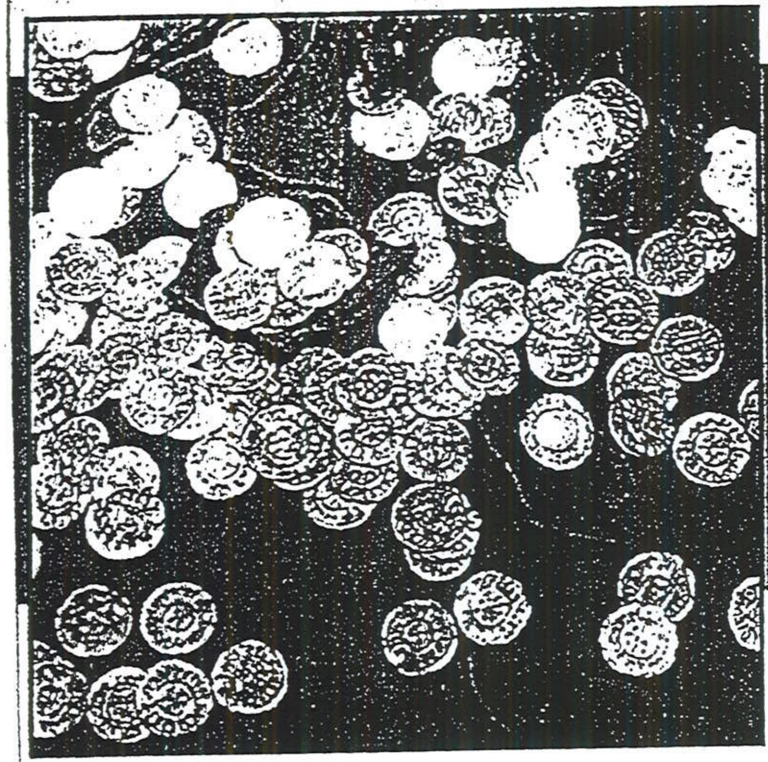
CAMBRIDGE MEDIEVAL TEXTBOOKS



The Carolingian Economy

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INTRODUCTION

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The title of this book needs some explanation. 'Carolingian economy' has to be understood here as 'the economy of the Carolingian empire'. The 'economy of the Carolingian period' would be too broad, not being limited to the empire within its borders under Charlemagne, which is the point of view adopted here. Countries and regions outside the empire, such as England, Scandinavia, the Islamic empire (including the bigger part of Spain), the Byzantine empire and eastern Europe, will be considered only in so far as their commercial relations with the Carolingian empire are at stake. The chronological terms, from the middle of the eighth century to the end of the ninth, are necessarily political, but they coincide by chance with the beginning and the end of an economic period, as will be demonstrated in Chapter 10. 'Carolingian economy' can also be understood as an economy directed by the Carolingian rulers. I do not reject this interpretation altogether, but it will be elucidated in Chapter 9 on 'The economy and the state'. 'Economy' is used in its singular form although the Carolingian empire was not an economically homogeneous area. Several regional 'economies' can be defined, each having different characteristics regarding population, the use of money, the presence of towns, the intensity of trade, etc. The territories between the Loire and the Rhine, between the Rhine and the frontier of the empire on the Elbe river and northern Italy are the most striking examples. Nevertheless an inquiry into the specificity of the Carolingian economy as a whole, compared with regions outside the empire or to economic situations before and after the Carolingian period,

makes sense and is possible. Was it, to quote Chris Wickham,[1] 'a network of subsistence-based exchange', where consumption commanded production, or was it an economy producing surpluses brought to the market?

This alternative comes near to that of Pirenne, for whom the Carolingian economy was a closed agrarian-based economy without towns, merchants or trade. His views, most strikingly expressed in his book *Mahomet et Charlemagne* (completed after his death in 1935 and published, with documentary evidence by his pupil Fernand Vercauteren, in 1937),[2] were essentially a reaction to ideas advanced by Alfons Dopsch in the second edition (1921–2) of his two-volume book, written between 1911 and 1913, on the economic evolution of the Carolingian period (*Die Wirtschaftsentwicklung der Karolingerzeit*).[3] In this book Dopsch had reacted against the conceptions of what he calls the old nineteenth-century school of von Inama-Sternegg and Karl Lamprecht, who had proclaimed the primacy of the manor ('Grundherrschaft') in Carolingian economic life. Opposing their views on an agrarian-based economy, Dopsch stressed the role of towns, money and trade. This point of view might have been expected from Pirenne but he, paradoxically, just took the side of the old school, where Lamprecht, before the First World War, had been his model and closest friend. It is however not the place here to enter into the genesis of Pirenne's *Mahomet et Charlemagne*,[4] but rather to review the historiography since Pirenne on the economic evolution under the Carolingians.

The first phase of this historiography, from the late 1930s through to the 1950s, was driven by an attack on Pirenne's work and, in particular, his thesis about the role of the Arabs. The absolute masters of the western Mediterranean since 711, they had, according to Pirenne, forced the western Christian world to retreat to the north from what until then had remained the centre of the civilised world, imposing a continental character on the Carolingian empire. In this way it put an

[1] Chris Wickham, *Land and Power. Studies in Italian and European Social History, 400–1200* (London, 1994), p. 197.

[2] Henri Pirenne, *Mohammed and Charlemagne*, English translation (London, Unwin, 1939). Paperback edition by Barnes and Noble (New York, 1955).

[3] Alfons Dopsch, *Die Wirtschaftsentwicklung der Karolingerzeit vornehmlich in Deutschland*, second revised edition, 2 vols. (Weimar, 1921–2).

[4] Paolo Delogu, 'Reading Pirenne Again' in Richard Hodges and William Bowden (eds.), *The Sixth Century. Production, Distribution and Demand* (Leiden, Brill, 1998), pp. 15–40.

end to the circulation, mostly by Syrian merchants, from the shores of the Mediterranean to the north, of goods such as papyrus, spices, oriental wines and olive oil. Different studies re-examined the references to these products in Merovingian and Carolingian texts and concluded that their disappearance from Carolingian texts had never been so complete nor so early as Pirenne had believed or had had other causes.[5]

More fundamental than the discussions on documentary evidence for the presence of these goods, was the argument about the causes of the adoption by the Carolingians of the silver penny and their abandonment of gold coins, which Pirenne had also related to the Arab conquest of the western Mediterranean and to the economic regression which in his opinion had been its consequence in the west.

In the late 1940s and early 1950s Maurice Lombard developed a theory about the vast quantities of gold the Arabs had acquired through conquest in Persia and Africa and which they brought into circulation. With this gold, according to Lombard, they bought slaves, wood, furs and other wares in western Europe and vivified its economy.[6] Sture Bolin supported these unorthodox views but through different ways, tracing trade links between the Arab lands and Scandinavia that would explain the hoards of Arab silver coins found in Scandinavia which finally reached western Europe.[7] These theories did not stand firm: Grierson proved that no Arab gold coins circulated in western Europe in any significant quantities.[8] Moreover most of the Arabic coins found in Birka (near Stockholm, Sweden) date from the end of the ninth century and the beginning of the tenth,[9] although a hoard of several thousand Arabic silver coins, the latest

[5] Bryce Lyon, *The Origins of the Middle Ages. Pirenne's Challenge to Gibbon* (New York, 1972), pp. 70–6.

[6] Maurice Lombard, 'Les bases monétaires d'une suprématie économique. L'or musulman du VIIe au XIe siècle', *Annales. Economies–Sociétés–Civilisations* 2 (1947), pp. 143–60; Maurice Lombard, 'Mahomet et Charlemagne. Le problème économique', *Annales. Economies–Sociétés–Civilisations* 3 (1948), pp. 188–99.

[7] Sture Bolin, 'Mohammad, Charlemagne and Ruric', *The Scandinavian Economic History Review* 1 (1953), pp. 5–39.

[8] Philip Grierson, 'Carolingian Europe and the Arabs: The Myth of the Mancus', *Revue belge de philologie et d'histoire* 32 (1954), pp. 1059–74.

[9] Björn Ambrosiani, 'Excavations in the Black Earth Harbour 1969–71', in Björn Ambrosiani and Helen Clarke (eds.), *Early Investigations and Future Plans*, Birka Studies 1 (Stockholm, 1992), p. 79.

dating from the mid-ninth century, was concealed at Ralswiek, on the island of Rügen, off the north-German Baltic coast.[10] This does not mean that there was no direct commerce between the Arab world and western Europe in Carolingian times, as Pirenne, not without admitting some exceptions, notably concerning the slave trade, contended. But their economic impact must not be exaggerated, even if Grierson himself and other numismatists suppose a link between the Carolingian monetary reform of the mid-eighth century and an earlier Arab reform at the end of the seventh century.[11] Numismatic evidence, which in this case too is scanty, does not indeed, in the opinion of K. F. Morrison, tell anything certain about trade routes or about the volume of trade.[12] On the basis of documentary evidence however, F.-L. Ganshof, himself a disciple of Pirenne, demonstrated the year after *Mahomet et Charlemagne* had appeared, that in the eighth century the relations between East and West continued through the ports of Provence, particularly in Marseilles, be it on a minimal level.[13] H. L. Adelson has made Byzantium responsible for this state of affairs[14] and other authors also tried to prove that relations between the West and Byzantium and the East, mainly through Italian ports under theoretical Byzantine authority, like Venice and Tyrrenean ports in southern Italy, particularly Amalfi, depended in the first place on the military relations between Byzantium and the Arabs in the eastern Mediterranean.

As the essential part of Pirenne's thesis, the negative role of the Arabs, with as its consequences the absence of merchants, towns and trade in western Europe and the predominance of an agrarian economy based on the self-sufficiency of the big estate, has been rejected totally or partially by most of his critics, only the latter element, in a second phase of the historiography of Pirenne's critics, has been the object of new studies. That the attention shifted from trade to agriculture may be explained by the satiation caused

[10] Helen Clarke and Björn Ambrosiani, *Towns in the Viking Age*, second revised edition (London: Leicester University Press, 1995), p. 109.

[11] Philip Grierson, 'The Monetary Reforms of Abd-Al-Malik', *Journal of Economic and Social History of the Orient*, 3 (1960), pp. 241–64.

[12] Karl F. Morrison, 'Numismatics and Carolingian Trade: A Critique of the Evidence', *Speculum* 38 (1963), p. 432.

[13] François-L. Ganshof, 'Note sur les ports de Provence du VIIIe au Xe siècle', *Revue Historique* 184 (1938), pp. 28–37.

[14] H. L. Adelson, 'Early Medieval Trade Routes', *American Historical Review* 65 (1960), pp. 271–87.

by the numerous critics during the first historiographical phase, all centred on trade, and the paradoxical situation that in his *Mahomet et Charlemagne* Pirenne himself had been very brief on the role of the manor, although he considered it the basis of the Carolingian economy. The prelude to the second historiographical phase in the 1950s and early 1960s, besides the roneotyped but important lectures by Charles-Edmond Perrin at the Sorbonne, was several fundamental studies by two German scholars, K. Verhein and W. Metz, on the sources for the study of the royal Carolingian estates, more particularly a capitulary of Charlemagne known as the *Capitulare de Villis* and inventories known as *Brevium exempla*.[15] To this phase belonged the 1965 'Settimana' in Spoleto on agriculture in the early Middle Ages, where I presented a new thesis on the origin of the classical bipartite estate, so typical for the Carolingian period. Its development in the eighth to ninth centuries was on the model of the royal estates between the Seine and the Rhine.[16]

Although my views were widely accepted, the real start of manorial studies centred on the Carolingian period were three international colloquia respectively held in Xanten (1980), Ghent (1983) and Göttingen (1987).[17] At Xanten I counted 109 studies published between 1965 and 1980 on that particular topic while Yoshiki Morimoto in 1988 numbered a hundred new titles between 1980 and 1986.[18] Meanwhile, at the Göttingen Academy, on the initiative of the archaeologist Herbert Jankuhn, a series of colloquia on the material

[15] Klaus Verhein, 'Studien zu den Quellen zum Reichsgut der Karolingerzeit', *Deutsches Archiv für Erforschung des Mittelalters* 10 (1954), pp. 313–94 and 11 (1955), pp. 333–92; Wolfgang Metz, *Das Karolingische Reichsgut* (Berlin 1960).

[16] Adriaan Verhulst, 'La genèse du régime domanial classique en France au haut moyen âge', reprinted in Adriaan Verhulst, *Rural and Urban Aspects of Early Medieval Northwest Europe* (Aldershot: Variorum, 1992).

[17] Walter Janssen and Dietrich Lohrmann (eds.), *Villa – Curtis – Grangia. Landwirtschaft zwischen Loire und Rhein von der Römerzeit zum Hochmittelalter. 16. Deutsch-französisches Historikerkolloquium, Xanten 1980* (Munich, 1983); Adriaan Verhulst (ed.), *Le grand domaine aux époques mérovingienne et carolingienne. Actes du colloque international Gand 1983* (Ghent, 1985); Werner Rösener (ed.), *Strukturen der Grundherrschaft im frühen Mittelalter* (Göttingen, 1989).

[18] Yoshiki Morimoto, 'Etat et perspectives des recherches sur les polyptyques carolingiens', *Annales de l'Est* 5–40 (1988), pp. 99–149; for the years 1987–1992: Yoshiki Morimoto, 'Autour du grand domaine carolingien: aperçu critique des recherches récentes sur l'histoire rurale du Haut Moyen Âge (1987–92)', in Adriaan Verhulst and Yoshiki Morimoto (eds.), *L'économie rurale et l'économie urbaine au Moyen Âge* (Ghent, Fukuoka, 1994), pp. 25–79.

and archaeological aspects of prehistoric and early medieval agriculture began in 1977.[19] In the 1980s, a 'boom' of critical editions put at the disposal of specialists the annotated texts of nearly all the preserved Carolingian polyptychs and inventories: those of the abbeys of Prüm, Wissembourg (Weissenburg), Montiérender, St Maur-des-Fossés and last but not least St Germain-des-Prés, mostly at the initiative of Dieter Hägermann from Bremen University and all by German scholars.[20] Before that Belgian scholars had published other famous Carolingian polyptychs and inventories, namely F.-L. Ganshof that of St Bertin, J.-P. Devroey those of Reims and Lobbes and I myself a fragment of a Carolingian inventory of St Bavo's at Ghent.[21]

After this 'boom' of studies on Carolingian manorial organisation, which even touched Italy,[22] there was a need for evaluation and synthesis, especially as Robert Fossier in a fuss-making pamphlet at the 1979 'Settimana' in Spoleto had passed a very negative judgement on Carolingian economy.[23] Nearly ten years later, in 1988, a confrontation with Fossier was organised at the abbey of Flaran under

[19] Herbert Jankuhn, Rudolf Schützeichel and Fred Schwind (eds.), *Das Dorf der Eisenzeit und des frühen Mittelalters* (Göttingen: Abhandlungen der Akademie der Wissenschaften, 1977); Heinrich Beck, Dietrich Denecke and Herbert Jankuhn (eds.), *Untersuchungen zur eisenzeitlichen und frühmittelalterlichen Flur in Mitteleuropa und ihrer Nutzung* (Göttingen: Abhandlungen der Akademie der Wissenschaften, 1979–80).

[20] Ingo Schwab (ed.), *Das Prümer Urbar* (Düsseldorf, 1983); Christoph Dette (ed.), *Liber possessionum Wizenburgensis* (Mainz, 1987); Claus-Dieter Droste (ed.), *Das Polyptichon von Montierender* (Trier, 1988); Dieter Hägermann and Andreas Hedwig (eds.), *Das Polyptychon und die Notitia de Areis von Saint-Maur-des-Fossés* (Sigmaringen, 1989); Dieter Hägermann, Konrad Elmshäuser and Andreas Hedwig (eds.), *Das Polyptychon von Saint-Germain-des-Prés* (Cologne, Weimar, Vienna, 1993).

[21] François-L. Ganshof (ed.), *Le polyptyque de l'abbaye de Saint-Bertin (844–859)* (Paris, 1975); Jean-Pierre Devroey (ed.), *Le polyptyque et les listes de cens de l'abbaye de Saint-Remi de Reims (IXe-XIe siècles)* (Reims, 1984); Jean-Pierre Devroey (ed.), *Le polyptyque et les listes de biens de l'abbaye Saint-Pierre de Lobbes (IXe-XIe siècles)* (Brussels, 1986); Adriaan Verhulst, 'Das Besitzverzeichnis der Genter Sankt-Bavo-Abtei von ca 800 (Clm 6333)', *Frühmittelalterliche Studien* 5 (1971), pp. 193–234.

[22] Pierre Toubert, 'L'Italie rurale aux VIIIe–IXe siècles. Essai de typologie domaniale', in *I problemi dell'Occidente nel secolo VIII* (Spoleto, 1973: Settimane di studio del Centro italiano di studi sull'alto medioevo 20), pp. 95–132; Bruno Andreolli and Massimo Montanari, *L'azienda curtense in Italia* (Bologna, 1985).

[23] Robert Fossier, 'Les tendances de l'économie: stagnation ou croissance?', in *Nascita dell'Europa ed Europa Carolingia* (Spoleto, 1981: Settimane di Studio del Centro italiano di studi sull'alto medioevo 27), pp. 261–74.

the presidency of Georges Duby, who himself in his book *Warriors and Peasants* in 1973 had made a similar judgement but who at Flaran did not commit himself. The major contribution to the Flaran meeting, which actually had as its central theme agricultural growth in the early Middle Ages, was that of Pierre Toubert on the role of the big manor in the 'take off' of the western economy during the eighth, ninth and tenth centuries. It is still the best analysis of the 'minimalist' views on Carolingian economy and at the same time a thorough refutation of them, based on recent scholarship and on primary sources alike.[24]

In the eyes of the minimalists the very low rentability of the big estate was one of the essential characteristics of the manorial production system. This statement was in the first place supported by demographic conjectures about the low population density of most regions, except where one cannot escape documentary evidence of the reverse, as in the Paris basin. Their interpretation of the vast average dimension of the *mansus* was also used as a demographic argument, again with the exception of the Paris basin. Low yield ratios and the reservation of a large part of the production for seed for the next year, for the army and for the supply of the king's or the lord's court, did not leave big grain surpluses for the market. 'Autoconsumption' was the rule and there was no incentive for reinvestment. Agricultural technique was primitive and agricultural instruments were scarce and made of wood. This kind of statement, mostly made without the thorough support of texts or other evidence, will be refuted in Chapter 3, drawing on Toubert's masterly contribution to the Flaran debate.

After this long concern with Carolingian agriculture and manorial organisation, a subject somewhat neglected by Pirenne, scholarship in the 1980s – after a twenty-year gap – reverted, in a third phase of post-Pirenne historiography, to Pirenne's favoured subject of trade and towns, now however from a totally new point of view hardly known during Pirenne's lifetime and mostly ignored by him: archaeology. Since the Second World War medieval archaeology had been emancipated from classical archaeology and was practised by archaeologists

[24] Pierre Toubert, 'La part du grand domaine dans le décollage économique de l'Occident (VIIIe–XIe siècles)', in *La croissance agricole du Haut Moyen Âge* (Auch 1990: Flaran 10), pp. 53–86.

who were at the same time historians or at least had this ambition.[25] Among them Richard Hodges is the most engaged in the economic and social history of the Carolingian period, more particularly in the problems initiated by Pirenne. Like Toubert and most specialists of the matter today, Hodges considers the age of Charlemagne a period of economic growth, about which he has written several controversial books.[26] One important aspect of this controversy is his strong belief in the Carolingian origin of towns, more particularly those towns that around the middle of the ninth century succeeded as *portus* to the so-called *emporia*. Both types, in his opinion, contain the seed of urban development in the eleventh and twelfth centuries. This statement is more questionable concerning the *emporia* than with respect to the new *portus* of the ninth century. As contrasted with the former, most *portus* survived the Viking invasions without any significant break and gave birth, from the tenth century onwards, to important towns engaging in long-distance trade in the eleventh century. The *emporia* within the Carolingian empire, Dorestad, Quentovic and other minor ones (Medemblik, *Witla*), in contrast to places outside the empire, like London, Hamwic (Southampton) or Ribe, did not form the nucleus of a later town of some importance. This is our only point of discussion with Richard Hodges's recent views as exposed in his book *Towns and Trade in the Age of Charlemagne*.[27]

Thus the recent new interest in towns, especially from the side of archaeologists like Hodges, Hill, Van Es and others, will surely reopen the debate on *Mahomet et Charlemagne*, which is still not closed and will perhaps never be.

For my part I hope that some ideas put forward in this book will prove a valuable contribution to it.

[25] Herbert Jankuhn, Walter Schlesinger and Heiko Steuer (eds.), *Vor- und Frühformen der europäischen Stadt im Mittelalter*, 2 vols. (Göttingen, 1975: Abhandlungen der Akademie der Wissenschaften); Richard Hodges and Brian Hobley (eds.), *The Rebirth of Towns in the West AD 700–1050* (London, 1988: CBA Research Report 68); *La genèse et les premiers siècles des villes médiévales dans les Pays-Bas méridionaux. Un problème archéologique et historique* (Brussels 1990: Crédit Communal, coll. Histoire in-8°, no. 83); Clarke and Ambrosiani, *Towns in the Viking Age*.

[26] Richard Hodges, *Dark Age Economics. The Origins of Towns and Trade AD 600–1000* (London, 1982); Richard Hodges and David Whitehouse, *Mohammed, Charlemagne and the Origins of Europe* (London, 1983).

[27] Richard Hodges, *Towns and Trade in the Age of Charlemagne* (London: Duckworth, 2000).

PART I

LAND AND PEOPLE

4

AGRICULTURAL TECHNIQUE

In many areas between the Alps, the North Sea, the river Loire and the Rhine, a primitive irregular fallow system to restore fertility to the soil, in which the same crop was grown for several years in a row before the soil was left fallow for a similar length of time, had been superseded in the centuries before and at the beginning of the Middle Ages by a more regular fallow system with one grain crop and shorter, more regular, three-year periods of fallow. This system in turn evolved during the ninth century into a system in which two kinds of grain instead of one were grown in regular rotation side by side during the same harvesting year, namely winter-sown corn and spring-sown corn. Every third year the fields that had produced spring corn the year before were left lying fallow for a year, before being sown, after two ploughing turns in June and October, with winter corn, followed in the subsequent spring by the sowing of spring corn. This is what is called the three-course rotation, to be distinguished from the later topographical three-field system, in which three fields corresponded each to one of the phases just indicated. The new system made the cultivation of two different and complementary grain crops possible: one – spelt, rye and wheat – was meant for human consumption as grain for bread, while the other – mainly barley and oats – was used as animal feed. All these grains had the advantage of being sown and harvested at different times (autumn and spring) thus distributing field work more evenly and lessening the risk of a failed harvest. It was even possible in spring to sow a field with spring corn in those plots where the winter crop appeared to have failed. The proportion

of fallow land was, furthermore, reduced from at least a half to a third, which led to a more intensive use of arable soil and a larger volume of production.

The origin of the three-course rotation has been the object of much discussion, especially among German scholars, who unnecessarily complicated the problem by making a connection between three-course rotation and the three-field system. One of them, Hildebrandt, thinks that a more primitive three-course rotation, in which spring corn dominated, was in place in the early Middle Ages and that an expansion of winter corn led to a more balanced three-course rotation.[1] His opinion was based on the Carolingian polyptych of Wissembourg abbey in Alsace,[2] but was rejected by Morimoto using the same document.[3] The latter, while admitting that in the oldest parts of the polyptych (*c.* 860) the rotation between different grain crops was less balanced, concluded that this meant that an evolution was going on towards a more regular three-course rotation through the introduction of more spring-grown crops. For him the basic crop at the start was winter corn and the expansion of spring corn during the ninth century made a more balanced three-course rotation possible. The polyptych of St Remi de Reims[4] strengthened him in this idea, for not only on the abbey's demesnes but also on the lands of the tenants, winter-grown crops originally dominated nearly exclusively. Other ninth-century polyptychs showed respectively progress of the three-course rotation between two chronological layers (868–9 and 889) as in the polyptych of the abbey of Lobbes and a more developed three-course system on the demesnes than on the tenants' plots at the abbey of Montiérender.[5] The latter observation raises the question of whether the new system was limited to demesnes or more collectively organised, to include holdings. One may even put the question whether the three-course rotation originated on demesne or tenants' lands. Although impossible to answer for the moment, the so-called 'lot-corvée', a plot of the demesne (called

[1] H. Hildebrandt, 'Systems of Agriculture in Central Europe up to the Tenth and Eleventh Centuries', in Della Hooke (ed.), *Anglo-Saxon Settlements* (Oxford, 1988), pp. 81–101.

[2] Dette (ed.), *Liber possessionum Wizenburgensis*.

[3] Yoshiki Morimoto, 'L'assolement triennal au haut Moyen Age. Une analyse des données des polyptyques carolingiens', in Verhulst and Morimoto (eds.), *L'économie rurale et L'économie urbaine*, pp. 91–125.

[4] Devroey (ed.), *Polyptyque de Saint-Remi de Reims*.

[5] Devroey (ed.), *Polyptyque Saint-Pierre de Lobbes*; Morimoto, 'Assolement triennal', p. 115.

ancinga in the polyptychs) regularly tilled by the same tenant for his lord, possibly has a key function in the resolution of this question. On evidence from the polyptychs of the abbeys of St Germain-des-Prés and St Remi de Reims, Morimoto noticed a more developed three-course rotation on parts of the demesne worked upon by the system of 'lot-corvée'.[6] He also noticed their topographical concentration in one part of the demesne and their lay-out in parallel long narrow strips in the same way as centuries later in the furlongs of a completed three-field system. Although dependent farmers thus knew the three-course rotation system, it is not certain that they were able to apply it themselves to their own land, even if they wanted to. The system implies that all plots cultivated according to it undergo the same kind of tillage at the same time and that once they have been sown they are not indiscriminately accessible to humans or animals. This is most easily achieved when all plots are located within the same field complex and are cultivated by and for the benefit of one owner, who is not obliged to take into account other farmers and neighbours. This was true for the larger complexes called *culturae*, of which the demesne of a large landowner usually consisted. The plots of individual farmers, however, with the exception of the 'lot-corvée', which in a way ended in being considered theirs, were usually well clear of the lands of the demesnes but were often intermingled with each other. This meant the three-course system could only be applied if all involved were in agreement. Even a clearly visible topographic division of arable land into three-field complexes can only have been applied (and not even generally at that) on the demesne lands in so far as they consisted of one or more of such complexes. This was not yet the case in all areas in the ninth century. Those scholars who presumed grouping in three units for those demesne lands that consisted of numerous complexes (*culturae*), even if their total number was a multiple of three, therefore, were wrong. The estate of Prüm in Mabompré in the Belgian Ardennes, for example, consisted of fifteen scattered *culturae*.[7] The terms *cultura*, *zelga*, *campus*, *satio*, *aratura*, *territorium*, used in many contemporary texts in connection with the three-course crop rotation system, should therefore not yet be interpreted as topographic-geographic subdivisions of arable land but merely as a reference to lands of the demesne sown with the same crop.[8] Thus the open field most probably did not yet exist. The field

[6] Morimoto, 'Assolement triennal', pp. 107–14.

[7] Schwab, *Prümer Urbar*, p. 208.

[8] Morimoto, 'Assolement triennal', pp. 93–4.

complexes – either demesne lands known as *culturae* or plots of individual farmers forming what was called an *accara* – did not yet form continuous open areas and were still separated by woods, heath, or uncultivated plots and possibly even enclosed by hedgerows or trees. Only within the complexes did the plots probably together constitute a kind of 'micro open field'.[9]

In spite of the importance of the sylvo-pastoral element in the form of hunting, fishing or wild fruits in the early medieval economy and food supply,[10] there is no doubt that grain production in the Carolingian period made considerable progress and had become more important than cattle raising or other forms of agrarian economy. This was even the case in a country such as Italy, where a proportion of half and half between wild and cultivated land in the triangle Milan–Como–Varese was considered very high for arable land. It was a higher proportion than the as yet little-exploited valley of the Po with its numerous and extensive boglands.

The pollen diagrams and the increase in three-course crop rotations, as seen from most polyptychs, prove this progress of grain production. It was however unrelated to the yield ratios of the various grain crops, for which only very rare, unreliable and ambiguous figures are available. It is now accepted that the very low yield ratios that were calculated by Duby and Slicher van Bath[11] on the basis of the inventory of grain stocks at the royal estates near Lille around 800 (mainly at Annappes), 1:3, 1:1.6, 1:1.3, 1:1.8, 1:2.15 for spelt, wheat, rye, barley and oats respectively, should be increased slightly in order to express real physical gross yields.[12] Although it is therefore no longer possible to refer to these yield ratios as catastrophic, the expansion in the Carolingian period did not entail an increase in efficiency but rather a production increase due to reclamations and the adoption of the three-course crop rotation system. In itself this important progress in agricultural technique did not lead to an increase in physical efficiency.

[9] See Chapter 1.

[10] Massimo Montanari, *La faim et l'abondance. Histoire de l'alimentation en Europe* (Paris, 1995), pp. 53–8.

[11] Georges Duby, 'Le problème des techniques agricoles', in *Agricoltura e mondo rurale in Occidente nell'alto medioevo* (Spoleto, 1966), pp. 267–83; Bernard Slicher van Bath, 'Le climat et les récoltes en haut moyen âge', in *Agricoltura e mondo rurale in Occidente nell' alto medioevo*, pp. 399–425.

[12] Toubert, 'La part du grand domaine', pp. 73–4.

In south-west Germany, northern France and the southern half of present-day Belgium there was in the ninth century a very great prevalence of spelt.[13] It accounted for between 50 and 80 per cent of grain production. This crop, *triticum spelta* is related to *triticum aestivum*, which is wheat. As opposed to the latter, which is a 'naked' grain, spelt has a husk around the grain. This is favourable to its conservation and explains the large stocks of spelt, as opposed to the near absence of wheat, rye and oats, in inventories such as the *Brevium exempla*, which describe some royal estates around Lille at the beginning of the ninth century. Its disadvantage is its small yield, compensated for however, by a better resistance to climatic conditions. The difficult separation of the husk from the grain, which needs special mill stones or hand mills, is probably one of the reasons for the decline of spelt after the ninth century. On the other hand spelt is not very exigent concerning soil conditions and gives relatively good and regular yields on poor, light and chalky soils, such as those of the Champagne. The demesnes of St Remi de Reims in this region between the river Marne and the Ardennes, consisted mainly of immense *culturae* of several hundreds of hectares, where only spelt was grown. Against a demesne production consisting of 90 per cent of spelt, rents and income from mills, representative of peasant farms, consisted of 67 per cent of spelt. Its production of flour is 50 per cent, against 70 per cent from wheat.

The decline of spelt after the ninth century is also part of a more general progress of 'naked' grain during the tenth and eleventh centuries, especially of rye and wheat. Since the fourth century in north-east Germany the growth of rye had increased and it became more important than barley in central and western Gaul between the eighth and tenth centuries. It was grown on the small enclosed fields (*campi*) of a few hectares on the demesnes of St Remi de Reims. Wheat became important only from the tenth century onwards.

Oats were an expanding spring-sown grain in the early Middle Ages. Easily adaptable to poor soils, it was a pioneer plant for marginal and recently cleared land, especially up to the middle of the ninth century. For example, in the Belgian Ardennes on the estates of the

[13] Jean-Pierre Devroey, 'Entre Loire et Rhin: les fluctuations du terroir de l'épeautre au moyen âge', in J.-P. Devroey and J.-J. Van Mol (eds.), *L'épeautre (Triticum spelta), histoire et ethnologie* (Treignes, 1989), pp. 89–105, reprinted in Devroey, *Grand domaine*; Jean-Pierre Devroey, 'La céréaliculture dans le monde franc', in *L'ambiente vegetale nell'alto medioevo* (Spoleto, 1990: Settimane di studio 37), pp. 221–53, reprinted in Devroey, *Grand domaine*.

abbey of Prüm only oats were cultivated. From the second half of the ninth century onwards oats were more and more inserted as spring corn in the then expanding three-course rotation.

The expansion of the cultivation of summer grain, barley and oats within a three-course rotation enabled farmers to keep more cattle. Nevertheless, the raising of cattle was far less common than that of smaller domestic animals such as pigs or sheep, even on demesnes. The prevalence of pigs (on average 40 per cent of all domestic animals) in comparison to sheep and especially to cattle (22 per cent), on both demesne lands and farms held in tenure, points to mixed farming in which the stock economy was subordinate to an agricultural economy centred on grain production. This was true for both northern and southern Europe, which have been contrasted too strictly as a Germanic animal-fat economy as against a Roman olive and grain producing economy.[14] Yet, there were some regions in northern Europe in the eighth and ninth centuries where cattle raising was more important than agriculture. In Frisia the area of landownership of the abbey of Fulda was expressed in terms of the animals, cattle, sheep and pigs, that could be put to pasture on it.[15] Along the coasts of the Low Countries huge flocks of sheep were kept not only by nearby Flemish abbeys, like St Peter's and St Bavo's abbeys in Ghent, but also by abbeys farther away in Germany and France.[16] Their enormous wool production largely surpassed the need of the abbeys that possessed them. A pastoral specialisation of this kind does not point to an underdeveloped economy but, on the contrary, presupposes a specialised trade in and processing of wool, both in the country, mainly in Frisia, and in the developing towns of, for example, Flanders. The church in this respect, played an important role, for its widely scattered landholdings made it easier for it to run the risks associated with specialisation.

Cattle raising, however, did not solve the fundamental fertiliser problem, as long as it did not increase within the framework of a grain economy. In the ninth century only a modest step was taken in that direction. Agricultural technology remained too underdeveloped.

[14] Wickham, *Land and Power*, pp. 127–31.

[15] Stéphane Lebecq, *Marchands et navigateurs frisons du haut moyen âge*, 2 vols. (Lille, 1983), vol. I, pp. 126–8.

[16] W. Jappe Alberts and H. P. H. Jansen, *Welvaart in Wording. Sociaal-economische geschiedenis van Nederland van de vroegste tijden tot het einde van de Middeleeuwen* (The Hague, 1964), pp. 42–3.

The introduction of the heavy asymmetrical plough with mould board, for example, was an innovation that has been incorrectly placed in the eighth or ninth century.[17] In fact, archaeological evidence proves that it had been in use in various regions of western and central Europe as early as the second century, with its front train on two wheels. It is nevertheless possible that the distribution of the heavy plough was stimulated by the general economic expansion of the Carolingian period and by the use of iron. *Carruca* with the meaning 'plough', clearly pointing to the plough's front train, occurs for the first time in the famous polyptych of Irmino of St Germain-des-Prés from the 820s.[18] The labour services called *corvada* in the same polyptych are ploughing services to be executed by the tenants with their own plough and team of oxen. In the polyptych of the abbey of St Maur-des-Fossés *mansi carroperarii* are farms equipped with wheeled ploughs, as opposed to *mansi manoperarii* that had none. Not only in the latter abbey but also in several others like Wissembourg, St Germain-des-Prés and Fulda iron ploughshares had to be delivered, probably by specialised craftsmen or smiths, to the demesne. The scarcity of iron in the Carolingian period, alleged by Duby and others, is a myth, as will appear from Chapter 5. But equally incorrect is the famous thesis of Lynn White Jr[19] concerning the use of the horse as draught-animal thanks to the introduction of a fixed halter, the use of which in Roman times has since been proved.[20] Oxen continued, at least until the thirteenth century and even later, to be

[17] Axel Steensberg, 'Agrartechnik der Eisenzeit und des frühen Mittelalters', in Heinrich Beck, Dietrich Denecke and Herbert Jankuhn (eds.), *Untersuchungen zur eisenzeitlichen und frühmittelalterlichen Flur in Mitteleuropa und ihrer Nutzung*, 2 vols. (Göttingen, 1980: Abhandlungen der Akademie, Phil. -Histor. Klasse, III, no. 116), II, pp. 55–76; Dieter Hägermann and Helmuth Schneider, *Landbau und Handwerk 750 v. Chr. Bis 1000 n. Chr.* (Berlin, 1991: Propyläen Technikgeschichte), pp. 380–92; Georges Comet, 'Technology and Agricultural Expansion in the Middle Ages: The Example of France North of the Loire', in Grenville Astill and John Langdon (eds.), *Medieval Farming and Technology* (Leiden, 1997), pp. 21–4; Elmshäuser and Hedwig, *Studien Saint-Germain-des-Prés*, pp. 353–5.

[18] Hägermann and Schneider, *Landbau*, pp. 390–1; Elmshäuser and Hedwig, *Studien Saint-Germain-des-Prés*, p. 354, note 107.

[19] Lynn White Jr, *Medieval Technology and Social Change* (Oxford, 1962).

[20] Georges Raepsaet, 'The Development of Farming Implements between the Seine and the Rhine from the Second to the Twelfth Centuries', in Astill and Langdon (eds.), *Medieval Farming*, pp. 41–68; Hägermann and Schneider, *Landbau*, pp. 397–401.

the draught-animals *par excellence* for ploughing. The cultivation of summer grain, barley and oats, within the three-course rotation, enabled farmers to keep more oxen still, at least four of which were needed to pull a heavy plough.

In the Carolingian period the main technical equipment for the working up of grain was the watermill (*molendinum*, *farinarium*).[21] Although better represented in Antiquity than earlier scholars have thought, the Carolingian period witnessed, as Marc Bloch once wrote in a famous article, its triumph.[22] Evidently such a success has all to do with the increase of grain production. Written evidence is, however, very unevenly distributed over the abbeys who were the main originators and builders of the mills. There is no or only scanty information for most Italian abbeys (except S. Giulia of Brescia with 23 mills) nor for such big abbeys as St Denis or St Gall. Apart from an inventory of St Wandrille abbey (787) listing 63 mills, most quantitative information is to be found in the polyptychs of the big Carolingian abbeys. Irmino's polyptych for St Germain-des-Prés (*c.* 825) lists 84 mills (concentrated in 16 of 22 listed manors). The other ninth-century polyptychs give the following figures: Prüm 45, Wissembourg 12, St Bertin 13, Lobbes 29, St Remi de Reims 13, Montiérender 18. The *Statutes* of Adalhard of Corbie (822), which have an important section on the exploitation of mills,[23] mention 12 of them in the immediate neighbourhood of the abbey. These absolute figures, when related to the arable land of the demesnes to which these mills belong and to the number of peasant's farms, allow the conclusion that the very great majority of peasants had access to a mill in their own estate or at not too great a distance. If the number of *villae* having a mill may seem low compared to the total number of *villae* of an abbey, one has to take into account the natural, that is the hydrographical conditions, the geographical situation (estates distant from the seat of the abbey had less mills, except those of St Germain-des-Prés in the rich grain producing regions of western France) and the importance of arable land in the *villa* and its demesne, to which the number of mills was clearly related.

[21] Etienne Champion, *Moulins et meuniers carolingiens dans les polyptyques entre Loire et Rhin* (Paris, 1996); Hägermann and Schneider, *Landbau*, pp. 346–73.

[22] Marc Bloch, 'Avènement et conquêtes du moulin à eau', *Annales d'Histoire Economique et Sociale* 7 (1935), pp. 538–63.

[23] Verhulst and Semmler, 'Statuts', pp. 241–6.

The standard type in the plains of north-west Europe, where watercourses have a normal flow and where the declivity is slight, was the vertical watermill, moved by the water under the wheel. Technically it may be supposed to have still been of the same type in the Carolingian period as the mill described by Vitruvius (33–22 BC). Most mills had several wheels, normally placed in parallel. The mills of Corbie, described by abbot Adalhard, had six wheels. In most cases dams and canals had to be built to guarantee a regular supply of the water. These were sometimes big works, as for example when Odland, abbot of St Bertin (798–805), deflected the upper course of the river Aa near St Omer over a distance of 2.5 km to build the mills at Arques.[24]

The building of a mill represented such an enormous investment of capital, that in the central regions of the Frankish empire they were usually in the ownership of a large ecclesiastical landowner as part of the demesne. Abbot Irmino of St Germain-des-Prés ordered himself the building of seven mills.[25] Normally mills were operated by tenants. They had to see that the income from the mill, which mostly consisted of grain and not flour, came into the hands of the abbey. In the manor of Villemeux, in the rich grain producing region between Dreux and Chartres, belonging to the abbey of St Germain-des-Prés, the income from 22 of the 28 mills on the rivers Eure and Blaise, amounted to 75,000 litres of grain, at an average rent of 5,000 litres per mill.[26] This total sum roughly equalled the needs of the abbey community, so that the income from all the other mills of St Germain could be brought to the market. The miller had a fairly autonomous position within the manor and, apart from paying the rent to the abbey, which he collected from the peasants who brought their grain to the mill, had no other significant obligations than those connected with the maintenance of the mill. The success of the watermill must certainly have caused the progressive disappearance of the handmill, which in turn continued the decline of the cultivation of spelt, the difficult husking and milling of which had needed hand work and could not be done by the big new watermill.

[24] Alain Derville, 'Le marais de Saint-Omer', *Revue du Nord* 62 (1980), pp. 73–95, reprinted in Alain Derville, *Douze études d'histoire rurale. Flandre, Artois, Cambrésis au moyen âge* (Lille, 1996), pp. 67–88, esp. p. 74.

[25] Elmshäuser and Hedwig, *Studien Saint-Germain-des-Prés*, pp. 436–65.

[26] *Ibid.*; Hägermann and Schneider, *Landbau*, pp. 368–70.

Wine-growing is a special branch of the agrarian economy and does not at all pose the same problems as grain cultivation.[27] It works with simple instruments and is in this, as in many other respects, the continuation of antique traditions. Only special knowledge of the treatment of vintage is required. In the Carolingian period the geographical distribution of wine-growing was the same as in Antiquity, spreading from Italy and southern France to the most northerly wine-producing regions around Paris and in the valleys of the rivers Moselle, Rhine and Main. In these northern regions more than in the south and Italy, wine-growing was part of the manorial organisation, more specifically of the exploitation of the demesne. The work was generally done the whole year through by unfree inhabitants of the manor. Unlike arable farming it was not bound to seasons, except for the vintage in autumn. Therefore, the system of 'lot-corvée', which was described earlier, was widely used as obligatory service. The same parcel of the vineyard, still as part of the demesne, was given for cultivation to the vintager, who by a natural evolution gradually came to consider it as his own. Already in Carolingian times some vintagers were allowed to hold their original 'lot-corvée'-parcel *ad medietatem*, that is in exchange for half the production. The situation on some estates was still more advantageous for them, as for example on the estate of the abbey of Prüm at Mehring, discussed below. Ordinary peasants in wine-growing regions had to deliver stakes for vines, and staves and hoops for casks. An estate of the abbey of Prüm had to deliver one cask and twelve hoops; a manor of St Germain-des-Prés 780 staves for 32 casks and the necessary hoops. Big casks with iron hoops had to be delivered to the army and the palace. The wine press on the demesne was the object of special care according to the *Capitulare de Villis*.[28] It might therefore be supposed to be a screw-press, although evidence for this type of press dates only from the tenth and eleventh centuries. Otherwise a simple beam was used levering big square wooden blocks.

[27] Hägermann and Schneider, *Landbau*, pp. 402–7; *Le vigneron, la viticulture et la vinification en Europe occidentale au moyen âge et à l'époque moderne* (Auch, 1991: Flaran 11); Elmshäuser and Hedwig, *Studien Saint-Germain-des-Prés*, pp. 365–99; M. Matheus (ed.), *Weinbau zwischen Maas und Rhein in der Antike und im Mittelalter* (Trierer Historische Forschungen 23, 1997).

[28] L. Clemens and M. Matheus, 'Zur Keltertechnik in karolingischer Zeit', in *Liber Amicorum für A. Heit* (1995), pp. 255–65.

Many abbeys had the wine from their vineyards transported by the obligatory services of their tenants. The system was particularly developed by the abbey of Prüm, on ships and even on rafts, down the Moselle.[29] It is generally accepted that the wine production of many abbeys exceeded their needs and that their surplus was conducted into commercial circuits. The abbey of Prüm received a total production of about 120,000 litres. One-fifth (24,000 litres) of it came from the village of Mehring on the Moselle, not far from the abbey, which was Prüm's most important wine-producing estate.[30] The total production of the eight Mehring vineyards (about 30 hectares), divided in 57 or 58 units of exploitation, called *pictura*, was however, 72,000 litres, three times that figure. Each tenant of such a *pictura*-parcel had to deliver 390 to 450 litres, which was indeed only a third of his production. Two-thirds could thus be sold by the tenants, who had to buy corn, meat and dung, stimulating in that way a money economy. There was one press at Mehring for which the landless unfree labourers (*hagastaldi*) of Prüm had to saw big square wooden blocks (Lat. *matrimen*) in the nearby Mehringer forest.

When seen against the clear and numerous signs of expansion of grain production, the famines of the eighth and ninth centuries are difficult to explain. It has been pointed out, possibly rightly, that they were less numerous in the two centuries before than after 1000, a fact which was considered to be related to the increased importance of grain in the diet after that date. It could also be said, however, that when we view these four centuries together, famine was more frequent in the ninth and in the twelfth centuries, that is, in the most expansive centuries at least as far as reclamations are concerned. This might lead to the conclusion that the famines in those centuries should not be interpreted primarily as a result of an underdeveloped agricultural economy, but rather as a consequence of too rapid an increase in population in comparison with the available means in terms of arable land or technology. They should perhaps, therefore, be seen as 'accidents' of expansion.

[29] Devroey, 'Services de transport à Prüm'.

[30] Franz Irsigler, 'Mehring. Ein Prümer Winzerdorf um 900', in Jean-Marie Duvosquel and Erik Thoen (eds.), *Peasants and Townsmen in Medieval Europe. Studia in Honorem Adriaan Verhulst* (Ghent, 1995), pp. 297–324.