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TRADITIONAL AND ANCIENT RURAL ECONOMY IN MEDITERRANEAN EUROPE: PLUS ÇA CHANGE?

The study of recent 'traditional' Mediterranean rural economy has long been a predilection of ancient historians and archaeologists working in that area. Traditional practices and production norms have been used by ancient historians in the interpretation of the often enigmatic testimony of the ancient agronomic writers, while archaeologists have used the same information to fill in the many gaps in the material record supplied by the spade. Much of the relevant data on traditional rural economy are gleaned from the accounts of early travellers or of modern geographers, ethnographers and agronomists. But *comparanda* acquired at first-hand enhance the credibility of archaeologists and ancient historians as fieldworkers, and chance summer encounters with Cretan shepherds or Cycladic fishermen are valuable currency in competitive displays at academic conferences.

More crucial than the *source* of traditional analogies, however, is the issue of their relevance to the prehistoric and historic past. In some quarters an implicit assumption of relevance perhaps arises from a rather romantic notion of the Mediterranean rustic, both ancient and modern, as a being in communion with nature.[1] Others have argued more explicitly for an essential continuity in rural economy as a reflection of the strong constraints imposed by the natural environment of the Mediterranean.[2] Yet it is clear that many aspects of traditional rural life are integrally bound up with elements of the contemporary natural and social environment which have not remained unchanged since time immemorial. The purpose of this paper is to caution against the uncritical use of traditional practices and norms as analogies for antiquity and to suggest that the greatest value of studying traditional farming may be as a guide to the questions we should be asking about the past.

I. Traditional Mediterranean Farming

Most descriptions of traditional Mediterranean farming recognize the influence of two distinctive features of the Mediterranean natural environment—climate and relief.[3] The climate of the coastal lowlands, where most human settlement is concentrated, is characterized by an alternation beween mild winters and hot summers and by a winter rainfall regime. Annual crops like wheat take advantage of the mild winters to complete their growth cycle by early summer, while perennial crops such as the olive are adapted to surviving the summer drought. The relief is heavily broken, such that the plains and hills of the lowlands usually lie within days, if not hours, of high mountains which are snow-bound in winter but cool and well-watered in summer. The flocks of sheep and goats which overwinter in the lowlands can thus escape the summer drought by moving to the high pastures of the mountains and there are 'transhumant' pastoral communities which undertake such a pattern of twice-yearly movement between lowland and mountain throughout the Mediterranean.

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[1] For a critique of such uniformitarian assumptions about rural life in Greece, see L. M. Danforth, *Journal of Modern Greek Studies* ii (1985) 53–85.

[2] E.g. M. R. Jarman, G. N. Bailey and H. N. Jarman (eds.) *Early European agriculture* (Cambridge 1982).

[3] E.g. E. C. Semple, *The geography of the Mediterranean region and its relation to ancient history* (London 1932); D. B. Grigg, *The agricultural systems of the world: an evolutionary approach* (Cambridge 1974); G. Barker, *Prehistoric farming in Europe* (Cambridge 1985).

Clearly one consequence of broken relief is considerable *local* diversity of topography and climate, but certain generalizations about land-use can still be made. Traditionally the Mediterranean landscape has been dominated by the seasonal pastures of sheep and goats and by wheat or barley fields sown on a two-year fallowing cycle. The fallow fields have been cultivated to prevent weed growth (hence 'bare fallow') and so to preserve two years' moisture for the succeeding cereal crop. A much smaller area is devoted to vegetable gardens and to orchards or vineyards, though the value of their produce is disproportionately large. Locally, olives and vines may take up a large part of the total cultivated area, partly because of their ability to thrive on soils to which shallow rooting cereals are ill-adapted.

Scholars have extrapolated a number of traditional features back into the past. In Greece, some sort of seasonal use of mountain pasture by early historical times is clearly implied in the story relating how the infant Oidipous was handed over by a Theban shepherd to a Corinthian shepherd on Mt. Kithairon,[4] but full-scale transhumant pastoralism has been suggested for later prehistory on archaeological grounds in Greece, Italy and Spain.[5] Indeed a broadly similar pattern of movement has even been suggested for a population dependent on animals such as red deer in northwest Greece during the last Ice Age.[6]

The alternation of cereals and bare fallow has also widely been assumed to be the norm in historical times[7] and perhaps in prehistory.[8] This assumption is integral to many estimates of past labour requirements or productivity and has contributed to the widespread belief that ancient agriculture was woefully unproductive, with rare insights by the early agronomists being effectively neutralized by technological shortcomings. Local specialization in olives or vines has also aroused interest, and is a basic prerequisite of Renfrew's argument that the palâces of Bronze Age southern Greece developed as centres for the redistribution of the fruits of locally specialized agricultural production.[9]

Unfortunately the direct historical or archaeological evidence for extrapolating these traditional forms back as widespread elements of past rural life is rarely unambiguous. For this reason circumstantial arguments as to what is likely to have taken place assume great importance. Clearly such circumstantial arguments are dependent on understanding the social and natural environmental context of traditional transhumance, bare fallowing or tree-crop specialization. For example, the geographical pattern of local specialization in crops such as olives and vines has changed radically during the last three centuries for a variety of locally and historically specific reasons—in response to the development of new urban markets, to the construction of new transport links such as canals and railways or to the growth and decline of competing producers because of government intervention or because of natural disasters such as the phylloxera which wiped out the vineyards of France and Spain, then Italy and Dalmatia.[10] In Greece itself local specialization in olives in areas ill-suited to cereal growing is clearly related to the opportunities of an international market economy: thus olive growers in the infertile Mani peninsula of southern Greece cut down their trees and reverted to cereal production when

[4] Semple (n. 3) 323.

[5] K. Kilian, *Archäologisches Korrespondenzblatt* ii (1972) 115–23; *Archäologisches Korrespondenzblatt* iii (1973) 431–5; G. Barker, 'Prehistoric territories and economy in central Italy', in E. S. Higgs (ed.) *Palaeoeconomy* (Cambridge 1975) 111–75; Jarman *et al.* (n. 2).

[6] E. S. Higgs, C. Vita-Finzi, D. R. Harris and A. E. Fagg, *Proceedings of the Prehistoric Society* xxxiii (1967) 1–29.

[7] Semple (n. 3) 386; M. I. Finley, *The ancient economy* (London 1973) 108; R. Duncan Jones, *The economy of the Roman empire; quantitative studies*[2] (Cambridge 1982) 49; but *cf.* K. D. White, *Roman farming* (London 1970) 119–21.

[8] W. Richter, *Die Landwirtschaft im homerischen Zeitalter* (Archaeologia Homerica ii. H [Göttingen 1968]) 100–1; H. J. van Wersch, 'The agricultural economy', in W. A. McDonald and G. R. Rapp (eds.) *The Minnesota Messenia expedition* (Minneapolis 1972) 183–4; A. G. Sherratt, *World Archaeology* xi (1980) 313–20; M. Wagstaff, S. Augustson and C. Gamble, 'Alternative subsistence strategies', in C. Renfrew and M. Wagstaff (eds.) *An island polity: the archaeology of exploitation in Melos* (Cambridge 1982) 177; J. L. Bintliff and A. M. Snodgrass, *Journal of Field Archaeology* xii (1985) 142.

[9] C. Renfrew, *The emergence of civilisation: the Cyclades and the Aegean in the third millennium* BC (London 1972).

[10] Grigg (n. 3) 141–4.

World War II disrupted international trade and forced them to rely on local subsistence agriculture. This does not, of course, mean that local specialization did not take place in the distant past, but it does cast doubt on Renfrew's model in which local specialization is a prerequisite for the initial development of the very institutions which would have made specialized communities viable.[11]

Two other traditional features noted above are rather harder to dismiss. Transhumance and bare fallowing (and hence the absence of manuring or crop rotation) together account for what many see as the single most fundamental distinction between traditional Mediterranean and temperate European farming—the divorce between stock husbandry and arable farming.[12] In essence, transhumance removes livestock from the lowlands for half of the year, thus depriving the arable sector of half of the available manure.[13] Bare fallow, in turn, produces less fodder than a weedy (i.e. uncultivated) fallow and far less than a rotation including fodder crops: thus the grazing potential of the lowlands is kept low and livestock are forced into seasonal transhumance.[14] Together the most distinctive characteristics of traditional stock and crop husbandry have locked the pastoral and arable sectors of the rural economy into a vicious circle of increasing separation.

But was this pastoral: arable divorce equally characteristic of rural economy in antiquity? To answer this question, we must first look critically at the natural and social context of transhumance and bare fallowing in traditional rural economy.

II. Transhumance

Most studies of traditional Mediterranean transhumance have rightly stressed the complementary nature of the lowland winter grazing areas and the highland summer pastures. A few of these studies have argued that the lowlands are in fact too hot and dry in summer for stock to survive, while winter conditions in the mountains are equally severe. Under this extreme formulation, transhumance is literally an inevitable consequence of environmental constraints and can be extrapolated back into the distant past with absolute confidence. All the common farmyard animals, however, can and do survive the heat and aridity of the lowland summers and a few even overwinter in the mountains, albeit at a considerable cost in stall-feeding.[15] A more usual, and less contentious, 'environmental' interpretation of transhumance sees such twice-yearly movements as evading the season of scarce grazing in both the lowlands and the mountains and so permitting the maintenance of larger populations of livestock (and people).[16] In other words, transhumance is a necessary response to the Mediterranean environment *if livestock are kept on a sufficiently large scale*. Stock husbandry on the necessary scale in the past cannot be assumed and has rarely, if ever, been demonstrated.

In later prehistory, at least, the ecological niche occupied by traditional transhumant pastoralists simply did not exist. Firstly, the present summer pastures in the mountains are, to a large extent, not a 'natural' feature of the Mediterranean landscape.[17] Although tree growth may be prevented locally in the mountains by steepness of slope, absence of soil, waterlogging and so on, no Mediterranean mountain is high enough (for its southerly latitude) for extensive alpine meadows to be the inevitable product of harsh winter conditions. On the contrary, tree growth tends to be associated in the mountains of the Mediterranean region with wet, rather

[11] See also S. Aschenbrenner, 'A contemporary community', in McDonald and Rapp (n. 8) 49; J. G. Lewthwaite, 'Acorns for the ancestors: the prehistoric exploitation of woodlands in the west Mediterranean', in S. Limbrey and M. Bell (eds.) *Archaeological aspects of woodland ecology* (British Archaeological Reports International Series cxlvi [Oxford 1982]) 218.

[12] Semple (n. 3) 297; Grigg (n. 3) 125.

[13] Semple (n. 3) 300.

[14] Grigg (n. 3) 125.

[15] E.g. J. K. Campbell, *Honour, family, and patronage* (Oxford 1964) 10–11.

[16] Higgs *et al.* (n. 6); Barker (n. 5); Jarman *et al.* (n. 2); J. M. Frayn, *Sheep-rearing and the wool trade in Italy during the Roman period* (Liverpool 1984).

[17] Higgs *et al.* (n. 6); G. Mavrommatis pers. comm.

than warm, topographical situations. In northern Greece, for example, the tree-line is higher on west- than on east-facing slopes, higher on high mountains than on low ones, and higher on impermeable than on permeable rocks, all of which suggests summer aridity, rather than winter cold, as the major *climatic* factor favouring grassland.[18] Even if insufficient to prevent tree growth, aridity could seriously retard regeneration of high mountain forests in the face of clearance by shepherds and woodcutters, which is very well documented in the recent past.[19] Most mountain pasture seems to be the product of human interference—either directly through the fire and axe or indirectly through grazing livestock—and, as the decline of the traditional pastoral economies leads to relaxation of grazing pressure, trees are widely recolonizing these areas. Throughout much of later prehistory, therefore, and perhaps well into early historical times, mountain pasture may have been very limited in extent.

Secondly, the fertile lowlands occupied by the earliest Mediterranean farmers in the sixth millennium bc were also well wooded.[20] This does not mean that a dense arboreal canopy prevented the growth at ground level of accessible graze and browse, but herding large numbers of animals would have been very difficult and a variety of large predators and competitors will have made close herding necessary. Moreover the trees will have offered browse for domestic livestock during the months when the more shallow-rooting grasses died back[21] and in some areas seasonal wetland will have provided an alternative source of graze for small numbers of animals, so summer will not have been such a season of scarcity for lowland livestock as has been the case in recent times. Thus seasonal use of distant mountain pastures may only have become advantageous, let alone necessary, once extensive clearance had created a surfeit of winter grazing in the lowlands and this surfeit had been taken up by greatly increased numbers of livestock.

Thirdly, the social environment in which the transhumant pastoralism of recent centuries flourished is quite unlike any which existed in the distant past. The unusual political and economic conditions under which the long distance systems of Spain (the 'Mesta') and Italy (the 'Dogana') developed to supply the mediaeval wool trade are well known. More recently Lewthwaite has discussed the international political and economic factors which underpinned smaller scale pastoral economies in Corsica and Sardinia.[22] In northern Greece the traditional economy of the Vlachs and Sarakatsani, who inspired much of the recent archaeological fascination with transhumant pastoralism, also warrants further investigation. Though many Vlach and Sarakatsani shepherds did make the prescribed annual moves with their flocks to and from the high mountain pastures of the Pindhos range, others stayed in the mountains as sedentary mixed farmers, while others travelled widely in Greece, the Balkans and eastern Europe making a living as merchants, tinkers or builders.[23] In recent times, at least, the shepherds have sold the produce of their flocks (wool, cheese, lambs) in the markets of the lowland towns and have bought in relatively cheap agricultural staples, such as flour and oil,[24] and up to the nineteenth century some of the highland population was employed in guiding, guarding and robbing traders passing through the mountains. Thus in a number of ways the recent highland economy has been heavily subsidized by and parasitic upon the market economy

[18] Admiralty, Naval Intelligence Division, *Greece, i: physical geography, history, administration and peoples* (Geographical Handbook Series [Andover 1944]); P. Quezel, *Vegetatio* xiv (1967) 127–228.

[19] W.B. Turrill, *The plant-life of the Balkan peninsula* (Oxford 1929).

[20] E.g.W. van Zeist and S. Bottema, 'Vegetational history of the eastern Mediterranean and the Near East during the last 20,000 years', in J. L. Bintliff and W. van Zeist (eds.) *Palaeoclimates, palaeoenvironments and human communities in the eastern Mediterranean region in later prehistory* (British Archaeological Reports International Series cxxxiii [Oxford 1982]) 277–321.

[21] G. Williamson and W. J. A. Payne, *An introduction to animal husbandry in the tropics*[2] (London 1965) 79; F. Pernet and G. Lenclud, *Berger en Corse* (Grenoble 1977).

[22] J. G. Lewthwaite, 'Plain tails from the hills: transhumance in Mediterranean archaeology', in A. Sheridan and G. Bailey (eds.) *Economic archaeology: towards an integration of ecological and social approaches* (British Archaeological Reports International Series xcvi [Oxford 1981]) 57–66.

[23] A. J. B. Wace and M. S. Thompson, *Nomads of the Balkans* (London 1914); Campbell (n. 15); N. Gage, *Eleni* (London 1983).

[24] Campbell (n. 15) 363–4.

of the lowlands.[25] Without this 'subsidy', pastoral communities would need to maintain far larger flocks to support a given human population.

Quite when the niche occupied by traditional transhumant pastoralists was first created and exploited is a difficult question, the answer to which doubtless varies from area to area within the Mediterranean. Firm palynological evidence for the impact of early farmers on lowland vegetation is notoriously hard to find,[26] suggesting that clearance was in most cases a very gradual process, and extensive deforestation in the mountains seems, in some areas at least, only to have taken place in the last few centuries. There is also a tendency among ancient historians to play down the importance in classical antiquity of the urban market upon which recent pastoralists have been dependent.[27] The appearance in northern Greece towards the end of the first millennium AD of the Vlachs,[28] the linguistically and culturally distinct group which has traditionally occupied much of the high Pindhos, may then reflect the colonization of a new economic niche.[29] Locally, specialized pastoralism may well have existed much earlier, particularly in agriculturally marginal areas, but the wholesale seasonal removal of livestock from the arable lowlands was probably not commonplace in antiquity.[30]

III. Bare Fallowing

The popular explanation for the traditional prevalence of bare fallowing (and near-absence of soil-improving practices such as manuring and cereal/pulse rotation) is that the limiting factor on crop production in the Mediterranean is the availability of water, rather than nutrients, and that bare fallowing allows two years' rainfall to be stored for one crop.[31] At best, therefore, manuring offers an irrelevant improvement in soil fertility and at worst it accelerates water loss by opening up the soil, and so is actually deleterious.[32] Similarly a pulse rotation crop, which adds nitrogen to the soil, is at best irrelevant and at worst competes with the ensuing cereal crop for moisture and so is positively disadvantageous. The fact that cereal/pulse rotation has only begun to oust bare fallowing very recently, and at the behest of modern agronomists, even though its theoretical advantages were appreciated by the ancient agricultural writers, apparently confirms the unsuitability of this practice to the Mediterranean.

That soil moisture can be a limiting factor on crop production in the Mediterranean is made amply clear by the frequent coincidence of severe drought and crop failure.[33] Moisture is evidently not the only limiting factor, however, because the widespread abandonment of bare fallowing since World War II has been accompanied by the adoption of weed killers and

[25] See also S. H. Lees and D. G. Bates, *American Antiquity* xxxix (1974) 187–93; P. Briant, *État et pasteurs au moyen-orient ancien* (Cambridge 1982) 235.

[26] See e.g. the extensive pollen record from central and northern Greece: T. A. Wijmstra, *Acta Botanica Neerlandica* xviii (1969) 511–27; H. E. Wright, 'Vegetation history', in McDonald and Rapp (n. 8); S. Bottema, *Late quaternary vegetation history of northwestern Greece* (Groningen 1974); *Palaeohistoria* xxi (1979) 19–40; *Acta Botanica Neerlandica* xxix (1980) 343–9; *Palaeohistoria* xxiv (1982) 257–89; J. R. A. Greig and J. Turner, *Journal of Archaeological Science* i (1974) 177–94; J. Turner and J. Greig, *Review of Palaeobotany and Palynology* xx (1975) 171–204; N. Athanasiadhis, *Flora* clxiv (1975) 99–132.

[27] Finley (n. 7).

[28] A. P. Avramea, Η βυζαντινή θεσσαλία μέχρι του *1204* (Βιβλιοθήκη Σ.Ν. Σαριπόλου 27), (Athens 1974) 66.

[29] The antiquity of transhumant pastoralism cannot be resolved by archaeological survey alone: the often ephemeral habitations of mobile pastoralists can be archaeologically invisible, especially in the difficult terrain of the mountains; conversely, to interpret all high mountain occupation sites as the remains of transhumant pastoralists is begging the question.

[30] P. Garnsey, 'Mountain economies in southern Europe or: thoughts on the early history, continuity and individuality of Mediterranean upland pastoralism' in M. Mattmüller (ed.), 'Wirtschaft und Gesellschaft von Berggebieten', *Itinera* v/vi (Basel 1986), 7–29.

[31] Semple (n. 3) 386; White (n. 7) 113, 118.

[32] Semple (n. 3) 411; White (n. 7) 129.

[33] E.g. D. Christodoulou, *The evolution of the rural land use pattern in Cyprus* (World Land Use Survey Regional Monograph ii [Bude 1959]) 28–33.

[34] H. M. James and A. Frangopoulos, *Cyprus Agricultural Journal* xxxiv (1939) 5–19; L. Littlejohn, *Empire Journal of Experimental Agriculture* xiv (1946) 123–33; P. A. Loizides, *Empire Journal of Experimental Agriculture* xxvi (1958) 25–33.

artificial fertilizers, but only rarely of irrigation. In fact experiments conducted during the 1930s, 1940s and 1950s in Cyprus showed that fertilizers improved cereal yields dramatically.[34] Fertilized plots produced more *every year* than did bare fallowed plots in alternate years. Moreover, sheep manure produced the same effect as artificial fertilizers. In fact manure is applied to tree crops, gardens and cereals throughout the Mediterranean and is evidently beneficial—at least if the timing and quantity are appropriate. So manured annual cropping is far more productive than a bare fallow/cereal rotation, if sufficient manure is available.

Alternatively, cereals may be grown in rotation with pulse crops, and again modern experimental data are instructive. The Cypriot experiments showed that wheat yields following a pulse crop were slightly lower than those after bare fallow, while experiments in northern Greece indicate a slight improvement in wheat yields after a pulse crop.[35] Data from the semi-arid south of Australia, however, suggest that in the long term the benefits of pulse rotation to alternate year wheat yields are quite unequivocal[36]—and of course a pulse crop is also produced in the intervening years.

If, as seems inevitable, bare fallowing is so much less productive per unit area than either manured annual cropping or cereal/pulse rotation, why was it so pervasive in the recent past? As was noted above, manuring is not in fact unknown in traditional farming and has probably tended to be concentrated in small-scale gardens, orchards and so on because of the scarcity of manure[37]—which in turn partly results from the traditional prevalence of transhumance.[38] The key to the rarity of cereal/pulse rotation in traditional farming seems to be the higher labour costs of (harvested) pulse crops compared with cereals:[39] though more productive per unit area than bare fallowing, cereal/pulse rotation may be less productive per unit of human labour.

In both cases the *scale* of traditional farming is crucial. Traditionally, most of the rural population of the Mediterranean has lived in nucleated villages or towns, far from the majority of their fields. Even small settlements, which are often located with an eye to security rather than for proximity to their fields, may face the same problem and the need to farm at a distance from home is widely exacerbated by broken terrain and by a highly fragmented and dispersed pattern of land tenure.[40] In consequence subsistence agriculture has been dominated by extensive cultivation of distant fields in which cereals alternate with bare fallow, while the more labour intensive pulses have tended to be relegated to a minor role, often restricted to intensively worked in-field gardens.[41] This labour-saving tactic rules out the possibility of widespread cereal/pulse rotation.

Why was bare fallowing characteristic of the cereal fields? Significantly, in the Cypriot experiments referred to earlier, the main obstacle to manured annual cropping of cereals was found to be the proliferation of weeds. The extensively cultivated cereal fields of traditional farming received only low levels of manuring, tilling and weeding and so produced poor crops which did not compete well with weeds. Bare fallowing, by ploughing up fallow weeds before they seed, is an effective means of checking weed growth and, because ploughing can take place in late spring in the agricultural slack season between sowing and harvest, it makes economical

[35] Β. Φ. Κοκόλιος, Γεωπονικά 110–111 (1963) 1–15; Σ. Ε. Σωτηριάδης, Γεωργική Έρευνα i (1977) 125–36.

[36] M. Williams, *The making of the south Australian landscape* (New York 1974); B. A. Chatterton and L. Chatterton, *Libyan Studies* xv (1984) 157–60.

[37] E.g. P. A. Loizides, 'The cereal-fallow rotation in Cyprus', *Proceedings of the first Commonwealth conference on tropical and subtropical soils* (Commonwealth Bureau of Soil Science, Technical Communication xlvi [Harpenden 1948)] 210.

[38] Also, in the recent, heavily deforested landscape, farmers have sometimes needed to use available dung as fuel—e.g. A. C. de Vooys, *Tijdschrift van het Koninklijk Nederlandsch Aardrijkskundig Genootschap* lxxvi (1959) 31–54.

[39] F. Dovring, *Land and labor in Europe 1900–1950* (The Hague 1960) 404; M. Wagstaff and C. Gamble, 'Island resources and their limitations', in Renfrew and Wagstaff (n. 8) 103.

[40] Dovring (n. 39) 15, 26–7; Christodoulou (n. 33); M. Chisholm, *Rural settlement and land use*[2] (London 1968); S. F. Silverman, *American Anthropologist* lxx (1968) 1–20; H. A. Forbes, *Annals of the New York Academy of Sciences* cclxviii (1976) 236–50; M. Wagstaff and S. Augustson, 'Traditional land use', in Renfrew and Wagstaff (n. 8) 108.

[41] E.g. Wagstaff and Augustson (n. 40) 119.

use of scarce manpower and plough animals.[42] This scarcity is in turn a consequence of the extensive and unproductive nature of traditional land-use.

Like transhumance, therefore, traditional bare fallowing is integrally related to a specific historical context and should not be extrapolated back into the distant past uncritically. If traditional extensive farming is integrally related to the traditional nucleated pattern of settlement, dispersed settlement in farmsteads and villages located nearer to the arable land might well be associated with more intensive farming. In fact a relatively dispersed pattern of settlement does seem to have been the norm for most of prehistory[43] and has recently been documented for classical antiquity in a host of intensive archaeological surveys.[44] Even if some of the smallest rural 'sites' located in these surveys are not permanent farmsteads, the presence of substantial (i.e archaeologically visible) field-houses may have rather similar implications for the intensity of land-use.[45] Thus if the deconstruction of traditional agricultural practice offered here is basically valid, intensive cultivation involving regular manuring and cereal/pulse rotation may have been commonplace in antiquity. Indeed the widespread 'background' scatter of ancient pottery, documented in parts of the lowland Mediterranean landscape as a spin-off of recent surveys,[46] surely reflects intensive agricultural activity and was perhaps largely created by manuring or middening.[47]

IV. Land-use in Antiquity—An Alternative Model

Transhumance and bare fallowing, the twin interrelated pillars of the traditional divorce between livestock and crop husbandry, have both been shown to be integrally bound up with the nucleated nature of human settlement and the consequently extensive nature of land-use in the recent past. During later prehistory and early historical times, much of the rural population of the Mediterranean lived relatively close to the fields they worked and small-scale intensive farming was a practicable alternative. Under such a regime, cereal/pulse rotation may well have been the norm rather than the exception and changes in animal husbandry are also likely. The traditional system of farming a scatter of distant and dispersed plots makes it difficult for individual households to graze their small herd of livestock on their own arable land. Instead most livestock were run in large consolidated herds, either on a communal basis or under the ownership of specialized pastoralists, and fields under cereals and those in fallow tended to be grouped into large blocks to facilitate herding. These large herds both permitted and encouraged transhumance. With dispersed settlement and closer plots, herding at the household level would be more practicable and more complex rotation schemes might be a substantial obstacle to large consolidated herds. Transhumance would then be less likely and the consequent integration of crop and livestock husbandry would in turn make manure more freely available and so reinforce the viability of intensive arable farming.

Viewed in this light, discussion by the ancient agricultural writers of the benefits of intensive practices like manuring and cereal/pulse rotation should perhaps be interpreted not as exploring the boundaries of contemporary agronomic theory, but rather as advocating the application to extensively farmed estates of techniques used on small farms since time immemorial.

[42] E.g. H. A. Forbes, *Expedition* xix. i (1976) 5–11.

[43] E.g. P. Halstead, 'Counting sheep in Neolithic and Bronze Age Greece', in I. Hodder, G. Isaac and N. Hammond (eds.), *Pattern of the past: studies in honour of David Clarke* (Cambridge 1981) 307–39

[44] P. D. A. Garnsey, *Proceedings of Cambridge Philological Society* ccv (1979) 1–25; D. R. Keller and D. W. Rupp (eds.), *Archaeological survey in the Mediterranean area* (British Archaeological Reports International Series clv [Oxford 1983]).

[45] R. Osborne, *ABSA* lxxx (1985) 119–28.

[46] T.W. Gallant, 'The Ionian Islands paleo-economy research project', in Keller and Rupp (n. 44); Bintliff and Snodgrass (n. 8).

[47] A. M. Snodgrass, *Annales (É.S.C.)* v–vi (1982) 800–12; see also T. J. Wilkinson, *Journal of Field Archaeology* ix (1982) 323–33; D. Crowther, *Scottish Archaeological Review* ii (1983) 31–44; T. M. Williamson, *Britannia* xv (1984) 225–30.

This contrast between traditional extensive farming and the alternative intensive model has a number of quite radical implications for attempts by ancient historians to quantify the likely labour requirements and productivity of classical agriculture. For example, traditional agriculture is heavily dependent on work animals—both pack animals, for carrying labour to and produce from the distant and scattered fields, and plough animals for tilling the extensive areas under cereals or cultivated fallow. The feeding costs of such work animals are prodigious[48] and Roman colonial land allotments may often have been too small to justify the capital cost of keeping work animals: as little as 7–8 jugera (*c.* 2 ha) worked by hand could feed a family, but 20 jugera (*c.* 5 ha) would be needed if work animals were kept.[49]

Spade and hoe cultivation is still the norm for in-field gardens today and has on occasion replaced ploughing both in recent centuries and in classical antiquity.[50] For the Roman period spades and hoes are richly attested by archaeological finds[51]—though many of these were doubtless used to complement rather than to replace the plough.[52] The wider implications for farming societies of plough versus hoe cultivation have been discussed by Goody,[53] but two particular points deserve mention here. Firstly, with plough agriculture, the capital-expensive plough team sets the limit on productivity, whereas hoe cultivation can make far fuller use of a household's human labour force. Secondly, the alternative cultivation technologies affect the costs of crop production at a number of levels.

Under the traditional extensive system, much agricultural labour is directly geared to the maintenance of work animals which, because they are working during the day, need to be stall fed for much of the year. Crops are therefore harvested together with much of the straw, which could otherwise have been left in the field and grazed *in situ*. Reaping thus becomes even more back-breaking and a far greater volume of crop must be transported from the fields and then threshed and winnowed. Trampling the crop under the hooves of work animals, rather than flailing by hand, offsets the greater volume of crop to be threshed, but the need to save straw and chaff for fodder means that the crop must be winnowed laboriously in only a light breeze.[54]

The different cultivation technologies may also entail very different seed:yield ratios. Extensive plough agriculture is traditionally associated, and again clearly for reasons of scale, with broadcast sowing, which is very wasteful of seed.[55] Intensive gardening, on the other hand, is compatible with dibbling—a sparser but more even method of sowing which permits much higher seed:yield ratios.[56] Thus extensive and intensive farming are characterized by different cultivation technologies, by different harvesting and crop processing techniques and so by different labour inputs and production outputs at almost every stage in the agricultural cycle.

These differences might account for some of the 'discrepancies' in ancient literary estimates of labour requirements or productivity noted so despairingly by Duncan-Jones.[57] Of course, additional variation is introduced by other factors. Speed of ploughing, for example, depends on the heaviness of the soil and number of plough animals. Threshing is faster on a hot day, but slower if the crop is a glume wheat rather than a free-threshing cereal or pulse. Consideration of

[48] E.g. Christodoulou (n. 33) 182–3.

[49] White (n. 7) 336, citing an unpublished paper of K. Hopkins; *cf.* G. Delille, *Agricoltura e demografia nel regno di Napoli nei secoli xviii e xix* (Naples 1977), who cites *maximum* cultivable areas of 3·5 ha and 10 ha respectively for smallholdings without and with a pair of oxen (pp. 127–9) and a requirement of up to 10–12 ha of grazing to maintain a single ox (p. 135).

[50] H. A. Forbes, *Strategies and soils: technology, production and environment in the peninsula of Methana, Greece* (Ph.D. dissertation, University of Pennsylvania 1982) 217; Delille (n. 49); White (n. 7) 484 n. 5.

[51] K. D. White, *Agricultural implements of the Roman world* (Cambridge 1967).

[52] E.g. Delille (n. 49) 118 fig. 39.

[53] J. Goody, *Production and reproduction* Cambridge Studies in Social Anthropology xvii (1976); see also A. Gilman, *Current Anthropology* xxii(1981) 1–23; A. G. Sherratt, 'Plough and pastoralism: aspects of the secondary products revolution', in Hodder *et al.* (n. 43).

[54] G. Jones and P. Halstead, 'Traditional crop processing in Amorgos, Greece', (in preparation).

[55] E.g. F. Sigaut, *L'agriculture et le feu* Cahiers des Études Rurales i (Paris 1975) 220–1.

[56] P. McConnell, *The agricultural notebook* (London 1883).

[57] Duncan-Jones (n. 7) 330.

decision making by modern farmers, however, suggests other, perhaps more fundamental, reasons for caution in the search for labour and production norms for ancient agriculture.

V. The Economics of Agriculture—Norms and Variability

When modern peasant farmers are questioned about *average* yields or labour requirements, they are often unwilling, even unable to give a straight answer. Though frustrating for the amateur ethnographer, this experience can also be instructive.

Through the life-cycle of an individual household, the number of mouths to be fed changes, additional production requirements occur for dowries and the like, and the number of available workers changes.[58] In effect the farmer is aiming at a moving target with a weapon of gradually shifting calibre. Upon this foundation of a gradually (and largely predictably) changing ratio of producers to consumers, is superimposed a morass of unpredictable variation in both input and output.[59]

Key members of the labour force, human or animal, may be lost through death, injury or illness. Crop returns from a given plot of land fluctuate in response to external factors such as variation in the amount and timing of rainfall. Stored crops are subject to unpredictable losses through fire, spoiling or pest damage. To complicate the issue, one of the many ways in which farmers absorb temporary surplus or deficit may be to buy or sell land or labour.[60] So each year the farmer may be aiming for a different production target, from a different area of land, with a different labour force and with the cushion of a greater or lesser amount of produce in store.

He may adjust a number of aspects of agricultural practice as a tactical solution to these problems. If stores are running out and a dry winter has ruined the main cereal crop, he may try a late spring-sown crop such as millet. If stores are plentiful, he may try a high risk crop with a high market value. His choice of fallowing and rotation regime will reflect the relative availability of land, human labour, work animals, manure, stored produce and so on—as will the frequency of ploughing, hoeing and weeding. Most sinister of all from the perspective of the quantitative ancient historian, he may vary his sowing rate, and thus his seed: yield ratio.

For a given soil type, the more sparsely a farmer sows, the more shoots or tillers each seed will put out. If a farmer has access to enough good soil for normal subsistence, he may sow fields with marginal soil very sparsely on the grounds that he loses little when the crop is a failure and secures a windfall bumper harvest when weather conditions are ideal.[61] If a farmer needs a good return from all his land to be confident of an adequate harvest, and yet is short of labour for tilling and weeding, he may sow thickly so that a dense crop outcompetes the weeds which would otherwise choke it.[62] Evidently the miserably low seed: yield ratios from mediaeval estates in northwest Europe,[63] often used in modelling prehistoric and classical agriculture, likewise reflect particular local factors (such as the availability of land and labour or the price of grain),[64] as well as the relatively high rates of sowing required in a region of cold and wet climate.[65] At any rate, the dangers of an uncritical search for 'normal' seed: yield ratios for classical antiquity are apparent.

[58] M. Sahlins, *Stone age economics* (London 1974).

[59] Forbes (n. 40); (n. 50); J. O'Shea, 'Coping with scarcity: exchange and social storage', in Sheridan and Bailey (n. 22).

[60] P. Hill, *Rural Hausa: a village and a setting* (Cambridge 1972).

[61] *Cf.* P. A. Rowley-Conwy, 'Slash and burn in the temperate European Neolithic', in R. J. Mercer (ed.), *Farming practice in British prehistory* (Edinburgh 1981) 85–96.

[62] E.g. E. A. Skorda, 'Constraints to cereal production and possible solutions in Greece', *Fifth regional cereals workshop, Algiers, i* (Algiers 1979) 30.

[63] B. H. Slicher van Bath, *The agrarian history of western Europe AD 500–1850* (London 1963); G. Duby, *Rural economy and country life in the medieval west* (London 1968).

[64] E.g. E. van Cauwenberghe and H. van der Wee (eds.) *Productivity of land and agricultural innovation in the Low Countries (1250–1800)* (Leuven 1978) 125–39.

[65] J. Percival, *The wheat plant* (London 1921) 421–2; I. Arnon, *Crop production in dry regions, 2: systematic treatment of the principal crops* (London 1972) 48.

VI. Agricultural Norms and the Ancient Economy

These issues of rotation and fallowing regime, sowing rates and so on are clearly important *per se* from the point of view of the agricultural historian. They are also relevant to certain broader questions in social and economic history, such as the relationship in Roman Italy between free peasantry and landowners and the relative importance to the latter of slave and seasonally hired free labour.[66]

The preceding discussion also suggests the need for reevaluation of Finley's conviction that the goal of self-sufficiency extolled by the Roman writers was a moral precept with no basis in economic rationality.[67] In fact, as Finley himself points out, because transport costs were high in the ancient world, local surpluses and deficits could not easily be evened out by trade.[68] The outcome was violent fluctuation in the prices of agricultural produce, and in such an environment to aim for self-sufficiency and so avoid being at the mercy of extortionately high prices would have been very hard-headed economic rationality indeed.[69]

This leads on to what is arguably the most important problem in the ancient economy—how did rich Greeks and Romans in classical antiquity acquire their wealth? The current consensus among ancient historians seems to be that farming was, with very few exceptions, the only really important area of economic activity, at least until well into the Roman period.[70] Yet agriculture seems to offer only modest potential for accumulating wealth: the average returns on cereals were low and, because of their bulk, they could not easily be traded, while cash crops such as vines yielded higher returns, but only high quality produce was really profitable and that was traded on a small scale.[71] The problem of how the rich first got rich—before they had accumulated extensive estates[72]—is even more difficult to resolve from this perspective.

Here the variability and uncertainty inherent in agriculture, instead of being an obstacle to the discovery of norms, become a useful heuristic device in their own right. Though the returns from cereal agriculture were normally low, a killing could evidently be made from exceptionally high prices in times of famine—a range of cultural and legal prescriptions against excessive profiteering are documented for the Greek world[73] and, for the Romans, Varro clearly advocates the storing up of produce for this very purpose.[74] Cereal farming does not emerge in the ancient writers as the primary economic goal of landowners, because the rewards of such famine-broking must have been as unpredictable as the risks.[75] But occasional windfall profits could well, over the timespan of a generation or two, have made a major contribution to the income of elite households— and may well hold the key to the original emergence of a rich minority, given that current ancient historical orthodoxy seems, on a mixture of theoretical and empirical grounds, to have ruled out all the obvious alternatives.

VII. Conclusion

This paper has perhaps taken a rather tortuous path through the Mediterranean rural landscape, but its message is simple. Before archaeologists and ancient historians seek to transfer the behaviour of those they meet on their Mediterranean travels back into the past, they should look closely at what their informants are doing and why. And though the complexity of traditional agricultural ecology may obstruct the search for simple production norms, the unravelling of this complexity may also help to identify new and important questions which

[66] E.g. K. Hopkins, *Conquerors and slaves* (Cambridge 1978); D. W. Rathbone, *JRS* lxxi (1981) 10–23.
[67] Finley (n. 7) 109.
[68] Finley (n. 7) 127.
[69] *Cf.* J. du Boulay, *Portrait of a Greek mountain village* (Oxford 1974) 33–7; Forbes (n. 50).
[70] Finley (n. 7).
[71] Duncan-Jones (n. 7).
[72] E.g. Finley (n. 7) 102–3; Hopkins (n. 66).
[73] E.g. Finley (n. 7) 169–70; M. M. Austin and P. Vidal-Naquet, *Economic and social history of ancient Greece: an introduction* (London 1977) 291–4.
[74] Duncan-Jones (n. 7) 38.
[75] Duncan-Jones (n. 7) 146.

should be asked about the past. It is certainly not intended to discourage ancient historians and prehistorians from using their knowledge of traditional rural economy in the investigation of the past. On the contrary, such knowledge is essential both to evaluate and to supplement the ancient literary sources. Moreover, the intensive model of land-use proposed here as an alternative (or complement) to the extensive traditional pattern is consistent with, but cannot really be tested against the ancient literary sources, given their systematic lack of interest in small-scale, subsistence farming.[76] Further progress is heavily dependent on developing improved archaeological methods for the study of ancient agriculture— and to this end ethno-archaeological study of the last vestiges of traditional rural economy in the Mediterranean is a matter of the greatest urgency.

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[76] *Cf.* Duby (n. 63) 23, suggesting that Pliny is describing *extensive*, but Columella *intensive* agriculture; *cf.* also M. H. Jameson, *CJ* (1977–8) 122–45.