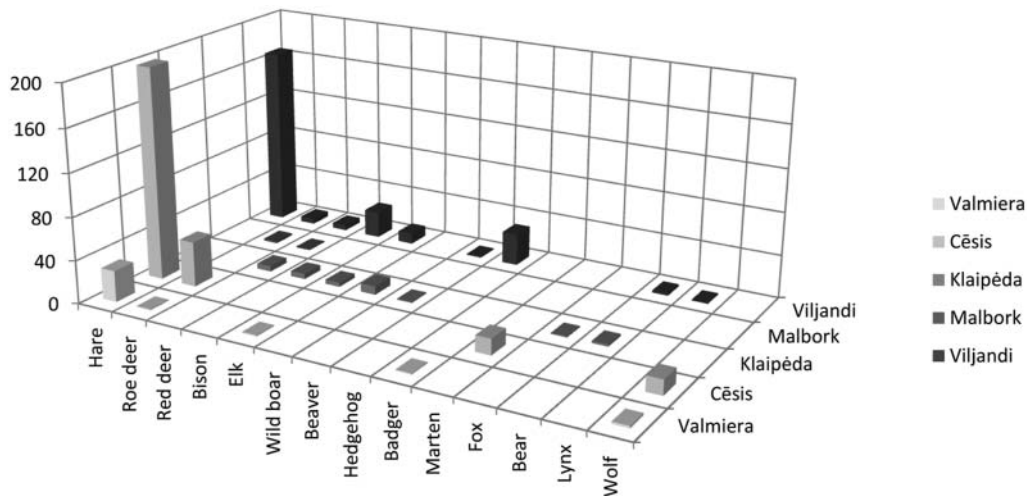


FIG 5

The relative representation of wild mammal remains by NISP (number of identified specimens present) illustrating diversity at Teutonic Order castle sites in north Poland: Malbork outer bailey (Maltby et al 2009); Latvia (Cēsis, Valmiera; Mugarēvičs 2003; Mugarēvičs 2009); Estonia (Viljandi; Rannamäe 2010); and Lithuania (Klaipėda; Žulkus and Daugnora 2009).

⁷⁴ Samsonowicz 1994.

⁷⁵ No regional synthesis of these exists, but see Makowiecka et al 1998.

⁷⁶ Žulkus and Daugnora 2009.

⁷⁷ Maltby et al 2010; see also forthcoming papers by *Anna Gręzak*.

⁷⁸ Apala, pers comm; but see Mugarēvičs 2009.

⁷⁹ Mugarēvičs 2002; on European castles see Erynck 1992 and for a regional summary Pluskowski 2006; 2010.

may have been an important source of provisioning in the 13th century,⁸⁰ the archaeological evidence points to a more limited reliance on game in the 14th century, thereby aligning the biological profiles of the Order's Baltic castles with those of the European secular aristocracy. Moreover, like aristocratic groups in Greenland, Norway and Russia, the Order came to play an important role in managing the exploitation of fur-bearing mammals within its territories for export as luxury commodities.

Sieving programmes carried out on Teutonic Order's castles, such as at Mała Nieszawka (Nessau), have produced abundant evidence of fishing, represented by both freshwater species (eg pike, cyprinids) perhaps caught locally, and marine species (eg sturgeon, cod) probably imported as salted and/or smoked fish.⁸¹ Excavations at Mārtiņšala recovered 15 identifiable species of fish from the castle (compared with four from the nearby village), as well as a range of fishing equipment.⁸² Only in contemporary written sources is the significance and scale of fish consumption fully glimpsed, however.⁸³ Financial accounts (*tresslerbuch*) from Malbork dating to the end of the 14th/early 15th century include references to over a dozen species as well as offices associated with their management, such as a *Fischmeister* (fish master) and *Fischerknecht* (fish knight).⁸⁴ A number of castles in Prussia and Livonia were situated on rivers or lakes, and the exploitation of fish was paralleled by significant hydrological works, such as the construction of canals and moats. Patterns of fish consumption in Christianised regions would have had a clear religious dimension with the introduction of a new fasting paradigm, and dietary regimes developing beyond the castle walls following the creation of the Crusader states could have reflected ideological as much as ethnic and technological shifts.

Although the early occupation phases of these castles are often difficult to isolate archaeologically, it is clear that garrisons established provisioning networks based on livestock and fish. The management of different species and their habitats cannot be isolated from the towns and smaller settlements that developed in the 13th and 14th centuries but, as suggested by the combined archaeological and historical data, castles were an important nexus in this network. It is, however, essential to consider the varied impact of different castles at local and regional scales. While the process of colonisation appears to have completely transformed the landscapes surrounding the most important Prussian castles such as Malbork, in Livonia there is evidence of cohabitation with overlapping chronologies for castles and indigenous fortifications.⁸⁵ These regional differences, and their implications for the pace of environmental transformation, will become increasingly clear through further local studies of castle hinterlands across the eastern Baltic.

As in the Latin East, crusading in the Baltic is associated with the introduction of new animals, in this instance horses. Large war-horses, contrasting with smaller indigenous breeds, were pivotal to the military success of the Teutonic Order. The development of the *Ordensstaat* was accompanied by a network of horse farms; in Prussia there were an estimated 16,000 horses on the Order's lands by the end of the 14th century.⁸⁶ While few farms have been excavated,⁸⁷ horse bones have been found in relatively high quantities at castle sites.⁸⁸ At Malbork, examples of a pathological spine from the Teutonic Order's

⁸⁰ Militzer 1997.

⁸¹ Makowiecki 2003.

⁸² Murgurēvičs 2008.

⁸³ Chęć 2009.

⁸⁴ See the index in Joachim (1973) for specific references to varieties of fish and fish management at the castle in the early 15th century.

⁸⁵ Eg at Cēsis.

⁸⁶ Ekdahl 1998.

⁸⁷ Chęć 2003 and related papers by same author.

⁸⁸ Makowiecka et al 1998.

occupation phase may indicate such military use or alternatively a work-horse; written sources certainly suggest that stud-horses were largely kept within castle grounds.⁸⁹ Horses played an important role in pre-Christian cult amongst Baltic tribes, but the introduction of intense horse breeding following the Crusades represented a significant shift in animal management. The maintenance of diverse horse breeds within the Order's territories is evident from assemblages at sites such as Gniew, where four different 'types' were identified.⁹⁰ The provisioning requirements of a castle community therefore reflected not only the requirements of the knights and extended household, but also of the horses. Historical and architectural studies have defined stables and fodder stores at some of the bigger castles, but geoarchaeological techniques could be readily applied to identify such spaces at smaller and more obscure sites.

Transforming the ecology of Baltic spirituality

The Baltic tribes in the centuries leading up to the Crusades appear to have shared a comparable religious system, which included a significant environmental dimension, such as sanctifying natural places in the landscape and sacrificing animals. Written, ethnographic and place-name sources suggest a pre-Christian Baltic landscape of sacred groves, hills and lakes. While the more prominent, public cult sites are most likely to be identifiable archaeologically, there is evidence from recent folklore suggesting that virtually every natural feature could potentially have had sacred associations.⁹¹

The cults of certain deities appear to have been linked to particular types of natural feature or vegetation, which survive in place names. In eastern Prussia, for example, lime trees and groves were sacred to the goddess Kurke (or variants such as Kurko). All toponyms associated with 'Kurke' are linked to natural features — water, woods, difficult terrain — and many have elements relating to lime trees. Within the *Ordensstaat*, the Teutonic Order rededicated her sites to the Virgin Mary.⁹² There is evidence to suggest this reorganisation of the sacred landscape did not obliterate earlier meanings, however. Henry of Livonia describes episodes where missionaries targeted idols within sacred groves, but did not destroy the religious landscape itself. There is evidence in Livonia for the continued use of sacred landscapes several centuries after the Crusades.⁹³ In fact, the persistence of documented pagan beliefs into the early modern period in Prussia and Livonia, as well as archaeological evidence for the continuity of earlier practices in some contexts, underlines the slow and uneven impact of Christianisation. The new religion was institutionalised most effectively in castle settlements and towns, where the influence of bishops and the Military Orders was strongest. The sub-division of Livonia and Prussia into dioceses and parishes, physically manifested through the construction of cathedrals, churches and monasteries, may have sought to obliterate pre-Christian sacred topography. But in Estonia, for example, natural holy sites continued to function alongside churches until the 19th and in some cases 20th century.⁹⁴ The prolonged and complex fusion of multiple pagan and Christian world views is invariably the source of much post-medieval Baltic folklore, and the most effective way of assessing the relative impact of the Crusades on the sacred environments of the eastern Baltic is, as argued in previous sections, to

⁸⁹ Pluskowski et al 2010.

⁹⁰ Sobociński and Makowiecki 1992, 137.

⁹¹ Jonuks 2009; Vaitkevičius 2009; Valk 2009; an annual, multi-disciplinary conference series entitled 'Holy Places in the Baltic Sea Region' was established in Tartu, Estonia in 2007.

⁹² Białuński 1993.

⁹³ *Klavinš 2006*.

⁹⁴ Valk 2009.

investigate landscapes within the sphere of influence of sites occupied by the new Christian elite.

Archaeologically, the sacred role of animals is most visible in ritual deposits, gradually discontinued in other regions of northern Europe following Christianisation. Rather than seeing such practices as tangential and removed from broader questions of ecological transformation, they may be useful documents of the changing values attached to particular species.⁹⁵ Horses, for example, consistently feature as important cult animals, as vehicles of divination, spirituality and as sacrificial offerings. The latter appears to have been a particularly prevalent rite in central Lithuania, although there is archaeological evidence for a diversity of practices, from cremation to living burial, clustering from the 8th–12th century.⁹⁶ Horse burial is also documented in Prussia and Livonia.⁹⁷ In Lithuania, this practice noticeably declines at least a century before the Crusades, after which there are very few archaeological examples, even though written sources document occasional public horse sacrifices into the 15th century.⁹⁸ Political developments may have driven this trend, while the influence of Christianity has been proposed as an explanation for the widespread use of bear claw pendants. These only become deposited in the graves of predominantly older women in Lithuania, including in the western territories of the Teutonic Order, from the late 14th and into the 15th century, once the official process of conversion is underway. This has led to suggestions of such widely distributed artefacts as indigenous interpretations of Christian ideas of resurrection.⁹⁹ In order to take such intriguing suggestions further, it is essential to situate all forms of animal exploitation within an ecological context.

Indeed, Lithuania represents an interesting ‘control’ region to contextualise the ecological transformations in Prussia and Livonia within the broader eastern Baltic region. At Vilnius, the power centre of the pagan Dukedom, palaeobotanical studies in the lower castle (most likely from barns) have demonstrated woodland clearance in the later 13th and early 14th centuries. Following a brief respite, from the second half of the 14th century, further clearance and intensification of agriculture paralleled the expansion of the town.¹⁰⁰ This environmental indicator of prosperity in the political centre of Lithuanian during the later decades of the ‘eternal crusade’ contrasts with the depopulated western borderlands. Future palaeoenvironmental profiling of a range of sites in Lithuania would shed invaluable light on both the local impacts of the Teutonic Order’s *reisen*, as well as trends in environmental exploitation outside the neighbouring Crusader states. It would be particularly interesting to compare the ecological profiles of high-status sites in Lithuania with those of the Teutonic Order and bishops in Prussia and Livonia. This would certainly enable us to determine the extent to which we can define the latter as reflecting Europeanising ecological niches.

In conclusion, the contribution from the eastern Baltic to an understanding of processes of conquest, frontiers and colonisation includes emerging urban ecologies and provisioning networks, the intensification of agriculture and animal husbandry, and an ecological dimension to the dialogue between incoming Christian and indigenous pagan world-views. Above all, the castles and associated settlements and hinterlands of crusading institutions exemplify this impact. It is clear that differential settlement trends in Prussia and Livonia, and within these regions, resulted in contrasting landscapes. Future research

⁹⁵ Fehner 1963, 88–9.

⁹⁶ The best example of an early medieval horse cemetery in Lithuania is at Marvelė (Bertašius 2009).

⁹⁷ Wyczółkowski and Makowiecki 2009; Bliujienė and Butkus 2009.

⁹⁸ See references in Gimbutas 1963.

⁹⁹ Svetikas 2009.

¹⁰⁰ Stančikaitė et al 2008.

would benefit from comparative studies of different types of castles and hinterlands in both heartland and border areas of the Crusader states. In both regions, despite the introduction and institutionalisation of Christianity, there is good evidence for the continuation of indigenous pagan beliefs and cult practices. But unlike the religious systems encountered by Crusaders in the Near East and Iberia, these contained an important environmental dimension, where plants, animals and natural sites in the landscape were charged with spiritual significance.

THE IBERIAN PENINSULA

By Christopher Gerrard

On display at the Real Monasterio de Las Huelgas outside Burgos in northern Spain is a tapestry pendant. In the summer of 1212 it fluttered above the caliph's tent before the decisive Christian victory against Muslim forces at Las Navas de Tolosa.¹⁰¹ Such a striking relic of the fighting across the Iberian Peninsula in the 12th and 13th centuries, this one object evokes an image of all who participated: kings, bishops, nobles and militias but also the knights of the Military Orders of Calatrava, Santiago, the Temple and the Hospital.¹⁰² Faced with this 'army of the Lord', as contemporaries referred to it, most of Iberia was to fall within 200 years, though Muslim political power was only finally shut out with the loss of Granada in 1492.

The unsteady progress of the Christian Reconquest (*reconquista*) created an unusual sort of frontier, which was characterised for much of the time by endemic hostility and raiding.¹⁰³ The border was a band, not a line, and the multiple religious and ethnic groups who inhabited it had a distinctive flavour. As the frontier slid erratically southwards, those who benefited most from new property ownership and privileges were the monasteries. Newly established Cluniac houses took up an important role in church life and education; no less than 22 stretched from Catalonia to Portugal by the mid-12th century, while Cistercian expansion into Spain began in the 1140s. These institutional links tied the recaptured regions of Spain and Portugal to the rest of Europe, and especially to France. As for the Military Orders, the Hospitallers were already attracting patronage in the early 12th century and two decades later the Templars followed suit, involving themselves in the Reconquest and winning land and strongholds in return. Controversially, it was these two Orders, together with the Holy Sepulchre, who were named as heirs to the entire Aragonese kingdom by Alfonso I 'the Battler' in his will of 1134;¹⁰⁴ further west it was the Spanish foundations who found favour.¹⁰⁵

URBANISATION

Among the many impacts of the Reconquest on newly captured Muslim cities and towns were architectural adaptations such as the conversion of mosques to churches and cathedrals (eg La Seo in Zaragoza) and the establishment of an ecclesiastical architecture.

¹⁰¹ Near Linares, Andalucía.

¹⁰² In 1123 Pope Calixtus II had first declared the Spanish wars as a crusade, though clashes had continued since the 8th century; for detail see O'Callaghan 2003.

¹⁰³ The nomenclature of 'Reconquest' and 'crusade' is not without its difficulties (Fletcher 1987).

¹⁰⁴ The will was set aside, though there were subsequently substantial concessions of property. For a partial transcript, see Barber and Bate 2002, doc 35.

¹⁰⁵ The first Spanish Military Order was the Order of Calatrava in 1164, followed by Santiago in 1170 (Ayala Martínez 2003). For recent work on the frontier, see Brufal and Sabaté 2009.

Urban overcrowding such as that found in the Latin East was not an immediate problem, quite the opposite; attractive terms were needed to attract new settlers and so maintain the existing urban fabric of bridges, walls and watercourses. In Zaragoza, for example, 60 years elapsed after the Christian Reconquest of the city in 1117 before there was sufficient population to merit the mention of a new quarter to house an expanding population.¹⁰⁶ The ecological implications of this intensification are certainly underworked, at least from an archaeological perspective, and especially in understanding provisioning networks for industry, construction and agricultural products. Large-scale excavations,¹⁰⁷ and the study of faunal remains recovered here, have the potential to change that, particularly when set against what is known from historical records about new irrigation, mills, and grazing privileges for sheep flocks that fed the growing urban demand.

Fortifications and settlements

In Islamic Spain a basic unit of rural settlement was the fortress/refuge, the *hisn*. Examples studied in the south of Spain consist of a fortified tower, a walled-in 'refuge space' with a cistern and grain storage pits, perhaps to store tribute.¹⁰⁸ With the Reconquest some of these earlier fortresses were converted into seigneurial or feudal castles, including preceptories of the Military Orders.¹⁰⁹ Most of these sites have since had lengthy histories of renovation and rebuilding, so capturing the 'moment' of Reconquest is quite a challenge. A good example can be found at Ambel (Zaragoza) where the Templars remodelled the space around a three-storey Islamic tower inside a walled enclosure. They combined their newly won property with two new first-floor halls that they grouped around a central space to create a site for their preceptory.¹¹⁰ There is clearly a change in function to recognise here, namely upgrading of pre-existing Islamic structures into a permanent residential complex used to administer a territory. The symbolism of this Christian 'appropriation' would not be lost on the local population, and many complexes of the Military Orders were created around pre-existing structures in just this way.¹¹¹

The Reconquest also encouraged a fundamental shift in the overall pattern of rural settlement. The countryside of Islamic Spain was dotted with hamlets and farmsteads, the proposed model being that 7–10 of these small dispersed settlements were dependent upon each fortress/village. In the 10th–12th centuries many of these smaller sites were abandoned, while others prospered and nucleated around castles and churches.¹¹² The process of 'resettlement' at the Reconquest then involved moving Christian settlers into newly conquered territory, sometimes complementing, sometimes substituting for the Muslim population, particularly for the elite who had emigrated to Islamic territory.¹¹³ The implication is that there was a fundamental transformation in the countryside in the distribution and size of settlement, to which archaeology can make a significant contribution to our understanding.¹¹⁴ At the Templar site at Castellnou (Catalonia), for example, five small

¹⁰⁶ Betrán Abadía, 2010.

¹⁰⁷ For example, Gutiérrez González 2006.

¹⁰⁸ Bazzana et al 1988; Malpica 1998.

¹⁰⁹ For this transition, see the important volume by Glick 1995.

¹¹⁰ Gerrard 1999; recent excavations have identified an immediately pre-Reconquest phase with many large storage pits.

¹¹¹ See Ruibal 1993 for a Hospitaller site in La Mancha where preceding Islamic structures were demolished entirely.

¹¹² In Catalonia this process began around the year AD 1000.

¹¹³ Jews also took advantage of these new opportunities by working across political and religious boundaries (Meyerson 2004). The transmission of intellectual learning from the Greek, Indian, Jewish and Muslim worlds is not considered here (Reilly 1992, 250–62; Mann et al 1992).

¹¹⁴ Programmes of test-pitting within the bounds of rural villages, study and classification of village forms are two suggestions.



FIG 6

Aliaga (Teruel, Aragón). Castle reconquered by Alfonso I after 1118 and later given to the Hospitallers in 1163. The site consists of three platforms, one with a chapel, leading to a high tower, defended at the base by 12 hemispherical towers of late 13th-century date. *Photograph by Christopher Gerrard.*

settlements were merged and enclosed.¹¹⁵ Elsewhere, in the upland Maestrazgo near Teruel (Aragón), a sequence of *cartas pueblas* or royal charters shows the granting away of places and land, the majority in favour of either the Templars or Hospitallers, establishing some new Christian settlements, and reviving others from total or partial abandonment with the intention of encouraging a permanent Christian community.¹¹⁶ Some donations were actually offered before the territory was taken, presumably as an incentive for action and, once captured, sites like the Hospitaller fortification at Aliaga (Fig 6) could serve as a base for incursions further south into Valencia. In the Maestrazgo, as elsewhere, many were attracted to the frontier by offers of houses, land, exemption from tolls and other privileges.¹¹⁷ Not all destinations were so inviting, however. One charter of 1176 for Encinacorba (Aragón) refers evocatively to the ‘terrible and vast solitude’ that confronted the Templars there;¹¹⁸ progress on resettlement could understandably be slow.

The Reconquest profoundly affected the morphology as well as the distribution of settlements. As in towns, when villages became mixed communities of Christians and

¹¹⁵ Modern Vilanova de Segrià (Bolòs 2009).

¹¹⁶ Ledesma 1983; for examples see Barber and Bate 2002, docs 42, 43 and 50.

¹¹⁷ Origins are sometimes reflected in either surnames (for Mallorca, see Mas and Soto 2004) or place names, such as Berrocalejo de Aragona (Ávila) indicating Aragonese migration westwards in the late 11th and early 12th centuries.

¹¹⁸ ‘horrorosa y vasta soledad’ (Ledesma 1994, 130).

Muslims, so new churches were often needed and Christian cemeteries provided. Clergy came too and with them a new imprint of ecclesiastical organisation in the form of dioceses and parishes. Thus, as the Reconquest drove southwards, it brought with it not only new secular lords but fresh religious leadership and practice.¹¹⁹ At the same time, the act of Reconquest was closely reinforced by new ideologies and symbols. The popularity of the pilgrimage to Santiago de Compostela brought northern Spain into different orbits of literature, liturgy and sculpture, triggering a re-orientation from the Latin and Arabic to the western European worlds. The most visible stamp of this on the landscape was perhaps the development of Romanesque architecture in the churches of Castile and León.¹²⁰

The settlements to which settlers came were no spontaneous creation; they were often carefully planned with fortifications and domestic housing huddled around about, and a church that was often situated on higher ground. In many instances in Aragón, where settlements were often of mixed faith, the entire footprint of the village or town came to be recast with religious communities housed in separate quarters in the ‘morería’ and the ‘judería’. In 11th-century Ambel (Zaragoza) there was a tower, a mosque, cemetery and the houses of the Muslim community, but by the mid-14th century, the two religious communities were ethnically separate,¹²¹ and the Military Orders preceptory with its new church lay significantly at the ‘hinge’ between the two communities.¹²² Even in grander urban locations, like Salamanca, the Military Orders ‘imported’ their rural identity and created self-sufficient ‘islands’ of settlement with their own church, market, shops, housing and public spaces suitable for formal ceremony and procession all surrounded by walls and access gates.¹²³ These were real physical barriers but they reflected a deeper sense of difference and the forging of self-conscious identities through urban and rural landscapes.

Irrigation

Given the arid climate over much of central and southern Spain, the capture and delivery of water to crops under cultivation have long been of vital importance. The challenge is how to move water from springs and mountainous areas with higher rates of precipitation to more arid parts of the landscape where drought threatens. The solution, well documented since Roman times, is to use gravity-flow water canals that take advantage of the subtlest changes of topographical gradient. Among all landscape features, these irrigation systems tend to be ultra-stable and many were already in place at the time of the Reconquest, locked in place by custom and precedent.¹²⁴ Like other lordships, the Military Orders busied themselves with the development of irrigation systems that they had inherited, setting out new rights and regulations.¹²⁵ It was not in their interests to disrupt farming — higher rents could be demanded from better irrigated land. At the

¹¹⁹ Fletcher 1978, 25–6 provides detail. Reilly (1992, 246) shows the many monasteries and bishoprics under French influence in the north of Spain in the 12th century in the wake of Reconquest.

¹²⁰ For example, Whitehill 1941; fine examples of Romanesque along the Santiago route include the Colegiata de San Isidro (León) and Santo Domingo de Silos (Burgos).

¹²¹ Further comparative work is needed on layouts and proportions.

¹²² For illustration, see Gerrard 1999, fig 3. This ethnic streaming did not happen everywhere nor at once. On Mallorca many of the indigenous population were killed or enslaved and sold; in Valencia Christians and Muslims mingled, at least initially.

¹²³ Gutiérrez Millán 2004.

¹²⁴ For general bibliography, see Glick 2006; for recent case studies, see Laliena 1994 for Aragón, Guinot et al 1999 for Valencia. For a 13th-century Templar document with irrigation rights, see Barber and Bate 2002, doc 48.

¹²⁵ There were penalties, for example, both for stealing water and for non-co-operation in the cleaning of the irrigation ditches (Forey 1987). Forey (1973, 240–1) plays down any improvements in farming methods by the Military Orders.



FIG 7

Typical diversion dam or *azud* across the River Huecha near Bulbuenté (Zaragoza) angled across streams to divert some of the water flow into water channels. In the medieval period, and more recently, these were constructed of stone, stakes and timbers. *Photograph by Christopher Gerrard.*

same time, where resettlement demanded it, new irrigation systems were a fundamental investment.

There is therefore a whole archaeology of ‘hydraulic technology’ to be mapped, understood and, ideally, dated if this impact is to be quantified (Fig 7). One recent study of lower Aragón near Alcañiz, where the Order of Calatrava held sway after 1179, draws upon field survey, cartographic analysis and medieval documents to identify a wealth of structures such as diversion dams that divert some of the water flow into artificial water channels or *acequias*. These then run for many kilometres distributing water into fields and subsidiary canals.¹²⁶ Elsewhere, there are *qanâts* (subterranean canals with air shafts driven on a gentle slope into the hillside to tap fresh water underground at the water table), adits (simple tunnels running back into the bedrock) and *cimbras* (drainage tunnels that cross beneath a river bed and allow water to filter down from above). These methods of capture all required maintenance, as did the water reservoirs that provided bulk water storage along the length of the network. Another essential component of the irrigation system was the watermill that was so profitable in a feudal economy where the milling of grain, and indeed the baking of bread, was a seigneurial monopoly. Flour mills regularly feature as purchases or exchanges by Military Orders and fieldwork reveals many to have been compact horizontal-wheeled structures.¹²⁷

Land use and agriculture

Wherever they found themselves, the Military Orders sought to capitalise on natural resources locally. Not only did this include dry and irrigated agriculture on some scale (or rights over it); it also embraced interests in mining and extraction, pottery production, salt production and much else besides.¹²⁸ Administration of these tasks was not

¹²⁶ Benavente and Thomson Llisterra 2006.

¹²⁷ For example, the mill at Ambel acquired by the Templars in 1192 in exchange for a vineyard (Gerrard 2003, 97–103). Members of Templar preceptories are sometimes named as managers of mills and irrigation systems (Forey 1973, 272).

¹²⁸ For iron mining and pottery workshops at the Templar preceptor at Ambel see Gerrard 2003, 96, 281; for salt at the Order of Santiago site at Montalbán, see Ledesma 1994, 133; both examples in Aragón. The Military Orders owned houses, shops and market gardens in urban areas that also developed during this period. They therefore shared in the expansion of textiles and arms industries, for example. Some would argue that the inspiration for the Reconquest was territorial and economic gain as oppose to religious crusading.

necessarily performed by members of the Orders, but occasionally they did provide a direct income, or else exemptions from taxes on revenue were granted. The Reconquest is also assumed to have affected crop production.¹²⁹ First, in the development of viticulture; tenants were ordered to plant vineyards in some cases.¹³⁰ While this may have reflected a cultural preference for wine, it was also profitable with a growing market. Second, Christian feudalism may have stimulated the intensification of agricultural products which could then be sold at market, such as wheat and barley. Conversely, the importance of market garden vegetables may have declined.¹³¹ Evidence for medieval palaeoeconomy either side of the Reconquest from preserved plant materials is rare at present and there are inevitable challenges in dating and in establishing clear associations between religious communities and excavated assemblages, but there are other sources of evidence. Some reconfiguring of fields and their boundaries is also possible as land tenure shifted from collectivity to individual owners and irrigation networks were consolidated,¹³² so more systematic mapping and analysis of modern field boundaries and their archaeological examination would be of great interest. Preliminary results from at least one systematic field survey, the Moncayo Archaeological Survey (MAS) project in NE Aragón, suggest that spreads of artefacts, when mapped, will make a useful contribution to understanding which fields were manured and when. Much of the material has clearly been manured into the fields rather than ploughed out of archaeological sites.¹³³ The picture is complex, however. Where we might logically expect some intensification of agricultural practices and an expansion in the irrigated area as attractive privileges drew new settlers in, there would also have been some movement of Muslims south as well as some emigration away into cities — so the archaeological signature of the Reconquest is not easy to tease out.

Another archaeological contribution to this debate is likely to come from palaeoenvironmental research, particularly pollen evidence. A recently dated upland peat from the MAS study area illustrates the potential of this approach: it shows that the dominant vegetation of oak woodland was being opened up in the mid-12th century with grassland and heath, probably for wood pasture with grazing animals.¹³⁴ Complementary lowland sequences are hard to come by in such an arid environment but are badly needed, the most promising locations being playa lakes.¹³⁵ More broadly, geomorphological mapping and the dating of deep fills often revealed in stream gullies confirm that there were no wholesale changes in vegetation cover at the Reconquest. Dramatic erosion episodes, at least in the MAS study area, are a feature of the Middle Bronze Age (1750–1300 BC) when the land was cleared for farming and again in the 19th century when severe deforestation took place on the upland slopes.¹³⁶ These quite recent events illustrate just how widespread changes of land ownership can profoundly affect a landscape; in this 19th-century example when church and monastic lands were sold off the new owners cashed in on their newly won resources by chopping down the tree cover. The Military Orders who moved into the same region at the Reconquest had longer-term management in mind.

¹²⁹ There is nothing to suggest that climate change contributed.

¹³⁰ Forey 1973, 240 for Templars in Aragón; Rodríguez-Picavea Matilla 1994 for Calatravans in Castile initiating the planting of vineyards.

¹³¹ Ledesma 1994, 134. Settlement charters established feudal rents that set these changes in train.

¹³² For a worked example with pre- and post-Reconquest phases of irrigation and field shapes in the Valle de Ricote near Cieza (Murcia), see Bazzana et al 2002.

¹³³ The MAS is designed to investigate population, economic and environmental change along the upper valley of the River Huecha, a 51-km-long, S-bank tributary of the Ebro to the north and east of the peaks of the Sierra de Moncayo (Wilkinson et al 2005).

¹³⁴ Keith Wilkinson and Basil Davies, pers comm. This pollen sequence is currently under study.

¹³⁵ Pollen analysis and dating work are underway for two such sites within the MAS study area.

¹³⁶ Wilkinson et al 2005.

Livestock

Although the general principle adopted by the Military Orders with respect to their agricultural environment is accurately characterised as ‘maximum profit with minimum dislocation’,¹³⁷ there are at least two outcomes of the Reconquest that may register in the archaeozoological record. First, there is some evidence of horse breeding associated with frontier activities, an example being excavations at the Castillo de Ambra (Alicante), where horse bones were recovered only for its post-Reconquest phase of occupation in the 13th century.¹³⁸ Sometimes horse remains are directly associated with Military Orders sites, such as Alcañiz Castle (Teruel).¹³⁹ That said, although it is true that privileges in Christian Spain were extended to those who kept horses and that the horse was a symbol of status,¹⁴⁰ Islamic Spain was also famed for its stud farms. The question is not so much whether horses were present or not, but more whether there is specific evidence of breeding associated with the Military Orders and, if so, with horses of what origin.

Second, where sheep grazing were already central to the rural economy, one objective of the Reconquest may have been the acquisition of good winter grazing. Concessions of privileges after the Reconquest in 1265 in the Alicante region, for example, particularly favoured the keeping of sheep, the largest flocks belonging to the Orders of Santiago and Calatrava.¹⁴¹ Large numbers of sheep, goats and occasionally pigs routinely feature in inventories.¹⁴² But this was more than a simple question of large flocks and having the space to run them; in 12th-century Navarre and Aragón, and 13th-century Castile and León the Military Orders also contributed to both the establishment of transhumance routes and their subsequent regulation.¹⁴³ Once more, they jealously defended rights to wood pasture and grazing because they were an important source of rental revenue.¹⁴⁴ There is now some archaeological evidence to suggest different strategies of pastoral husbandry either side of the Reconquest,¹⁴⁵ and since livestock rearing was so fundamental to the Military Orders, this theme should rightly be the focus of further research.

Diet

The extent to which the Reconquest affected dietary habits requires further consideration. Some archaeological sites do show contrasts in faunal assemblages, so that game, fish, lamb and beef are better represented in Christian levels at Castillo de Ambra, for example, while documentary sources are used to suggest a shift from polyculture towards a less varied cereal-based Christian diet. Quite possibly differences in diet reflected status more than faith. There was, however, certainly some transmission of cuisine between the two communities — for example, new pottery forms for cooking couscous. Christians in Valencia accepted Islamic forms only where there was a use for them and imported those

¹³⁷ Burns 1984, 194.

¹³⁸ For Ambra, see Benito Iborra 2006.

¹³⁹ De la Torre et al 1995.

¹⁴⁰ Their purchase cost being 26 times that of a cow in the Alicante region at the end of the 13th century (Hinojosa Montalvo 1992–3, 167). Spanish horses were prized by the Normans and it might be argued that the Reconquest further opened a northern European market for Spanish horses because the safe conduct of buyers could be better guaranteed (Davies 1989, 85; Gladitz 1997, 164).

¹⁴¹ Hinojosa Montalvo 1992–93.

¹⁴² Thus in 1289 the Templar preceptories at Miravet and Monzón (both Aragón) had 1,380 and 1,061 sheep/goats respectively (Forey 1973, 238).

¹⁴³ For this and other examples of grants of wood pasture and pastoral exploitation, see Ayala Martínez 2006.

¹⁴⁴ Ayala Martínez 2003, 345–7.

¹⁴⁵ For a case study not specific to the Military Orders at Albarracín (Teruel), see Moreno Garcia 1997. Crudely, the shift suggested here is from Islamic subsistence to Christian wool production, the latter being favoured by new political circumstances that gave access to lowland winter pasture for transhumant flocks.

they could not obtain locally from Christian kingdoms further north.¹⁴⁶ Some 'Islamic' crops, such as rice and sugar cane, were also accepted in time. Greater potential in mapping the specifics of dietary change may lie in new isotope studies,¹⁴⁷ and differences between faith communities, relationships with gender, social status, age, urban versus rural and coastal versus inland are currently under examination.¹⁴⁸ The same principles also apply to human skeletal material. Archaeologists could examine age, sex and disease in Christian and Muslim populations either side of the Reconquest, though well-dated samples would be a pre-condition.

In conclusion, the contribution from the Iberian Peninsula to an understanding of medieval conquest, frontiers and colonisation embraces evidence for agricultural and industrial intensification, monetisation of markets, the imposition of feudal structures, Church reorganisation, migration and segregation, shifts in settlement form and size, and much else besides. Currently this narrative is largely drawn from chronicles, histories, charters and law codes while the context for Military Orders and their properties is presented either as documentary biographies of individual sites,¹⁴⁹ or regional or thematic synthesis.¹⁵⁰ To understand fully the impact of frontier settlement what is required are detailed case studies with a strong multi-disciplinary range and a landscape perspective.¹⁵¹ Given that later medieval archaeology is as yet not well developed beyond a few major universities, core texts and key sites,¹⁵² a more detailed exploration of the ecology of crusading from an archaeological perspective would have much to offer as a flag carrier for the wider discipline.

CONCLUSION

The process of colonisation accompanying the Crusades gave rise to complex frontier societies. These resulted in the construction of new ecological niches, and it is possible to see emerging inter-regional patterns supporting the concept of a shared cultural basis for these niches. The growth of urban communities and the reorganisation of the countryside were central to the process of colonisation in all three regions. The challenge for future research is to identify how the involvement of distinct groups (Military Orders, secular landowners, urban communities and peasant colonists) came together as a whole in shaping these societies. From an archaeological perspective, each of these groups has an identifiable set of material signatures in the form of sites and artefacts, as well as associated data relating to their particular responses to local environments to suit specific social, economic and ideological requirements. The Military Orders, which in many respects embodied the spirit of medieval Christian holy war, represent the most obvious point of departure for investigating this process. Given the organisational infrastructure of these institutions, to what extent did the ecological profile of their castles and related settlements in these frontiers reflect their regional management, and how did this relate to resources supplied by their houses in the heartlands of Christian Europe?

But there are also striking differences. For example, the religious systems encountered by Crusaders in the Baltic, with their evident environmental dimension, were

¹⁴⁶ Coll et al 1988 for changes to pottery forms in the Valencia area in the 13th and 14th century.

¹⁴⁷ See Müldner and Richards 2005 for medieval England.

¹⁴⁸ Mundeé forthcoming.

¹⁴⁹ For example, Barquero Goñi 1998.

¹⁵⁰ Bonet Donato 1994.

¹⁵¹ Of a type which has been undertaken for other periods and regions in Spain. See, for example, Laliena and Ortega 2005 for late Antique and Visigothic Spain. Regions well suited to this approach are Aragón and Valencia.

¹⁵² Though momentum gathers pace (Quirós 2009).

very different to Islam, while the challenges of adapting to local climatic and topographic conditions varied both within and between the three regions. By situating the ecological niches created by colonising groups within the long-term environmental histories of these regions, we will significantly further and deepen our understanding of the role of the Crusades in shaping European societies. This paper has demonstrated that increasingly diverse and rich data exist in all three frontier regions, with each posing comparable and contrasting challenges for investigating the ecological dimension of medieval colonisation.

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Résumé

L'écologie des croisades : étude de l'impact environnemental de la guerre sainte et de la colonisation aux frontières de l'Europe médiévale par Aleksander Pluskowski, Adrian Boas et Christopher Gerrard

Les croisades au Proche-Orient, dans la Baltique orientale et la péninsule ibérique (dans le contexte de la Reconquête) se sont accompagnées de processus de colonisation caractéristiques de l'expansion de l'Europe médiévale et résultant en la création de sociétés frontalières aux limites de la Chrétienté. La colonisation était étroitement liée à l'exploitation des environnements locaux, dont elle dépendait, mais cette dimension apparaît rarement dans les études des régions frontalières des croisades. Cet article, rédigé après un atelier exploratoire de la Fondation Européenne de la Science sur « L'écologie des croisades » en 2009, analyse le potentiel d'investigation de l'impact

environnemental des croisades dans les trois régions frontalières. Il prend en compte une gamme variée de sources archéologiques, paléoenvironnementales et écrites et vise à replacer les sociétés créées par les croisades dans le contexte de la colonisation médiévale et de la construction d'une niche écologique humaine. Il démontre l'existence d'un vaste éventail de données pouvant être mises à profit pour transformer en programme de recherche significatif cet aspect généralement négligé, ou étudié de façon disparate, des sociétés frontalières au Moyen Âge.

Zusammenfassung

Die Ökologie der Kreuzzüge: Eine Untersuchung der Umweltauswirkungen des Heiligen Krieges und der Kolonialisierung an den Grenzen des mittelalterlichen Europas von Aleksander Pluskowski, Adrian Boas und Christopher Gerrard

Die Kreuzzüge im Nahen Osten, im östlichen Baltikum und auf der iberischen Halbinsel (im Zuge der Rückeroberung oder *Reconquista*) waren von Kolonialisierungsprozessen begleitet, die charakteristisch für die Ausweitung des mittelalterlichen Europas waren und zur Schaffung von Grenzgesellschaften an den äußeren Grenzen der Christenheit führten. Die Kolonialisierung war eng verbunden mit — tatsächlich abhängig von — der Ausbeutung der lokalen Umwelt. Doch diese Dimension bleibt in Studien über die Grenzen der Kreuzzüge größtenteils unerwähnt. Die vorliegende Arbeit ist das Ergebnis eines von der European Science Foundation veranstalteten Erkundungs-Workshops zum Thema “Ökologie der Kreuzzüge” im Jahre 2009; sie untersucht das Potenzial für die Erkundung der Umweltauswirkungen der Kreuzfahrerbewegung in allen drei Grenzregionen. Hierbei wird eine Reihe unterschiedlicher archäologischer, paläo-ökologischer und schriftlicher Quellen einbezogen, um die durch die Kreuzzüge entstandenen Gesellschaften im Kontext der mittelalterlichen Kolonialisierung und der human-ökologischen Nischenbildung zu verorten. Die Arbeit zeigt, dass eine Fülle von Daten vorliegt, mit denen sich dieser weitgehend vernachlässigte und bisher nur bruchstückhaft untersuchte Aspekt der mittelalterlichen Grenzgesellschaften zu einem maßgeblichen Forschungsprogramm entwickeln ließe.

Riassunto

L'ecologia delle crociate: indagine sull'impatto ambientale della guerra santa e sulla colonizzazione ai confini dell'Europa medievale di Aleksander Pluskowski, Adrian Boas e Christopher Gerrard

Le crociate nel Vicino Oriente, nel Baltico orientale e nella penisola iberica (nel contesto della *Reconquista*) furono accompagnate da processi di colonizzazione che caratterizzarono l'espansione dell'Europa medievale e portarono alla creazione di società di frontiera ai confini della cristianità. La colonizzazione era strettamente legata allo sfruttamento degli ambienti locali, addirittura ne dipendeva, ma questo aspetto è largamente assente dagli studi sulle frontiere delle crociate. Questo studio, frutto di un laboratorio esplorativo della European Science Foundation tenutosi nel 2009 dal titolo ‘L'ecologia delle crociate’, esamina le potenzialità di un'indagine sull'impatto ambientale del movimento delle crociate sulle tre regioni di frontiera. Prende in considerazione una serie eterogenea di fonti archeologiche, paleoambientali e scritte, allo scopo di collocare le società create per effetto delle crociate nel contesto della colonizzazione medievale e della creazione di nicchie ecologiche umane. Dimostra che esiste una ricca gamma di dati su questo aspetto delle società di frontiera medievali, finora per lo più trascurato e studiato in modi disparati, che consente di svilupparlo in un programma di ricerca di grande portata.