23. Demographic and ceramic analysis in regional survey

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INTRODUCTION

The latest edited volume on surface survey – John Schofield's *Interpreting Artefact Scatters* (1991a) has one overriding message, that is constantly underlined by most of its contributors: the archaeological landscape is our first zone of observation, not that opaque and ever-disputed concept 'the site'. Accumulated experience has taught us that there is no self-evident, predictable structure across ancient landscapes, – we have to extract pattern from empirical observation. Moreover, in long-occupied landscapes with complex societies under scrutiny, the forms of human behaviour and their material correlates across the surfaces of those landscapes will be highly varied both from period to period and equally within each period. No cookbook methodology can ease our scientific task of taking each survey landscape as a *tabula rasa* at inception of survey, then devise a methodology that will allow the variety of surface data to reveal itself, followed by an interpretative procedure that introduces as little bias and manipulation as possible into the data thus revealed.

Such cautionary comments may seem curious when field survey has been visibly maturing since its rapid development as a subdiscipline in the 1960s and 1970s. In fact it is a sign of a growing maturity in surface survey that we are aware of the need to go slower and less superficially in planning and interpreting field survey, not least because of the far higher resolution that modern surveys allow in reconstructing the complexity of past landscapes.

These considerations are especially important when we confront one of the central aims of regional survey – a task it ought to be primarily suited for – the reconstruction of population dynamics at the regional level. Field survey cannot usually address the life of a particular named individual, or the events of a particular year, unless it be totally catastrophic. One recorded example of the latter from survey is the destruction of the Greek city of Haliartos by the Romans (Bintliff and Snodgrass, 1988a). On the other hand, regional survey can offer an unparalleled view of the density of rural and urban populations at a given phase of the past and fit this into a medium- to long-term perspective on regional population fluctuations.

To claim this – and most other Mediterranean survey directors would do the same – we need answers to the more sophisticated critiques that field survey has evoked, as much from its own practitioners as from sceptical historians.

POTS = PEOPLE ?

One of those critiques focusses on the concept 'pots = people'. We believe that this simplification is, with obvious exceptions, broadly true for the Mediterranean lowlands, but *only* in a carefully argued sense. Firstly our exclusions: we will obviously not consider ceramic surface data as primary evidence for pre-neolithic hunter-gatherer societies; but more importantly, empirical experience – our own and many others – has made it clear that for much of later prehistory (Neolithic to Bronze Age) the quality, quantity and taphonomic conditions characteristic for ceramics make pottery an unreliable database for population reconstructions (Di Gennaro and Stoddart, 1982; Stoddart and Whitehead, 1991).

From a mature phase of the Iron Age, however, the lowland Mediterranean world is firmly characterized by a high level of ceramic use at the household level upwards, utilizing a range of hard, well-made fabrics, and in sufficient quantity, to ensure a primary place for broken pot and rooftile in regional field survey. That such conditions last until late Roman times throughout the Mediterranean can hardly be disputed, nor that early medieval to early modern Mediterranean lowland societies have been equally focused on a high level of ceramic use.

Was there however a post-Roman Dark Age when even lowland societies reverted to aceramic inventories of material culture? For the western Mediterranean, we remain sceptical: the strong likelihood of massive depopulation

and relocation of sites, and general shifts in the nature of artefact production and distribution occurring at the same time, pose extraordinary difficulties in locating and identifying characteristic assemblages for these centuries (as the shifting debate over Forum Ware has made clear). For the east Mediterranean, we have growing evidence for continuing use of ceramics at the rural household level throughout the 'centuries of darkness'and beyond to the threshold of the early medieval era, an era spanning the later seventh to eleventh centuries AD.

This is the right juncture to elaborate on our own interpretation of the 'Pots = People' model. What we mean by this concept is that the ceramic data from surface survey are the appropriate means to derive population parameters. We do not believe that there can ever be a fixed cross-cultural ratio of broken pots to past population numbers, but neither do we believe that pot numbers are irrelevant as guides to population levels. At one extreme, field surveyors who disbelieve quantitative statistics of surface pottery as *indications* of population change end up without any means of gaining regional population dynamics (as with the *Ager Tarraconensis* Survey, see Carreté *et al.*, 1995). At the other extreme, those who see pottery numbers as direct equivalents to population statistics have chosen to ignore the ethnohistoric evidence for variable pot production and consumption, as well as the variable taphonomic and geomorphic factors, which create between them a complex variety of relationships between pots and people over time and space.

SCALES OF FIELDWALKING AND SCALES OF FIELD SCATTER

With these qualifications, how can one go about inferring population parameters through the medium of surface ceramics? Our primary task is to recover as detailed, as nuanced, a picture of the archaeological ceramic surface as possible without cutting corners. Most contemporary surveyors will agree on intensive survey utilising walkers at intervals of 5–15m as essential for such work. Even this distance range poses problems of exclusion: once we move from 5m and towards a 15m spacing, surface phenomena of a few metres to say, 10 metres in diameter will often remain unobserved by fieldwalkers; if such features are very common, some examples will be found at a broader spacing and their approximate observable number can perhaps be extrapolated to the entire visible landsurface. However if such features are rare, though important, fieldwalkers at the broader end of this range may find few or even none of such sites. Even 5m spaced fieldwalkers will certainly miss such small features and even much larger features 20–30m in breadth, wherever vegetation and cultivation conditions obscure the visible soil surface or restrict the visible sector of a ploughsoil assemblage, respectively.

Such microphenomena of the few metres to 10 metres diameter do exist in every region, as do the obscured sites of this and somewhat larger scale. Those familiar with Mediterranean surveys will recognize types of human activity whose remains regularly fall into this class of site: rural cemeteries, rural shrines, specialist activity areas (e.g. stock shelters), – and last but not least, vestigial rural settlement sites where the limited surface density and extent of scatter are misleading for the true scale of the original occupation.

VESTIGIAL SITES AND THE 'INCONSTANCY' OF SURFACE SCATTERS

This last phenomenon deserves special consideration, as it is often neglected by survey theorists. Recurrent survey of the same sectors of landscape by our own Boeotia Project and colleagues in Italy (for example, Graeme Barker at Montarrenti: see Barker and Symonds, 1984; Barker *et al.*, 1986) is an essential learning experience to assist the interpretation of field survey data. One can show how in any one season a high proportion of surface sites are either unavailable to recognition even by a very intensive survey, or unrepresentative of their true size. With the exception of the highly-exposed palaeolandscapes of the deserts and semi-deserts of the south and east Mediterranean lands, a typical north Mediterranean landscape will only reveal a proportion of its surface sites to full surface visibility in a particular fieldwalking season. We can do little but revisit to bring to our attention the degree of variation this reveals. A complementary approach is to commission geomorphic mapping to identify sectors of landscape with the potential for site burial or erosion. Allen (1991: 45ff) suggests that as much as 1/5th of the English Downlands has its palaeosols and associated artefact scatters obscured through hillwash and alluvium; in Italy, Barker and Symonds (1984: 281) refer to 'geomorphological windows' as the reason for the rare and irregular discovery of prehistoric surface exposures. Permanent or semi-permanent burial or erosion are only a part of the story, since a significant part, perhaps the majority of ploughsoil sites, are visible at some time or other – but an unpredictable proportion of these appear in the season you survey for them in a particular landscape zone. We are not lacking in empirical and theoretical knowledge of the relevant causative factors: different forms of cultivation, including different stages in the cultivation process itself, are known to have very strong effects on surface assemblages (Allen, 1991; Boismier, 1991: 18; Clark and Schofield, 1991); the differential effects of erosion cycles and cycles of soil growth will produce completely contrasting surface assemblages even with the same site type in a single region, but especially between contrasted pedologies, lithologies and climates (Allen 1991: 45, fig.5.3; Bintliff and Snodgrass 1988b; Wells *et al.*, 1990).

When sites of this kind are rare in the landscape, they cannot much affect overall population estimates for a

region when missed in intensive survey (unless population levels are actually so low that rare, small-to-medium sites constitute the reality of a minimal population). But if such small or 'vestigial' sites are common, then the effective approach to combat the first bias – 'unseen transect land' – is to multiply such sites as are discovered in transects by the sample fraction of the landsurface actually observed in fieldwalking, to give a general indication of the likely frequence of such occurrences were the landscape to have been completely observed. For the Argolid Survey it has been suggested that the Classical farmsteads found by the survey could represent 5 per cent of regional population; yet on the possibility that four times as many sites remained to be found, this would still only rise to 16 per cent (Jameson *et al.*, 1994: 553).

This approach cannot, however, deal with the second bias – vegetation/cultivation problems affecting surface visibility of small artefact scatters. One can be confident that a certain proportion of landsurface walked offers adequate visibility, with an initially unknown proportion providing inadequate conditions. The systematic use of a visibility grading of transects to control vegetation filters (remarkably little used by contemporary surveys!) allows a correction factor for surface density counts that undeniably produces a far more realistic, if dramatically different, picture of surface scatters (for a series of examples see Bintliff and Gaffney, 1988). Understanding these factors does not, however, give us a tool to estimate what we still have missed – the always small, and the currently vestigial, small-to-medium sized artefact scatters hidden from fieldwalkers' eyes at the time of survey.

'SITE' AND 'OFF-SITE' ARCHAEOLOGY

So far, we have argued that close-order fieldwalking with visibility correction and revisits can reasonably be argued to pick up a high proportion, (but never all) of the ceramic discard foci of more than minimal size or more than minimal occurrence across the landscape. Even to mention foci however threatens a step backward in methodology, since any concept of focus demands a clear view of what exists as 'unfocussed' across the ceramic landsurface. The carefully documented Mediterranean landsurface of intensive survey does not form widely dispersed heaps of ceramic discard separated by ceramic wastelands: rather we are all now aware with refinements in surface recording, that in reality the Mediterranean lowlands are an almost continuous surface of artefactual discard:

> 'the density map of surface archaeology resembles much more an undulating contour map of discarded material culture than an empty plain interspersed with isolated hills – the artifact clusters (the hills) forming the 'sites' of normal archaeological expectations' (Barker *et al.*, 1986: 294).

Figure 23.1 shows the Valley of the Muses from the Boeotia Survey, with off-site sherd densities in grey scale and activity foci marked in solid black or as black sample grids. As most commentators have reminded us, drawing a line around small areas of this artefact surface and calling them 'sites' has all too often been a decision based on *a priori* and usually arbitrary criteria rather than justification from the empirical evidence.

In reality, Mediterranean lowland surveys have made sufficient advances in total landscape recording to allow the following working models to be proposed:

- If a post-prehistoric settlement site is not heavily obscured by surface post-prehistoric vegetation or adverse cultivation techniques, occupation by even a single household over a few centuries is likely to produce sufficient ceramic discard to stand out against adjacent off-site discard on a combination of quantitative and qualitative criteria.
- Quantitative criteria may not be sufficient (cf. also the experience of the Rieti Survey for this insight, Coccia and Mattingly, 1992: 228–229), as one can cite examples where a manuring halo emanating from a very large site can overflow across such a small site and mimic its density (for the Gubbio Survey see Malone and Stoddart, 1994; Stoddart and Whitehead, 1991). In contrast, large sites which reflect population foci, or sites with long periods of occupance, should produce quantitatively-distinct isolates of density allowing their recognition even before qualitative considerations are brought to bear on them.
- Non-occupation ceramic discard in the Mediterranean lowlands has hitherto largely been linked to intensive agricultural manuring and 'halo' effects of edge-of-site rubbish disposal, which produce characteristic forms of surface ceramic evidence.

Up to this point, we have argued that intensive surface survey can reproduce inherent structure within the ceramic landsurface, ultimately reflecting past occupation sites and related off-site activity of agricultural, funerary or ceremonial nature. We have deliberately avoided the simplistic claim that 'residuals' of 'occupation' character are easily correlated with population densities. We have nonetheless stated our belief that from the mature Iron Age onwards, almost without exception in the Mediterranean lowlands, it is ceramic data that provide us with the primary evidence for population study, whilst allowing for the fact that no straightforward relationship exists between numbers of surface pots and numbers of past occupants of a landscape.

A PATHWAY FOR THE ANALYSIS OF SURFACE CERAMIC PATTERNING

We must repeat the warning: treat every survey landscape as *terra incognita*. We have to allow each period to speak for itself. The only way forward is to collect and count continuously, from close-order transect fieldwalking across large, contiguous blocks of landscape, then to tease out

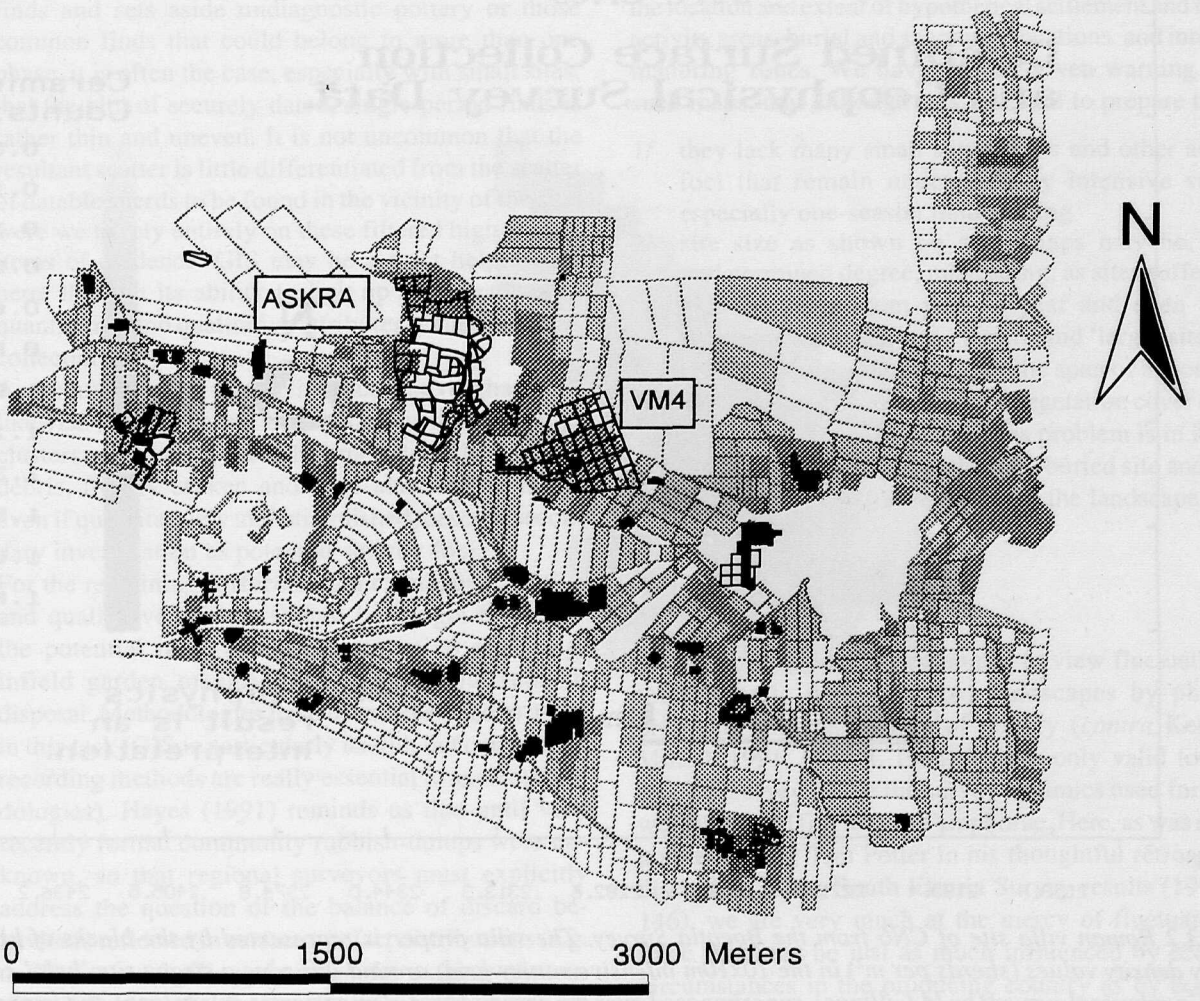

Fig. 23.1 Valley of the Muses, Boeotia Survey: off-site sherd densities are shown in grey scale, activity foci marked in solid black or as black sample grids.

what structure should be hidden within the resultant distributions (for similar non-judgemental empirical procedures on the Rieti Survey, see Coccia and Mattingly, 1992: 257–259). Before proceeding to population estimates, we ought then to move through the following stages:

(a) Construct density maps, corrected using a visibility factor, and with due attention to problematic geomorphic zones (those with maximum erosion or recent alluvium/colluvium), for large sectors of contiguous landscape, based on a continuous not discontinuous recording system. The problems and pitfalls of spot sampling, or surveying a haphazard collection of fields or field groups separated by large areas of unsurveyed land, are so great that in our view it is unrealistic to use such data as a basis for any kind of modern, sophisticated settlement or land use survey.

A best practice methodology provides us with raw material from continuous lines of collection over complete landscape blocks, for period specialists to date or relate to ceramic fabric/style groups with period implications. For any one phase (and in the Mediterranean such periods are often 300–500 years in length) our landscape will then reveal itself to be a mosaic of varying finds' densities: highpoints, medium-to-low carpets, empty or near-empty spaces, and a lot of 'fuzzy' fluctuations in density that may not provide an immediately recognizable shape ('focus', 'carpet' etc.)

(b) Such work has to be done with as little interpretative bias as possible. Indeed we simply do not have any grounds for inferring the meaning of such a map from *a priori* grounds. Both quantitative and qualitative criteria can be applied to elucidate this density distribution, neither being adequate in itself to provide a final secure interpretation of the behaviour underlying its patterning.

(c) Absolute density highpoints, already often revealed as

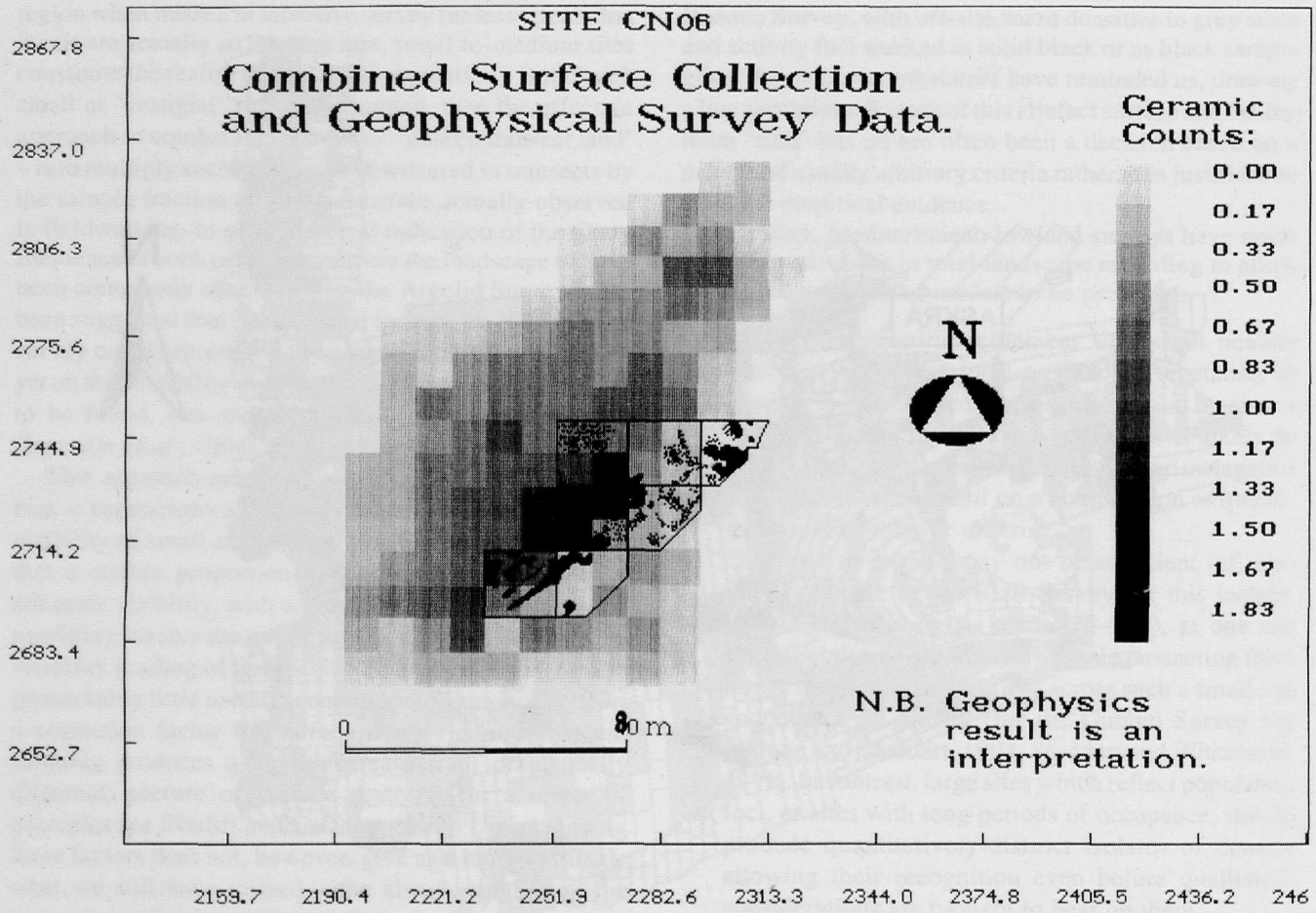

Fig. 23.2 Roman villa site of CN6 from the Boeotia Survey. The villa proper is represented by the blocks of highest pottery density values (sherds per m²) in the 10x10m intensive survey grid; around this zone a strong site 'halo' can be seen. Geophysical survey (by M.Gillings), superimposed over the ceramic grid, demonstrates a very large and impressive villa structure at the heart of the site.

quantitative highs during the process of fieldwalking, deserve secondary investigation as likely large-scale and/or long-term foci of activity, if not as permanent settlement sites. (By secondary investigation we refer to the gridding of the zone of interest – with 5x5 or 10x10m squares – and a further counting and collecting exercise of a more intensive kind, perhaps accompanied by mapping of tile/building material distributions, even in sample cases by geophysical and geochemical analysis). Figure 23.2 shows the large Roman villa site of CN6 from the Boeotia Survey. The villa proper is represented by the blocks of highest pottery density values in the 10x10m intensive survey grid; around this zone a strong site 'halo' can be seen. Geophysical survey (by M.Gillings), superimposed over the ceramic grid, demonstrates a very large and impressive villa structure at the heart of the site.

However, it is a fallacy to assume that 'highspots' always represent permanent settlements. As already noted, manuring scatters around urban sites can equal small site level density, and some site types of a non-domestic kind may exceed domestic density levels (Clark and Schofield, 1991: 104; Schofield, 1991b).

Further questions arise even when a local concentric focus of artefacts indicates a 'site' that is distinct from surrounding density levels, as a result of problems that arise with chronological precision in dating sherds and the way in which the surface scatter has been constructed. We all recognize the importance of the total density plot for a site, as it is mainly this that has justified site definition in quantitative terms or alternatively in more qualitative terms as a concentric structure with a focus. Likewise this map provides our ideas of site boundaries, and the extent and shape of a site. But for the high proportion of sites that are multi-period (cf. the survey of the Valley of the Muses, Boeotia, Fig. 23.3), it is those phases that dominate the assemblage that are likely to have created the dimensions and density we are recording overall, and this in turn affects our sampling strategy and level of collection,

at least initially. Once one breaks down the collected finds and sets aside undiagnostic pottery or those common finds that could belong to more than one phase, it is often the case, especially with small sites, that the plot of securely dated, single-period finds is rather thin and uneven. It is not uncommon that the resultant scatter is little differentiated from the scatter of datable sherds to be found in the vicinity of the site, were we to rely entirely on these filtered high quality items of evidence. GIS may be a most helpful tool here, through its ability to link up combinations of quantitative and qualitative attributes of the site finds' collection.

(d) Associations of a distinctive qualitative character, likewise often apparent during fieldwalking, such as clusters of fineware, special-purpose vessels, building debris, freshly broken and little abraded ceramic – even if quantitatively undistinguished, deserve secondary investigation as potential activity foci.

(e) For the remaining surface ceramic data, quantitative and qualitative criteria should be sought to clarify the potential role of outfield extensive manuring, infield garden manuring and/or near-site rubbish disposal. Methodologies have been developed to assist in this task (GIS is particularly useful, but continuous recording methods are really essential to such methodologies). Hayes (1991) reminds us that until very recently formal community rubbish-dumps were unknown, so that regional surveyors must explicitly address the question of the balance of discard behaviours reflected in surface artefact distributions (e.g. deliberate stockpiling of rubbish for extensive/intensive, infield/outfield manuring; simple dumping on or around settlements; recycling through pigs, or as constructional materials; burial in disused storage pits, ditches etc).

At the end of this process of quantitative and qualitative analysis it should be possible to create an interpretative map for particular phases of landscape occupance indicating the location and extent of hypothetical settlement and related activity areas, burial and sanctuary locations, and intensive manuring zones. We have already given warning about such maps, that although it is essential to prepare them:

1/ they lack many small settlements and other activity foci that remain undetected by intensive survey, especially one-season fieldwalking

2/ site size as shown on such maps may be, to an undetermined degree, misleading, as sites suffer variable exposure from year to year and even within individual field seasons. 'Small' and 'large' sites may reverse dimensions even over the span of a month if a major change in cultivation or vegetation cover occurs during that time. However, this problem is in inverse proportion to the size of the total buried site and to the number of such sites existing in the landscape.

SUPPLY VERSUS DEMAND

We do not consider it meaningful to view fluctuations in total ceramic discard across landscapes by phase as problems with the supply of pottery (*contra* Keay and Millett, 1991; Millett, 1991).This is only valid for older types of survey where the survey ceramics used for dating were imported finewares or amphorae. Here, as was already pointed out by Tim Potter in his thoughtful retrospective discussion of the South Etruria Survey results (1979: 18, 146), we are very much at the mercy of fluctuations in trade that may be just as much influenced by economic circumstances in the producing country as by economic and demographic conditions in the receptor country being surveyed. One might hope that those days have gone and that modern surveys have all seen fit to create local assemblage sequences that are ultimately independent of import quantities. As far as we are aware (cf. for example, Fulford, 1987) it is almost universally the case that till the

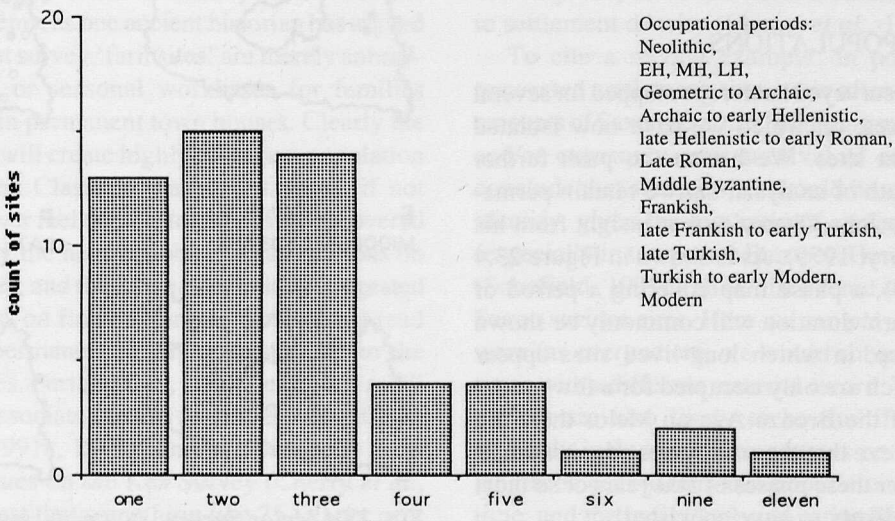

Fig. 23.3 Occupational periods present in the sites found by the Boeotia Survey in the Valley of the Muses.

early modern era the majority of ceramics discarded in non-port locations in the Mediterranean lowlands were locally produced, within the general region being surveyed. With appropriate methodology local ceramic sequences can be created even within phases of extreme site rarity, allowing us to control to an adequate degree the problem of ceramic supply to within the confines of the region. Put bluntly: if we focus our analysis on ceramics produced within the region, it is very unlikely that fluctuations in discard across the region reflect inadequacies in the distributional mechanisms of pottery, and far more reasonable to suppose that fluctuations reflect changing levels of demand by regional populations. We would argue that variations in regional demand for artefacts are the product of a tightly bound nexus of relations between population levels, economic prosperity and the complexity of regional society; the florescence or collapse of local population play a key role in this nexus.

If we are correct in focussing total ceramic discard fluctuations on user-populations, we are still some way from providing demographic estimates from discard data. The way to this desired goal has been clearly delineated by most contributions to the Schofield volume: it is the structure and composition of surface assemblages that are our best way forward rather than mere numbers (Schofield, 1991a).

We have already sketched out how we can reconstruct representative pictures of past landscapes using a combination of qualitative and quantitative criteria: from this we are in a position to focus on the loci of permanent habitation – the obvious sector for population estimates. Intense manuring phases, ritual and burial sites are secondary indications retrieved from survey for heightened or reduced levels of human activity in the landscape, and the former especially is widely considered as a key symptom of population pressure. Nonetheless I would wish to retain one traditional aspect of survey – the focus on permanent settlements, as the prime component in demographic reconstruction.

FROM SITES TO POPULATIONS

We have before us a surveyed landscape mapped for several archaeological phases, on which we have now isolated presumed settlement sites. We hesitate to push further hindrances in the path of analysis, but we remain permanently impressed by John Cherry's clear insight from his Melos Survey (Cherry, 1979). As is shown in Figure 23.4 (after Cherry, 1979), a phase map covering a period of several hundred years' duration will commonly be shown as a single site map, in which long-lived sites appear alongside those which are only occupied for a few generations. For much of the Bronze Age on Melos there are good reasons to believe that the commonest site is a small family farm, and over these phases of 500 years or so most sites mapped are unlikely to have coexisted!

A regionally-specific answer to that problem (based on in-depth analysis of site nature, associated evidence e.g. cemetery size), or else a range of population values in which a number of models are explored to create the final recorded site number (gradual rise, gradual decline, steady site replacement, etc.), seem unavoidable steps to take in interpretation, with the widespread absence of ceramics/coins/inscriptions of sufficient diagnostic precision so as to allow each site to be assigned to occupation in specific centuries.

Allowing for this additional complication (more likely to afflict sites of small, family-farm character than other site types), it remains for us to give site numbers and their size some demographic meaning. What should be the interpretative guidelines?

- (a) any interpretation needs to be period-specific, as we know for certain that in some historic periods a single family employed far more ceramic utensils than others (cf. Blake, 1980). The reasons for this include a greater or lesser reliance on wood, metal artefacts, changes in wealth and the cost of ceramics, and several other historically attested factors.

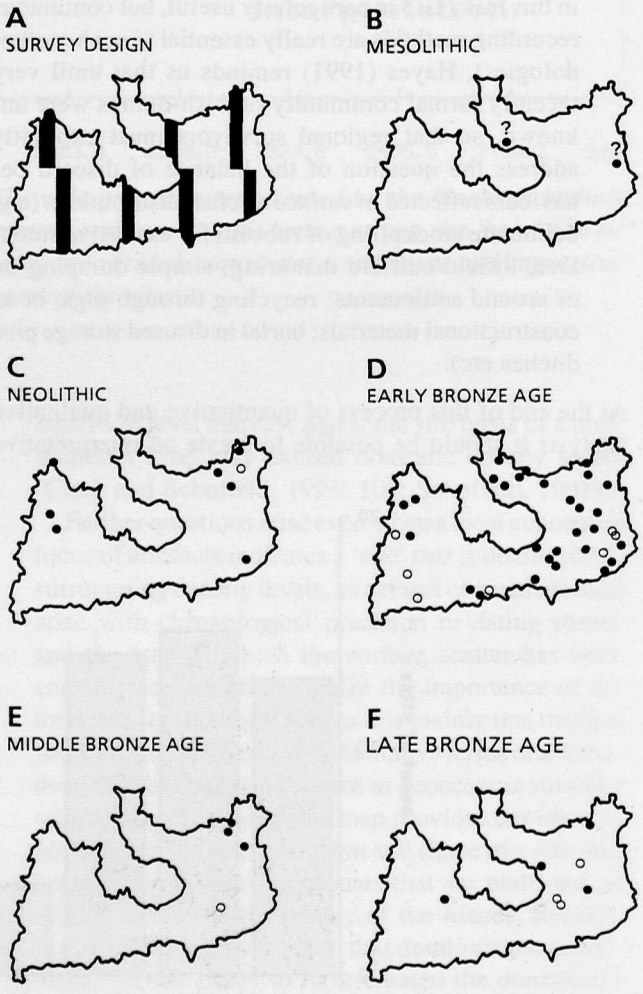

Fig. 23.4 Melos Survey: survey design and recorded sites (from Cherry, 1979).

– (b) if we feel we have good surface visibility, and excellent cultivation conditions for surface expression of sites, and allowing for (a), then we are prepared to support the view that the extent of a surface scatter and density per square metre will reflect the dominant factor of population numbers. However one must immediately add a further complication requiring careful study: whether high ceramic discard rates, if a broad indicator of total population formerly active at a site, are the result of a large contemporary community or a smaller community occupying the same location for a longer era.

The ultimate interpretative problem is converting this relative distribution of activity to putative population numbers. Its solution, albeit always a working model, should require a 'polythetic' approach (see below) to the archaeological landscape, and where possible cumulative credibility may be achieved through a parallel use of written sources. Nonetheless archaeological survey must attempt its own internal analysis before recourse to a dialectic with equally controversial historic and inscriptional sources.

An example familiar to surveyors working everywhere in the Greek Classical world is a class of surface site, frequently some 20–30m in diameter, comprising fine tableware – somewhat rare in proportion to the rest of the assemblage, much cooking ware and storage vessels, frequently finds of loomweights and lamps, occasional coins, and up to half of the ceramic fragments commonly comprised by rooftile. Geophysics and occasional standing walls reveal that beneath this surface phenomenon one can usually expect to find a small building complex appropriate to a simple farmstead of no great wealth or pretension. The accommodation is appropriate to a nuclear or extended family, and this is an interpretation easily matched to the family-based system of historic landholding of that era and contemporary references to rural life (although the sources also support the hypothesis that each family would possess at least one slave to assist with farm labour).

Even this seemingly clear case-study is not without interpretative problems, as one ancient historian has argued (Osborne, 1985) that survey 'farmsites' are merely animal-shelters, toolsheds or seasonal workbases for families otherwise resident in permanent town houses. Clearly the two interpretations will create highly divergent population models for surveyed Classical landscapes. Most, if not all, surveyors however feel that the totality of the recovered evidence, especially the heavy rubbish accumulations on and around such sites, and the range of activities suggested (Anthony Snodgrass on finds of lamps: 'goats don't read at night') point to permanent family domestic use for the majority of such sites. Furthermore, the scale of such small sites compared to associated towns and cities has led us in Boeotia (Bintliff, 1991a, 1997a) and independently John Cherry and colleagues on the Kea Survey (Cherry *et al.*, 1991: 337) to suggest that something like 25–30 per cent of the population in this period may have been living in such farmsteads and small hamlets, contrasted to some 70–75 per cent resident in large villages and urban sites.

Thus, if these small rural sites are correctly interpreted as nuclear family farms, and then we estimate the likely population range of known village and urban sites using appropriate variations upon standard population density formulae for their area in hectares, total regional populations can at least be 'guesstimated' (to borrow a term from Keith Hopkins). In turn these ideas of the scale of regional populations and the balance town-country can be compared with historic sources for contemporary demography, whether written histories or inscriptional corpora, often with surprisingly good results. At a third level the resultant picture for the scale of population density for a region can be compared with the survey evidence for both the extent of human activity, especially in marginal areas, and the evidence for intensive manuring episodes (cf. Bintliff, 1991a, 1997a; Bintliff and Snodgrass, 1985; Wilkinson, 1994). Nonetheless, estimates of 'missing sites' are an integral part of such analyses, as also taking account of the 'Cherry factor' where sites are not strictly contemporary within a ceramic phase. Moreover, even the spread of sites across the landscape can conceal a wide demographic variability. Thus in southern Greece, whereas the Classical Greek and late Roman settlement patterns as recovered by many surveys seem comparable in the density of sites, intrinsic evidence from the internal structure of the settlements concerned suggests a very different scale of population in the countryside for the two periods (cf. Bintliff and Snodgrass, 1985; Jameson *et al.*, 1994).

Creating period-specific interpretations is never predictable. In the Kea Survey the high rate of discard of middle Byzantine sherds across the landscape is a misleading symptom of settlement location and number; the ceramics are not functionally diverse, with 70 per cent of the diagnostic sherds being from amphorae that are interpreted as beehives suspended from trees or otherwise placed in the landscape. In late Byzantine times the amphora type goes out of use, helping to create an apparent scarcity in contemporary finds that need not indicate a severe decline in settlement density (Cherry *et al.*, 1991: 356–7).

To cite a second example: in post-Roman England excavated settlement sites have often yielded very slight amounts of Saxon ceramics, implying minimal use of pottery and/or extremely poor survival of ceramics. One could conclude that surface sites would be almost impossible to identify, given the low ratio of surface to subsurface pot (especially in temperate Europe). However recent surveys (Schofield, 1991c) have discovered a number of prolific Saxon surface sites. Here we can only conclude that there were (as everywhere, we would submit!) a variety of site types with a different material record. The reasons for such variety are also likely to be multifactorial, but would probably include: differing status or function of site, the length of occupation and population density at any one time, and the individual cultivation history of each site. It would clearly now be impossible to suggest for Saxon

settlements a magic formula, a density threshold value which rapidly identifies 'settlements' from 'off-site'; we now know that whilst in one locality a small cluster, maybe only one or two diagnostic Saxon sherds found together, can be the survey clue to an underlying settlement, in another locality settlements can appear as a profuse carpet of sherds.

Schofield rightly draws a general moral from this particular example for field survey interpretations:

> 'Density alone, therefore, is not a reliable measure by which to study those variations. Instead the composition or structure of pottery distributions needs to be considered in more detail.....and compared with the types of discard regime that (different) types of behaviour may produce' (Schofield, 1991c: 4–5)

This is merely restating something that Plog, Plog and Wait pointed out some 20 years ago, but with too little effect on more recent European survey practice (1978: 387). The *only* reliable methodology for interpreting variations in surface concentrations is the use of both quantitative and qualitative criteria (Clark and Schofield, 1991: 102; Stoddart and Whitehead, 1991).

In summarizing this section, we hope we have demonstrated a vigorous confidence in survey's ability to approach past population statistics. We are sufficiently sensitised to the inadequacies of site survival, site exposure, chronological 'coarseness' to doubt whether great exactitude can ever be expected in such palaeodemographic exercises. On the other hand, we can reasonably attempt order of size estimates per period and comparisons of the same nature between periods, so as to analyze the overall trends in population over time and the changing balance of population, both between town and country, and across the grain of the landscape from heartland to marginal land.

DEMOGRAPHIC TRENDS: THE CONTRIBUTION OF REGIONAL SURVEY DATA

Up to this point we have been discussing the reliability of surveys in reconstructing the density of rural and urban populations. But apart from the methodological problems, what do population parameters derived through surface ceramics mean within a demographic framework?

Demographic profiling moves in four successive levels of analysis: 1. aggregate populations; 2. vital events; 3. demographic mechanisms; and 4. overall forces. These are considered in turn below.

Aggregate populations

At the level of *aggregate population* analysis, the evidence is used to produce overall figures. This doesn't evaluate population structure and demographic variables, but attempts the calculation of the population for a region or area, aiming for generalized information on long-term aspects of population size and growth which would be suitable for comparison with population estimates for other periods or regions. Surveys with their regional and multi-period aspect, and comparative studies bringing together information from a number of surveys within larger areas (cf. for example Alcock, 1993; 1994; Barker and Lloyd, 1991; Bintliff, 1997b; Patterson, 1987) are a strong source of information for such overall pictures.

This information is important within the wider framework of disciplines trying to reconstruct past population trends, since the period by period sequence and general trends given by surveys –

(a) can be used as the foundation for evaluating a variety of ancient sources that are subject not only to elite, urban and other commemoration biases, but also to the use of population growth or decline as common rhetorical themes that are not always related to genuine demographic situations (Alcock, 1993: 23–32; Bintliff, 1991b; Bintliff and Snodgrass, 1985; Clauss, 1973; Duncan-Jones, 1980; Hopkins, 1987; Parkin, 1992: 4–17).

(b) help evaluate the size of our sample and define the physical boundaries of the populations we are studying. Populations with vaguely defined boundaries, which often form the basis of ancient source demographies and of cemetery data, obscure the real significance of the demographic phenomena we are observing. An example can be seen in the discussion by Morris (1987), on whether increased grave numbers in eighth century BC Attica, which have been used to infer a period of rapid population growth, might actually be linked with a social change, in the proportion of the population receiving a formal burial. Surveys help us get a more realistic insight into more natural, geographically defined demographic entities, helping to counterbalance many uncertainties in the ancient sources as to whom their numbers mentioned refer to, as well as those uncertainties in the cemetery data on the proportion of population buried.

(c) reveal the dynamics across time, a perspective often lacking in many demographic studies by ancient historians, that lump together ancient written source information and cemetery databases from different periods, different geographical regions and different kinds of source to construct an overall picture. An example of this practice is discussed by Parkin (1992: 6): the attempt to calculate average life expectation for the whole Roman period or empire by dividing the sum of the years lived by the total number of individuals recorded on grave inscriptions. Surveys with their specific geographical context and time-depth give a firmer foundation at a more reasonable scale of demographic observation. They are sensitive to regional variability, they help assess the relationship between town and country, and reveal patterns related to the behaviour of all social groups and not selected

data. Individual cemeteries and census information for a restricted period and a particular town or district are ideal complementary databases for comparison and contrast with surveys of the same period and area, allowing for the weaknesses in both of these sources noted above.

Yet two things must be taken into account. Firstly, the credibility of survey results has to be evaluated within each regional context on the basis of the problems and conditions posed by the specific survey area, the methodology followed and specific answers that can be given to a series of questions related to the recovery, dating and interpretation of the data. Secondly the general trends revealed in period by period survey sequences characteristically treat together all the information recovered in undifferentiated time periods of usually 200–400 years. By merging period data that might not be contemporaneous, they create a spurious mean for the whole period that balances short-term fluctuations and masks potential dynamics within the phase. Furthermore they might create a distorted picture when the periods are long, and small, short-lived sites are the prevalent settlement type (cf. above for this contemporaneity problem).

On the question of population dynamics, estimation of absolute population numbers, whenever possible, might offer further insights into the general scale of rates of growth or decline (for examples tied to survey data see Bintliff, 1997a, 1997b; Bintliff and Snodgrass, 1985: 139–145; Jameson *et al.*, 1994: 544–545, table B.2). In assessing the results of such exercises for the evaluation of growth rates, we should not forget that the population size we observe in settlement patterns does not constitute an exact reflection of the original demographic condition. A settlement system reflects the result of a combination or synthesis of contributory factors: it includes primary demographic elements (natural birth and death rates), the effects of political events such as wars and population movements, plus the reaction of the population in terms of internal and external migration. Although internal migration within the region as a whole is detectable through town and country survey, and survey coverage of different sectors of a region, external migrations (as are not infrequently recorded from our sources for the Greek and Roman world) must be evaluated for their possible contribution to regional survey statistics. Archaeological surveys in regions where, for example, Greek or Roman long-distance colonisation changed the local demographic landscape, show that the long-term impact of the colonisation, spreading over centuries, definitely shows up on the landscape (see for example Carter, 1990 for Metapontum; Keay, 1992: 303–309 for Spanish Turdetania; Wightman, 1981: 281–282 for the Liri Valley). However in contrast, such historic phenomena often fail to match up with survey results in the short-term, a failure that may be connected to methodological problems in the recovery of sites and our lack of knowledge of fine chronological distinctions in the ceramic finds for certain periods (see discussion for the *Ager Cosanus* in Attolini *et al.*, 1991: 144 and Dyson, 1978: 258–273). Minor population movements, or other incidents of political history that cause short-term demographic fluctuations, are not easily reflected in the recovered settlement pattern and it is mainly through historical sources that their magnitude can be assessed. In Figure 23.5 a series of such short-term fluctuations for fourth-century BC Athens can be seen, as reconstructed by Hansen (1986) on the basis of ancient sources.

Vital events

The next level of discussion in demographic analysis focusses on the formation of these aggregate population data through the *vital events* of mortality and fertility. As population size and growth are products of several different and mutually interacting processes it is essential to move a step further, to the evaluation of the demographic factors that regulate such structures and changes. It is evident that surveys cannot offer direct data for this discussion. It is through information from cemetery studies or through the use of model life tables that vital events can be evaluated. Such attempts have in any case to face considerable critique from within the palaeodemographic/ palaeopathology community in trying to establish the credibility of their results (for criticisms, see Bocquet-Appel and Masset, 1982; for a response, Buikstra and Konigsberg, 1985). Yet in such discussions survey data can offer valuable background information to overcome existing biases and evaluate discrepancies caused by common assumptions (cf. Sbonias, 1999):

1. They can show a growing or declining regional population. Allowing for this will require modifications to estimated mortality rates from skeletal information that assume stationary populations (on the overestimation or underestimation of mortality rates when the assumed stationary population is in reality growing or declining, see Willigan and Lynch, 1982: 45; for an archaeological example that shows the discrepancies caused between survey and cemetery data as a result of such assumptions, see Carter, 1990: 40).
2. Through changes in apparent population levels and the detection of new demographic cycles, surveys reveal possible changes in population structure and thus help evaluate estimations based on model life tables that assume stable populations.

Furthermore, although surveys cannot offer direct data in respect of central demographic events, the relationship between settlement pattern and demographic events must be assessed, in order to evaluate the demographic significance of the trends that are revealed by surveys. Generally, in the middle- to long-term, there seems to exist a quite straightforward relationship between a population growing and declining and the number and size of sites observed in the landscape. In the case of Pantanello Necropolis in the

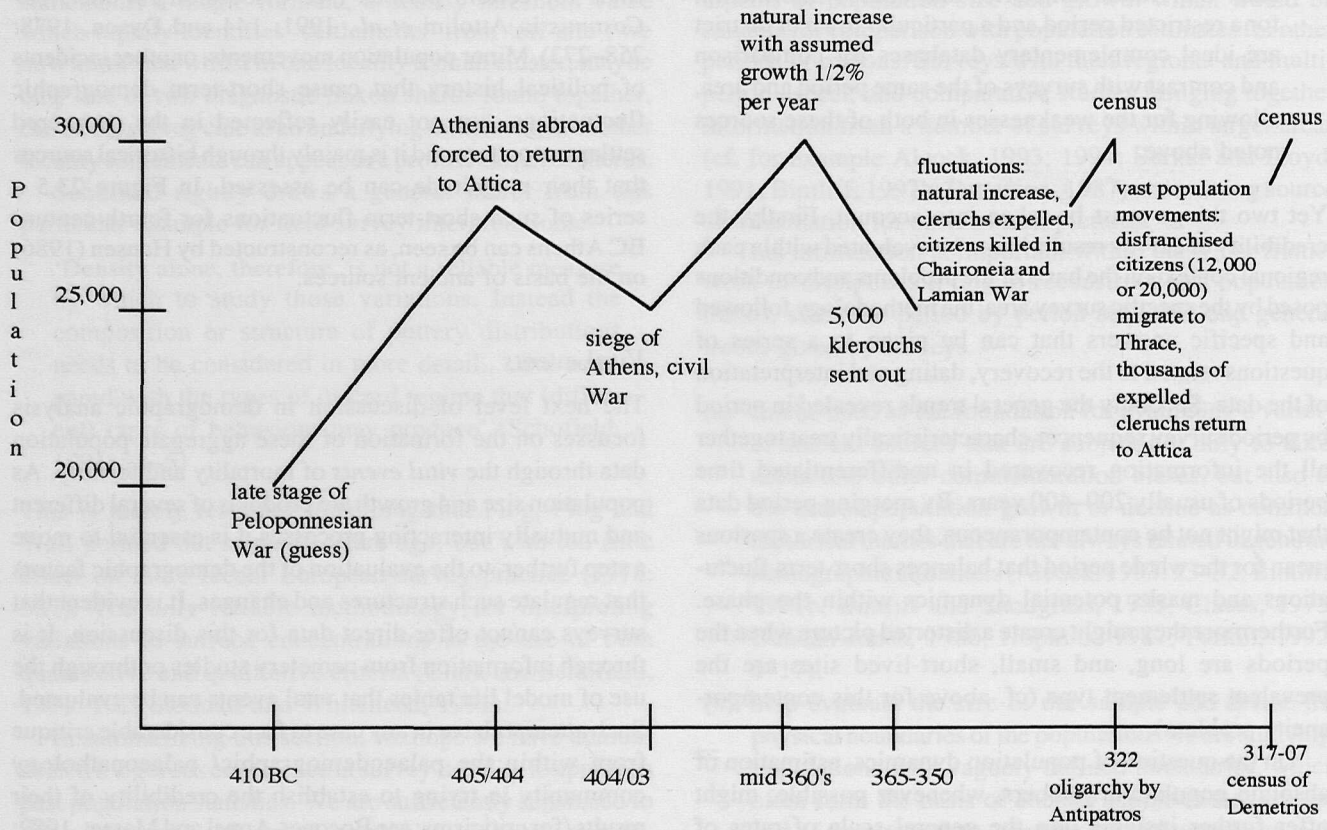

Fig. 23.5. Short-term population fluctuations for fourth century BC Athens, as reconstructed by Hansen (1986) on the basis of the ancient sources.

territory of Metapontum (Carter, 1990), one of the few examples where cemetery analysis can be compared with the results of the survey of a city territory or *chora*, a parallel development between trends revealed in the burial data and trends reflected in the landscape can be observed, though often with a time-lag of half a century (Figs. 23.6 and 23.7).

A less straightforward relationship must exist between population size as reflected in settlement density and the vital events that have altered to produce this population size. This has to do with the way that settlement patterns are formed. What we observe in survey data are dramatic contrasts between periods as a whole, which will not correspond in a proportionate way to the time-scale of shifts in vital events. For example, a major increase in fertility rates could occur at an early phase of a cycle which as a whole achieves a settlement system corresponding to a high settlement density. Sallares (1991: 62, 90–94, 101–102, 116) argues for the existence of a rapid period of growth in Greece in the late Geometric period, though the settlement pattern of this phase cannot be compared to the high level of site numbers achieved by the succeeding later Archaic and Classical periods. Yet it can be suggested that the later dense population was a product of this earlier process, although by Classical times Sallares assumes decreasing growth and fertility of population.

Whilst the above example is far from clear (see Morris, 1987, for another interpretation of the supposed population increase), we could suggest that a time-lag might normally exist between vital events and the appearance of the effects of a certain demographic behaviour on the landscape. Settlement density is cumulative and can often be the long-term result of a past demographic behaviour. On the other hand a major modification of vital rates can be a good reflection of the overall demographic condition in a region and is important in its own right. For a glimpse into demographic events that are reflected in a direct way in the settlement pattern, we should look closely at those periods where population levels appear to change with some sharpness and new demographic cycles commence (in the case of Greek developments, for example, attention should focus on the the final stage of late Geometric, the short-lived late Hellenistic, and the inception of the late Roman, phases).

Demographic mechanisms

The third level of analysis, that of biological and cultural *mechanisms* (for example age at marriage, birth intervals

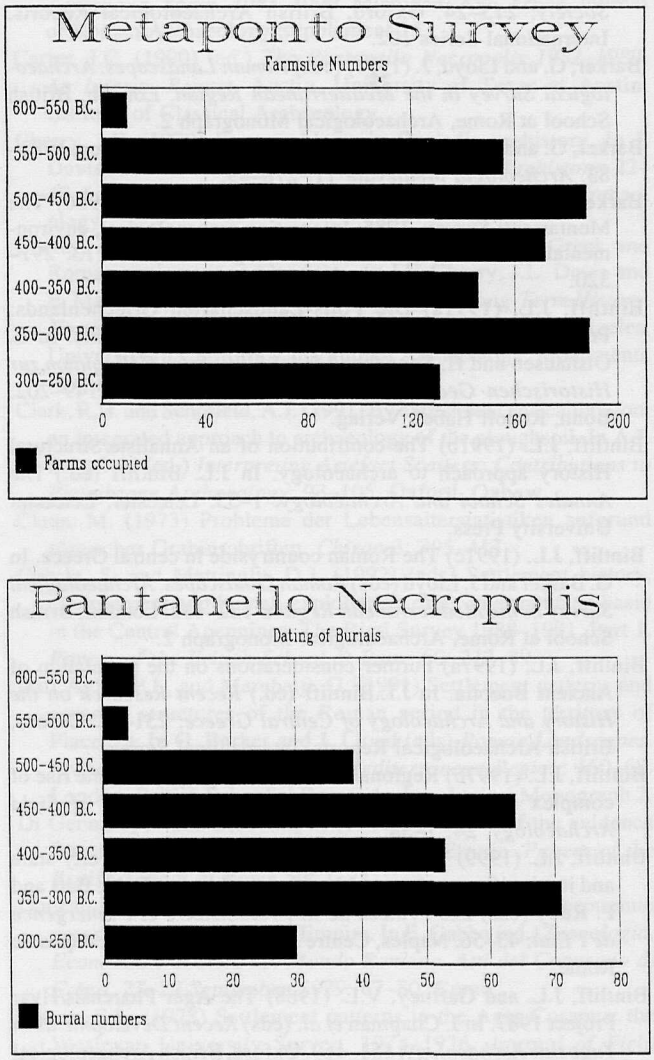

Fig. 23.6 Number of farmsites found by the Metaponto Survey (above) and (below) of graves found in the excavation of the Pantanello Necropolis in the territory of Metaponto (after Carter, 1990).

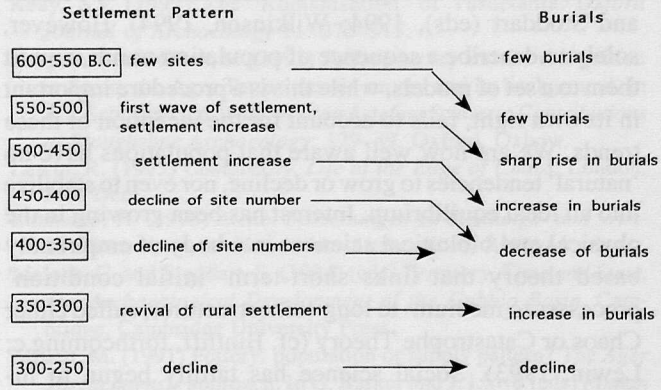

Fig. 23.7 Comparison of the gross population trends revealed in the cemetery data of Pantanello Necropolis in the territory of Metapontum (Carter, 1990) with the trends found by the survey of the city territory or chora *of Metapontum (Carter, 1990): a parallel development between trends revealed in the burial data and trends reflected in the landscape can be observed, though often with a time-lag of half a century.*

etc), is beyond the reach of archaeological survey information. Our knowledge of these aspects must derive from whatever can be achieved for a region using historical studies of well-documented periods, or through the use of appropriate demographic models (see for example Eyben, 1980/81; Harris, 1982; Hopkins, 1965, 1965–66; Parkin, 1992: 111–133; Russell, 1985; Sallares, 1991: 129–160; Shaw, 1987), as well as through modern palaeopathological investigations of regional cemetery populations (Henneberg, 1976; Weiss, 1976: 358–360).

Overall forces

At the final level of demographic analyses, where one considers the *overall forces* at work in a regional population, we need to make a differentiation in respect of the time-scales in which relevant phenomena may be seen to operate.

Short-term fluctuations in population, resulting from factors such as famines, variable agricultural production, wars, diseases and so on, will only find a clear reflection in regional survey results if such perturbations create a longer-term structural change in regional demographic patterns. Historical evidence when combined with survey can show that such fluctuations do indeed remain invisible, or highly visible, depending on their impact on population structure. Thus the minor modifications suggested by Hansen (see Fig. 23.5, after Hansen, 1986) for fourth century Athens oscillate around a high mean that is all that seems evidenced by the Attic survey record (Lohmann, 1993). In contrast, the catastrophic coincidence of Bubonic Plague, recurrent warfare and climatic change may be held responsible not only for the rapid collapse of regional populations in late sixth century AD and fourteenth century AD Greece, but more importantly for a radical and long-lasting reorganisation of population levels and land use which regional surveys show very clearly. It still remains the case that our available knowledge and theory seem somewhat inadequate for investigating the way these short-term fluctuations interrelate with general social and economic variables in the local trajectory, to initiate or affect longer-term structures.

In contrast, regional survey has a privileged role in being able to characterize the general dynamic of a sequence of occupational phases within a regional landscape, in a way that encourages the modelling of fluctuating population structures in the Braudelian medium-term (i.e. cycles of several centuries' duration, cf. Bintliff, 1991b) (see for

example, Alcock, 1993; Barker, 1981; Bintliff, 1991c, 1997a, 1997b; Dall'Aglio and Marchetti, 1991; Malone and Stoddart (eds), 1994; Wilkinson, 1994). However, solely to describe a sequence of population trends, and fit them to a set of models, while this is a procedure important in its own right, fails to account for the inception of these trends. We are now well aware that populations have no 'natural' tendencies to grow or decline, nor even to stabilize into an ideal equilibrium. Interest has been growing in the physical and biological sciences in a body of empirically based theory that links short-term 'initial condition' processes to medium- to long-term structures, called either Chaos or Catastrophe Theory (cf. Bintliff, forthcoming c; Lewin, 1993). Social science has tardily begun to incorporate such ideas into its interpretations of human social phenomena, especially for economic cycles, but it may be suggested that demographic structures would also be an ideal area for future application.

CONCLUSION

A fruitful dialogue free of dominance by either side should be entertained between regional archaeological survey specialists and specialists in historical (archival and inscriptional) sources. Excavated cemetery statistics, – another route entirely – could begin to provide yet another source of cumulative credibility for both field survey and historical demography in their search for the pulse of past population fluctuations; this resource has been hitherto almost unexplored for this purpose (though our comments above on the Metapontum Survey well illustrate the potential; cf. also Bintliff and Sbonias, 1999).

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