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The cover illustration depicts the theatre of Delphi.
Photo by R. Frederiksen, see p. 135, Fig. 1.

On the Gardens and Marginal Lands of Classical Attica

Jens Krasilnikoff

Throughout the 20th century scholars have been occupied with different aspects of ancient Greek farming, the subsistence basis of the Greek *poleis*. Important aspects of ancient agriculture were from an early start the subject of thorough investigations and in this process the evidence of Attica and Athens has played a dominant role. Substantial parts of the conclusions of these early works are, however, now outdated especially because of the intensified work which has been done throughout the last 30 years.¹ The recent discussions have mainly been conducted on the basis of the literary evidence and the heterogeneous archaeological material and have mainly focused on the farmland (*agros*)² thereby excluding the extensive “wilder-ness” and boarderlands (*ore*) of the *poleis*. The purpose of the examinations has been to explain the different roles played by agriculture with reference to different social and economic aspects of the *poleis*. Among the various topics the positions for and against *agropastoralism* or *mixed farming* have dominated the debate since 1981 when Halstead introduced the idea of a balanced agricultural production for the bronze age societies of the eastern Mediterranean. In the years that followed this concept was applied to other historical periods including Classical Greece. The purpose of the discussion was to determine whether the ancient Greek farmer aimed at producing for subsistence or for a market with the aim of securing a surplus in cash. The latter of these forms was by some scholars claimed to be the dominant form of production in ancient Attica, and was apparently made possible because the inadequate cereal production was counter-measured by the extensive grain supply.³

Ever since the 19th century scholars have been working on the settlement history of Greece, and Attica has received much attention. Accordingly, historians have used the results from archaeological excavations to elucidate the history of agriculture in ancient Greece. The pin-points of these excavations did not, however, produce coherent results allowing for more general conclusions, and not until the results of the survey projects started to emerge 20 years ago was it possible to say something about the relationship between agriculture and settlement in Greece and ancient Attica. Still, we have not fully exploited the possibilities which the identification of a differentiated settlement structure gives for the interpretation of ancient Greek farming. However, since the majority of the literary evidence relevant for the study of ancient Greek farming originates from writers of 5th and 4th century Athens, and since survey-results are available for ancient Attica, I find it useful to examine farming in Attica itself.

The purposes of this paper are first, to comment on some of the results of recent research especially concerning marginal lands and animals. Second, it is my intention to demonstrate the advantages of including all levels of ancient farming, that is, to incorporate both the domestic production and the marginal land in the examination. Parallel to this, it is also my ambition to demonstrate that the incorporation of gardens and marginal lands into Attic farming rather than agropastoralism contributed to the subsistence of the growing population outside Athens and Piraeus proper.

The Basics

Attica is dominated by mountains covered with a mixture of pine wood and maquis mixed with plains suitable for cereal production. In comparison with modern Greece marches, fens and wetlands were far more dominant in the past and generally one must imagine a wetter and partly more fertile landscape than today. In this richly varied landscape the inhabitants of Attica had farmed the land ever since neolithicum. Therefore, 5th and 4th century farming was based upon centuries of accumulated knowledge of how to implement the proper agricultural strategies. This inherited knowledge of how to cultivate the land and how to breed animals in the harsh climatological and environmental conditions of Attica was the only guideline available to farmers. For Attica, as for the majority of the Greek *poleis*, evidence exists of the production of cereals, olives and vine, crops which conventionally constitute the "Mediterranean triad". Several other crops have been claimed to be dominant or at least vital to ancient agricultural production, especially various kinds of pulses and fodder crops (alfalfa), and these crops all played a vital role in the debate about the very existence and nature of the so-called farm systems in ancient Greece.⁴ It seems equally important to focus on the basic elements: water and nutrients.

Ancient as well as modern farming is dominated by a number of factors including the two essential determinants: the level of technology and the conditions of growth including the amounts of water and nutrients available. Scientists have in different ways tried to establish the availability of both water and nutrition in the landscapes surrounding the modern Mediterranean.⁵ For the present, it is sufficient to establish that the soils of modern Greece and Attica are generally poor on nutrients and nothing indicates that this was fundamentally different in antiquity.

The majority of the farmers relied upon precipitation for water supply, since irrigation was not commonly, if ever, used

in Attica.⁶ Because of this the farmer aimed at preserving the limited amounts of water in the soil and this is why ancient Greek farming is often referred to as "dry farming".⁷

Both Xenophon and Theophrastus were well aware that both climate and location dictated what might be able to grow and how the crop was to be raised. According to Theophrastus the farmer was to cultivate the crop in a way that allowed for the plant to pursue its natural course (*telos*). If this knowledge was combined with the right procedures and with some luck and the good will of the gods, the fields and the gardens would provide a surplus. It should be pointed out that the qualities and usefulness of these nutrients were not understood by the most sophisticated writers on botanical matters - Aristotle and Theophrastus - let alone by the farmers of ancient Greece and Attica. Therefore, we cannot suppose that farming in Classical antiquity was ever based upon the knowledge of nutrients and their chemical functions. Neither the Classical Greeks nor the Romans, who in many ways practised more sophisticated forms of agriculture, were able to utilize empirical knowledge of the value of nutrients for cultivation.⁸ The absence of an agricultural sophistication in Greece after the Roman annexation more than suggests that the land and climate themselves were the main obstacles for such a development. It is of the utmost importance to realize that the ancient writers and farmers did not possess a thorough empirical knowledge on the nutritional and chemical aspects of farming.⁹

The Garden

Apart from cereal cultivation in *agros* two other forms of production are documented by the literary and epigraphical evidence: the garden (*kepos*) and the orchard or plantation.¹⁰ The garden is mentioned frequently and must be considered uniform to all levels of *agros* as well as the urban and quasi-urban centers of Attica. Greens, vegetables and several kinds of

fruit were the produce of the garden.¹¹ The *kepos* could therefore most appropriately be described as a kitchen garden, but the *kepos* also functioned as a nursery for seedlings and perhaps as an *experimentarion* where new forms of known species were grown.¹² The *kepos* was indeed one of the most specialized parts of ancient farming and the horticultural expertise was sometimes provided by a specialist, the gardener (*kepouros*). Recently, it has been suggested that the garden was less relevant to a general synthesis on ancient Greek agriculture.¹³ This might be true if size and quantity were the only guidelines, but many factors point to the fact that at a specific level a very intimate relationship could exist between gardening, agriculture and animal husbandry. The evidence suggests that most gardens were located in the vicinity of the residence of the members of the *oikos*. This makes sense, since the crops of the garden demanded intensive care including frequent waterings, and it seems probable that many gardens and residences extracted water from the same source.¹⁴ Three levels of cultivation existed in Attic farming: cereal production in *agros*, marginal production on *phelleus* and *eschatia* and the most intensive and integrated production in the garden. Although small in area the yield of the garden was relatively high and would secure a varied diet not obtainable from the traditional crops of Mediterranean agriculture. The *oikos*-level of the production could combine plenty of water and nutrients with sufficient manpower: all members of the *oikos* could presumably contribute to the outcome of the garden, while the male members of the *oikos* were in charge of the production in the *agros*, *phelleus* and *eschatia*.¹⁵

The evidence suggests that in those periods of history when the peninsula experienced profound demographic pressure – from the Peloponnesian War to Alexander – all levels of agricultural potential were exploited. Agriculture aimed at subsistence primarily by cultivation of the three main crops: cereals, olives and wine but all of these might frequently

be transformed into commodities with the purpose of cash-generating,¹⁶ as was most certainly the case with animal husbandry.

Domestic Breeding

Even though focus has primarily been placed on the cereal production of the *agros*, several scholars have been working with different aspects of animal husbandry. There seems to be no greater controversies concerning the species involved in ancient animal husbandry.¹⁷ This is not, however, the case when discussions are directed towards the question of the form(s) of animal husbandry and the role of animals in agriculture and society.¹⁸

Although the evidence does not allow for exact estimations of the various species involved, there is no doubt that sheep and goats were the most numerous and important animals in ancient Attic farming. The good relationship that exists between nutritional requirements and reproductive qualities makes *probata* the preferred animals in an agricultural production conditioned by limited fodder and water resources. The documentation for animal flocks is, however, very limited. The Athenian forensic speeches give a few examples probably referring to wealthy farmers: Panaitius kept 84 sheep and 67 goats,¹⁹ Demosthenes²⁰ relates of 50 sheep, and Isaius²¹ of one stock consisting of 60 sheep and 100 goats and another²² of goats with shephard valued at 1.300 drachmas.²³ Cattle demands considerable amounts of fodder and water and so do pigs. This is probably the reason why the evidence gives the impression that pigs were kept in small numbers and mostly found in the vicinities of farmsteads. Given the climatological and vegetational conditions of ancient Attica, *probata* were the obvious choice for animal husbandry in Classical Attica. More difficult, however, it seems to decide the nature of animal husbandry in Classical Attica. Although few scholars have been interested in or even observant of the small domestic animal breeding, this less spectacular form was commonly used. In fact, one can hardly imagine a farmstead

without a fair number of different animals attached to it.²⁴ The limited focus on the domestic breeding is closely connected to the nature of the evidence: the archaeological material cannot contribute with decisive information - it is often difficult to decide whether evidence originates from domestic or more extensive forms of breeding. Therefore, we have to rely heavily upon the relatively few references in the literature. Several facts are nevertheless clear: domestic breeding relied potentially upon a mixture of kitchen waste, chop-pice and grazing off the nearest fields and maquis. Furthermore, the animals could benefit from the water available at or nearby most farmsteads. Therefore, close to the residence of the *oikos* one might expect to find the most intensive forms of production: domestic breeding and the growth of vegetables and greens in the *kepos*. If any parts of Classical farming are to be described as "intensive" the interplay between domestic breeding and cultivation of the *kepos* is one obvious candidate. Other forms of integration involve less elements such as pasturage on fallow, manuring and the nibbling of the premature barley and wheat to increase the yield.

An examination of animal husbandry in ancient Attica or Greece could originate from an examination of the domestic level of production. First, the *oikos*-level provides evidence for all animals involved in ancient farming including a number almost entirely testified at this level (poultry and pigs). Second, domestic breeding acted as outset for more extensive forms of breeding and third,²⁵ the domestic production expectedly provided the majority of the people of Attica with meat, wool, leather, bone, manure, etc.²⁶ The production of even a limited amount of animal produce seems to be important especially for the less well-off *oikoi* since the economic surplus necessary for external purchase was very limited.

In 5th and 4th century Attica there seems to have been a distinctive contrast between the *oikoi* able to invest in a number of enterprises such as cereal and fruit

production, animals, wood, charcoal, mining, etc. and the ones dependant upon a few productive units (a few *plethra* of arable land, garden and a few animals).

The Marginal Lands

The evidence suggests that the production of the basic crops of ancient Attic farming was concentrated on the four major plains of ancient Attica but that significant contributions were also supplied from the hills and mountainous regions. The cereals were either produced in smaller fields as mono crops or with olives and other tree crops. Both vine and olive are able to grow in rather poor and stony soils, and vine and olives normally produce long roots better suited for extracting the limited amounts of moisture from the land. The formation of deep roots could according to Theophrastus be accelerated by frequently digging around the crops in order to remove surface roots.²⁷ Furthermore, some species of modern vines during night time make good use of the warmth accumulated during daytime in soils consisting of great amounts of fist sized stones and rubble.²⁸ These are the reasons why vine and olive are often found on what is often called "marginal lands".²⁹ In this way the farmer was able to produce crops from land otherwise suited only for pasturage.

The field structure on plain and valley was designed as a "patchwork" of more or less rectangular pieces of land.³⁰ With a single exception no Attic estate known to us exceeds 200 *plethra* (1 plethron = 10.000 square feet). The land of Hagnias valued at two talents was big enough to sustain a thousand olive trees.³¹ The estate of Timesius extended over 180 *plethra*³² and Plutarch mentions an estate of 100 *plethra*.³³ The cultivation of marginal lands tends towards the creation of irregular fields of varying sizes. Demosthenes gives the odd example of Phainippus the inheritor of two estates (both *eschatiai*) with a common boundary of 5 or 6 miles (40 *stadies*).³⁴ If both lands were rectangular the accumulated area would constitute

between 3.000 og 4.000 *plethra* or ten times more than the other examples known from Attica.³⁵ As far as possible both fields in the plains and the marginal lands would be circumscribed by fences and dikes.³⁶

The normal agricultural activities involved very labour intensive processes. This was indeed true in the case of the hilly and stony regions of Attica - the *eschatiai* and *phelleis*. Agricultural production in these areas preconditioned extensive labour with rocks and soils including the construction of dikes, ditches and trenches for the regulation of the massive amounts of precipitation falling in winter and the maintenance of these constructions.³⁷ Modern literature on ancient Greek agriculture often points to the importance of terraces and that the Greeks constructed these to be able to extend the area of cultivable land so desperately needed in (both modern and) ancient Greece. The terraces constitute arable *lacunae* by holding back soil from erosion, moisture and thereby the important nutrients. A significant side effect of the construction of terraces, dikes and trenches is the improvement of the land itself by the collection of stones which are transported elsewhere.³⁸ One advantage that terraces have to offer has not yet been acknowledged: the heat absorbing effect of both terraces wall and the soil behind it. The terraces, especially those facing south, are able to preserve the solar heat received during daytime. This provides the crops with a higher and more constant temperature throughout day and night, an advantage recognized by e.g. modern wine producers. The majority of the terraces identified by Lohmann in southern Attica were facing south or in southern directions. However, these orientations were not associated with cultivation by Lohmann.³⁹

The ancient documentation for the construction and use of terraces is circumstantial. Ancient literature and inscriptions never mention terraces explicitly in connection with the two most commonly known types of marginal lands in ancient

Attica, *phelleis* and *eschatiai*.⁴⁰ Theophrastus does not mention it and it seems as if the Greeks did not use a terminology consistent with our modern understanding of a 'terrace.' Bradford and Lohmann among others have found and interpreted structures as ancient terraces and all of these have been dated back to the Classical period.⁴¹ Recently, Foxhall has argued that serious doubt could be raised about the old age of the terraces identified in Attica and that the absence of terraces in ancient literature actually reflects the limited use in Classical Greek antiquity.⁴² The degree of decay of the rocks and the growth rate of lichen or moss were used as the strongest arguments against a 5th and 4th century dating of the terraces identified by Lohmann in Atene. These criteria are difficult to administrate and generally hard to accept: first, the criteria used by Foxhall are without the necessary objectivity which enables them to be used on terraces in general. One can, however, apply very general criteria, e.g. does the terrace wall look as if it is "new" or "old", but this general distinction does not offer much help. We know for example very little of how a specific rock deteriorates in a specific environment and climate. Second, the application of growth rates for lichen or moss would demand a very special kind of knowledge not available for the primitive botanical fauna of Attica.

The farm structures identified by Lohmann must be interpreted in connection with the surrounding structures including terraces. No other settlement structures were erected in the interregnum between antiquity and modern times (post war 20th century),⁴³ and so the terraces of south western Attica must be interpreted in an ancient context. On the other hand, it is not clear why Lohmann ignores the possibility of a late Roman dating, suggesting that southern Attica was involved in the so-called "late Roman renaissance" which flourished in the 4th - 6th century A.D.

The results from the southern Argolid and the publications of Zangger and Brückner point towards another dating

strategy for the terraces of Attica.⁴⁴ With the improved methods which now exist for the analysis of earth slide profiles it is possible to determine whether a specific erosion originates from the decay of specific terraces and as a consequence decrease the errors of dating.

However, the importance of Foxhall's arguments against a too optimistic interpretation of terraces should not be underestimated and the attention towards digging as an alternative to terracing is very useful. Digging is well testified by Theophrastus and the Roman authors and the purpose of this activity was to restrain the limited precipitation (moist) and to remove surface roots, thereby forcing the crop to grow deep roots, better suited for extracting the moisture of deeper soils. Thereby the same advantages are obtained by digging and one avoids the labour intensive process of constructing and maintaining terraces. Nevertheless, Foxhall maintains that terraces did exist but only in rather limited numbers and only instigated by wealthy farmers with adequate labour force at their disposal. It is not clear why Foxhall after rejecting all evidence used by previous research to indicate the existence and use of terraces in antiquity still maintains that they were actually used.

It seems plausible that the very limited documentation for terraces also reflects the rather limited extension of terraces. Some reservations primarily concerning the very landscape involved are, however, unavoidable. First, I do not agree that digging generally ought to be seen as a more cost effective alternative to terracing because the two methods appeal to two very different types of landscape. Digging around crops growing in rather steep locations would almost certainly promote erosion. That is why terracing is the only possibility available if the farmer chooses to cultivate topographical progressive landscapes. Digging only makes sense on locations not so exposed to erosion and terracing is only attractive on locations too steep for digging. Furthermore, the two methods are intertwined, since the cultivation of tree crops and vine in terrac-

es normally involved digging around the roots as well.

Finally, using the example of southern Attica, I find it possible to combine the positions of both Linn Foxhall and Hans Lohmann. The structures identified by Lohmann as terraces and affiliated structures in the vicinities of Charaka, Agia Photini, Legrana and Anavyssos do form significant markers in the landscape, perhaps because they are dominant among the few remaining man made structures in those particular areas. Nevertheless, if the attention is directed towards the surrounding landscape, it is obvious that even in these marginal areas of Attica the so-called terraces occupy only a minor part of the total arable landscape at the present.⁴⁵ The poor documentation for terraces simply reflects the choices made by farmers and that even in those very marginal landscapes farmers was able to choose between different strategies.

Extensive and External Breeding

Whereas most scholars ignore domestic breeding the external and extensive forms of animal husbandry have received much attention. Some scholars have focussed on the form of animal husbandry often called *transhumance* which is dictated by the climatological constraints and changes that the vegetation undergoes during the year.⁴⁶ Because of the seasonal changes in vegetation the flocks have to migrate between suitable pasturages. Other scholars have played down or even rejected the "free" pasture under the guidance of shepherds, partly with reference to the poor evidence of this, partly with reference to the possibility of incorporating animals into agropastoralism.⁴⁷ The two parties interpret the purpose of animal husbandry very differently: The "trancehumanists" put emphasis on what one might call "the necessity of the landscape" while the champions of *mixed farming* have focussed on the narrow (and potential) intimacy between agriculture and animal production. Although none of these positions are

supported by substantial evidence the transhumanists can present examples of annual migrations of flocks. Mixed farming, on the other hand, is not documented in an Athenian context and as stated above there seems to be great difficulties in accepting a widespread cultivation of fodder crops and thereby mixed farming in Attica. Intensive farming of Attica beyond the boundaries of domestic production was indeed hampered by inadequate technology including lack of knowledge and ability to distribute water and nutrients in adequate amounts and qualities.

There exists no Greek terminology which can elaborate on the subject of transhumance, and only a few of the modern versions of transhumance can be associated with an Athenian context. In 1988 Skydsgaard, nonetheless, emphasized three strong arguments for the existence of transhumance in Classical Greece. None of these exclude Attica and Athenians as actors and entrepreneurs in transhumant production: Skydsgaard maintained that 1) animal husbandry was a mobile enterprise - flocks migrated between pasturage. 2) Existence of agreements between *poleis* concerning common pasturage (*epinomia*) and 3) agreements between *poleis* regulating traffic over boundaries and between pasturage.⁴⁸

Several factors do indicate, however, that transhumance proper was not a widespread activity in Classical Attica - with regard to both number of animals and people involved - and that other forms of animal breeding presumably constituted a more realistic alternative for the majority of Athenian farmers. No external flocks of animals are recorded in the Athenian evidence and no examples of Athenian flocks taken outside Attica are recorded.⁴⁹ Furthermore, only the citizens of some wealth could expectedly honorate the investment demanded in transhumance since the animals themselves represented some value and must have been of some size to be able to support a shepherd. The number of animals involved in transhumance cannot be established with any certainty at least the previous research has failed to do so,

but I expect that a cost effective flock consisted of several hundred animals. First of all, flocks of this size are not documented from Attica. If they did exist it is difficult to imagine large seasonal migrations through Attica without these causing serious problems with the land owners e.g. on the route between Parnes and the plain of Marathon. Even though Demosthenes (55) and Plutarch (*Kimón*) both refer to fences constructed with the purpose of keeping *probata* out of the fields this does not necessarily indicate widespread transhumance in Attica but could just as well be a precaution against local *probata* or even the farmer's own animals.

The vegetation and the fact that animals raised inside Attica for a large part had to rely on the maquis for grazing, scarce water supplies, population density and close to full use of the available farm potential. All these factors must have limited or even deterred potential transhumanists. Transhumance demands space and that is something Attica was very short of in the Classical period. Athenians interested in transhumance had to travel abroad or fight the Boiotians over the limited pasturage in the Parnes region. Other options were, however, available.

Although it seems evident that a full understanding of the nature of animal breeding in Classical Attica cannot yet be achieved, the last 5 years have brought about new knowledge and new ideas of how animal breeding was managed in antiquity. The key to a better understanding lies in a thorough investigation of the "nature" of the landscape, in a proper evaluation of the pasturage available, and in the roles played by animal breeding in the economy.⁵⁰ Therefore, I will advocate a third model that seems to suit Attica well (and other parts of Greece with similar vegetational and precipitorial conditions). This is perhaps "the missing link" between the small domestic flock attractive to all economies and the large transhumant breeding forms only attractive to the most wealthy farmers.

In 1983 Oliver Rackham observed that the maquis contained a considerable

potential for pasturage (as it does for the gathering of firewood), and in 1995 Forbes combined this information with the data from several survey projects to form the theory of estate based animal breeding that existed on pasturage in *ore*, *shoppice*, *shepherds* and consisted of flocks of some size but notably smaller than the ones involved in transhumance.⁵¹ Forbes claimed that this form of animal breeding had been concealed by the very way in which the previous discussions had proceeded and his aim was to unite the strong positions of the transhumanists and the agropastoralists. His general position that animal breeding has generally been underestimated, both with regard to size and economical importance, seems to be plausible.⁵² There are, however, some reservations to be made. The reasoning is based upon indications rather than firm literary evidence and/or archaeological remains – no ancient writer mentions farms that fit in all together and no farm or settlement structure has been revealed which was undoubtedly intended for the kind of animal breeding suggested by Forbes. Furthermore, the idea of estate based animal breeding was not applied to a specific context or region by Forbes. This could inspire one to make an attempt.

There are good reasons to accept the general idea in the case of Attica. It seems reasonable to suggest that most flocks and animals were concentrated in those regions most densely populated, that is, the four plains and adjacent lowlands of Attica. These landscapes would supposedly constitute the types of land called *agroï* and *phelleis* in the ancient literature and epigraphic texts. In the most fertile northern regions of Attica the majority of farmers, who had their engagement concentrated in one region, would keep small flocks on local pasturage and *maquis* and the flocks of wealthy farmers would not exceed 150 to 200 animals. Both categories of farmers would generate a cash income from animal breeding as a mere supplement to the more important cereal production. A few wealthy farmers might choose to concentrate on the breeding of

either *probata* or horses, as one example shows.⁵³ In the southern part of Attica where the low precipitation produces a different kind of vegetation as compared to the north, the production was generally more extensive in nature, with regard to the raising of both crops and animals. This observation is to some extent confirmed by the latest publication on the socio-economic history of Southern Attica, including the survey conducted by Hans Lohmann. The physiological conditions that dominate Southern Attica also apply to the southern Argolid recently surveyed by American scholars.⁵⁴ None of the results yet published challenge the idea that estate based animal breeding was practised or even dominated animal production in the southern Argolid. A clarification of this question will hopefully emerge from the publications to follow.

The epigraphical evidence from Attica shows that the most attractive pasturage was either owned by privates, (religious) institutions or by the *demes*. The rather few examples of lease contracts that have survived until today certainly concerns some of the best or at least expensive pasturage in Attica.⁵⁵ Nothing indicates that these leases included parts of the *maquis* and I cannot find any reason why the vast areas of *maquis* in Attica were not free to utilize for any animal breeder in ancient Attica. This means, first, that most farmers were able to shift between different pasturages throughout the year, second, that hypothetically farmers were able to breed animals without having to buy or lease expensive pasturage, a luxury probably only reserved for the more wealthy farmers. Animal breeding based on the *maquis* and fallow fields was probably the economically most attractive form available to the majority of Athenian farmers and therefore also the most common. The forms of animal breeding, which demanded investments exceeding the expenditure on the animals themselves, were most probably exclusively reserved for the wealthy citizens, who were also potentially involved in the mining activities in southern Attica and the timber and wood

enterprises of Northern Attica and central Greece. As for most other parts of ancient Greece animal breeding was a natural and logic part of farming.

On Farming and Demography

The increase in the number of people living in Athens and Attica in the Classical period was not made possible only by the development of all potential farmland available. Although I do agree with Hanson,⁵⁶ demonstrating the limited effects of warfare upon farming, naturally some effect must be attributed to warfare with regard to the demographic development. However, most scholars agree that despite temporary setbacks, for example during the Persian and Peloponnesian Wars, Attica experienced a significant growth in the number of people both living in and living off Athens and Attica during the 5th and 4th centuries B.C., until the reign of Alexander the Great.⁵⁷ The grain supply was certainly responsible for a substantial part of this development, but only in the Classical period itself, as Garnsey pointed out.⁵⁸ The majority of the documentation for the food supply of ancient Athens indicates that most was meant for the city of Athens itself and for Piraeus.⁵⁹ According to Plutarch the household of Pericles relied upon purchases from the market financed by selling off all produce after the harvest. Surely, this one example was of interest simply because Pericles apparently acted out of the ordinary, and I find it plausible that the majority of those Athenians able to do so consumed their own agricultural produce.⁶⁰ In fact, no evidence relates of any (imported) grain travelling outside the *astu*. Finally, the few examples and quantifications mentioned in the evidence might suggest that the grain imported to Piraeus and sold at Piraeus and Athens was primarily consumed by the populations of Athens and Piraeus themselves.⁶¹ If this is correct, it implies, first, that Athenians living outside Athens were supposed to support themselves by their own produce. Second, that

a growth in the population of the countryside, i.e. the population normally self-sufficient, could only happen if the production of staple foods could be raised accordingly, as well. This presupposes either an improvement in technology - which was certainly not the case - or an extension of the farmland available. The survey of Atene conducted by Hans Lohmann provides the best example of the latter.

The dating of the structures identified by Lohmann in southern Attica to the early Classical period at the same time suggests an early revision of the reforms of Cleisthenes. Indeed, this expansion involving one of the most marginal lands of Attica suggests many possible changes, one of them surely being the intention of creating space and subsistence for a number of *oikoi*. Another supplementary or even single explanation would be to consider the importance of the finding of the great silver motherload in Laurion in 483/2 B.C. for the specific development of Atene. Undoubtedly, a number of citizens of the southern demes were involved in mining activities. One must, however, be cautious in suggesting that citizens of the so-called "mining demes" in general were engaged in a balanced production involving both mining enterprises and farming. Whether or not silver played a role in the development of Atene there seems to be no doubt, that agriculture was an essential economic element in the region. The agricultural basis of this deme consisted to a very large degree of marginal cultivation and animal breeding. As mentioned above, terraces dominated the countryside and this more than suggests that the necessary expansion in the countryside in the Classical period was indeed a matter of transforming potential *oros* into either *agros*, *felleus* or *eschatia*.

The forms of cereal production and animal breeding practised in ancient Attica cannot be characterized as fully integrated parts of a developed agropastoralism. The know-how was either not available or on an experimental basis in 5th and 4th cen-

tury Athens. The most important argument against these forms of production is simply the landscape itself, the climatological conditions prevailing and inadequate technology, making the farmer unable to sustain the delicate balance between producing fodder crops and raising cattle. Although more research has to be carried out in the farming of Hellenistic and Roman Greece, this position is most clearly illustrated by the fact that agropastoralism was not, as far as I am able to tell, practised in Roman Greece, at a time when the know-how of integrated farming was effectuated in other more fertile parts of the Roman world.

These considerations do not mean that cereal-, fruit- and animal production were separate worlds. Integrations were achieved but at a rather low level, which was indeed hampered by lack of manure,

water and knowledge of how to utilize these two essentials in a more sophisticated integrated agricultural production. Cereal and animal production were supplementary elements in a rather primitive but yet effective exploitation of the limited resources of ancient Attica. In this form the products of *agros*, *phelleus*, *eschatia* and *oros* were all valuable to the Athenian farmer who by the multiple engagements was able to produce for subsistence and, if volume allowed, for the market as well. Finally, the exploitation of all the types of landscapes in Attica was also the condition for the extension of settlement. The laborious job of transforming *oros* into *agros* was indeed responsible for the transformation of early Attica into one of the most heavily exploited and populated farmlands in Classical Greece.

Notes

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NOTE 1

Cf. Sallares 1991, 1-2; Isager & Skydsgaard 1992, 3-6 for the historiography of ancient Greek farming.

NOTE 2

Cf. e.g. the publications of Amouretti 1986; Halsted 1981; Foxhall & Forbes 1982; Jameson 1982; 1994, and lately Isager & Skydsgaard 1992; Burford 1993 and Hanson 1995.

NOTE 3

Recently Lohmann 1993 used this logic to explain the economy of southern Attica in the Classical period.

NOTE 4

Halsted 1981; Gallant 1982; Hodkinson 1988; Garnsey 1988a; cf. Isager & Skydsgaard 1992, 108-14 for critical comments on agropastoralism.

NOTE 5

The amount of literature is massive. Cf. for instance the contributions in di Castrietal 1981. Vita-Finzi 1969 is outdated.

NOTE 6

The literary evidence is circumstantial and the archaeological evidence does not exist. Cf. Isager & Skydsgaard 1992, 40 and esp. 112 for further discussion.

NOTE 7

Cf. Burford 1993, 132.

NOTE 8

White 1970 is still fundamental for the study of Roman agriculture.

NOTE 9

Cf. for example Burford 1993, 100-9.

NOTE 10

Isager & Skydsgaard 1992, 41-2, on fruit. Also Burford 1993, 135-37.

NOTE 11

Cf. IG II² 10.7; Tod no. 100.15, for a metec working as a gardener; lease of garden cf. IG II² 2494. Cf. also Burford 1993, 136, note 105 and 192 for examination of metec specialists, who according to Burford were freed slaves, who continued to live by the skills which they acquired when they were slaves. *Ampelougos* ("winedresser") in IG II² 2492. The literary documentation is massive, cf. for example Ar., *Fr.*, 679 on watering of gardens; Arist., *PA*, 668 a 14-18 for analogy between the irrigation system of the garden and the human circulatory system; *D.L.*, 7.168-9, Cleanthes of Assus, who spend his youth "drawing water in the garden". Thphr., *HP*, 7.1.2; 7 for vegetables grown in gardens; 7.5.1. on manure for gardens; 7.7.2. on wild plants previously cultivated in gardens.

NOTE 12

Cf. D. 53.15-6.

NOTE 13

Isager & Skydsgaard 1992.

NOTE 14

Cf. Plu. *Sol.* 23; D. 50.4-6, 61; D. 55; Ar., *fr.* 679. X. *oec.* 2.15. for water management,

farming and problems with neighbours concerning water. Also Koerner 1973 for epigraphical evidence and Crouch 1993 for water management in cities including Athens.

NOTE 15

Exceptions do occur cf. Scheidel 1990 and Burford 1993, 135, 149, 191.

NOTE 16

By "cash-generating" is meant an extensive form of production whereby the farmer aims at producing a negotiable surplus in cash and/or to replace the crops normally applied in subsistence farming. The most commonly produced *cash crops* were olives and animal breeding - to a lesser degree vine in Attica. Cf. Forbes 1993 and 1995.

NOTE 17

Cf. Isager & Skydsgaard 1992, 85-96 for catalogue. For Horses, cf. Vigneron 1968 and Spence 1993. Cf. Arist., *HA*, 553a; Plato used the bee in *Critias* as an indicator of the environmental status. Semonides, 7 gives a description of the attractive woman in the shape of a bee. Xenophon also compares the good women with bees in his *Oikonomikos*, 7. Cf. also Forbes 1996, 92-93. Snodgrass 1983 on cattle, and Isager & Skydsgaard 1992, 89-91, 102 og 104-7 for transport.

NOTE 18

Isager & Skydsgaard 1992, 83-5, 108-14 for evidence and recent research. Cf. Forbes 1995, 325-38 for different interpretations of animal breeding in ancient Greece.

NOTE 19

Meiggs & Lewis no. 79 64-73.

NOTE 20

D. 47.52.

NOTE 21

Is. 11.41.

NOTE 22
Is. 6.33.

NOTE 23
For speculations concerning number of goats involved, cf. Hodkinson 1988, 63 and Burford 1993, 151 with note 143.

NOTE 24
Cf. for example Thphr., *CP*, 4.12.4 and Aristotle, *HA*, 595a 15-19 on pigs. Isager & Skydsgaard 1992, 85, 107 on domesticated animals. Isager & Skydsgaard 1992, 93, state that the pig was nicknamed *synanthropeuomenos* - "one, who lives together with man", which more than indicates a domestic affiliation. Burford 1993, 110-18, 146-7, 152 makes no further delimitation between the domestic form and other forms of animal breeding.

NOTE 25
A possible and probably also widely used practice by farmers was to hire or purchase expertise to administrate a combined flock at a larger level, cf. Chaniotis 1995. Burford apparently downgrades the importance of flocks kept near by the farms, which does not totally agree with Burford's accept of the potential of both the fallow fields and the maquis as pasturage, Burford 1993, 145-6, 149 with note 136.

NOTE 26
Including an important supplement from participation in the common meal at religious festivals and cults. Cf. Burkert 1985 and Bruit Zaidman & Schmitt Pantel 1994.

NOTE 27
Thphr., *CP*, 5.9.8. Most important for olive and wine cultivation, since both produce large amounts of surface roots, cf. Thphr., *HP*, 1.6.4. For the extent of digging, cf. Thphr., *HP*, 2.7.5; *CP*, 3.10.1; 3.12.1; 3.20.7. Cf. Foxhall 1996, 55.

NOTE 28
Cf. Renfrew 1973 for ethnobotanical information on olives and the history of olive growth in Isager & Skydsgaard 1992, 33-40. Cf. also Sarpaki 1992, 70 and references.

NOTE 29
Gavrielides 1976 and Forbes 1993.

NOTE 30
Cf. for example Is., 9.17-18.

NOTE 31
D., 43.69. Estimated by Burford 1993, 69 not to exceed 200 *plethra*.

NOTE 32
Langdon & Watrous 1977.

NOTE 33
Aristides, 27.1.

NOTE 34
D. 42.

NOTE 35
Cf. Burford 1993, 69, 112, contends, without giving further explanations that a more realistic estimation would be between 500 and 600 *plethra*.

NOTE 36
For example D. 55.11. Lohmann 1993, 219-24, refers to several boundaries in Charaka og Agrileza. It is, however, obvious that those boundaries discovered in Agrileza do not circumscribe rich land but instead marginal poor soils with no clear agricultural potential. For Charaka it is evident that these boundaries describe a structure dominated by terraces. Cf. Stanton 1994 and 1996 who believes that the internal demarcation of Attica was without importance for the majority of farmers who lived in *komai*. The deme demarcations according to Stanton only had relevance for the few shepherds who existed on the periphery of the demes.

NOTE 37
Rackham & Moody 1992, 123-30.

NOTE 38
This observation was made by professor Skydsgaard.

NOTE 39
Cf. Lohmann 1993, 171 (TH42); 199 (CH4); 202 (CH26); 203 (CH33); 205 (CH53); 207 (PH36); 222 (PH48).

NOTE 40
Cf. for example IG II² 2492 where the lease conditions of a piece of land designated *jelleus* in the deme Axione is described. The leaseholders were allowed to dig and remove soil - but only within the boundaries of lease. Nothing indicates that this soil was intended for terraces. Cf. Rackham & Moody 1992 for consultation on different types of terraces.

NOTE 41
Bradford 1956 and 1957 on Hymettus. Lohmann 1992 and 1993 on Southern Attica and cautious commentaries by Isager & Skydsgaard 1992, 81-2.

NOTE 42
Foxhall 1996, 44-67.

NOTE 43
Cf. Bradford 1956 and 1957. Also Geographical Handbook Series 1944.

NOTE 44
Brückner 1990 and Zangger 1992.

NOTE 45
There is no reason to believe that this state of affairs should have been fundamentally different in antiquity. Cf. Rackham 1990.

NOTE 46
Cf. Georgoudi 1974, who presents the majority of the evidence, including later Greek examples. Also Skydsgaard 1988, 75 on Chithairon and Euboa, and Chaniotis 1995 on Crete.

NOTE 47
Hodkinson 1988; Garnsey 1988a; 1988b. Cf. Isager & Skydsgaard 1992, 108-14, for criticism of agropastoralism. Burford 1993, 76 uses "mixed farming" to describe both integrated and non-integrated forms of agriculture.

NOTE 48
Skydsgaard 1988, 80.

NOTE 49
Th., 5.42 on Panakton is the only example of foreigners being allowed to use pasturage considered to be Athenian by the Athenians.

NOTE 50
Forbes 1995. Also Forbes 1992 and 1993 for criticism of comparative methodology when used to explain ancient economy.

NOTE 51
Cf. also Foxhall 1992 for the relationship between property class and landholding in Athens.

NOTE 52
Forbes 1995, 338.

NOTE 53
X., *Mem.* 4.3.10.

NOTE 54

Cf. van Andel & Runnels 1987 and Jameson, Runnels & van Andel 1994 for the Southern Argolid. The Boiotian results can to some extent be used to say something about northern Attica cf. Rackham 1983 and especially Bintliff & Snodgrass 1985.

NOTE 55

Cf. Jameson 1982.

NOTE 56

Hanson 1983, 1995.

NOTE 57

The amount of literature is massive, e.g. Hansen 1985.

NOTE 58

Garnsey 1988a.

NOTE 59

Osborne 1987, 98-100. A few quantities are related in the evidence: Demosthenes mentions 400,000 *medimnoi* imported from Bosphorus (it is not certain whether this quantity was imported in a single year or throughout several years). If one year basis is assumed and 1 *choeniks* (approx. 3700 kcal/*choeniks*) were allocated the total amount would feed between 50,000 and 60,000 adults. Cf. Osborne 1987, 99, who finds that this figure would feed between 80,000 and 90,000 persons (not specified). E.g. also D. 34.39 (10,000 *medimnoi*); IG II² 360.8-10, 28-30 (3,000 *medimnoi*).

NOTE 60

Plu. *Per.* 16.

NOTE 61

We are still not able to tell how the slaves in Laurion were maintained. In a forthcoming paper on the economic relations of Attica and Euboea in the Classical period I will try to shed some light on this subject.

Bibliography

- Amouretti, M.-C. 1986
Le Pain et L'huile dans la Grèce antique. Paris.
- Amouretti, M.-C. & Brun, J.-P. (eds.) 1993
La production de vin et du L'huile en Méditerranée. BCH. Suppl. 26. Paris.
- Bintliff, J. L. & Snodgrass, A. M. 1985
The Cambridge/Bradford Boeotian Expedition, *JFA* 12, 123-63.
- Bottema, S. Entjes-Nieborg G. & van Zeist, W. (eds.) 1990
Man's Role in the Shaping of the Eastern Mediterranean Landscape. (1990). Proceedings of the INQUA-BAI Symposium on the Impact of Ancient Man on the Landscape of the Eastern Mediterranean Region and the Near East. Groningen, Netherlands, 6-9 March 1989. Rotterdam.
- Bradford, J. 1956
"Fieldwork on aerial discoveries in Attica and Rhodes", *Antiquity* 36, 172-80.
- Bradford, J. 1957
Ancient Landscapes, London.
- Bruit Zaidman, L. & Schmitt Pantel, P. 1994
Religion in the ancient Greek city. Cambridge.
- Brückner, H. 1990.
Changes in the Mediterranean ecosystem during antiquity - a geomorphological approach as seen in two examples, in: *Bottema et al. 1990*, 127-137.
- Burford, A. 1993
Land and Labor in the Greek World. Baltimore and London.
- Burkert, W. 1985
Greek Religion. Cambridge, Massachusetts.
- Chaniotis, A. 1995
"Pastoralism" and "Trancehuman- ce" in Classical and Hellenistic Crete," *Orbis Terrarum* 1, 39-89.
- Coulson, W.D.E, Palagia, O., Shear jr., T.L., Shapiro, H.A. & Frost, F.J. (eds.) 1994
The Archaeology of Athens and Attica under the Democracy. Proceedings of an International Conference celebrating 2500 years since the birth of democracy in Greece, held at the American School of Classical Studies at Athens, december 4-6, 1992. Oxbow Monograph 37. Oxford.
- Crouch, D. 1993
Water Management in Ancient Greek Cities. Oxford.
- di Castri, F, Goodall, D.W. & Specht, R. L. (eds.) 1981
Mediterranean-Type Shrublands. Ecosystems of the World vol. 11. Amsterdam.
- Dimen, M., & Friedl, E. (eds.) 1976
Regional Variation in Modern Greece and Cyprus: Towards a Perspective on the Ethnography of Greece. Annales of the New York Academy of Sciences, 268. New York.
- Doukellis, P. N. & Mendoni, L. G. (eds.) 1994
Structures Rurales et Sociétés Antiques. Paris.
- Forbes, H. 1992
The Ethnoarchaeological Approach to Ancient Greek Agriculture. Olive Cultivation as a Case Study, in: *Wells 1992*, 105-16.
- Forbes, H. 1993
Ethnoarchaeology and the Place of the Olive in the Economy of the Southern Argolid, Greece, in: *Amouretti & Brun 1993*, 213-226.
- Forbes, H. 1995
The Identification of Pastoralist Sites within the Context of Estate-based Agriculture in Ancient Greece: beyond the "Trancehuman- ce versus Agro-pastoralism" Debate, *ABSA* 90, 325-38.
- Forbes, H. 1996
The uses of the uncultivated landscape in modern Greece: a pointer to the value of the wilderness in antiquity?, in: *Shipley & Salmon 1996*, 68-97.
- Foxhall, L. 1992
The control of the Attic landscape, in: *Wells 1992*, 155-59.

- Foxhall, L. 1996
Feeling the earth move: cultivation techniques on steep slopes in classical antiquity, in: *Shipley & Salmon 1996*, 44-67.
- Foxhall, L., & Forbes, H. A.. 1982
"SITOMETREIA: The Role of Grain as a Staple Food in Classical Antiquity", *CHIRON* Band 12, 41-90.
- Gallant, T. H. 1982
Agricultural systems, land tenure, and the reforms of Solon, *ABSA* 77, 111-24.
- Garnsey, P. 1988a
Famine and food supply in the Graeco-Roman World. Cambridge.
- Garnsey, P. 1988b
Mountain economies in southern Europe. Thoughts on the early history, continuity and individuality of Mediterranean upland pastoralism, in: *Whittaker 1988*, 196-209.
- Garnsey, P., Hopkins, M. K. & Whittaker, C. R. (eds.) 1983
Trade in the Ancient Economy. London.
- Gavrielides, N. 1976
The impact of olive growing on the landscape in Fourni valley, in: *Dimen & Friedl 1976*, 143-57.
- Geographical Handbook Series 1944*
The British Admiralty, Naval Intelligence Division edn. 3 vols.
- Georgoudi, S. 1974
"Quelques problèmes de la transhumance dans la Grèce ancienne", *REG* 87, 155-85.
- Halsted, P. 1981
Counting sheep in neolithic and bronze age Greece, in: *Hodder et al. 1981*, 307-339.
- Hansen, M. H. 1985
Demography and Democracy. The Number of Athenian Citizens in the Fourth Century B.C. Vojens.
- Hanson, V. D. 1983
Warfare and Agriculture in Classical Greece. Pisa.
- Hanson, V. D. 1995
The Other Greeks. The Family Farm and the Agrarian Roots of Western Civilization. New York.
- Hodder, I. Isaac, G. & Hammond, N. (eds.) 1981
Pattern of the Past. Studies in Honour of David Clarke. Cambridge.
- Hodkinson, S. 1988
Animal Husbandry in the Greek polis, in: *Whittaker 1988*, 35-74.
- Isager S. & J. E. Skydsgaard. 1992
Ancient Greek Agriculture. London.
- Jameson, M. H. 1982
"The leasing of land at Rhamnous". *Hesperia* suppl.19, 60-74.
- Jameson, M. H. 1994
Class in the ancient Greek countryside, in: *Doukellis & Mendoni 1994*, 55-63.
- Jameson, M. H., Runnels, C. N., & van Andel, T. 1994
A Greek Countryside: The Southern Argolid from Prehistory to the Present Day. Stanford.
- Koerner, R., 1973
Zu Recht und Verwaltung der griechischen Wasserversorgung nach den Inschriften, *AfP* 22, 155-202.
- Langdon, M. K. & Watrous, L.V. 1977
The Farm of Timesios: rock-cut inscriptions in South Attica, *Hesperia* 46, 162-77.
- Lohmann, H. 1992
Agriculture and Country Life in Classical Attica, in: *Wells 1992*, 29-57.
- Lohmann, H. 1993
Atene. Forschungen zu Siedlungs und Wirtschaftsstruktur des klassischen Attika. 2 vols. Köln.
- Murray, O. & Price, S. (eds.) 1990
The Greek City - From Homer to Alexander. Oxford.
- Osborne, R. 1987
Classical Landscape with Figures. The Ancient Greek City and its Countryside. London
- Rackham, O. 1983
"Observations on the Historical Ecology of Boeotia", *ABSA* 78, 291-351.
- Rackham, O. 1990
Ancient Landscapes, in: *Murray & Price 1990*, 85-111.
- Rackham, O. & J. Moody, 1992
Terraces, in: *Wells 1992*, 123-30.
- Renfrew, J. M. 1973
Palaeoethnobotany: The Prehistoric Food Plants of the Near East and Europe. London.
- Sallares, R. 1991
The Ecology of the Ancient Greek World. London.
- Sarpaki, A. 1992
The Palaeoethnobotanical Approach. The Mediterranean Triad or Is It a Quartet?, in: *Wells 1992*, 61-75.
- Scheidel, W. 1990
Feldarbeit von Frauen in der antiken Landwirtschaft, *Gymnasium* 97, 405-31.
- Shipley, G. & Salmon, J. (eds.) 1996
Human Landscapes in classical Antiquity.

- ity. *Environment and Culture*. Leister-Nottingham Studies in Ancient Society. Volume 6. London.
- Skydsgaard, J. E. 1988
Transhumance in ancient Greece, in: *Whittaker 1988*, 75-86.
- Snodgrass, A. 1983
Heavy Freight in Archaic Greece, in: *Garnsey et al. 1983*.
- Spence, I. G. 1993
The Cavalry of Classical Greece. A Social and Military History with Particular Reference to Athens. Oxford.
- Stanton, G. R. 1994
The rural demes and Athenian politics, in: *Coulson et al. 1994*, 217-24.
- Stanton, G. R. 1996
Some Inscriptions in Attic Demes, *ABSA* 91, 341-64.
- van Andel, Tj., & Runnels. C. N. 1987
Beyond the Acropolis. A Rural Greek Past. Stanford.
- Vigneron, P. 1968
Le Cheval dans l'antiquité Gréco-Romaine I-II. Nancy.
- Vita-Finzi, C. 1969
The Mediterranean Valleys. Geological Changes in Historical Times. Cambridge.
- Wells, B. (ed.) 1992
Agriculture in Ancient Greece. Proceedings of the seventh International Symposium at the Swedish Institute at Athens, 16-17 May, 1990. Stockholm.
- White, K.D. 1970
Roman Farming. London.
- Whittaker. C. R. (ed.) 1988
Pastoral economies in classical antiquity. PCPhS, Suppl. 14. Cambridge.
- Zangger, E. 1992
Prehistoric and Historic Soils in Greece: Assessing the Natural Resources for Agriculture, in: *Wells 1992*. 13-18.

