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A PRACTICAL HARMONY: PAGAN ECOLOGICAL ATTITUDES
AND THE ROMAN AGRICULTURAL SUCCESS IN NORTH AFRICA

Keith Wesley Adams

A Thesis
in
The Department
of
History

Presented in Partial Fulfilment of the Requirements
for the Degree of Master of Arts at
Concordia University
Montréal, Québec, Canada

November, 1991

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ABSTRACT

A PRACTICAL HARMONY: PAGAN ECOLOGICAL ATTITUDES AND THE ROMAN AGRICULTURAL SUCCESS IN NORTH AFRICA

K.W. Adams

This thesis argues that contrary to modern assumptions about the newness of ecological ideals, excuses about a wetter climate in antiquity and biases about the role the Romans played in North Africa, major ecological decline is the result of human misuse of the environment within the last 200 years and Roman agricultural success was based on conscious attitudes and responsible action.

Pagan religious, philosophical and popular thought is shown to have contained all primary environmental ethics called for by environmentalists today. It acted as a check on consumption and abuse of nature. This worship and sense of duty to nature formed the basis of Roman socio-economic attitudes. Rural concerns for spirits within the land, the dead and yet unborn and the continuity of the state set limits on economic and technological development, shaping the very use of land and farming methods, as is shown in agronomic texts and laws. These attitudes are evident in North Africa in gardens, mosaics, literature and epigraphy. Most importantly pagan values are evident in the conscious adaptation of Roman mixed farming practices to the arid climate and thin soils of the Maghreb and in the private and imperial policies protecting the ecologically important small farmer.

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First of all, I would like to acknowledge Concordia University, whose dedication to continuing education and multiculturalism gives it the interesting and enthusiastic student body and atmosphere that inspires learning and that I expected all universities to have, but (literally after searching from one university on the shores of the Atlantic Ocean to another on the Pacific) found only here. I would like to thank Concordia for its respect of "real education," by which I mean, all those professors who throughout my studies respected the opinions of students whose knowledge came from experience rather than books, and encouraged them to expand and enrich their experience by exploring the world of academia. I would like to thank its dedication to interdisciplinary studies, specifically in the departments of History and Classics, which allowed me to pursue my wide goals and interests (from environmentalism to literature, from geography to paganism) and to bring them together in one work. I believe that it is in the comparison of ages, experiences, cultures, and disciplines that all true learning takes place.

I am very grateful to Dr. Robert Titler who gave me encouragement and advice at the beginning and end of this process, first by welcoming me into the Masters in History and now by urging me to continue further research. I thank Dr. F. Shlosser who saw me through the first year. And I thank Dr. William Hubbard, whose course Modern European Historiography broadened and influenced my concept of history and whose own dedication to history greatly inspired me. I thank all the professors of history, whom I talked to, however briefly, such as Dr. M. Mason, Dr. F. Bode and Dr. R. Rudin, who showed keen interest in my topic.

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Abbreviations

Journals

- Annales ESC Annales, Economie, Sociétés, Civilizations.
- ANRW Aufstieg und Niedergang der römischen Welt.
Geschichte und Kultur Roms im Spiegel der
neueren Forschung. Berlin, de Gruyter.
- Ant Afr Antiquités Africaines. Paris. Centre national
de la Recherche Scientifique.
- EMC Echos du Monde Classique. Classical Views.
Alberta: University of Calgary Press.
- Opus Opus. Rivista internazionale per la storia econo-
mica e sociale dell'antichità. Roma, Opus.
- PBSR Papers of the British School at Rome. London:
MacMillan.
- ZPE Zeitschrift fuer Papyrologie und Epigraphik. Bonn.

Texts

- ALIP Arid Lands in Perspective. W.G. McGinnies & B.G.
Goldman eds., Tuscon: University of Arizona Press/
Washington D.C.: American Association for the
Advancement of Science, 1969.
- ALIT Arid Lands in Transition. H.E. Dregne ed.,
Washington D.C.: American Association for the
Advancement of Science, 1970.
- CIL Corpus Inscriptionum Latinarum. 1863.
- FIRA Fontes Iures Romani Antelustiniani. Riccobono,
1941.
- Garnsey & Saller.
ESC P.D.A. Garnsey and R. Saller, The Roman Empire,
Economy, Society and Culture. Berkeley & Los
Angeles: University of California Press, 1987.
- ILS Inscriptiones Latinae Selectae. H. Dessau ed.,
1892-1916.
- Rostovtzeff,
Roman Empire M. Rostovtzeff, The Social and Economic History
of the Roman Empire. 2 vols. Oxford: Clarendon
Press, 1926.

Man has lost the capacity to foresee and to forestall.
He will end by destroying the earth.

Albert Schweitzer, quoted in Rachel Carson's ecological
groundbreaking work, Silent Spring, (Boston: 1962) dedication.

Attitude is not so different from deed as many believe. All
activity of men begins as ideals and later becomes ideals once more.
The task of politics is to present ideals in such a form as to touch
the subrational wellsprings of human desire and will.

Theodor Herzl, Altneuland, epilogue, trans. Carl E Schorske,
Fin de Siècle Vienna: Politics and Culture, (N.Y.:1980) p.164
(adapted: replacing the word "dream" with attitude & ideals).

Power without ethics is profane and destructive in any community.

Holmes Rolston, Environmental Ethics, (Phil.: 1988) p.xii

A man is only ethical when life...is sacred to him, that of plants
and animals, as that of his fellow men.

Albert Schweitzer, Out of My Life and Thought: An Autobiography,
(N.Y.: 1949) p.158-9.

(We must regain) the traditional teaching that power must entail
restraint and responsibility, the ancient awareness that we are
interdependent with all of nature and that our sense of community
must take in the whole of creation.

Donald Worster, "The Vulnerable Earth," in idem ed., The
Ends of the Earth, (Cambridge U P.: 1988) p.20.

A PRACTICAL HARMONY: PAGAN ECOLOGICAL ATTITUDES
AND THE ROMAN AGRICULTURAL SUCCESS IN NORTH AFRICA

INTRODUCTION

The agricultural prosperity of North Africa under Roman domination cannot be denied. Countless remains of wells, irrigation ditches, plot divisions, olive oil presses, farming implements, and long abandoned farm sites, villages and cities cover the now desolate, barren hills and desiccated plains of the Maghrebian interior. Ever since the French conquered Algeria in the 1830s, scholars have debated the causes of such obvious success, deeply inspired by the sharp contrast between ancient abundance and modern dearth. Because of the rapidly growing man-made ecological crisis, one that has for the first time in human history truly brought into question not only the survival of civilization but of all humanity and life as we know it, this contrast has taken on new significance. In this age of global warming, rapid desertification and mass starvation on a level hitherto unheard of, the ability of the Romans to have successfully survived in this fragile, arid and semi-arid zone is of extreme importance. It provides us with the proof that, and a model of how, a high civilization may live in relative harmony with the environment. It is the purpose of this thesis to show that the Romans prospered in this region because of their pagan worship of and attitudes toward nature, that these were intrinsically ecological and effected their very social and economic institutions and methods of farming, making for a much more respectful, careful and thus environmentally sound and successful supplying of human needs.

This thesis forms part of a new school called environmental history.

Environmental history, perhaps more than any other history, matches what the French call "total history." It assumes that we can only understand events and causation in a holistic sense, taking into account not just the political decisions of great men, nor even just the medium durée of social and economic structures and attitudes, but also the very climate, geography and ecological state of the region under study. Above all environmental history believes that we are a part of this planet and our history is drastically shaped by our relation to nature: how we are shaped by our environment, our attitudes toward nature (conscious or not) and most importantly how our actions and social-economic structures effect the planet we live on. Or as the doyen of environmental history, Donald Worster outlines it, environmental history looks at natural environments of the past, human modes of production and perceptions, ideologies and values.¹ Environmental history must concern itself with geographical, climatic, economic, cultural, social and political history, from the history of ideas to the history of use.

This thesis will focus on the attitudes (perceptions, ideologies and values) of the Romans toward nature, partly because of the limits of the master's thesis, but also because of the importance traditional Roman ideals came to play in North Africa. Too often ideals become secondary to economic needs, desires and motivations, but there are times when ideals clearly shape action. The 2nd century A.D. was one of these times. After a definite decline of traditional values at Rome with the rise of the empire in the first centuries B.C.-A.D., an influx of new men from rural provinces and a reaction to the materialism and individualism of the Julio-Claudians lead to a triumph of traditional values which, as we shall see, were far more concerned with environmental than monetary issues.²

However, although the focus is on attitudes and much of the evidence will be literary, religious, artistic, philosophical etc, this is not purely a cultural history, for we are concerned with the application of these attitudes and how they effected agricultural modes of production and the natural environment. Indeed, through the comparison of ideals with the methods of existence and the ecological history of an area, we can often get a truer picture of a culture. For example, by matching the widespread existence of first growth forests in North Africa up until the 18th century with the ancient Roman farming practice of leaving the mountain sides for forest crops(acorns, leaves for compost, coppicing), we can show that the Roman worship of trees, the poetic outcries against any deforestation and laws concerning protection of public forests were genuine and effective in limiting abuse, that short term economic concerns were secondary in Roman culture to sustainability and love of nature. Along with the comparison of ancient attitudes to modern ecological concepts, this comparison of ideals, production and natural history is the gist of the methodology used in the thesis.

A caveat with regards to the focus on ideals is that the thesis may tend to give too idealistic a portrayal of what was, after all, an imperialist, exploitive power. However, the argument here is that although Rome was far from an utopian society, enough individuals and collectives struggled to champion the traditional and more just attitudes of Rome's past. And that the hard work of such rural traditionalist "gadflies" eventually triumphed and succeeded in restraining, for a time, the more negative aspects of Rome's expanding powers. Ideals are the root of action. Pagan-environmental ethics checked these powers, and not only prevented disruption of the larger community, but also made the desert bloom.

The main time and geographic frame of the paper is North Africa in the 2nd century A.D. The 2nd century was chosen for a number of reasons. Firstly, because the triumph of traditional Roman values, mentioned above, makes for a more definite picture of Roman culture as distinct from Greek and eastern influences of the first century and later empire. Secondly, the 2nd century marks the time of Rome's most active expansion into North Africa, especially the interior, and of the period of fullest Romanization. Thus, again, it is a period in which we may more easily distinguish Roman culture, here as opposed to Punic and Berber traditions.

North Africa has been chosen firstly, because I was first inspired by the extension of Roman cultivation up to 80km further south into the Sahara than present day agriculture. Secondly, because a fragile arid zone highlights the relation of a civilization to nature, by more rapidly demonstrating the consequences of its attitudes and modes of survival.³ The main geographical focal point, thus, is the plateaux of the Maghrebian interior of Tunisia and Algeria, roughly from Cirta to Thamugadi (running north-south) and Thysdrus to Sitifis (running east-west). For it is this region that is and was truly semi-arid, receiving only between 100-400 mm of rain per year. (See Appendix A). This large region, although not as arid as the Saharan plain, provides more archaeological evidence. And as will be demonstrated in Chapter 1, it was also the area with the highest concentration of Roman settlers and Romanization, once again allowing us to distinguish between Roman and Punic or Berber influences.

The scope of the paper, however, is much larger due to the comparative nature of the methodology and in order to validate the argument that it was Roman pagan culture that made for successful agriculture in North Africa. Cultural attitudes are neither developed nor assimilated over

night. We must demonstrate their existence in earlier times, their continuity into later times and their transportation from the place of origin. Hence, we shall consider literary and archaeological evidence from as early as the 2nd century B.C. in Italy and compare it to similar evidence in 2nd century A.D., first in Italy or elsewhere in the empire, then in Africa. It is only in this more holistic sense, proof through multiple examples of strong and tenacious traditions, that the sometimes isolated evidence for North Africa can be argued to be part of a larger system of beliefs and modes of production. And, as the argument is that these were ecologically sound attitudes, we shall be comparing them to present environmental ethics and to the Romantic age, which is viewed as the genesis of the modern ecological movement. The thesis also contrasts present abusive mentalities and methods to highlight the soundness of ancient attitudes and ways.

Because of countless modern assumptions and biases, many which amount to no more than excuses for modern failure, Chapter 1 looks at the issues of the novelty of ecological thought, the climate in antiquity and the question of Roman responsibility both for agricultural success and ecological decline. This section explains why no scholar has previously considered Rome's success in North Africa from an environmental perspective, and in doing so also gives a brief history both of the North African climate and ecology and of Roman North African studies.

The main body of the thesis, Chapters 2 and 3, is structured closely on the argument of environmentalists that ecology is a "subversive science." Donald Worster shows how any concern for survival sets itself against the three main institutions of modern civilization to which he traces the main source of ecological destruction today: the anti-nature

bias in Christianity, and its two far more deadly offshoots, expansionary capitalism and scientific imperialism.⁴ As a pagan society, with a tradition of nature worship, Roman civilization naturally sides with ecologists, fundamentally against these modern institutions or "ideologies of death." Chapter 2 demonstrates how the pro-nature bias inherent in pagan thought and beliefs set limits to abuses against nature. Chapter 3 shows how pagan thought influenced Roman modes of production and social structures, putting community and continuity above profit, and setting limits to both economic and technological development, limits dangerously lacking in modern society.⁵

Also due to the limits of space, Roman attitudes toward, and treatment of animals will not be considered. However, these may be summed up in one word: cruel. The countless "beastie" shows, in which at times thousands of animals would be killed in one week for entertainment and political propaganda, led to the extinction of at least one species, the North African elephant.⁶ This does not, however, detract from my thesis that pagan worship of nature resulted in its protection. The Romans did not worship animals; they considered such worship disgusting.⁷ The Romans did however, worship trees, water and earth (rocks and soils). It is these aspects of nature with which this thesis is concerned.

The Roman relation to nature, vegetation, water and soils allowed Romans to survive in an arid land without depleting its resources and destroying its ecology for future generations. What environmental history enlightens us to, is the fact that it is the institutions of modern society that are the true subversives. By studying Roman attitudes toward nature and the role of humans in society, we realize just how out of line we are. Even if the roots of the present arrogant belief that we can

manage and conquer nature for human needs goes back to Greek scientific and Christian traditions, it is only in the last 200 years that an aggressive and rationalized exploitation of natural resources has led to the pollution of every major body of fresh water, entire oceans, the very soils and air that sustain us. We desperately need to reassess our society. As the root of Western Civilization, as a pre-Christian, pre-capitalist, pre-scientific imperialist society, Rome provides a good starting point. It shows us that a fundamentally different and yet still complex civilization may live in relative harmony with nature. As pagans, the Romans clearly perceived their interdependency with nature and adapted their lives accordingly, never forgetting the ancient awareness that our community must include all of creation. It was the very absence of modern capitalist and technological arrogance which accounts for Rome's success in the Maghreb.

CHAPTER ONE:

MODERN ASSUMPTIONS, BIASES AND EXCUSES: THE CASE FOR ROMAN CONSCIOUSNESS AND RESPONSIBILITY

Again and again I hear the leading men of our state condemning now the unfruitfulness of the soil, now the inclemency of the climate for some seasons past, as harmful to crops;...in their opinion, the soil was worn out and exhausted by the over-production of earlier days and can no longer furnish sustenance to mortals with its old-time benevolence.... I do not believe that such misfortunes come upon us as a result of the fury of the elements, but rather because of our own fault. 1

To Columella, the reasons for agricultural success or decline in Italy were clear: human responsibility. Were he able to return from Hades and look at the ecological decline in North Africa today he would probably come to the same conclusion, as would many an ancient author. Plato would even have recognized that it was deforestation that led to the eroding of the "rich soil," producing the "shingle plains of the present day."² Hadrian clearly believed in the role of human effort when he encouraged African farmers to bring under cultivation any land left abandoned or fallow by giving them ownership as long as they cultivated it and rent free occupation for a number of years, depending on the types of crops they planted.³ Countless examples could be given to demonstrate that the ancients were highly aware of their role in environmental change and that they actively sought to develop the land.⁴ Yet, despite such evidence and the importance of understanding whether or not the Romans had a conscious policy, or even an attitude that contributed to the cultivation of the Maghreb in the 2nd century A.D., modern assumptions, historical biases and excuses have prevented scholars from researching the true causes and nature of the Roman success in North Africa.

If there is a common thread behind all these hindrances to understanding Roman success in the Maghreb, it is the modern evolutionist assumption about the "backwardness" of earlier cultures in comparison to our own, based on an overestimation of imperialist scientific technology. And, especially among classical scholars, there has been a too easy association of Rome with modern European imperialists, preventing a clear understanding of Roman success or failure. This chapter will explore these assumptions and biases among ecologists, climatologists, historians and arid zone researchers in order to immediately dispose of any criticisms that might otherwise arise in the following chapters, to give the reader a selective survey of Roman North African studies in relation to agriculture and to demonstrate that this subject is worth studying from an ecological perspective.

The Charge of Anachronism
and the Assumption of the Newness of Ecological Ideals

The study of ecology only became popular in the 1960s, and it was in part through this popular movement that historical scholarship broadened its scope to include in its domain such subjects as environment and culture.⁵ This late development partially explains the dearth of historical research on Roman attitudes to nature. The first work appears in 1967 by the social historian Clarence J. Glacken, who traces the roots of modern attitudes to nature from the Hellenistic age to A.D. 1800. However, this leaves over twenty years with only two other studies: a popular work on Ecology in Ancient Civilizations with three chapters devoted to Rome by Donald Hughes (1975), and a short article by Klaus Sallmann on the notion⁶ of responsibility to nature in the works of Pliny the Elder (1986). Hughes' work is too general and imprecise to be of value and is based on

7

some frustratingly clichéd views of the Roman character. Of the scholarly works, both Glacken's and Sallmann's efforts show a clear consciousness and care for nature among ancient authors, yet neither explores these ecological attitudes in Roman thought to see if they were manifest on a wider scale in their culture, actions and developments.

The main reason for this dearth is an assumption on the part of environmental scholars of the novelty of ecological ideals. In general it is assumed that environmentalism began as a reaction to industrialism and that the Romantic Movement was the first sign of a new consciousness of nature. ⁸ Thus, environmental ethicists believe that the concept "that humans have a responsibility to nature is among one of the more recent philosophical discoveries," and it has generally been considered anachronistic to speak of ecological ideals in antiquity. ⁹ The Greeks and Romans, it has been argued, although aware of the influences of the environment on man, "largely ignored the significance of man as an agent in altering his environment." ¹⁰ But, as Glacken has shown, this belief is founded on

- 1) an underevaluation of the abilities, technology and consciousness of the past, while overevaluating these attributes in modern times.
- 2) the belief that an "advanced technology and sophisticated theoretical science are required for permanent and extensive change," and an awareness of it, and
- 3) on an underevaluation of man's spiritual and physical dependence on nature. 11

In Chapter 2, we shall show how the Romans had all the primary values considered fundamental to an ecological perspective and even how they had their own "Romantic Movement" as a result of the growth of Rome in the 1st century B.C. For now I wish to emphasize that environmental ideals are intrinsic to humanity. If anyone, it is moderns who lack consciousness in this important area. Anthropologists have long come to realize the environmental values inherent in indigenous societies.

Numerous studies on North American Indians have shown how taboos and customs prevented natives from over-hunting animals or depleting other re-

sources.¹² Of course there will always be the Marxian view point which denies the role of causation to any factor except economics, however,

more and more scholars are realizing that traditional societies had other non-materialistic values which ensured their survival.¹³ Thus the 1987 Bruntland Commission to the United Nations on global environment and development argues that indigenous peoples of the world are key to the

struggle for a better global environment in the future, (for they are) the repositories of vast accumulations of traditional knowledge and experience that link humanity with its ancient origins, (which can) offer modern societies many lessons in the management of resources in a complex of forest, mountain and dryland ecosystems.¹⁴

The new environmental history argues that "primitive people" in general had a more advanced relationship to nature than "civilized people."¹⁵

Although Romans cannot be considered "primitive", they "spent their lives often in conditions of proximity (to nature) which are now difficult for us to imagine," a proximity far greater than our own.¹⁶ And, it has long been remarked that an incredible tenaciousness to "primitive" customs and beliefs was one of the outstanding features of Roman culture.¹⁷

Further, as Glacken argues, man's dependence on nature is so strong that "any artificial divorcement from it leads to attempts to reestablish the communion, and thus to self-conscious sentiments about nature and a distinct method of artistic expression."¹⁸ It is not surprising that we find such expression in the earliest known literature to man, and not just for the Hellenistic era as Glacken has shown. In the Epic of Gilgamesh (1700 B.C.) the wildman Enkidu, who lies on his deathbed, laments his loss of nature, cursing the shepherd and harlot who brought him to the city. He says to Gilgamesh, "on whose account he had left the wilderness," (as the poem stresses):

It was I who cut down the cedar, I who levelled the forest. I who slew Humbaba (the guardian spirit of the forest) and now see what has become of me.

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Thus, Enkidu blames his death on the abuses he had committed against nature. In Chapter 2 we will see how this animist belief and sense of responsibility to nature existed in Roman times and acted as a check against the exploitation of trees and resources. But as we see such ecological consciousness as early as 1700 B.C., we should not be surprised or deem it anachronistic to find it in the 2nd century A.D. Whether Sumerian, Amerindian or Roman, ecological ideals are common to all pagan peoples. As the root of western civilization, Rome can act as a link between modern society and "primitive" culture.

In short, ecologists have fallen prey to the very evolutionist ideals for which they criticize imperialist science. For they seem to have assumed that we are the only civilization capable of ecological thought, as we are the only with such an advanced technology and complex philosophical jargon. But neither of these are needed. As the historian of ideas Arthur Lovejoy has argued, "every age tends to exaggerate the scope and finality of its own discoveries, or rediscoveries."²⁰ And, as Worster notes, although the term ecology was coined in 1866 and only became popular in the 1960s, "the idea of ecology is much older than the name."²¹ There is "no gainsaying the persistence of the past."

The Excuse of Climate

The question of climate in antiquity has been another hindrance to understanding Roman success in the Maghreb. The contrast between present desiccation and extensive Roman ruins has been used as prima facie evidence that a wetter climate than now existed in Roman times. Again we find in this climatic determinist argument the evolutionist assumption

and a blind belief that it is only the conquest of nature by science and technology that can achieve significant results. For how could the Romans with their inferior technology and "backwards" economy succeed where modern science has failed, unless some vast impersonal force, climate, made it possible?²²

The determinist argument has been held primarily by climatologists who naturally wish to see their field of study as the main motor of historical causation. Historians have stood alone, accused by the sciences of avoiding the "embarrassing complication" and "protean problem" of climate, arguing against a wetter climate in antiquity because it is obvious that it has not become wetter since.²³ But now the trend has reversed, this division between the humanities and natural sciences no longer exists,²⁴ and historians have proven themselves capable of grappling with Proteus. Presently, the weight of scholarship—arid zone research (Le Houerou 1970), geology (Murphy 1951), geography (Butzer 1966), hydrology (Raikes 1969), pedology (Rackman 1983), zoology (Cloudsley-Thompson 1984) and even a new school of climatology (Wigley et al. 1981)—agrees with the anti-determinist position held by historians all along, that the climate in antiquity was remarkably similar to our own, and that human factors account for both Roman agricultural success and subsequent ecological decline.²⁵ It would be too long to go into the details of this debate so we shall simply look at the most recent dissenters to the anti-determinist argument.

The main, if not only, proponent of the climatic determinist position at present is the eminent climatologist H.H. Lamb (1982), whose interest seems to be to save climatology from the low esteem in which it has fallen among historians.²⁶ However, it must be stressed that historians do not deny climatic factors entirely. "The problem is not whether

climate was involved, but the manner and degree of its involvement."

A.N. Sherwin-White has shown how geo-climatic factors effected the very kind and displacement of Roman agricultural development in North Africa.

What historians argue, however, is that these factors were the same as we

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experience today. Even Lamb himself has complained that the similarity between the climate in Roman times and now has made historians believe climate has had no effect in subsequent eras. Nevertheless, Lamb argues that his new methodology, multi-variate analysis, overcomes the weaknesses of earlier climatic theories such as Huntington(1907) and Brooks(1949)

and shows that North Africa did enjoy slightly greater precipitation and water tables than now, "making possible the Carthaginian and later Roman croplands there."

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Multi-variate analysis, however, is nothing more than the comparison of various proxy data and proves to be as ignorant of historical fact and as chronologically imprecise as earlier methods. Its main failure is the use of non-regionally specific data. The most glaring example is the use of peat bogs in Wales which increased over a metre in the Sub-Atlantic period(850-200 B.C.)—more than in the following 2000 years combined—to conclude a wetter period also existed in the Mediterranean and North Africa and continued as slightly moister throughout the Roman era to about

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400 A.D. It is a well known climatological fact (one Lamb is aware of), however, that North Africa lies in an anti-cyclone zone between the sub-polar low which effects northern Europe and the subtropical high(Azores) which effects the equatorial regions. Thus, North Africa not only does not experience the greater climatic fluctuations of northern Europe, but more importantly experiences almost the direct inverse of the English

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climate. (See fig.1). The rainier period of northern Europe marked by

Lamb may mean a period of greater aridity in North Africa. Indeed, the more regionally specific data of the geographer K.W. Butzer, shows this, that the Roman period was not just similar to today but followed a period of hyper-aridity, matching Lamb's Sub-Atlantic period. (See fig.2). Lamb's numerous other proxy data suffer mostly the same faults. From palynology, which is untrustworthy in arid zones, to Atlantic sea levels, which do not apply to the "inland sea" of the Mediterranean, correlation of such imprecise data does not equal more certain results any more than ³² two wrongs make a right. Although Lamb's conclusions may be true for northern Europe, they do not apply to North Africa. We are much safer with the historical conclusion based on written and archaeological evidence that, to all intents, the climate was similar to today's.

The classicist B.D. Shaw, however, even though he in general agrees that human and not climatic factors account for agricultural success and ecological decline, has recently (1983) criticized the use of written and archaeological sources as "simply not the type of data required to solve the problem of long term climatic variation." Indeed, he goes so far as to ³³ condemn the use of such data as a "futile and indefensible methodology." To Shaw only quantitative studies can determine this question. But there are a number of weaknesses in this criticism.

Firstly, Shaw — like the old school climatologist Lamb— fails to see that climatology itself is moving away from long term trends (i.e., post glacial) to snorter fluctuations (i.e., individual storms and annual patterns) and from secular to regional climatic phenomenon. This new school of "climate and history" uses a form of "Occam's razor" (things not known to exist should not be postulated, unless absolutely necessary) in which local social, economic, political and other explanations of a

human and more readily proven nature are used first before turning to theories of secular climatic change and exotic theories of sunspot cycles. Their findings show that even in the societies believed to be most vulnerable to climate during the most definite periods of climatic fluctuation, such as European peasants during the "Little Ice Age" (A.D. 1600-1900), man was capable of great adaptability which protected him from catastrophe. Where such societies failed to continue (e.g., the Norse in Greenland), definite human factors have been found to have been the cause (e.g., a rapacious use of natural resources). In short, this school has shaken up the old assumptions about the vulnerability of early agrarian societies. Human adaptability or unadaptability can in even the most drastic climatic changes and most fragile ecological zones explain success or decline.

However, the new school relies heavily on quantitative data such as grain prices, so that their studies must focus primarily on societies post A.D. 1000. This means that we must rely to some degree on written and archaeological sources for Roman antiquity. Nonetheless, studies by historical geographers unanimously demonstrate through archaeological and written evidence how extremely adaptable the Romans were in thought and action to the arid climate of North Africa. This sensitivity, as we shall see in Chapter 3, not a wetter climate, was the key to their success. Shaw's criticism of conflicting historical evidence is simply outdated. No work since Carcopino's has argued for a wetter climate. Moreover, as Shaw himself points out, the "middle ground" of this debate was reached in 1911 when the "Doyen of Maghribi studies," Stephan Gsell "cannonized" the collection of ancient sources by H. Leiter (1909). Gsell clearly concludes that "if the climate of Barbary has changed since Roman times, it is only in some very small measure."

Shaw complains that this conclusion reflects only Gsell's "sane judgement," not any, "reliable empirical analysis."⁴⁰ But this sane judgement has been verified not only by the weight of scholarship from arid zone research to zoology, as mentioned above, but also by practical reclamation of lands and Roman water systems by the French and by the very quantitative studies Shaw calls for.⁴¹ Further, Shaw greatly underestimates the value of qualitative sources while overestimating the value of quantitative. As we have seen with Lamb above, the scientific data can suffer the same problems of poor interpretation as historical evidence. Shaw himself trusts a report of heavy soil alluviation between A.D. 1100 to 1700 to reveal climatic change, when human factors—a switch to pastoralism and neglect of terraces—much better explains the erosion of this period.⁴² (See below p.30)

Moreover, as the very editors of Shaw's paper recognize, historians have smoothed out most of the contradictions and sorted out the weaknesses in the documentary and archaeological evidence.⁴³ For example, of approximately 150 climatic "fragments" from written sources (i.e., mentioning of climate in one form or other) 140 mention either the "uninhabitable" aridity or the sandy soils or "no water," "no vegetation," "no life,"⁴⁴ all in terms which cannot be mistaken as the psychology of the writer. Contrarily, of the 40 or so ancient fragments which may be interpreted as a wetter climate almost all can be matched by modern climatic phenomena.

Similarly, contradictions in archaeological evidence can usually be cleared up by closer studies. For example, Lamb's use of the ancient abandoned site of Petra in the Jordanian desert as proof that Roman times experienced a "somewhat wetter moister regime in Africa and the Near East,"⁴⁵ illustrates an obvious lack of research. Raikes' study of the region shows that the many springs in the region have simply been redirected from

the Roman site, "canalized and quite skillfully distributed to the terrace⁴⁶ cultivation of the modern village." If they were not diverted, the main spring, Ain Mura, would easily reach the Roman system of rock cut channels which leads into the Roman town. This desolate but naturally barricaded town has been abandoned because the present inhabitants do not have to hide or defend themselves from the Persian army. In general, as in this case, written and archaeological sources have proven invaluable for corre-⁴⁷lating with modern records and phenomena in determining past climate.

If we are to succeed at the study of climate and history we would do well not to discard any data—quantitative or qualitative. This is a field that "demands interdisciplinary cooperation."⁴⁸ There is much that can be learned simply from an old abandoned oil press and some ancient agricultural treatise. The French have successfully revitalized over 300,000 hectares of deep sandy soil simply by cleaning out ancient wells⁴⁹ and using Roman dry farming methods. (See fig.3). Caution is invaluable in the world of scholarship, but where it overshadows practical questions such as rapid desertification in an area that has been studied for almost 200 years, it embarks on the dangerous modern course of researching a problem instead of solving it, of looking in the wrong direction to the "highly dangerous interpretation" of climatic determinism⁵⁰ instead of facing the real causes of success and decline: human. Much does come down to "sane judgement." And the sane judgement of Gsell and others has been backed up by scholars from archaeologists to hydrologists and zoologists: there is no reliable evidence for climatic change since Roman times. Human factors were as responsible for success as for decline in the Maghreb "ever since man crossed the threshold of historical documen-⁵¹tation."

Imperialist and Anti-Imperialist Historical Biases,
The Question of Roman or Native Responsibility for Agricultural Success

Granted that human factors account for agricultural success, then which humans, which factors? Shaw has revealed the colonialist bias which has prejudiced most 19th and 20th century Roman North African scholarship. From Coudray de la Blanchère (1897) to J. Birebent (1964), Europeans have undertaken studies with the belief that it was their duty as inheritors of Rome's glory to "restore the lost productivity."⁵² In large part it was a justification of their imperialism, political and scientific. This bias led to the attribution of all water works to the Romans without any critical analysis. An almost racist assumption argued that "only the Romans with their technological experience and organizational abilities could have been capable of constructing these vast rural hydraulic systems."⁵³ The similarity of the irrigation works across North Africa added to the Wittfogelian thesis that the works must have been imposed by a "single maker." For European scholars, the maker was a "European power" which brought "prosperity and social organization" to the "backward" native population.⁵⁴ Again, an evolutionist assumption confused the reason for agricultural development in antiquity, believing that success was obtained only through the conquering of nature by a superior technology.

Indeed, where such "superior" technology has been used, whether in antiquity or more recently by the French and Italians, it has ultimately failed.⁵⁵ The mud banks of the natives mentioned by Corripus, built only as the annual storms burst, prove more successful as they can be formed wherever the storm waters might wash.⁵⁶ Shaw argues that such wadi-cross-wallling irrigation methods visible in aerial photographs reflect an adaptation to the arid environment, not any conscious importation of technology from outside. Topography and scant precipitation limits a large

percentage of irrigation technology to these methods, even today.

By showing how wadi-cross walling (both flood and terrace methods)

1. contrast with Roman centuriation,
2. contrast with the hydraulic water systems clearly built by the Romans for urban consumptive uses, (ie. wells, cisterns, aqueducts) and
3. how settlements which would have had such systems by necessity pre-date Roman settlement,

Shaw has redressed the imbalance and put forth strong arguments for the native (perhaps neolithic) origination of the irrigation schemes and later agricultural success of the Roman period. ⁵⁸ Definitely as Despois, wrote

Les Berbères n'avaient certainement pas attendu les Latins pour faire des cultures en terrasses et pour s'ingenier à utiliser au mieux les eaux indispensables aux cultures. ⁵⁹

But there is no reason to assume that Roman methods of development were only on a large technologically imperialist scale and not on a more modest and regionally appropriate level. Surely the Tripolitanian dams are in a region that was clearly a Punic stronghold, while in the most Romanized province of western Algeria no such large dams have been found, only the small schemes of local municipia which are thoroughly adapted to their environment. ⁶⁰ (See Chapter 3 p.115-6 on Roman irrigation). Shaw is clearly part of an anti-imperialist trend which has developed since World War II and the independence of the Maghreb (Algeria 1962, Tunisia 1957 and Morocco 1956). This school, in trying to deny Rome any positive contribution to North Africa, has ignored much solid scholarship and historical fact. ⁶¹ Although I do not wish to deny the contributions of Africans in the development of the ancient Maghreb, the biases of this school must be addressed for they are numerous and misleading.

The main weakness of the anti-imperialist argument is its portrayal of Romans as merely rich urbanites who exploited native agricultural workers. ⁶² This portrayal

1. ignores the extreme importance of agriculture to Romans, evident in their cultural attitudes, and to Roman civilization in general.
2. assumes that there was a clear division between town and country, as in modern times, and finally,
3. assumes that there was a clear split between Roman settlers and the indigeneous peoples as in modern European imperialism.

Thus, ironically, Shaw and the anti-imperialist school make the same mistake for which they criticize Roman apologists: the association of the Romans with modern French colonialists. They differ only in that for the apologists it was a matter of pride, whereas for the detractors it is a matter of shame. Not all colonial regimes have the same "propensity".⁶³ Earlier ages were capable of more enlightened behaviour to their provinces than moderns to their colonies. Shaw and the anti-imperialists have accepted the apologist cliché that the Romans were rigid systematic imperialists, failing to see the Roman ability to adapt to climate and culture.

The Importance of Agriculture to Roman Society

The importance of agriculture to Roman civilization can hardly be stressed enough. Up to 90% of the population of the empire was involved in some form of agricultural pursuit, and much of this at a subsistence level.⁶⁴ This economic predominance of agriculture in Roman life is reflected in religious, social, economic, philosophical and political beliefs and ideals.⁶⁵ Agriculture was deeply imbedded in Roman culture. It was so respected that the top statesmen (Cato, Pliny), the most learned scholars (Varro), the most celebrated poets (Horace and Virgil), the most renowned medical men (Cornelius Celsus, "the Roman Hippocrates"), all wrote on farming, not as philosophers and men of science like the Greeks, but based on practical experience.⁶⁶ When Carthage was destroyed in 146 B.C., the one thing saved from Punic culture was the agricultural treatise of Mago, ordered translated into Latin by decree of the Senate.⁶⁷

Agriculture was possibly the most important element of Roman culture.

The pride of owning land and being self-sufficient was the dream of the lower classes too.⁶⁸ Soldiers were ever eager to settle new frontiers in order to have a farm. As White writes, from Gracchan's land reforms to Trajan's alimentary scheme, "land hunger and land appointment" are the key to understanding Roman history.⁶⁹ Both Gracchus and Trajan (also Marius, Sittius, Caesar, Augustus, Vespasian, Nerva and more) settled colonists and veterans in North Africa.⁷⁰ Thus, politically, emperors had a keen interest in expanding agriculture, not just to acquire the annona, but as a means of appeasing their veterans and of Romanization. Nowhere is this so clear as in North Africa.⁷¹ The very fact that the army was provisioned with agrimensores (land surveyors who set out agricultural plots: centuriation) librators (hydraulic engineers and apprentices) and aguilei (water diviners) shows that agricultural development was a conscious part of military expansion.⁷² There were conscious policies to develop the hinterland of the Maghreb, which Shaw and the anti-imperialists have "assiduously avoided."⁷³ It is only in consideration of this deep rooted concern with agriculture that Roman history in North Africa and its expansion can be understood.

Epigraphy & Onomastic Studies: The Proof of the Roman Presence, and the Rural-Urban, Settler-Native Unity

The extent of the agricultural expansion is evident in epigraphical and onomastic studies. Although Romanization itself was irregular, all of the most highly developed agricultural regions reveal a predominance of Roman settlers.⁷⁴ It is impossible to know to what degree such regions as the Bagradas Valley were already developed under the Carthaginians or the Cirtan environs under Massanissa's rule, but J-M. Lassère's study of pop-

ulation movements shows major Roman immigration and colonization of these regions at the end of the Republic.⁷⁵ The degree of Romanization of Cirta is evident in its provision of three-fifths of all senators from Africa to Rome in the later 2nd century.⁷⁶

But were the settlers farmers? The majority of Cirtans came from Campagna, the old granary of Rome.⁷⁷ Probably they were people whose land was confiscated during the proscriptions, or veterans, smaller farmers who lost their land to the latifondisti. 40 % of all inscriptions in the western provinces by farmer colonists come from Africa.⁷⁸ Further, a study of the farmlands and castella of the Cirtan territory shows that there was no separation between farmsteads and local forts. These forts were the town center for the Roman farmers and were not indigenous structures.⁷⁹ There is no doubt about the nature of Italian immigrants, they were farmers.

These regions then formed the source of later internal migrations in the 2nd century, which were predominantly from north to south and from east to west. In short, people moved from the Romanized parts of Africa to acquire land on the unsettled frontiers after new military posts made them secure from pastoralist nomads and semi-nomads.⁸⁰ A 3rd population movement consisting of native Gaetuli and Numidii went north into urban centers.⁸¹ Thus, quite contrary to the anti-imperialist argument, it was Romans or Romanized Africans who were heading for farms, while natives, displaced from their traditional grazing lands and ways of life, looked for work in towns. This division existed as early as the Marian settlements between the Carthaginians and Romans also. Frank's study of the epigraphy of the Bagradas region shows that it was Roman settlers who lived on the land, while earlier Punic colonists resided in towns. This

is provable by the rare local situation wherein the pagus (bearing Latin names) had higher status than the civitas (with a Punic onomastica).⁸²

Southern Numidia is believed to have been uncultivated except in the wadi valleys in the mountains, and relatively unpopulated before the Romans.⁸³ The solitudines africae is suggested by the fact that many colonists sent for girls from the Cirtan confederation to marry.⁸⁴ By this process, mainly a settling of veterans in colonies such as Tingad, and a funneling of individuals through advancement in the military stationed at Lambaesis, the entire region around the Aurès became highly Romanized. Veterans settled in large numbers into the surrounding towns: Diana Veteranorum, Lamiggiga, Lamsorti, Lamasba, Lambirdi, Lambafundi, Tingad, Bagai, etc.. Later these towns supplied soldiers for the Saharan frontier.⁸⁵ The supposedly "local African stock," such as L. Hostilius Felix, who made up the population of these towns and the army, were fully Romanized descendants of Roman veterans, many of whom intermarried with native women and thus took on a mixed nomenclature. But the culture they embraced was Roman and rural.⁸⁶

Again, as around Cirta, there was little division of town and country or Romans and agriculture in most of the Aurès region. H.D'Escurac-Doisy shows that veterans of Lambèse were highly active as farmers.⁸⁷ Shaw's own study of the Lamasba decree shows that "all property holders (i.e., users of the agricultural irrigation system) were members of the municipality:" the ruling ordo as much as smaller land owning coloni.⁸⁸ Thus, to portray the Romans as rich urbanite conquerors who had no concern for participating in irrigation for agricultural purposes seems ignorant of historical fact. As agriculture was the main form of wealth, the rich had to first irrigate their fields to produce the wealth with which they

could build the aqueducts and amenities of the town. That decurions used the Lamasban irrigation system and Roman laws concerned themselves with irrigation systems such as at Lamasba shows vested interests existed on the part of Roman legislators (the well-to-do) even if the origination of the system was African.⁸⁹ What MacMullen has shown for the north western provinces is also true for North Africa, rural Romanization was the basis and source of urban Romanization. The farmer and city dweller were inter-dependant.⁹⁰ It is, indeed, suprising that anti-imperialists ever assumed a rural-urban division considering it was, and still is, the traditional Italian manner for farmers to live in towns and walk to their fields to work.⁹¹ Most North African towns it must be remembered were mere hamlets, and even the larger villages were local markets for produce, places to meet seasonal labour or to buy what the farm does not produce.⁹²

Moreover, there is no proof that such time-sharing irrigation systems were originally African. As Shaw himself notes, there are numerous examples from Italy that demonstrate that this "division of water into time units, dependant on a constant water source, was typical of northern Mediterranean lands and Italy in particular."⁹³ But Shaw in looking for differences has found some minor ones which he claims reflect an indigenous reaction to local conditions.⁹⁴ Shaw does not consider the possibility that the Romans could have themselves adapted their methods to local conditions, even though he himself has pointed out the flexibility of Roman water systems.⁹⁵ We will demonstrate this adaptability in Chapter 3.

In considering the Italian water systems, Shaw has also overlooked the fact that the aqueducts were not soley for urban consumption but also tapped for irrigation purposes. The very Aqua Crabra which Shaw talks of in relation to time-sharing was a stream which supplied the drinking water

for both Tusculum and later for Rome through the Aqua Julia et Tepula built by Agrippa in 33 B.C.. An inscription similar to the Lamasba decree tells us that several owners also tapped this urban source for irrigating their lands. One of them was Cicero, who tells us that he paid rent to the town of Tusculum for the rights to water his land from this source.⁹⁶ We know that a spring that supplied Lambaesis with drinking water was also used to create gardens to the west of the town.⁹⁷ There was no clear separation of urban and rural water systems.

Equally false is the equation of mountains with "agricultural exploitation" and plains with Roman "urban settlements."⁹⁸ This division ignores the fact that olive oil presses, farming plots and instruments have been found most extensively on flat plains. (See figure 4). Indeed, the high ranges of the Grand Kabylie and Jurjura mountains, a Berber stronghold,⁹⁹ are relatively barren of agricultural remains.

Also, the portrayal of rich Romans and poor native labourers is a gross oversimplification. By tracing the epigraphy of the Comini, O. De Croizant has shown how Roman fortunes in the colonies were not all the same. This family from Samnium, Italy, first settled in the Cirtan confederation as companions of Sittius. By the 3rd century A.D., they had spread all over Numidia and Proconsularis. Some became nobles at Cuicul and Altiburous, one achieving the post of governor of Numidia under Phillip the Arab.¹⁰⁰ Many others, however, appear as humble descendents of slaves. Contrarily, many natives were to raise to prominent positions. The story of the harvester of Mactar who worked his way from dire poverty to become owner of a small farm, then to magistrate in a municipium is well known.¹⁰¹ As is the son of the decurion from Calama who rose to be procurator of Sicily.¹⁰² Juvenal complains that Africa is the nursery of lawyers.¹⁰³

Fronto the orator who became tutor to the emperor Marcus Aurelius was a native African. In 193 A.D. Africa provided the emperor Septimus Severus. In the words of Lassère, "social mobility est dans l'Afrique romain plus grand que certains l'ont prétendus;" and he is referring specifically to the anti-imperialist Laroui. ¹⁰⁴ Roman society, then, was not closed and racist like European imperialism. It willingly mixed with the Berber. Onomastic studies reveal plenty of intermarriage and a cosmopolitan population even in outskirts towns such as Sitifis. Indeed, Romans, ¹⁰⁵ natives and Carthaginians often shared in temple building.

This openness was a major cause of Roman success. It explains, for example, what Shaw fails to comprehend in his essay on the Lamasba decree: why the veterans who settled in Lamasba fit so well into a system which he regards as native. ¹⁰⁶ The intermingling of cultures naturally brings about a sharing of ideas and practices. Since this is evident in Romano-African religion, ¹⁰⁷ is it not also possible in technology? The fact is that irrigation and cultivation reached its peak, not at some vague point during the "seven centuries" of Roman rule, but at the height of occupation when the Romans, no longer distracted by civil wars and problems both internal and on other boundaries, put energy into expanding in the North African interior. To explain the development of Magrebian water control technology at this point as "destined, in any event, to have its own cycle ¹⁰⁸ of development," is a highly irresponsible interpretation of history. It ignores the incredible agricultural and economic impetus inspired by demographic growth, supplying army provisions and the opening of the Italian market for African trade and produce. Such a technologically determinist interpretation proves Mackendrick's point, who, addressing the balance between Roman apologists and detractors, wrote:

While even the most conservative historians admit that the Roman imperial government was not uniformly virtuous, the critics select their evidence to prove too much. 109

This anti-imperialist interpretation, not surprisingly, also ignores the conscious human efforts, policies and the entire Roman culture. For to explain agricultural success in the Maghreb by human factors would necessarily include the Romans and thus give credit to a pre-industrialist, pre-high tech society. But the fact of Roman cultural pre-occupation with agriculture, their predominance in areas of high cultivation and their intermingling with native Africans means that their contribution to agriculture cannot be denied. In the wish to equate the Romans with the French, anti-imperialists, like apologists, have selected centuriation as the only measure of the Roman character, failing to see the more traditional and important Roman traits of flexibility and adaptability.¹¹⁰ But if Rome played an important role in the agricultural success of the 2nd century, are they also responsible for the subsequent ecological decline?

The Myth of Drastic Post Roman Ecological Decline

Finally, we must consider the explanations of the actual ecological decline that has taken place in North Africa since antiquity. B.D. Shaw has argued that the whole decline argument is based on an exaggeration of the extent of prosperity under the Romans, what he calls the "Granary of Rome" myth. However, even he admits there is truth to this, as North Africa provided approximately 5,000,000 bushels of grain to Rome per year, enough to feed the populus for two-thirds of the year. And there was still surplus to trade elsewhere. Despite Carthage's trade and Masinissas' exports and a long and continuous post-Roman history of exportation, the fact is that in no previous or following time was so much land cultivated¹¹¹ as under the Romans in the 2nd century A.D. The only mythical aspect

of Africa being the "Granary of Rome" is the belief that the present decline in productivity and the ecology happened immediately and drastically following Rome's period of domination. Thus, we are better off referring to the "myth of drastic decline."

Again, with this myth, we find the same historical biases, modern assumptions and excuses for present failure preventing an understanding of past success. Roman apologists have blamed the Vandals for burning Roman orchards and destroying aqueducts, or the "lazy" Arabs for the herding of goats and neglecting the wells and cisterns, allowing them to silt up. The detractors, and arid zone researchers whose studies are contiguous, blame the Romans for deforestation, depleting the water tables and strip mining the soils. ¹¹²

The obvious anomaly in the anti-imperialist argument is the wish not to portray Romans as responsible for the agricultural success, but to blame them for any decline resulting from that success. ¹¹³ Definitely, the latter view has been the most common in recent years. It is based on an ignorance of actual Roman farming methods, an ancient exaggeration about the extent and destructiveness of the latifundia, and a popular misconception about the exploitiveness of Roman civilization in general. We shall demonstrate the ecological soundness of Roman attitudes toward nature and agricultural development in the following chapters. Now we shall briefly trace the history of the ecological decline, for both the apologists and detractors irresponsibly attribute decline to the distant past without having studied the actual environmental history. By doing so ourselves, we shall dismiss the myth of a drastic post-Roman ecological and agricultural decline, showing that the Romans were not rapacious in their use of resources, and thus prove them worthy of studying as a model of how civilization may live more harmoniously with nature.

"The Invasion Hypothesis," and Pastoralism: Vandal and Arab Land Use

The accusations against the Vandals have proven to be the propaganda of ecclesiastics who dreaded the loss of their villas and places of power to the invaders (A.D. 429-39). In reality, the orchards and aqueducts remained for the Byzantine conqueror Belisarius 100 years later. Any real decline in cultivated lands, such as around Tingad, was regained under Heraclius (600-620). But as the Albertini Tablets (493) demonstrate, the Vandals imitated the Romans in the practice of agriculture.¹¹⁴

The first Arab invaders were also agriculturalists, and the general prosperity of the Maghreb continued under their rule, though to what extent is unknown. The poet Ibn Khaldun (c.1332-1406) describes parts of North Africa as wooded and prosperous, yet complains that the nomadic tribesmen of the 11th century destroyed Maghrebi civilization like a "cloud of locusts." Shaw mistrusts this poet as a reliable source. And the "invasion hypothesis" that the Banu Solaim and Banu Hillal wrought utter destruction has been "dismantled in favour of a more credible interpretation of the internal collapse of Fatimid society."¹¹⁵ But, even though this second wave of Arab invaders probably no more ruined the aqueducts and orchards than the Vandals, they were pastoralists, and a switch to pastoralism does have damaging effects on the environment.

A recent study on soil formation in the Argolid, but applicable to all the Mediterranean, shows how continual cultivation with proper terrace maintenance or total abandonment of land will not contribute to soil erosion as both provide vegetative cover, one by artificial means, the other by allowing the natural flora to grow back. But pastoralism neither maintains terraces nor allows vegetation to recover, as goats¹¹⁶ not only browse, but also dig up the roots of young plants and trees.

(See figure 5). The barren soils are then subject to the main climatic factors of arid lands: desiccation and wind erosion, and the annual torrential rainfall. The soils are washed from the slopes and settle in valleys. This process fully explains the heavy alluviation that took place from c. A.D. 1000/1100 to 1750/1800, matching the period of pastoralist domination.¹¹⁷

Nevertheless, the actual damage wrought by goats and camel herds in this period would have been limited to areas farmed by the Romans (i.e., the plains and lesser slopes, and wadi valleys, and even there negligible). Firstly, because the decline in population from the Roman period onwards and the limited market meant that herds were small and damage minimal. It is only in the late 1800s with the salt trade that camel herds reached staggering proportions and reduced the grasslands of the Ahaggar to desert "pavement."¹¹⁸ Secondly, goats can only do extensive damage to small trees and bushes. As long as the forest remained on the hillsides, erosion was limited. Deforestation is the first and most damaging step to ecological decline in an arid zone. Grazing is second.¹¹⁹

The Myth of Roman Deforestation

Were the Romans responsible for deforestation? Detractors are able to point to an inscription from Ain-el-djemala which preserves a petition of tenant farmers requiring that Caesar grant them "the land which is swampy and wooded, to plant with olive orchards and vineyards." Tertullian's lines (2nd c. A.D.) that in Africa "wildernesses have been replaced by most attractive estates, woods have yielded to the plough, the cover of wild beasts has become grazing lands," also provide evidence that the expansion of Roman farming encroached upon the forests.¹²⁰ However, such expansions did not extend onto mountains slopes where it

would do the most damage. And as long as olive trees or vineyards were planted, continually intercropped with wheat or légumes, as was the Roman practice, little to no erosion would occur on the plains or rolling hills as mixed intensive farming with arboriculture is the most ecologically sound form of agriculture for semi-arid regions.¹²²

The only evidence for deforestation on the slopes is the fashion trend for citrus wood tables from North Africa that lasted from the mid 1st century B.C. to the mid 1st century A.D., which lead to the over-cutting of this tree.¹²³ Pliny the Elder tells us that Mons Ancorarius (of the Warensis Babors range—central coast Algeria) was stripped of citrus wood trees that could produce tables.¹²⁴ However, this cannot be used as evidence for clear cutting of forests, only of selective cutting of this one kind of tree. This same region remained heavily treed and was an important source of timber for Ifriqiyya and Egypt in the high middle ages.¹²⁵ Further, only the large citrus trees were cut down as only they could justify the cost of transportation. Indeed, with the peace of the empire and a switch from wood to stone construction, very little timber was needed during the empire. The fuel for heating, mining and the baths was acquired through the silvicultural practice of coppicing (silva caedua), which meant there was continual forest cover and root systems which prevented erosion. Russell Meiggs' authoritative work, Trees and Timber in the Ancient Mediterranean World, has conclusively dismissed the myth that the Romans exhausted all timber supplies in the Mediterrean. Even Italy retained massive first growth forests in the early middle ages and even into the early 20th century.¹²⁶

Thus, we find in Algeria that the Aurès (Saharan Atlas) and the Tell (Coastal Atlas) mountain ranges remained deeply forested at least

until 1871 when the deforestation began during the intensive warfare of
this period. ¹²⁷ Boudy's Economic Forestière Africaine, argues that the
majority of deforestation took place between 1890 and 1945. Around
"15,000 hectares per annum were cleared 'legally'" during this period by
French colonizers and by forest companies which were granted official con-
cessions. Another 10,000 hectares per year were cleared by the indigenous
peoples who, forced from their fields, "retreated upwards onto marginal
lands and slopes which they then cleared of trees." ¹²⁸ Slash burning for
grazing land, as is done in the Amazon today, was also common. ¹²⁹

Reports of travellers substantiate that it was the period of Euro-
pean domination in which the decline of forests took place. Following
the guide of the explorer Bruce, Lieutenant-Colonel R.L. Playfair, Consul-
General in Algeria (1877), found endless barren mountains and "white
stumps" where Bruce recorded thick forests only a hundred years earlier.
Included in this itinerary were the Aures mountains which were famous
for their cedars in Bruce's day, but are now barren hills stripped of
even their soil. (See figure 6). To the west at Lambaesis, however, ¹³⁰
Playfair found "an unlimited quantity of timber," mostly oak forests.
Other travellers' reports also show that the region of the Hodna chain
was covered in extensive forests and even had good streams for fishing.
However, these regions are now desolate. ¹³¹ Whatever was not cut down in
the 19th century was cleared out in the two world wars when oil supplies
were cut off and locals reverted to wood for heating, cooking and for fuel-
ing trains. As Meiggs has shown for most of the Mediterranean, it was the
modern trains that permitted many of the more remote mountain sides to be
deforested and the timber transported. ¹³² Modern Europeans are to blame,
not the Romans. Notably, accelerated deterioration caused by goats has

only taken place in the Algero-Tunisian high plains since the since 1930s when an increase in population meant increase in herds, and the deforestation was complete enough that grazing meant a prevention of new growth. (See figures 5-6). These are "man-made" deserts.

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The Myth of Roman Strip-Mining of Soils

But what of the soils where the Romans did farm, an area of several million hectares of land and much of it in arid zones? Did they strip-mine these soils?

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The main source for this misconception has been the "rhetorical and exaggerated" attacks of Seneca, Pliny and Columella

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against the latifundia. In reality there were probably very few latifundist like C. Caelius Isidorus who owned 3,600 pair of oxen, 257,000

other stock, 4,116 slaves and countless acres of land devoted to pasturage.

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Due to inheritance practices wherein all family members receive an equal share of the property, and to gifts and legacies, properties were constantly being fragmented. These tendencies were counteracted by marriage customs, payment of debts and purchases, but the overall result was that most large landowners had their properties divided up into small plots. Even Sicily had plenty of small farmers and forests, though it is generally considered the prime victim of the latifundia.

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This division of properties is shown by an inscription from Veleia. Only three landowners in Veleia had property worth the senatorial census, Mommius Persicus, Coelius Verus and the Annii brothers, who had 33, 26 and 13 properties respectively. Most of these were small lands valued at 8,000 s., some medium sized worth 85,000 s. and only one large property (usually one, though the Annii had three) worth 100,000 to 350,000 s.

Such properties were often not contiguous and mostly worked by tenant

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farmers. For example, Pliny the Younger writes to Calvisius Rufus of

his desire to buy up a property that "runs in and out of" his own, for
the pleasure and practical advantage "of joining them together."¹³⁹
Indeed, of all his estates, the only property that was actually a single
farm was his smallest, valued at 100,000 s., well below the 1,300,000 s.
farm given by his uncle as the cost of a latifundia. Most of his land was
operated in multiple smaller units by a "plurality of tenants."¹⁴⁰

This division of property into small units run by tenant farmers
was more true for Africa. As Africa was one of the key places for redis-
tribution of land to veterans, small and medium parcels of land were more
the rule than the exception.¹⁴¹ Further, it is believed that there was a
general shortage of slaves in Africa making tenant farming the common
practice. This shortage may explain the favourable terms to small farmers
in the Lex Manciana.¹⁴² H. D'Escurac-Doisy has shown that even the large
imperial saltus were divided up into smaller plots farmed by veterans.¹⁴³
Slave gangs, herding, and large monoculture wheat farms were discouraged
both socially and officially.¹⁴⁴ Nero put to death the six large landown-
ers "who owned half of Africa;" by the 2nd century, the saltus Neronianus
was worked not by slaves nor used for herding, but run by numerous tenant
farmers in multiple units.¹⁴⁵ Further, Romano-African farmers developed
and used methods of cultivation that improved or at least preserved soils.
They consciously worked against the forces of erosion. (See Chapter 3
p.112f). The Roman strip-mining of the soils is a myth.

This is provable by continued soil productivity. Shaw has shown
that Africa continued to export into the 19th century, and would have con-
tinued to do so. But new technology allowed the heavier soils of northern
Europe to be farmed more economically and decreased the demand for North
African crops due to more competitive prices.¹⁴⁶ In this century a rapid

increase in the population meant that there were no longer such large surpluses to export. With Maghrebian independence the loss of colonial status has resulted in native ownership of the land and less chance for artificially created surpluses being exported "even in the face of local starvation."¹⁴⁷ But despite this decline in export, there is really nothing to suggest that the yields of old cannot be attained now, and indeed some wadi farmers receive the same incredibly high yields as in antiquity.¹⁴⁸ "The total yearly grain supply sent from all of North Africa to Rome, estimated as enough to feed about 350,000 people is by no means impossible under present conditions." Definitely, "the physical potential is clearly far in excess of current utilization."¹⁴⁹

The only real decline in productivity came in 1960s following the population explosion of the 1950s. In 1966 the FAO reported a 20% drop in per capita food production in Algeria.¹⁵⁰ The dilemma is partially of a social origin, trying to demonstrate the need to people whose entire life depends on animals to get rid of their herds and work much harder at tilling the earth.¹⁵¹ But also abandonment of the traditional rural way of life with a modernization of the economy and the demographic shift to the city has contributed to the present crisis. Studies suggest that yields could be increased 3 to 5 times, all that is lacking is the will and irrigation.¹⁵² Thus, we must finally consider whether there is now enough water to match Roman agricultural production.

The Depletion of the Water Table Myth

Considering that small towns like Tingad with about 15,000 inhabitants had over 14 public baths, the accusation that Roman baths and aqueducts taxed the water table seems at first possible.¹⁵³ But it is highly possible that bath waters were subsequently used for irrigation.¹⁵⁴ Arch-

aeological studies definitely show that the water table must have been the same in the past as now. Ancient bridges match modern riverbeds, and in some places, milestones along the chotts are even under water suggesting a raise in the water table. ¹⁵⁵ Even Shaw is inclined to argue that no such drying up of the water table has taken place, as "a great number of wells and cisterns constructed during the Roman period are still in active use and show no sign of drying up or producing insufficient supplies of water." Those which no longer function can be explained by either their silting up through neglect, actual physical damage which prevents functioning, or a shift in the wadi stream. "In virtually every case in which an effort has been made to clean out cisterns, wells, aqueducts and irrigation systems and to repair the damage to them, the water has flowed again to maximum capacity of the system concerned." ¹⁵⁶

Nonetheless, Shaw calls for quantitative aerial studies to measure retreat or gain of irrigation systems. Two that have been done show conflicting results. Achenbach's survey of the southern flank of the Aurès shows reclamation, while Mensching and Ibrahim's survey of southern Tunisia shows definite deterioration. ¹⁵⁷ However, although such studies may be beneficial for finding regions where further studies may be made, they tell us little about the social, political and economic forces behind the development, or lack of, in these regions. Maybe government funding provided incentive in the Algerian context, but not in the Tunisian? And as Raikes' study of Petra makes clear, much of the studying of water sources involves underground channels (above pp.17-18). There is as much that can be revealed by the archaeologist's shovel and the historian's documents as by airplanes and Nikons.

Further, archaeological studies have been backed up by hydrological and geological studies. The northern Sahara lies on a sandstone bed which

collects water and provisions the oases with aquifers. In the east this bed is replenished annually by the Nile between Hafa and Khartoum, where a sandstone surface sorties and channels water down under the sands. Many aquifers in this region which once pumped water to the surface of their own accord now stand dry. But a 1908 French archaeological expedition, by simply cleaning out the silt of the underground Roman channels of the Kharga Oasis that had been abandoned by the Arabs, were able to obtain a flow "sufficient to irrigate twelve new acres!"¹⁵⁸ In other cases, hydrological studies show that a lack of understanding of hydrological principles on the part of the local inhabitants has meant that too many wells were dug in a small area, reducing the water pressure and forcing the wells to be pumped manually.¹⁵⁹ However, where some of these wells have been stopped up the others return to a natural flow.

In the Maghrebian region the annual torrential rainfall still runs down the flank of the Aurès and "never forms a river," but gets "swallowed by the sands"—just as Pausanius wrote over 1800 years ago.¹⁶⁰ Surveys by the Ministère du Développement Industriel et Scientifique du France demonstrate that the Saharan Atlas contains a very considerable region of recharge, what Georges Drouhin calls "interpluvial resevoirs."¹⁶¹ The entire Maghrebian region benefits from such reservoirs and the area is still rich in springs. There is absolutely no proof for a decline of the water table since ancient times.

Conclusion Chapter One: The Rapid Decline of Arid Lands

Recent deforestation, misuse of resources, abandonment of agriculture, or lack of will and know-how has caused present decline in North Africa, not any Roman exploitiveness. Ecological decline in a fragile zone is rapid. Any Roman misuse of the environment would have been visible long before our age. Consider the speed of ecological decline

in the Saharan plain. When the French military attempted to expel the Tuareg in 1917, within a year the neglected wells and gardens deteriorated to the point that they "looked exactly like other areas which have been used as evidence of progressive desiccation."¹⁶² As Braudel dramatically writes, "in a few years the sand from the dunes can bury a capital city, its houses, streets and aqueducts."¹⁶³ Although decline in the high plateaux is slower, it is not that much slower. Had the Romans deforested the hills, mined the soils and depleted water sources, it would have been impossible for agriculture to continue right into the 11th century as it did, only stopping because the new Arab invaders brought with them other modes of production. Roman agricultural success must be explained by something other than climate, more fertile soils, or higher water tables. Indeed, excuses of climate and ecological decline are dangerous when the true reasons for Roman success may provide important solutions to the serious problems of desertification and starvation.

While anti-imperialists have demonstrated the important native contribution, we have shown that it is impossible to deny the overriding Roman cultural, demographic, economic and political influence. Shaw has questioned whether the Romans had any conscious policies to "make the desert bloom," and he has criticized the possibility of ecological motives on the part of the Romans as misleading.¹⁶⁴ But we have shown that such ideas are not new to our age. The fact is that there has been no study of Roman attitudes to see if any environmental ethics existed and played a possible role in the Roman development of the Maghreb. The arid zone researcher D.H.K. Lee argues that attitudes play a key role in how we develop and if we survive in an arid region. It is of value to explore Roman attitudes to see if this is the case.¹⁶⁵

CHAPTER TWO:

PRIMARY ENVIRONMENTAL VALUES: THE PRO-NATURE BIAS OF PAGANISM, ROMAN RELIGIOUS, MORAL-PHILOSOPHICAL AND POPULAR ATTITUDES.

The great fault of all ethics hitherto has been that they believe themselves to have to deal only with the relations of man to man. In reality, however, the question is what is his attitude to the world and life that comes within his reach. A man is ethical only when life, as such, is sacred to him, that of plants and animals as that of his fellow men. 1

Ecologists and environmentalists argue that a concern for nature should be "man's own ultimate moral attitude." ² Modern attitudes have lacked this concern, according to environmental historians, mainly because they are based on the Christian world view that man's role on earth is to "dominate" and "subdue" nature for his own needs. ³ In order to survive, environmental ethicists argue that we must radically change our attitudes toward nature. We must reestablish our emotional, intellectual and spiritual connections to nature by developing what they call primary environmental values. These are:

- a) an appreciation of nature approaching a "religious dimension,"
- b) an attitude of respect and a sense of responsibility to nature, or duty to protect it against exploitation, and finally
- c) an awareness that nature has intrinsic value, surviving for its own reasons beyond the needs and desires of men.

These attitudes should, ultimately, be manifest in our lifestyles, in order that they are not simply empty ideals. ⁴ As argued in Chapter 1, there is a growing realization that most "primitive" tribes developed and lived by such values as a means to ensure their continued existence. What is forgotten in the admiration of Rome's rapidly acquired civilization and empire is the degree to which they retained such values. ⁵ As pagans, the Romans saw God as equal to nature. Thus, they never developed an antagon-

istic attitude toward the natural world, but instead, developed a sense of respect and duty toward nature, for to abuse nature was to abuse the gods themselves.

In the 2nd century A.D. a vital animistic belief in the sacredness of nature still existed among the people, especially in rural areas and provinces such as North Africa. Roman Stoicism, too, different from its Greek origin, understood the divine force as existing in nature. Nature was, in fact, the ultimate moral model and judge of action for the Stoic, whose doctrine was the major doctrine of aristocrats throughout the empire in this period. Simultaneously, an ancient Romantic movement that began in the 1st century B.C. came to fruition in the high empire, reviving traditional beliefs, perhaps nowhere so much as in Africa. All these developments and continuities reveal not just an approach of a religious appreciation of nature, but an actual religion of nature, and a sense of duty to it which acted as a check on the more exploitive aspects of Roman civilization. This chapter will explore these animist, Stoic and Romantic attitudes for these primary environmental values, and demonstrate their existence in and/or effect on the Maghreb. Traditional Roman culture was fundamentally ecological; a deep-rooted concern for the environment is visible in its religious, moral-philosophical and popular attitudes. As for modern ecologists, a concern for nature was the Romans "own ultimate moral concern," it was the basis of their ancestral customs, the mos maiorum.

The Worship of Nature: Roman Animism and the Cult of Silvanus.

The Romans have been noted both for their rich and "chaotic" pantheon of deities and for the tenacity with which they clung to their ancestral beliefs. ⁶ One of the most ancient and enduring aspects of the

Roman cultus deorum, was their continued belief in the countless genii, spirits of nature. Whereas major agricultural deities, such as Mars and Venus, were subsumed under Greek forms (Ares and Aphrodite, respectively) thus reducing many of their earlier functions as protectors of farmlands or as vegetation gods, woodland deities like Silvanus and the countless genii of rocks, trees and streams remained purely Roman.⁷

Previously, scholars put too much emphasis on the religious skepticism of a few ancient writers to the point that it became a cliché that paganism was a dying creed. Paganism, it is argued, was unable to meet the spiritual needs of the people of the Roman empire from the 2nd century onwards because of its increasingly official nature, and hence, the popularity of eastern cults and the eventual triumph of Christianity.⁸ Now, a number of different writers from the same period have been used to argue the opposite, that there was more than likely an upsurge of pagan religious feeling in the 2nd century.⁹

In reality, there was probably always a mix of religious emotion among the aristocratic class, but among the masses of peasantry there is no reason to believe in any crisis of faith. The growth of eastern cults merely reflects the adaptive and tolerant nature of polytheism, and perhaps a desire for the novelty of Mithraism or the more ancient cults of Egypt.¹⁰ The abundance of inscriptions shows that these later cults were no more popular than the traditional Roman gods. Indeed, in the 2nd century A.D. there is even visible in epigraphy and panegyrics a "genuine feeling of warmth" toward the cult of the emperors, especially under the Antonines.¹¹ In rural places, the gods of fertility and the genii of springs, woods and hills remained as popular as ever, and in some regions (e.g., parts of Europe), they never ceased to be worshipped until late

into the Middle Ages. In general, it is "wrong to suppose that traditional Roman religion was quietly expiring." For the majority of Romans and provincials in the 2nd century, "the divine was present everywhere and the old tendency to deify natural forces...was still alive" and strong.¹²

The most important aspect of this animism, ecologically speaking, was that it acted as a restraint on human use and abuse of nature and natural resources. Ecologists now believe that such checks are essential for the survival of any culture, for without sustainable resources there is no sustaining civilization.

In Antiquity every tree, every spring, every stream, every hill had its own genius loci, its guardian spirit. Before one cut a tree, mined a mountain or dammed a brook, it was important to placate the spirit in charge of that particular situation, and to keep it placated.¹³

The most spectacular example of this animist reverence for nature preventing ancient man from drastically altering his environment comes from Tacitus. During the reign of Tiberius, the senate was proposing to divert a number of streams and lakes which fed the Tiber river in order to prevent devastating flooding around Rome. Deputations from the countryside poured into Rome complaining of the disastrous effects such works would have on their own lands. After other arguments against the project, such as the destruction of the farmlands in the effected regions and engineering difficulties, the final point made was that

respect must be paid to the religious susceptibilities of the inhabitants, who had honored the rivers by their homes with rites and groves and altars —and indeed Tiber himself would scarcely be glad to flow less majestically, deprived of his associate tributaries.

Whatever the actual deciding factor of the dispute, "superstitious scruples" is one of the three reasons Tacitus offers for the senate carrying the proposal "that nothing be changed."¹⁴

We see a few important elements in this passage. Firstly, it is

obvious that Romans were highly aware of the changes that they could
create in the environment.¹⁵ Secondly, we see that the ancients themselves
recognized a difference in religious piety between the country and city
peoples. The more "religiously susceptible" country people worshipped
rivers to the degree that they planted entire groves of trees along their
banks in their honour, an act that would also prevent soil erosion. Most
importantly, we see that such emotions were not only considered in the
Senate but carried some weight, enough to prevent altering the environ-
ment's natural state.

As we have argued in the previous chapter that deforestation was the
major cause of decline in the Maghreb and the Mediterranean in general, it
is worth seeing whether these religious checks existed for forests, where
they would be of most value. The worship of trees was a major aspect of
Roman spiritual emotions. The Elder Pliny (A.D. 23/4-79) writes that

trees were once the temples of the divine powers and, following tra-
ditional ritual, simple country people still dedicate a tree that is
particularly grand to a god. Nor do we honour with our worship
wooden images gleaming with gold and ivory more than sacred groves
and their silence.

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Nor was this worship and emotional appreciation of trees limited to "sim-
ple country people," or to a more ancient time. The 1st century A.D.
Stoic tutor of the emperor Nero, Seneca, similarly "speaks of a faith in
the divine that is inspired by the silence and unbroken shade of a grove
of tall trees that shut out the sun."¹⁷

The role this spiritual appreciation played in antiquity as a check
on deforestation is illustrated in a number of texts. For example, Cato
the Elder (239-149 B.C.), a leading statesman of his age and considered by
many throughout the duration of the empire as an authority on farming,
gives in his agricultural handbook a very elaborate "formula to be obser-

ved in thinning a grove." The passage is set among other farm chores and as it does not specify the grove as sacred at first, but questions "whether though be god or goddess to whom this grove is dedicated," the impression is that most woods must have been considered sacred (probably all first growth). Romans had to be careful in their chopping of any trees. We should also note, that this ritual applies not to clear cutting but even when simply thinning a forest—which today is considered not only unharful, but actually beneficial to the forests. The Roman feeling for trees must have been intense.

Several inscriptions from a grove near Rome defend this interpretation. It was forbidden to even enter the grove with iron instruments as they might harm the trees. Later iron graving instruments were permitted, but only after an atoning sacrifice had been offered. The particular priests involved, the Arval Brethren, are found performing similar practices as late as the 4th century A.D. The intensity of the sacredness of trees is also revealed in an inscription from Spoleto (NE Italy). It lists a number of "severe penalties for cutting down trees in a sacred grove."

Such groves were countless in ancient times. Nor was such care restricted to Italy; at times the imperial government may have even consciously spread it to the provinces. More than 100 inscriptions commissioned by Roman imperial agents have been found throughout Lebanon, prohibiting the cutting of four different kinds of trees. The inscriptions cover a large area, reaching from north of the Lebanon range to Beirut. The lettering in all the inscriptions is very large, often requiring two huge limestone rocks. Obviously there was great concern involved for such an extensive effort. This is possibly the first protection plan for a forest reserve. Russell Meiggs, however, the author of Trees and Timber in the Ancient Mediterranean World, doubts whether there was any conscious

effort to preserve these trees for their own sake. He has argued that the
inscriptions were probably erected for protecting imperial property.²¹

However, there is much to suggest otherwise. Hadrian, who ordered
their erection is known to have preferred rustic gods and in particular
the woodland gods Silvanus and Diana.²² His beloved Antinous was often
associated with the forest god Silvanus.²³ It would hardly be out of line
with "the nature lover" Hadrian's character²⁴ to care for trees in this
manner. He was, after all, the sort of man known to climb mountains in
the early hours of the morning in order to appreciate the sunrise.²⁵
Considering Hadrian's general concern for the people and his generosity
in wiping out debts to the imperial purse, it would seem more out of
character for him to be worried about imperial property to the point of
erecting such an army of inscriptions.²⁶ As a man who worshipped wood-
land goddesses and clearly appreciated nature, it is likely that his com-
mission of inscriptions to protect the Lebanese forests—badly reduced
since time immemorial by the Babylonians, Egyptians, Greeks and Persians—
was out of that deep Roman appreciation, worship and sense of responsibi-
lity to nature and her forests.²⁷

Of course such religious checks did not always work. Lucan tells us
of Caesar's clear cutting of the region around Massilia in his siege of
that city.²⁸ However, it must be noted that he only cut the sacred grove
when all other sources had been exhausted and he was in a desperate situ-
ation. Further, it was he who had to do it. According to Lucan's
account, the soldiers, like the Gauls before them, were awed by the grove
and refused to cut down the trees until Caesar himself came, set his axe
to tree and took the guilt upon his own head. The story is most likely
fictitious.²⁹ Nevertheless, it is probable that it was believable to Roman

readers. Caesar, the aristocrat from Rome, had no qualms, but the soldiery, made up of rural peasantry, did.

A different story tells a similar tale. The ancient historian Dio Cassius writes that Octavian, after the battle of Actium, had Antony's general P. Turullius executed for cutting trees from the grove of Asclepius on Cos which he used to build Antony's ships. Undoubtedly, this was a politically shrewd excuse Augustus used to justify his revenge on this general, one of Caesar's murderers. Yet, it demonstrates that such an excuse was thought by the new princeps to be one that would be acceptable to soldiers, people and senate alike. Further, Valerius Maximus stresses that Octavian had him executed in the grove itself in order to emphasize his impiety.³⁰ So, although in times of war religious susceptibilities were often forgotten, they could also be recalled as propaganda.

But the empire after the battle of Actium was, for the most part, at peace. Deforestation for siege engines and ships was not as necessary. A switch to stone as the major building materials further reduced the demand for timber.³¹ Yet, still we find "superstitions" working and limiting the amount of trees that could be cut by the daily drive of economics and survival. For example, Pliny, Tiberius Caesar and Cato all give specific times in which trees could be felled, relating to the position of the moon. Even with the least restrictions, cutting was regulated to two-thirds of the month. As Meiggs points out, such superstitions would not "appeal to modern timber merchants."³² Thus, even if war often abused the sacred groves, economic forces would not. And, as these sources show, they were restricted by religious scruple even outside of sacred groves.

We do not have any actual evidence of particular sacred groves in North Africa being protected, but we do have a wealth of evidence of the worship of forests through the major deities of the woodlands, Diana

and, in particular, Silvanus. The importance of Silvanus has not been stressed enough in ancient mythology due to a tendency to focus on Greek gods and their Roman equivalents. This is a failure of mythologists, for Silvanus was clearly equal in importance to the major deities, judging by the numbers and the widespread discovery of inscriptions dedicated to him. (See figure 7). As mentioned above he remained purely Italian, one of the few major deities not to have been assimilated under some Greek form. By the 2nd century he was worshipped in Britain, Gaul, Pannonia, Illyria and North Africa.³³ Instead of showing any signs of decline it is clear that Silvanus' popularity grew and his cult prospered. Where he was worshipped some degree of protection of the forest must have ensued. For an example of his popularity in North Africa, we will look at the military camp and highly Romanized town of Lambaesis in the high plateaux near the Aurès mountains, a town which has uncontestably provided the largest number of religious inscriptions in North Africa.³⁴

In the first chapter we mentioned that the area around Lambaesis remained heavily wooded until the late 19th century. It is interesting to note that Silvanus was highly favoured at Lambaesis by the soldiers of the camp and in the surrounding area. A number of stone altars were dedicated to Silvanus, a temple built under Marcus Aurelius in honour of Aesclepios was dedicated to Silvanus, and there was a special sanctuary some distance from the camp but reserved for soldiers. Most of these inscriptions come from the 2nd and early 3rd century A.D.³⁵ Lambaesis itself, was founded in A.D. 81 by Titus, with its largest camp being built under Hadrian, and its town becoming the capital of Numidia under Septimius Severus.³⁶ When the military abandoned the camp in A.D. 238, the worship of Silvanus declined, but was restored immediately on the army's return in

A.D. 253. Of the numerous inscriptions of the region, 161 are dedicated to Saturnus (we will return to the special case of Saturn in the next chapter) 13 to Mercury, 12 to Minerva, 11 to Silvanus, 9 to Mithra, 6 to Fortuna and 6 to the Dei Mauri.³⁸ Some qualifications must be made.

There were two forms of Silvanus worshipped at Lambaesis. The rural Silvanus, who was without a doubt the Latin god of the forest, and Silvanus Castrensis, or Pagasianus, who was worshipped by the military and is believed to have been an Illyrian/Pannonian deity. The Latin god, as the French classical scholar Marcel Leglay points out, was worshipped not in temples but in sanctuaries covered in leaves and vines. Indeed, an inscription to Silvanus from the plain of Sers in Tunisia makes this very point, that he of the virident nemus (verdant forests) is to be found³⁹ "among the sacred woods which rise from the sinuous rocks." It is, thus, unlikely that many of his shrines or sanctuaries will have been found, as they existed not in the easily discoverable urban centers, but in the vast countryside near the vanished farms and houses of the peasantry. Further, as Silvanus was a god of the rural folk, it is probable that most of the dedications to him are lost forever, as they were made of humbler materials, decayable matter such as wood, as opposed to the durable marble and stone of the rich in the city.

How popular then was Silvanus? The chance survival in oxygenless peat of 300 wooden figurines of the goddess Sequana at the source of the Seine river in France, and another larger deposit of such figurines found on the site of a mineral spring outside Clermont-Ferrand reveal the degree to which an otherwise unknown and considered unimportant deity was worshipped. It is known that Silvanus was similarly worshipped by such wooden figures. However, only a few have been found, and those, except for a rare lifesized wooden statue from Geneva, are made of stone or terracotta.

Nevertheless, despite that there has been no discovery of a major caché, it is believed that such figures must have existed in large numbers, but have simply decayed as "the majority will probably have been of wood."⁴⁰ Hence it is probable that the number of inscriptions, dedications and shrines to Silvanus—and hence his worship—was far greater than present records tell us. It is entirely possible that his dedications numbered in the hundreds around Lambaesis just like Saturn's.

Of the role of the other Silvanus, Castrensis of the military camps, Leglay is vague. However, there is much to suggest that he too was a woodland god. First, there is the fact that he is considered to be from Illyria and Pannonia. The "native deities (of this region) only took shape within the outward religious framework of Rome."⁴¹ Although the Latin name masks a local deity, he is most likely a woodland deity, as it was the common practice of assimilation to associate Roman gods with their local counterparts.⁴² Silvanus' popularity in the north central provinces is attested on the chart by Ramsay MacMullen based on the Corpus of Latin Inscriptions, which shows it is almost parallel to Italy itself; North Africa is not far behind. (See figure 7). Further, these regions were heavily wooded in antiquity and remained so until quite late.⁴³ As pagans, it is likely that their gods related to their environment.

Secondly, Lambaesis was a town expanded by Hadrian, and visited by him in A.D. 128, after which the garrison set up a column with his five addresses to the troops inscribed upon the base in order to commemorate his review.⁴⁴ That Hadrian was a favorite of the army is unchallenged. We have already mentioned that Hadrian himself favoured Silvanus and Diana and that his beloved Antinous was often identified with Silvanus. It is possible that the soldiers of this camp, whether they were Illyrians or

not, (in the early 2nd century, most were from more Romanized provinces) chose to worship a god favoured by the emperor himself, and that this remained tradition. This is supposition, but as Silvanus in his Latin form was worshipped in the surrounding countryside, no doubt by settled veterans

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of the camp, it is probable that there was no great difference between the two Silvani. That his sanctuary for the military was some distance from the camp suggests that it probably existed in a grove, as was usual. His worship in both forms in this region probably provided some form of protection to the "sacred woods that rise from the sinuous rocks" or from the woods that marked the boundaries of the "omnisata terra" (sowed fields).

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Finally, out of the 13 inscriptions to Mercury at Lambaesis, 3 were dedicated to a specifically African creation known as Mercury-Silvanus. This god, as Leglay demonstrates, was a combination of Mercury in his role as protector of olives and olive oil factories (found all over North Africa and depicted with a scorpion) and Silvanus in his capacity as protector of arboriculture—often shown as at Carthage as a subsidiary god to Saturn. The inscriptions to Mercury-Silvanus were found outside of the town of Lambaesis in olive growing country, as they have been appropriately found all over North Africa. So Silvanus was not only worshipped on the level of "les grands dieux" on his own, but also in his combined role with Mercury as protector of olive groves. Leglay's findings further show the importance of olive culture to North Africa, a form of agriculture that we have argued was beneficial to this arid environment.

Thus the role of Silvanus was a major one in the ancient Maghreb. He protected the forests and the orchards from destruction. He was, moreover, simply one of many woodland deities. Liber, also highly popular in North Africa, acted not only as god of wine, but also of wild vegetation.

hence, his constant portrayal in woodland scenes among nymphs and Satyrs and other spirits of the forests. His worship continued very late into the empire, his vegetation symbols were eventually appropriated by the Christian church. Diana also had a not insignificant following and other deities such as Asclepios and Venus had roles as spirits of springs and gardens. All these divinities are found worshipped in large numbers in inscriptions from the 2nd and 3rd centuries. This pagan animism was spread by the Roman occupation, even indigenous pagan gods had their greatest era under the Antonines and Severans. The appreciation of nature was a religion among the Romans, it remained a vital part of Roman beliefs into the late empire, especially among rural areas and rural provinces such as North Africa.

**Respect for and Duty to Nature:
Roman Stoicism and Traditional Thought.**

The rural peasantry was not alone in its religious appreciation of nature. The cultured aristocrat had an emotional and intellectual contact with nature in Stoicism. The interpretation of Stoicism as equally part of the basis of the modern anthropocentric attitudes as Christianity, most commonly based on a passage from Aristotle's Politics and its echo in Cicero's De Natura Deorum, reflects an ignorance of Roman Stoicism's doctrine of man's relation to nature. Undoubtedly, Greek philosophy contributed to the utilitarian view of man's superiority and the separation of the soul from the world. However, Greek philosophy is not the same as Roman moral thought. Stoicism underwent a drastic change when it came to Rome. As D.C. Earl writes "when Roman tradition and Greek philosophy met, it was the latter that made concessions." Stoicism's acceptance in Rome has been seen as based purely on its adaptation to Roman attitudes. Indeed, some scholars have argued that ultimately Stoicism's role in Rome

was simply the "articulation and consolidation of traditional beliefs."

The traditional beliefs, as we have shown above, were based on a deep-rooted animistic worship of nature. The changes made in the Stoic doctrine by Panaetius, who brought Stoicism to Rome in 144 B.C., and his student Posidonius, thus, all revolved around man's relation to nature. First, the principle of a divine Reason or vital universal force, which the Greeks saw as separate and superior to nature, was reintegrated into the environment by connecting it to the numen and genii, the nature spirits of the

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Romans. By putting "God" back into nature, Panaetius (secondly) switched Stoicism's emphasis from the "old Stoic anthropocentric belief that the earth has been created for human needs alone" to (thirdly) a "strong feeling for nature" and a "joy in the beauty of earth."

Posidonius (fourthly) preached that nature's beauty should be preserved.

And it was precisely this "ecological" aspect that Glacken argues appealed

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to Romans such as Cicero, Seneca, and Vitruvius, among others. Thus, the utilitarian aspects of Stoicism were tempered by the traditional Roman appreciation of nature as divine and this, combined with traditional Stoic responsibility, lead to a sense of duty to protect nature from human exploitation. (In these aspects, which we will now explore, it differed greatly from modern Christian based attitudes to nature.)

Before we turn to a specific example of a Stoic reacting to ecological exploitation in North Africa, it is important that we fully understand the precise way in which Stoicism differed from modern Christian-based attitudes to nature, the degree to which Stoicism was environmentally aware, and the basis of this awareness. By doing so we shall see that the example is not an isolated case, or an unconscious expression of ideals that just happen to be ecologically sound, the author perhaps intending

something else. We will also be laying the foundation for the arguments in the following chapter where the manner in which Stoic attitudes came to have a much wider effect in North Africa in the 2nd century will be shown.

Perhaps the most important difference between Stoic and Christian attitudes to nature hinges on their opposing views of God. Warde Fowler long ago pointed out the falsity of comparing 18th century Deism to Roman Stoicism, because the very idea

of a personal deity, distinct from the universe and its creations was obnoxious to them (the Romans); it would have committed them to a dualism of Mind and Matter which, from the very outset of their history, they emphatically repudiated. 56

This is extremely important, ecologically speaking, for it is only "in ethically dualistic religion (i.e., Christianity) that 'natural' takes on a depreciative sense as antithetic to 'spiritual'." 57 Whereas for Christians God was external to nature, for the Stoics, God or Reason or the vital force was always within nature, never separate. As Cicero writes,

God, pervading all nature, can be understood as Ceres on the land, as Neptune on the sea, and so on, and maybe and should be worshipped in all these forms. 58

It was morally correct to perceive God in this pluralistic natural way.

For the pragmatic Roman, nature told him that he needed nature in all its variety to survive, that man was helpless alone. 59 Pliny goes so far to

call it sheer "madness" to imagine God or humanity as separate from nature, "downright madness" to imagine man could "see things that the world itself does not contain." For the world is "fitly believed to be a deity ...holding in its embrace all things that are without and within, at once the work of nature and nature herself." 60

The Roman Stoics saw God as not only pervading all nature, but as equal to nature herself. 61 Thus, for the polytheistic and pantheistic Romans, nature never developed the negative sense found in the modern world as something to be conquered for

spiritual satisfaction. On the contrary, because it was associated with the divine, the Romans developed (or retained) a sense of love for and duty to nature.

That the Roman elite had an emotional attachment and sense of duty to nature is obvious in its personification of nature and the divine force as "mother nature."⁶² And this close relation to nature as a parent translated directly into a sense of duty toward it. Hence, Pliny's opening line to book XVIII of his Natural History: "It is our pleasant duty, first of all, to champion Earth's cause, and to support her as the parent of all things."⁶³ An attack of Pliny's on mining reveals how this moral and emotional feeling for, and sense of duty to, nature lead to its verbal defense. Criticizing the contemporary desire for metals, Pliny claims it is an insult to nature to dig holes in the earth and then live on the

very hollows we have made in her, marvelling occasionally as she gapes open or begins to tremble—as if forsooth it were not possible that this may be an expression of the indignation of our holy parent!

Klaus Sallmann calls this the first shadow of the notion of responsibility to nature in ancient writing, and considers Pliny the first environmentalist. Considering Pliny's obvious love of nature, and his 37 books on natural history, it is an honour he deserves. But there are other examples from Pliny which are far from shadows, nor was he exceptional, as will be shown. His attitudes are common to many Romans. Thus, we may only consider him the first naturalist author, not the first environmentalist.⁶⁴ The notion of duty to nature was integral to traditional Roman ideals and to the Roman Stoic creed.

Cicero, for example, borrowing from Posidonius, wrote of nature that "its beauty should be preserved." Horace quoting this Stoic creed writes⁶⁵ in Epistle I, "'to live agreeably to nature' is our duty." Horace, celebrating the beauty of nature to convince a friend to join him in the

country, clearly means that we should live in the simple, frugal and pure manner of country life. This is a particularly Roman interpretation of the Stoic "nature" as the natural world, as opposed to the more abstract Greek concept of physis, inner nature or divine Reason. Although those concepts were also present in Roman Stoic thought, we find more often in Latin writings their direct connection to the natural world itself.

This notion of living agreeably with physical nature also reveals that the Roman Stoics were highly environmentally conscious, as they saw the necessity of applying their ideals to their lives. Indeed,

it was a constant tradition at Rome to preach moral standards by exemplifying now the noble savage, now the Romans of an earlier age, now the rustic virtue of the remote parts of Italy. 66

These expressions of anti-civilization and pro-nature attitudes from antiquity have been thoroughly outlined by the historians of ideas Arthur Lovejoy and George Boas in their extensive work on primitivism. However, they have missed the ecological implications and have mistakenly perceived much of these ancient naturalist passages as simply "un façon de parler." 67
They greatly underestimate both religious and moral feelings of the past. The writings of Cicero, Horace, Pliny and many others, reflect a genuine concern for nature, which was part of the long animist and moral tradition of the pax deorum, in which the good of the state rested on the proper treatment of the gods. As the gods were seen as inhabiting nature and as nature itself, the Stoic concept of duty to the state translated into the proper treatment of nature: "il faut donc tenir compte de la responsabilité pour son propre épanouissement dans le cadre de l'environnement." 68

Thus, we find the most familiar maxim of ethical living in Roman Stoic thought, "conformity to nature," was directly related to what one consumed of nature. Hence, Seneca wrote "seek not out the makers of

artificial things, but follow nature." And Cicero in De Senectute uses Cato, the ideal Roman, to express the concept in which nature is the source of wisdom in action:

So if you compliment me on being wise...my explanation is this. I regard nature as the best guide: I follow and obey her as a divine being.

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Following nature meant using her as the ultimate judge by which to measure how one should act, and what things should be used: "all the things that nature rejects are among evils, all that she approves are to be reckoned goods." ⁷¹ It is only in this light that we begin to understand Cicero's writings on the creation of nature for the use of man (Nat. D., II.14.37) as being fundamentally different from modern religion's same claims. Cicero's use of nature depended heavily on proper use. Proper use was decided by nature itself.

What did "proper use" constitute? And how ecologically aware was this ancient notion? Essentially, proper use meant to use products that were natural, that did not harm the earth. Thus Pliny writes.

As for us, we even poison our arrows and add to the destructive properties of iron itself: we dye even the rivers and the elemental substance of Nature and turn the very means of life into a bane... Let us, therefore, confess our guilt, we who are not content even with natural products.

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This is a direct statement of responsibility. There could be no clearer environmental position. True, a pragmatic concern with the basic necessities of life was common to any age, and shows as Sallmann writes that "la ⁷³ défense de la nature est motivée par l'intérêt vital de survivre." But Pliny (and other Romans) goes further, showing a real concern for nature itself, responsible ecological foresight and a naturalist vision of a world better off without some of the trappings of progress.

Suddenly the mind soars aloft into the void and ponders what finally will be the point of drawing her dry in all the ages, what will be the point to which avarice will penetrate. How innocent, how bliss-

ful, nay even luxurious life might be, if it coveted nothing from
any source but the surface of the earth. 74

It is in this ecological light that we must understand many of the
countless attacks on luxury and greed in antiquity. Yes, they formed part
of the Stoic belief that luxury bred corruption and thus was dangerous to
the state, but also for the harm done to nature. Hence Seneca writes

Nature suffices for what she demands. (But Luxury) began by desir-
ing superfluities, the things contrary to nature, all those arts
by which the bustle and uproar of the city are kept up. 75

We will return to anti-urbanism in the next section. First let us look
at Horace, who demonstrates how attacks on luxury could be directed
against even the most minor changes in the environment,

the fishes note the narrowing of the waters by the piers of rock
laid in their depths. Here the builder with his throng of slaves,
and the master who disdains the land, let down the rubble. But
fear and threats climb to the selfsame spot as the owner does.

Even the fish note the changes in the environment! How can it be said
that the ancients were unaware of environmental change? Alteration of any
degree was considered unnatural and destructive. Thus even ploughing came
under criticism as harmful to nature, but in general the Romans saw farm-
ing as a necessity and a good balance between civilization and nature. 76
The more destructive elements of human civilization, however, were not
excused.

We are now in a better position to understand the full beliefs of
the Stoic notions concerning the use of nature. Nature was not simply an
"inanimate object" that could be used or abused by man as he chose. 77 Na-
ture was life itself and precious. The Romans recognized that people can-
not exist without nature, and therefore care must be taken of her. To
measure all one's actions and livelihood by nature was common sense to them.
It is also ecologically sound. Cicero's famous passage, along with
Stoicism in general, inspired an obligation to nature, to protect it by

"un usage seulement rationel et sensé non pas à céder sans freins aux
78
impulsion."

It is with all this moral baggage—a religious appreciation of nature as divine, a primitivist disdain of the evils of civilization and love of the purer natural state, and a sense of duty to nature, to protect her from the depredations of man's greed for luxury—that we must understand the attacks on the exploitation of citrus wood from North Africa. Citrus wood tables, were a highly desired luxury item among the Roman aristocrats, which as shown in Chapter 1, lead to their being overcut in Cyrenaica and from Mount Ancorarius in Algeria. But as we argued, this did not mean the forest was clear cut. Only the best trees were cut as only they "could justify the cost of the long journey." Some went for the nominal price of 1 million sesterces, which was equal to a senator's property qualification, and as Pliny points out, would be better spent
79
on a large estate.

"Fierce competition" for the tables lasted somewhat over a hundred
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years from the time of Cicero until Domitian. But from even earlier there was outcry against it. From Cato, who denounced it as a "monstrous extravagance" to Martial who sniped "your tables support your Libyan circles on Indian teeth," (referring to the trend to place the citrus wood slabs on ivory legs) the fashion was criticized from the traditional Roman and Stoic view that luxury leads to corruption and is hurtful to the
81
state. But as we have argued this anti-luxury attitude was deeply enmeshed with ecological concepts of proper use. Lucan, a Stoic epic poet of Seneca's circle, reveals this ecological attitude in his criticism of the fashion.

This was a very fertile area which had never been disturbed in the hunt for metals.

The timber of Mauretania was the people's only wealth. They were innocent of its value, it was the leafy shade they enjoyed, and they lived happily. Into the forest hitherto unknown our axes came: we search tables for our banquets from the ends of the earth. 82

In the 2nd century A.D., soon after these lines appear, we hear no more about citrus wood being exploited. Meiggs argues that there was no literature during the middle Empire "where we might expect to find references." 83 But surely Apuleius or Fronto, both moralists well read in Roman literature and supporters of traditional values, would have mentioned something if this extravagance continued. Either the fashion or the supply was spent. With the growth of frugal Stoicism as the predominant doctrine of the 2nd century, it was possibly the fashion that disappeared. Nevertheless, Meiggs' claim that the "sensitive Roman imperial consciences should have been pricked by Lucan's lines," appears true. 84

We do have an example where an appeal to the Roman concern for trees prevented their exploitation. Cicero, to block the Rullan Bill of 63 B.C., twice made appeals to the people concerning the public forests that would have to be cut in order for the land to be freed for the plebs. He was in a tight position because his opponents could easily, and did, make him out to simply be the protector of the interests of the large landowners, preventing the people from obtaining land. However, his appeal for the forests won the court case. 85 Thus, possibly few of the other appeals against the luxury of citrus tables worked until they were connected by Lucan to the destruction of the Citrus forests and the loss of the natural state of the "noble savages." This may sound like absurd supposition to modern ears, but it is precisely this moral, emotional attachment to nature that I wish to demonstrate differentiated Roman attitudes from our own modern economic view of causation and antagonistic view of nature. 86

This difference of appreciation between pagan and Christian thought

can be best seen in comparing Lucan's lines to Tertullian's praises of fertility in North Africa. Tertullian, an early Christian priest in Africa (3rd c.), eulogizes Rome's development in the province by writing:

wildernesses have been replaced by most attractive estates, woods have yielded to the plough, the cover of wild beasts has become grazing land, sands are sown, stones are broken up, and marshes are drained.

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Contrarily, Lucan, we will recall, claimed "This was once a fertile area... into the woods hitherto unknown our axes came." The wilderness was appreciated as fertile before man knows or touches it. To Tertullian, however, fertility is appreciated as the cutting down of forests and the cultivation of plains, in short the domestication of nature by man.

Keith Thomas in his book Man and the Natural World, Changing Attitudes Towards Nature in England from 1500 to 1800, argues that it was precisely this attitude that wilderness is barren and only man-made farms productive, that justified and fueled the clear cutting of almost every surviving woods in England, Ireland and finally, under the same banner of 'manifest destiny' (the duty of man to subdue the earth) in the environmental conquest of America. This is very different from the Roman Stoic idea of the wilderness itself being equal to God, and the primitivist appreciation of nature for its own sake, beyond the needs of man. Contrary to Christians, Roman Stoics preferred the wilderness in its natural state, and saw it as their duty to protect its beauty from the exploitation of civilization and man's greed. We will now explore further this deep "Romantic" appreciation of nature as beautiful on its own as a more widespread phenomenon among Romans, and in the 2nd century A.D. among Romano-Africans.

Appreciation of Nature for Its Own Sake: The Ancient Romantic Movement

The Romantic Movement of the 18th and 19th centuries has been seen as the root of modern ecological ideals, a turning point when people stopped perceiving nature as existing solely to serve the practical needs of humans. Cities and towns, once the pride of human achievement, were now seen as a blight on the countryside. Naturalists began to study nature for its own sake, not to simply find ways to exploit it. Poets began to sing the praises of wild, uncultivated nature, and artists to paint idyllic landscapes. Aristocrats and middle class gardeners began "to plant trees and to cultivate flowers for emotional satisfaction."⁸⁹ In short, Romanticism marked the beginning of a new way to see nature as having intrinsic value and beauty of its own, separate from and opposed to the utilitarian values it held for modern industrial man. But as we have seen, the Romans already had values other than utilitarian ones in animism and Stoicism. Nor was the 18th century the first time anti-urbanist, ecological sentiments were expressed in a self-conscious artistic celebration of nature.

Beginning in the first century B.C., a revived appreciation of nature developed in Rome as a result of the civil wars and the rapid expansion of the population. This development was "strangely akin" to the Romantic Movement of the 18th and 19th centuries. A number of classical scholars have made comparisons between the striking likenesses of the two⁹⁰ ages. Yet, despite the obvious similarities, ecologists, have failed to grant the ancients environmental awareness. A few, such as the social science historian Clarence Glacken, have argued that the roots of modern⁹¹ ideals concerning nature may be found as early as the Hellenistic period. But most have failed to stress the degree to which the later movement

borrowed from the earlier, nor have they noted the ecological implications of either the similarities or the essential differences between the modern and the ancient Romantic movements. Thus we will first look at the great debt of the modern Romantic Movement to Roman antiquity in order to demonstrate the extent to which the Romans were ecologically aware, and to show the degree to which this was an integral part of pagan culture. Secondly, we will show that these Roman environmental attitudes expressed through various art forms, were present in North Africa at the height of the Roman occupation in the 2nd century A.D.

Anti-Urbanism

The modern Romantic Movement has been largely understood as a reaction to the growth of cities, industrial pollution and the regimentation of farming.⁹² England, it is true, was the first industrialized nation and, consequently, the originator of the modern Romantic Movement. However, the troubles of urbanization and critical reactions to it began much earlier.⁹³ In Chapter 1, we noted the earliest reaction to city life and a sense of loss of nature in Mesopotamia, and the first major "Romantic" movement as a reaction to the megapolis of Alexandria. By the 1st century B.C., Rome too had become a megapolis. Refugees from the social wars (91 B.C.), the growth of latifundia, the land proscriptions of the civil wars, or even simply the lure of the big city and the new center of power in the Mediterranean—all these elements—contributed to an influx of people into Rome from all over the empire. By the time of Augustus the population rose to 1,000,000. Under the prosperity of the early Antonines a second surge of growth swelled the population up to as much as 1,600,000.⁹⁴ The once small agricultural village had become the cosmopolitan center of the Mediterranean world.

This rapid growth led to overcrowding, poor housing, dangerous

traffic, endless noise, smoke. "the cities myriad perils:" the "endless nightmare of fires and collapsing houses...and poets reciting their works in August," all satirized by writers such as Horace and Juvenal.⁹⁵ It is interesting that these two great growths of population are reflected in the two major periods of anti-urbanist writing in antiquity—the Golden Age poets and the Silver Age satirists, respectively. Whatever the exaggerations of the satirists, their complaints reflect real sentiments and situations, the uneasy feeling of "artificial contrivances of houses rising story above story, and cities crowding against cities."⁹⁶ As Carcopino has noted, Rome equaled in population a modern American city, yet lacked the transportation, wide streets and communication systems that make such large cities bearable.⁹⁷ On the other hand, it also lacked the automobile which takes up much of the modern spaciousness and spews carbon monoxide.

Although I have little doubt the pollution of the industrial cities of England in the 18th and 19th centuries was far worse, it was "the literature of the early Empire which set the fashion of painting the life of the big city in distressing colors."⁹⁸ It is surprising that scholars such as Thomas have failed to recognize the extent to which English poets borrowed from their Roman counterparts. Samuel Johnson's poem "London,"⁹⁹ was an imitation of Juvenal's famous third satire on city life. Gilbert Highet has traced numerous echoes of this poem from Balzac to T.S. Eliot.¹⁰⁰ Carcopino has compared Boileau's attack on the traffic of Paris to Juvenal's similar remarks on Rome from 1500 years earlier. A line that Thomas, himself, quotes from the London Magazine of 1743, "immers'd in smoke, and stunn'd by perpetual noise," sounds like a play off of Horace's "cease to wonder at the smoke, the riches and the din of wealthy

Rome." Even if the pollution was not as devastating in ancient times as in modern, it shows that man need not destroy nature entirely in order to appreciate it. As the Romans sensed their loss of nature, though less than our own, their anti-urbanism may reflect a greater sensitivity to nature and a greater degree of consciousness of its importance.

Whether the cause be the poisonous coal smoke of London or the wood-smoke and noise of Rome, the anti-urbanism of both ages reflects a sense of loss of nature seen as caused by human civilization, and a desire for the purer and simpler life of a less "advanced" society. Despite any differences, both ages reacted in a similar way to this loss of nature: weekend escapes to country villas, landscape gardening, scenic paintings and naturalist poetry. Many have remarked that these developments were simply a "bucolic fantasy" in which nature was viewed as an "elegant curiosity from the window of a comfortable and sophisticated room." Modern and ancient Romantics alike have been accused of praising a lifestyle, the reality, rigours and boredom of which, they could not stand and mostly ignored.¹⁰² This is very doubtful for antiquity. As mentioned in Chapter 1, the very structure of Roman society was agricultural, the vast majority (rich and poor alike) were involved with farming in some way, and even the foremost statesmen and poets demonstrate full knowledge and appreciation of agricultural work. For now, we may consider that Horace, whose praises of country life have been singled out as the "patter of poets who would not have been caught an hour away from town, unless a patron's invitation to his country estate made that absence politic," was conversely the one to invite his patron to come visit him on his small Sabine farm. It is also clear that Horace visited his own farm regularly and even enjoyed taking part in working the fields.¹⁰³ The criticism is simply false for antiquity.

Further, "bucolic fantasy" or not, Romanticism reflects a genuine desire to reestablish an emotional connection with nature. Mortimer Wheeler has written, that although

there can of course be no complete identity between one age and another...the conscious cult of nature...is in harmony with the spirit of both Augustan ages. 104

Romanticism, whether ancient or modern, is an effort to reattain that closeness to nature which is vital to man's sense of well being — a spiritual need lost by the distancing effect of civilization. Again, in the attempts to bridge this gap between man and nature, Rome seems to have been the guide for the English Romantics.

The Idyllic Landscape: Gardening and Painting

The planting of trees and flowers for "emotional satisfaction" is considered one of the environmentally ethical developments of Romanticism. 105 However, emotional satisfaction in gardening was very common in Rome. The agronomist Varro tells us that pleasure was half the importance of any farm, and he himself had an aviary built purely for pleasure. 106 From 55 B.C., plane trees were planted for their beauty and shade in gardens of the rich all over Rome and Italy. Martial is able to satirize social groups by the types of trees they plant. The Roman architect Vitruvius wrote that greenery ought to be planted in the city between colonnades, clearly regarding it as essential to human health. 107 Augustus' general Agrippa was the first to put into practice an active program of beautifying Rome with small groves. But Caesar and others before him already had extensive forested gardens along the right bank of the Tiber. Emotional satisfaction in gardening was a traditional part of Roman farming, intrinsic in their animist worship of nature. Even the austere Cato talks of the pleasure in a "good piece of land." 108

Landscape gardening has also been mistakenly understood as a parti-
109
cularly English creation and phenomenon. Pliny the Younger's Tuscan pro-
perty, on which plane trees—some in clusters round a fountain, others in
rows hung with ivy—along with cypress, box hedges, dwarf shrubs, laurel,
topiary and fruit trees all planted in patterns, was considered typical
of Roman villas and gardens. Ultimately originating in Mesopotamia, the
fashion came to Rome along with Romanticism in general in the 1st century
110
B.C. The parks, fish ponds and woods of Lucullus, Hortensius and other
senators from this time were so famous that many retained their names and
identity into the late empire. Lucullus' garden passed into the hands of
a certain Valerius Asiaticus who was forced to commit suicide when Messa-
lina, the wife of Claudius, desired his garden. Asiaticus's love of the
garden was so great that he was worried that the smoke of his funeral pyre
might ruin the shade of the plane trees. This garden was on the esqui-
111
line hill, which became the favoured spot for such aristocratic gardens.
In A.D. 54, Nero, and circa A.D. 161, Fronto the North African tutor of
112
Marcus Aurelius, came to own the famous gardens of Maecenas on this hill.

For comparison, the most famous modern Romantic landscape garden is
Stourhead, England. Its borrowing from Rome is obvious in its Neoclassi-
cal architecture: a temple to Apollo based on the round Roman design of
the temple to Venus at Baalbek, another temple to Venus and an imitation
of the Pantheon. Indeed, the very fact that "Neoclassicism" and "Roman-
ticism," once considered opposites, are now realized to be so interrelated
113
as to deserve one name reveals the Romantic debt to antiquity. Designed
on classical ideals of natural beauty, Stourhead was "carefully planned
to look unplanned." With its Roman temples surrounded by "winding paths,
irregularly spaced clumps of trees and little lakes and rivers," Stourhead

looks as though it was lifted from a sacro-idyllic landscape painting from
114

Pompeii. The art historian E.H. Gombrich has traced the garden's in-
spiration to Palladius, an Italian architect well studied in classical
architecture, and to the paintings of the French Italophile, Claude
Lorraine (1600-1682), who painted Roman ruins and country scenes through-
115

out Italy. But we may just as easily look to the ruins of Hadrian's
garden at Tivoli or to an impression of Nero's Golden House with its arti-
ficial lake and grounds which brought the country to the very center of
Rome. (Compare figures 8a-d). Whichever of these sources, it is clear
that English landscape gardening was heavily influenced by the earlier
Roman models of idyllic and sacro-idyllic scenery.

Similarly, the painting of idyllic landscapes by Romantic artists
as Corrot (1796-1875), Turner (1775-1851) and Constable (1776-1837) has been
seen as another modern development which reveals a new appreciation for
nature in its natural state. We have already mentioned Claude Lorraine
who, painting over a hundred years earlier, was heavily influenced by
classical scenery such as in his "View of the Campagna, (1650)" or "Land-
scape with Sacrifice to Apollo, (1662)"
116 But ultimately this development
goes back to Alexandrian Nilotic mosaics, and for painting to the time of
Augustus in Rome. Pliny praises a certain Spurious Tadius for starting

the pleasant fashion of painting walls with pictures of country houses
and porticoes, landscape gardens, groves, hills, fish-ponds, canals,
rivers, coasts...with sketches of people going for a stroll or sailing
and approaching country-houses on asses or in carriages, and fishing
or fowling or hunting or gathering the vintage. 117

In short, the Romans painted all the favourite subject matter of Romantic
painters 1600 years earlier. Perhaps the most famous painting of this
ancient Romantic movement is the "Garden of Livia" (fig.9), which clearly
displays a love of untended nature, not of trimmed and neat domestic
gardens. It is an appreciation of nature as it is, for its own sake.

The examples of landscape gardening and paintings in antiquity are endless. Most houses of the rich had miniature gardens in their peristyles or idyllic paintings covering their walls which were designed to give the "illusion of an escape to a lush mythological landscape." ¹¹⁸ The garden of M. Lucretius at Pompeii is a perfect example (fig.10). However, as in this house, complete with its statues to woodland deities, many of these gardens were not simply matters of escapist pleasure. As we have argued in the first section of this chapter, the shrines to Silvanus and statues to Venus and temples to various gods reflect an authentic religious devotion to nature. This actual pagan worship of nature marks an essential difference between the two ages. The Greek and Roman temples in the English gardens and idyllic paintings, reflect primarily, if not purely, aesthetic interests.

Contrarily, Zanker has argued how the sacro-idyllic reliefs and paintings of the Augustan age were heavily weighted with the revived morality of this period. An old peasant with a cow passes a rustic sanctuary in a relief from Munich. In a relief from Turin, a satyr leaves his nymph unmolested as both gaze at a sacred shrine surrounded by animals, trees and ¹¹⁹ rocks. They reflect a celebration and worship of nature also seen in the paintings of Corrot or Turner, but here the connection to nature worship is direct through actual ancient pagan nature deities, and traditional ideals and authentic beliefs.

Thus, the ancient temples, groves and many gardens were real religious institutions. They were not simply art objects as in modern times. The ancients would not clip or prune sacred groves because it was sacrilege to so abuse the vital form of the gods. It was more than a matter of reasoned aesthetic naturalism, it was an actual spiritual connection.

Maybe, as Thomas argues, the English rich hypocritically paid for their art and gardens with money made from the very industry that Romanticism rebelled against, and by the very farming that destroyed the nature that the Romantic art celebrated, but not so in antiquity. ¹²⁰ The pagan emotional connection to nature, as will be shown in Chapter 3, was a powerful force in determining the actions and policies of Roman society in the 2nd century A.D.. It effected the very kind of economic development and agricultural production making it less harmful to the environment.

The "Broad Reverence for Life": Poetry and Propaganda

A final artistic development of Romanticism which we shall consider was the obvious worship of nature that is revealed in Romantic poetry. Here again, the debt to antiquity is evident in poems such as Tennyson's "Ulysses," Keat's "Ode to a Grecian Urn," or "On First Looking into Chapman's Homer." Roman poets too had a large influence, especially in the celebration of nature. Tennyson's "Frater Ave Atque Vale," which laments the death of a brother and praises the beauty of "venusta Sirmio...Sweet Catullus' all-but-island (paene-insula), olive silvery Sirmio," was inspired by and directly quotes poems 31 and 101 of Catullus. ¹²¹ Such examples of a purely sentimental and emotional appreciation of nature are numerous in antiquity. Yet, Thomas argues that with Wordsworth we see the beginning of an outcry against the classical ideal of a union of beauty and utility which resulted in the destruction of nature. ¹²² We have already argued in the section on Stoicism above, that the classical notion of utility was ecologically balanced, based on concepts of proper use and a sense of duty to nature. Compare, for example, Pliny's comments on mining above (p.55) to Wordsworth's poem "The Excursion":

I grieve, when on the darker side/Of this great change I look:
and there behold/ Such outrage done to nature as compels/ The

indignant power to justify herself;/ Yea, to avenge her violated rights.

123

We see in both the same sense of duty and indignation at the destruction wrought on nature.

Similarly, Ovid's account of the Golden Age reveals that the primitivism of the Stoics was part of popular poetry, and that modern Romantics were not the first to consider man's actions as the cause of ecological decline. Ovid shows that in the Golden Age

never yet had any pine tree, cut down from its home on the mountains, been launched upon ocean's waves, to visit foreign lands...and men were content with foods that grew without cultivation.

The Golden Age myth is as old as Hesiod, but it was the Romans who first tied the decline of the Golden Age to human actions against nature, as opposed to simply human actions against fellow humans.

In the age of hard iron, the trees which once clothed the high mountains were fashioned into ships, and tossed upon the ocean waves, far removed from their own element....Nor was it only corn and their due nourishment that men demanded of the rich earth: they explored its very bowels, and dug out the wealth which it had hidden away...and this wealth was a further incitement to wickedness.

124

We will return to the myth of the Golden Age in the next chapter. For now we will consider the concern for nature as if it were human, seen here in Ovid's and Virgil's poetry. Ovid thought the trees were better off in their "own element." Similarly, Virgil's famous fourth Eclogue which foresees the arrival of a new age, begins

Not all do the orchards please and the lowly tamarisks. If our song is of the woodland, let the woodland be worthy of a consul. 125

Orchards will not do, the woodland must be considered equal to the highest office in Rome. In short, Virgil celebrates nature itself as greater than man's plantations. It is this valuing of all life as having an intrinsic worth of its own beyond the needs of humans that we may match to modern environmental ethics. Yes, this concept is found more directly stated,

perhaps, in the poetry of Wordsworth, such as in his "Lines Written a Few
126
Miles Above Tintern Abbey:"

...these steep woods and lofty cliffs,/ And this green pastoral land-
scape. were to me/ More dear, both for themselves, and for thy sake.

But even in the 18th and 19th centuries this broad reverence for life is
not found so widespread as in antiquity. Warde Fowler argues that this
sympathy for nature was a fact of Roman pagan religious experience, and
that it was the Golden Age poets, especially Virgil, who captured this
127
"spirit of old Italian worship" in words. Again, this pagan spiritual
connection to nature is a major difference between the two periods.

Thus, when Virgil celebrates nature in the Georgics, a work under-
stood as the happy balance of man as farmer with nature, he speaks as the
128
voice of all Romans:

Happy, too, is he who knows the woodland gods, Pan and old Silvanus
and the sister Nymphs! ...He plucks the fruits, which his boughs,
which his ready fields, of their own free will, have borne.

On the contrary, Wordsworth, although there is no reason to doubt his own
129
intense and obvious devotion to nature, speaks as one who worships alone:

/...I so long/A worshipper of Nature, hither came,/Unwearied in that
service: rather say/ with warmer love, oh! with far deeper zeal/
Of holier love.

The wild green landscape. Once again I see/ These hedge-rows,
hardly hedge-rows, little lines/ Of sportive wood run wild; these
pastoral farms/ Green to the very door..../O sylvan Wye! Thou wan-
derer through the woods,/How often has my spirit turned to thee!/
130

Hence, even though he has similar concepts of living in balance with na-
ture, (i.e., the farmer lives within nature, not controlling the hedge or
greenery) he speaks for himself. He, like other Romantic poets, are in-
dividual heroic voices, speaking out against the dominant attitude toward
nature of his era: the Christian world view that nature has no intrinsic
value of its own but exists solely to serve man's needs. This lonely
heroic voice of modern Romanticism marks an essential difference from

the stately Virgilian voice of ancestral traditions. We will return to this difference below.

Yet, some have seen a parallel between pagan idylls and Christian pastorals which are also from the modern Romantic Age. But Worster argues that there is a large difference. The latter was never concerned with a "broad reverence for life." Instead, the good shepherd was "limited to ensuring the welfare of his human charges," against a "nature that has been seen as corrupt and predatory."¹³⁰ This negative view of nature can be equally seen in the paintings of the 19th century, such as Turner's "Slave Ship," in which sharks hungrily follow a boat in a storm, or in George Stubbs' "Lion Attacking a Horse," which uses light and darkness to suggest the purity of the horse versus the sinister nature of the lion. Such scenes of animal violence were common enough in antiquity, but they were action paintings, not moral interpretations of nature. (See fig.11).

Worster argues that the exception to the rule, the famous preacher-naturalist Gilbert White whose Natural History of Selbourne had a major influence on Romantics, was equally influenced by Greek and Roman pagan writers, as were other English writers of his age. White's Christian inheritance had been "strongly tempered by his reading of Virgil and other pagan pastoralists." In fact much of his writing shows "hardly a vestige¹³¹ of the Christian clerical mind."

It was the ancient pagan influence in the 18th and 19th century that greatly inspired the Romantic Movement. The changing attitudes toward nature at this time in England, marked by Thomas in his extensive work, were not merely reactions to economic or technological developments. Those elements existed, undoubtedly, but they were aided by a revival of pagan values. If the Christian church in this period shows a growing interest in nature, it is because "faced with powerful competition from a redis-

covered paganism, Christianity was forced to mellow considerably its long-standing suspicion of nature."¹³² Ecologists who have failed to grant the ancients ecological awareness seem to have forgotten the degree to which Latin and Greek authors were studied in the English education system in the 18th & 19th centuries. The modern Romantic love of nature had Roman roots.

Before we look at Roman Romanticism in North Africa, we must look at the major difference between the ancient and modern Romantic movements, in order that we understand the vitality of the earlier movement, which will be of extreme importance for the following chapter. In modern times Romanticism has been seen as subversive. Lord Byron was feared as a dangerous revolutionary by the Italian police.¹³³ In recent decades, this distrust has reached an extreme so that even simple nature lovers are seen as subversive. An attorney general of the U.S. declared in 1976 that "the conservationist movement is a breeding ground for Communists. We intend to clean them out even if it means rounding up every bird watcher in the country."¹³⁴ In short, the interests of business and the state are threatened by a movement which would limit its wealth and power by restricting its strip mining of natural resources.

In antiquity, however, this love of nature was in harmony with the views of the state. This difference is reflected in the violent emotions of the modern Romantic period, the call to individual heroics in the poetry and actions of such men as Lord Byron and T.E. Lawrence. It takes heroics for the modern Romantic to stand up for naturalist ideals which are contrary to the interests of the time, to bridge the large gap between man and nature caused by the inexorable "progress" of destructive industrialism which is justified and defended by the religious attitude of the majority that nature has no value of its own. This is quite in contrast to

the peace seeking poetry of Virgil and Horace, and the ideal Roman, the
duteous, unwilling hero Aeneas.¹³⁵ The ancient Romantic had no need of
personal glory in a state that supported his ideals.

Augustus, Fowler argues, grasped that the success of the Empire
rested on the traditional ideals of Rome which fundamentally believed

that the prosperity and fertility of man, of his flock and crops on
his farm, and of the citizen in the city, depended on the dutiful
attention (pietas) paid to divine beings. 136

This attention is summed up in the phrase pax deorum, which is best ex-
plained as the correct relationship between man and the "power" or vital
force, which as we have seen in the section on Stoicism, was nature her-
self. Hence, the very existence of the empire was seen as resting on the
proper relation of man and nature.

Thus, Virgil and Horace, with their deep respect for nature and tra-
ditional ideals were supported by Augustus. Both Virgil's Georgics and
Horace's Carmen Saeculare were commissioned by Maecenas, Augustus' chief
public relations man. Images of nature's bounty were placed on the Ara
Pacis, the main monument which celebrated and justified Augustus' reign.
Reliefs of animals nursing their young were used to encourage child birth
among the Roman elite. Everywhere nature was used as the symbol of the
peace and prosperity of the Augustan age. Wild vegetation was portrayed
in symmetrical patterns to suggest the union of law and order with nature. 137

Nor was the state bolstered Romantic revival merely a shallow political
tool, but as with the poetry of Virgil, it appealed to a "deeply-rooted
idea in the popular mind."¹³⁸ The ecological ideals of Romanticism were
acceptable to Rome, just as Stoicism was, because they were in line with
the traditional views of pagan civilization. It is in this light that we
must understand all the art, poetry, and gardens of ancient Romanticism.
It is in this light of vital pagan beliefs that we must look at the strong

existence of Roman Romantic art in North Africa. The Romantic love of nature had Roman roots. Where the Romans or their culture went, so did a broad reverence for life.

Roman Culture in North Africa

Nowhere is this Roman influence so clear as in North Africa. Zanker has argued that the symbols of the Augustan revival, especially those of nature's fertility and abundance, became part of the Roman conscious shaping the character of the empire "well into late antiquity."¹³⁹ We definitely find this imagery in North Africa, especially in the Antonine age. An almost exact replica of Terra Mater on the Ara Pacis has been found in Carthage. Hadrian's coins show the Dea Africa in similar pose, with cornucopia laden with the fruits of the earth (Figs. 12a-b). Virgil was taught in North African schools. The Augustan morality reflected in the sacro-idyllic motifs (above p.69) are repeated in the large repertoire of seasonal and Dionysian mosaics, which "glorify the creative forces of nature".¹⁴⁰ (Fig. 13a-b) If anything, these later works are a little more joyous, reflecting the prosperity and peace of the Antonine age, as opposed to the fresh memories of civil wars still alive in the early Augustan age. Nevertheless, both reflect a cult of nature and country life that was not only in harmony with the ideals of the government, but was consciously promoted by the state.

There were of course other incentives to Romanticism. Anti-urbanism must have existed in North Africa, as well. Under Rome, Carthage by the 2nd century became one of the only five really large cities of the empire.¹⁴¹ It is estimated to have had a population of 500,000, equal or comparable to Alexandria where Romanticism first began. Further, Carthage was only one of the countless towns that was founded or expanded during the Roman

occupation, especially from the Flavians onward, when there was a steady advance of the frontier. With the frontier went new military posts, which became new centers of trade and often urban centers.¹⁴²

North Africans had another reason for Romantic sentiments. Glacken has argued that Roman centuriation is proof that "complex theoretical science is not needed for conscious change of the environment."¹⁴³ Only Italy itself had centuriation comparable to the Maghreb. Almost every square kilometer, wherever cultivation was possible, was divided into square or rectangular plots. If the geometric farms of England inspired some reaction in the Romantic era, it is possible that centuriation had an effect on the Romano-Africans. This is supposition, yet, even though we have played down the effects and strict regimentation of Roman centuriation, Ovid shows us that such changes could warrant emotional reaction from the ancients:

The land, which had previously been common to all, like the sunlight and the breezes, was now divided up far and wide by boundaries, set by cautious surveyors. 144

Even if we do not have such a specific statement from a Romano-African, we can see that the same self-conscious artistic expression of a Romantic feeling for nature was popular in Africa in the 2nd century A.D. as it was in Italy beginning in the 1st century B.C., (and England in the 18th and 19th) and that Rome was at least part of the root.

The Roman house with its atrium and peristyle was common all over the Maghreb, and we find in it the same Romantic concern for gardens. In the highly Romanized veteran town of Tingad, for example, one house used the rain from the pluvium to water an extensive garden by means of a number of small channels that fed a well and watering system that encircled the entire peristyle.¹⁴⁵ We have already mentioned that Fronto owned the famous garden of Maecenas on the esquiline hill. Champlin, in

his authoritative work on Fronto, argues that he is representative of the local North African elite of the Cirtan Confederation that produced him, an elite which eagerly adopted Roman ways to the suppression of their own culture.¹⁴⁶ An inscription from Calama (Guelma) just west of Cirta, shows that Fronto was indeed not alone in his Roman love of landscape gardening. A man who made improvements on a fish pond, boasts:

In former years, barely a thin stream of water flowed, today
it is a veritable river which makes a 'noise of thunder.' 147

The 1st century B.C. Italian fashion of pleasure gardens was adopted by provincials in the 2nd century.

The House of Venus in Mactar (Tunisia) has a number of frescoes with flower buds amongst a meander pattern, but as they are only one example of very few frescoes that have survived in North Africa,¹⁴⁸ it is difficult to know if a similar occupation with Romantic painting existed there as well. Mosaics, however, have survived in vast numbers, and although landscape settings were slow to enter the art of mosaic making, we do find a large number preoccupied with this subject matter.¹⁴⁹ Further, a wealth of season mosaics and Dionysian scenes display an obvious joy in nature, by the very lushness of their portrayals of vegetation (figures.13a-b). The popularity of season mosaics from the middle of the 2nd century onwards shows a definite preoccupation with "fertility and regeneration."¹⁵⁰

It is impossible to go into any detail because of the sheer number of mosaics. Thus, we will merely look at the clearest example of this enjoyment of vegetation. One of the most popular designs in North African mosaics was the floral pattern which originated in Italy, but was usually either black and white or of a limited polychrome. In North Africa this floral pattern formed not only a background or border element, but came to almost dominate the subject matter of various compositions. The Dionysian

and season mosaics (above) reflect this development. The veteran town of Tingad, however, was to take this African peculiarity to a local "extreme,"¹⁵¹ creating "floral carpet patterns" of unusual lushness and rich colours. Despite a tendency to move from a more naturalistic portrayal to geometric and symmetrical plant patterns, the trend in varying the design tended to¹⁵² be toward an even richer portrayal of vegetation. As western North African mosaic workshops only began to produce in the late 2nd century A.D., these Tingadian "fantasy" ancanthus flower mosaics show that the Romantic appreciation of nature of 1st century B.C.-A.D. Italy existed in North¹⁵³ Africa deep into the empire. (See figure 14).

Of all the Roman artistic influences in North Africa, none is so in evidence as Virgil's poetry. From the 1st century B.C. Roman literature was obviously in high demand. Horace worries over the fate of his book in Epistle XX. He thinks either it will be ignored, thumbed by vulgar hands in Rome, eaten by moths, or it "will run away to Utica" (Tunisia). The 19th century classicist Gaston Bossier claims that books were shipped over by the boatload, sure of buyers, but it is unclear where Bossier's source¹⁵⁴ of information is from other than Horace who makes no such statement. It does appear, however, from Horace's line that Latin literature was popular in North Africa. There is a wealth of other evidence to suggest it, and of Latin authors Virgil seems to be the favourite.

Perhaps the greatest tribute to Virgil is the mosaic entitled, "Virgil and the Muses," from Hadrumetum (Tunisia) and dated from the early 3rd century A.D. (fig.15). Virgil is depicted seated between two muses with a scroll on his lap, on which the words of the Aeneid I.8, Musa mihi causas memora quo numine laeso Quivde...¹⁵⁵ are written. So as late as the 3rd century Virgil was thus celebrated. But he was not the only Roman

author to be honoured. A mosaic from Altiburus entitled "Catalogue of the Boats" shows a number of boats with the names and some quotations of various Latin authors. Quotations from Ennius, Lucilius and Cicero have been identified.¹⁵⁶ Again this is a 3rd century mosaic, reflecting a continued respect for Roman literature. But by far it is Virgil and his idylls of nature that were the most popular in North Africa.

With almost 300 metrical inscriptions, the Maghreb "far outstrips" any other Latin province in its enthusiasm to embrace Roman culture. Most of these inscriptions are pastoral poetry, imitations of Virgil's Eclogues done by romantically inspired youths, so that "bad poetry flourished in Roman Africa."¹⁵⁷ The Cirtan and Setif plains in Algeria abound in such imitations. One son of a soldier, who had become a man of note attaining a priesthood, T. Flavius Secundus, honoured his family with 90 hexameters and some odd distichs upon his parents' tombstone. Nor was it just the rich, but here a peasant, there a jeweller, or a messenger, even the silversmith of Cirta boasts of writing his own epitaph in verse.¹⁵⁸ All tried their hands at verse. Nor did Virgil's popularity rapidly fade away. As late as A D 374, a young boy from Tigava municipium in western Algeria dedicated an inscription to his mother with a line from the Aeneid.¹⁵⁹ This reveals both the extent and the duration of Roman pagan influence after Christianity had become the major religion in Africa. Yes, bad poetry flourished in Africa, but so did the traditional Roman ideals as enshrined by Virgil, which included a Romantic appreciation of nature.

In poetry, art, gardening and even propaganda the influence of the Roman appreciation of nature is very visible in the Maghreb in the 2nd century A.D. It is of course difficult to tell whether or not this reverence reflects successful Romanization, a large number of Italian immigrants, the reaction to similar stimuli of population growth and cen-

turation, or the welcoming of an attitude to nature by the Berber which was similar to their own. But even this would show a universality in the ecological soundness of pagan ideals. The Roman influence was definitely stronger than has been admitted by the recent anti-imperialist historiographical trend. In this matter, the artistic evidence agrees with the epigraphical shown in the first chapter.

Conclusion Chapter Two: Christian Pogroms versus Pagan Protectionism

In summation, Roman pagan attitudes to nature were very ecologically minded. Its animist religion, Stoic philosophy and popular Romanticism reflect a deep worship, sense of duty to and appreciation of nature as having intrinsic value, all of which are considered primary values of modern environmental ethics. These values were an integral part of traditional Roman society and reflect a continuation of "primitive" pagan attitudes to nature. Their vitality is visible in the long survival of animism, in the adaptation of Greek Stoicism to the Roman numina, a philosophy which became the dominant doctrine of aristocrats in the Antonine age, and in the Romantic imagery of the Augustan revival which came to a second fruition in the Mahgreb in the 2nd century when Rome was most active in colonizing this region.

Yet, despite such obvious religious, moral-philosophical and popular checks, some have argued that the Roman pagans were just as, or even more, exploitive of nature than the Christians. As we have seen above, war and luxury items such as citrus wood tables often overrode the pagan scruples about cutting down the sacred trees of nature, or digging in the earth. The argument is that pagan views did nothing to prevent exploitation, nor Christian views to encourage it, all rests on economic forces that are

magically separate from human attitudes. It is true that a few sacred groves were protected by the Roman Catholic church. However, these can be counted on one hand, literally a few in Italy and one or two in Lebanon, whereas pagan groves must have easily numbered in the thousands, and a basic respect of forests and trees was extended to all trees, none excluded. 161

Although early monks, as Glacken has shown, tended to forestry with an obvious love, I argue that this is a continuation of pagan values. Cultural values do not simply disappear over night. Many have pointed to the continuation of pagan rituals such as the Saturnalia and spring vegetation festivals in Christian holidays such as Christmas and Easter respectively. 162

In North Africa, despite the early arrival of Christianity, pagan imagery was continued even within the churches themselves. Leschi argues that the church, unable to suppress the Dionysian cult, ended in borrowing its symbols. Hence we find vines, leaves and grapes in early Christian art and on the pillars and lamps of ancient Maghrebian churches. 163

Dunbabin has traced the existence of a pagan revival in the late empire in the Maghreb, based on 4th and 5th century A.D. mosaics of pagan gods and caches of pagan figurines. 164

Most scholars agree with Meiggs that with Christianity all restraints were gone, and as forests were associated with paganism, they were cut down with "religious fervour." 165

There were never in pagan times conscious plans to clear cut entire forests in order to champion a religious or moral cause. If there was no major deforestation in the Byzantine Maghreb it is because of this continuation of pagan principles and a decline in population and building programs.

But under Christianity, even with a decline of population in Italy in the mediaeval age, when pagan values faded, more deforestation occurred. Only then did actual pogroms versus pagans forests occur, such as the 11th

to 14th century drive to build churches, known as the "great age of forest clearance." In this period alone, France built 80 cathedrals, 500 large churches, and over 10,000 small churches. For forest clearance and stone quarrying there is no other previous period comparable. ¹⁶⁶ Contrary to the old belief that Arabs were responsible for ecological decline, the North African forests were saved by the Arab invaders, who despite being pastoralists (11th century) at least had no antagonism against nature, no drive to deforest. In Europe, however, deforestation was done with religious "zeal" to chase out the pagans who were considered

illiterate, ignorant of God, worshippers of all kinds of creatures. They also had fields, woods, and waters which were holy to them, so that they neither plowed nor fished nor cut wood in them. ¹⁶⁷

It is precisely this different kind of attitude that marks the difference between environmental pagan thought, and exploitative Christian thought. The worship of nature deities such as Silvanus, did provide some protection for the environment and especially the ecologically important forests that existed in this region under Roman occupation. It is notably in the 19th century that they were cut down, when a more environmentally antagonistic religious outlook conquered the Maghreb. For, despite Christianity's toning down of its anti-nature attitudes in the face of a revived paganism, its attitudes toward nature were carried on by expansionary capitalism and imperialist science. Ideals do make a difference. In the next chapter we shall see how this pro-nature bias of Roman-pagan culture both informed and combined with the equally traditional anti-capitalist and anti-technological attitudes, and had a concrete effect on the economic and agricultural policies and development of the Empire. It was these environmental ideals which account for the successful and ecologically sound cultivation of Roman North Africa.

CHAPTER THREE

ETHICS APPLIED: NATURE, THE MEASURE OF ALL THINGS; ANTI-CAPITALISM AND APPROPRIATE TECHNOLOGY IN ROMAN FARMING.

There is, therefore, no advice...which I would rather give you than this: that you should measure all things by the demands of Nature. Nature demands nothing except mere food.

You may chase out nature with a pitchfork, but she'll return and burst through your arrogant folly. She will win! 1

Did the ecological consciousness of the Romans seen in Chapter 2 have any effect on agricultural development in North Africa? Or, was it as today, where a deep rift separates ecological ideals and economic reality? The present assumption, both popular and scholarly, is that the Romans were much like us, capitalists and technological imperialists. If there was no major ecological destruction, (as we have seen in Chapter 1 that there was not), the contemporary view argues that this is simply due to the "underdeveloped economy" and "backward technology" of the Romans.² If they had had double ledger accounting, a more expansive market, heavy ploughs, better ox yokes and steam powered engines, "their impact on the environment would have been swifter and more destructive."³ Undoubtedly, but so-called "advanced economies" and "high technologies" never developed for good reasons. Nor were the reasons impersonal abstract market forces, but human ideals and restraints against the forces of capitalist greed and technological arrogance which are the main sources of environmental damage today. For as the anti-nature bias of Christianity forms the basis of capitalist and scientific imperialist attitudes toward nature, so the pro-nature bias of paganism formed the predominant socio-economic value

system of Roman society. Because the gods were perceived as existing in nature and Rome's prosperity was believed to be intrinsically related to their proper treatment, Rome, unlike modern society, imposed limits on agricultural production both in quantity and kind. She found a balance between nature and civilization in an ecologically sensitive agriculture. The view of Romans as capitalists and technological imperialists is an anachronistic failure to see the fundamental differences between ancient and modern civilizations. Unlike modern civilization (or even Greek) the Romans held nature, not man, as the measure of all things.⁵

In this final chapter, we shall demonstrate that, unlike capitalism's suicidal concern for immediate individual gain, the Romans had a sense of duty to an expanded community, including nature and the future, called for by ecologists today.⁶ Non-anthropocentric religious qualms, anti-individualist social pressures, intergenerational moral obligations, enlightened political policies and even legal documents set limits to the acquisition of wealth, denouncing greed as disruptive to the earth and society. Romans did not have the naive capitalist belief in the possibility of unlimited production and consumption. At all times, they recognized and championed values other than individual profit, discouraging all methods of farming that they saw as harmful to the soils.

Secondly, we shall show that Romans also had an anti-technological tradition contrary to the destructive modern delusions of science's ability to conquer and control nature. Their sensitivity to nature encouraged a respect of geographical, topographical and climatic limits. The traditional agricultural wisdom taught adaptation to the environment. Finally, we shall see how limits on man's production and adaptation to nature were consciously applied in North Africa through the predominance

of the Roman rural/pagan value system. Nature's measures were accepted both on economic and technological levels. It is this sensitivity to nature that accounts for the ecological soundness and success of Roman agriculture in the semi-arid and arid lands of North Africa.

Animism, Ancestors and Sentiment:
Non-Capitalist Concerns in Roman Farming

Agricultural Deities and the Prudential Use of the Land

Unlike Capitalists, the ancients never reduced the land to a mere commodity, or factory from which a profit may be reaped on the market.⁷ Because of their animist belief that the gods existed in every aspect of life, animate or inanimate, the land remained sacred and farming a highly religious practice. From major deities like Jupiter and Tellus who as sky and earth "embrace all the fruits of agriculture," to the minor deities like Lympha (moisture) and Robigus (disease in grain) every part of nature⁸ was worshipped as having an agricultural function.

This animistic nature of Roman agriculture is revealed even more by the fact that every agricultural function was worshipped as a spirit called numina. From the most important, even if disagreeable, task to the most obscure chore, the Romans treated each aspect of farm life as something sacred, giving it a name by which it should be addressed as a living force to be appeased by acknowledgement and care. Thus Sterculius was the spirit of manuring the fields and gardens and Spiniensis was the spirit of digging up thorn bushes. This short list gives an example of the extent of this animism throughout the year's chores:

<u>Vervactor</u>	1st plougher	<u>Puta</u>	pruner
<u>Redactor</u>	2nd plougher	<u>Sarritor</u>	hoer/weeder
<u>Imporcitor</u>	harrower	<u>Messor</u>	reaper/mower/harvester
<u>/Occator</u>	"	<u>Convactor</u>	gatherer
<u>Saturnus</u>	sower	<u>Conditor</u>	preserver
<u>/Insitor</u>	"	<u>Distributor</u>	distributor.
<u>Obarator</u>	top-dresser		

Even the later important god of the sea, Neptune, was originally the god of watering. It was a religion occupied with the supplying of human needs and concerns, a religion of "usage" to be sure, but also of sentiment. For, it reveals that the Romans had a "sense of conscious powers external to ourselves pleased or displeased by the right or wrong conduct of every circumstance of daily life." Thus, although the Romans believed that we may use nature for our own ends, it was only with great care so as not to upset the "powers behind the universe."⁹ It was a religion of proper and prudential use.

The numina of agriculture acted with the nature spirits as checks on abuses against the land, but specifically in the acts of farming. For the sensitivity to nature and the deference paid to these numina made the Romans aware, like modern ecologists, that even farming (the very basis of their civilization) is "unnatural, against spontaneous nature."¹⁰ Hence, Virgil writes in the primitivist vein we talked of in Chapter 2,

Before Jove's day no tillers subdued the land. Even to mark the field or divide it with bounds was unlawful. 11

The classical scholar Patricia A. Johnson's masterful study on Virgil's Agricultural Golden Age shows how the most important lesson of the IVth Georgic is that the farmer must learn "how to heal the wounds that he, as farmer, has inevitably inflicted upon nature." He must become the master farmer as opposed to the durus arator who "wrecklessly harms" the earth.¹² Thus, the Romans distinguished between the good farmer who respected the numina of nature and those who did not. Those who did not were punished.

In the Georgics, Aristaeus is punished by the loss of his bees for the offense he has committed against Eurydice and her nymphs in their grove where Aristaeus built his farm. As part of his atonement he must appease the offended numina by sacrificing a number of his steer and an

13
ewe. This was not a mere literary device. It is found throughout agricultural treatises and in relief sculpture as late as the 2nd century A.D. suggesting a regular practice. (See Figure 16).

The most atonements were made to the earth, who was variously worshipped as Tellus Mater, Juno, Venus, Diana, Ceres, Flora and Fortuna. Further, the Greek, Phoenician and Egyptian earth mothers (Gaia, Cybele and Isis, respectively) became favoured by Italians and all had large followings at Rome and in North Africa by the 2nd century. Combined, the cults of the earth mothers outnumber inscriptions of all other deities, especially in Italy, but also in North Africa, with the exception of Saturnus, whom we will return to below.¹⁴ This religious and sentimental concern for "Mother Earth"¹⁵ led to rituals of appeasement when tilling, sowing or harvesting.

Cato tells of the porca praecidanea offered to Ceres before harvest. There was also a porca succidanea that was to be offered to Ceres after the harvest, as we know from Aulus Gellius (b.130 A.D.).¹⁶ A pig was also sacrificed in the tilling of the ground, and in such ceremonies elaborate prayers were involved which had to be repeated "so long as the work continues" and if a day was missed, or intervened by public or domestic feast days a new offering had to be made.¹⁷ Land also had to be purified before working it by the sacrifice of the suovotaurlia (a swine, a ram and a bull: sus, ovis, taurus) to Janus, Jupiter and Mars.¹⁸ (Fig.16). Such prayers and rituals were time consuming, costly and thus not conducive to profit. They reflect a value system fundamentally different from capitalism.

This animist value system, one accepted by rich as well as the poor,¹⁹ contains inherently anti-capitalist elements. The wealthy and learned

scholar Varro, for example, opens his treatise on agriculture with an invocation to the 12 councillor gods, whom he calls the "special patrons of husbandmen" distinguishing them from the Greek pantheon of "urban gods, whose images stand around the forum (i.e., the market place), bedecked with gold."²⁰ Varro is stating a traditional Roman view by such a distinction, that the hard working farmer is more important than the merchants who "have crept within city walls."²¹ To the Roman, the natural, the necessary and humble were more valued than the crafted, conspicuous and useless. Frugal country life and agriculture always came before soft city living and commerce.²²

Indeed, "in a world where religion was simply a dimension permeating the whole of life," the very transactions of business were regulated, hindered and often brought to a full stop by religious qualms. The calendar of Rome was scheduled around the affairs of agriculture and countless religious festivals, the great majority of which were sacro-agricultural. April and December alone had five agricultural festivals each on which,²³ as true "holy days," business was mostly prohibited. The festivals were so numerous, with many of which lasted over a week, it is surprising trade and commerce could develop at all. (See Appendix C). Today we see how our holidays are more and more encroached upon by commercialism and commerce. Not so in antiquity! The pragmatic concerns with supplying the basic demands of life (food and the continuation of civilization) combined with their sentimental animist beliefs outshadowed business, giving farming other values higher than the accumulation of profit. As we shall see, this care for an extended, non-anthropocentric community had definite repercussions in agricultural development.

The After Life, Ancestors and Descendents

Other non-capitalistic concerns were also predominant in Roman farming and landowning as a result of animist beliefs concerning the after life. For the Romans there was a "communion of sentiments and exchange of services between the deceased and their descendents." This belief that the dead were not cut off from the living had a strong influence on how the individual treated his land, because the ancestors were "believed to actually inhabit the place."²⁴ The ancestral gods, the lares, were protectors of the fields. And although in the city they became protectors²⁵ of the pantry, in the country they always remained attached to the land. Gardens, both pleasurable and practical, even entire orchards and vineyards, were planted around tombs. There were powerful sentimental attachments to the land through the dead which outweighed capitalist concerns, and made "ancient values profoundly different from ours."²⁶

Town commerce was no less effected by concerns for the dead. The ancestors were commemorated in three festivals, the Lemuria in May, the Larentalia in December, and the Parentalia in February, which together²⁷ brought business to a standstill at Rome for over two weeks. The ancestral acres also remained a very potent part of the city dweller's emotional concerns. Cato, Cicero, Catullus, Pliny, Martial, all remember fondly and often visited the fields of their home land, quite regardless whether the land was "valuable" in any commercial way. As Cicero writes of Arpinum, "rough land, but breeds good men, and as for me, I can see no sight sweeter than my home."²⁸

Indeed, many of the Romantic sentiments to the land seen in Chapter 2 were mixed with the emotional attachments to the ancestors, enhancing an anti-capitalist attachment to such land. As Horace writes, "happy the

man, who far away from business cares, works his ancestral acres with his
steers." ²⁹ Pliny the Younger displays that the sentiment for ancestral
land was above profit when he writes,

the farms I had from my mother do not treat me very well, but I
delight in them because they were my mother's and anyway I've
grown inured to the trouble they cause me. 30

Ancestral lands were kept even if they caused a loss of profit or other
troubles. The concern for wealth was severely attacked if it involved
chasing someone off their ancestral land to one's own gain. Horace uses
an emotion packed image to peck at the consciences of the land hungry who

lusting for more, jump the claims of/tenant farmers. They are
driven off, wife and/husband, and they carry their/ household
gods and scrawny children in their arms.

As Horace lost his own ancestral land in the civil wars, we can be assured
his emotions are sincere. ³¹

And so was the sentiment for ancestral lands throughout the empire.
The Digest of A.D. 533 grants the right to a man not to sell his land
(i.e., if in debt) if

he has a particular feeling for it, because it is convenient, or
in a good neighbourhood, or has a good climate, or because he was
brought up there or his parents were buried there.

Similarly, a patron was able to reobtain possession of land after the
death of a freedman if "the property contains the tombs of his ancestors."

The Romans, even in pragmatic legal documents, recognized values
other than those of the market-place and took into account emotional
ties which might exist between an owner and a piece of property. 32

That the Romans adapted laws to sentimental values shows the extreme im-
portance attached to land, especially considering that they did not bend
legal principles to accompany business interests. ³³ Roman values in
land ownership were at the "opposite extreme" of capitalist concerns. 34

The Limits of Nature, the Community Ethos and a Sustainable Future

Intergenerational Obligation

More importantly, the pagan attitude toward the dead entailed an obligation to keep up the ancestral land, both in respect of ancestors and to provide for descendents. This was in part inspired by self-interest. As Romans were to honour the ancestors by keeping alive their memory, so they wanted to live on "with honour in their survivors' memories."³⁵ Nonetheless, this belief inspired upkeep of the land, for one would only be remembered fondly if one had left a good inheritance, and in an agricultural society this meant land.

Thus, it was a dicta of Cato that "to expand one's property was to be deserving of honour equal to the gods."³⁶ Virgil relates this attitude in the Georgics where Aristaeus, the son of Apollo and a shepherd who became a farmer, only becomes a god himself when he "fulfills his destiny to his descendents" by providing them with the secure future of a good farm.³⁷ To lose one's ancestral land through one's own fault was a matter of great shame. We know from a few of Cicero's court cases that Romans who lost their paternal farm were bitterly scorned. In Defence of Milo Cicero defends his client against the slander that he had wasted three patrimonies. In another case Cicero quotes an older patrician against a man who had to sell his inheritance.³⁸ Thus, there was a

firm conviction that those who owned property had a responsibility to ensure that it was carefully managed, maintained, and if possible increased, that to allow an inheritance to be seriously diminished was especially reprehensible.

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And the key words are "carefully managed," for it was not enough just to pass on land, if it had been degraded through over-exploitation and was no longer productive. It was an intergeneration obligation to keep the land in a healthy and fertile condition. This meant sustainable farming, not

a modern strip mining of soils for immediate and maximum returns. The pagan farmer was concerned with "building a secure future for his descendents," leaving a farm which could provide for many generations. The Romans had a strong moral sense of long term responsibility.

Social Obligation and the Rural World View

This sense of obligation to the "dead and yet unborn" extended to Roman society as a whole. For, unlike capitalism's narrow concern for the investor, pagan culture was not individualistic, but community oriented; the future of the race was a major concern for all. Farming, in particular, was considered socially responsible, because a long tradition believed that it was the virtues of discipline, hardiness, frugality, courage and incorruptibility (best summed up by the Roman term virtus) which were the cause of Rome's incredible growth from "tiny Cures' humble land...to a mighty realm." And, like modern ecologists, the Romans perceived that such virtues were best learnt "from the contact with rural nature." The pragmatic and insightful Romans saw that farming was the provider not only of the basic necessity of foodstuffs, "without which mankind can neither subsist nor be fed," but also of the brave soldiers and honest statesmen who "won an empire." If farming was the cause of past success, so would it be of future prosperity.

The interrelation of farming, duty to the state and its future is made clearest in the Golden Age myth. To the Greeks, farming and the Golden Age were "traditionally pessimistic topics." But to the Romans, they were a matter of pride and responsibility. Virgil's Georgics, for example "integrates them into a single optimistic theme." Contrary to the Hesiodic vision of farming as being a fall from a toil-free paradise, Virgil makes farming the means to a new Golden Age. He places the onus

on the individual farmer to work hard and provide the bounties of nature for the next generation of Rome. He makes this return "possible by placing the responsibility for a state of felicity in the hands of those who will enjoy it:" farmers.⁴⁵ Yet, he is simply following the Roman tradition, in which farming and its values are the root of prosperity.

This rural world view may be considered as a secondary ecological value, for it is more concerned with supplying human needs, the role of people in society and the continued prosperity of Rome. But as we saw above (pp.87 & 92) it was only through being "master farmers" that Romans believed they could achieve a state of grace. They could not offend the numina, or pax deorum. The farmer must "work in concert with nature" so as not to degrade the soils, in order to provide a secure future for posterity.⁴⁶ Most simply put, the Roman world view amounted to this pragmatic philosophy: Farming is the basis of civilization, therefore, the appropriate measure of the state is a healthy agriculture. But,

farming cannot take place except in nature, therefore if nature does not thrive, farming cannot thrive. But we know too that nature includes us... If it does not thrive, we do not thrive. The appropriate measure of farming, thus, is the world's health and our health, and this is inescapably one measure. 47

For the Romans, society, farming and nature were one measure, and it was a social obligation to farm properly to ensure the state's continuity. Here in a nutshell is the Roman rural world view for rich and poor alike. There was no separation between the survival of man and nature

The Large Landowner and Social Status

Donald Earl has fully demonstrated how duty to state and its future was the ideal of the nobility, and how this moral and political tradition extended far beyond the class of its origin, becoming the standard of the ruling class of the 2nd century A.D.⁴⁸ Here, we wish to demonstrate how

it was inseparable from the proper treatment of the land.

For the rich, farming remained the only socially acceptable form of income throughout the empire. Land was always the qualification for entry into the Senate. Trade and usury were never fully respected, and profits went to buying land, in order to obtain social acceptability with the predominant ideology of the landed aristocracy, but also because land was considered a "secure" investment; where there is a concern for the future,⁴⁹ security is valued above risky large gains. Similarly, "where ownership of land is a matter of status and prestige, ... the landowner is not motivated in the direction of increasing productivity."⁵⁰ Thus, we find little investment in this area, because the ancient landowner did not farm merely to obtain personal wealth. He was more concerned with obtaining positions of influence and respect, which he would only get if he demonstrated his responsibility to society's continuity as a whole. Ownership of land was based not on the narrow concerns for profit, but on the much broader and deeper concerns of "duty, history and continuity."⁵¹

The gravity with which the educated Roman believed the historical-agricultural-ecological interpretation of continuity (above p.94) is evident in the fact that failure to treat the land properly, whether through greed or neglect, was not only socially disrespected but severely punished. In the Republic, it was the prerogative of the Roman Censor to downgrade any citizen to an aerarius who did not plough, weed or properly care for his farm.⁵² Cato in particular upheld this right and duty. But such punishments were in existence in the high empire as well. Hadrian, who notably referred to Cato as an example for some of his policies, had any man who neglected his property and diminished his inheritance through his own fault flogged in the amphitheatre.⁵³ The Roman understanding of the need

for atonment between economy and ecology went far beyond mere rituals of appeasement.⁵⁴ There were very real social and legal pressures to farm responsibly, because of the care for posterity and the understanding of the interdependence of society, agriculture and nature.

Stoicism, Land Use, Land Size and Nature's Limits

What did responsible farming consist of? Next to deforestation, arid zone researchers point to overcultivation and overgrazing as the two main causes of desertification.⁵⁵ Although the Romans did not use these terms, it is obvious that they were aware of the damaging effects of such practices and condemned them vigourously. Only the elite could be capable of such abuses, as the great majority could afford neither the slaves nor cattle to create large capital intensive farms. But such forms of development were held in check among the rich by moral limits which clearly defined the large landowner's responsibility to the land. Stoicism (main philosophy of the 2nd century upper classes) and its doctrines of moderation and duty to live agreeably to nature applied no less to farming as to consumption in general. Indeed, here we see how Stoicism sprung from the soil of traditional rural ideals.

Stoic attacks on the harmfulness of greed and luxury to nature and society combined with social concerns of posterity in condemning attempts to increase productivity on farms. The Stoic naturalist, Pliny the Elder, for example, writes, "moderation is the best criterion in all walks of life. Good cultivation is essential, but optimum cultivation is ruinous."⁵⁶ As White remarks, "nothing could be further removed from the contemporary attitude than this; the modern farmer aims to get maximum profit on the capital he has invested."⁵⁷ regardless of consequences to the land and "even the continuation of humanity," for such moral concerns are consi-

dered "unscientific," human weakness.

But the Roman rich lived long before the "great transformation" in which the "dark energies of greed and envy" were made out to be "blessings and virtues for the race."⁵⁹ Purely profit motivated, capital intensive methods such as slave gangs and grazing were severely criticized. Pliny's passage above, for example, follows a criticism of slave gangs as the worst way to farm, since "men without hope" cannot possibly care for the land. Columella criticizes

those men of enormous wealth who, possessing entire countries of which they cannot even make the rounds, either leave them to be trampled by cattle and wasted, . . . or keep them occupied by citizens enslaved for debt and by chain gangs.

Varro too attacks greed, herding and harm to soils as one crime. He criticizes those who

from greed and in the face of the laws, have made pastures out of grain lands—not knowing that agriculture and grazing are not the same thing. . . . For grazing cattle do not produce what grows on the land, but tear it off with their teeth. 60

The standards of social acceptability were set by the measure of nature. Land use and social responsibility were one.

As very few large cattle ranches and slave farms actually existed, we may assume these outcries show more the predominance of such values⁶¹ rather than the extent of such farms. Reality to a large degree matched standards. We would have more reason to assume such land corruption if the Romans supported the latifundia with silence or if counter attacks⁶² were published. These were moral outrages reflecting a genuine care for nature, as is proven by the special concern over the decline of arable land into pasture.⁶³ Columella even shows how to replenish soils run down by grazing through "a régime of succession cropping with roots grains⁶⁴ and legumes." The Romans realized early that grazing is destructive to

soils, and goats are especially hurtful to olive trees. Thus, their original homesteading laws set controls on grazing. But not all herding was condemned. A few head of cattle kept to provide manure for improving soils for other crops was highly encouraged. ⁶⁵ It was a matter of limits. And those limits were set by nature and concerns for continuity.

Everyman's limit will be determined by his own desire plus his means; for...the desire for possession does not suffice if you lack the wherewithal for cultivation. 66

What was good for sustaining the earth was good for the state.

Pliny makes an exception to a highly productive farm: "where the farmer ploughs his own fields, or employs workers he will have to take care of at any rate." ⁶⁷ The exception is made because the owner is likely to be more careful of his own land. Here he is echoing a long tradition, first written by Cato, that the farmer should be able to visit and oversee his farm regularly, to ensure good returns and prevent damage. ⁶⁸ This meant having a farm small enough to take care of. Hence the many dicta: "admire a large farm, but yet a small one till;" "the farm should be weaker than the farmer;" "Better a small field well tilled, than a large one neglected." ⁶⁹

As early as 376 B.C., Gaius Licinius Stolo passed a law that fifty iugera be the maximum amount of land that a citizen could own, in part to leave some for others, but also to ensure proper cultivation. Thus, when Stolo broke his own law, he was condemned firstly because it was "a mark of arrogance to occupy" vast tracts of land, and secondly,

for the reason that it seemed the more scandalous for a Roman citizen, by extending his ownership in unheard-of fashion, to leave untilled those lands which the enemy by their flight had abandoned.

It was better that the enemy who worked the land keep it than a Roman own it and neglect it. (Recall the punishments for neglect, above p.95).

As in all matters, so too in the acquiring of land, moderation shall be exercised. For only so much is to be occupied as is needed that we may appear to have purchased what we may keep under control, not to saddle ourselves with too great a burden and to deprive others of its use and enjoyment. 70

Here again are Stoic/traditional concerns for moderation, proper cultivation, the greater community's survival and the measure of nature.

Small Farmer Ideal

Ultimately it was the small farmer who was the ideal Roman, men such as Cincinnatus, Gaius Fabricius and Curius Dentatus, the legendary consuls who worked their own ancestral acres. They are renowned for serving the state valiantly in war and unselfishly in peace, for returning to their small parcels of land and farming it "with an energy not inferior to the bravery in arms with which they had gained it," for refusing with country frugality and honesty to abuse their well-earned positions of power and take more than the seven iugera of land allotted to the average soldier.⁷¹ The proper cultivation of the land was as valuable a task of the farmer as the provision of food, courageous soldiers, honest statesmen and empires. It was only the small farmer who was capable of such care.

Although there were few slave run latifundia or cattle ranches, the reality of land owning by the 2nd century had switched drastically from the days of legendary farmers ploughing three and a half acres.⁷² The upper classes usually owned numerous pieces of land, often scattered through diverse climatic regions as a "traditional risk-reducing strategy."⁷³ They surely did not plough their fields themselves, and it is unlikely that they could often visit all their possessions. Nonetheless, the small farmer paradigm manifested itself in two ways among the large landowners.

Firstly, the 2nd century emperors consciously tried to reestablish

a small farming class, probably in the belief they would thus acquire a constant supply of soldiers and tax.⁷⁴ But there is no reason to doubt a sincere belief in the historical-eco-agricultural tradition. Trajan's alimentary scheme which provided capital for agriculture, definitely shows more than a concern with a tax fund. For the mortgage was non-repayable on part of their land and the interest went not to the state, but to supporting poor children in municipalities across Italy. He was proud of this progressive scheme and along with the boasts on his arches and coins, "Restitutio Italiae,"⁷⁵ it reflects Virgil's ideal of renewal through agriculture. Hadrian also followed this path, supporting the small farmer in cases against "the great capitalists." His love of the people and nature was well known.⁷⁶ It is unlikely he thought of just a source of soldiers and taxes. As we shall see for Africa, his interests in supporting the small farming class had broader, ecological concerns.

Secondly, the support of the small farmer was found on an economic level, in direct relation to caring for the land. During the rise of the empire, with the introduction of coinage, small farmers had to pay fixed cash rents. All it took was two bad harvests to put the small farmer in debt, out of which he could only escape by "mining" the land for the remaining years of his contract (usually 5 in all) regardless of the "disastrous consequences for its future productivity." As a direct attempt to solve such abuse, share cropping was reinstated in the late first century A.D. both by imperial policy and by private landowners of their own accord. This demonstrates that the landowners were more willing to take a loss in profits, rather than destroy the land for the future. For sharecropping was not conducive to high productivity, as the tenant farmer stood to gain little by increasing output on the land.⁷⁷ Thus, social, ancestral, and historical concerns and obligations combined with an eco-

agricultural idealism at the highest level of Roman society to ensure the limits of nature were adopted in the supplying of human needs.

The Small Farmer and the Reality of Subsistence

But what of the small farmer, the great majority of Romans? We have already stated that the peasantry were the ones most likely to keep up animist beliefs. They are, therefore, likely to be the most careful not to offend the numina by poor farming practices.⁷⁸ It is, thus, arguable that poor farmers above all kept up traditional methods that were ecologically sound. Firstly, because they were restricted by geographical limits, and were not able to afford to buy land elsewhere if their plots should fail. As a result, they were highly conscious and concerned for their local environment. "Where else, in the event of a degraded environment,⁷⁹ could they find a living?" They did not wish to deplete that which would provide food and shelter for their family or descendents, their only hope of continuity.

Secondly, being a small farmer meant a relative degree of self-sufficiency was required to provide oneself with the various basic needs of life. Self-sufficiency was also the ideal of farmers, such as Cato who influenced farming for centuries: "the master should have the selling habit, not the buying habit."⁸⁰ The self-sufficiency of the Roman farmer, though far from complete, was still fairly impressive (far greater than a modern farmer with his monoculture farms and petrol powered harvesters). It involved having a mixed farm, growing willows for baskets, a coppice wood for stakes and fencing, having a few animals for manure, a kitchen garden and a few olive and other fruit trees with wheat intercropped for private fare.⁸¹ In short the small farmer needed to work a mixed intensive farm to meet provisions he could not afford to buy nor trade for.

The mixed farm is the most ecologically sound form of farming for the
82
Mediterranean climate.

Thirdly, the subsistence farmer is not likely to have luxuries that are harmful to the earth, either to produce or consume. It is simply beyond his means. In a subsistence economy, such luxuries are reserved for
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a tiny elite.

Lastly, it is not unlikely that as the traditional Roman socio-historical ideal so closely paralleled his own frugal life, that the Roman small farmer applied it to himself. The land hunger and Romanticism seen in Chapters 1 and 2, amounting to a veritable back-to-the-land movement, may have been inspired by a reawakening (or continual decrying) of the ancient dream of the self-sufficient small farmer and the inclusive social respect. Throughout the empire, farm work was considered superior
84
to manual labour in city or industry. Without the moral idealism and social respect, it is doubtful the small farmer would face backbreaking
85
agricultural work with its meager returns. In our present age, where acquisition of individual wealth is the sole social paradigm, farming is abandoned in droves for more lucrative careers. But the Roman empire was built up of a population of predominantly subsistent farmers, who had a great tradition of social responsibility, moral idealism, and an inherent respect of nature in which the pious Roman could come to terms with his own purpose in society and life itself. The small farmer could justify his existence through an agriculture which benefitted the state without harming nature. It is no secret, to moderns or ancients, that the champions of Roman ideals mostly came from the small rural communities outside Rome.
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It would be mere modern elitest arrogance to assume that such eco-agricultural idealism was beyond the mental capacities of the

ancient, or any, peasant sharecropper or small landowner. Their respect for locality made them conservationists. Hence, it was local farmers who poured into Rome to stop the dam project seen in Chapter 2 which would drown their land and gods. Eco-agricultural idealism existed at all levels of Roman society, it was inherent in pagan traditionalist animist and Stoic thought.

Ancient Concerns for Profit and the Capitalist Anachronism

It is, thus, false and anachronistic to compare Roman farmers to modern capitalists. Of course Rome had its Verres and Trimalchios, but such men were viciously attacked, or socially ridiculed. Yes Romans had the requirement in farming that it be productive, but, unlike modern farming since the agricultural revolution, it was not the only requirement.⁸⁸ The Roman word for profit was utile, and this reflects the practicality of the Roman. He thought it useless to farm at a loss so he concerned himself with profit, but this is quite different from profit maximization. The Roman regarded most profitable "the methods of cultivation which improve the aspect of the land." It is hard to separate his notion of profit from caring for nature and society.⁸⁹ In short, the Romans shared the exact requirements called for by contemporary eco-agriculturalists: that the land must be well used in order to preserve its fertility and ecology. He thus needs these "fundamental resources:...the knowledge, the where-withal and the will to cultivate them."⁹⁰ Social-political and religious-philosophical concerns combined to make the Roman motivated to, able to, and to actually, use the land well. The Roman understood that economy and ecology must co-exist, and that nature was the measure, and as we shall see now, nature was also the teacher.

Learning From Nature:
Appropriate Technology in Traditional Farming Methods and Attitudes

As with the economic attitudes toward farming, so the traditional farming wisdom on methods matched modern ecological concerns. The eco-agriculturalist writer Wendell Berry argues that the view that we can live only in and from nature (seen above as inherent in the pagan world view) holds that we have "an obligation to be nature's students." ⁹¹ The Romans never lost the tradition that nature was the best teacher. We have seen this attitude briefly in Stoic attitudes (Chapter 2). Now we wish to demonstrate that this ecological wisdom, ultimately part of a pre-Stoic rural tradition, was especially applied to agriculture.

Attitudes on Methods

By learning from nature the ancient agronomists meant paying attention to all the details of nature, the latitude, soils, winds, seasons, stars, the climate and all its variations long and short term, "the wavering moods of the sky," ⁹² these must all be taken into account for each and every region. Recalling the importance of the notion of the master farmer (agricola bonus) and his sensitivity to nature in connection to Rome's continuity (above pp.87, 92 & 94), it is worth quoting a long passage from Columella to demonstrate the Roman awareness of the various features of nature that the farmer must know, understand and adapt to.

For one who would profess to be a master of this science must have a shrewd insight into the works of nature; he must not be ignorant of the variations of latitude, that he may have ascertained what is suitable to every region and what is incompatible. He should tell over in his mind the rising and setting of the stars, that he may not begin his operations when rains and winds are threatening and so bring his toils to naught. He must observe the behavior of the current weather and season, for they do not always wear the same habit as if according to a fixed rule... (He must) discern what the very diversity of land and the nature of each soil may deny us or may promise us. ⁹³

The science of the Roman farmer was one of being "compatible" with nature,

planting that which it allows, not that which it denies. "To learn the tillage of our sires and nature of the place, what fruits each district does produce and what it does refuse"—these were the "eternal covenants" which nature has made for each locality; they were not to be ignored.⁹⁴ There was an extremely conscious and constantly repeated idea of adapting to nature, and not forcing nature to adapt to human desires. The Romans followed nature as "the best guide" in the supplying of human needs.

When we see this wisdom applied, we understand how the Romans achieved an ecologically sound agriculture, and that the application of the latter was conscious. For example, paying attention to the suitability of crops to topographical regions,

different crops are planted, grains being considered best adapted to the plains, vines to the hills, and forests to the mountains.⁹⁵

This is a very ecologically appropriate distribution of crops, which prevents soil erosion, which the ancients did care about. That the mountain-sides remained forested argues this was probably the distribution used.⁹⁶

Similarly with soil types, the agronomists stress planting only that which is "adapted to the soil," and "best suited to each field."⁹⁷

The Roman knowledge of various soil types and what to plant in them was impressive, if unsystematic. White gives a list of over 88 words used to describe soil types, a knowledge based on centuries of trial and error and not bettered until half way through the 20th century. It was unscientific in that there were not set terminology for each type, but not in its envi-

ronmental soundness.⁹⁸ The Romans knew which soils needed to be left fallow, a method scorned by modern farming theory as expensive and unproductive, but now respected by arid zone researchers as invaluable to the Mediterranean region, and especially arid lands.⁹⁹

They knew which soils to plant with "lighter crops, ...I mean by that crops which are less ex-

hausting to the land," and soils which because of their strength do "not
need to lie fallow." ¹⁰⁰ Thus, they adapted not only what, but how often
they planted according to the natural abilities of the soils.

The idea of adaptability to nature as being based on a conscious
concern for continuity is most evident in their development of manures.
The Romans were quite aware that without constant replenishment of the
land with nutrients, the soils would become lifeless. They stressed
saving manures carefully, ¹⁰¹ and had an expertise, equal to that of soil
types, of what manures were suited to what types of soils and crops. As
Varro states, "we must observe what parts of the land must be manured, how
the manure is to be applied and the best kind to use." ¹⁰² Just as eco-
agriculturalists now are stressing imitating nature's processes of crea-
ting humus, so the ancients did just that. Columella, after showing why
forest soils are rich through seasonal replenishing of soils from fall
foilage, stresses the need for "frequent, timely and moderate manuring." ¹⁰³

Most impressively, Columella's advice for "moderate" manuring re-
flects the realities of the Mediterranean climate. The Romans realized
that dry regions cannot ingest high amounts of animal manures, as the lack
of rain leaves the manures concentrated, which burn rather than feed the
plant. ¹⁰⁴ They thus made composts with chaff, bean stalks, husks, hlex and
oak leaves. ¹⁰⁵ Lupines, beans and vetches were also grown to be ploughed
directly into the soil as a green manure. This is a highly advanced me-
thod, which replaces minerals and nitrogen to the land, and improves the
actual structure of the soils. Columella gives detailed information of
the most prolific green manures and the precise timing of ploughing in
such crops for different soils. For example, he suggests to delay plough-
ing for sticky soils, "showing an appreciation of the effect of extensive

root-development in breaking up heavy clods," while to plough earlier is
106
better for more open or gravelly soils. Green manuring also led to the
107
ecologically sound practice of crop rotation. Through such methods, the
Roman believed it was both possible and a moral responsibility to keep up
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the fertility of the land or to "overcome the thinness of the soil."
These are methods and attitudes which, as we shall see, were extremely
valuable for the arid land and soils of Africa.

Such knowledge was built up over generations of practical experience
and passed down in a "common fund of maxims and proverbs, often cast in
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archaic language." The Romans paid strict attention to the lessons of
the ancients in matters of farming and to the experts of the day. But
they did not slavishly follow set rules. They were highly conscious that
nature was in a constant state of flux, and that one had to experiment
constantly to test whether the old methods were well suited to the pre-
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sent and to develop new and better methods. Thus, as a result of
attentiveness to her details, the ancients believed that

Nature has given us two routes to agriculture, experiment and
imitation...we ought to do both—imitate others and attempt
by experiment to do some things in a different way, following
not chance, but some system. 111

Concerned agriculturalists early in this century, already noticing the
negative effects on soils of the agricultural revolution, have said of
these lines, "Here in a few words is the whole doctrine of intelligent
agriculture." The neglect of this injunction is what has retarded the ad-
112
vance of the science."

For, although we have had spectacular advances in farm machinery and
chemical fertilizers and insecticides, these "advances" are all causing
more harm than good, exhausting soils and contaminating ground water from
North America to Africa and the Middle East. Secondly, this singularity

of purpose for high productivity has led to the developing of monocultures and single strain crops, which are highly susceptible to disease and insects. We have, through the scientific imperialist delusion of our ability to conquer nature and lack of respect for past knowledge, caused a drastic retardation and decline in ecologically important crop diversity and soil maintenance.

Contrarily the Romans had

no spectacular advances in technique, but a tradition of diligent attention to well tried methods matched by a willingness to try out new varieties and make improvements in the quality of those already in favour with growers.

Through a respect of nature's ways and limits, through imitation and experiment, the Romans became "experts in plant selection and developed distinct varieties of all the leading horticultural and field crops." Pliny alone mentions over 194 varieties of vines, olives and fruit trees, among them 39 types of pear! And they planted these according to various soil types. For example, the large Amminian, Murgetian, Apician and Lucanian vines were well suited to "soil that is heavy or more subject to fogs." While the small Amminian, the double and the small parti-coloured eugeneum were vines planted in lighter soils exposed to the sun. Variety was the "key note" and favoured form of Roman farming, variety and adaptation to the countless specific details of nature in each locality. Their attitude was the direct opposite of the scientific imperialist. Development was slow and cautious, but successful and ecologically sound.

Attitudes toward Technology

The development of technology followed this same route. Much has been written on the stagnation of technical invention, even to the degree of attributing to it the decline of the empire. But was it stagnation or

caution? Most scholars agree that attitudes played a major role in slowing technological development.¹¹⁸ However, none have considered these attitudes as part of an ecological mentality which contributed more to success and sustainability than decline.

We find among the Roman attitudes toward technology all the socio-economic, moral-political, religious-philosophical concerns that we have demonstrated so far. In short, the Roman world view did not change when it came to the realm of invention. The famous story of Vespasian refusing to use a column moving machine because he felt it was his duty to "always ensure that the working class earn enough money to buy themselves food," demonstrates the traditional Roman concern for community, the poor and self-sufficiency.¹¹⁹ Tiberius went even further, demolishing the shop of an inventor of unbreakable glass because of the vested interests of metalsmiths. Such conservatism and defence of the status quo at the highest level of power were hardly conducive to scientific discovery. Indeed, one version has Tiberius behead the inventor, reflecting an anti-technological bias that surely discouraged scientific development.¹²⁰

This anti-technological attitude is part of the general Stoic primitivism and Romanticism seen in Chapter 2. Technical development was related to moral and physical decline of humanity, part of the traditional mistrust of soft living and Greek ingenuity. Technology too had to obey the limits of nature. To extend beyond them was destructive. "You have been too clever for your own good, oh human nature, and gifted beyond measure to your ruin," warns Ovid.¹²¹

These limits were the limits of necessity and the larger community. "The idle pyramids" of the Egyptians and numerous and "famous but useless inventions of the Greeks" were no match to the Roman aqueducts, for the

former did not contribute anything practical to society as a whole nor to future generations.¹²² Thus, the Stoic, Cynic Dio Chrysostom, reflecting the general opinion of Rome of his time, claims man's "cleverness in having discovered and devised so many inventions has been of small benefit to the life of those of after times;" while Frontinus, whose work on the aqueducts ensured the basic necessity of water to a growing population, was considered the most valuable Roman of his age.¹²³ Limits, usefulness, continuity and community: these are all part of the secondary ecological values we have seen existing in the Roman world view.

Primary ecological values also existed in attitudes to technology in the inseparable relationship between the gods and nature. "I worship nature as a divine being," claims Cicero, "resistance against nature is as pointless as the giants against the gods."¹²⁴ Nature, was everything in Stoic doctrine, the measure of all. It was useless to try and conquer her with technology. "You may chase out nature with a pitchfork, but she'll return and burst through your arrogant folly. She will win!"¹²⁵ This pagan attitude is entirely against today's Baconian and unwittingly Deist creed which believes man's divine purpose is to use science to conquer nature through technology, to extend "the bounds of the human empire to the effecting of all things possible."¹²⁶ An anti-scientific imperialist respect of nature was behind the so-called lack of Roman development.

We may say so-called, because not all invention was frowned upon. Irrigation technology which was generally beneficial to soils and vegetation saw great development.¹²⁷ Inverted siphons, pressure piping and even pneumatic pumps were developed for raising water to fields. The Romans, however, preferred the simpler rock cut channels because they were all that was necessary to do the job properly, were easier to fix in case of

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a leak, and the materials were readily available. Again, practicality, the necessary and humble were preferred above complex, expensive ingenuity. Yet, the aqueducts were not so simple as recent critics make out. Modern engineers are beginning to realize the genius involved in transporting water over great distances, at an average gradient of 0.34 m/km.¹²⁹ Even if water was moved by the simple principle of gravity, "aqua descendere," nevertheless, incredible skill was necessary to adapt to the changes in topography.¹³⁰

Similarly with farm machinery, advancements were made that were rarely used. The knowledge was at hand for a steam engine, yet animal and human power prevailed.¹³¹ The Romans developed four different types of ploughs, the variations of which suited different conditions. But the most advanced, with the wheeled forecarriage never left its place of invention, present eastern Switzerland. The Romans stuck primarily to the simple sole ard. A threshing machine was invented which also never left the region of its conception. Again, it was a matter of appropriateness to the environment combined with traditional rural conservatism. Such a machine was fine for the large plains and heavy soils of transalpine Gaul, but not for the drier, more mountainous Mediterranean regions where simple manual tools were not only sufficient but the best choice against erosion.¹³² The Romans did not naively accept all invention as positive. They balanced the problems against the merits of inventions and threw a good many ideas back into oblivion. They retained the all important ability to foresee and forestall and thus did not end by destroying the earth.

It has been well said that the Romans "never contributed anything to the scientific habit of mind that has made our modern attempt at civilization possible. and is rapidly making it impossible."¹³³ The lack of

development in weaponry may have added to defeat by the Vandals, although there are more satisfying explanations of decline. But more probably the general lack of technological development contributed to the continuation of Roman society ensuring a sustainable source of survival. As we shall see for Africa there was a conscious application of farming machinery, methods and irrigation to local ecology, which can account for agricultural success. This sensitive adaptation more than fully accounts for Roman success in the Maghreb. As with the eco-agricultural idealism of their economic outlook, so with the Roman technological approach to survival: there was a "cautious and careful recognition of man's inter-
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dependency with nature."

Roman Agriculture in Africa
Consciousness, Adaptation and an Agricultural Golden Age

Roman agricultural success in North Africa can only be understood in the light of their entire cultural value system, their attitudes toward economy and technology, their consciousness of their interdependency with nature. In this final section, we shall look at how Roman concepts of learning from nature and adapting to her limits were consciously applied in the Maghreb. Agricultural writing and archaeological remains reflect a conscious adaptation to an arid environment. Imperial inscriptions show that definite policies encouraged proper treatment of land. Mosaics and epigraphical boasts tell of a pride in farming among rich and poor alike, a pride necessary to sustain farmers in a harsh land where returns are meager. Roman religious and social beliefs contributed to an ecologically sound agricultural Golden Age in Africa, the prosperity of which lasted for centuries.

The Sole Ard, Dry Farming and Irrigation: Adaptation to Arid Lands

The advice in agricultural treatises to pay close attention to the details of nature, and to imitate others, was especially applicable to foreign lands. "Yet ere our iron cleaves an unknown plain, be it our first care...to learn what each clime yields, and what each disowns." ¹³⁵ Imitating others was also especially important when buying a farm in a new region. "Notice how the neighbours keep up their places...(and) be careful not rashly to refuse to learn from the methods of others." ¹³⁶ The farmer was advised to see what the former owner and the locals grew and how, and to verify if practices on neighbouring farms would be beneficial or harmful to his own. ¹³⁷ The Romans knew that "the soil and the climate of Italy and Africa, being of a different nature, cannot produce the same results." ¹³⁸ They were highly conscious of their surroundings and the most apt students foreign wisdom. ¹³⁹ Thus, they were not ignorant of what type of technology or methods to use in the Maghreb.

This is obvious in simple matters of climate. Columella after describing dimensions of threshing sheds for Italy, writes that such sheds are unnecessary in Africa due to the dry summers. A mosaic from Zliten demonstrates that threshing was done outdoors. (See figure 17a). Noting the hot winds of Egypt and Numidia, Columella argues that vines should be planted on a northern exposure, in contrast to the recommended southern exposure of more northern climates. More importantly, both Virgil and Columella write that for Numidia only the "lightest plough-point" (levis-simo dente) should be used, lest by ploughing too deep a furrow, "the scant moisture deserts the barren sands." ¹⁴⁰ Contrary to Shaw, Roman use of the scratch plough was not simply a coincidence of a "backward technology" happening to be ecologically sound. ¹⁴¹ There was a conscious know-

ledge and teaching in agricultural treatises of the need for a light plough and light ploughing for the arid soils of Numidia.

Recalling Virgil's popularity in Africa, the above passage was possibly well known. But that a light plough is necessary for the thin soils of Numidia appears to have been common knowledge. A fairly conclusive proof of this comes from the two top panels of the famous mosaic of Cherchel. They depict farmers ploughing between rows of olive trees. (See fig.17b) The detailed knowledge of the process is evident in the way the plougher bends his back to apply a downward pressure on the stilt (latin stiva) to prevent the share beam or the point (dentale) from digging too deeply into the ground. Note that the farmer also uses his foot at the back of the sole ard to add extra pressure in order to make a shallow furrow. ¹⁴² Either the patron or the mosaic maker (probably both) were conscious of proper ploughing methods for dry lands. Regionally appropriate farming methods seem to have been common knowledge.

We also see from this same mosaic that intercultivation methods, (e.g., sowing wheat among olives) were used and celebrated in art. As mentioned (above p.102), this method of mixed intensive dry farming is the most ecologically sound method for arid regions. By creating a wind break and some shade, the trees, along with the continual vegetative cover provided by crop rotation, prevent wind and water erosion and evaporation of ground moisture. The Roman knowledge of dry farming was highly advanced. Trees were planted at the great distance of 25 metres apart to allow sufficient moisture for each tree, and sufficient room for growing wheat. Side roots were cut to allow the main tap root to dig down deep for ground water sources. Modern attempts at farming the same arid regions as the Romans failed until these methods were imitated. (See Chap.1, p.18, fig.3).

The widespread success of Roman agriculture in North Africa suggests dry farming was a "standard practice."¹⁴³ The Romans obviously knew how to adapt farming practices to arid zones.

The dry farming methods reflect an acute awareness of the need for careful use of water sources. Both olives and wheat have low water needs and olives are especially drought resistance. However, when first planted they require lots of watering and thus the Romans by necessity had to irrigate.¹⁴⁴ As many of their olive orchards are found far from any water source, they dug wells and either relied on the natural pressure from aquifers, like at Kharga and El Djem, or drew the water up by various means, such as the ortae (wheel and bucket), the tolleno (swipe) and the Archimedean screw. That we have no remnants of these devices is not surprising. Wood is likely to deteriorate or be burnt as fuel where sources are scarce. But these devices were common, even proverbial, in Italy and countless Roman wells have been found in the most barren Maghrebian plains.¹⁴⁵ Due to the difficulties and water needs of starting the proverbially slow olive, the Romans could only have extended their cultivable area by planting and carefully watering each tree as they did with Tamarisk trees on the dunes of the Kharga Oasis. In this sense, they literally "pushed back the limits of the desert."¹⁴⁶

It is unlikely with such consciousness of local needs and the will to fulfill them that Romans did not develop other irrigation methods appropriate to the region. Archaeological remains certainly argue in favour of a conscious adaptation to the environment. Cisterns were buried in the ground to prevent evaporation, aqueducts were built with filters in order to reclaim swamp waters that would otherwise be wasted in the hot African sun, springs were shared on a strict time table.¹⁴⁷ When the winter rains came, the Romans were ready with dams which were stepped on the down side

to resist the torrential downpour, barrages were set at cross valleys, and channels were cut along the bottoms of barren knolls to direct the rain to cultivated plots. These are the kinds of ruins found most extensively in Roman dominated areas of the Algerian plateaux. This run-off irrigation allowed the growing of crops which would usually need two times the amount of rain in 50-400mm/y rainfall areas. Roman ruins show an ingenious use of topography to get the most out of scant rainfall, and their attitude of adapting to nature's limits through a simple technology.¹⁴⁸

Most of these methods are found in Italy. After all its climate is not that much wetter than Africa's. Upland drainage for lowland irrigation through underground or open channels and terracing the slopes to prevent slip erosion are among the earliest ruins found in the hills of Rome and the Apennines.¹⁴⁹ Even the methods argued to be clearly African (the natives waiting with their shovels to form mud dams when the rain falls as mentioned by Corrippus in the 4th century A.D.) were common to the Italian farmer in the 2nd century B.C. Just as Shaw complains for North Africa, so White has shown for Italy: the focus on large aqueducts has hidden the fact that small-scale intensive cultivation was the core of Roman farming. Centuriation and the large dams of Libyco-Punic that dominated Tripoli are not a good measure of ecologically-minded Roman agricultural development and irrigation technology, nor of their culture. They are more derived from Greek and Phoenician influences.¹⁵⁰

A final proof of Roman consciousness and use of regionally appropriate methods is in their drainage of swamps. Shaw had regarded Roman irrigation methods as inappropriate to North Africa because they were based primarily on drainage, which he thought was useless in arid lands.¹⁵¹ However, this reflects an ignorance of irrigation principles and arid zone

ecology. White's comprehensive work, Roman Farming, correctly argues that drainage and irrigation are based on similar techniques and should be treated as one topic, for especially in arid lands,

tasks may be dovetailed; drainage works for the reclamation of boggy low lying areas may be converted into more comprehensive schemes of the redistribution of the available water-supply into productive use in dry areas. 152

This seems to have been a common practice in Roman Africa. The aqua paludensis of Timgad, for example, had built-in filters to reclaim the water for other purposes. Tenant farmers of the Bagradas region requested in the inscription of Ain-el-Jemala (A.D. 117/38) to have rights to drain swamplands to plant with olives and vines. Hadrian replied by granting 153 this request to all of Africa.

Not only were drainage techniques used but they were ecologically important. On a human level, swamplands and stagnant waters in this region are a prime source for Malaria, as we have found out this century. 154 It is a disease the Romans knew by experience if not by name. Environmentally, poor drainage, contrary to popular beliefs, is a major cause of desertification. Alan Grainger, one of the leading experts in this field, demonstrates that water that sits on the surface evaporates in arid lands, creating a pumping action that draws ground water sources up to the surface. These, with other waterlogged surfaces, evaporate causing alkalinization, salinization and a hardening of the soil, leaving a barren salty crust which is unredeemable. 155 "The key to good irrigation is good drainage." Whether or not you use scientific terms like salinization, such processes of desertification are observable to the naked eye. The Romans were probably aware of them. And considering the Roman concern for land, society, future generations and their deep cultural appreciation for nature, it is highly possible that they consciously set out to counteract

such desertification processes. But whether conscious or not, Roman drainage techniques (and dry farming) combined with their sensitivity to local needs, served them in good stead in the arid Maghreb.

Private and Imperial Policies for Proper Cultivation

A conscious application of eco-agricultural and long term social concerns is evident in a series of legal inscriptions which encouraged proper development. In Africa, as in Italy, a movement began in the late 1st century A.D. among large landowners to counteract the land glut, which began here with the Marian settlements (c.100 B.C.).¹⁵⁶ On the private Mancian estate, squatters were encouraged to cultivate unsurveyed lands by an offering of partial title. Squatters lacked only the right to sell, but had to pay a rent of one third of their produce and a corvée of a total of six days work per year.¹⁵⁷ Obviously the landowner stood to gain in such an offer, instead of letting the land go to waste. But the law reflects the general concern for keeping land cultivated.

That the traditional concern for land existed, and not a simple desire to reap profit from the tithe or to "stimulate production," is evident for a couple of reasons. Firstly, the offer was given to free labourers on a condition of partial ownership instead of turning the land into slave farms. Secondly, the landowner chose sharecropping instead of fixed rents. Both slavery and fixed rents, as we argued above (p.97 & 100) were known as causes for mistreatment of land and thus less profitable sharecropping was instituted.¹⁵⁸

Thirdly, five year rent-free inducements were given for the planting of vines and figs, and ten years for olives, encouraging farmers to change from solely wheat production, the simplest, most sure source of agricultural income, to long term investment in arboriculture and diversified in-

tercultivation methods. Wheat alone cannot be sustained, especially on the steep hillsides of the Bagra das, because the lack of wind barriers and vegetative cover between croppings leads to serious erosion. The change from wheat (evident in earlier inscriptions) to horticulture (pre-dominant in later) betokens a conscious realization of the problems of cereal cultivation in an arid land, and a pragmatic and ecological decision to right a previously damaging practice. ¹⁵⁹ Such a decision must have been based on traditional farming wisdom, and as we shall see social concerns for status, continuity and the gods.

The Lex Manciana comes down to us from the imperial inscription of Henchir Mettich (c. 116/7 A.D.). In this inscription, Trajan extends this law to other estates of the Bagra das region. He demonstrates a concern for the soils not only by also giving tax breaks for those starting vineyards or olive and fig orchards, but by further charging immediate taxes on fields planted with grasses for the herding of animals. This grass tax must relate to the traditional social-ecological cares for the land and dislike of massherding, because vetches, a form of grass which was used specifically for soil improvement as a green manure in arid lands, were exempt from this tax. This may well have put "direct pressure on conductores and procuratores to replace pasture by arable farming." ¹⁶⁰ Further, the encouragement of vetches suggests the Roman administration was knowledgeable of farming methods beneficial to soils and appropriate to the region and actively supported their use against destructive herding.

Also in the traditional vein of upkeep of property, penalties of forfeiture were inflicted on any farmer, who having obtained the land through cultivation, failed to keep it under cultivation for two years running. This would be extremely important on terraced plots, which need constant upkeep to prevent soil erosion. Due to a mutilated clause in

the inscription, we cannot tell if this penalty was part of Mancian law or newly implemented by the emperor.¹⁶¹ Whomever, it reflects the ancient antipathy of land abandonment and waste, and the general movement in the late 1st and early 2nd century back to the ecologically sound traditional ideals.

This progression seems to reach its peak under Hadrian. Firstly, whereas the Mancian law applied to unsurveyed land, (usually uncleared scrub or marginal land) the terms in Hadrian's inscription of Ain Wassel (A.D. 117/38) applied to all land "suitable for olives and vines and grains...even of those parts among the leased out surveyed parcels" on estates that had lain uncultivated for over ten years. Thus, Hadrian extended the penalties of forfeiture to private landowners, by making their surveyed lands open to squatters. Here, most definitely,¹⁶² we find the traditional Catonian concern for proper upkeep of land. Secondly, we also see in the specification "suitable" the concept of planting what is appropriate to nature's covenants for each locality.

Thirdly, Hadrian's lex de rudibus agris especially encouraged the cultivation of "wasteland," by which we may infer stony and rubble lands, as the soil term rudus suggests, but also as we have seen swamps.¹⁶³ Considering the traditional sense of responsibility to improve the condition of the land, the inscription's stipulation of wasteland may well reflect a desire to improve those areas then subject to desertification. The present interpretation of the limes as a boundary to control native pasturing of herds in the arable plateaux adds to this thesis.¹⁶⁴ The Roman took into consideration the greater environmental conditions for his own survival. Hadrian, whose concern for the depletion of the forests of Lebanon led to an "army" of inscriptions across the Lebanon range to

protect them, surely was capable of thinking for the greater environment of North Africa. (See above Chapter 2, p.45-6).

That Hadrian did think of development on a large scale is obvious as the lex Hadriana (as it is also known), extended the terms of the Lex Manciana to all tractus of Africa. This had social as well as environmental benefits, for it made farmland available to a much wider population base. But it also encouraged cultivation of wasteland throughout the African provinces. That he did think on an ecological level is arguable from the fact that he extended the ten year tax free inducements for orchards to grafted trees, which bear fruit much quicker than new planted trees, increasing the ability and desirability of starting and succeeding at ecologically sound arboriculture.¹⁶⁵ Of course this may reflect other political interests, such as the acquisition of oil for the poor of Rome, but in the holistic context of the moral-political tradition and Hadrian's and the Romans' worship and sense of interdependency with nature, political concerns were often one with ecological concerns. Moreover, "the rapid spread of olive growing all over Africa, ..due to a large extent to the privileges granted by Hadrian to prospective planters," was far greater than the needs of Rome.¹⁶⁶ Hadrian's efforts seem to reflect genuine socio-ecological concerns.

The Necessity of the Roman Rural World View to Africa's Agricultural Golden Age

We also argued above that the Roman concern for proper upkeep of land lead to the realization and tradition of the importance of the small farmer to the continuity of the soil and state. Hadrian made titles to the land more definite for the squatters. Whereas Mancian law promised quasi-possession, and Trajan promised to protect the mortgages and pledges. Hadrian guaranteed full possession, usufruct and "of leaving it to

their heirs." Such inducements were of great value to the ecologically sound small farmer. It must be remembered that much of the land was of poor quality and that "the best of farmers would give up courage on some of these hillsides" and plains.¹⁶⁷ The small farmer in Africa needed a supportive socio-economic paradigm, one that gave him (and the wealthy) motives and rewards other than material gain, and a government that would protect him from the abuses of greedy landlords and corrupt conductores who would make the work unbearable. All this he found in the traditional rural world view and its triumph through the 2nd century emperors.

This moral idealism and pride in farming is in evidence among Romano-Africans in the 2nd century in epigraphical boasts, such as the veteran Flavius Secundus' claim to be the first man to grow grapes in the region of Cyrene. Or in the famous inscription of the harvester of Mactar, who having raised himself to a position of decurion from abject poverty, proclaims, "so it is that my labour brought me brilliant years which no envious tongue ever dared assail." Just so Cato wrote over 400 years earlier, saying farm work is the most respected work and "looked upon with the least hostility."¹⁶⁸ Either the Mactar peasant fully assimilated Roman ideals, or Roman ideals were identical to his.

Similarly, the Romano-African had a religious attachment to land. The agricultural deity Saturnus the Sower (*sero, satus*), associated with fertility and prosperity, appears to have been the most worshipped god in Africa.¹⁶⁹ His inscriptions outnumber those of other gods 10 to 1. There is a possible, if not definite, connection of his worship to the Roman sense of responsibility to the state's continuity. The agricultural Golden Age of Virgil (above p.93) was closely associated with Saturnus.¹⁷⁰ Romans had long considered farmers the only descendants of Saturnus. Virgil immortalized this role, making him an early king of Latium and a

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farmer and closely intertwined his myth with the entire Augustan vision. Saturn's name was synonymous with the Golden Age and the Golden Age synonymous with peace, agricultural prosperity and good government. 2nd century emperors went to great lengths to associate their reigns with the Golden Age. It is the underlying theme of all the coinage of Hadrian (fig.18).¹⁷² It is not unlikely that the Romano-African who so admired Virgil saw the connection between Saturn in the prosperity of his own age, especially since the spread of the cult of Saturnus went hand in hand with the expansion of Romanization and agriculture.¹⁷³ The small farmer, and the large landowner too, had in Saturnus a perfect religious symbol and social justification of their way of life in Rome's growth and Africa's own agricultural Golden Age.

We find the same pride in agriculture among the rich in the realistic detail of farming mosaics from this period (fig.17a-b). The workers are dressed in clothes appropriate to the job, the tasks are portrayed with an obvious knowledge of and pride in farming, down to how the plougher makes a shallow furrow, as we have seen. Although mosaics of Zliten and Cherchel are exceptional in the skill of their representation of country life, there are plenty others, such as the mosaic from the Maison de La-berii at Oudna which reveal a widespread "interest in the land."¹⁷⁴ This interest is also evident in the season mosaics which celebrate the cycles of produce and the fertility of the soil and a Golden Age.¹⁷⁵ The later 4th century mosaics, in contrast, focus more on the sumptuous villas and the landowner's fine clothes, quite out of place with and ignorant of farm work.¹⁷⁶ The pride became the possession of land, no longer the proper working of it. A preoccupation for wealth grew, while paganism and its love of the land declined.

Again, this is not to say greed did not exist earlier. But in the 2nd century, the Romano-African elite had reason to adhere to the ideals of frugality and social responsibility inherent in the traditional Roman rural world view. For beginning with the Antonines, Africa began to make her way into the Roman Senate and administrative positions. Prior to the 2nd century there were only six Senators from Africa. Between Hadrian and Commodus, Africa (with Asia) provided more Senators than Italy herself.¹⁷⁷ And like noves homine from Cato onwards, they "energetically adopted the attributes of a civilization to which they were relative newcomers."¹⁷⁸

Countless acts of munificence demonstrate a pride in social duty. Libraries such as at Timgad, child assistance funds such as at Sicca Veneria, and aqueducts from Cirta to Timgad are among the munificent donations by Romano-African patrons.¹⁷⁹ There seems to have been a special importance attached to the donation of aqueducts as they are usually dedicated to emperors. The Aqua Flavia at Mascula and the Aqua Septimius Felix at Timgad are two examples.¹⁸⁰ This honour concerning aqueducts reflects a consciousness of the importance of water in the region and the Roman valuing of usefulness to the community. The African elite championed such traditional values in order to earn acceptance among their new peers. Indeed, Champlin believes that Africa outstrips all other provinces in voluntary assimilation and Romanization.¹⁸¹

Africa was, thus, doubly blessed by its timely entrance into the Senate and the triumph of the traditional values through the Antonines, which must have encouraged emulation.¹⁸² For 2nd century emperors appear to have made every possible effort to ensure agriculture was successful. Besides the extension of and improvements on the Lex Manciana, they refused to raise taxes which would burden farmers rich and poor. Hadrian

and Marcus Aurelius waived debts of African farmers to the annona. They purposefully lived frugally to ensure taxes stayed low. Marcus Aurelius even sold off his own property rather than burden the provinces with a tax hike. ¹⁸³ Such actions would have prevented the need of landowners to be oppressive to their tenants in order to meet the grain tax. Tenant farmers received even further protection from Trajan and Hadrian who actively restrained the abuses of governors and procuratores. Thus the ¹⁸⁴ small, thrifty and responsible agricola bonus could survive.

The importance to proper agriculture in Africa of such traditional anti-capitalist values and actions against individualism can hardly be stressed enough. For with Commodus' departure from the frugality of his father, and his drastic increase of the annona, necessitating the creation of the Classica Commodiana, we begin to hear of abuses by landowners and conductores. The inscription of the Saltus Burunitanus tells of the horrible injustices of the tax collectors, even torture when the tenants tried to make appeals. We assume by the publication of the inscription that the tenants received justice, Commodus still fulfilling the traditional role of Tribune. ¹⁸⁵ But in the later empire, when emperors losing the ancient virtue of diligence no longer hear the petitions of the poor, then abuses get out of hand. We find in Tingad in 362/3 a list published in the forum which issued for the whole province required tips (commoda) which were to be paid to the chief of staff of the governor for litigation of any case. The price mounted rapidly if any of his clerks needed to travel. As MacMullen has shown, what was once probably practiced but kept in check by traditional attitudes and moralist attacks, becomes publicly accepted, or legitimized. ¹⁸⁶ By the 5th century, one-third of all farms in Africa Proconsularis lay deserted. Laws had to be established to

prevent tenant farmers from running away from the land. Obviously the burden became unbearable.¹⁸⁷ Concern for the gods, the land and the state, the greater community of the people and nature is lost to the individualism inherent in Christianity. Under the weight of increasing graft and taxes, the small farmer, whom Jones calls the backbone of the empire, is broken and so is the empire.¹⁸⁸ It crumbles with the pagan view of the interdependency of nature, agriculture and civilization, which had earlier created a Golden Age in Africa.

2nd century imperial policies clearly gave great inducements to proper agricultural development. Through taxes on herding, tax breaks on arboriculture, inducements to the poor and protection of the small farmer, they played a major role in applying the Roman eco-agricultural attitudes and methods to North Africa. Modern scholars are correct in attributing to Trajan and Hadrian the expansion of "the higher forms of agriculture" throughout the Maghreb, especially olive orchards.¹⁸⁹ The efforts made visible in the imperial inscriptions show a desire on the part of the emperors "to get the best possible results, and an effort on both sides to adapt the crops to the lands so far as the lands were arable."¹⁹⁰ Farmers poor and rich appear to have used light ploughs, dry farming methods and irrigation techniques that were appropriate to the arid climate and soils of the Maghreb. Their pride in farming, their religious respect of nature, their social obligation and sense of duty to the state and its future, all contributed to an ecologically sound agriculture. Sensitivity and adaptability to nature were the key to Roman success in North Africa.

CONCLUSION: A PRACTICAL HARMONY

The attitudes, methods and policies that account for Roman agricultural success in North Africa were based on a world view fundamentally different from, if not outright opposed to, the present Christian based capitalist and scientific imperialist paradigm. The pagan worship, sense of duty to and appreciation of nature both contributed to and was enhanced by the pragmatic understanding that human life and civilization can only exist within the bounds of nature. This perception led to the ecological concept that humans must consider themselves a part of nature's community and concern themselves with her health in order to ensure their own prosperity. Thus, contrary to the Deist mission of conquering and controlling all of nature to fulfil personal aims, the Romans set limits to human desires and development. They found a balance between nature and civilization in an agriculture that did not destroy the land.

This balance was further enhanced by pagan attitudes toward the afterlife and community, and the strong desire for worldly continuity inherent in animist and rural beliefs. On the socio-economic level, the realization that the survival of the state and soils were one led to strong social and political checks on land use and land size, and to an economic paradigm in which the small farmer was ideal and proper cultivation was far more important than profit. On the technological level, the primary and secondary ecological attitudes lead to a sensitive adaptation of farming methods and technology to meet the abilities of each region's soil, climate and environment.

These attitudes and methods were consciously applied in the Maghreb as is evident in the agricultural literature, imperial inscriptions, epigraphical boasts of the poor and mosaics of the rich. Ecological values did play a major role in Roman-North African success. Although the Romans did not state directly "let's make the desert bloom," we have seen that there are plenty of conscious praises and defences of nature, attacks on greed in direct relation to its harming of land, and calls for responsible improvement or upkeep of soils through the use of regionally appropriate methods and technologies. Contrary to the recent anti-imperialist criticisms, the Romans do appear to have had conscious concerns about maintaining soils. But also contrary to apologists, the Roman success was not one of the imposition of a "superior" technology. It was a tenacious preservation of methods, however primitive, proven to be appropriate to the locality and a sensitive adaptation of others, that were not appropriate, to meet this same criterion. The Romans simply were not scientific and capitalist imperialists in the manner of modern Europeans.

It is anachronistic to claim that the Romans were simply backward in their technology, and underdeveloped in their economy as if they were failed capitalists and scientists. It is, indeed, a particularly ridiculous criticism considering that they succeeded where we are failing miserably: sustainable survival in an arid land.¹ It is we who are the failures, the ecological delinquents in our relations with the planet and resources that give us life. It is we who are "living an ideology of death and accordingly are destroying our own humanity and the planet."² The Romans succeeded because of their application of an ethic of being which is more environmentally sound than ours. They were not perfect ecologists, they surely lacked in their treatment of animals, and often

humans. But in their careful management of trees, waters and soils, they never lost the traditional teachings of responsibility to the future and respect of the gods in nature and nature herself. And, as the root of Western Civilization, they are more approachable to us than more ecologically sound indigenous peoples. If there is anything of Rome we should try to emulate in these fragile times, it is their attitudes to the environment and their social-economic and moral-political priorities.

In short, the Romans fully recognized their interdependence with nature. Through a community ethic which included the poor, the dead, the yet unborn, and most of nature, through restraints on the forces of greed and individualism and an intelligent caution with new technologies, through a sensitivity to all the details of each environment, the Romans achieved an ecologically sound agriculture with which to ensure the prosperity of their civilization. Only when these traditional rural values broke down, did the small farmer leave the land and the Empire decline. Nonetheless they left a legacy of an agriculture in North Africa which, where imitated, endured at least until the 11th century A.D.. They left an ecology that remained in a healthy condition until the European invasion in the 1800s. And, the Romans left a legacy of ruins which show us our failure, our responsibility, and a challenge to survive in arid and all lands alike—the challenge of their legacy which shows that a high civilization can achieve a practical harmony with nature.

c) Chart of average annual rainfall from 25 year period at different stations throughout Algeria. Comparison to 24 inch annual average in dry parts of England. (L. Wernstadt, World Climatic Data, 1977, pp.1-5)
 * (Ancient name in brackets)

Mediterranean Coast:

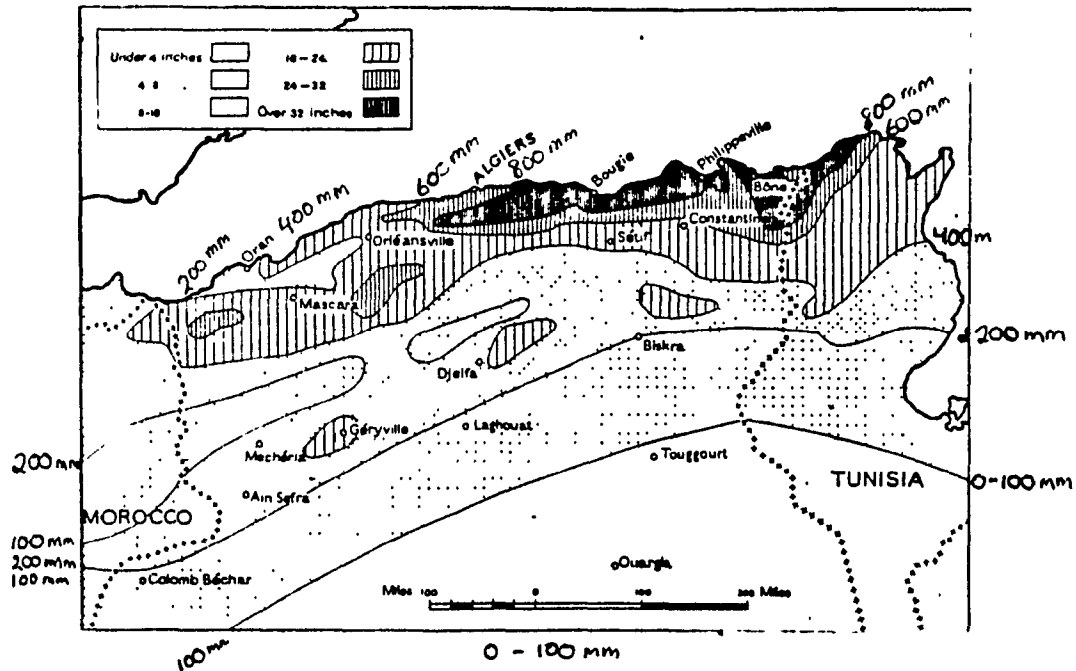
Bone (Hippo Regius), East coast	30.00"
Collo (Chullu), East coast	39.44"
Tenes (Cartennas), West coast	21.46"

High Plains:

Orléansville (Castellum Tingitanum), Chélif pl.	15.75"
Sétif (Sitifis), Biban, Sétif plain	18.46"
Tebessa (Theveste), Sétif plain, c. Aurès	13.31"
Tiaret, Sersou plateau	24.49"

Sahara Desert, Northern Edge:

Biskra (Vescera), southern flank of Aurès	6.00"
Laghouat, South, beyond Roman limes	6.68"
Tozeur, Chott Djerid	3.49"



d) Map of mean annual rainfall in inches, with isohyets (rainlines) provided in millimeters. (map Sherwin-White, above, isohyets adapted from Regine Van Chi bonnardel, The Atlas of Africa, 1973, p.34).

Appendix B:
"Climatic Fragments" on North Africa from Ancient Sources

1. "Dry Fragments":

Direct mention of desert:

Diodorus Siculus	III,50
Herodotus	II,32
Orosius	<u>Seven Books Against the Pagans</u> , trans. by R.J. Deferrari in <u>Fathers of the Church</u> , vol.50 (Washington D.C., The Catholic University of America Press, Inc., 1964) p.17
Pliny the Elder	V.i,5 V.i,14-15 V.iv,27 V.iv,26 V.v,35 V, 51 & 52
Sallust	<u>Jug.</u> , LXXV,2
Strabo	XVII,3,i II,5,33
Tertullian	(Raven, <u>Rome in Africa</u> , 1969, p. 72)
Theophrastus	<u>Enquiry into Plants</u> , IV, 3,5

Very Sandy:

Corippus	<u>Johannide</u> , II, 158 (South of Aurès)
Herodotus	II,32, IV, 181
Justinian	XLIV,1
Pausanius	I,33,5 (rains soaked up by sand)
Pliny the Elder	V. v. 33-35
Pomponius Mela	I, 31 I,32 III,100
Seneca	<u>Natural Questions</u> , III,6
Strabo	II, 5,33 XVII,3, 20&23 f.

Lack of any or all: water, rain, animals, vegetation or humidity:

Aristotle	<u>Histor. animalium</u> , VIII,28, 7
Columella	I,6.24 V.5.4
Diodorus Siculus	III, 50-1 XX,42
Eumenius	<u>Orat. pro restaurandis scholis</u> , 21 (Gsell, p.52)
Herodotus	IV, 185, & 173-5
Lucan	IX,431 f.
Pliny the Elder	X,201
Posidonius	(in Strabo) XVII,3, 10
St. Augustine	<u>Psalm</u> , LXXX. 1 CXX, 15
Sallust	<u>Jug.</u> , XVII,5 LXXXIX,4 LXXXIX,5 XXXIX,3
Seneca	<u>Natural Questions</u> , III,6
Strabo	XVII, 3, 23
Theophrastus	<u>Enquiry into Plants</u> , IV, 3, 5

Uninhabitable heat and aridity—hot and dry, burning sun:

C.I.L.	VIII, 118224, verse 13 (inscription from Maktar)
Columella	III, xii,1
Corippus	<u>Johannide</u> , III, 24-5 VI, 285-6 & 294
Frontinus	<u>De controversiis agrorum</u> , in <u>Gromatici veteres</u> , p.36 (Gsell, <u>Le Climat</u> , 1911, p.52)
Manilius	4.728-30

Pomponius Mela	I,32
Pliny	V.1,15 V.26 & 35 (South of Aurès)
St. Cyprien	<u>Ad Demetrianum</u> , 3
Sallust	XLVIII,41-5 LXXXIX,7
Solinus	XVII, 3. 20-3
Strabo	XVII,3,5 & 8, after Artemiodorus(Gsell,p.23)

Comparisons to other countries which emphasize "burning" heat and dryness:

Justinian	XLIV,1 (Gsell, p.52)
Vitruvius	<u>The Ten Books on Architecture</u> , VI.i,4-9, trans. M.H. Morgan 2nd ed., (N.Y., Dover Publ.1960)p.171-3

Drought / no harvest:

Arnobius	<u>Adversus gentes</u> , I, 16 (Gsell, p.58)
C.I.L.	VII,2610 & 2609 (A.D. 128) VI 9520 VI 1736 (Mentions governors providing relief during drought) VIII, 9250
Corippus	<u>Johannide</u> , VI,247 (A.D. 547)
Histoire Auguste	<u>Hadrien</u> , XXII,14 & 121
St. Cyprien	<u>Ad Demetrianum</u> . 2, 3, 7 & 8 (3rd century A.D.)
Strabo	XVII,1.3-4 (famine, drought corrected by irrigation)
Symmaque	<u>Lettres</u> , IV,74 (A.D. 383) (Gsell, p.59)
Tertullian	<u>Ad Scapulam</u> , 3 (A.D.202)
Victor of Vita	III,55 (A.D.484) (Gsell, p.58)

Drying up of rivers:

Appian	<u>Bell. Civ.</u> , II,45
St. Augustine	<u>Psalm</u> , LXXX,1

Troops lacking water:

Caesar	<u>Bell.Afr.</u> , LI.5
Cassiodorus	VI, 473,93 & 513 (battle over a river as water source between Byzantines and Indigenes.) Also mentioned by St. Augustine <u>Psalm</u> , XXXVI,9
Procopius	<u>Bell.Van.</u> , I.15,34 & <u>Edifices</u> , VI,6
Sallust	<u>Jug.</u> , LXXV,3 (Marius needs to have water provisions for a march on Capsa)
Velleius Paterculus	II, liv. 1-3

Aquilegi, (men hired to search for water sources):

Cassiodorus	III.53
C.I.L.	VIII,8809

Prayers for Rain:

St. Augustine	<u>Psalm</u> . XCVIII.14
Tertullian	<u>Apolog.</u> 23

Thirst quenching foods of the Garamantes:

C.I.L. VI,1736
Pliny the Elder X, 201

Sirocos (hot and dry South winds):

Aristotle Meteorologica, II,3 28
Corippus Johannide, VII,322 ff. VI,272-3 VIII,84
Herodotus IV, 173
Horace Satires, II,6,18 Odes, III,23,5
Lucan IX, 463 f.
Pliny the Elder XVIII, 329
St. Augustin Anot. in Job, 38,24 (Gsellp.54)
Victor of Vita III,56 (wind dries up all life)

Haboobs (sand storms):

Mela Pomponius De situ orbis, I, 39(Kish, p.129)
Sallust Jug., LXXIX, 6
Silius Italicus XII,656-7 XVII, 246-8

Harvesting same as now:

Columella XI,2, 60
Procopius Bell. Van., I,16,i I,17,10
St. Augustine Psalm, CXXXVI,9
St. Cyprian Ad Donatum, I

2. "Wet Fragments"

Rain in south of Morocco and Ethiopia in the summer like today:

Strabo XVII, 3,7

Rain rare, spring or fall, torrential like today:

Caesar Bell. Afr., XLVII (46 B.C.)
C.I.L. VII, 10298-9, 10304, 10308-9, 10315, 10320, 10323,
22371-3, 22379
Corippus In Laudem Jusitini, IV,215 Johannide, III,256
Dio Cassius LX, 9 (A.D. 238 near Carthage)
Frontinus De Controversiis agrorum, in Gromatici veteres, p.47
(Gsell, p.62)
Histoire Auguste Gordian III, XVI,2
Inscription Bull. archaéologique du Comité, 1908 p. CCXLIII
ibid, 1899, p. CLXXXI (Gsell, p.62)
Orosius V, 15, 15-16
Plutarch Pompey, 12 (42 B.C. in desert)
Ptolemy XII,3,2
St. Augustine Psalm, LXXVI,5 XCVIII,14 LXX (1st part) 7,
CXXIX,8 CXXXVI,5 Letters, XCI,8
Sallust Jug., LXXV,7
Tertullian Ad Scapulam, 3 (A.D.212)

Rain—wetter on coast like today:

Pliny the Elder V.14
St. Augustine Psalm, LXXX, 1 XCVIII,14 Lettre, CXXIV, 1
(too much rain. winter of A.D. 410-11)
Solinus XXVII, 5 (Gsell, p. 62)
Strabo XVII, 3, 10 (from Posidinus)

Humid south wind: (But Gsell argues that these authors think
of the Italian South Wind, p.55)

Claudian De Consulatu Stilichonis, II, 395
Statius Silves, I, 6,78

Cool north-east summer winds on Egyptian coast same as today:

Galen (Gsell, p. 55)

North west winter winds that bring rain to coast like today:

Lucan III, 69-70 IX,422-3
Statius Thebaid, VIII, 410-1

Water oriented animals, hippopotamus and crocodiles:

Periplus of Hanno 9 & 10

Dew in the night gives moisture to plants:

Pliny the Elder (Gsell, p.56)

Snow in Atlas, but only in winter or in high Atlas, like today:

Dio Cassius LXXX,13
Pliny the Elder V.14 (confirming Suetonius Paulinus —Gsell, p.56)

Mild seasons:

Appian Pun., 71 (winter not too cold, summer not too hot in
Numidia. But Gsell notes that Appian, Pun.,73 writes of
Africa being excessively hot.)

Excerpt of Sallust describing area much as it is today.

In that part of Numidia which the partition had given to Adherbal there was a river flowing from the south called the Muthul, and about twenty miles from it was a naturally desolate and uncultivated range of hills running parallel with the river. From about the middle of this range an elevation branched off and extended for a long distance, clothed with wild olive, myrtles and other varieties of trees which grow in a dry sandy soil. The intervening plain was uninhabited from lack of water except the parts along the river which was covered with shrubs and frequented by cattle and farmers.

Bellum Jugurthinum, 49.3-4

Appendix C: Roman Agricultural Religion

A) Comparison of Greek Urban and Roman Agricultural Pantheon

Greek Pantheon	Roman Equivalent	Roman Agricultural Gods
Zeus (thunder, sky, king)	Jupiter	Jupiter (sky, rain)
Hera (wife, marriage)	Juno	Tellus (earth mother)
Apollo (son, civilization)	Apollo	Sol (sun)
Artemis (virgin huntress, moon)	Diana	Luna (moon)
Demeter (crops)	Ceres	Ceres (grains)
Dionysus (wine)	Bacchus, Liber	Liber (vines)
Athena (protectress of cities, olives)	Minerva	Robigus (disease in grain)
Hades (underworld)	Pluto	(rich in farm produce) Flora (power of blossoming.)
Aphrodite (love)	Venus	Venus (garden)
Hestia (hearth)	Vesta	Lympha, (moisture)
Hephaestus (smith)	Vulcan	Bonus Eventus (good issue)
Poseidon (ocean)	Neptune	Neptune (watering).

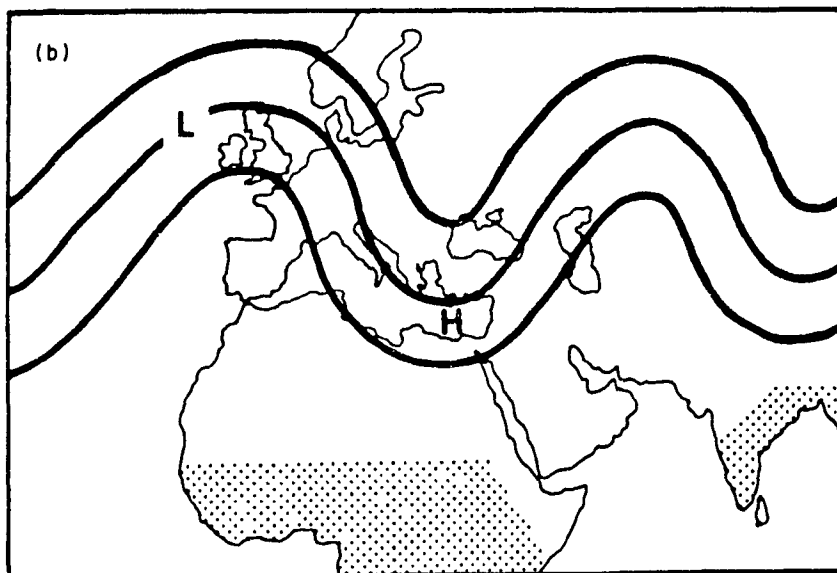
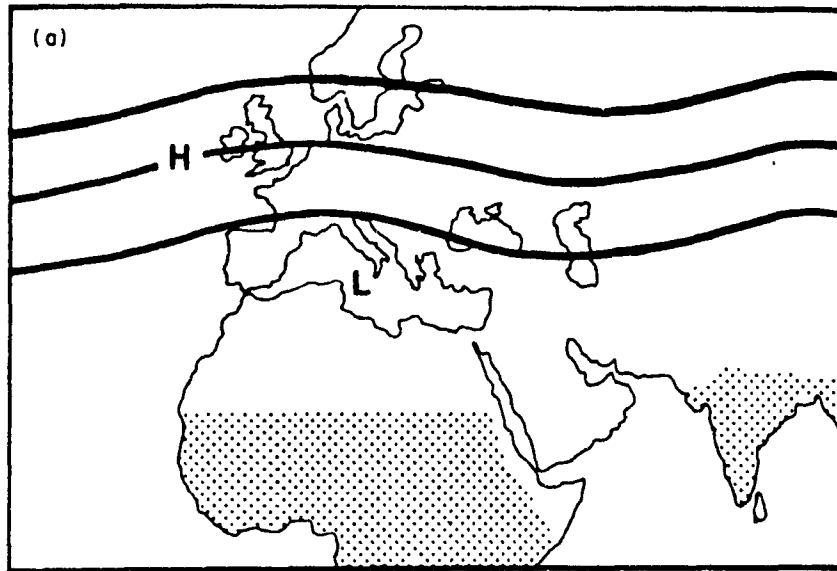
B) The Roman Calendar, Festivals and Agricultural

*March:	No festival, beginning of ploughing, and war campaigns.
April:	<u>Fordicalia</u> offering of pregnant cattle.
	<u>Cerealia</u> Ceres, grain growing.
	<u>Paralia</u> shepherds' festival.
	<u>Vinalia</u> offering of new wine to Jupiter.
	<u>Robigalia</u> propitiation of Robigus, spirit of disease in grain.
May	<u>Lemuria</u> festival of dead.
June:	<u>Mater Matuta</u> festival of goddess of women and of Vesta.
July:	Dangerous heat, few obscure festivals.
*August:	No festival, harvesting of corn.
September:	Rest after August, then 2 week festival of Rome.
*October:	No festival, vintage and closing of campaigns.
*November:	No festivals, winter ploughing and sowing.
December:	<u>Consualia</u> honouring Consus, spirits of harvesting and storage.
	<u>Saturnalia</u> celebrating the gifts of the land.
	<u>Opalia</u> in honour of Ops, the power of plenty.
	<u>Divalia</u> winter solstice, return of the sun.
	<u>Larentalia</u> in honor of ancestors, <u>Lares</u> .
January:	<u>Carmentalia</u> honour of spirits of prophecy and childbirth.
February:	<u>Lupercalia</u> month of purification, 6 festivals in all.
	<u>Parentalia</u> dead parents, ancestors.

*Note festivals not held during major agricultural operations, and when held the majority celebrate some aspect of agriculture.

Figure 1. Zonal Circulation Systems

Demonstrating the opposing rainfall systems of North Africa and the Mediterranean to Northern Europe and the Equatorial Regions.
(Pearson, Climate and Evolution, 1978, p.42)



H = High rainfall (low pressure system)
L = Low rainfall (high pressure system)
dots = summer monsoons

a) When a high rainfall system (ie. low pressure) is over England, the Mediterranean and North Africa are in a high pressure system and receive little rain. This high pressure system allows the monsoon rains to move further North, resulting in higher Nile floods.*

b) When rainfall is low over England, the low pressure system (high rainfall) moves southwards over the Mediterranean and North Africa, forcing the equatorial monsoons further South, resulting in low Nile floods.*

* Contrary to Brooks, Climate through the Ages, pp.338-340, who interprets high Nile floods as a wetter climate.

Figure 2. Climatic Chronologies From the Last Ice Age Until A.D.1000

	<u>Brooks, (1949)</u> "Post Glacial Sucession, Western Europe," p.296	<u>Lamb, (1963)</u> pp.5-8 & 59-69 Secular	<u>Butzer, (1966)</u> pp.72-6 Sahara
B.C.			
15000-5000			Desiccation:
8300-7000		Generally wetter than now	low rainfall
6000	Boreal: dry becoming warmer		
5000	Atlantic: warm becoming wetter	Climatic Optimum: wetter and warmer	Subpluvial: moister
4000	Climatic Optimum: humid	" "	" "
3000	Sub-boreal: becoming	becoming drier	
2500			"Hyper-arid"
1000	cooler and drier		
850		Sub-Atlantic:	Hyper-arid ends
500		no dry season	still arid
200		extremely cool and wet	
100		Continuance of Sub-	Similar to today
0	Sub-Atlantic: cool & wet	Atlantic: slightly wetter than today	
A.D.		Progressively getting	
100		drier but still wetter	
200	Return to slightly ranier	than today	Arid period
300	period	Beginning of 2nd	like todays
400		Optimum: warm	starts to
500		and dry	end.
600	Heavy desiccation		
1000	Near Present		



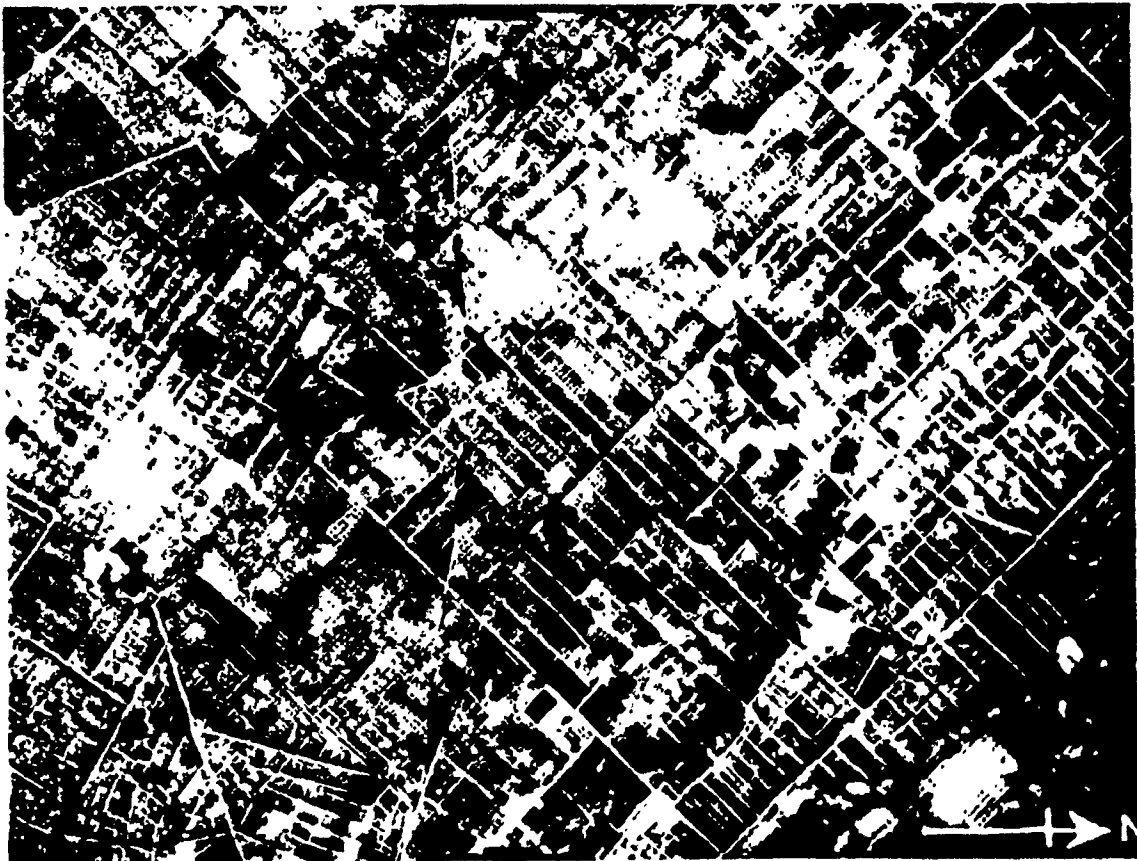
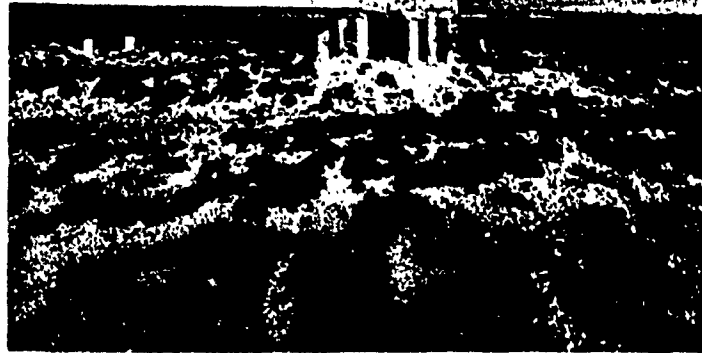
Figure 3. Modern Success With Ancient Punic-Roman Dry Farming Methods

- a) Olive grove at Sfax, Tunisia, note dry, sandy soils.
(Le Houerou, "North Africa, Past, Present, Future," in ALIT, p.255)
- b) Olive grove Libya. Demonstrates success even in desert like conditions.
(Raven, Rome in Africa, 1969, p.75)

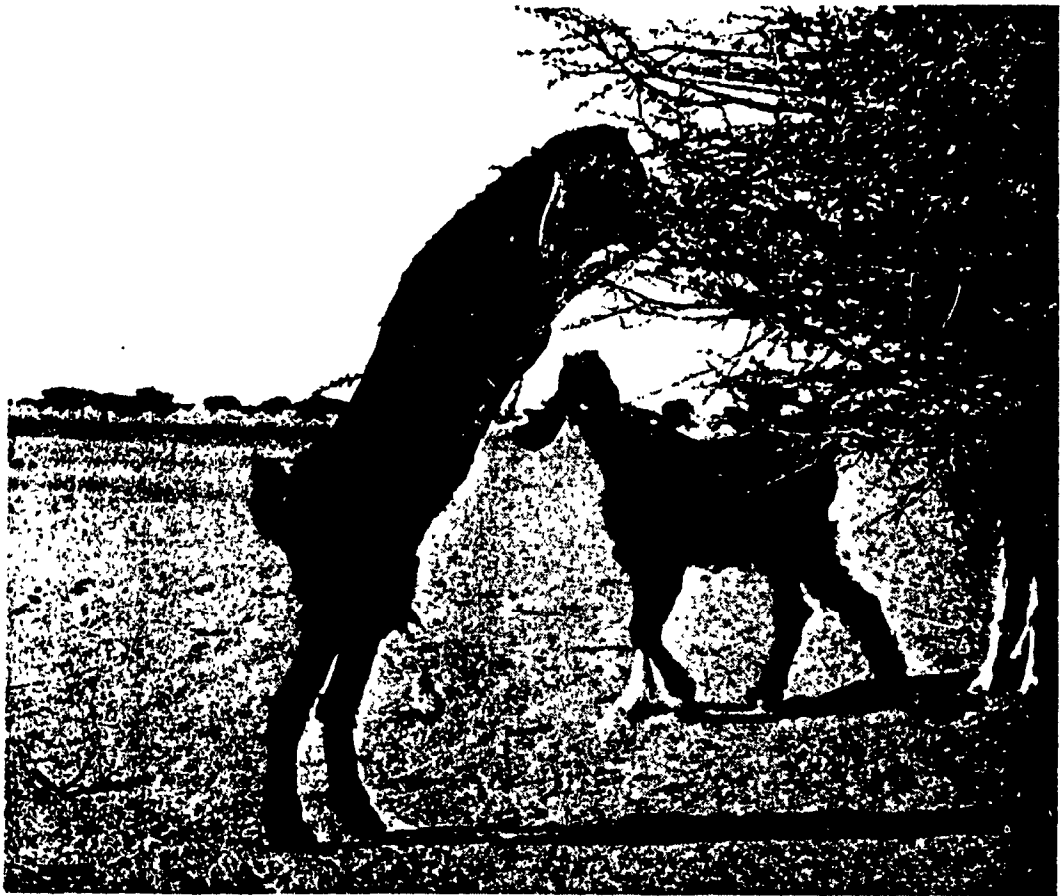
Figure 4. Roman Plains
Agriculture

a) Ruins of Roman olive
oil mills and presses
in southern Tunisia
(Le Houerou, "North
Africa, Past, Present
and Future," in ALIT,
p.247)

b) Aerial photograph of
centuriation in
Tunisia. (Mackendrick
North African Stones
Speak, 1980, p.31)



a)



b)



Figure 5. Goat Made Deserts.

a) Goats browsing, Omdurman, Sudan

(Cloudsley-Thompson, "Animal Utilization," in ALIT, (1970) p.63)

b) An enclosure protecting grasslands from being grazed by goats, Sudan.
Note in comparison the barren unprotected grazed foreland.

(Kassas, "Desertification versus Potential for Recovery," *idem*, p.133)

Figure 6. Deforestation

a) Tingad among the now barren Aurès Mountains which the explorer Bruce found covered with cedars only 200 years ago. (Photo from Mortimer Wheeler, Roman Art and Architecture, 1964, p.49)



b) Deforested Saharan Atlas north of Biskra, Algeria. Probably clear cut in the late 1800s. (Photo from Drouhin, "Alternative Uses of Arid Regions," in ALIT, 1970, p.107)

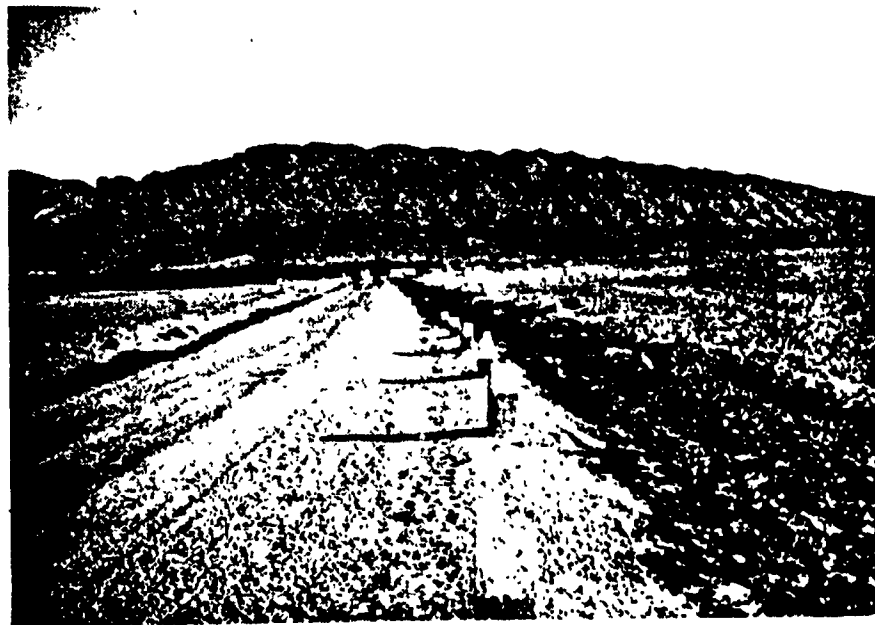
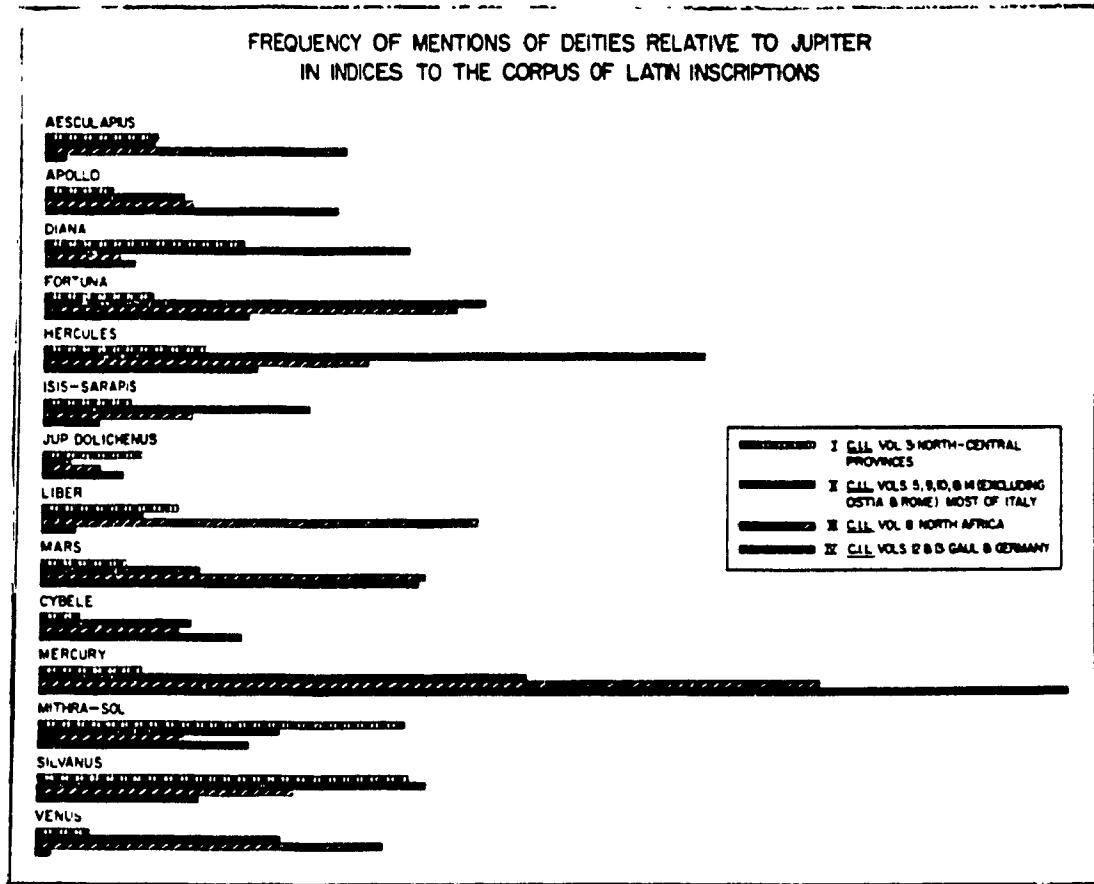


Figure 7. Frequency of Mentions of Silvanus in the Corpus of Latin Inscriptions in Relation to Major Deities. (from Ramsay MacMullen, Paganism in the Roman Empire, 1981, p.6)



Note also:

- a) Mercury's popularity in Africa, who was often worshipped with Silvanus, as one deity, Mercury-Silvanus, protector of Olive Orchards.
- b) Liber's popularity, who was a god of wild vegetation as well as wine. See fig.13b. p.149.
- c) Venus' popularity, who was also a garden spirit and along with Cybele, Isis and Diana (woodland goddess) were associated with aspects of the Earth Mother Goddess' power. Thus combined, the cult of the Earth Mother was extensive. (See Chapter 3 p.88 note 14.)

a)



b)

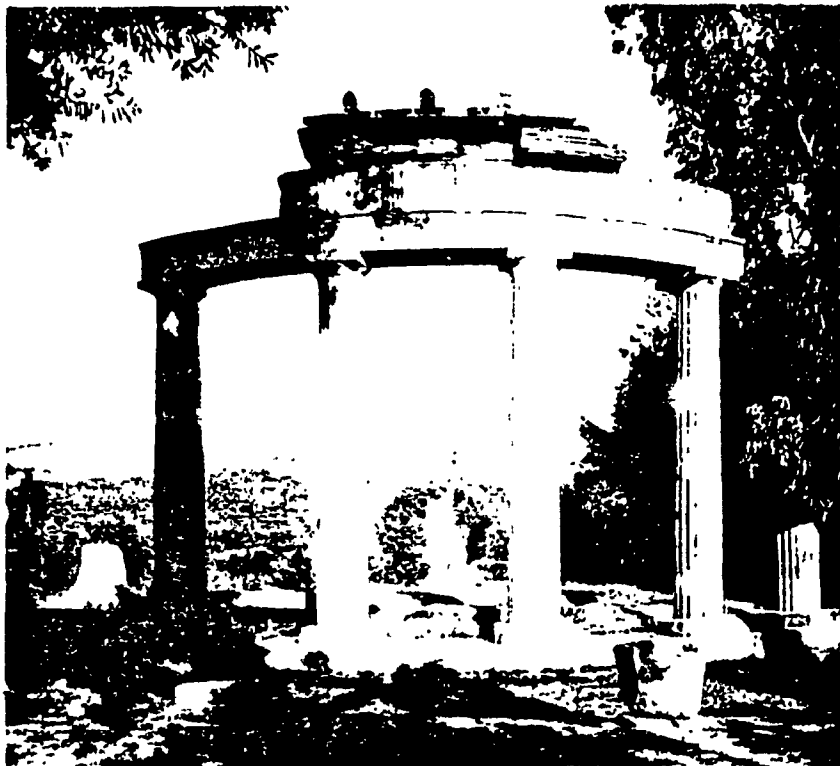


Figure 8. Sacro-Idyllic Landscapes Past & Present.

a) English landscape garden with temple to Apollo, based on Roman temple of Venus at Baalbek. Stourhead, England, designed and landscaped 1744-56 by H. Hoare and H. Flitcroft. (Janson, History of Art, 1976, p.558).

b) Ruins of a small temple in gardens of Hadrian's villa at Tivoli, overlooking the vale of Tempe. 2nd c. A.D. (Wheeler, Roman Art and Architecture, 1964, p.139).

c)



c) "Landscape with
Sacrifice to Apollo,"
by French Italophile,
Claude Lorraine, 1662.
(Gombrich, Story of Art,
1972, p.309).

d)

d) Roman sacro-idyllic
landscape painting from
villa of Agrippa Post-
umus, near Pompeii,
pre A.D. 79. (Zanker,
The Power of Images in
the Age of Augustus,
1988).





Figure 9. Ancient Romantic Scenery Painting, "Garden of Livia," Prima Porta, Italy, Augustan, shows clear Romantic tendencies among ancient Romans in the appreciation of nature for its own sake. (Wheeler, Roman Art and Architecture, 1964, p.185).

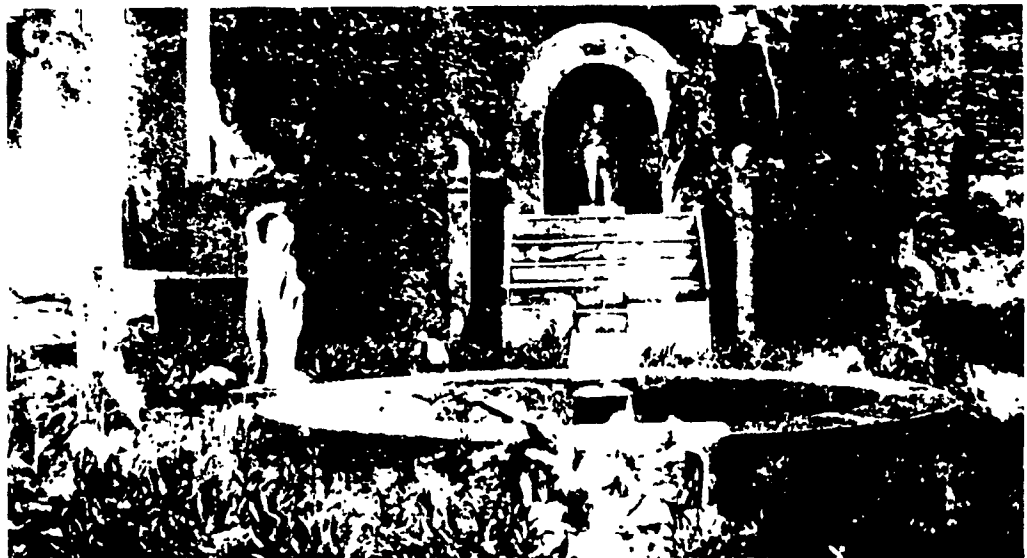


Figure 10. Ancient Garden as Actual Worship of Vegetation Spirits, House of M. Lucretius, Pompeii. Shows how the wealthy created "rich mythological landscapes" in their houses, but also that shrines reflect real religious beliefs. Niche with statue in back is actual altar. (T.C. Blagg, "Society and the Artist," in J. Wachter, ed., The Roman World, 1987, p.735)

Figure 11. Modern Moralistic Interpretation of Nature versus Ancient Action scene.

a)



b)



a) Detail of modern Romantic painting, "Lion Attacking Horse," by George Stubbs, 1770. Note the use of dark tones to portray nature as savage and evil, esp. the lion, while the horse, commonly associated with humans and tamed nature, is white to portray innocence; shows a moral interpretation of nature. (Janson, History of Art, 1976, colour plate 89).

b) Similar scene from antiquity, "Lion Attacking Bull," mosaic from Hadrian's villa at Tivoli, A.D. 130. This is a simple action scene. There is no use of light and dark to portray nature as evil. (Wheeler, Roman Art and Architecture, p.188).

Figure 12. Augustan Revival and African Abundance.



a) Immitation of the Augustan Ara Pacis, Carthage, 1st-2nd c. A.D., showing transference of Augustan images and themes to North Africa. (Zanker, The Power of Images, p.246; cf p.173-4).

b) Aureus, coin of Hadrian, c. A.D. 134, representing Dea Africa with cornucopia in traditional position of terra mater, showing continuity of Augustan themes of abundance and fertility in 2nd c. A.D. and application in propoganda to North Africa. (H. Mattingly, Roman Coins, 1962, plate XXXVIII.6).



a)



b)



Figure 13. Celebration of Nature's Fertility, North Africa.

a) Zodiac with Seasons, mosaic from Haidra North Africa, 2nd c. A.D. Note lush vegetation for this and fig.13b; Cf fig.18 Zodiac figure on Hadrian's "Golden Age" coin. (Dunbabin, The Mosaics of Roman North Africa, 1978, plate LXI, fig.155).

b) Triumph of Dionysus, detail, Maison de la Chasse a Courre, El Djem, (Ibid., p.LXXI, fig.181).



Figure 14. Lush floral carpet design, Tingad. Acanthus leaves on Tingad Mosaic, 3rd c. A.D.. Detail from "Triumph of Marine Venus." This lush vegetation was typical of Tingad mosaic workshops. Compare to figs.13 a-b. (Dunbabin, plate G).

Figure 15. Virgil And the Muses, Hadrumetum, North Africa, showing high regard for Virgil in North Africa. (Dunbabin plate LI, fig.130).



Figure 16. Suovotaurlia, Sacrifice before tilling new ground. Sacrificial procession of bull, sheep and pig, offered to Mars, god of war and agriculture, when virgin land is to be opened to the plough. (Cato, Agr. 141; Photo from J. Ferguson, Religions, fig.36).



Figure 17. Realism and Knowledge in Farming Mosaics

- a) Mosaic, "Threshing Scene," c. A.D. 200, Zliten, North Africa, showing threshing done outdoors not in sheds like in Italy. Note also realistic detail, such as clothing, or lack of, and fact that work takes predominant place, villa only background. (Mortimer Wheeler, Roman Art and Architecture, p.188)



Figure 17b. Mosaic, "Labours of the Fields," c.2nd c.A.D., Cherchel, N. Africa, showing Intercultivation-dry farming methods and proper use of plough to make shallow furrow. (White, Farming, plate 19).



Figure 18. Golden Age, Aureus, Hadrian 121 A.D. stamped Aur.Sae. On it a figure steps through a zodiac hoop holding a globe on which stands a phoenix. This figure is taken to be the Genius Saeculi (Mattingly, p.cxxxi & J.M.C. Toynbee, Roman Medallions, p.91-2, attributed to Hadrian. Although I could find no association of Saturnus with this figure, the satchel which the figure carries could be the seed bag for the sowing god. However, this is pure supposition. Saturnus was usually portrayed with sickle and scepter or with chariot and horses. e.g., Crawford, Roman Republican Coinage, 2 vols. (Cambridge U.P., 1974) p.xlii. (Photo, Mattingly, Roman Coins, XLV,11a)



NOTES

INTRODUCTION - Pages 1 - 8

1. Donald Worster, "Doing Environmental History," in idem, ed. The Ends of the Earth; Perspectives on Modern Environmental History, (Cambridge U.P., 1988) pp.296ff; *ibid*, p.289f & p.306 on environmental history as "total history," plus on its historiography in connections to the Annales school; p.290 on its views concerning human relation to the planet.

2. On new men see D.C. Earl, Moral and Political Tradition of Rome, 2nd ed. (Ithaca, N.Y.: Cornell U.P., 1984) Chap. II, "The New Men;" See M. Rostovtzeff, The Social and Economic History of the Roman Empire, 2 vols.(Oxford: Clarendon Press, 1926) p.118 on the ideal period of the 2nd century as a public reaction against the frivolity and materialism of the 1st century.

3. Colin Wells, The Roman Empire, (G.B.: Fontana Paperbacks, 1984) p.248 on extension of limits of cultivation; See M.L. Parry, "Climatic Change and the Agricultural Frontier: a research strategy," on Scotland and T.H. McGovern, "The Economies of Extinction in Norse Greenland," for examples of the tendency to look to fragile climates for studies of human relations to nature. Both are in Wigley et al. eds. Climate and History, (Cambridge U.P., 1981) pp.319-334 & pp.404-33, respectively.

4. Donald Worster, Nature's Economy, A History of Ecological Ideas, 2nd ed. (Cambridge U.P., 1988) p.23 & 58 on main institutions of modern society and present ecological crisis. The label "Subversive Science," is originally from ecologists Paul Sears, "Ecology—A Subversive Subject," and Paul Shepard, "Ecology and Man— A Viewpoint," in P.Shepard and D. McKinley eds., The Subversive Science: Essays Toward an Ecology of Man, (Boston, 1969) p.9.

Christianity's contribution to ecological decline is still hotly debated, mainly due to religious bias. The original and one of the more honest critiques comes from L. White, "The Historical Roots of our Ecological Crisis," Science, 10 (March, 1967) vol.155 #3767 pp.1203-7, who though himself a "churchman," originally put out the thesis on Christianity's "burden of guilt" (p.1206); J. Black, Dominion of Man, the Search for Ecological Responsibility (Scotland: Edinburgh U.P., 1970), countered White, trying to put Christianity in a better light, especially Chapter 4, "The Concept of Stewardship," arguing that Stewardship did not give free reign to exploitation. Black also distinguishes between the "Priestly" version of Genesis ("dominate and subdue") and the more sympathetic "Jahweh" version of the creation myth(p.31-3). But he admits that Christianity is the "most relevant" doctrine to modern attitudes of abuse (p.24); American farmer, essayist, Wendell Berry, "God and Country," in idem, What Are People For? (San Fransisco: North Point Press, 1990) pp.95-102, has taken up this argument of stewardship. But both Berry and Black seem ignorant of the more complex ways in which Christianity contributes

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to modern attitudes to nature, through seeing God as separate from nature, making the natural world antithetical to spirituality, thus creating an emotional schism and even an antagonism between man and nature which removed all barriers to exploitation of the environment. On this argument see Worster, Nature's Economy, Chap.1 & pp.28 & 58; See further in thesis Chap.2, p.73f, n.131 on Christian antagonism to nature mellowed by regrowth of paganism; and Chap.3, p.84-5, n.4 on Christianity and concept of stewardship as root of modern economic and technological thought.

5. Herman E. Daly & John B. Cobb, For the Common Good, Redirecting the Economy Toward Community, the Environment and a Sustainable Future, (Boston: Beacon Press, 1989) p.21 "We are living by an ideology of death and accordingly we are destroying our own humanity and killing the planet."

6. Pliny, NH, VIII.53 & Dio xxxix.38 tell of 600 lions being slaughtered in a single show. At the opening of the Flavian Amphitheatre by Titus in A.D.80 supposedly 5000 animals were killed in one day. And Trajan killed over 11,000 in a series of games in 107. On extinction of elephant see L.G. Seurat, Exploration Zoologique de l'Algérie de 1830-1930, (Paris: Masson et Cid., 1930) p.90 and Stephan Gsell, Le Climat de l'Afrique du Nord dans l'Antiquité, (Algeria: Typographie Adolphe Jourdan, 1911) p.44f. Seurat shows that most of the decline in fauna in North Africa has been recent, due to modern gun and deforestation, especially for smaller species (p.90); Cf. B.D. Shaw, "Climate, Environment and History, the case of Roman North Africa," in Wigley et al. eds. Climate and History, p.387. For all the Roman cruelty to animals, and for all our S.P.C.A.s we are guilty for the extinction of far more species through deforestation, (one species dies every 15 minutes, Worster, "Vulnerable," p.17) and just as inhuman treatment in the general raising of livestock in factory farms; Cf. Chap.2 n.50.

7. P. Garnsey and R. Saller, The Roman Empire, Economy, Society and Culture, (ESC) (Berkeley & Los Angeles: U of California Pr. 1987) p.168 Roman distaste for animal worship is evident in the repression of Egyptian cults.

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1. Columella, I. preface 1-2.

2. Plato, Critias, 110C-111D

3. Henchir Mettich Inscription, CIL VIII, 25,902; see also petitions to Hadrian from Ain-el-Jemala and Ain Wassel, CIL VIII 25,943 & 26,416. Olive growers had 10 years free rent, fig 5 years. Plots were withdrawn after two years if left uncultivated.

4. See C. Glacken, Traces on the Rhodian Shore: Nature and Culture in Western Thought from Ancient Times to the End of the Eighteenth Century, (Berkeley & Los Angeles: California U.P., 1967) See below Chap.2 for eggs.

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The Charge of Anachronism — pages 9 - 11

5. Donald Worster. "Doing Environmental History," pp.290-91. Aspects of what is now called environmental history have been practised for years, such as the long durée geographical studies of the Annales school. But it is only in the 1960s that the new methodologies of the Annales school really flourished. Environmental history was first defined by Roderick Nash's essay, "Environmental History," in The State of American History, ed. H.J. Baass, (Chicago: Quadrangle Press, 1970) pp.249-60; See also the special issue of the Annales ESC devoted to "Environnement et Histoire," 29 (1974): 537-647.

6. Hughes, (Albuquerque: U of New Mexico P., 1975); Sallmann, "La Responsabilité de l'homme face à la nature," Helmantica, XXXVII (1986): 251-66; I have recently been informed of a Phd Dissertation in progress at Cambridge, Mass. by Roxanne M. Gentilcore entitled The Classical Tradition and North American Attitudes to Nature. There seems to be a new interest thus growing, though environmental history for more recent periods has grown continually since the 1960s despite ebbs in the popular movement (Worster, "Environmental History," p.290).

7. Hughes' portrays the Romans as modern businessmen who only lacked modern technology to do real damage. This view will be shown as incomplete and outdated in Chapter 3. In general Hughes appears ignorant of important texts as Boudy's Economie Forestière Nord Africaine vol.4 (Algeria and Tunisia, 1955) which has demonstrated that the Romans did not destroy North African forests. Other important works which show the Romans were not so rapacious in their use of land and resources, such as Meiggs' Trees and Timber (1982) or Treggiari's, "Sentiment and Property" (1980) came obviously after his publication.

8. See especially K. Thomas, Man and the Natural World, Changing Attitudes in England 1500-1800, (London: Allen Lane, 1983) which is based on the premise that the Industrial Revolution inspired a new appreciation of nature.

9. H. Rolston, Environmental Ethics, Duties to and Values in the Natural World, (Philadelphia: Temple U.P., 1988) p.x1

10. A.D. Ekirch, Man and Nature in America, (Columbia U.P., 1963) p.3

11. Glacken, Traces, pp. 349, 117 and 25, respectively.

12. The best known examples are Calvin Martin's Keepers of the Game: Indian-Animal Relations in the Fur Trade, (U. of Cal. P., 1978) & Adrian Tanner's Bringing Home Animals: Religious Ideology and Mode of Production of the Mistassini Cree Hunters, (N.Y.: St. Martin's Press, 1985).

13. E.g., K. Thomas, Changing Attitudes, p.23 gives Marxian view of fur trade against Calvin Martin. However, this ignores the tremendous pressures on Indians to have guns to defend themselves from extinction and that previous to these pressures non-materialistic values kept a

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balance between Indians and animals for thousands of years. See the Algonquins' own account by Chief J.-M. Matchewan, "Mitchikanibikonginik Algonquins of Barriere Lake: Our Long Battle to Create a Sustainable Future," Drum Beat, B. Richardson ed. (Toronto: Summerhill Press, 1989) p.144

14. Matchewan, "Mitchikanibikonginik," p.162.

15. R.F. Dasman, "Towards a Biosphere Consciousness," in Worster ed. Ends of the Earth, p.277. He calls "primitive people" "ecosystem people," and shows that where exceptions to the rule have existed (i.e., ecosystem people defiling their environment) this is explainable by new technologies or adjustments to new environments, after which symbiosis is regained.

16. Quotation is from Thomas, Changing Attitudes, p.16 which he applied to the early modern English, how much more applicable to ancients!

17. H.J. Rose, Primitive Culture in Italy, (London, Methuen & Co. Ltd., 1926) p.20 claims primitive ways lasted into medieval ages; also H. Wagenvoort, Roman Dynamism, p.3; and A. Lovejoy & G. Boas, Primitivism and Related Ideas in Antiquity, (N.Y.: Octagon Books Inc., 1965; 1st ed. John Hopkins U.P., 1935); On continuity of moral-political thought see D.C. Earl Tradition, passim; For a view contrary to Rose's primitivist theory see below Chap.2 n.5.

18. Glacken, Traces, p. 25

19. The Epic of Gilgamesh, 2nd rev. trans. N.K. Sandars, (England: Penguin Books, 1983) pp.93 and 91.

20. "Reflections on the History of Ideas," Journal of the History of Ideas, 1 (January 1940) p.17

21. Worster, Nature's Economy, p.xiv & 347 respectively.

The Excuse of Climate — pages 12 - 18

22. B.D. Shaw, "Climate, Environment, and History: the Case of Roman North Africa," in Climate and History, T. Wigley et al. eds (Cambridge, U.P., 1981) p.382-3

23. See criticisms of climatologist H.H. Lamb, Climate and History in the Modern World, (London: Methuen & Co., 1982) p.4; C.E.P. Brooks, Climate Through the Ages, (N.Y. & Toronto: McGraw-Hill Book Co., Inc., 1949) p.287 on wetter climate argument; quotes: Shaw, "Climate," p.381; Cf., Wigley et al., "Past Climates and Their Impact on Man: a Review," idem, eds., Climate and History, (Cambridge U.P., 1981) p.37.

24 This division was noted by E. Le Roy Ladurie, Times of Feast and Famine: A History of Climate Since the Year 1000, trans. B.Bray (N.Y.: Doubleday, 1971) p.1, who along with Fernand Braudel's The Mediterranean and the Mediterranean World in the Age of Phillip II, 2 vols., trans. Sian Reynolds, (London: Fontana, Collins, 1972-3) and others of the

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Annales school have proven themselves very capable in the field of climatology; Cf below Chap.1 n.32.

25. I have not referred to M. Geyh & D. Jaekel's study of carbon 14 dates from pollen and plant remnant analysis from the Sahara (1973) due to the generally accepted untrustworthiness of such data from deserts. See Raikes, 1967, p 99 for harsh criticism of this method for Sahara. Or Beckinsale, R.P. "Climatic Change: A Critique of Modern Theories," in Climate in Review, ed. G. McBoyle, (Boston: Houston Mifflin Co., 1973) pp.132-151.

26. Lamb, Climate, p.4; See Ladurie's criticisms, Times of Feast, pp.7, 11 & 17. The Annales school has high regard for climatic factors, they simply do not accept the "highly dangerous" climatic determinist interpretation, when more "immediate and intelligible" human causes can be easily found.

27. P.B. Sears. "Climate and Civilization," in H. Shapely ed., Climatic Change, Evidence, Causes and Effects, (Harvard U.P. 1960) p.35

28. Sherwin-White, "Geographical Factors in Roman Algeria," Journal of Roman Studies, XXXIV (1944) 1-10 passim; See also K.W. Butzer, "On Climatic Change in Arid Regions Since the Pliocene," UNESCO, A History of Land Use in Arid Regions, Arid Zone Research, vol.17 (1961) p.44 who shows that Roman ruins fall mostly within the 500 mm/y isoyhet and almost never outside the 200mm/y isoyhet, i.e., within the possible limits of cultivation today. Though, see below Chap.3 p.116 n.148.

29. Lamb, Climate (1982) p.4 on improvement of methods: quotation from p.148: Huntington explained mass migration from Asia by fluctuations in rainfall and barometric pressure, then Brooks used the migration of the Mongols to chart Asian rainfall graphs! These were common imprecisions.

30. Lamb, Climate, p.144-5; The term Atlantic relates to an increase of the ocean's effects on the weather of Europe, making it cooler & wetter.

31. R. Pearson, Climate and Evolution, (N.Y.: Academic Press, 1978) p.42-4; Lamb, Climate, (1982) p.144-5.

32. R Raikes, Water, Weather and Prehistory, (N.Y.: Humanities Press, 1967) pp.75-110 gives full criticism of proxy data for arid zones and use of sea levels; See also Beckinsale, "Critique of Modern Theories," passim. Wigley et al., "Past Climates," p.14-15 even criticize Lamb's climatic chronology for AD 1100 to 1500, which he regards as certain. But they excuse him as a "pioneer" in his field.(p.9) The only proxy data in which there has been a definite correlation between European and North African climates is the shrinking of Alpine glaciers and the expansion of the Sahara.(Braudel, Mediterranean, p.270). Notably, Braudel's interpretation of this data is more correct, and honest, than Lamb's who does mention the mines of the Hohe Tauern, but neglects to show that they were worked in Roman times as they are now again, suggesting similar dry climates and expansion of Sahara in both ages, as Braudel rightfully concludes (p.269) (Lamb, Climate, pp.157-8, & 139.)

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33. Shaw, "Climate," p.383

34. Wigley et al., "Past Climates," pp.27-36. Shaw's paper on climate is published in this work, but he seems ignorant of its findings. Sunspot cycles have ironically come back into vogue among some climatologists, though still unprovable. See Pearson, Climate, p.23.

35. Wigley et al. "Past Climates," pp.33-41. On Europe's peasants and climatic change see J.L. Anderson, "History and Climate. Some Economic Models," in Wigley et al., eds., Climate and History, pp.337-355; on Scotland, M.L. Parry, "Climatic Change," *ibid* pp.319-334; on Norse Greenland, T.H. McGovern, "The Economics of Extinction," *ibid.*, p.404-33.

36. M.L. Parry, Climatic Change, Agriculture and Settlement. (Conn.: Archon books, 1978) p.22.

37. Butzer (1969), Tozer (1964), Despois, (1961), Murphy (1951), Cary (1949), and Thompson (1948); See Chap.3 for examples of Roman adaptation.

38. Of the classical scholars Shaw provides in favour of a wetter climate all may be easily discarded. Carton(1894) wrote before Gsell's masterful study. Killian (1934) uses the theory of progressive desiccation, which even climatologists call outdated (e.g., Brooks 1949, p.286). And Carcopino's work (1943) is specifically on Morocco, which is still the moistest region of the Maghreb, as rain coming from the Atlantic falls on the higher mountains of the Atlas in the West, and is diminished as it moves eastwards. Further, Carcopino's work is based on the much disputed Periplus of Hanno. See Gsell, Le Climat, p.41 and J. Thompson, History of Ancient Geography. (Cambridge U.P., 1948) p.54 & 73-6. On the other hand, of those Shaw gives arguing against climatic change only Bartoli (1931) and Gribaudi (1928) can be directly accused of having "vested colonial interests," while Shaw himself claims that Riviere's work (1930) is one of the best surveys. (Shaw "Climate," p.397, note.3)

39. Shaw, "Climate," p.385; Gsell, Le Climat, p.70 (my trans.)

40. Shaw, "Climate," p.385.

41. *Ibid.*, p.389 calls for quantitative aerial studies, but both Achenbach's (1973) and Mensching & Ibrahim's (1975) aerial studies argue for human causes of decline; See n.49 below for eg. of recovered wells

42. Shaw, "Climate," p.394-5.

43. Wigley, et al. eds., "Past Climates," p.8.

44. For full list of these sources, see Appendix B: Ptolemy's so-called weather record is typically used as an example wherein the psychology of the recorder makes it an untrustworthy document. His recording of two rain showers in July in Alexandria and four entries of thunder in August, once taken as proof of a wetter climate, are now seen as the kind of record made by a man living in a very dry country, who is apt to make a

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point of the weather only when it rains. Notably, historians from Gsell (1911) to Shaw (1982) have pointed this out, not climatologists, (except for Brooks). Lamb, Climate, p.124, ironically uses it, though it has been the most criticized source in climate history. Further, the geographer Butzer has matched these "rare depressions," "meteorological curiosa" with similar phenomenon today. Rainshowers do occur in Cairo and the Red Sea hills in August when the "intensification of the 'Sudan monsoon low' leads to early autumn thunder showers." Butzer, "Climatic Change," p.33.

45. Lamb, Climate, pp. 150, 124 & 149, unawares of Raikes' earlier study (1967).

46. Raikes, Water, pp.183-4.

47. See P. Defosses brilliant study, "Note sur le climat en Italie Centrale au premier siècle de notre ère," Latomus, XL (1981) pp.105-8, which correlates written evidence with modern flood records and climatic phenomenon to dismiss the arguments for climatic change in Italy, based on the same sources— Pliny Epistles, V.6,4-5 & 12 and Livy II.5,3. Lamb, for example, uses Livy, Climate (1982) p.148.

48. Wigley et al., "Past Climates," p.4.

49. E.F. Gauthier, Sahara the Great Desert, end ed., trans. Mahar (N.Y.: Octagon Books, 1970) p.27. At El Djem (ancient Thysdrus). Birebent, Aquae Romanae: Recherches d'hydraulique romaine dans l'est Algerien, (Algeria, 1964) gives plenty of other egs. of recovered wells pp.9, 51, 65, 71 etc. See also R. Murphy, "The Decline of North Africa Since the Roman Occupation: Climatic or Human?" Annals of the Association of American Geographers, 41 (1951) p.126 f. on reclamation of wells in the Kharga Oasis.

50. Le Roy Ladurie, Times of Feast, p.7.

51. Butzer, "Climatic Change," p.39.

Roman or Native Responsibility? — pages 19 - 27

52. Shaw, "Climate," p.384; and idem, "Water and Society in the Ancient Maghrib: Technology, Property and Development," Ant Afr 20 (1984) p.122 & p.124ff.: "Historiography and the Problematic;" The degree to which the French associated with the Romans is evident in a statement by Jean Colin to his officers in 1925: "Let the indigenes know that 'we Romans were here before the Arabs.'" Mackendrick, North African Stones Speak, (Chapel Hill: U of North Carolina Pr., 1980) p.319. La Blanchère's hydraulic survey was under the auspices of the military. J. Birebent's thorough survey of ancient water systems in Algeria, Aquae Romanae: Recherches d'hydraulique romaine dans l'est Algerien, (Algeria: 1964), although not published until two years after Maghrebien independence (1962), was started in 1947 under the Service des Antiquités Algériens, and was taken with the colonial interests of reviving the irrigation systems. (Not an entirely bad motive, as Shaw would make out). See intro. by J. Lassus, p.7-8

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53. Shaw, "Water," p.127

54. Ibid., p.127; last quotation, D. Oates, "Ancient Settlement in the Tripolitanian Gebel, II: the Berber Period," PBSR, n.s., t.9 (1954) p.113; K.A. Wittfogel's famous thesis that large scale irrigation works require superior political organization has influenced the interpretation of irrigation works around the world. Shaw, however, argues that they cannot be transferred easily to North Africa whose systems function on a more local pre-capitalist model. Further, Wittfogel's thesis has been refuted even for China, which he had used to exemplify his argument. See B. Hindess & P.Q. Hirst, Pre-capitalist Modes of Production. (London: 1975) Chap.4, esp. p.207-20 "Wittfogel and hydraulic society;" and a critique for its application to China in W. Eberhard's Conquerors and Rulers: Social Forces in Medieval China, 2nd ed., (Leiden, 1965) 74-88.

55. Shaw, "Water," pp.151-5; Shaw gives a critical analysis of the Roman Tripolitanian Dams first studied by C. Vita-Finzi, "Roman dams in Tripolitania," Antiquity, XXXV (1961) pp.14-20. Shaw calls them "Magnificent Failures." Finzi gave them a much more positive review, claiming they provided soil retention for over 300 years. With O. Brogan, Finzi published a very optimistic article in the London Illustrated News, 239 (1961) pp.1058-61 entitled, "Ancient Systems for Making the Desert Bloom: Water Conservation in Roman Tripolitania." But Shaw shows how their immovability meant they had to be constantly extended as is revealed by concrete additions and ultimately had to be abandoned because the wandering wadi streams simply skirted them altogether. Modern Italian and French schemes in Libya and Tunisia similarly ignored the indigenous methods as inferior and fell into worse troubles, failing almost immediately. Their "superior" concrete walls were washed away by the first torrential rains. (Probably they were not sidestepped as the Roman dams were, which did not wash away. See below, Chap 3 p.115-6, n 148)

56. Corripus, Johan, III, 256; also Procopius, Bell. Vand, 4.19.1-20; & Shaw, "Water," p.143; See Chap.3 p.116 notes 149-5 on Roman irrigation technology being similar to natives.

57. Shaw, "Water," p.156 versus "introductionism" of water systems. It is suggested (p.221) that 95% of agriculture was limited to such methods in antiquity. But this is unlikely as Shaw does not deal in this article with springs which provided constant source, such as at Lamasha, dryland farming used all over North Africa and wells which were used, despite Shaw's belief that they were not, especially in oases where aquifers were common. See Rhoads Murphy (1951) & Chap.3 p 115, n 145-6)

58. Ibid., centuriation: pp.127 & 158-9; urban consumptive systems: pp.132-4; pre-Roman settlements: pp.163-7; On centuriation as not the only aspect of Roman character see Chapter 3 below. Against the split of urban and rural water systems see below p.25-26. I agree with the argument that native settlements which pre-date Roman occupation must have had wadi-crosswalling methods in order to survive. But, again, this only accounts for farming in wadi beds and not the cultivation of plains and rolling hills by the Romans far from wadis. See below p 24 n 83 & p 26.

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59. J. Despois, "La culture en terrasses dans l'Afrique du Nord," Annales (ESC), t.11 (1956) p.49

60. On the predominantly Punic-Libyan population and culture of Tripolitania, especially in the agricultural zone next to the desert, hence around the Tripolitanian dams, see D.J. Mattingly, "Libyans and the Limes. Culture and Society in Roman Tripolitania," AntAfr. XXIII (1987) pp.71-94. On Roman predominance in western Algeria, see below p.23.

61. The debate over Romanization is still vibrant in North African studies. Most notable is the published debate between Yvon Thébert, Marcel Benabou and Phillipe Leveau, "La Romanisation de l'Afrique: un débat," Annales (ESC), 33 (1978) pp.64-92. Thébert argues that Romanization was thorough and positive. Benabou agrees that many natives assimilated willingly, but argues nevertheless they must be put at the center of their own history. Leveau, however, claims Romanization was shallow, oppressive and fought by constant revolutions of the natives. The anti-Roman view has been naturally joined by African scholars such as Laroui The History of the Maghrib, trans. R. Manheim, (N.J.: Princeton U.P., 1977) which argues that the Romans were just a passing wind. ; & Maboubi, "The Roman and Post Roman Period in North Africa," in History of Africa, II, ed. G. Mocktar, (California: UNESCO, Heinemann 1981) pp.465-512. But the extreme position of Leveau et al. is being discarded as the limited number of Roman military forces and upheaval in the 2nd century does argue for a peaceful settlement. See Daniels, "Africa," in vol. 1 The Roman World, ed. J. Wachter, (London: Routledge & Kegan Paul, 1987)p.235-6

62. Shaw's argument in "Water" is based on this division of rich urban Romans and native agricultural workers. E.g., p.135.; P. Leveau's argument takes this division to an extreme(see note 61).

63. Shaw. "Water," p.169

64. C.G. Starr, The Roman Empire, 27 B.C.-A.D.476, A Study in Survival, (Oxford, 1982) p.76.

65. These subjects are dealt with in detail in Chap.3, passim.

66. K.D. White, Roman Farming, (London: Thames and Hudson, 1970) p.18

67. Columella, I.1.13; Cf. Pliny HN, XVIII.22

68. See below Chap.3 p.101 for more detailed discussion.

69. K.D. White, Farming, p.12.

70. See J.-M. Lassère, "L'Organisation des Contacts de Population dans l'Afrique romaine. sous la Républiques et au Haut Empire," ANRW, 10 II (1982) pp.397-426. for chronology of Roman settlement of North Africa.

71. The role of the army in expanding agriculture and Romanization is constantly debated. Garnsey & Saller, ESC, p.194 accept that the army

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was the main official instrument of rural Romanization, but also accept Shaw's argument that soldiers were cut off from local population, which would mean they could not have been too effective at Romanization. (Shaw, *Soldiers and Society: the Army in Numidia*, "Opus II" (1983) pp.133-60. But E.B. Fentress replies to Shaw's article (which was itself a critique of Fentress' earlier *Numidia and the Roman Army*) showing that the army had a more positive role and olive culture was extended with army expansion, (Fentress, "Forever Berber?" *Opus II* (1983) pp.161-175.) I accept Fentress' argument because epigraphical and onomastic studies show a high concentration of Romans in rural areas and a definite mix and intermarriage among the Roman, Berber and Punic. D'Escurac-Doisy, "Lambèse et les vétérans de la legio tertia Augusta," in *Hommages à Albert Grenier*, ed. M. Renaud, (Brussels: Latomus, 1962) p.573-4, shows the Roman veterans actively practised agriculture. See immediately below p.22f, also Chap.3 p.118f on *lex Manciana* and *lex de rudibus agrorum*— imperial policies for agricultural expansion.

72. L. Leschi "Aqueduc Romain dans l'Aurès," *Etudes*, (Paris, 1957) p.167 on *librators* as army officers; also famous story of Nonius Datus, engineer sent from Lambaesis to fix aqueduct of Saldæ, *CIL* VIII 2.728: Vitruvius, VIII.I.1-2 describes how to divine water by placing ear to ground and watching vapours rise. Thus, contrary to Shaw ("Water," p.124) water divination "of the most primitive kind" was not, nor the necessity of the skills of looking for water, unique to Africa. Nor were *aquilex* first noticed in Italy by Theodoric in the early 6th c., but already part of Roman know-how in the 1st c. B.C.

73. Shaw's criticism against the apologist of assiduously avoiding questions of consciousness ("Water," p.122) applies equally to himself and his avoidance of facts.

74. J.Gascou, "La politique municipale de Rome en Afrique du Nord I. de la mort d'Auguste au début du IIIe siècle," *ANRW*, II 10.2 (1982)p.136-229 on irregularity of Romanization; idem, "Pagus et Castellum dans la Confédération Cirtéenne," *Ant Afr*, 19 (1983) p.206 on predominance of Romans in the southern Algeria farming region; P. Morizot, "Inscriptions inédites de l'Aurès," *ZPE*, XXII (1976) p.165 argues Roman predominance around wadi terraces in Aurès region.

75. Lassere, "Population," p.404 for Bagradas Valley.

76. M. Leglay, "Sénateurs de Numidie et Maurétaines," *Epigraphia e ordine senatorio*, II (1981) pp.755-81; also on the extreme Romanization of Cirta see E.Champlin, *Fronto and Antonine Rome*, (Harvard U.P.,1980)p.7

77. Lassere, "Population," p.410. But there were also plenty of other Italians (Samnites, Picenians, Bruttians) & Spanish, who came with Sittius.

78. K.P. Kohne & V. Weber, *Die Kolonen in Italien und den westlichen Provinzen des römischen Reiches*, (Berlin: 1983).

79. Gascou, "Pagus et Castellum," p.206

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80. Lassère, "Population," p.423; C. Wells, Roman Empire, p.162 argues that the rebellion of Tacfarinas (A.D. 17-24) was incited by herders upset about the encroachment of Roman settlers on their traditional grazing lands and way of life.

81. Lassère, "Population," p.423

82. Tenney Frank, "The Inscriptions of the Imperial Domains of Africa," American Journal of Philology, 47 (1926) p.62-3.

83. Shaw, "Water," by his first and second principles argument in which irrigation was limited to wadi beds demonstrates this. pp.134 & 135 ff.

84. On marriage CIL. VIII, 18418, 17,589 & 2805; Tacitus, Ann., II.52: Solitudinibus afri.; The Cirtan confederation was an amalgamation of small towns and castella(forts) in the region of Cirta, belonging or associating economically and politically with the Municipia of Cirta. See Gascou, "Pagus et Castella."

85. P. Février, "Urbanisation et Urbanisme de l'Afrique Romaine," ANRW, 10 II (1982) p.339; also Morizot, "Inscriptions," passim; Shaw, "Lamasba: An Ancient Irrigation Community," Ant Afr, 18 (1982) p.64-5 n.2 shows how the prefix Lam resembles the Berber word for a natural spring, which would suggest a native origin of many of these towns. But the large migration of veterans who settled the land is unquestioned. (Shaw p.67). Note that lam also acts as a prefix related to water in Latin: lamyrus: a sea-fish; lamentata: weeping, wailing; lambo: to lick.

86. Shaw, "Lamasba," p.67 on "local stock;" L. Hostilius Felix, CIL VIII 4437 is one of these soldiers, who came from the Carthage region and was able to become duumvir and pontifex through his army career at Lambaesis, eventually settling in Lamasba as municipal pontifex; Lassère, "Population," p.422 demonstrates the intermarriage and mix of nomenclature. See, e.g., C.I.L. VIII 17590.; Shaw's interpretation of the majority of names of the region and on the Lamasba decree as clearly of "African descent" (p.67) seems based purely on his bias.

87. "Lambèse," p.573.

88. "Lamasba," p.70.

89. Shaw, "Lamasba," p.68 & 70, As the preamble of the decree, CIL VIII, 18,587, tells us that a special commission of arbitration from the administration of Elagabalus was called on to settle a conflict that resulted in the inscribing of this water-use time table on stone, Shaw argues that the irrigation system pre-dated Roman participation. But the reign of Elagabalus post-dates by a few generations the Roman settlement of the area, and thus his argument is faulty. Similarly his argument of Africans preferring non-intervention by authorities may just as easily be applied to Italians. See e.g., Earl, Tradition, p.15: "the ordinary Roman asked only for...freedom from interference."

90. Ramsay MacMullen, "Rural Romanization," Phoenix, XXII (1968) p.341; P. Troussel, "Nouvelles observations sur la centuriation romaine à l'est d'El Djem," Ant Afr, 11 (1977) pp.175-207 shows there was very

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little distinction between rus and urbs.

91. Garnsey & Saller, ESC, p.192; for 20th c. e.g., see J. Cole & E.R. Wolf, The Hidden Frontier, (N.Y.: Academic Press Inc., 1974), p.262.

92. On large number of rural markets, many established in isolated areas as hamlets see H. Pavis D'Escurac, "Nundinae et vie rurale dans l'Afrique du Nord romaine," B.A.C., n.s. 17B (1981): 251-9 passim; and Rostovtzeff, Roman Empire, p.131 on African towns as centers of agricultural commerce.

93. Shaw, "Lamasba," p.75 egs: from the legal codes, D.39.3.17 pr (Paulus) & D.43.20.5 pr-1 (Iulianus); from the Corpus, CIL XIV 3676 & 7696; see also Frontinus de Agr. 1.9

94. I.e., similarities to indigenous cross-walling methods, "Lamasba," p.75f. Indeed, the small differences which Shaw uses to argue for African origin may actually prove the Italian importation of such a system. For one example, he points out that the sluice gates from a system at Tivioli (CIL XIV 3676) are of different sizes, whereas at Lamasba the gates "were probably single and of uniform size." The "more flexible" Italian schemes may reflect a long term development wherein new property owners (possibly through divided inheritance see below p.34-5) were gradually admitted to the scheme in a community where established seniority, wealth and prestige account for acceptance of unequal divisions of water. In a new system, built at one time in a relatively new community, there would be greater expectations and demands for equality.

95. Shaw, "Lamasba," p.76.

96. Ibid., p.75; CIL XIV 7696; Cicero Leg. Agr. III.2.9; Cf. Frontinus de Agr 1.9 and White, Farming, p.157-8 on competing of farmers for water supply from main sources near large urban population as common.

97. CIL, VIII, 2653; Cf. Birebent, Aquae, p.325.

98. Shaw, "Water," p.134

99. Sherwin-White, "Geographical Factors," p.5

100. O. de Croizant, "Les Cominii en Afrique," Caesarodunum, VII (1972) pp.299-324.

101. CIL VIII 5351

102. ILS 1435; his name Titus Flavius Macer, suggests that he was originally a Musulamii and received citizenship from one of the Flavians. C. Wells. Roman Empire, p.251.

103. Juvenal, VII, 148-9

104. "Population," p.424; versus Laroui, L'Histoire du Maghreb, p.43.

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105. Lassère, "Population," p.423 finds Syrians, Jews, Greeks, Cirtans, Napolitans, Madaurans, Noricans etc. all living in backwater town of Sétif. See Frank M. Snowden Jr.'s, Before Color Prejudice, The Ancient View of Blacks, (Harvard U.P. 1983) on general non-racism of ancient society; On temple building, Frank, "Imp. Dom." p.62.

106. Shaw, "Lamasba," p.95.

107. See, e.g., Chap.2 p.51 on Mercury-Silvanus, & Ferguson, "Classical Religions," in The Roman World, 2 vols. J. Wachter ed., (London: 1987) p.754. Shaw's own study "Lamasba," (1982) p.93, states that the Lamasban irrigation system was a hybrid of native and Roman technology. It is surprising that he should revert in a later article "Water," (1984) p.132 to arguing for a clear separation of Roman urbanite and native agricultural hydraulic systems.

108. Shaw, "Water" p.129; See Daniels, "Africa," p.235 for why Rome developed Africa so slowly.

109. African Stones, p.329.

110. Hughes, Ecology, p.114 makes this equation of Roman character and centuriation. Nor was centuriation itself so rigid a practice, but often followed the contours of hills. There were also various kinds. White, Farming, p.42, notes three types of centuriation in North Africa.

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111. Shaw, "Climate," p.389 gives 5,000,000 as a conservative estimate; H.N. Le Houerou, "North Africa, Past, Present and Future," in ALIT, p.246 estimates 20 million kilolitres of grain were exported under Masinissa; See below p.36 on why exports of grain finally stopped in the 19th c. and n.146 on history of export.

112. Arid zone researcher, Le Houerou, "North Africa," p.246 on "strip mining" of soils. He claims soils ruined by time Arabs arrived. S. Raven, Rome in Africa, (London: Evans, 1969) Chap.5: "Granary of Rome," is typical apologist outlook.

113. See, e.g., Shaw, "Water," p.146: one of the only times he considers the Roman contribution is in connection to erosion, which he argues was desired not countered by any ecological motives. On the faultiness of this hypothesis, see below note 117.

114. Raven, Rome in Africa, p.153 & A.M.H. Jones, The Roman Economy, ed. P.A. Brunt, (Oxford: Basil Blackwell, 1974) p.295.

115. Shaw, "Climate," p.385; Cf. A. Julien, History of North Africa, 3rd ed., J. Petrie, rev. & ed., R.L. Le Tourneau, (London: Routledge & Kegan Paul, 1970) p.341.

116. K.O. Pope & T.H. Van Andel, "Late Quaternary Alluviation and

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Soil Formation in the Southern Argolid," Journal of Archaeological Sciences, XI (1984) p.297.

117. Contrary to Shaw's climatic explanation. "Climate," p.394-5. Shaw's argument that as wadi farmers depended on erosion of soils from the slopes they did not care for conservation of soils and had no conscious plans to prevent erosion but rather encouraged it ("Water," p.146) is dangerously misleading. Yes, farmers desired run off soils. But they would not want the mud slides and barren hills that would result from deforestation or "exploit(ing) the effects of erosion," (his italics), leaving no soils for the following year. The fact that ancient yields have been matched, and that forests remained on the mountains until the last century proves that ancients or Berbers did not "encourage erosion." In Chapter 3 we shall show that the farmers "whether Roman or not, were motivated by ecological concerns" in their farming activities. It is his argument that is "very misleading," and indeed dangerous, for failing to see the importance recognized by Romans and indigenous peoples to conserve soils, it encourages the modern form of exploitation or mining of soils. It is based on a modern misinterpretation of ancient methods.

118. Stebbing, "The Threat of the Sahara, " Journal of the Royal African Society, supplement to vol.36 (1937) p.14. On depopulation, see for example R. Meiggs Trees and Timber in the Ancient Mediterranean World, (Oxford: Clarendon Press, 1982; repr. N.Y.: Oxford U.P. 1985) for Rome p.382.

119. Stebbing, "Threat," p.18 & 34; Cf. Le Houerou's, "North Africa," excellent series of photos on the progressive stages of desertification from deforestation to herding etc. pp.239-252, figs.5-18.

120. Ain-el-Jemala (A.D.117) CIL VIII, 25,943; Cf. Ain Wassel inscription (A.D. 138) *ibid*, 26,416; Tertullian, De Anima, 30.3.

121. Sherwin-White, "Geographical Factors," p.5

122. White, Farming, p.403 on ecological soundness of mixed crops.

123. R. Meiggs, Trees, p.289. 124. HN, XIII.95.

125. Shaw, "Climate," p.392-3.

126. Meiggs, Trees, on peace and stone construction reducing wood consumption in empire see p.182; on use of coppice woods for fuel pp.42, 263, 269 and 380. He claims the locals of mining towns must have gone to coppicing after realizing they were starting to deforest the region. Coppicing is a method in which broadleaf trees are cut down before they fully mature leaving their roots to put up new shoots. It is done in a silvicultural method, always leaving trees in different stages of growth in order to have a continual annual supply of fuel. In this way no area is clear cut, or left so that soils may wash away; On Italy's forest history and its continuance throughout Roman ages see pp.382ff. Heavy deforestation for churches in 15th to 17th centuries. Calabria, southern

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Italy boasted firs almost equal in size to the Douglas Firs in California right into 1905, in fact they were visited and commented on by Douglas. (Meiggs, p.387).

127. Shaw, "Climate," p.392. 128. Ibid., p.392.

129. Stebbing, "The Threat," p.18 & 34.

130. Meiggs, Trees, pp.399-400.

131. Shaw, "Climate," p.393.

132. Meiggs, Trees, pp.401 & 386-7.

133. Le Houerou, "North Africa," p.238 & quotation p.240.

134. Ibid., p.246; Clausen, The Roman Colonate: Theories of its Origin (N.Y.:1925; repr. Rome:1965) is typical of soil exhaustion theory, and source from which many have assumed African soils must have been exhausted too, though never proven.

135. Quote: Garnsey and Saller, ESC, p.67; Seneca, de Ben., 7.10.5; Pliny, HN, 18.35; Columella, 1.3.12; Indeed, Garnsey and Saller remark that by Pliny's own criterion (1,300,000 sesterces = latifundia) he himself was a latifundist. The real point of the attacks was against the degeneration of arable land into pasture. (Garnsey & Saller p.67) See below Chap.3 p.96f.

136. Pliny, HN, 33.135.

137. Garnsey & Saller, ESC, p.66f., especially p.70; For comparison to equal share inheritance practices today in Italy in comparison to Germany which is based on primogeniture, see Wolf and Cole, Hidden Frontier, p.19 and Chapters VII & X passim. Note the village under study, Tret, is an isolated, highly traditional village. On Sicily see White, Farming, pp.52 & 75-6.

138. Garnsey & Saller, ESC, p.69; Note also the father of Cicero's client Rosicus had 6 million s. divided into 13 unconnected properties. Garnsey and Saller argue it was a "traditional risk-reducing peasant strategy" to disperse property through "diverse ecological zones." Though I suppose this would apply only to the rich. (s. = Roman money sesterces).

139. Ep., III.19.6.

140. Pliny, HN, 13.92 on size of latifundia. Quotation: Garnsey & Saller, ESC, p.69.

141. Shaw, "Lamasba." pp.62-3, 81-2, 97 and diagram p.64 demonstrates the degree of small landowners by arguing that the existing fragments of the Lamasba decree represent only 1/6th to 1/5th of the entire inscription and that those displayed seem to own the bulk of the land. Thus,

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the remaining 5/6ths or 4/5ths must have been made up of countless small landowners. On land distribution to veterans in Africa, see above p.22 note 70.

142. Counterview, Garnsey & Saller, ESC, p.72-3; Cf, however, Jones, Roman Economy, p.244 farms in general were very small and if worked by slaves then in groups of 2 to 3, rarely in gangs of 20 or more & p.296 on almost no agricultural slaves in Egypt.

143. D'Escurac-Doisy, "Lambèse," p.573-4.

144. See below Chap.3, pp.96ff. esp n.60 & p.117f. esp. n.159.

145. Pliny, HN, 18.35; T. Frank, "A Commentary on the Inscription from Henchir Mettich in Africa," American Journal of Philology, vol.47 (1926) p.158 notes that the terms of the Lex Manciana, which are applicable to tenant farmers, were eventually applied to the saltus Neronianus.

146. Shaw, "Climate," pp.390-1 shows how Spain in the 15th century and France from the 16th to the 19th century imported grain from North Africa. It was an incident over grain debts that lead to French military intervention in Algeria in July 1830 and to its position as a French colony; Garnsey and Saller, ESC, pp.77-82 give a full account of yields for Italy, showing the untrustworthiness of Columella's moral pessimism, and that yields in Palermo, Agrigento and Enna, and in Sicily (notorious for being pillaged by Roman soil mining latifundia) match those in antiquity at least until the 19th century. Sicily's 6-fold average continued until the last quarter of the century when external competition, as in Africa, lead to a conversion of land use and reduction in yields.

147. Shaw, "Climate," p.391.

148. Garnsey & Saller, ESC, p.79 on high yields in modern Africa.

149. R. Murphy, "The Decline of North Africa Since the Roman Occupation: Climatic or Human?" Annals of the Association of American Geographers, 41 (1941) p.123.

150. Wynne Thorne, "Agricultural Production in Irrigated Areas," in ALIT, p.50. (FAO = Food and Agriculture Organization).

151. Ibid., p.50; Houerou, "North Africa," p.269; Cloudley Thompson, "Animal Utilization," in ALIT, p.70.

152. Thorne, "Production," p.50. on yields; Shaw, "Water," p.167 on various reasons for present agricultural decline.

153. C. Courtois, Timgad, (Algiers: Presses de l'Imprimerie Officielle, 1951) p.19; baths passim.

154. Columella, I.6.24 suggests bath waters should be used for irrigation purposes. Nor should such intelligent, pragmatic and economic use of resources surprise us. E.M. Wightman, "Geological Research and

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Excavations in the Northern Sector at Carthage," (Canadian Team, June-July, 1983) EMC, XXVIII, n.s.3 no.2 (1984) pp.209-18, found proof that urban refuse was used as fertilizer for expanding agriculture in the surrounding areas. Something cities are finally rediscovering as part of the present recycling movement.

155. Gsell, Le Climat, pp.63-4 & 67.

156. Shaw, "Climate," p.388.

157. Ibid., p.389; Idem, "Water," p.167 claims Achenbach shows an overall quantitative retreat, but with the added caveat that economics, demographics, politics, etc. may be responsible.

158. Murphy, "Decline," p.127.

159. Ibid., p.127.

160. Paus., I. Attica XXXIII, 4-7.

161. Drouhin, "Alternative Uses of Arid Regions," in ALIT, p.112.

162. Murphy, "Decline," p.123; "progressive desiccation" here referring to much maligned climatic theory.

163. Braudel, Mediterranean, p.173.

164. Shaw, "Water," pp.121 & 146.

165. Lee, "Variability in Human Response to Arid Environments," in ALIP, p.229.

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1. Albert Schweitzer, Out of My Life and Thought, p.158-9

2. P. Taylor, Respect for Nature, (N.J.: Princeton U.P., 1986) p.59

3. Genesis, I. 26-8; See above Introduction n.4 & below p.73.

4. I have extracted these points from various works on environmental ethics on the basis of their being most often mentioned and deemed of highest importance. See especially Rolston, Environmental Ethics, pp.1-2 & 42:quotation point a); Taylor Respect, p.80; also R.F.Nash, The Rights of Nature, (Wisc. U.P., 1989).

5. Georges Dumézil, Archaic Roman Religion, 2 vols., (Chicago & London: Chicago U.P., 1966) p.18-31. argues against Rose et al. about the continuity of primitive pagan values(see Chap.1.n.17). He claims that the

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Roman numina, animistic spirits of nature and agriculture did not exist previously to individual gods, according to linguistic tracing of the indo-european roots of deos. His work is part of a recent trend in ethnography lead by the likes of Mircea Eliade, which has itself come under fire recently for its too easy dismissal of concrete scholarship and ignorance of historical fact. In our case, this is obvious as will be shown, animism did exist late into the empire mostly in "backward" rural areas, and not as much among the cultured elites. Further, the ancients themselves refer to the nature worship of their ancestors. See, e.g., the quotation from Pliny provided below p.44

Roman Animism — Pages 41 - 52

6. Ramsay MacMullen, Paganism in the Roman Empire, (New Haven & London: Yale U.P., 1981) Chapter I.1 "Finding Order in Chaos" & p.62ff on vitality of paganism.; & above note 5. p.40.

7. J. Ferguson, "Classical Religions," pp.754-5.

8. C.G. Starr, Civilization and the Caesars, (Ithaca, N.Y.: Cornell U.P., 1954) is typical of this view, e.g., p.117 he calls the Roman gods "powerless fictions." MacMullen, Paganism, p.111, questions where this idea of "official" cults ever originated. Indeed Starr's thesis regarding intellectual sterility of the 2nd c. causing the decline of Rome is contrary to my thesis that it was the application of traditional ideals which accounts for Roman success during the 2nd c.; See below Chapter 3.

9. See for example Paul Petit, Pax Romana, (Berkeley & Los Angeles, California U.P., 1976) Chapter 4 in general; For the use of ancient literature in this debate see MacMullen, Paganism, pp.62-73 who overall favours the view that pagan beliefs were still vital among most Romans. E.g., p.127 versus "doomed" paganism; Against his view that paganism was "a very spongy, shapeless...structure," see the more recent work of P. Garnsey and R. Saller, ESC, p.176.

10. Petit, Pax, p.117.

11. ibid., p.104 and p.105 on Antonines.

12. ibid., p.117; On the continued existence of paganism into Mediaeval ages, see Glacken, Traces, p.330 on pogroms versus pagans, 13th c..

13. L. White, "The Historical Roots," p.1205(col.3); on the importance of such views as checks, Black, Dominion of Man, p.44; Perhaps there is some connection between these attitudes in Roman culture and the generally appreciated long lifespan of the empire.

14. Tac. Ann., I.79.

15. I have not dealt in detail with the question of Roman awareness of environmental change, both because that it is obvious in light of the other discussion, and because Glacken has dealt with it thoroughly in

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Traces, see his Chap.3, "Creating a Second Nature," pp.116-150.

16. NH, 12.3; I am indebted to Meiggs, Trees, Chap.13 esp. p.378 & pp.151 & 171 for this and many references ff.; See also E.E. Burriss, Taboo, Magic, Spirits, (Conn.: Greenwood, 1974) Chap.7.

17. Meiggs, Trees, p.378 (Sen., Ep., 44.3).

18. Cato, Agr., 139; Meiggs, Trees, p.332 on authority.

19. ILS 5042, 5045-8; Burriss, Taboo, p.206; Meiggs, Trees, p.518 n.23; & W. Fowler The Religious Experience of the Roman People, (N.Y.: Cooper Square Publ., Inc., 1971, 1st ed. 1911), p.433-4 on 4th c. dates; Spoleto, Meiggs, Trees, p.378 (CIL II 4766)

20. Burriss, Taboo, p.205 re. Italy, ref. Apul., Flor., I.i

21. Meiggs, Trees, p.86.

22. Petit, Pax, p.107 23. Ferguson, "Classical Religions," p.774

24. S. Perowne, Hadrian, (London: Croom Helm, 1960) p.129 & 131-2

25. S.H.A., "Hadr.", XIII.2-6 Hadrian climbs Mt. Aetna, Sicily to see the sunrise before crossing over to Africa; ibid, XIV.3 Hadrian climbs Mt. Cassius, Syria to see the sunrise.

26. Ibid, "Hadr.," XXI.7 debt remittance; XVII.6 love of common people. Also see following chapter pp.99 n.76.

27. Note, despite being a Hellenophile, Hadrian has some very strong traditional Roman traits, such as admiration of Cato the Elder, the ideal Roman and author of the De Agr. Cult., (S.H.A., "Hadr.," XVI.6.); Though it must be noted that Cato himself, despite his proverbial hatred of the Greeks, was well read in Greek and his work on agriculture is inconceivable without Greek sources.

28. Luc., 3.394 ff.

29. Meiggs, Trees, p.171

30. Dio Cassius, 51.8.3; Valerius Maximus, 1.49

31. Meiggs, Trees, p.182

32. Ibid., 332 (Pliny, NH, 16.190; Cato, 37.3)

33. Ferguson, "Classical Religions," p.755

34. M. Leglay, "La Vie Religieuse à Lambèse d'Après les Nouveaux Documents," Ant Afr., vol.5 (1975) p.125

35. Ibid., p.148

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36. MacKendrick, African Stones, p.221
37. Leglay, "La Vie Religieuse à Lambèse," p.131
38. MacMullen, Paganism, p.141 note 2.
39. Leglay, "La Vie Religieuse," p.131
40. Meiggs, Trees, p.324
41. M.J. Green, "Provincial Cults," in Wachter ed., Roman World, vol.II p.786 Even the geni of the Danube, Danuvius, was created by immigrant Romans.
42. Ibid., on masking of local deity p.286; The matching of Roman gods to local gods is a generally accepted fact. Leglay's entire article "La Vie Religieuse" is about such assimilation. For Africa see, P.A. Février, "Religion et Domination dans l'Afrique Romaine," in Dialogues d'histoire Ancienne, II 1976 pp.305-36 which shows how religion played an essential role in integrating Africa to Rome by assimilation.; Also G. Bossier, Roman Africa, (N.Y. & London: G.P. Putnam's Sons, The Knickerbocker Press, 1899) p.30 on similarity of African and Roman religion. The same would apply to Pannonia.
43. Meiggs, Trees, p.391
44. CIL VIII nos. 2532 & 18042, from N. Lewis & M. Reinhold, Roman Civilization, Sourcebook II, (N.Y.: Harper Torchbooks, 1966) p.507-9
45. C. Wells, Roman Empire, p.136; At least legionaries who had to be citizens, and citizenship beyond Gaul and Spain only really opens up under Antonines.
46. H. D'Escurac-Doisy, "Lambèse," pp.571-82 shows that the region was heavily settled by veterans.
47. Leglay, "La Vie Religieuse," p.131 plain of Sers inscription & following paragraph p.130-1; Cf. Horace, Epodes, II.22: "Father Silvanus, guardian of the boundaries."
48. Louis Leschi, "La Vigne et le Vin dans l'Afrique Ancienne," in Etudes, p.84 (see below page 81f, & note 163).
49. J. Toutain, Les Cultes Païens dans l'Empire Romain, Vol. III: Les Cultes Indigènes, Nationaux et Locaux, (Roma: L'Erma Bretschneider, 1967) p.114-115

Roman Stoicism — Pages 52 - 61

50. Arist., Pol., 1256a-b; Cic., Nat. D., II.14.37; K. Thomas, Changing Attitudes p.17, for example, uses these ancient passages to hold Stoicism equally responsible for the modern crisis. He has notably misquoted the passage of Cicero as II.14.61-5. It is further interesting to

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note that Cicero tones down Aristotle's "all nature," to simply "animals" being created for man's sake; Cf. above Introduction on Roman attitudes to animals.

51. On the contribution of Greek philosophy to modern attitudes to nature see especially Hargrove, Foundations of Environmental Ethics, (N.J.: Prentice Hall, 1989) pp.21-26 on Parmenidian, Platonic and Aristotelian concepts of forms that detached truth and beauty from the natural world; and Black, Dominion, p.16 for general attitude.

52. Earl, Tradition, p.40 & quotation p.41.

53. Garnsey & Saller, ESC, p.179.

54. Fowler, Religious Experience, p.336.

55. Glacken, Traces, p.54 last reference. Previous quotations p.51-2 & p.12 No doubt both Greek philosophers were also influenced by the new appreciation of nature visible in the poetry, gardens and art of the Hellenistic age But the fact that it was the ecological attitudes in particular that found such welcome in Rome suggests a strong foundation of such thought already present, and as Fowler suggests, Panaetius' long stay with the Scipios taught him fully the Roman temperament. Religious Experience, p.364.

56. Fowler, Religious Experience, p.366;

57. A. Lovejoy & G. Boas, Primitivism and Related Ideas in Antiquity, (N.Y.: Octagon Books, Inc., 1965) p.455 n.63 & p.450 n.31; Cf. White, "Historical Roots," p.1205 on ecological destruction and religious dualism.

58. Nat.D. II.xxviii. 71.; This is Fowler's translation(p.367) which seems closer to the essence than Rackman's in the Loeb edition, as deus is singular, and the poterunt intellegi qui qualesque sint, (may be and are to be understood) refers as much to the various forms of the deities as to the consuetudo nuncupaverit, (names bestowed by custom).

59. Fowler, Religious Experience, p.368 points out Stoic pragmatism believed that humans were helpless without other humans, I argue that this view extended to nature, which is clear in Pliny. See next quotation.

60. NH, II.1.

61. Lovejoy & Boas, Primitivism, p.450 n.31;Cf. Cic., Nat.D.II.57-8.

62. E.g., Pliny, NH, XXXVII; Cic. Paradoxa 14, Tusc., V.xiii.39.

63. NH, XVIII.1; following quotation ibid. XXXIII.1.

64. Sallmann, "Responsabilité," pp.251-66; ibid. p.265 states that Pliny is "exceptionnel," thus the following sentences counter this statement; "Shadows" refers back to Sallmann's statement of the newness of the notion of responsibility to nature in Pliny's writings. This thesis

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argues that environmentalism is common to all primitive peoples.

65. Cic., Nat.D., II.52-3; Hor., Epist. I.x, line 12.

66. Earl, Tradition, p.71

67. Primitivism, op.cit., p.252; See Chapters IX, X & XI on primitivism in relation to Rome and Stoicism.

68. Sallmann, "Responsabilité," p.258: Man must be held responsible for his proper growth in relation to the environment (my trans.). This is said in relation to Pliny's ideas concerning divine logos & nature, but Sallmann goes on to show how Pliny's views conform to the Stoics'. p.258. On the pax deorum, see below p.75 in relation to Augustus. As the Augustan principate was heavily influenced by Stoic thought (Moses Hadas, Seneca, 1968, p.20) and since Stoic thought itself was respectful of the traditional gods of the ancestors, (see above, Cicero p.54) we may assume that the Roman Stoics with their concept of duty to state were equally influenced by the pax deorum.

69. Sen., Ep., XC.7, trans. by Lovejoy & Boas, Primitivism, p.270; On "conformity" as main Stoic ideal, ibid., p.261; Though Seneca is hardly exemplary of his own words, there is no reason to doubt the sincerity of Horace, Pliny the elder, or the many unknowns who embraced Stoic doctrine in the 2nd c. A.D.

70. Sen., II.5; Cf. Acad., II.viii.24

71. Cic., Tusc., II, xiii.30 as trans. by Lovejoy and Boas, Primitivism, p.153; We will return to the notion of following and learning from nature in the last chapter in relation to technological & agricultural development in North Africa.

72. Pliny, NH., XVIII.4.

73. "Responsabilité," p.251

74. Pliny, NH., XXXIII.1-3; Sallmann, "Responsabilité," p.257.

75. Ep., XC.7, trans. Lovejoy & Boas, Primitivism, p. 271

76. Hor., Odes, III.1 lines 33-6; E.g., Verg., G., I.126-7; On Roman agricultural ideals in relation to environment see next chapter.

77. Sallmann, "Responsabilité," p.255

78. Ibid., p.258

79. Quote from Meiggs, Trees, p.291; ibid p.289 on Pliny (NH 13.94)

80. Meiggs, Trees, p.289; History of Citrus wood exploitation is actually much longer, going back at least to the Ptolemies. See ibid pp.287-292.

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81. Ibid., on Cato p.287; Martial II.43.9; Cf. Juvenal II.122-7; Seneca supposedly had 500 such tables (Dio Cass., 61.10.3), but criticized himself for it: "Why don't you live according to your principles? Why do you have such elegant furniture?" (De Vita Beata, 17.2) Meiggs p.290; But note that though Stoicism was big in 2nd c., Seneca was not, because of his hypocrisy. G.M. Ross, "Seneca's Philosophical Influence," in C.Costa ed. Seneca, (London: Routledge & Kegan Paul, 1974) p.121; Fronto from North Africa notably condemns him saying of his weighty sayings: "little pieces of silver are sometimes found in sewers. Ibid, p.122.

82. Meiggs, Trees, p.288, (Lucan, 9.426-30.)

83. Ibid., p.291.

84. Ibid., p.288

85. Ibid., p.327, a bill put forth by Tribune Servilius Rullus.

86. On Roman view of causation as moral see Earl, Tradition, esp. pp.17-18, p.77, & pp.188-121

87. Tertullian, De Anima, 30.3

88. Thomas, Changing Attitudes, pp.14-15 for England and America, and & note * p.15 for Ireland, also pp.254-5; See also Ekirk, Man and Nature 11-12, 22f.

The Ancient Romantic Movement — Pages 62 - 80

89. Thomas, Changing Attitudes, p.243; D. Worster, Nature's Economy, p.58 best demonstrates the connections between Romanticism and the contemporary (late 20th c.) ecological movement.

90. Quoted from British archaeologist Mortimer Wheeler, Roman Art and Architecture, (N.Y.: Thames & Hudson, 1985) p.185; other examples: Art Historian H.W. Janson, History of Art, (N.J. Prentice Hall Inc., & N.Y.: Harry N. Abrams, 2nd ed., 3rd pr. 1979) p.557ff.; Ecological Historian Donald Worster, Nature's Economy, pp.10 & 28; & Glacken, Traces, op.cit., p.349 & especially pp.24-5

91. Glacken, Traces, p.25

92. See e.g., Thomas, Changing Attitudes, pp.243-253

93. Even in London, complaints about smog began as early as the 13th c., Thomas, Changing Attitudes, p.244

94. W.L. Westermann, "Concerning Urbanism and Antiurbanism in Antiquity," Bulletin of the Faculty of Arts, Farouk I University, vol. 5 (1949) p. 87 & J. Carcopino, Daily Life in Ancient Rome, trans. E.O. Lorimer, (England: Penguin Books, 1962) pp.26-32, variously estimate population at highest 700,000 and 1,600,000 respectively. The latter, however, gives

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fuller calculations and explanations. e.g.. on social wars p.27.

95. Juvenal, III, 11. 8-10.: Cf. Hor., Sat., II.vi, Epist. II.2 & Epod.II.

96. Quoted from Sen., Ep., XC.7, trans. Lovejoy & Boas. Primitivism, p.269; Westermann's criticism that the satirists' comments do not reflect reality("Urbanism & Anti-Urbanism," p.94), is ignorant of the nature of satire, which reflects aspects of truth through exaggeration. He forgets: the big fires, such as under Nero, and the edicts of Augustus and Trajan which restricted heights of buildings to 20 and 18 meters respectively, because of the real danger of collapsing insula. Carcopino, Daily Life, p.36.

97. Carcopino, Daily Life, p.31.

98. Westermann, "Urbanism & Anti-Urbanism," p.92.

99. E. Lucie-Smith, editor, The Penguin Book of Satirical Verse. (England: Penguin Books, 1967) notes p.301. It also influenced Elizabethan satirists.; also Horace's Satire II.vi was imitated by Alexander Pope. (H.R. Fairclough, LCL, Horace, Satires, p.208).

100. G. Highet, Juvenal The Satirist, (Oxford U.P., 1955) p.65

101. Thomas, Changing Attitudes, p.245. Lon. Mag., XII (1743)p.43; Horace, Odes, III.xxix.11-12.; Carcopino, Daily Life, p.61, Boileau & Juvenal.

102. P. Zanker, The Power of Images in the Age of Augustus, trans. Alan Shapiro, (Ann Arbor: Michigan U.P., 1988) "bucolic fantasy" p.285f; following quotation from Wheeler, Art & Architecture, p.186; Thomas, Changing Attitudes, p.251 + note, on escapism and fantasy of modern Romantic Movement.

103. Thomas, ibid., p.251, quoting: M.Fitzgerald, First Follow Nature, (N.Y.1947) p.56; Hor., Odes, III.xxix invites Maecenas, his patron, to join him; Epist., I.14 Horace working on his estate. Note he himself mentions the sincerity of his love of country in comparison to his Bailiff, and how he "departs in gloom, whenever hateful business drags" him to Rome. See below Chapter 3, p.91, n.31.

104. Art & Architecture, p.186

105. Thomas, Changing Attitudes, p.243 & p.192 on 18th c. movement.

106. Rust., III.iii.1 & aviary III.iv.2.

107. Meiggs, Trees, p.273; Martial, X.79, defines the rich by a grove of Myrtles, the poor by 100 chestnuts; Vitruvius book V. Chap 1x.5 --p.155.

108. Meiggs, Trees, p.274 on Agrippa, p.275 on Caesar; Cato, Agr., I.1.

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109. Thomas, Changing Attitudes, p.13.
110. Meiggs, Trees, pp.270-8 for full list; & Glacken, Traces, p.122.
111. Meiggs, Trees, pp.274-5 (Tac., Ann., II.3.1).
112. E. Champlin, Fronto, p.21-2. Clay piping bearing his name and his brother's have been found near house of Maecenas, on which a fragmentary inscription bearing the name of Fronto's son-in-law. + Letter to M. Caesar 1.9.5: "My gardens of Maecenas."
113. Janson, History of Art, p.557 & 558 on Stourhead.
114. Ibid., p.558; Cf. Zanker, Power of Images, p.285 on Roman sacro-idyllic scenes evoking a look of "unspoiled nature," though "artfully contrived."
115. The Story of Art, (Oxford: Phaidon, 1978) p.363.
116. Ibid., "Apollo," p.309; Janson, History of Art, "Campagna," p.524; and in general part 4 Chap. 1 on Constable, Turner and Corrot.
117. NH., XXXV.16; Wheeler, Art & Arch., p.182 on Alexandria.
118. T.C.F. Blagg, "Society and the Artist," in Wachter ed., Roman World, p.733.
119. Zanker, Power of Images, pp.285-7 & reliefs pp.288-9.
120. Thomas, Changing Attitudes, p.287.
121. J.F. Nimms, ed., Harper Anthology of Poetry, (N.Y.: Harper & Row Publ., 1981) pp.365-6.
122. Thomas, Changing Attitudes, p.285.
123. copied from Thomas, Changing Attitudes, p.285.
124. Ovid, Met., I.95-7 & 103-4, 133-141, respectively.
125. Verg., Ecl., IV. 2-3.
126. Nimms, Harper Anthology, p.248-251, lines 158-60.
127. Fowler, Religious Experience, p.409 & p.407 compares Virgil and Wordsworth.
128. Verg., G., II. 493-4 & 500-1; on farming as balance see below following chapter, *passim*.
129. Wordsworth, "Above Tintern Abbey," Nimms ed., Harper Anthology, pp.248-51, lines 152-6, 15-18 & 57-8, respectively.

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130. Worster, Nature's Economy, quotes p.27.; for paintings: Janson, Hist. of Art, colour plates 95 (Turner) & 89 (Stubbs, commentary p.567)

131. Worster, Nature's Economy, p.28; As for another major exception, St. Francis of Assisi, Lynn White argues that, he was a heretic, although not burned at the stake himself, many of his followers were. "Historical Roots," p.1206, col.3; Wendell Berry (author of "God and Country," see above Intro. note 4), whether aware of it himself or not, also has a large debt to pagan thought. His essay "A Practical Harmony," People?, for example, quotes Alexander Pope in advising that we learn to "consult the genius of the place," (p.105). What could be more pagan than this?

132. Worster, Nature's Economy, p.28.

133. Nimms ed., Harper Anthology, p.294.

134. John S. Mitchell, U.S. Attorney General, 1972, quoted in The Little Green Book, Quotations on the Environment, O. Luinberg & S. Osborne, eds., (Vancouver: Pulp Press Book Publ., 1990) p.49; The trend now is for governments and corporations to pretend to be environmentally sound by various propaganda ploys while continuing to pollute. For e.g., see Greenpeace's compilation of wildlife programs sponsored by the major polluting industries, in Harper's, vol.282 # 1688, (Jan 1991) p.40

135. See Earl, Moral & Political Tradition, on individual glory criticized in the poetry of Virgil and Horace as harmful to state, a movement born of the violence of the civil wars, seen caused by the glory seeking of generals such as Caesar, etc., and on dutiful Aeneas as key to Roman ideal, pp.65ff. Conversely, Virgil may be seen as simply a propaganda tool for the State, but this does not deny argument that the view of the state was one that saw its strength as based on the proper treatment of nature in contrast to modern states which view any protection of nature as a hindrance to profit, progress, jobs and votes.

136. Fowler, Religious Experience, p.430-1; Of course, R. Syme, The Roman Revolution, (1939) would argue that Augustus was merely a shrewd politician and ultimate propagandist, nonetheless, as Earl, Tradition, p.64 points out, Augustus' mind moved in Roman ways. And shrewd or not, he does seem to have touched the "subrational wellsprings" of the Roman "desire and will." (See epigraph, Thesis, Theodor Herzl.)

137. Zanker, Power of Images, p.181 on "union." See Chap.5 in general on nature imagery, esp. pp 172-6, Ara pacis: p.173 fig.135, images of child bearing in nature: pp.178-9 fig.138 a,b, & c.

138. Fowler, Rel. Exp., p.431. Augustus' connection to Virgil, p.428. See above notes 135 & 6; This is of course the idealistic view of Rome, for example, Cicero's Arpinum inspired pure vision of Rome as mentioned by R. Smith, Cicero the Statesman, (Cambridge U.P., 1966) p.11-12. But see below Chapter 3 on rural world view of Romans, passim, how this was part of a strong and long lasting tradition, even if Rome itself became decadent, new men constantly replenished the vision and eventually the ideal triumphed for a century.

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139. Power of Images, quoted p.335, & pp.167 & 172 specific to nature.
140. Ibid., Carthage: Ara Pacis, p.315, fig.246; Hadrian's coins of Dea Africa, H. Mattingly, Roman Coins, (London: Methuen & Co. Ltd., 1962) plate XXXVIII.6, descript. p.293; Virgil was taught in n. Afr., Gaston Bossier, Roman Africa, Archaeological Walks in Algeria and Tunis, trans. A. Ward, (N.Y. & London, G.P. Putnam & Sons, The Knickerbocker Press, 1899) p.274; mosaics quotation, Rostovtzeff, Roman Empire, p.272.
141. Along with Selucia, Antioch, and Alexandria, Westermann, "Urbanism & Anti-Urbanism," p.87 & n.7 comparison of Carthage to Alexandria.
142. Daniels, "Africa," p.240 advance of frontier in Africa; for e.g., J.N. Doré, "Settlement Patterns in Pre-desert," in H.Buck & D.J.Mattingly eds. Town and Country in Roman Tripolitania, (Oxford, 1985—B.A.R. intern. Series 274) pp.107-27 shows that settlement greatest in Roman times; See H. Pavis D'Escurac. "Nundinae" pp.251-9 on establishment of markets in even very isolated places under Roman occupation; Wells, Roman Empire, p.161f on army's role.
143. Glacken, Traces, 117.; On Centuriation in n.Af. see e.g., Mackendrick, African Stones, pp.28-33, 282 & 322. also C. Saumagne, "La Centuriation rural de l'Afrique," Cahiers Tunisiens, 10 (1962) pp.207-12.
144. Ovid, Met., I.135-7.
145. Courtois, Timgad, p.41; Cf. Rostovtzeff, Rome, trans. J.D. Duff, (Oxford U.P., 1960) p.256.
146. Champlin, Fronto, p.10, 13 & 19.
147. Bossier, Roman Africa, p. 152 (CIL 5335).
148. Mackendrick, African Stones, p.76.
149. K.M.D., Dunbabin, The Mosaics of Roman North Africa, (Oxford: Clarendon Press, 1978) p.109
150. Ibid., p.158.
151. Ibid., p.22.
152. J. Lassus, "Le Rinceau d'acanthes dans les mosaïques de Timgad," Hommages à Albert Grenier, ed. M.Renard, (Brussels: Latomus, 1962) p.959 n.4
153. Dunbabin, Mosaics, p.21.
154. Bossier, Roman Africa p.272; Hor., Epist., I.XX.13.
155. Dunbabin, Mosaics, p.131 & n.2. There is a debate on the date of this mosaic, early 3rd c. is Dunbabin's conclusion, see her app.1v
156. Ibid., p.136 & pl.122.

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157. Champlin, Fronto, last quotation p.18; first, p.17 for #s of inscriptions and their relation to Virgil see his note 86 on p.148.; Bossier, Roman Africa, p.272 also mentions Africa having most metrical inscriptions.

158. Bossier, *ibid.*, p.273; Flavius Secundus, C.I.L. 211-12; Messenger, C.I.L 1027; Silversmith, C.I.L. 7156.

159. Mackendrick, African Stones, p.251.

Christian Pogroms vs. Pagan Protectionism — pages 80 - 82

160. Thomas, Changing Attitudes, p.23. trade not Christianity broke down native reserve to exploit. See above Chapter 1 page 11, n. 13-15.

161. Meiggs, Trees, p.378; Burriss, Taboo, p.205.

162. J.Simpson, European Mythology, (London: Hamlyn, 1987) p.118 for counterview.

163. Leschi, "La Vigne et le Vin dans l'Afrique Ancienne," in Etudes d'Epigraphie, d'Archéologie, et d'Histoire Africaines, (Paris: Arts & Métiers Graphiques, 1957) p.84.

164. Dubabin, Mosaics, pp.58 & 157; Cf Mackendrick, African Stones, p.281

165. Meiggs, Trees, p.378; L. White, "Historical Roots," p.1205 col.3

166. Glacken, Traces, p.350 # of churches & quotation from p.330.

167. *Ibid.*, p.330, from a 13th c. church document.

Notes Chapter Three - pages 84 - 126

1. Sen., Ep., vol. III, CXIX; Horace, Epist. I.10.25-6.

2. Garnsey & Saller, ESC, Chapter 3 is called "An Underdeveloped Economy," pp.43-63; *ibid.*, "backward tech.": p.43; also Shaw, "Climate," p.391: "primitive technology of premodern agriculture".

3. Hughes, Ecology, p.140; Roman accounting methods did not separate the costs for each activity, product and labour. "Without such self-contained departmental accounts, the owner of a mixed farm could not tell what portion of his income was from each section." Thus he could not determine where to improve and where to do less. Thus, he did not have capabilities for scientific maximization of profit. (White, Farming, p.454). G. Mickwitz, "Economic rationalism in Graeco-Roman agriculture," Eng. Hist. Rev. 208 (1937) 577-89 is the originator of this theory; S. Treggiari, "Sentiment and Property: Some Roman Attitudes," in A. Parel & T. Flanagan eds., Theories of Property: Aristotle to the Present, (Waterloo, Ontario: 1979) p.55 and Garnsey & Saller, ESC p.52 also use it

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as an argument for underdeveloped economy, and they also argue for the lack of an expansive market, p.45; On the possibilities of steam engines in antiquity see Heron's works, including use of steam powered pistons to open temple doors, in Sprague de Camp's The Ancient Engineers, (15th pr. N.Y.: Ballantine, 1988) p.261.

4. On Christianity's responsibility for present attitudes see esp. Kenneth Boulding, Beyond Economics, (Ann Arbor: U of Michigan Pr., 1968) p.187: "Economics sprang at least half-grown from the head of Adam Smith, who may very properly be regarded as the founder of economics as a unified abstract discourse, and it still, almost without knowing it, breathes a good deal of the air of the 18th c. rationalism and Deism."; Daly and Cobb, Common Good, p.159f, on Smith, Deism and the rash individualism of present economic thought; Also Lynn White, "The Historical Roots of our Ecological Crisis," p.1207; Worster, Natures' Economy, p.30-1 on Baconian thought, (i.e., "The world was made for man, not man for the world.") as an extension of the Christian tradition of the good shepherd becoming scientist and technocrat; Worster, "The Vulnerable Earth: Toward a Planetary History," in idem ed. The Ends of the Earth, p.14: on how behind European imperialism (economic and scientific as well as political) is the assumption that "God had made the world for them, and in his wisdom and benevolence, had so designed it that nothing they did could interfere with its order; whatever happened to nature was furthering God's work of creating and managing it for the greatest good of his noblest species."

5. i.e., versus Protagoras' line, "Man is the measure of all things," in Pl. Tht., 160D (15), the creed of modern scientific thought.

6. Worster, "Vulnerable Earth," p.20 calls for extended community, and p.14 on capitalism's naive "utopian dream of unlimited wealth." On capitalism and individualism see Daly and Cobb, Common Good, Chap.8.

Animism, Ancestors and Sentiment — pages 86 - 91

7. Worster, "Vulnerable Earth," p.11 on Adam Smith and capitalist theory. Capitalists "regard everything around them—the land, its natural resources and even their own labour— as potential commodities that might fetch profit on the market."

8. Varro. Rust., I.i.5-7.

9. List on numina gathered from J. Ferguson, "Class. Relig.," p.752; quoted from idem, Religions of the Roman Empire, (2nd ed. 3rd pr. Ithaca, N.Y.: Cornell U.P., 1987) p.69; My arguments on usage and sentiment derived from here. Note, there are an equally large number of numina for household chores, fertility in women, marriage and birth rites etc.

10. Rolston, Environmental Ethics, p.35.

11. Virgil, G. I.125-7: cf. Ovid, Met., I.135f & Tibullus, II.ii.35f.

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12. Johnston, Virgil's Agricultural Golden Age, A Study of the Georgics, (Netherlands: Leiden E.J. Brill, 1980) p.129 and p.113 "wrecklessly harms," from Callimachus' "Hymn to Demeter."
13. Virgil, G. IV.315ff., esp. 531-548; indebted to Johnston p.113.
14. Ferguson, Religion, p.26 and p.23f. on various forms of Roman earth mothers. Number of inscriptions is based on R. MacMullen's chart tabulating inscriptions in Paganism, p.6. However, calculating from a graph is very inexact. A tabulation of actual inscriptions is needed; See my Appendix D, fig.7, note c); On Saturnus below p.122
15. Varro, Rust., III.i.5
16. Cato, Agr., 134; Gellius, N.A., IV.6,7, thanks to Ash, rev. trans. Loeb p.114 n.1.
17. Cato, Agr., 139.; Burriss Taboo, p.181 on entire city repeating major religious procession when priest missed lines.
18. Cato, Agr., 141.
19. The costs of the suovotaurlia probably made it limited to the rich, as not every peasant can afford to kill off three animals every time they set the plough into new land. We know that offerings of cakes and fruits were made by the poor to Saturnus, this seems a more probable donation for most. See M. Leglay, Saturne Africain, pp.356-7.
20. Varro, Rust., I.i, 4-5; See Appendix C Roman Agrl. Religion.
21. Columella, Rust., I.pref.15, Varro Rust., II.pref.3. both vs. softness of city life in comparison to the goodness of hardworking farm life.
22. I had originally intended to go into depth on the subject of the predominance of rural values and how they stifled business interests and thus contributed to a more ecological development, but this could be a thesis in itself. Briefly: see Cato, Agr., preface on respect of farming over trade and usury, the latter which was considered two times worse than robbery; Columella I.pref.17 versus all city work as slothful; Earl, Tradition, p.31 on aristocratic contempt for trade, mercator (merchant) used as a term of abuse; Garnsey and Saller, ESC, p.43ff and esp. p.45 on lack of investment and other development because of the predominance of the landowning value system; Also Rostovtzeff, Roman Empire, p.165 on lack of interest in investment in industry. See below p.95.
23. Ferguson, "Class. Relig.," p.779; on "holy days," pp.756; on festivals p.755; plus see Appendix C on Roman Agricultural Religion.
24. F. Cumont, After Life in Roman Paganism. (2nd ed., N.Y.: Dover, Publ. Inc., 1959) p.19 & 57.

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25. Ferguson, Religion, p.68 and his fig. 35: "An ancestral spirit guarding the fields round the farm, later brought inside;" Treggiari, "Sentiment," Lares as "household" gods, p.65; but following the argument in Chapter 2, (above p.42) the more traditional connections remained longer in the country. Further, protection of the pantry suggests their agricultural connection even in the city.

26. Cumont, After Life, p.57.

27. Dumézil, Archaic, p.364-5 denies that worship of ancestors played a major role in Rome, claiming that "the only times in the year in which they were specifically concerned with the dead were the Parentalia in February and the Lemuria in May." (p.366). Firstly, he forgets the Larentalia in December (Ferguson p.755). Secondly, three festivals every year for ancestors and dead is hardly a minor role! Thirdly, the Lares maintained a prominent place in the household sitting near the entrances, when not used in processions. Lastly, see below p.91, the dead even found recognition in legal texts. Dumézil has ignored some important factors which show a far more active interest in the deceased than today.

28. Cicero, Att., 2.11.2; Indebted to Treggiari, "Sentiment," p.62 & passim for arguments here; Other attachments: Cato & his Sabine farm, (Plutarch, "Cat. Mai.," VP, I); Catullus, Sirmio, (31); Pliny, Como, (Ep. 7.11) is one of many places Pliny mentions his home land, here he offers one of his estates to a Cornelia, except those inherited from his parents; Martial, Bibilis, (XII. 18), his bliss at having retired there. Treggiari also points out how lack of primogeniture counts for lack of continuity in ownership of property thus dismissing earlier beliefs that Romans had little sentimental attachment, e.g., E. Rawson, "The Ciceronian Aristocracy and its Properties," in M.I. Finley ed., Studies in Roman Property, (Cambridge U.P., 1976) 85-1-2.

29. Horace, Epod., II.1-4.

30. Pliny, Ep. 2.15.2.

31. Horace, Odes., II.23-8; Treggiari, "Sentiment," p.63 on Horace's biography and sincerity; cf. Seneca, Ep., 88.12; Ammianus, 19.11.1 & 27.6.9.

32. Digest, 38.2.36 & 38.5.1-15; Treggiari, "Sentiment," p.77.

33. Both convention and law retained an "opposition to senatorial involvement in trade." Garnsey and Saller, ESC, p.48. cf. Earl, Tradition, p.31f. on contempt for trade.

34. Treggiari, "Sentiment," p.55; cf. White, Farming, p.453.

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35. J.M.C. Toynbee, Death and Burial in the Roman World, (London: Thames & Hudson, 1971) p.36: Hence, "the catalogues of virtues and achievements in inscriptions" to "memoriae aeternae" (Cumont p. 19) through

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which the pagan continued to live vicariously. Thus Cicero writes: "death is to be feared by those for whom everything is extinguished with their life, but not those whose renown cannot perish." (Par. Sto., II.18); Dumézil, Archaic, shows that living on in one's ancestors' memories applied to soldiers, workers, and peasants too (p.363-4).

36. Plutarch, V.P., "Cat. Mai.," 21.7 end.

37. Johnston, Golden Age, p.123-2; Virgil, G., II.514-5.

38. Cicero, Mil., 95; idem, De Or., II.222-26; Treggiari, "Sentiment," p.63, argues that such criticisms reflect the predominant attitude.

39. A.E. Astin, Cato the Censor, (Oxford: Clarendon Pr., 1978) p.89.

40. Johnston, Golden Age, p.120.

41. Ibid., p.123; Earl, Tradition, p.26-7 on concern for "dead ancestors" and "unborn posterity;" And see note 6 above on capitalism.

42. Virgil, Aen., VI. 810-12; quoted in S.H.A., Hadr., II.6.8, reflecting continuation of traditional views; On virtus see Earl, Tradition, p.20 & passim. This tradition remained strong at least until Ammianus, who claims Marcus Aurelius' reign reflects continued ancient virtus (XXXI.5,14), while later decline, a loss of values (XIV.6, ff.).

43. Rolston, Ethics, p.17; The entire argument of virtus and the novus homo relates to the renewal of ancient morality in decadent Rome, by a continual influx of idealistic men from the country who "brought with them the frugality they practised at home," (Tacitus, Ann., III, 55); See Earl, Tradition, p.88-9; Smith, Cicero, p.11-12 on simple values of country folk versus corruption of city, and p.14 on how Cicero brought with him, and flourished because of, his small town ideals and his "country man's innate respect for work."

44. Columella, Rust., I.pref.6; 2nd, Treggiari, "Sentiment," p.55.

45. Johnston, Golden Age, p.1 & p.55; The myth of the ages was one of determinist decline to the Greeks. Johnston shows how the Romans changed this to a myth of cycles in which humans became responsible for their own future prosperity, and farming is a matter of pride and joy. (e.g., p.120: Virg. G., II.514-5) On Hesiod's attitudes to farming see Op., 178-181: I wish I were not of this race, that I/had died before, or had not yet been born./ This race of iron. Now by day, /Men work and grieve unceasingly."

46. Johnston, Golden Age, p.50.

47. Wendell Berry, "Nature as Measure," in idem People?, p.207-9; Although he is applying this to modern needs, here again, Berry has summed up perfectly pagan thought. See above n.4; cf. opening quotations p.84.

48. Earl, Tradition, p.7.

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49. Cato, Agr., pref. trade as risky; Cf. above note 22.
50. White, Farming, p.454.
51. Treggiari, "Sentiment," p.55.
52. Astin, Cato, p.83; ORF3 Cato fr. 124.
53. S.H.A., Hadr. XVIII.9; Ibid., on Hadrian's reference to Cato as example for policies: V.10 In relation to containment of empire, his reduction of Trajan's gains paralleled to Cato's recommendation to leave Macedonia a free state; Hadrian's admiration for Cato, XVI.6.
54. Idea of balance between econ. & ecol.: Berry, "Nature," p.208.
55. Alan Grainger, The Threatening Desert; Controlling Desertification, (London: Earthscan Publ. Ltd., 1990) p.27; Poor irrigation is another major factor Grainger gives. See below on drainage p.116-7.
56. Pliny, HN, XVIII.38.
57. White, Farming, p.453.
58. Daly & Cobb, Common Good, p.159 & p.2 "unscientific;" Worster, "Vulnerable Earth," p.11, argues that to the capitalist behaving with moral sentiment equalled "human failure."
59. Worster, "Vulnerable," p.11; Karl Polyani's The Great Transformation, (N.Y., 1980) according to Worster, offers the best account of the development and acceptance of the immoral attitudes of capitalism.
60. Pliny, HN, XVIII.3.6 & see White, Farming, p.375; Columella, Rust., I.iii.12; Varro, Rust., II.intro,4-2.; cf. Tibullus, II.iii, 35-46: "The pillager desires to hem in huge fields that he may pasture countless flocks upon his many acres."; Jones, Roman Economy, p.242-4 & 296f argues that slave gangs were rare and farms were in general very small. See above Chap.1, pp.34-5.
61. Not infrequently it was imperial freedmen who owned the large cattle ranches, men indifferent to the social values of a class they could not join. E.g., Petronius' Trimalchio with his countless acres was a freedman (Garnsey & Saller, ESC, p.67), so was Isidorus whom Pliny criticizes, (HN, XXXIII.135).
62. I owe this argument to R. MacMullen's Corruption and the Decline of Rome, (New Haven & London: Yale U.P., 1988) in which he shows that the outrages against corruption in the early empire tell a more positive story than the acceptance and even published corruption of the late empire(p.133). See below p.125. Possibly the compassion of these 1st c. attacks reflect a real struggle against the growing individualism of this time, but the argument here is that the traditional values triumphed in the 2nd c. partly as a result of continual outcries of the moral "gadflies" of the empire, the agronomists among other authors.

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63. Versus White, Farming, p.402 who claims for Columella "large estates are condemned not on moral grounds, as his contemporary Seneca condemned them, (Sen Ep., 87.7; De Ben., 7.10 etc.) but because the inevitable lack of supervision lead to rapid decay." But we argue that land decay is a moral issue in an agricultural society. See above p.93ff.

64. White, Farming, p.152; Columella, Rust., II.17.5.

65. Varro, Rust., I.ii.17-18 on goats, olive trees and homestead laws; ibid., II.intro.5 on benefits of having some cattle. On manures, see below p.106.

66. Columella, Rust., I.iii.13.

67. Pliny, HN, XVIII.39; cf Columella's concerns "rounds" above p.97.

68. Cato, Agr., I.2-3, & especially iv.2.

69. Virgil, G., II.412-13; Carthaginian saying in Columella, Rust., I.iii.9; Palladius, I.6.8.

70. Columella, Rust., I.iii.11-13; Cf Varro, Rust., I.ii.9 claims it was 500 iugera. Still an unsettled difference. But note, Varro I.x,2 tells us Romulus allotted 2 iugera to each citizen, and the Marian land donations of 100 iugera are considered to have caused abandonment because of their large size (See below p.118, n.156). Thus, 500 seems extreme and 50 more likely.

71. Columella, Rust., I.pref.13-15; See esp. Livy's rustic depiction of Cincinnatus, complete with ditch digging and sweat, Early Hist., III.26.

72. Treggiari, "Sentiment," p.55; Even Cato, the "very epitome of ancient Roman virtus" (Earl, p.39) was far from being a small landowner. Nonetheless, he did live up to the other aspects of the ideal Roman in service to the state, both in war and peace, and he did till some of his own land.

73. Garnsey and Saller, ESC, p.75.

74. Rostovtzeff, Roman Empire, p.319, but he adds that it was also to introduce "higher forms of cultivation." Hadrian "wanted good gardeners and vine dressers, holders (possesores) of land in place of tenants, and he acted in accordance of his ideal;" Note also, MacMullen, Corruption, shows that actually the more settled a province became in agriculture, the "less likely its youth would be enrolled in the legions" (p.53). See his chart p.54 on the origins of legionary recruits.

75. CIL, Vol. XI, 1,147, Beneventum arch; See Wells, Roman Empire, p.186 & 201 or Lewis and Reinhold, Sourcebook, p.344-5 for details. This inspired similar actions among private citizens, see below p.124. On Virgil's idea of renewal, above p.93-94.

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76. Vs. "great capitalists," Rostovtzeff, Roman Empire, p.295: Hadrian supported single pit, independent contractors versus the large industrialist slave run mines, in Dalmatia, Spain and Corsica. (p.295 & 225) These were possible hotbeds of revolt, but he also supported small farmers against bankers in Asia (p.323, Org. Inscrip. 484), prevented middlemen from raising the price of fish in Greece, by making their trade illegal, and forbid unlimited exports of olive oil from Athens which caused shortages for locals (p.323; IG III.38) For agriculture in Africa see below p.119f. Thus Hadrian was the "real foster father" of the policy of defending the weak and poor humiliores versus the rich honestores. (p.322).; On Hadrian's love of poor see SHA, Hadr., XVII.6 & XXII.10.

77. White, Farming, p.407; e.g., of private farmer instituting sharecropping to solve abuses: Pliny, Ep., IX.37,2-3; For imperial policies see below. p.119f; On lack of incentive to produce, White p.408.

78. See Chap 1. p.21, 90% of pop. as subsistence farmers; Chap.2 pp.41-44f. on rural beliefs and numina.

79. Worster, "Vulnerable," p.20.

80. Cato, Agr., II.fin.

81. White, Farming, p.394-5; ibid., p.54 argues that mixed intensive farm based on need for self-sufficiency goes back to earliest days of Roman husbandry; See Cato, Agr., 135 on what still had to be bought; Thomas, Changing Attitudes, p.251 argues that the self-sufficiency mentioned by the ancients is unrealistic. However, the ancient subsistence farmer was able to feed himself in the worst of times without any complex trade structure, just through his own and local produce. See Daly and Cobb, Common Good, p.268-270 on how small independent farming communities are much more stable and have greater survival capacities than the complete dependence on complex economic structures of today.

82. White, Farming, p.403. Intercropping and rotation of legumes are all a part of the mixed farm.

83. Worster, "Vulnerable," p.19.

84. Treggiari, "Sentiment," p.55; See Columella (I pref.17) and Varro and Cato (pref.) on respectability of farming. "Good farmer," was the "highest commendation" one could receive. (Cato, pref.)

85. This especially applies to Africa. See below p.122f & Frank, "Henchir Mettich," p.159.

86. See above note 43.

87. One of the most brilliant testimonies to the conscious moral eco-idealism of the "uneducated" farmer is Theodore Rosengarten's All God's Dangers: The Life of Nate Shaw. This oral history of a black sharecropper's life in the Southern States at the turn of this century shows strong parallels between the conscientious American farmer and the

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Roman traditional rural value system of hard work, self-sufficiency, social responsibility, courage and care for the earth. See especially Wendell Berry's review of this book, "A Remarkable Man," in his People?, pp.17-29, where he contrasts the moral consciousness and high intelligence derived from practical experience of the "uneducated" Nate Shaw to the "ignorant and insipid" scientific optimism of Buckminster Fuller (p.27-8), whose article "Cutting the Metabical Cord" exemplifies the naive scientific imperialist belief of constant progress. Berry stresses that Nate Shaw's "loyalty to his place made him a conservationist, and one of his most indignant attacks is against polluters (p.28)."

88. Berry, "Nature," p.206 shows how modern agriculture has applied far too simple an economic standard (its narrow focus on productivity) to survive: cf. White, Farming, p.453-4 contrasts ancient social concerns to modern, which aim only to get "maximum profit."

89. utile has the sense of useful, beneficial.; quotation from Varro, Rust., I.iv.2; Varro also suggests foolishness of running farm at a loss, and that profit is more important than pleasure (I.iv1-2) yet he himself owned an aviary purely for pleasure (III.v.8) and his notion of profit differs from the modern. He considers violets unprofitable because they cause soil erosion (I.xxxv.1). Thus profit contained notions of long term sustained profit in an ecological sense, quite different from "profit maximization" as Garnsey and Saller show, ESC, p.74.

90. Columella, Rust., I.1.1; note how this quotation from Columella is matched almost exactly by Berry's words in his "Nature," p.206-7: Requirements for survival of farming:

One is that if agriculture is to remain productive, it must preserve the land, and the fertility and ecological health of the land; the land, that is, must be used well. A further requirement, therefore, is that if the land is to be used well, the people who use it must know it well, must be highly motivated to use it well, must know how to use it well, must have time to use it well, and must be able to afford to use it well.

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91. Berry, "Harmony," p.104.

92. Virgil, G., I.61.

93. Columella, Rust., I.pref.22-24.

94. Ibid. I.iv.4 quoting Virgil, G., I.51-53. Just so the Stoics professed: "all things that nature rejects are among evils, all that she approves are to be reckoned goods" (Cicero, Tusc., II.xiii,30); See above Chap.2 p.56f. on Stoicism and ecology; Cicero, Sen., II.5 for "best guide."

95. Varro, Rust., I.vi.5; cf. Columella, Rust., II.11.1 & Palladius, I.5.5.

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96. Versus Shaw, "Water," p.146 who claims that not only the Romans were not concerned to prevent erosion but also that with Berber wadi farmers they encouraged erosion. See above Chap. 1, note 117. And see Varro's concerns re erosion I.xxxv.1 (above note 89).

97. Cato, Agr., VII.1; Columella, Rust., I.iv.54.

98. White, Farming, pp.94-6 argues that although the Roman naming of soils was unsystematic ("crude categories" and "rough distinctions") we should not underestimate their knowledge. M. Whitney's Soil and Civilization, (London: 1926) 36ff argued that knowledge based on experience of several generations was still better and more efficient than soil science of his time. As White points out, our soil science is very new, 70 years maximum. Romans and Greeks had centuries of knowledge about the soils they worked and this was far more advanced than has been generally acknowledged; The 88 soils terms are derived from his 13 page appendix on Roman soil names(pp.97-107). Some varying terms may refer to same soils.

99. C.E. Stevens, "Agricultural life in the Late Roman Empire," in CEHE, vol.1, 96 is typical, calling fallowing "primitive;" Even White, writing in the 1970s, who recognizes the benefits of fallowing for conserving moisture and increasing nitrogen, nonetheless stresses its weakness of low productivity(p.173); But Grainger, arid land expert writing in the 1990s argues that present reduction of fallow land due to population pressure and demands for increasing production is causing overcultivation and desertification (p.67 & p.108).

100. Varro, Rust., I.xliv.3; Cato, Agr., XXXV.

101. Cato, Agr., V.8 & XXXVI.

102. Varro, Rust., I.xxxviii.

103. Columella, Rust., II.i.5-7; Berry, "Harmony," p.107 gives a brief and selective history of such agricultural practices in the U.S.. In particular, Wes and Dana Jackson of the Land Institute, and their work New Roots for Agriculture stress that "the best agriculture for any region is the one that best mimics that region's natural ecosystems." As Berry states, there is nothing new about this approach, "it is our present principled and elaborately rationalized rape and plunder of the natural world that is the new thing under the sun."(p.108).

104. White, Farming, p.131.

105. Cato, Agr., XXXVII.

106. Ibid., XXXVII.2 mentions use of lupines, beans and vetches for fertilizers; Varro, Rust., I.xxiii.2 distinguishes between crops for food and those for soil improvement, citing lupines and beans as suitable for ploughing in green; Columella, Rust., II.13.1f. & II.15.15-6 on sticky and gravelly soils; See White, Farming, p.136; quotation ibid p.477 n.32.

107. White, Farming, p.137 & p.121f.

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108. Columella, Rust., I.iv.3-4; Varro says same I.iv.2-5.

109. White, Farming, p.18.

110. Columella, Rust., I.i.3-4 on listening to ancients and experts of the time and seeing if their methods were appropriate to each farm. For Columella believed Hipparchus that even the magnetic poles were in the process of changing places and that one had to be constantly adapting methods. He goes on to note that differences of methods from Africa that his contemporaries found inappropriate were due to differences of climate and soil(I.i.6).

111. Varro, Rust., I.xviii.8.

112. Ibid., Loeb trans. Hooper & Ash(rev.) p.232, n.1 quoting American Farmer Fairfax Harrison, Roman Farm Management, (N.Y.: 1913).

113. Worster, Nature's Economy, Chap. 12 "Dust Follows the Plow," pp.219-254 on monocultures, machinery and the dustbowls of the American midwest in the 1930s; Garnsey and Saller, ESC, p.77 on heavy machinery as unnecessary in the Mediterranean basin and harmful in semi-arid and arid lands "as is painfully being discovered" from Italy to the Mideast; *ibid.*, p.78 claims small plow sufficient, while a "caterpillar tractor causes all kinds of ecological damage;" Grainger, Desertification, p.72 on mechanized farming as "unsuitable to fragile dry lands; On contamination of soils by DDT etc. see e.g., W.C. Mahaney & F. Ermuth, The Effects of Agriculture & Urbanization on the Natural Environment, A Study of Human Impact in Southern Ontario, (Toronto: Geographical Monographs, no.7, 1974) pp.61 & 137.

114. White, Farming, p.260; *Ibid*, p.452 on transfer of old techniques to meet regional needs.

115. *Ibid.*, appendix A p.262 Varieties of olives, vines and horticultural crops; quoted from Ash rev. trans of Loeb, Cato, Agr., p.16 n.2.

116. Cato, Agr., VI.4.

117. *Ibid.*, I.7: "If you should ask me what is the best kind of farm, I should say a hundred iugera of land, comprised of all sorts of soils; White, Farming, p.65, "key note" & cf. his p.51.

118. Sprague de Camp, Engineers, p.272 on lack of military invention and the growing military superiority of barbarians leading to invasions. A lack of development he attaches to lack of new resources, lack of patents (p.275) and because of attitudes (p.273). Eg. Frontinus who thought military inventions had reached their limits, (Str., III, introd.); White, Farming, p.450-3 argues that attitude was major factor in lack of development of farm machinery, not excess of labour. Versus Finley's "living tools" argument(Innovation, 29f), White shows how agronomists mention ways of performing tasks when lacking labourers (Columella, Rust., IV.6..2; Pliny, HN, XVIII.300; Palladius, IX.3). Jones, Roman Economy, p.242. calculates that Roman farms had only half the labour force required for sufficient cultivation; Further in the later empire lack of

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farm labourers became a crisis (see below p.125) and yet "labour consuming methods continued to be employed" (White p.452).

119. Suetonius, Vesp., XVIII.

120. Pliny, HN, LXV, LXVI, CXCIV; Petronius, L1.

121. Ovid, Amores, III, viii, 45-6; (See above Chap.2 p.57f.); Cf. Lovejoy and Boas, Primitivism, pp.128ff; Cf. American naturalist Joseph Wood Krutch: "Man's ingenuity has outrun his intelligence," in Ekirch, Man and Nature, p.8.

122. Frontinus, Aq., I.16.

123. Dio, Orat., VI.25-6; Pliny, Ep., IV.8 ad Maturus Arrianus, calls Frontinus "one of our greatest citizens."

124. Cicero, Sen., II.5.

125. Horace, Epist., I.10.25-6.

126. Boulding, Beyond Economics, p.187 on 18th c. rationalism and Deism still existing in modern economic thought; Francis Bacon, The Works of, ed. J. Spedding (N.Y.: 1872-8), vol. I, pp.47-8; See above Chap.3 n.4, esp. Worster and Daly & Cobb; Lynn White, "Roots," p.1203 c3. "The emergence in widespread practice of the Baconian Creed that scientific knowledge means technological power over nature...may mark the greatest event in human history since the invention of agriculture, and perhaps in nonhuman terrestrial history as well."

127. White, Farming, p.452 shows contrast between tech. stagnation in other fields and advances in plant selection and irrigation.

128. Sprague de Camp, Engineers, p.209f on preference of rock cut channels for ease of repairs; *ibid* p.210 on siphons and inverted siphons. Inverted siphons were used at Arles to cross the Rhone river "by means of pipes laid in the river bed;" See also A.T. Hodge, "Siphons in Roman Aqueducts," PBSR, LI (1983) pp.171-666; *idem*, "Druckleitung in roemischen Aquaduckten," in Spektrum der Wissenschaft, (Weinheim: 1986) pp.120-5 claims that the Romans were capable of building very complex pressure driven water distribution systems. But that they generally preferred the simple gradient techniques for their aqueducts for financial reasons. Also due to lack of materials (Sprague de Camp p.209). Bronze was expensive and liable to be stolen. Clay cannot resist inner pressure, wood rots and bursts. Though used regularly, lead was not liked for health and taste reasons (Vitruvius, VIII.vi.10-11), though Hauck, p.102. (see next note) claims that due to calcium deposits from hard water, lead pipes were not so harmful as believed. Nonetheless, Romans preferred the healthy water from a rock channel. Pressure piping was used for crossing the river Garon. Instead of one large pipe, 18 6&5/8" diameter pipes were used to resist pressure (Sprague de Camp, Engineers, p.210); See also Vitruvius VII.vi.5-6 and note 130 below on use of pressure for raising water up hills; Sprague de Camp, p. 297 on the pneumatic pumps of Heron used main-

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ly for fighting fires; also White, Farming, p.156; and Vitruvius, X.vii.1-3, the pump of Ctesibius, complete with pistons.

129. G.F.W. Hauck, "The Roman Aqueduct of Nimes," Scientific American, vol.260 #3 (March, 1989) p.99 shows that to get the water to flow properly over 50km without backing up and bursting or leaking, an incredibly slight gradient was needed, plus gauges, and sluice gates controlled by the Castellarius, who would know rate of head and could adjust it to ensure optimum flow. A very sophisticated technique and yet as he stresses a few times, done with the least of waste and cost and yet extremely durable, "it would be difficult to imagine how a channel...could be built any better." pp.98-104.

130. Versus Shaw, "Water," p.136 who claims Romans used only the "simple principle...of gravity." But as Hauck "Nimes," p.99 points out the "mathematical formulas engineers now rely on for designing gravity controlled water pipes were not developed until the 19th c.." yet the Romans achieved same results without. Further, Vitruvius VII.vi.5f shows that Romans did have agua ascendere techniques: venters, risers and elbows were used to make water "slow in swelling up to the top of the hills." Vitruvius even mentions that venters had water cushions to relieve air pressure and prevent bursting.

131. See note 3 above. Even a simple waterpowered mill based on the Vitruvian wheel would have increased Roman mill power up to 40 times. But the donkey and human powered captstan mill was simpler and cheaper and Romans were not motivated to relieve poor donkeys. (White, Farming, p.446-7) See Apuleius on cruel treatment of mill slaves (Met.IX.12) and donkeys (Ibid, passim); see note 118 above on attitudes and labour.

132. Pliny HN, XVIII.172; White, Farming, p.174 & p.173 on wheeled Swiss plough; on light ploughs vs. erosion see below p.113; White p.448 on Gallic threshing machine. Other factors against its use were, again, conservative attitude of farmers, value of straw, and dense forests.

133. Eric T. Bell, Numerology. (Baltimore: 1933) p.57, thanks to Sprague de Camp, Engineers, p.173.

134. Berry, "Measure," p.208.

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135. Virgil, G., I.50-54: his advice for ploughing in dry lands follows this. See below p.113. n.140.

136. Cato. Agr., I.2-4.

137. Varro. Rust., I.xxxix: "You should observe what separate operation should be carried out at each season and in each locality;" ibid, I.xvi.1-2, whether the practices of a neighbour were beneficial or harmful, e.g., a plantation of oaks was not good beside your farm if you wanted to plant olives because of root systems, and leaching—Varro simply says "hostile in nature," I.xvi.6.

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138. Columella, Rust., I.1.6.

139. Rose, Primitive, p.329 Stresses that Romans were "great free traders in ideas." They were not in the habit to deny their debts to foreign peoples, they openly admitted that Carthage gave them a whole system of rural economy. (p.240) Yet they were also great preservers of their own methods.

I have left out the discussion as to what the Romans learnt from the Cathaginians and Berber, firstly because it is a moot point, if not impossible to determine. On one hand the Romans openly declare Mago as the "father of husbandry" and had his works translated into Latin by senatorial decree. (Col. I.1.13; cf. Varro I.1.10) On the other, their tradition of critical imitation and sensitivity to nature, left them dissatisfied with some of the African methods. (Col. I.1.6). For, the Cathaginians were primarily concerned with large plantation farming, "leaving their Berber subjects to provide them with corn raised on an extensive basis," (White p.18). It would thus appear that the mixed farming, so appropriate to the region, was brought from Italy and adapted to Africa. But we cannot be sure the Carthaginians or even the Numidians whom Polybius claims first made Romans aware of the cultivability of the plateaux (Raven, p.31), did not practice mixed farming previous to Roman domination, as Shaw claims, "Water" (p.141 & 149). But he admits that it is almost impossible to prove. Contrarily, we do know, that mixed farming methods go back to the earliest days of Rome. (White p.54).

Secondly and most importantly, I have left out this discussion because it does not effect the main argument of this thesis: that the Romans used environmentally appropriate methods and actively expanded agriculture in North Africa. Regardless, whether they were learnt from nature herself or from local cultures, Roman agriculture reflects successful adaptation to the arid lands of the high plateaux and across North Africa. Either way, contrary to apologists and detractors, it shows that the Romans were not scientific imperialists but open to learning from others and nature.

140. Columella, Rust., I.vi.24. sheds; III.xii.5 winds & vines; II.ii.25. levissimo dente; Virgil, G., I.67-70 shallow furrow.

141. Shaw, "Climate," p.391, in this line, Shaw suggests that the Roman success was simply unconscious luck: "the primitive technology of premodern agriculture, the very aridity and barrenness of the Sicilian and North African plains regions were, ironically, their greatest asset."

142. White, Farming, p.176 (& plate 19). The sole ard had a slight downward curve at the point in order to bite into the soil. But this curve created a natural tendency to dig deep into the ground when ploughing. A downward pressure was needed to maintain an even keel. More pressure applied at the back would tip the point up making for a shallower furrow.

143. Ibid, p.124f. Olives are the most common crop for intercultivation; White claims Columella's specifying of spacing implies intercultivation was a standard practice—60' x 40' for rich soils fit for corn & 25' x 25' for poor soils (V.ix.7). White also claims this method was developed over centuries, hence not just learned from Mago, it was adapted.

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Economic reasons for development of dry farming are 1) it cuts down weeds and 2) the wheat gives a steady harvest from the land while the olives are taking their 7 to 15 years to mature and produce, and for when the olives give a poor crop, which can happen every other year (White p.48). But that Romans had natural concerns is evident in Columella's line in which he states that the trees should be planted in rows, not for the sake of regimentation or profit, but that the trees "may be cooled by the summer breeze blowing through them," (V.ix.7).

144. White, Farming, p.154, olives were often started in nurseries so they could develop adequate root systems to withstand dry conditions; Despois, "Development of Land Use in North Africa," UNESCO A History of Land Use in Arid Regions, (Arid Zone Research, vol.17, 1961) p.220, gives:

Crops and their Water Needs in m.3/hectare

Actual Rainfall:	2,000 - 4,000
Wheat:	3,000 - 6,000
Olives:	6,000 - 8,000
Apricots:	10,000 - 15,000
Market Garden:	15,000 - 16,000
Date Palms:	20,000 - 30,000

Thus, the use of wheat and olives was more ecologically appropriate than the date palms grown by Arabs and Berber today.

145. White, Farming, p.156-7, states that many Roman farmers did not have wells and stuck to dry farming methods alone. Yet he gives ample evidence for use of all types of wells and water raising devices: Pneumatic pump: Pliny HN XIX.60f mentions its use for irrigation, and although only to do so, they have been found on a number of sites (White, p.48, n.35).

Archimedean Screw: in a Pompeian mural worked by slaves on treadmill, (White p.157 & plate 18.)

Rotae, wheel & rope: Horace, Odes, III.10.10 as proverbial.

Cato, Agr., XI.3 part of inventory of vineyard.

Swipe, or swing beam: most common, still used on Nile today, shaduf.

For North Africa, Birebent, Aquae Romanae, pp.9,51,65,71 etc. gives plenty examples of Roman wells. So versus Shaw, "Lamasba," p.77 there were other types of farming than where springs or wadis were.

146. White, Farming, p.225 on difficulties of olives; Murphy, "Decline," p.126 on Kharga; Frank, "Imperial Domains," p.71 on watering olives by hand; Rostovtzeff, Roman Empire, p.251 for quotation.

147. M. Kassas, "Desertification versus Potential for Recovery in Circum-Saharan Territories," ALIT, p.135 on filters, & cisterns & underground channels versus evaporation; on time shared springs see Lamasba above, Chap. 1, p.24f, n.89; Another such spring was found 250km east of Lamasba recorded in the Albertini Tablettes, FIRA, III, no.139 & see Shaw, "Lamasba," p.81.

148. M. Cary, The Geographical Background of Greek and Roman His-

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tory. (2nd ed, Oxford: Clarendon Press, 1950) p.228; Frank, "Imperial Domains," p.69f & 73 on predominance of such ruins in upper plains. That these were Roman dominated areas, see Chap.1 p.23f.; Le Houerou, "North Africa," p.246f, crops and rainfall. In Bani Wadi, Libya, e.g., has traces of Roman agriculture in 50mm rain/yr zone. This is rare. But 200mm common.

149. White, Farming, pp.146-7; versus Despois, "Development," p.227 who claims fogaras (underground rock cut channels) must be Berber.

150. Corripus, Johan., III.256; Cato, Agr., CLV; Shaw, "Water," p.126; White, Farming, p.172; Chap.1 p.21; also versus view of Romans as originators of largescale regimented farming above n.139 that Romans learnt large plantations from Carthaginians; the grid town so closely associated with Romans originated with the Greek Hippodamus (Arist., Pol., II.v) and brought by him to Thurii, South Italy (Diodorus, XII.10); Mega dams seem more the style of the Near Eastern River-valley civilizations.

151. Shaw, "Water," p.137.

152. White, Farming, p.146.

153. Birebent, Aquae Romanae, pp.325-7 agua paludensis A.D.184-5; CIL, VIII, 25,943 cols.1-3, petition; ibid., 26,416, Hadrian's reply; White, Farming, p.226 olives especially need good drainage.

154. Cloudsley-Thompson, "Animal Utilization," ALIT, pp.63-5; White, Farming, pp.69 & 420-1; Romans show great concern for healthiness of site, e.g., Vitr., I.vi.3, Col.I.vi.1-3. Varro, I.13; and for purity of water: Vitr., VIII.ii, Pallad., IX.4, Pliny, HN, XXXI.23 boils it.

155. Grainger, Desertification, pp.27 & 90-1, interestingly, Grainger connects present poor drainage to the capitalist focus on largescale irrigation schemes built for profit making, contributing to the thesis that capitalist attitudes lead to ecological decline.

156. Frank, "Imperial Domains," p.65f, argues Marius gave 100 iugera plots to colonists, but that the individual farmer could only cultivate 10 to 15 acres on his own, using intensive Roman methods. This led to much land being wasted and sold or bought off and an early concentration of lands in a few hands.

157. CIL VIII, 25,902, Henchir Mettich inscription. Following arguments based on this inscription; Frank, "Henchir Mettich," p.168, claims the corvée goes back to Caesar's Lex Genitivae, enforcing community work, reflecting the use of traditional ideals used for political ends.

158. Versus interpretation of Lewis & Reinhold, Sourcebook, p.179, "stimulate production."; See above pp.93-100 for social reasons and attitudes that explain why this more unprofitable change was not simply a matter of a shortage of slaves, or fear that subsistence farmers could not make cash rents; Cf. Frank, "Imperial Domains," p.65

159. Frank, "Imperial Domains," p.68; Le Houerou, "North Africa,"

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p.242 on Roman diversification of crops.

160. Lewis & Reinhold, Sourcebook, p.181 n.43 on vetches; quotation Petit, Pax, p.78; also Rostovtzeff, Roman Empire, p.330, calls it "prime objective of 2nd c. emperors to reduce pasture and increase" arable land.

161. Lewis & Reinhold, Sourcebook, p.182 on mutilation; Frank, "Henchir Mettich," p.153 on forfeiture for neglect; Chap.1 p.23-4. on terraces and erosion.

162. CIL, VIII, 26.416; above p.95 on Cato.

163. White, Farming, appendix D, p.108; Cato, 34, 35; Varro I.9; Pliny XXI.x.3 all mention terra rudecta, or runderatus ager as rubble; Swamps above pp.116-117.

164. Daniels, "Africa," pp.234-6; also P. Troussset, "Signification d'une Frontière; Nomads et Sédentaires dans la Zone des Limes d'Afrique," in W.S. Hanson & L. Keppie eds., Roman Frontier Studies, III (Oxford: 1980) p.931-43 argues, based on the placements of openings in walls, for control and filtering of nomads rather than total exclusion and that they were put up bit by bit in response to local needs. Further the farmers were dependent on the semi-nomadic Berber for seasonal agricultural labour.

165. Frank, "Henchir Mettich," p.164, the lex Manciana only gave 5 years remittance on grafted trees as they bear fruit much quicker than planted seedlings. Thus Hadrian's extension to grafted trees gave great encouragement, probably 3 years of actual crops without taxes.

166. Garnsey & Saller, ESC, p.87 oil part of the dole at Rome; CIL, VI 1620 & 1625b, African oil traders commemorate the prefects of the grain supply; Rostovtzeff, Roman Empire, p. 322; H. Pavis D'Escurac, "Murdinae," pp.251-9 shows how numerous local markets grew up in even the most isolated places. There was a local demand for farm products in Africa; H. Slim, "El Djem - Thydrus, une des plus importantes villes romain d'Afrique," Les Dossier de l'Archéologie, 69 (1982-3) pp.62-73, shows how Thydrus grew up in part because of internal trade due to its strategic position on the N-S roadway.

167. CIL, VII, 26.416; Frank, "Henchir Mettich," p.159.

168. Wells, Roman Empire, p.248. Flavius Secundus; CIL II,824, Harvester of Mactar; Cato, Agr., pref., calls farming the livelihood most highly respected and "looked upon with the least hostility."

169. Leglay, "La vie religieuse à Lambèse," p.131; Since M. Leglay's Saturne Africain, (Paris: Editions de Boccard, 1966) it has been generally assumed that Saturnus was almost purely the Punic-African god Ba'al Hammon with only the thin veneer of a Roman name to disguise this "fact." Though I do not question the Punic-African aspect of the deity, the denial of his Roman aspects and worship has been greatly overexaggerated. Consider:

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1st, the extreme importance of Saturn to Rome. His temple is the 2nd oldest in the Forum (497 B.C. RE: 2A:I:218-223); His temple housed the state treasury (Suetonius, Claudius, XXIV.2) (Johnston, Golden Age, pp.63 & 89).; His festival one of the most important of Roman festivals, its gift giving ritual still celebrated as Christmas. (i.e., unsuppressible).

2nd, Roman names are found side by side worshipping Saturnus with Punic & Berber names (Bossier, p.306) and Roman pagus even shared in building temples with punic civitas (Frank, "Imp. Dom.," p.62).

3rd, his cult expanded in direct relation to Roman agr. expansion, (see below n.173)

4th, why was the name Saturn chosen for Ba'al in Africa. when Jupiter was the common association, such as in Lebanon? Probably because, his association as fertility power, numen of sowing, and with "ancien régime," made him a "peculiarly apposite equivalent" for 2nd c. African society with its agricultural prosperity and its favouring of archaic latin language and Roman society, and with the general revival of traditional values of the 2nd c. (Ferguson, Religion, p.215; and below n.178)

5th, assimilation and "geographical relativism" were keys to Roman religion. Their respect of locality applied to a respect of local gods, and close association of their gods of similar nature to local ones. Thus gods from Britain to Syria adapted to each other and exchanged names, one god often having five diff. names (Ferguson, Religion, pp.21 & 242) or making up a new deity, as we have seen with Mercury-Silvanus (Chap.2 p.51) Saturn is just one such deity. Romans were not religious imperialists like modern Europeans. Even Leglay notes he is a Mediterranean god, not specific to any one culture (Leglay, Saturne, p.449). As Pagans, Romans shared a common respect of local spirits and places with Africans. Just as Bossier claimed 100 years ago, this similarity of religion made for the easier assimilation and acceptance of Roman development in Africa (Roman Africa, p.301). Saturnus is symbolic of this mutual assimilation and should be called Saturne Romano-African, not just Saturne-African.

Cf. Février, "Religion et domination dans l'Afrique romain," for counter view: Romans imposed their gods "like urban landscape," and they are more prevalent than the indigenous gods; Also A. Besaouch, "Pluto African," Karthago, XVI (1971) pp.103-5 argues that Leglay mistook epigraphs of Frugifer for Saturnus; Cf. below note 180.

170. Varro, Rust., III.i.5.

171. Johnston, Golden Age, Chap.5 "Saturnus and the Agricultural Golden Age," esp. pp.68-9; Italy was even called the "Saturnian land," Virgil, G., II.173-4.

172. Tacitus, Agr., III & XLIV associates reigns of Nerva and Trajan, respectively to (blessed) Golden Age; bad government was associated with absence of Saturn's Golden Age, Suetonius, Tib., 59: "Saturn's Golden Age has passed,/Saturn's Age could never last;/Now why Caesar holds the stage,/this must be an iron age;" H. Mattingly, Coins of the Roman Empire in the British Museum, (London: 1936) p.xliv, Nerva associated his reign with Augustus' and a new Golden Age by printing the sign of Capricorn on coins; pp.lxxiv & lxx Trajan's use of coins to associate his reign

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with Golden Age; pp.cxxxiii, cxxxvi Hadrian associates his reign with Augustan Golden Age, & p.cxxxvii Golden Age underlying theme of Hadrian's coinage. We see this in use of Cornucopia always assoc. with Golden Age, p.cxxxvi, (my fig.12: Dea Africa Chap.2); & my figure 4 Hadrian's Golden Age coin and possible Saturnus figure.

173. J. Toutain, Les Cultes Paiens, vol 3, book iv, p.95 spread beyond narrow influence of Carthage due to Romans; Even Leglay, Saturne, shows how Saturnus' cult spread 1st with Vespasian (p.80) then especially under Antonines (p.86) and finally with the "last great effort of Romanization" under the Severans (p.95).

174. Dunbabin, Mosaics, pp.112-3; White, Farming, plates 26-7 is able to parallel photographs of modern Italian farmers with Roman mosaics of Roman labourers doing tasks in same way.

175. Dunbabin, Mosaics, p.161 & p.186 on season mosaics and fertility; Rostovtzeff, Roman Empire, p.272 on prevalence of this subject matter in agricultural provinces, Britain, Spain and esp. Africa; note, Toynbee, Medallions, p.91-2 assoc. depiction of seasons with Golden Age.

176. Dunbabin, Mosaics, p.121, & pp.117-8 on switch from depictions of peasants farming to villas of great estates.

177. Earl, Tradition, p.88.

178. Champlin, Fronto, p.19; Notably, Africans were head of the Archaic revival in Latin language & thought in 2nd c. (Champlin, p.26); See Earl, Tradition, Chap.II on "New Men" and Tacitus, Ann., III.55 for one example of ancient awareness of this "syndrome."

179. MacKendrick, African Stones, p.232 on library; p.323 for list of philanthropy; Sicca Veneria, CIL, VIII, no.1641, A.D. 169/80, under Marcus Aurelius, patron gave 1,300,000 s. to support 300 boys from age of 3 to 15 and 200 girls from 3 to 13; Interestingly, the descendants of Frontinus (author De Ag.) settled in Cirta and became the patrons of that city. Cirta had one of the largest aqueducts in Africa. (W.C. McDermott, "Stemmata quid faciunt? The Descendants of Frontinus," Ancient Society, VII (1976) p.238-40, CIL, VIII, 7066). And a P. Julius Frontinus, prefect of the VIIth cohort of volunteers dedicates a base to his Deae Patriae at Timgad near the Aqua Sept. Felix. Leschi, "Découvertes Récentes A Timgad, Aqua Septimiana Félix," Comptes Rendus des Séances Académie des Inscription & Belles Lettres, (Paris: 1947) p.96.

180. Leschi, "Aqua Sept. Félix," of Timgad, dedicated to Sep. Sev. c.211-12. Originally dedicated to Antoninus and Geta, but chiselled out and rededicated. (p.95); Ibid., Aquae Flaviana, p.97f, 70km east of Timgad, the patrons of Mascula donated this water works and dedicated it to memory of Vespasian & his sons; Interestingly both had dedications to Frugifer also, whom Leschi says was confused with Pluto and Saturnus!, CIL, VIII, 17,722.

181. Champlin, Fronto, p.17.

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182. Tacitus, Ann., III.55 talks of how deference to Vespasian encouraged acts of good faith among Senators. How much more so in 2nd c. when cult of emperors was at peak (Petit, Pax, p.104). MacMullen, Corruption, p.6 shows inscriptions to emperors at height in 2nd c. Though, so was the number of inscriptions period. Nonetheless, we do find emulation of emperor's acts, such as of Trajan's Alimenta. There is the child fund mentioned above n.179 in Africa; but also all over empire, Pliny, Ep., VI.34 did same; and CIL X 5,056 & 6,328 from Italy.

183. SHA, Hadr., VI.5 remitted Italian taxes and lessened those of provinces; XXI, remitted tribute when touring provinces; X.5f lived frugally; XIII.4 kindness to province of Africa; SHA, M. Ant., VII.1 lack of greed; XVII kindness to provinces; XVII.4 sale of imperial furnishings in order not to burden provinces with new tax for German wars.

184. P.A. Brunt, "Charges of Maladministration under the Early Principate," Historia, X (1961) pp.189-227. From Augustus to Trajan, shows how Trajan was most aggressive in clamping down on abusive governors. He had highest number, 7 out of which only 1 was acquitted, whereas Nero, acquitted 5 out of 6. Two of Trajan's cases were against governors of Africa. They were forced to pay compensation, were barred from Italy and denied entrance to any other posts. I follow MacMullen's thesis here, that such actions reflect more active morality rather than rampant corruption of the time (see below, p.125f); SHA, Hadrian, III.9-10 restrained greed of procuratores and conductores; XIII.10 punished governors so severely as their crime demanded, that "it was believed that he thus incited those who brought accusations"; Rostovtzeff, Roman Empire, p.298 on Agricola Bonus.

185. H.Hurst, "Excavations at Carthage, 1977-8, 4th interim report," The Antiquaries Journal, LIX (1979) pp.19-49 claims that a massive rebuilding of the harbour at Carthage in A.D. 200 was due to the creation of the corn fleet Classica Commodiana, in A.D. 186, which began the trend of sending demands for grains from Africa soaring; Commodus himself actually remitted taxes to Africa, when he was in need of supplies, AE, 1948 #109. But the demand increased pressures and his favourable acts are but bandages for wounds he himself inflicted; Saltus Burunitanus, CIL VIII, 10,570, petition of farmers shows these wounds; & 14,464 their dedication to Commodus, suggesting that they received the aid they asked for. (c. A.D.180/83.)

186. MacMullen, Corruption, p.151; MacMullen's excellent work shows how graft brought down empire by breaking down army supply lines (pp.411-4) and burdening farmer, (p.180); This is not a new thesis, as Earl has shown loss of old time honesty and frugality was argument for decline by the ancients themselves from Sallust to Ammianus (p.121). But MacMullen has made a convincing picture that it is a valid "interpretation of historical causation (Earl p.55); Of ancients and graft in late empire see e.g., Ammianus XXXI.5,14; In relation to seclusion of emperors, SHA, Aurelian, XLIII.3f talks of how only 4 to 5 men had access to emperor and they purposely misinformed him to their own financial benefit; Ammianus, XXX.4.2 shows how Valens no longer heard petitions and this led to abuse of poor farmers; See MacMullen p.145f & p.148 claims this began under

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Diocletian. And, the once cream of Africa, Lepcis Magna, did not even recover stagnation of A.D. 230s to 280s, like other African towns, because as Ammianus says it fell victim to a "greedy and inert Roman army commandant" (MacMullen, p.30); Much of this was but the "principle of private enterprise," but which was equal to decline (MacMullen, p.151).

187. Jones, Roman Economy, p.84-5 deserting of land; p.408 flight of workers; Berlin Papyrus, no. 7 A.D. 247 binds tenants unequivocally to land to pay fisc; C.J., XI.iv.1 & XI.li.1 set laws preventing peasants to leave land, under Diocletian, c. A.D.290; C.Th., X,xii.2 & XI.xxix.6 laws enforcing the return to land of runaway slaves and tenants under Valentinian I A.D.364-75; Cf Jones, p.242.

188. A.H.M. Jones, LRE, vol. II, 1043 f. (White, Farming, p.12).

189. Rostovtzeff, Roman Empire, p.320-1.

190. Frank, "Henchir Mettich," p.158.

CONCLUSION — pages 44 - 46

1. On the criticism that North Africa was underdeveloped by the Romans see A. Deman, "Materiaux et réflexions pour servir à une étude du développement et du sous-développement dans les provinces de l'Empire romain," and the appendix by J.M. Michel "L'insuffisance des investissements: signe ou cause du sous-développement dans les provinces romaines, l'Espagne et l'Afrique du Nord," ANRW II 3 (1981) pp.3-97; For a critique of this article see L.A. Thompson, "On <<Development>> and <<Underdevelopment>> in the Early Roman Empire," KLIQ LXIV (1982) p.383-401, calls it anachronistic because Roman ideas of development were entirely different than modern.

2. Daly and Cobb, The Common Good," p.21.

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