

## 4. Settlement and Territory: a socio-ecological approach to the evolution of settlement systems

John Bintliff

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*A model is presented to link the dynamics of rural settlement infill with mating networks and social evolution. The critical importance of related transformations in marriage-patterns, settlement size and village organisation is shown in a theory of the origin of city-states as politicisations of enlarged village communities with 'corporate decision-making' institutions.*

*Keywords:* TERRITORY; CITY-STATE; SOCIOBIOLOGY; CATCHMENT-ANALYSIS; VILLAGE; EXOGAMY; CORPORATE-COMMUNITY.

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### INTRODUCTION

The study of human territoriality within the discipline of Archaeology, in particular the application of various forms of Territorial or Catchment Analysis, has suffered severe neglect during the later 1980s and the 1990s. In part this can be attributed to technical problems in operationalising a cross-cultural theory of such scope, given the rather limited theoretical debate that accompanied its first formulation around 1970 (Vita-Finzi and Higgs, 1970). But to a far larger extent, the study of human territory has been the victim of a wider lack of interest in human ecology by archaeologists, the result of a bias to Culturalism within the dominant theoretical approach of Post-Processualism, in which the environment has gone back to being a rather passive backdrop to a world created in the human mind.

However, this is in spite of the impressive evidence to show that recurrent patterns exist in human adaptation to landscapes which have to be primarily economic rather than purely symbolic in character, and which are closely structured to the kind of physical environment in which a society seeks its livelihood. Thus Dyson-Hudson and Smith's (1978) striking general model (Fig. 4.1) matching the degree of territoriality to the density and predictability of resources, and applicable from hunter-gatherer to mixed-farming scenarios, remains a potent insight into cross-cultural settlement behaviour that matches closely to empirical case-studies both ethnographic and his-

torical. A neat illustration can be provided by Wilkinson's (1983) model of traditional territorial behaviour in south-east Arabia (Fig. 4.2).

Amongst the core problems associated with Catchment Analysis is the question of variable territory size and social factors affecting the spacing and size of settlements. Ellison and Harriss (1972) and Kent Flannery (1976) provided pointers towards solving this problem by erecting dynamic catchments which changed in size over time as pioneer settlements matured within a specific district (Fig. 4.3), partitioning larger early territories into tessellations at a smaller scale through settlement offshoots. Flannery's insights in Mexico, that this process occurred before pioneer settlements had begun to use their large catchments to a full degree, pointed to a social rather than economic cause for progressive multiplication of settlements (Fig. 4.4). It should be noted that these archaeological studies concentrate on the territorial behaviour of nucleated communities: although similar principles can be identified in the analysis of dispersed rural communities, in what follows, for heuristic purposes, I shall also focus on nucleated settlement forms.

### TERRITORIAL SIZE AND SPACING

A review of documented territorial sizes, mainly for mixed dry-farming societies recorded by archaeologists

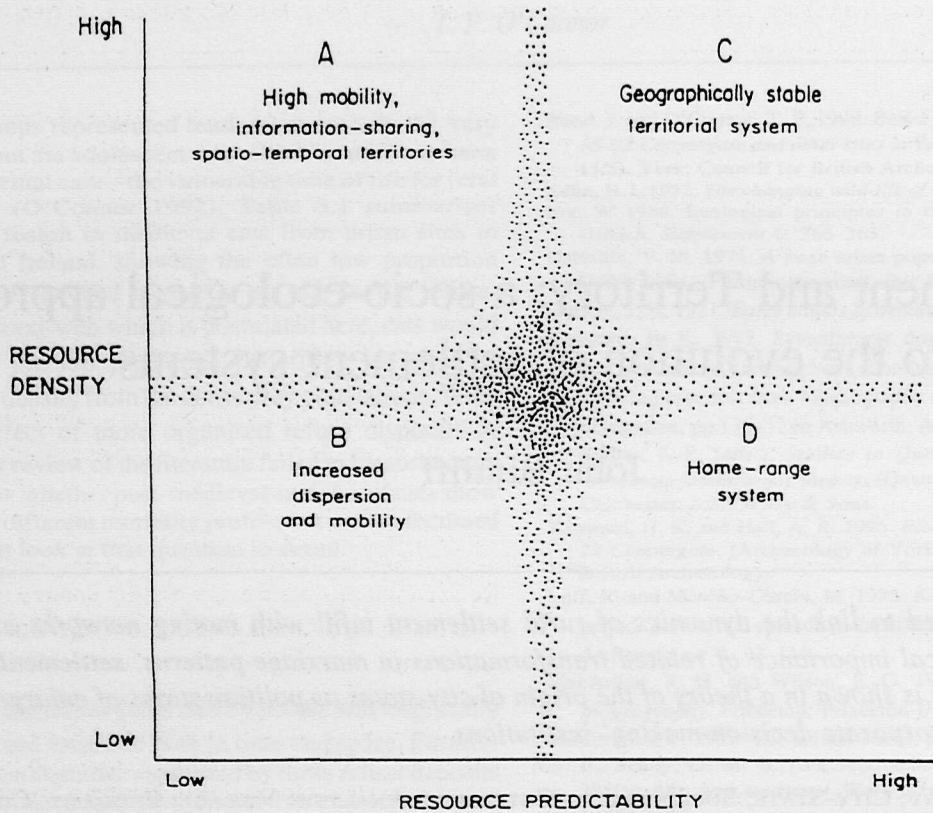


Figure 4.1 Model for the creation of human territoriality. (After Dyson-Hudson & Smith, 1978: fig.1)

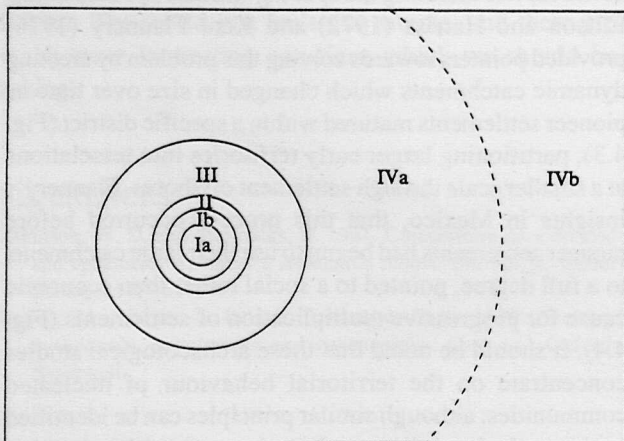


Figure 4.2 Concepts of radial territoriality in S.E. Arabia. (After Wilkinson, 1983: fig. 2). Ia: permanent cultivation (tree crops); Ib: permanent cultivation from less reliable base flow (alfalfa); II: seasonal crops; III: village grazing and sown land; IVa: mixed-herding nomads; IVb: camel-herding nomads.

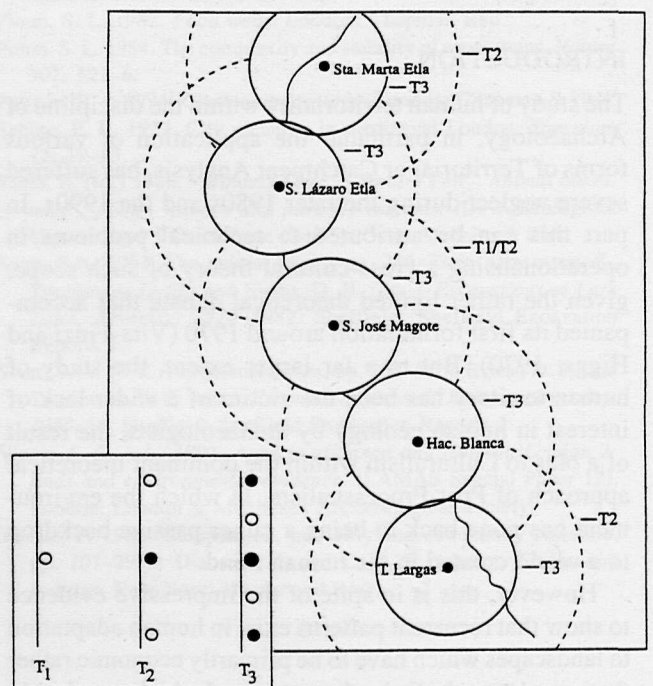


Figure 4.3 Inset: Idealized model of settlement evolution along the Atoyac River during three temporal phases (T1 to T3). (After Flannery, 1976: fig. 6.8).

Figure 4.4 Early Formative villages along the Atoyac River in the northeastern Valley of Oaxaca (Mexico). Catchment circles with radii of 2.5 km (solid line -), 5.0 km (dashed line ---). Evolution of territorial network follows progression T1 to T2 to T3 catchment system (After Flannery, 1976: fig. 4.7).

or historians, provides evidence of recurrent *quanta* for catchment radius, scaled in size from 5 km, to 3–4 km, to 2–3 and finally 1–2 km radius. Where the evidence permits a dynamic reconstruction over time, catchments at the larger scale give way to those at a smaller scale – this may be taken to counter the criticism that in reality there is merely a spectrum of land-use ranges varying according to landscape and land-use differences. Thus in 9<sup>th</sup> century AD Brittany (Fig. 4.5) early Medieval villages have on average territories of 3–4 km radius (Davies 1988), but by High Medieval times a notable multiplication of villages occurs throughout Northern France, averaging to the next quantum of 2–3 km radius. Likewise English Medieval villages have parishes which frequently provide evidence of progressive fragmentation from a common 2–3 km radius to 1–2 km. In Classical Greece (Bintliff, 1994) villages tend to stabilize into 2–3 km radii territories (Fig. 4.6).

### Demographic processes

I would suggest that during the process of population infill and subsequent demographic growth within a particular region, smaller territories were carved out of larger, but respecting the typical cross-cultural parameters of the *quanta* listed earlier. A very simple mechanism accounting for the recurrence of certain specific catchment radii is a model whereby most new settlements arose via fission out of older, adjacent settlements. When new areas of the landscape remained to colonize, the existing radius may have been continued for a new territory bordering

the ancestor, but when fission involved dividing up the parent village lands into two to accommodate its daughter settlement, a principle of equal partition would result in tessellations at exactly the empirical radii. In other words a 5 km radius tessellation fragmented by a factor of 2 produces a 3–4 km radius tessellation, the same process for a 3–4 km radius tessellation produces a 2–3 km, and in turn a 1–2 km radius tessellation. If, as Flannery argued, pioneer settlements with up to 5 km radius were comfortably overstocked with potential land and resources, 1–2 km radius catchments could well be a symptom of unusual pressure of people on land; not surprisingly the commonest radius seems to be a more stable 2–3 km radius, reflecting sustainable population infill. It is incidentally quite likely that colonisation may have taken place using a customary territory module known in the ancestral village, so that we need not postulate every district commencing with a maximal mixed farming catchment of 5 km radius, but expect many to exhibit pioneer settlement duplicating maturer settlement system of 3–4 or even 2–3 km territories. In any case it is noteworthy that the theoretical model outlined here is strikingly similar to the observed patterning in the colonisation of Northern Sweden analysed by Bylund in his classic study of 1960.

Despite the plausibility of such a relatively simple mechanism operating cross-culturally to produce the observable historical sequences of settlement dynamics, there remains the challenge set by Flannery of offering a social explanation for the earliest stage of internal subdivision (the later stages and smallest radii do seem to reflect a traditional model, with pressure of population growth

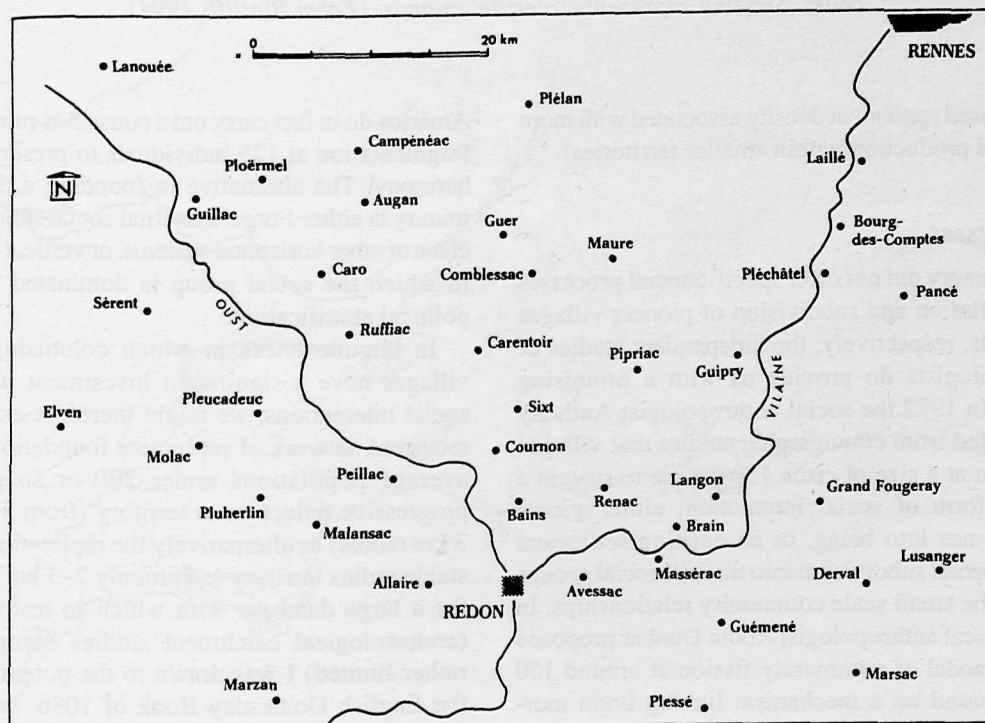


Figure 4.5 Ninth-century AD plebes and plebiculae (villages and hamlets) in Brittany. (After Davies, 1988: fig. 11).

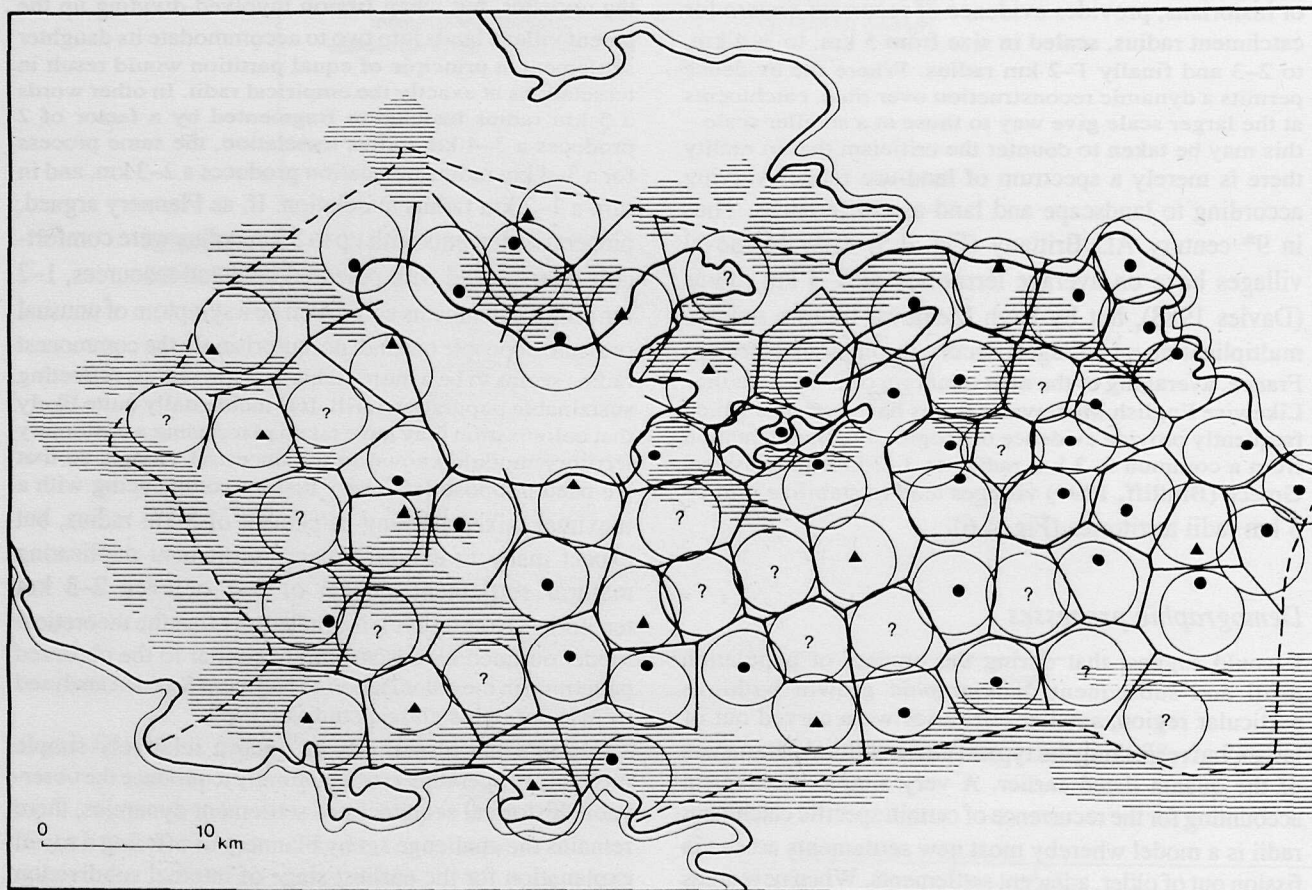


Figure 4.6 Known (solid symbol) and hypothesized (question-marks) nucleated settlements in the Classical era for the region of Boeotia, Central Greece. Cities indicated by triangles, villages circles. Best-fit circles of 2.5 km radius have been placed within village-city subsistence territories first defined through Thiessen-polygons (solid line cells). Shading represents infertile uplands. (From Bintliff, 1994).

causing increased settlement density associated with more intensive food production within smaller territories).

#### *Social processes*

Although Flannery did not offer specific social processes for the early fission and subdivision of pioneer villages and their lands, respectively, the independent studies of two anthropologists do provide us with a promising explanation. In 1972 the social anthropologist Anthony Forge suggested from ethnographic studies that villages tend to fission at a size of *circa* 150 people to sustain a face-to-face form of social interaction; either a new settlement comes into being, or an existing settlement undergoes internal subdivision into distinct social groups maintaining the small scale community relationships. In 1992 the physical anthropologist Robin Dunbar proposed an identical model of community fission at around 150 individuals, based on a mechanism linking brain morphology to the memorable face-to-face social group (Dunbar 1992, 1996). The modern Hutterites of North

America do in fact carry out a conscious rule of settlement fragmentation at 125 individuals to preserve communal harmony. The alternative to founding a daughter community is either Forge's internal social fragmentation via clans or other horizontal systems, or vertical fragmentation in which the social group is dominated by a form of political stratification.

In circumstances in which colonising or infilling villages have a significant investment in face-to-face social interactions, we might therefore expect to find a recurrent network of settlement foundations typified by average populations under 200 or so people and a progressive reduction in territory (from 5 → 3/4 → 2–3 km radius) or alternatively the replication of a mature, stable radius territory (commonly 2–3 km). In searching for a large database with which to test such a model (archaeological catchment studies being numerically rather limited) I was drawn to the potential offered by the English Domesday Book of 1086, which provides information on some 13,400 medieval communities (Fig. 4.7). Hallam's (1981) study summarizes average village



Figure 4.7 Village settlements in Domesday Book. (After Hill, 1981: fig. 25, reproduced with the kind permission of David Hill).

size from this considerable database (Fig. 4.8), and suggests a remarkable agreement with our predictions for a rapidly colonising society in which social group size is the primary control on settlement size. It is thus not surprising that archaeologists commonly quote typical village size for early farming communities in the Near East at around 50–200 individuals, or for the Neolithic of the Balkans at around 60–120 individuals. Indeed the social process model in itself could be seen as a significant element in the rapid spread of farming settlements across the Old World, outpacing maximal land-use by pioneer agricultural communities which has often been the explanation put forward in the past (but which falls down on the empirical evidence).

#### DYNAMIC FACTORS

One major problem, however, which arises from a village fission at between 100–200 villages or less, is that of inbreeding. As Martin Wobst showed in influential

studies (1974, 1976), the minimum community size to ensure a wide choice of mates who are not near relatives is around 4–500 individuals. The tendency in almost all recorded ethnohistoric societies to avoid small-group endogamy<sup>1</sup> is clearly at odds with the equally strong pressure for the maintenance of small group size in relatively egalitarian farming societies. A contradiction between attraction and repulsion would seem to be a predictable consequence for such communities, hovering

E. England	villages average	150 inhabitants
S. E. England	villages average	150 inhabitants
E. Midlands	villages average	115 inhabitants
S. England	villages average	120 inhabitants
Welsh Borders	villages average	54 inhabitants
Devon	villages average	88 inhabitants
Cornwall	villages average	82 inhabitants
Yorkshire	villages average	21 inhabitants

Figure 4.8 Summary statistics for average village size in the 1086 Domesday Book, by region (from Hallam, 1981).

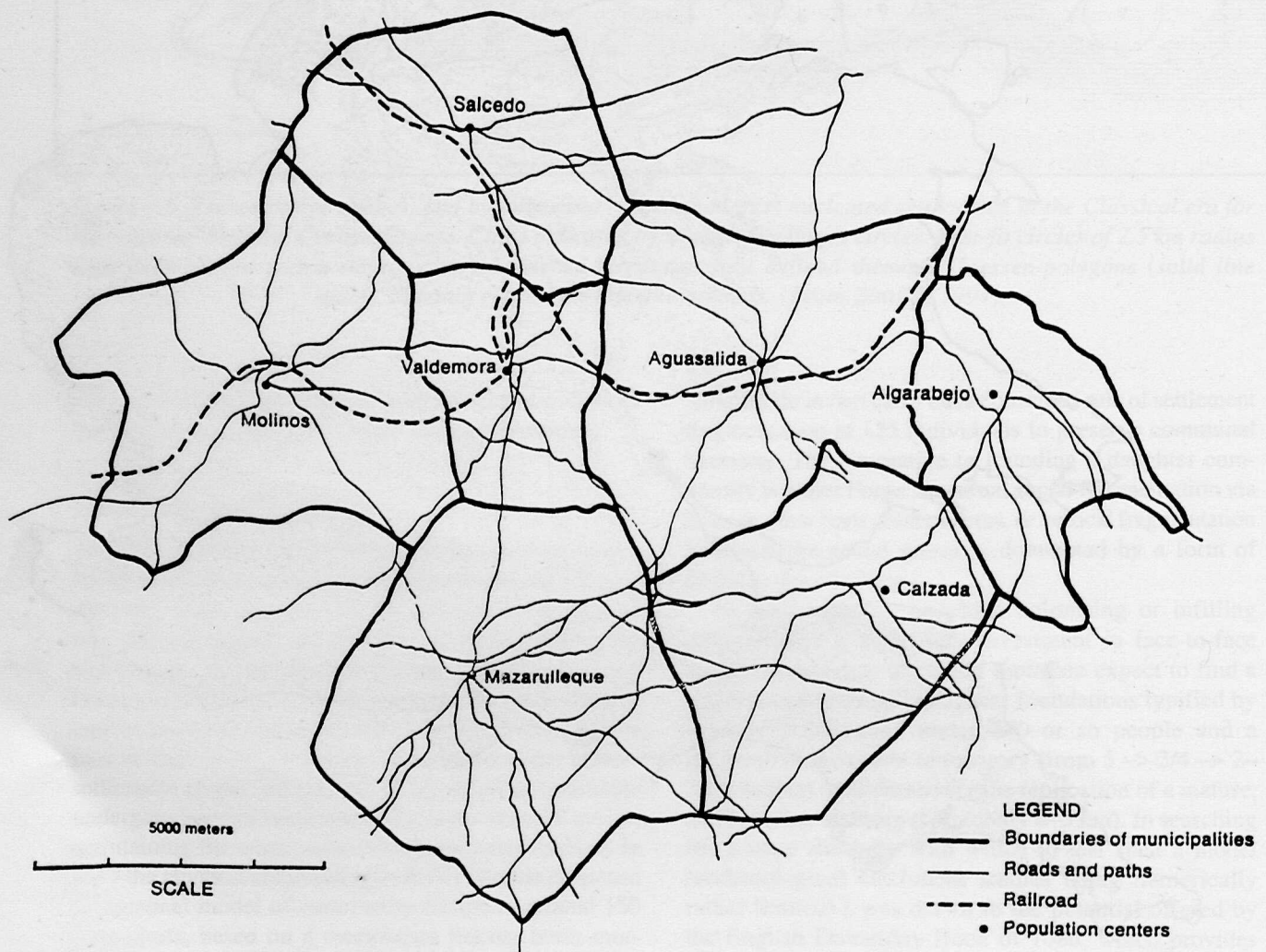


Figure 4.9 The undersized territory of the community of Valdemora, Spain (from Freeman, 1970, Map 2).

as they are between two social gravitational forces, or to use the terms of Dynamic Complexity Theory – *strange attractors* (Lewin 1993; Bintliff 1997).

Indeed, European village ethnography identifies exactly such a tension in small communities, such as Valdemora (Fig. 4.9), the subject of Susan Freeman's (1968 & 1970) Spanish village case-study, whose inhabitants wish they were a large village or *pueblo* and not the victim of a constant exogamy with its alienation of village property through dowry. Tak, likewise, in Tuscany (1990) emphasizes the tensions that erupt into physical aggression as well as systematic verbal denigration (*campanilismo*), between rural communities divided by land disputes on their borders but forced to exchange marriage partners and alienate communal resources to their neighbours<sup>2</sup>.

A resolution to these contrary pressures would be an expansion of village size until it reached or surpassed the Wobstian threshold for a viable endogamous community, or at least – since some gene flow is probably desirable from outside the district for long-term adaptation – allowing the majority of marriages to be conducted within the community. This means a population of 4–500 or more. Exactly this form of expansion underlies Freeman's model for the *corporate community* in European village development. Having achieved such a size, the village gains possession of almost all its resources and begins to take on *mini-state* attributes of communal organisation. In Early Modern Tuscany, when central state power was weak, such villages even waged smallscale wars on each other over resource disputes (Fig. 4.10).

Enlarging the community in this way, nonetheless, breaks the face-to-face society and either calls into being a formal subdivision into horizontal social groups within the village (as in the classic south-western States Pueblo Indian settlements), or more commonly is achieved through a vertical stratification in which communal decisions are dominated by a minority in the village. European village ethnographies again suggest that village councils are the preserve of the better-off male heads of land-owning families, a principle which often preserves the efficacy of the less than 200 face-to-face society within the confines of the dominant male group within the enlarged village<sup>3</sup>.

### THE RISE OF THE GREEK CITY-STATE

I have elsewhere discussed in more detail the deep implications of these tendencies for our understanding of early historic societies in Archaic Greece and Italy, and other cross-cultural scenarios (e.g. the first urban societies of the Early Bronze Age in the Levant). Here let me merely summarize the case of the rise of the Greek city-state or *Polis* in the period *circa* 750–500 BC. We can immediately become aware of the relevance of corporate village theory when we consider Ruschenbush's (1985) statistics for Greek city states (Fig. 4.11). We can see why the historical geographer Ernst Kirsten

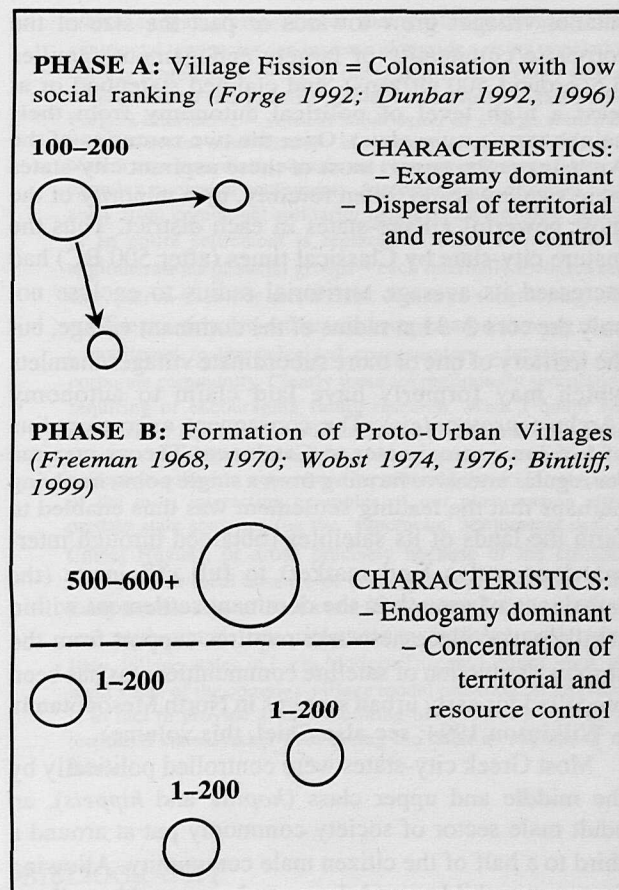


Figure 4.10 A model for the transformation from a face-to-face settlement to one largely endogamous and ripe for the development of a corporate community. Numbers refer to population range of settlements.

### THE 'NORMAL' POLIS

Of the 700–800 city-states of the Classical Aegean for which data are available:

- 80% have populations of 2000–4000 people, and maximal territories of 5–6 kilometres radius

Figure 4.11 Summary average statistics for Greek city-states (from Ruschenbusch, 1985).

accurately perceived that the typical Greek city-state was no more than a village-state (Dorfstaat) in both origin and indeed function in the landscape (Kirsten, 1956).

I would conceive of the evolution of the city-state network as follows (cf. Bintliff, 1994). Initially Dark Age settlements were few and widely-spaced, and small. Through the process of fission at densities below 200 people per village, population recovery by early historic (Archaic) times had resulted in a mature settlement network with approximately 2.5 km radius territories per village. Although there were already some sizeable and powerful village-towns, a very large number of the

smaller villages grew towards or past the size of the corporate community of largely endogamous families (i.e. around 500 citizens), and claimed statehood or at least a high level of political autonomy from their neighbours (*protopoleis*). Over the two centuries of the Archaic era, however, most of these aspirant city-states were swallowed-up, often forcibly, by a minority of the most powerful village-states in each district. Thus the mature city-state by Classical times (after 500 BC) had increased its average territorial radius to enclose not only the core 2–3 km radius of the dominant village, but the territory of one or more subordinate villages/ hamlets which may formerly have laid claim to autonomy (Archaic *protopoleis*). The consequent average radius of 5–6 km approximates to Catchment Theory maxima for regular intensive farming from a single point, implying perhaps that the leading settlement was thus enabled to farm the lands of its satellites (obtained through inter-marriage and a land market) to full efficiency (the imbalance of growth in the dominant settlement within small central-place networks requires support from the surplus production of satellite communities – as has been modelled for early urban systems in North Mesopotamia – Wilkinson 1994; see also Shiel, this volume).

Most Greek city-states were controlled politically by the middle and upper class (*hoplite* and *hippeis*), an adult male sector of society commonly put at around a third to a half of the citizen male community. Allowing for women, children and slaves, and some resident aliens, a face-to-face politically-active male group of 150 could still represent a total city population of around 2000 people. Ruschenbusch's averages show that at the lower end of the typical city-state population, a close personal society may still have operated, whereas at the upper end there would have been factions and patronage networks when face-to-face knowledge ceased to be effective.

Another central aspect of Greek city-state society was the general concept that the *polis* was an integral town and country unit, where citizens were typically identified through rights to ancestral holdings in the *chora* or territory of the urban focus. This is identical to the corporate community structure of traditional European villages of the Early Modern period, and I would argue that this arises at the point where the predominance of endogamy within an expanded communal mating pool hands over control of communal lands to the inhabitants of the main settlement, or more correctly the male landholders of a certain status.

## CONCLUSION

It can be argued that such a model, connecting a shift from a face-to-face society to a larger corporate community of 500 or more members, with a stronger political control structure legislating over the utilisation of the

settlement's territory, has excellent cross-cultural potential for providing insights into the genesis of city-states in many different periods and regions (e.g. the Bronze Age of the Near East, Medieval north-central Italy). It also has unsuspected potential for explaining the elaboration of complex village organisation that stops short of city-state formation (the Dorfstaat model), a development far more frequent than normally realised. Thus in the transition from Early to High Medieval times in large swathes of north-west Europe, circa 1000 AD, the face-to-face fissioning villages of 150 or less, frequently expand in a period of rapid demographic growth to two or three times that size. Along with the predictable subdivision of territories which this usually occasioned, and the colonisation of marginal lands, there are clear signs of the creation of corporate communities within these villages, which were closely involved with the overall management of village resources. Fox (1992) has argued, for example, that the shift from a patchwork of individual peasant estates combining arable and pasture to the classic 2- and 3-field communitarian farming regime, a dramatic landscape alteration occurring across the same transition period, is a calculated response by the village corporate community and its feudal lords to the requirements to rationalise the use of territory under population pressure. In the absence of powerful feudal lords and strong overarching state structures, these repetitive processes might otherwise have led to innumerable small, competing polities such as in ancient Greece. Indeed this could be suggested to have occurred in the context of a weak feudalism in north-central Italy at the same time-period, when several hundred city-states emerged claiming various degrees of autonomy, and as

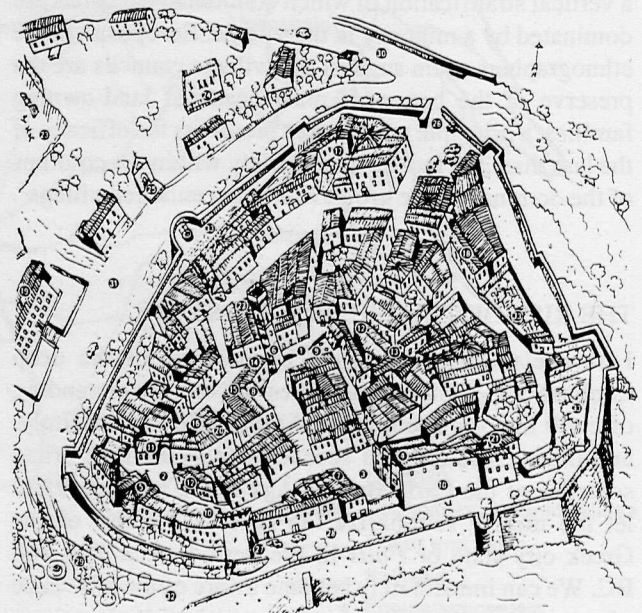


Figure 4.12 A traditional hill-village/ town in Italy (from Silverman, 1975, Figure 3).

Tak showed for Early Modern Tuscany, even recent villages can show behavioural tendencies in this direction when the state is ineffective. Still today the inhabitants of the large hilltop villages of Italy (Fig. 4.12) exhibit a strong degree of internalised cohesion that makes them proudly pronounce that they are *villagers by day, townspeople at night*.

## NOTES

- 1 Cross-cultural ethnohistorical research underlines the near-universality of marriage-restrictions on close-kin in recorded human societies. Biological anthropologists confirm the reality of deleterious inbreeding as a powerful element in accounting for kin-group exogamy as an adaptive mechanism. Indeed evidence for comparable out-movement by male or female apes and monkeys suggests that the practice may well have its roots amongst our pre-modern ancestors. I am grateful to Professor Bob Layton (Durham University) for helpful discussions on this topic.
- 2 An alternative means of preserving patrimony within a single settlement, to increasing community size, might be unogeniture – where a single son or daughter inherited in each household and remained there to replace the parental generation, and no resources moved with out-marrying further sons or daughters. This would seem to create a rather static or ‘closed’ household resource system, in contrast to a dowry-system, where an ‘open’ system would create a lively market for mates with advantageous dowry-wealth. Ethnohistory offers many examples of both systems (with a perhaps more readable set of examples for the *mate-market* being the dominant theme in the novels of Jane Austen). Once a precedent was set for endowing children, a chain-effect could be envisaged causing rapid social differentiation within the networked community, as those who could, married their offspring to wealthier partners and enhanced any pre-existing land or stock differentials between families. In terms of the rise of corporate nucleated agricultural communities where land-ownership is largely the basis for civil rights in ‘proto-city states’, the basic model I am putting forward in this essay, we must assume that at least male offspring retain the option of full citizenship through land-ownership, and that therefore sons (and probably also daughters) in such emergent complex societies preserve shares in the community’s land and stock through inheritance or dowry. The implications for the enhancement of internal social stratification would be worth further research as an additional factor in the greater political and economic complexity of such nucleated settlements – not least when we seek to explain how they can be managed at population levels above Dunbar’s theoretical, face-to-face range. As I discuss later in this paper, it is indeed the case that corporate village and city-state communities are commonly controlled politically by the wealthier group of landholders, even if all landholders tend to have de facto civil rights or full citizenship.
- 3 I have already noted that two ‘attractors’ come into opposition in the possible repetitive trajectories of nucleated communities: the social fission model, boosted by pressures for exogamy, and that in which the Wobstian-threshold is overcome by enlarging the settlement – with considerable effects on enhancing corporate activity. Why – and it clearly happened repeatedly in societies throughout the world and since later prehistory – and how – was the strong tendency for settlements to remain small – broken, with important results for social evolution? One answer, with practical examples at hand, is through Forge’s horizontal subdivision of a growing settlement; if larger villages are really agglomerations of clans or otherwise related kin-groups, between

which exogamy is practised and resources circulate, then centripetal tendencies can increase alongside a rising population. Clearly more intensive use of the settlement’s territory seems a requirement of this pattern – could it be a causative factor, too? Forge’s alternative – vertical subdivision of a large settlement through social stratification, is a factor already discussed in Note 3 as a potentially significant element in the emergence of complex nucleated settlements. A reorientation of social focus away from communal solidarity based on face-to-face politics of an entire settlement is replaced in these two models by agglomerations of social groups – each internally focussed on a clan, patron-client, or social class, or similar subgrouping – the confederate enlarged settlement being bonded through shared commitment to the perceived compensatory advantages of a corporate community. Clearly these are preliminary speculations requiring or encouraging future research. What I doubt very much is an argument in which complex villages arise merely through the impact of existing state systems, as a form of collective cohesion germinated by external threat. Firstly some of the most interesting examples of our phenomenon either predate state societies (eg the ‘supernova’ settlements such as Chatal Huyuk), or arose precisely because of the collapse, weakness, or local absence of state systems (city-states in the Early Bronze Age of the Levant, city-states in Archaic Greece and north-central Italy, city-states in Medieval north-central Italy, village-states in Early Modern Tuscany). In my view, the main value of the complex-village model presented in this essay is in fact to provide a basic building-block for the creation of territorial states, rather than seeing the latter as explaining the former.

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