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Proposal full title :
« THE RURAL LANDS OF NORTH-EASTERN GAUL, FROM THE LATE
LA TÈNE PERIOD TO THE LATE ANTIQUITY »

Proposal short name : « RurLand »
Proposal duration in months : 48

Position of project and objectives

The objective of the Rurland Project is to study rural space in the North-Eastern quarter of Gaul from the early La Tène D1 (middle of the second century BCE) up until the late fifth century CE. It is centred on the Roman period and proposes to examine the evolution of the rural world over the *longue durée* with its protohistoric antecedents and its changes in late Antiquity over a vast area where recent research, although active, has not produced any syntheses. The project covers the entire North-Eastern quarter of Roman Gaul from the River Seine to the German *limes* and from the North Sea to the Swiss plateau, i.e. the provinces of Belgica, the two Germanias, and a small part of Gallia Lugdunensis. The area therefore extends over six modern countries (France, Belgium, Netherlands, Germany, Luxembourg and Switzerland), where studies of the Roman countryside are far from uniform, for reasons to do with the past history of research or with present-day methods, with language and bibliographic barriers, but also with the very diversity of the natural landscapes that form the entire hinterland of the Roman boundary of Germania. Led by a French Principal Investigator, the core of the project is centred on North-Eastern France, where research is lagging, with a concern to compare this territory with the other regions of Europe adjacent to France. It shall therefore involve two complementary facets:

1-one facet on collecting and establishing available archaeological data, *for the French area alone*, essentially for reasons of the practicality of the operation. For this part of the research the PI shall rely mainly on a French team that has already been put together.

2-one facet on comparing and contrasting the data acquired with existing data for the other European countries concerned. Specialists from these countries, who have already been contacted, shall be an integral part of the project from the initial phase through to the final synthesis.

Based on a GIS, the project is intended to integrate the approach to sources that are very different in their nature and object, but complementary and seldom studied together—archaeological excavations, especially those of the most recent preventive archaeology, the study of the different components of rural settlements of all kinds, carpology, bone material, soil maps, aerial photographs, LiDAR data—so as to promote an interdisciplinary and multi-scale approach to the whole of the geographical area ranging from the sites proper to the territories. The purpose is ultimately to understand the spatial and historical dynamics of the rural world of the time and their diversity. In this perspective, prominence shall be given to study windows on what may be very different scales depending on the quality, abundance and nature of the information they yield.

For some years now, research into the countryside of the ancient world has been making substantial advances and offering a renewed vision of land use, a more nuanced view of the patterns and scope of scrub and forest clearance, the more or less permanent trace of ancient activities on the countryside (landscape forms, field boundaries, settlement patterns, road networks) and the properties of present-day soils (enrichment, biodiversity but also palaeo-pollution, degradation, instability of certain hill-slopes, etc.). Understanding the ways in which the ancient countryside was organized and farmed enables us to better understand the geographical space we live in today and to propose knowledge that is useful for developers and planners who must take account of the rhythms and activities with delayed effects if they are to work within a perspective of sustainable development. Research is also a fundamental stage in ascertaining ‘archaeological risk’, by promoting the modelling of forms of land use. In France, only the South of the

country has benefitted from major programmes of this kind, such as the Archaeomedes programme (van der Leeuw, Favory and Fiches 2003). In the North, although research into the countryside of the ancient world has made considerable progress in recent years, the research teams, being too compartmentalized and dispersed, have not been able to form the networks of relations required to promote ambitious and innovative programmes on a very large inter-regional scale. Relations with neighbouring European countries often remain limited to individual and sporadic contacts.

The project follows on from a vast preliminary survey of the aspects of Romanization in the East of Gaul (Reddé *et al.* 2011). That survey was conducted under the same leadership (PI) and involved a large number of the actors involved in the present project. Hence it is a tried and tested team, with scientists who are used to working together and who have long been thinking about the proposals set out in this document further to an initial investigation that lasted for several years. The aim now is to make a far wider exploitation of the documentary sources available, to achieve synergy between archaeologists and naturalists so as to make a real breakthrough in the study of the countryside and the economics of the ancient world, along the lines of what has recently been undertaken in the Netherlands (e.g. Groot *et al.* 2009). In the North-East of France, conditions for studying the antique environment are good and recent archaeological excavations have yielded a mass of underexploited information. The ultimate objective is therefore to fill this gap in research and to provide a historical benchmark synthesis, drawing on multi-disciplinary and varied approaches. The project therefore aims to:

- Collate the documentation that is currently scattered and therefore intractable for scientific consideration
- Systematize the available data so they can be processed statistically and spatio-temporally
- Encourage sustainable partnerships across regions, institutions, laboratories and disciplines
- Produce a synthesis that extends beyond modern national borders
- Allow ambitious French and European projects to arise out of rich and original documentation.

State of the art

The town has always been thought of as the true marker of Romanity while the study of the countryside has long been the poor relation of research on Roman Gaul. Up until recent times, it is research on villas, considered as the sure testimony of Romanization that has dominated thinking. This type of luxurious habitat is readily recognized (with its baths, mosaics, paintings) as a characteristic Italian feature, because we can rely on classical but also on certain major excavations of exceptional monumental ensembles that have become famous (Anthée, Köln-Müngersdorf, the great villas of the Mosel Valley, etc.). In this context, it is the study of the habitat proper, essentially the major aristocratic estates, that has long dominated research, because it seemed to correspond to a model imported from the Mediterranean world.

This ‘Romanocentric’ approach to land use was common to most European countries until recently. The development of aerial photography in the 1960s barely altered that outlook in any far reaching way. True, the direct view over vast stretches of the extensive estates of Picardy revealed by Agache (Agache 1978) was a revolution, especially for this part of Northern France, where no villas had been identified before then. Agache’s photos showed up for the first time many ‘small’ settlements, marked by enclosures, and characterized as ‘indigenous farmsteads’. In his copious 1975 analysis of land use for *ANRW* (II, 4, p. 658-713), the author suggested they could be seen as dependent rural settlements occupying marginal land beside the great ‘Roman-style’ estates, which, he claimed, were boosted by the economic demand from the Rhineland *limes* and the conquest of Britain. But these ‘small’ settlements have to date remained the subject of secondary studies that have come in for little investigation.

Now, the new practices in preventive archaeology, with major overburden removal randomly affecting all forms of land use, have opened up windows on a scale that is incomparable with what scheduled research previously made possible. There are more than 300 ha in a single swathe at Actiparc near Arras, more than 470 ha at Vatry near Châlons-en-Champagne. The finest example is perhaps that of the partially explored lignite basin in the hinterland of Cologne where substantial windows have been opened up (Lenz 1999; Kaszab-Olschewski 2004). They offer a previously unheard of wealth of information, particularly for periods that have so far been poorly documented or poorly characterized from the beginning or the end of Roman times (Haselgrove 2011). At the same time, they provide access to hitherto under-exploited documentary sources (analyses of soils and the surrounding environment, carpology, archaeo-zoology). Seriated over nearby territories, as has been done for the many operations in the plain of France (Ouzoulias and Van Ossel 2009), these windows can be used to compare the agricultural settlements unearthed, to establish a hierarchy among them, to evaluate their specific features, both in the local context and the inter-regional context, and to analyse their trajectories. The current difficulty remains that of access to a vast and dense documentation

arising from excavation reports, little of which has been published.

Until the very early 2000s, few studies were to be found of rural buildings proper, their function, their association within a single production area, their economic purpose. On this point, the thinking of protohistorians is far more advanced than that of Romanists. The role of 'small' agrarian structures (enclosures, silos, grain stores, dryers, workshops, etc.) has been the subject of investigations that are developing and providing an understanding of the agricultural settlement as an economic unit (Malrain and Blancquaert 2009). The string of operations, their diversity and complementarity on the same domain, and the very nature of the tools can be used to characterize the forms of production and the society that implements them (Nilesse 2009). This overall functional approach to rural settlements is happily beginning to be taken into account by a number of specialists of Roman times. However, there is a lack of hard thinking on these issues, and a lack of regional summaries since the already old thesis by Van Ossel (Van Ossel 1992). Research in this direction is both possible and necessary, provided that the currently dispersed data is collected, as has recently been done for implements (Ferdrière 2009; Marbach 2004).

One of the most innovative trends observed in the last quarter of a century in archaeological studies is related to the emergence of natural sciences, which have fortunately multiplied, providing very new information about the environment, the type of plants cultivated and the animal world. Their extension to research into the periods of recent protohistory and the Roman era, based on practices long used by pre-protohistorians, has led to the development nowadays of an ecological approach that has long been lacking in France, compared with the situation prevailing in Switzerland, the Netherlands or the United Kingdom. Again, investigations are more advanced for the Iron Age than for the Gallo-Roman period. The INRAP (*Institut National de Recherches Archéologiques Préventives*) has thus developed a database of studies of fauna of rural settlements in Gaul (French territory only) that stops unfortunately at the Augustan period, but that has led to some most interesting initial syntheses (Méniel *et al.* 2009). Much the same is true of carpological (Zech-Matterne *et al.* 2009) or palynological (Leroyer *et al.* 2009) studies. The preliminary study conducted in the context of the present project shows, however, for the Roman period, the existence of resources that have been little used as yet. While we are still far from the number of analyses conducted in Switzerland (Jacomet and Vandorpe 2011) or in Hesse (Kreuz 2004), it is hoped that substantial synthetic information can be derived from them. It is clear, too, that the cross-feeding among these different disciplines is able to raise questions about rural production and agronomy in general from another angle. This is what Lepetz and Matterne have clearly shown for the North of Gaul, from a sample of some sixty geographically clustered settlements (Lepetz and Matterne 2003). The distribution of cultivated plant species and domestic animals proves that there are very clear matches between the choices of livestock and of crops and that regional specificities arise. This research still has to be compared with pedological studies.

One last background trend has characterized research on the rural world over the last quarter of a century: allowance for the long duration, continuity and breaks in the occupation of the countryside beyond the division of traditional history that reasons in terms borrowed from political and administrative history. In this respect, some of the clichés have happily vanished: that of the sudden appearance of speculative and overproductive agriculture, bringing about a revolution in rural practices from the very start of the Roman period, but that was ruined for good after the crisis of the third century. Recent studies all shown that the Augustan age did not necessarily see a boom in the countryside economy and that sometimes as many farms were abandoned as were founded (Nouvel *et al.* 2009). Those studies also reveal, especially in Germania, that the surge in villas was not concomitant with the military moving in, but on the contrary occurred almost a century later (Heimberg 2002-2003; Gechter and Kunow 1986). These differences are obviously dependent on factors that must be examined *regionally*, allowing both for ecological conditions and indigenous traditions, but also for new needs induced by conquest and the change in the pattern of land use, with the emergence of new clusters of economic development. Thus the rhythm of change was different in the Rhine delta, which was naturally little amenable to agriculture but favourable to livestock farming, from what was observed on the loess soils of the colony of the Ubians (Kooistra 1996; Groot 2008; Groot *et al.* 2009). For late Antiquity, it can now be shown that the pattern of abandonment was not linear from the second half of the third century onwards but was on the contrary marked by periods of upturn, before a clear downturn towards the end of the fourth century (Kasprzyck 2005). This dynamic approach to territories, studied individually and not globally must obviously now be a desideratum for any future research.

Towards new horizons

The conference proceedings recently published by Roymans and Derks on the diversity of agrarian landscapes in North-Eastern Gaul in Roman times show, to my mind, the way forward in studying agricultural settlements in their ecological, social, political and cultural context (Roymans and Derks 2011).

My own approach will take into account the spatial aspect of rural settlement, will examine the various functionalities of settlement, within their environment, with their agro-pastoral output that can be identified by disciplines like carpology and archaeo-zoology. It will also endeavour to understand the spatio-temporal dynamics of the countryside. The approach is therefore fundamentally a historical one, based on the consideration of varied archaeological data. It will combine both human and environmental sciences.

The basic hypothesis is that the inclusion of the regions making up the North-East of Gaul within the Roman Empire, far from having brought about the standardization of economic and social conditions, accentuated and accelerated processes of spatial differentiation that were already perceptible before the conquest. Many regions (e.g. the Rhône-Saône-Mosel corridor and the frontier regions) benefitted fully from the input from Rome (territorial development, economic fallout from the presence of the administration and the army) to undertake or maintain a sustained pace of economic development that might take on different forms in different areas. To date, historians and archaeologists have concentrated above all on forms of development that were expressed in ways which borrowed some of their 'vocabulary' from Romanity. Thus in the countryside, the spread of villas, the construction of major funeral monuments or the use of epigraphy have been thought of as sure signs of the presence of highly Romanized elites and therefore of economic systems capable of producing large surpluses. Without denying this, it can also be wondered whether there are not forms of economic development that follow different paths. In other words, in places where the signs of Romanity are less present, as in the countryside of the Remi, it may be possible to show that the countryside was also capable of producing wealth, as has been demonstrated for the Limagne area (Trément 2010) or the Rhine delta (Roymans and Derks 2011). One must therefore question the traditional historiographic scheme which, by associating Romanity and economic development, considers that the territories where Romanity is less clearly expressed were also the territories that remained on the margins of the economic processes induced by Rome (Woolf 1998).

A 'Romanocentric' approach to the countryside therefore requires the internal logic of agrarian systems to be better characterized by looking especially at farms and more specifically at the information by which their operation can be understood: farm buildings, implements, carpological, palynological or zoological data, etc. We shall also attempt to grasp the relations within homogeneous territories between the different forms of land enhancement: villas, farmsteads, 'villages', agglomerations. Then, in a comparative perspective, we shall try to characterize the specific features of the territories, both in terms of their social and economic organization and in terms of the way their agricultural potential was exploited. Ultimately we shall look into the evolution of these territories during Roman times. To be entirely effective, such a programme must take account of a fairly long chronological evolution, considering both the protohistorical heritage and the dynamic induced by the Roman conquest, but also the trajectory of the rural world and the changes in late Antiquity. We shall therefore consider a time span extending from LTD1 (i.e. after the major changes of the middle LaTène period) to the mid or even late fifth century of our era (i.e. before the major political, economic and social changes of the period).

The general objective is to come up with a 'geography' of rural areas and of the agricultural economy of a vast inter-region that is morphologically very diverse, with different agro-sylvo-pastoral potential. This unit is also characterized by protohistorical heritages that are not identical in terms of population, social structuring, agrarian organization, agricultural traditions and economic production; it was also unequally marked by the transformations following the Roman conquest (road network, urban creations, impact of the military market, different civic statuses presupposing unequal economic constraints, etc.), which was reflected by specific local patterns of change.

The obstacles that need to be removed, primarily in France, are of several kinds:

- the dispersion of teams and personnel, who are scattered geographically and institutionally, but also separated by modern language barriers, with different research traditions, bibliographies that are poorly known from one country to another, highly disparate and dispersed 'grey data'. The prime objective is therefore to broaden the existing scientific networks and to give them a European dimension by federating them within a project that extends beyond today's borders.
- the need to bring together protohistorians, Romanists and specialists of the Merovingian period who are all too often separated by the erudite divide in written sources for the Roman period, while archaeology perceives the cultural continuum instead.
- the need to associate researchers in human sciences (archaeologists and historians) with specialists of the various natural sciences who are not necessarily grouped together everywhere in the same way in common laboratories.
- the need to master a teeming and very heterogeneous documentation: apart from excavations (mostly

preventive) that have followed the recent creation of large linear or suburban developments, the documentation relies on research in high quality aerial photography but that has not been systematically exploited: for France alone the Goguey fund runs to some 7000 photos; the Agache fund, which is equally substantial, has been published but cannot readily be exploited by modern techniques. Added to this are new partial but highly promising data from LiDAR prospecting, especially under forest cover and that have recently led to some spectacular discoveries (Georges-Leroy *et al.* 2009). Allowance must also be made for older excavations, even if they are often poorer in quality. In France, they can be consulted through the archaeological map of Gaul (*Carte archéologique de la Gaule – CAG*). Much of the data is accessible through the territorial archaeological departments (*système Patriarche*).

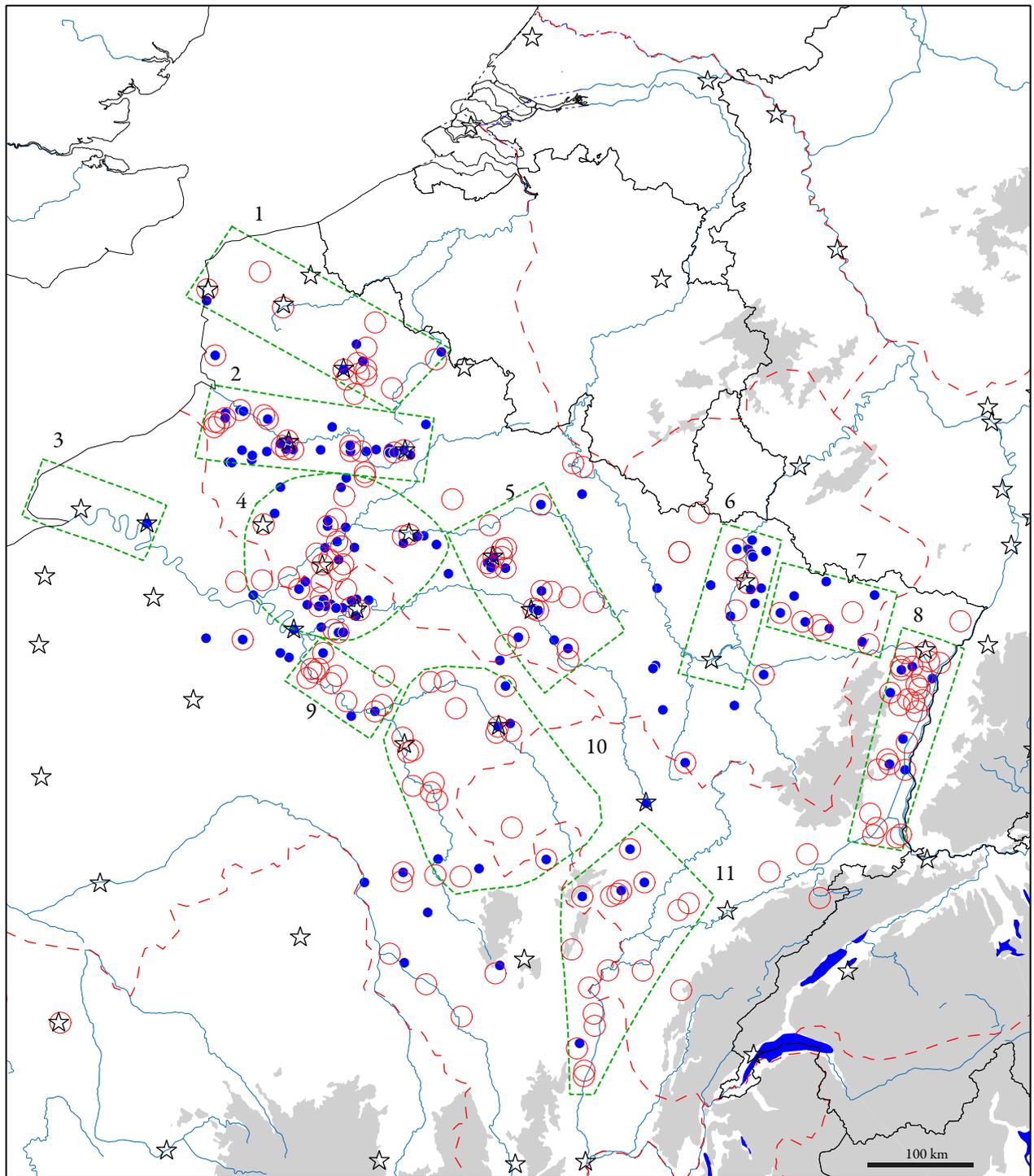
The Rurland Project is therefore innovative and ambitious: innovative because this form of investigation consisting in cross-matching such diverse information is still hesitant in Europe and even more so in France, especially for the Roman period; ambitious because the overall scale of the study area is so vast. There is obviously a risk of failing to master so substantial a whole. *This is why the collection of primary data shall be focused on France and carried out by a tried and tested, homogenous team. The European dimension of the project shall be provided by comparing and contrasting this survey with those in neighbouring countries, in conjunction with the scientists concerned.* The challenge is scientifically significant enough to be worth the risk, because it might radically alter our historical perspective of the rural world of Antiquity in a key region of Northern Europe.

Methodology

The analysis over such a vast area will necessarily involve defining ‘workshop zones’ which may be of variable size, ranging from the territory proper to the village area or even to the site (fig. 1). The study grid must therefore include multiple scales and allow each spatial ‘window’, on the basis of documentation selected in terms of the quality of the archaeological data, to propose samples that can be modelled. The fitting together of these different pieces of the mosaic will provide, on the scale of the entire region in question, a set of data to enable meaningful comparisons with the situations brought to light in the adjacent European countries and to write a general synthesis, which is the ultimate purpose. The final outcome will therefore be both a monograph and a system of on-line information comprising the databanks collated over the course of the programme. The Rurland Project will be organized around four complementary focuses:

Focus 1: Agro-sylvo-pastoral systems.

My first ambition is to study the diversity of forms of farming through an examination of agrarian systems, that is, interactions between productive social systems and cultivated ecosystems. In this perspective, the first job is to better characterize agrarian techniques using the data provided by pedology, archaeo-botany, archaeo-zoology, the study of buildings, of agricultural implements and of processing structures for agricultural produce. This investigation will bear also on the means by which rural societies use forest areas and little cultivated or uncultivated areas to supplement their resources and exploit materials useful to agricultural production and livestock farming. It is now proved that the process of intensification of agricultural production was not consecutive to the Roman conquest but began in the second century BCE, at rates and in ways that varied from one territory to another. To be very brief, it can be considered that it is characterized by the selection of plant varieties offering better yields and animal species of larger body size. This development was made possible by greater mastery of cultivation and breeding techniques. Combined with a substantial densification of agricultural settlements, this process provided the conditions for a marked surge in population through the all-round increase in surpluses. In cereal farming, the importance taken on by free-threshing varieties of wheat, which could more easily be made into bread but which were more demanding and more fragile, is a good example of quality gains of Gaulish agriculture. Likewise, the increased stature of livestock is an illustration of the marked improvement in breeding techniques. This dynamic continued after the conquest and even seems to have stepped up a gear in the first century CE. Several indications suggest that it was this period that saw the gradual development of a new agrarian system closely combining cereal growing and livestock farming and that made it possible to produce greater quantities of crops that consumed large amounts of nitrogen, such as free-threshing cereals. The use of cattle sheds and the provision of fodder probably also had positive effects on livestock management. Lastly, it may be that the advances in ploughing implements fostered the development of agricultural techniques. These developments did not occur everywhere in the same way and at the same pace. One of the major achievements of recent research is to have shown their variety and their specialization depending on the agricultural potential of the soil, the weight of tradition and the nature of agrarian systems. To take just one



— Frontières Altitude > 500 m ☆ Chef-lieu de cité - - - Limites provinciales ● Étude carpologique ○ Étude archéozoologique

- Zones ateliers :**
- 1 : Artois, côte de la Manche (Atrébates, Morins, Nerviens)
 - 2 : Vallée de la Somme (Ambiens, Viromandes)
 - 3 : Basse vallée et estuaire de la Seine, pays de Caux (Véliocasses, Calètes)
 - 4 : Vallées de la Marne et de l'Oise, plaine de France et Beauvaisis (Parisii, Bellovaques, Meldes, Suessions)
 - 5 : Champagne, Perthois (Rèmes, Tricasses)
 - 6 : Vallée de la Moselle (Médiomatriques, Leuques)
 - 7 : Plateau lorrain (Médiomatriques, Trévires)
 - 8 : Plaine d'Alsace, Sundgau (Triboques, Rauraques)
 - 9 : Moyenne vallée de la Seine, Bassée (Sénons, Parisii)
 - 10 : Haute vallée de la Seine, vallée de la Cure, Châtillonnais (Sénons, Tricasses, Lingons, Éduens)
 - 11 : Vallées de la Saône et du Doubs, Dijonnais (Lingons, Éduens, Séquanes)

Fig. 1 : Study windows, as they are planned according to the documentation which is available before the beginning of the RurLand project.

example, Lepetz and Mattered have shown that Picardy, with its deep limestone soils, and the East of the Paris region, where highly fertile loamy soils are more common, were characterized by clearly differentiated agricultural production (Lepetz and Mattered 2003). In Picardy, hulled cereals and spelt wheat especially, were preponderant together with cattle farming. The land was farmed by a high proportion of extensive agricultural settlements. By contrast, in the East of Île-de-France, the proportions of free-threshing cereals and sheep were far higher and the agrarian system was based essentially on a dense network of smallholdings. Paradoxically then, it seems that the large estates of Picardy were associated with extensive agriculture and the smallholdings of Ile de France with more intensive farming practices. The agricultural potential of the soil was undoubtedly essential to this differentiation of agricultural systems. The absence of any collation of carpological and archaeo-zoological data means it has not yet been possible to examine the issue for the entire study area under this project. This will therefore be the first ambition.

In this perspective, experimentally, we shall develop several limited and independent archaeometric programmes but that are complementary in their objectives and innovative in their methods:

—**Fertilization of cropland by manure and the potential role of cereals in fodder for cattle:** insight by means of isotope analyses into carpological and archaeo-zoological remains (nitrogen cycle). Fertilization of cropland soils by animal manure or droppings is reflected by a change in the ratio between two stable isotopes of nitrogen: ^{15}N and ^{14}N , expressed as the value $\delta^{15}\text{N}$. The use of this principle in identifying the practice of manuring of cropland in an archaeological context has recently been the subject of several publications designed to measure the effect of the intensity and duration of manuring on plant $\delta^{15}\text{N}$ values, and to test the preservation of those effects on carbonized grains, since it is essentially in this form that archaeological grains come down to us. In the Rurland Project, two ‘window-workshops’ have been selected to compare $\delta^{15}\text{N}$ measurements on soils, palaeoseeds and animal remains: the Champagne chalkland and Lorraine. This research is the subject of a two-year post-doc application.

—**Isotope analyses of animal enamel.** Isotope analyses provide new insights into the history of movements of people and animals. In the context of this project, the questions concern the geographical origins of large animals found in Gaul (local improvement or imports from the Mediterranean area). Among the study sample, are there large or small cattle or horses that stand apart from others in terms of their isotope ratio and so come from a different geographic area than the other individuals? Can a geographical area of origin be defined? To answer these questions, the isotopic composition of dental enamel in oxygen, carbon and strontium is measured. This isotope ratio varies with environmental parameters such as geology, precipitation, sunshine, type of photosynthesis of plants eaten, etc. By studying this ratio, recorded in animal tissue and the parameters it depends on, it is possible to tell individuals apart and to identify their geographical areas of origin. This specific research is the subject of a one-year post-doc application.

—**Soil analyses.** In the Forest of Haye, work directed by Georges-Leroy provides a map of Gallo-Roman occupation drawn up from LiDAR data, which is already highly instructive (Georges-Leroy *et al.* 2009). Moreover, the dosage of phosphorous on the scale of the forest provides valuable information about the overall use of the land. It is now proposed to go further by making a detailed map of soil texture and its composition in organic matter (carbon, nitrogen and phosphorous). The objectives of these analyses are to better understand the diversity of the farming settlements in their environment and to identify the sectors that were largely transformed by agro-pastoral activities. Work on organic debris of Viking farms in Greenland has shown that it is possible to identify manuring by the $\delta^{15}\text{N}$ values (Commisso and Nelson 2007). In the present project, it is proposed to transpose this method in an innovative way to soils of the Forest of Haye. The results of the analyses will be compared with those for sediments filling small cavities (“*mardelles*”) located close to dwellings. In these stratigraphic sequences dated by ^{14}C , we shall try to identify the contributions of organic matter by geochemical analyses (C, N, C/N, ^{15}N , ^{12}C) and the search for molecular markers like miliacine (Jacob *et al.* 2009). There is still little work on nitrogen isotopes in the environment of archaeological sites (Liu *et al.* 2006; Commisso and Nelson 2007; Shahack-Gross 2011). This work in the Forest of Haye will therefore be experimental. A similar protocol shall be used in the Forest of Châtillon-sur-Seine. As the knowledge of Gallo-Roman occupation of this forest is less complete than for the Forest of Haye, the analyses shall be made close to a network of well identified field boundaries and in the area of a large agricultural settlement: the villa of La Soue du Saule. Mapping of the relief with digital elevation models derived from LiDAR data shall be used to specify the organization of this part of the land. To continue this work of data comparison, similar studies shall be undertaken on the probable large agricultural estate of Rolmapont-Faverolle, south of Langres, and close to the hillfort of Saverne, in the Forest of Wasserwald, in Alsacia. We shall thus have a set of benchmarks on Gallo-Roman fertilization that will make it possible to evaluate additions of organic matter to poor soils. This evaluation is a first step towards an

understanding of agronomic and economic conditions of the farming of these micro-regions. This research requires post-doc funding for one year.

These different tasks will result in a supra-regional diachronic mapping of the species cultivated and animals farmed as the primary accomplishment. Subsequently, this geography of crops and livestock will be compared and contrasted with that of the soils and their agricultural potential. At present there is no such map. *Its conception is therefore one of the innovative objectives of this project.* Its production relies on the processing of data about soil quality and the conditions that affect it, such as their hydromorphy, their slope or their altitude. The work shall be to collate all of the available geo-pedological and agronomic data (information at 1:250 000 of the IGCS database). Major soil categories shall be identified depending on the agronomic potential. It shall thus be possible to identify micro-regions in terms of their agro-pastoral potential: mountain areas, rich lowlands, limestone plateaux, etc.

Comparison of this map with those for agricultural output and the functional typology of agricultural settlements (focus 2) shall provide insight into one of the mainsprings of the diversity of farming practices. It seems *a priori* that the poor soils of the limestone plateaux of Champagne were farmed mostly as smallholdings engaged in relatively archaic agriculture in which growing barley occupied a large place, while large villas were to be found in the rich alluvial plains of the lower valleys of the Rivers Saône and Doubs. The ambition is to understand the logic of these systems. We shall also try to understand the localization of ancient vineyards, as markers of Roman culture, in the northern regions on the boundaries of the natural conditions favourable to vines. Recent syntheses on ancient vine-growing in Gaul (Brun, Laubenheimer 2001) and in Gallia Lugdunensis and its marches (Brun *et al.* 2011) together with the discoveries from preventive archaeology authorize the comparison of areas chosen for winegrowing and the earliest viticultural settlements known from the first century in the North (Garcia *et al.* 2010).

Focus 2: agricultural settlements: functional typology.

The objective of this focus is to better characterize the economic functions of the different types of rural settlements, while these are the parts of the habitat that have usually commanded archaeologists' attention. The aim is not to compile a full corpus—an objective that would be illusory—but to analyse, from selected examples, the role of different types of agricultural buildings in the production cycle, and to characterize the settlements in a functional and hierarchical interpretation (Habermehl 2011).

To date there are no substantial works defining the agricultural settlements of the Early Empire based on excavation data for all of North-Eastern Gaul. It may be considered, then, that those for the late Iron Age are now better known than their successors of the Roman period. For want of published data, the existing typological studies are based largely on aerial photography data (Ferdière *et al.*, 2010), which are fundamental for characterizing the general organization of large agricultural settlements, but that may not seem terribly relevant for describing the organization and functions of lower-ranking settlements, which were certainly the more numerous but often less visible because they were not always hard-built. This observation is particularly valid for regions where building materials were in short supply and wooden architecture predominated, if the data of preventive archaeology are to be believed. It therefore seems vital, initially, to go back to the existing documentation, at least for representative zones, matching data yielded by field archaeology that might be supplemented by aerial photographs. Apart from the study of architecture and the spatial organization of buildings, the equipment of these settlements needs to be investigated: craft structures or structures for processing agricultural products (mills, presses, wine storehouse, dryers), wells, ponds, orchards, and so on. The definition of agricultural settlements may also be addressed in terms of their functional organization and their complementarity within the holding, especially for small farmsteads, which are probably the least well known. This morphological analysis will have to include a diachronic approach so as to investigate the protohistoric antecedents of architectural forms of buildings and their layout: recent work shows the probable indigenous origin of the organization of the largest settlements of the Three Gauls, with clearly separated residential and agricultural parts, unlike examples in Gallia Narbonensis (Fichtl 2009). Another aspect that is often ignored and that may be considered an important expectation from this research is the existence (or not) of settlements in the form of 'agricultural villages', which is suggested by a number of prospective digs in the woodlands and several preventive archaeological operations.

For late Antiquity no major work has been undertaken in North-Eastern France since the research by Van Ossel (Van Ossel 1992). However, in Ile-de-France, the contribution of research in the 1990s and 2000s is particularly prominent in the domain of the architectural structuring of late sites (Ouzoulias and Van Ossel 2009). A few observations relativize the idea that the transition from stone to wooden architecture is the sign of economic decline (Ouzoulias and Van Ossel 2001). Recent research reveals the existence of agricultural

establishments created in late Antiquity (late fourth and above all throughout the fifth and early sixth centuries), which was for long not perceived, but also the maintenance of an aristocratic type of habitat. For now this type of settlement is essentially attested in the provinces of Gallia Lugdunensis II and IV (south of the Paris Basin) and in the Belgica I province (around Trier). A re-examination of the existing documentation would probably broaden this observation. In some regions like Lorraine, it is often observed that large estates were still occupied by rural populations formed into 'hamlets' on the ruins of former villas of the Early and Late Empire, during the Valentinian and Theodosian periods, and then again in the first half of the fifth century, despite the effects of the Germanic invasions. Often there are but few vestiges of late Antiquity (coins, typical objects, kiln structures, T-shaped dryers), within the traces of partly eroded sites (late top levels often ploughed up and dispersed by past and present agrarian erosion). The diachronic occupation of rural sites over long durations is now often observed. In view of recent discoveries, it would be a good idea to take account of these findings to support research on the theme of the duration of ancient occupation of agrarian land and the role of such occupation in the peopling of the countryside at the time of the transition with the Early Middle Ages.

Focus 3: field boundary systems.

Unlike in regions of northern France, preventive archaeology in the East has failed to provide any substantial information about protohistoric and Gallo-Roman field boundaries (Favory 2011). Field boundaries remain a marginal object of archaeological investigation simply because they are recognized only on the edges of a rural settlement or an area of agro-pastoral or artisanal activity in the rural environment while it is those features that remain the primary object for excavations. However, other approaches have yielded information and continue to do so:

- field surveys when the field boundaries remain in the form of raised boundaries (walls, banks, elongate stone piles). Several micro-regions in the East have yielded valuable data about this type of remains (foothills of the Vosges, forests of Lorraine and Burgundy, Dupouey *et al.* 2007; Fruchart *et al.* 2011). The fact is that these micro-regions share a number of characteristics and primarily their topography and their pedological facies. These fossil field boundaries are found on hills and plateaux, with limestone or sandstone bedrock and thin soils where agriculture involves clearance of large volumes of stone which provide the main material for rural features such as boundary walls, walls to shore up terraces, walls lining tracks, walls or ground courses for dwellings.
- LiDAR remote sensing that offers a coherent and comprehensive view of fossilized field boundaries beneath forest cover and can be used to supplement and correct field surveys (Forest of Haye, Georges-Leroy *et al.* 2009; Forest of Chailluz).
- low-altitude, large-scale aerial prospecting in non-wooded areas (e.g. the work by Goguy and Chouquer in Burgundy and Franche-Comté).
- photo interpretation of vertical aerial missions on varied scales or of satellite imagery, on a small scale for the geographic footprint of the scene and large scale when focusing on details (Burgundy, Franche-Comté).
- cartographic interpretation of plans on large and medium scales and of maps of modern and contemporary times on medium and small scales (Burgundy, Franche-Comté). It is these last techniques that have enabled researchers like Chouquer to investigate the hypothesis and consequently gauge the influence within contemporary field boundaries of possible Roman centuriations in the Saône Valley from the Chalon area to the plain of Mirebeau.

The traces of Protohistorical and Gallo-Roman field boundaries are a highly effective and very valuable indicator for locating and spatializing the footprint of land developed for agropastoral activities of Ancient communities. These developments are located in different types of topographic profiles: floodplains, lowlands, hills, plateaux, foothills. This diversity of contexts raises many questions. The traces can be seen both in non-wooded areas, that are currently used for crops and livestock (lowlands of the River Saône catchment basin) and in forested areas (Lorraine, Burgundy, Franche-Comté), in other words, land that was formerly used for agriculture and livestock farming, and then abandoned to the forest at times that it is important to specify. This diversity of topographical and pedological situations prompts questions about the different forms of agro-pastoral production implemented at the end of La Tène and during the Gallo-Roman period and their respective articulation with the regional, provincial and imperial market. The pioneering work in Lorraine and in smaller areas of Burgundy invites us to extend the survey to other fossil field boundaries, including the systems identified and studied by Chouquer in the Valley of the Tilles, in Côte-d'Or (Chouquer 2009) and to apply to them the statistical protocol of morphological and metrological characterization developed and tested as part of ANR ArchaeoDyn.

Focus 4: Rural societies and socio-economic activities.

The fourth focus seeks to propose a historical consideration on the rural area of the North-East of Gaul. It forms an array of questions about the social organization of the countryside and its economic operation within territories characterized at the same time by their road network, their fabric of agglomerations and their geostrategic position behind the Rhine *limes*. It aims therefore to study the local, regional or long-distance interactions between rural production proper and the different, more or less remote, potential consumers: local, 'urban', military, etc.

It is very rare that Roman rural society is not described in the overall context of the Empire where the case of Italy and of certain provinces like Africa have great weight because of an exceptional wealth of documentary records. The current approach relies on the idea that the needs of the *Urbs* first of all, then of the army and finally of the urban world engendered new commercial circuits (wheat from Africa and Egypt, oil from Betica, and so on) and led to the general economic surge of the provinces (Kehoe 2007). My aim is not to discuss whether this 'global' approach based on identifying 'major' trade flows and on the idea that the villa was predominant in the agricultural system, the organization of territories, the cultural transformations of the countryside is well founded (Scheidel and Wilson 2009). This approach reflects the local variations in land use in terms of 'development/underdevelopment'. The dichotomy of the villa/'indigenous farms' is readily interpreted in terms of the economic subordination of the latter to the former.

In the context of the research I propose on the rural territories of North-Eastern Gaul, it seems to me that this region cannot be dealt with if its regional context and the market that the *limes* formed are ignored. Leveau came up with an analysis and a map suggesting that this study area lay at the heart of a 'development corridor' running from the Mediterranean to the Rhineland. It encompassed the Saône/Mosel line but also a large part of Belgica (Leveau 2007). However, I have tried to show that, in the first decades after the conquest, the substantial logistical requirements of the army might not have provided an economic impetus but on the contrary could have been a drain on the wealth of a region that had not been spared by the Gallic Wars (Reddé 2011). Different interpretations of the style and rhythm of economic development of these territories are therefore possible, but they must now be correlated with a finer and better structured approach to local societies. Given the nature of our documentation, it is obviously the elites who were the most prominent. Certain traditional 'markers' of their presence in the countryside show that their spatial distribution was far from regular. Among the Remi, for example, although much is known about their aristocracy, villas were comparatively rare, recent preventive archaeological research around Reims notwithstanding. The question must therefore not be addressed solely in terms of development / underdevelopment but in terms of different 'agrarian systems' depending on time and place, and on the type of society. These geographical disparities had many causes. We shall endeavour first to appraise what they owed to the economic and social organization of the end of La Tène. Thus in certain *ciuitates* (Treveri or Mediomatrici) it seems that the early emergence of large villas may be related to the presence of a Latenian aristocracy, that can be identified from the archaeological evidence of their funeral rites or the ways the land was farmed. For the Gallo-Roman period, the study can be conducted by examining the spatial distribution of villas, of funerary mausoleums and epigraphic records. Now, the North-East is one of the regions of Gaul that was best supplied with funerary monuments, which are sometimes recent discoveries as at Faverolles or Bertrange (Kremer 2009). A map of sculptures discovered in rural settings might, from this point of view, prove a significant marker for the presence of large estates (Krier and Henrich 2011). The East of Gaul also provides a real epigraphic wealth, which is also an excellent marker of elites and their acculturation (Woolf 1998; Derks 2011) with areas where inscriptions are plentiful (Saône and Mosel Valleys) and others where they are rare. The countryside of the *ciuitates* of the Remi or the Tricassi, or of the Ambiani, for example, have still yielded very little evidence of this kind. Yet they did have their elites, although perhaps they manifested their position in other ways. Conversely, it is no less clear that there were marginal areas, probably because of the specific ecology, such as the mountains or forests, where it can be surmised that economic activity and social organization were different.

The objective of this fourth line of research is therefore to try to reconstruct the interactions among these different factors that define one or more agrarian systems on the scale of a vast and diversified geographical area and to analyse their position between the Mediterranean world and the Rhineland frontier. Collecting this information, collating it, characterizing it by a standardized protocol, mapping it and proposing an overall historical interpretation would obviously be a major quantitative and qualitative leap in our understanding of the agrarian system of this region and of its economic workings on the scale of Gaul and the Germanies.

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