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2.4 Settlement Pattern Analysis and Demographic Modeling

John Bintliff

The wave of intensive and semi-intensive field survey projects sweeping across the entire circum-Mediterranean region since the 1970s, has infilled many regional landscapes with dots representing settlement and activity networks of every period from Paleolithic to Post-Medieval. From the beginning these projects have been carried out in the unshaken belief that sites can be identified with comparative ease, that their size can be determined for each chronological phase and that therefore the pattern of demographic change in the *moyenne* and *longue durée* can be reconstructed. Careful study of the publications and ongoing experience of projects being prepared for publication make it difficult to accept these assumptions of an earlier wave. Albert Ammermann (pers. comm.) characterizes the most recent phase of methodological rethinking in field survey as one in which regional project directors must cease to see surface data as simpler and more direct evidence on regional settlement dynamics than excavation data - and recognize that surface data are just as difficult to understand as excavated artefact assemblages. Relevant aspects of this new 'problématique' focus on the taphonomy of surface assemblages, on the serious need for refining ceramic and lithic typologies, on the inadequacy of regional sampling strategies, and on the limited number of publications evaluating the relationship of surface finds to deposition and its governing conditions (full-time occupation, temporary-seasonal occupation, storage or specialized activity loci, burial and cult foci), not forgetting the often considerable effects of offsite deposition on surface find study even within 'sites'. A final aspect to be noted is the relatively small body of applied theory concerned with pattern and process in long-term settlement dynamics. The longest tradition in the Mediterranean - that of German scholarship with its *Landeskunde* approaches of the pre-War and early post-War era - has suffered unaccountable neglect, whilst other approaches are only just beginning to be investigated and experimented with.

In this paper I shall elaborate on the issues just raised and discuss new ways to work on the closely-related tasks of settlement analysis and demographic reconstruction using Mediterranean survey data.

2.4.1 The historical development of intensive survey

Topographical landscape research has almost as long a history as Archaeology itself: one thinks for example of the field trips and observations of Antiquarians such as Stukeley in the 17th century (Greene 1995:21-23), and of the more detailed recording of monuments along exhaustively explored country routes in late 19th century Greece to be found in the work of Lolling and other scholarly topographers (Lolling, reissued 1989). Archaeological field survey in the Mediterranean lands only came of age with the planned regional coverages pioneered by teams such as that

of the British School at Rome in South Etruria during the 1950s-60s (Potter 1979) and the Minnesota Expedition to Greek Messenia in the 1960s-70s (McDonald & Rapp 1972). As is now well-known, within a short period there arose a further development in topographical landscape research, a 'New Wave' (Cherry 1983; Bintliff 1994b) - in which the aim was to accomplish field-by-field cover of small sectors or whole blocs of a regional landscape, using fieldwalkers placed within such close distances that all but the smallest activity-traces on the surface would be observable by one or more of the team; this is often referred to as 'intensive' as opposed to the previous 'extensive' method of reconnaissance. In retrospect, I see that the methodology we devised enabling us to intensify observation was ready to be applied before we realized what it entailed in data processing and interpretation. An unparalleled explosion of new information required far more time to sort and interpret, and prepare for publication than expected. A new complication arose from the delay in project completion, in that the impetus towards improvement in the young subdiscipline of field survey meant that projects working with older data found themselves with an array of additional questions and analytical procedures to incorporate into their plans. Nonetheless the 'New Wave' projects gave us a Mediterranean densely-filled with 'sites' or dots on the map of a remarkable richness in space and time, and summoned up a very lively discourse among historians, anthropologists and excavation-based archaeologists.

By the 1990s, when many projects of the 'Golden Age' of field-by-field survey were fully or partly published, questions could rightly be raised as to what was the precise status of the numerical and spatial information on these distribution maps which emerged from regional surveys all around the Mediterranean. Doubts were raised by practitioners themselves, and by other scholars, notably in Ancient History. Two problems were highlighted: first, it was much easier to find a rich spread of surface sites than to evaluate what each one represented in social, economic, chronological etc. terms. Second, that even the vast increase in sites per square kilometer represented only a random sample of the original settlement and activity systems in a given landscape - what was not being found and how significant was it? Some success had already been achieved through refinements in local contextual procedures, for example the linking of visible sites and distributions to the geomorphologic maps and histories of the region under study (most notably by the Southwest Argolid project in Greece - van Andel et al. 1986), or the recalculating of figures on past populations to allow for coarse chronologies (on the Melos project, also in the Aegean - Cherry 1979), other refinements were the adoption of filtering mechanisms to allow for variations in vegetation cover, and total-counting of all surface artefacts during fieldwalking to include 'offsite' as well as 'site' activity traces (a procedural link pioneered on our own Boeotia project in Greece - Bintliff & Snodgrass 1985), and we had some success in correcting the bias introduced through differential ability to recognize and date surface artefacts (as for example with the balancing of imported fineware chronologies for sites

with local domestic and coarseware assemblages – cf. Cambi & Fentress 1989 for the Albegna survey).

2.4.2 The need for a new *Quellenkritik*

Despite the undeniable success of the New Wave surveys of the 1970s–90s in plotting on landscapes plentiful sites of almost all periods, the corrections and methodological changes brought into that tradition in its more recent phase have only served to reveal far more deep-seated problems in the recovery and interpretation of surface survey data (cf. in general, Bintliff, Kuna & Venclova 2000). Tackling these problems is all the more important, since scholars want to utilize the growing number of New Wave survey publications for comparisons between regional patterns on an interregional scale (a fascinating project notably explored for the first time in the Roman Landscapes conference – Barker & Lloyd 1990), with later examples including Sue Alcock's monograph on Roman Greece (Alcock 1993) and her study of Eastern Mediterranean surveys (Alcock 1994), and my own paper on long-term growth trajectories in the Aegean (Bintliff 1997a). I shall discuss in turn a number of topics arising from the data brought into current survey theory discourse as a result of the New Wave surveys, complex and difficult though it is.

2.4.3 Density and quantity are not enough...

Two case studies in Mediterranean survey bring out rather well the need to challenge and replace the assumption that the density of activity foci or 'sites' can be used as a reasonable indication of economic complexity or cultural florescence. This is a significant revisionary statement, since one of the key points of New Wave survey was its success in multiplying regional site densities many times over in contrast to earlier extensive and topographic research. The first of the case studies is the recent remarkable results from the survey of a polis / city state territory in Lycia (S.-W. Turkey) – that of Kyaneai, by a German team led by Frank Kolb (Kolb 1993, 1995, 1996, 1998). This is some 138 km² and can well be described as very marginal karst landscape. However, the great colonization and infill of the region which occurred between Hellenistic and Roman times, followed by retraction to very low levels of population in all subsequent eras (including recent times) has ensured that the Greco-Roman town and country survive in enviably fine upstanding monumental condition (urban and rural house structures, rural tomb monuments, etc.). A site density of some 5 per km² is typical of recovery results from the richest farming landscapes elsewhere in the Mediterranean. Although there is historical evidence to suggest some degree of export from the region, the land potential and communication problems would argue that the primary activity underlying this ancient intensification of occupancy was a growing internal regional market.

In dramatic contrast are the results obtained by another recent intensive survey, this time in Tunisia, but also emphasizing Greco-Roman antiquity – the Segermes survey (Dietz, Ladjimi Sebai & Ben Hassen 1995). A far larger

zone, some 600 km², has been surveyed, from which some 69 farms and other rural sites can be identified for the Roman Imperial period. At around 1 site per 8 square kilometers, it is very tempting to relegate this region to extreme underdevelopment in socioeconomic terms compared to contemporary settlement and land use systems in Lycia. The extraordinarily small size of the associated urban foci in this part of Tunisia – a few hectares, might seem to bear this out. Nothing could be further from the truth in fact. Recent research has shown that low-density, widely dispersed rural sites in this region reflect a specialized form of economic production geared to long-distance exchange – with unusually-extensive olive groves – each tree far from its neighbor to enhance its productivity – matched to very large estates.

If differences in regional economic organization (an aspect of the Roman Empire increasingly apparent from archaeological research – cf. Fulford 1987) help to give a quite new reading of site density variation as revealed by survey, more difficult and even perhaps intractable problems can result from the limitations of chronological determination for a period map of sites. John Cherry back in 1979 (*op. cit.*) made a very plausible case for deconstructing a map of Early Bronze Age rural sites – seemingly a full landscape of family farms – on the Aegean island of Melos, by suggesting that only a handful of farms were likely to be in use at any one time (based on the immense time span of the ceramics dating the sites and their probable individual life span of 1–2 generations).

Another form of quantitative revisionism concerns an even more fundamental reading of survey data – the equation of numbers of dated sherds or lithics collected from a site with intensity of activity per period represented. Here my own recent analysis of the Boeotia Project survey in Central Greece has caused me to rethink our understanding of that landscape in ways totally divergent from our views at earlier stages of this regional project (cf. Bintliff & Howard 1999; Bintliff, Howard & Snodgrass 1999; Bintliff 2000). The final publication of this long-lived survey program (it began in 1978) will commence with a volume devoted to a small sector – some 5 kilometers square – which forms a part of the rural hinterland of the ancient city of Thespieae. This Leondari South-East / Thespieae South (LSE/THS) district produced 18 rural sites, one being Medieval, seventeen being Greco-Roman, and none being recognizably prehistoric. The publication of this slight group would have been easy enough till recently, since grid collection on all the sites and reasonably-large sherd collections would have allowed one to produce a map of occupation sites per period across the landscape, where significant numbers of finds was read as occupation, low numbers as temporary use or 'offsite' (a vague way of leaving that data out of further analysis). Indeed this has been the norm for other Greek New Wave surveys up to the most recent to be published. And yet distinctive and problematic aspects of the LSE/THS data argue against such a straightforward path – and indeed several years have been spent dealing with those methodological and interpretative difficulties before we now feel confident enough to publish the group.

The first obstacle to easy reading of the district is the nature of the 'offsite'. Continuous counting of sherd densities in line-walking allowed us to create a total density map of the whole sector, corrected for visibility variations. The entire district is an unbroken carpet of sherds, with an average of well over 2000 pieces per hectare. A dated sample collected throughout the 5-plus square kilometers surveyed revealed a further remarkable statistic - something like 75-80% of all this material (of the order of some 1.5 million surface sherds by extrapolation) belongs to just one chronological phase - the broad Classical Greek period. We have rehearsed our arguments to explain such offsite densities elsewhere (Bintliff & Snodgrass 1988b; Snodgrass 1994), but the data now available leave no other possibility than to ascribe this to radial manuring out of the large city of Thespieae, a phenomenon closely matched in Tony Wilkinson's studies of agricultural manuring in the historic and prehistoric Near East (Wilkinson 1989). The scale of impact here is also very comparable - with major urban sites in the Near East creating manuring haloes in the form of dense carpets up to several kilometers out from their perimeters. GIS study using an access surface out from the city of Thespieae, merging distance with slope angle, and allowing for major differences in soil fertility, also finds very good agreement with variations in the density of the LSE/THS carpet.

The specific problem raised by what now still seems a manageable mass of data relates rather to the implications for site study in the district. Since the manure carpet is ubiquitous, and considerable, sherds collected onsite cannot automatically be assumed to reflect site-activity, but could have resulted from manuring at times when the fields incorporating the site were merely in agricultural use. Indeed when we formalized this challenge into a 'residual analysis' - predicting the typical density of offsite finds in the area of the site were the site not to have been in use - we found that many of our sites had finds per period that were not elevated above offsite expectation. Naturally this result generally arose with sherds onsite of Classical Greek date - and we have concluded that even where the commonest finds onsite were of that period, in several cases the absence of densities above local offsite must mean that the 'sites' were agricultural fields in that era, only achieving occupation status in subsequent Roman, Late Roman or Medieval times, when often smaller numbers of sherds still represented vastly-increased densities compared to the modest to poor representation of those periods in the local and general offsite.

A not-unexpected corollary of the site-offsite problem is posed by what is a relatively common site type in the survey of the Greek Mediterranean - the small rural family-clan cemetery. We have been able to show that in the LSE/THS sector at least, the very-localized and low density scatters of fine and special purpose wares revealing the presence of such tomb groups usually are at or below the density of contemporary urban manuring carpets. It is the qualitative features that seem to have allowed identification in the first place, and since such scatters can be so small that only one walker may pass on or near these sites, it must be

highly likely that many if not most elude detection in standard 15 m or greater interval fieldwalking.

One very positive result of the manipulations required to resolve occupation or otherwise for Classical Greek sites has been a much greater resolution of the significance of other period finds on the sites of this district. We have been able to suggest differences in the density and shape of scatters for Roman and Late Roman times which could indicate variable site function - from full intensive occupation through small scale and possibly seasonal or temporary use, down to minimally-heightened activity foci within an agricultural or pastoral land use pattern. Here I would underline the necessity of continuous landscape offsite recording to clarify the depositional context of onsite finds, but also add that raw numbers of finds per period is not enough alone to indicate what was happening in the site locality. I have already illustrated this in the special case of cemeteries, but we are now able to point to an additional complication: even when a small collection of finds onsite for a particular period may be little different to expected offsite finds for that phase, leading to an initial evaluation that at that time the site cannot be shown to be more than a zone of agricultural manuring or very light temporary activity, the spatial properties of low-number onsite finds can reverse such an interpretation. The reason for this is as follows: although over the whole site area absolute numbers of finds for a particular period may be merely at local offsite level for that phase, when their dispersal over the site grid is shown - those small numbers can turn out to be highly focussed in just one limited part of the grid - where their density is significantly-higher than in the offsite. The clear implication of such complex empirical observations is that the days of surveying without detailed offsite counting and collecting are over, nor can onsite collections rely any more on ungridded grab samples.

Quite a different but no less significant revision of procedures seems now clearly called-for when we come to consider the way in which prehistoric surface sites make their existence manifest to fieldwalkers. Even New Wave surveys can be shown to achieve very large increases in site densities for most historic periods but far less significant multipliers for the much longer periods of prehistoric occupation. Indeed the calculable population and land use picture one might extract from the data for the prehistoric phases of most surveys seems far too limited to be plausible, although such surveys normally can point to well-defined sites with abundant sherds and lithics from the later prehistoric farming eras of Neolithic, Bronze or Iron Ages. Now it can be shown from exhaustive study of small surveyed landscapes (in Boeotia for example, - Bintliff, Howard & Snodgrass 1999, or the Agro Pontino - Attema, van Joolen & van Leusen 2001), that these clearly-identifiable later prehistoric sites are probably the exception, with other kinds of barely- to hitherto un-recognized sites forming the norm for Mediterranean landscapes. The arguments can be summarized as follows: much of the ceramic material of these eras is coarse or low-fired, and in the many millennia since deposition such pottery has a very

low survival rate in surface deposits prone to natural weathering and regular cultivation, in contrast to the harder wares of historic times. The larger and longer-occupied a later prehistoric site may be, the greater chance that its presence reaches the normal level of site recognition typical for historic sites. But if a prehistoric site is relatively short-lived and/or small, then the sherd material is normally as slight as a mere few pieces or even a single piece of pottery visible to a fieldwalker in a single fieldwalking transect. Fortunately, a confusion with prehistoric manuring can be ruled out, as a result of insights obtained by Czech colleagues on similar settlement systems (Kuna *et al.* 1993; Kuna 2000), where it has been shown convincingly that current surface finds have to be the result of modern plowing into settlement or burial strata, since the survival of coarse scatters – had they been only placed from the beginning in the ploughsoil – would be well-nigh impossible.

Now this problem will only be critical if whole regions and periods of prehistory had a settlement pattern in which farms or hamlets were common – at these times, according to the arguments, their settlement traces will be so limited as to be ignored by modern field surveys as ‘offsite’. In fact it has become clear that much of Europe was typified by such a mode of settlement in Neolithic to earlier Bronze Age times, and locally also into the earlier Iron Age, with villages or multi-period sites being in the minority and tending to become typical only as a later horizon in most regions.

This model has been tested on the Boeotia LSE/THS sector discussed above, with the result that although initially no prehistoric occupation sites were identified in the area, but instead a group of nucleated village-hamlet sites at regular and wide distances around it, we now would recognize a very dense cover of small, one-to-two generation farms of later Neolithic to Bronze Age date across the whole district – on the basis of very small scatters of ceramics found throughout the area.

Another area of rethinking also concerns density measurements for ceramics or lithics in surface collections. Martin Millett has suggested that variations in pottery supply or less commonly consumption, between periods, will have the effect of creating significant fluctuations in apparent activity across regional landscapes (Millett 1991). In most Mediterranean landscapes however it seems up to now that the bulk of total assemblages were made within the region, so that consumption would be a more likely factor to investigate (the opposite being true though where surveys have relied on exotic imports to date site occupation – as with African Red Slip in Late Roman Italy – cf. Cambi & Fentress 1989). The Boeotia Project LSE/THS district for example seems to provide evidence for unusually-enhanced pottery consumption on sites of Classical Greek as opposed to later periods, and this extends to the range of recognized forms in use. One practice which can be identified as contributing to this is the social importance of formal dining and associated tableware in contemporary society, whereas for example Roman, and even more, Late

Roman sites seem to have far higher proportions of storage and processing vessels. Such investigations have been pioneered in Aegean survey by Todd Whitelaw for the data emanating from the Kea survey (Whitelaw 2000).

2.4.4 Refinements to demographic reconstructions

In the excitement generated by the vastly increased site database produced by the New Wave surveys, working assumptions were made in order to give an impression of population change as reflected in regional survey data. Most project teams have been aware of the weaknesses of seeing such ‘guesstimates’ as factual, but it is now right to move on to more refined palaeodemographic interpretations. We have already referred to John Cherry’s pioneer deconstruction of Bronze Age settlement maps, but it has still to be admitted that little progress has been made in dealing with the problem that in most parts of the Mediterranean, surface finds of later prehistoric ceramics and lithics are generally only assignable to such long periods of time that the resultant phase maps cannot claim to offer settlement or activity pictures likely to belong to the same points in time. Put bluntly, maps of 20 activity foci could be a short-lived subphase, with all sites in contemporary use, within a potential time span of 1000 years for a pot or lithic assemblage, or alternatively, might reflect a society of one or two families shifting base around a wide territory over a far longer period of time.

Within the historic periods conditions are more favorable for progressive refinement of dating. Some long-term projects such as Metapontum in southern Italy (Carter 1990) have been able to link excavation of urban and rural sites to associated rural survey, and at the same time to subdivide the typological series of ceramics – even for domestic wares – to much shorter phases than the norm for Mediterranean survey projects, where surface finds are often only assignable in bulk to periods of 300–400 years. Thus at Metapontum claims can be made for rural site abandonments and reoccupations during phases as short as a century – a situation most surveys would be unable to document. In fact on most surveys, activity evidenced at a surface site within a phase of maximum several hundred years’ duration is commonly read as equal to continuous use throughout the period.

In the absence of such advanced typo-chronologies, more traditional links between ancient sources for population levels and the evidence of survey continue to be made (cf. my own attempts on behalf of the relationship between archival data for ancient Boeotian populations and the intensive and extensive evidence from town and country in Classical Greek times – Bintliff 1997c). The recent growth of interest in post-Roman landscape history has opened up greater opportunities for close-matching of survey data and historical records of greater detail and accuracy than Greco-Roman records. Thus work on Venetian (cf. the Argolid project – Jameson, Runnels & van Andel 1994) and Ottoman tax registers and cadasters (Bintliff 1995, 1996; Kiel 1997), has opened up exciting opportunities to compare the surface traces of abandoned settlements of late Medieval or early Post-Medieval date with archives offer-

ing very detailed information on population size and structure as well as economic production.

2.4.5 Settlement patterning

One aspect of landscape study increasingly neglected by archaeology since the beginning of the 1980s (not coincidentally in parallel with the displacement of law-seeking new archaeology by anti-positivistic post-processual archaeology) is that of regularities in the spatial patterning in settlements. Since the New Wave surveys matured over the same period, unsurprisingly they have suffered from theoretical poverty on this topic.

The approaches available from the earlier tradition of Spatial Analysis are however of vital significance to the interpretation of long-term as well as synchronous settlement systems within each regional landscape. They focus on regularities in the spacing, number and size of rural settlements of equivalent status, and on the similar properties to be associated with settlement hierarchies. To study such phenomena survey methods have to be adequate to recover large and meaningful segments of such past systems, and this means first and foremost that strip or small bloc surveys rarely work. One needs contiguous blocs of the size of at least several modern communes / parishes, preferably also incorporating their relevant central-place(s). It has first to be mentioned why such 'old-fashioned' locational approaches deserve reintroduction into archaeology (a topic I have discussed elsewhere – Bintliff 1997b). The reason is very simple – regularities remain a normal feature of recovered settlement distributions, and the geographical literature of the 1950s-1970s dealing with such phenomena were empirically-based and robust, and have not gone away with the rise of more fashionable cognitive and phenomenological approaches. Nonetheless, the critique of New Geography lay in the valid argument that it relied too much on automatic mechanisms for settlement geography and made little or no allowance for historical uniqueness and the role of human action. As a result, the rebirth of such generalizing approaches needs a less deterministic underpinning, which can now be found in the non-linear dynamics of Chaos-Complexity Theory (Lewin 1993; Reed & Harvey 1992; van der Leeuw & McGlade 1997; Bintliff 1997b). Very summarily, Chaos-Complexity argues that there is no predictable shape to an aspect of past society, such as rural settlement systems, however there are strong but not overwhelming tendencies to the recurrent and cross-cultural emergence of similar forms of life. The actual realization of a settlement system or hierarchy will always therefore represent a specific dialectical compromise between such general shaping factors and the particular opportunities and constraints offered by a given landscape and its given society within a given preceding and unique historical trajectory.

I have been much influenced by earlier applications of landscape geography in which some of these cross-cultural elements have been explored. The German *Landeskunde* tradition for example, and in particular the concept of favored zones of settlement (often separated into natural cells by less favored areas) or *Siedlungskammer* offers

worked examples for us to develop and refine today (the pioneer analysis of the settlement chambers of Eastern Crete by Lehmann 1939, or of those of the Early Medieval Netherlands by Heidinga 1987, spring to mind). More recent, micro-studies of the long-term sequent occupation of single modern parishes can also serve as models – for example the exhaustive survey and excavations of Lunel in Languedoc by Claude Raynaud (Raynaud 1990) or our own total survey of the Valley of the Muses in Boeotia (Bintliff 1996, 2000). Equally notable is the development out of *Landeskunde* models of the Czech group of landscape archaeologists deploying what they term 'community area theory' (Kuna 1991; Neustupny 1991) – which has strong links to *Siedlungskammer* geography.

What all these geographical approaches share in common is their grounding in empirical evidence for regularities in settlement systems across time and space. The fact that genuine ethnic or social memory continuities are frequently inapplicable, plus the cross-cultural parallels, suggest strongly that the tendencies to recurrent form are created by basic tendencies in human spatial and social behavior which are not tied to specific cultural systems. Amongst recognized relevant factors (cf. in general, Bintliff 1999a) are:

1. Catchment constraints for land use – least effort principles generally restrict the radius of land use from home bases, and there may be agreement across many societies regarding the scale of preferred territory with related forms of exploitation;
2. A limited range of territory shapes dependent on whether favored resources are generally distributed or layered directionally across the landscape (so that circular or strip territories might be common, respectively);
3. *Siedlungskammer* may be defined through natural barriers or resource pockets, creating constraints on the positioning of all rural sites in a region, either through direct limits within such chambers or through the effects of chambers on adjacent settlements in less constrained environments (cf. the long-term nucleated-settlement niches of the Greek province of Boeotia – Bintliff 1994a);
4. Cycles of population growth and decline can often be linked to increasing density of settlements, and this replication and infill can produce nested series of regular spacings and territory sizes through relatively simple and even cognized processes of internal colonization;
5. Tendencies to recurrent forms of settlement system may be associated with cross-cultural regularities in social organization. Thus it can be argued that in many farming societies with little or no social ranking, the decreasing effectiveness of face-to-face community relations when settlements exceed 100-200 people can cause recurrent fission and the creation of similarly small scale satellite hamlets across the landscape. In contrast, it can be argued that although overcoming such problems, so that settlements can rise to many

hundred or even several thousand inhabitants, requires the emergence of other forms of social organization (ranking or horizontal social segmentation), the resulting large communities have the potential (realized in widely-varying times and places) to develop into small polity-city state networks;

6. In tandem often but sometimes independently, recurrent regularities in the placing of district 'central-places', especially market towns, have long been identified and analyzed by geographers. Archaeology has neglected these properties in the last generation, but there is much to be learned by testing for the regional operation of recognized recurrent characteristics of simple central-place systems (often a day-return radius appears limiting on participation by rural inhabitants, creating radii of servicing of 2-3 hours travel and inter-center distances of 10-30 or so kilometers);
7. A promising area of analysis, frequently closely-tied to the emergence of central-place and/ or market town networks, focuses on the parasitic rise of local large settlements with the power to grow on the surplus products of a surrounding cluster of lesser rural settlements (cf. Wilkinson 1994). Differences can be observed between hierarchies of this sort where military power and tribute typify the system of dependency, and those where factors of marketing and economic or service specialization tie such hierarchies closer to modern forms of settlement hierarchy.

At present it seems reasonable to suggest that there is a general tendency in the long-term for settlement hierarchies of a relatively parasitic nature to give way to networks where large, upper-level settlements provide useful economic and social services complementary to what is available at lower levels of the settlement hierarchy. Much attention therefore is being focused on the timing and spread of commercial and economizing forces into the countryside, with reference to geographical classics such as the 19th and early 20th century studies of Von Thünen and Christaller. Recent work has indeed suggested that the hinterlands of 'megapololeis' such as ancient Athens or Rome were already being transformed into urban market-focussed specialized production zones with new kinds of 'suburban' settlement (Bintliff 1994a; Morley 1996), whilst even small regional market towns may well be acting in defined central-place niches in antiquity (for the Roman town of Iol Caesarea cf. Bintliff 1997b after Leveau). The sophisticated research program using survey and excavation to investigate the Gallo-Roman settlement systems in Southern France, initially carried out under the auspices of the Archeomedes Project (Durand-Dastès *et al.* 1998), uses elaborate statistical and computerized database management and spatial analyses to delineate such recurrent networks of hierarchised sites and place them into interpretations informed by geographical theory. In England, it has even proved possible to study the comparative degree of commercialization of the rural market centers through a comparative analysis of the number and spacing of such centers across the same landscape in Roman, earlier Medieval and then High

Medieval times (Brown, 1995). Interestingly, whereas Roman market centers compare well to Early Medieval networks, implying a relatively-poor flow of surpluses across and out of the region, the High Medieval pattern forms a far denser and better integrated network which is held to represent the effective emergence of a long-distance commercial economy up to the national level (Britnell 1995).

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