

Habitations and microenvironments of man from the Paleolithic to the Renaissance

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**HABITATIONS AND MICROENVIRONMENTS OF MAN
FROM THE PALEOLITHIC TO THE RENAISSANCE**

**A Thesis submitted to The University of New South Wales for the
Degree of Master of Architecture**

by

S A Baggs B Arch *NSW*, Grad Dip *NSW*, ASTC, FRAIA, ARIBA, AAILA

1973

DECLARATION

The candidate, Sydney A. Baggs hereby declares that none of the work presented in this thesis has been submitted to any other University or Institution for a Higher Degree.

A historical study of man's attempts to alter his environment and create suitable conditions whereby the potential for satisfying his individual basic needs was made possible, from the Paleolithic to the Renaissance with emphasis on the pre-historic periods up to the Bronze Age.

These individual basic needs and the various social needs which are overtly expressed in the extant works of a culture, are assessed on a normative basis and correlated with the available evidence. This is done using a value scale corresponding to Dr Abraham Maslow's categories of basic human needs arranged in hierarchical, ascending order.

The Ancient Egyptian civilisations are researched as a particular example and their motivations and the methods of climate control which they used are investigated at greater depth with particular emphasis on the latter. Circumstantial evidence of their horticultural skill is presented and the existence of a specific "indicator" plant species is proposed. This species is one which exhibits morphological changes in the vegetative and reproductive cycles which are causally linked to certain thermoperiodic and/or photoperiodic pre-requisites not present in the macroclimate.

Graphical methods are adopted to show fluctuations in levels of basic needs satisfaction for individual societies or Ages and sketches illustrate the evidence from which subjective assessments were made.

All periods and ages to the Bronze are summarised in graphic form correlating environmental factors with levels of individual and social needs realisation. Diagrams and models are designed as supplementary to the "Summary-Analysis" graphics.

Acknowledgements

I should like to thank my supervisor, A/Prof.P.Spooner for his continued help and confidence and Prof.A.Taylor, Political Studies and Geography, Queens' University, Ontario for his time, interest and encouragement.

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Preface

■ In 1968, during A/Prof. Peter Spooner's postgraduate course in Landscape design, essays were written which prepared the way for this thesis. It was then suggested that Abraham Maslow's theory of human motivations could be used as a tool of investigation, on a normative basis, into the evaluation of the various methods used in the past to modify man's environment.

Rapaport and McHarg have also published ideas developing the same general theme. Such support for this approach to the subject is encouraging, because this is a field in which little specific information is available.

Architects now have to work holistically, considering the complete man-environment nexus, understanding the levels of organisation of man's needs, while correlating them with the design of rational systems of spatial use (v.p.xvii), properly integrated within natural systems, so trying to avoid the repetition of historical mistakes.

■ Prof. Spooner had warned, "beware of side issues which could easily woo you away from your central enquiry. This is at once the attraction and the danger of research - it opens innumerable doors through which you glimpse fields of study previously unknown to you....these can lure you to a 'sticky end', like honey pots"....

This almost happened during the course of reading on archeology, anthropology, climatology (and paleoclimatology), psychology (social psychology), sociology, demography, paleontology, meteorology, biology (and paleozoology), palynology, paleo-hydrology, paleopedology, dendrochronology, botany, ecology (paleoecology), Egyptology, history, geography, anthropogeography, geology, geophysics, thermal dynamics, General Systems' Theory and histories of art, landscape, horticulture, agriculture, religion and architecture.

The thermal dynamics involved in heat-flow calculations for the cryptoclimate of the Great Pyramid and the separate calculations on heat-flow for the relative efficiencies of each microclimate

control method were too extensive for the scope of this thesis and even the investigation in some depth on each period had to be restricted to that between the Paleolithic and Bronze, with a summary (vide Appendix B. pp.254-365 incl.) covering the period between the Bronze Age and the Renaissance in order to restrict the content to a reasonable page count.

Because of the wide scope of the research matter, it is not possible to include all the necessary definitions; consequently, it is assumed that the reader has (as the writer now has,) a layman's knowledge of the subjects leaving only unusual words and phrases (some of them being Maslow's "specialised private vocabulary" (101) to be defined in Appendix C or described in context in the main body of the work.

Another problem arose when "indicator" plants were sought which by thermoperiodicity would establish certain climatic conditions as being present within historical microclimates, Prof.Kantor had remarked that she "suspects....the evidence upon which answers could be based, simply does not exist"....mainly because, as Prof.Dixon commented, archeologists should "show considerably more interest than hitherto in the less 'glamorous' aspects of their work", adding.... "it will be sometime before information of the kind you require becomes available....although the idea is well worth keeping in mind for future investigation".

The subject of microclimates was so vast that man's shelters and dwellings alone became a dominant theme with landscape elements ie. walling, terracing, hydraulics, shelterbelts, etc. becoming a minor one as these were mainly developed over later periods than the Bronze Age (although some of these elements are covered in Appendix B.)

- The method of attack was to consider each culture or civilisation by a) collating examples of the methods used to create microclimates for man to inhabit or use and
- by b) correlating them with the history of the culture or civilisation.

Having chosen those which best represented overt expressions of the

basic individual and social needs which motivated that society, normative assessments were made as a measure of man's progress towards the development of an ideal social environment in which the individual would eventually realise his full potential of psychological growth (v. Chart No. I back cover, as part of Appendix B.). Such advantaged people may be termed the "elite" of history who became segregated from the "masses", very early in man's evolution and growth towards needs fulfilment. They have remained so until the present day, although greater numbers are now enjoying the privileges of this class.

From the observer's point of view, both categories are to be considered as common to nearly all civilisations and cultures, with no other racial, ethnic, biological or historical links than that of sharing the constant descriptions of "advantaged" and "disadvantaged".

A normative science has been defined as one which tests or evaluates, and it is in the context of the latter meaning that subjective assessments on status of needs fulfilment are made in each case. Consequently, these value judgements represent the opinions of the writer and are not absolute. However, architects should be adopting definite attitudes in professionally guiding others who, have the means to fulfil societies' socio-economic and socio-political needs yet do not have the training to make competent value judgements. It is the tremendous misjudgements of the past which have produced ecological and sociological disasters, now recurring within shorter periods and of a greater magnitude than ever before in the history of man.

■ ■ Reading the Thesis

The introduction and Chapter I form a general background and Chapter 2 explains briefly the various theories of psychology that have been used. Chapter 3 is concerned with anthropogeographic theories which endeavour to bridge between the physical environment and the requirements of human needs. Section 2 comprising Chapters 4-8 inclusive, covers the historical periods from the Paleolithic to the Bronze Age correlating man's shelters and microclimate systems

with his basic individual and social needs. At the end of each of these five chapters, the relevant Age or Period is summarised in a "Man-Environment Nexus-Summarised analysis" diagram, (numbered A-E incl.). This summary sheet correlates the multi-factored environmental complex with the basic needs which that society overtly expressed. These sheets are described in detail in Appendix A.

The periods from Paleolithic to Bronze have been illustrated in context with more extensive illustrations being given in Appendix B.. Appendix B. then proceeds beyond the Bronze age to illustrate the subject in summary form only up to the Renaissance, from here hypothetical lines are shown on Chart No.I (which is part of Appendix B and included in a pocket in the back cover). All of Appendix B (including the explanation) pp.238-365 incl., should be read in conjunction with Chart No.I which graphs the fluctuations in levels of needs satisfaction for individuals in a society, assessed as levels of fulfilment, using Dr Maslow's hierarchical order of prepotency of the basic needs 1-5 incl., on a vertical scale. These are plotted against a horizontal, chronological scale and a value is allocated, taking into account the extant evidence of a society together with the historical record. Cross-reference is possible between the illustrations (which are given a "B" prefix before the illustration number) and the example given in its chronological scale context on Chart No.I, where the reference number is again repeated. By this means, it is intended that Chart No.I be used to give continuity to the illustrations in Appendix B (which are listed separately in Section 3, pp.242-253 incl.) Chart No.I also correlates geological, climatological and anthropological events on the time scale.

Also see p.162 for a chart complementary to Chart No.1, headed "Table 9" (describing needs fluctuations in the same method) which covers Pre-Dynastic and Dynastic Egypt.

With the intention of raising the standard of presentation and communication as suggested in "Writing Handbook" (Architectural Assoc. School of Architecture, London, 1969, No.2,) and to improve the layout, double spacing has been adopted throughout, (except in Appendix B where it was impracticable) and to improve readability, even where it is

usual to use single spacing (i.e. where quotations exceed five lines).

As there were 400 illustrations, tables and graphs in the text, such disruptions in the continuity of the content, would have been ponderous and tedious although the choice of material was nowhere near exhaustive. Consequently, the bulk of illustrations are to be found in Appendix B, with text in a summary form to reduce the page count which has been a constant problem. These illustrations comprise the writer's sketches taken from source references shown thus "(12)"; and original graphs, charts and analysis diagrams. The notation "(12)" refers to a corresponding number in the Bibliography, (pp. 210-224 incl. Section 3) and also occurs on Chart No. I to aid cross-referencing again. This method of notation has been adopted in the text as well, to improve continuity and avoid tedious footnotes arising from the large number of source references used.

When extracting from biographical references which originated in the U.S.A. (approximately seventy source references were used in this category) American spellings occur, eg. "arbor".

In "Comments on Appendix B. Chart No. I", pp. 240-1, mention is made of various symbols designating systems of spatial use correlated with historical time (as a time-space, "TS" symbol), e.g. "TS^{0(p)}" = time-space segment - paleolithic, with undifferentiated use of terrestrial space; "TS⁰⁽ⁿ⁾" = TS segment - neolithic (still undifferentiated), prefix "L" indicates rising levels of socio-technological organisation (117). Prof. Taylor uses the General Systems Theory and other integrative techniques (isomorphism) and successive levels of organisation, applies them to socio-political structures to derive these private symbols. This hierarchical system has the same implicit pattern as that presented by the writer to graphically describe Maslow's theories, e.g. a higher level of socio-organisation such as the town, has unique emergent qualities compared to the lower level of the village and cannot be reduced to units of the lower level; yet the lower level contains all the necessary conditions for the emergence of the higher level, for man and society such emergence is usually accompanied by "an explosive increase in richness of pattern". (ibid)

SECTION 1.

"The pattern of human life is composed of threads leading from the past, interwoven with others formed by the present. Strewn between these - still invisible to us - lie those of the future." (50)

INTRODUCTION

"Apart from the few great upheavals in the earth's crust, natural change can never have had so rapid or so conspicuous an effect as those wrought by men during the last ten thousand years. From their first tentative experiments at felling trees with flint axes, they have cleared whole regions of forest, have made lakes, drained fens and changed the course of rivers, they have honeycombed the carboniferous strata and burnt much of them, they have plundered the accumulations of many ages and used the plunder to cover the surface of the country with roads, houses and cities. They have changed plants and animals to serve their own ends with ten thousand times the speed of evolution, and, by substituting these creations of their own for the natural animals and vegetation, have completed the transformation of the land". (118)

The imposition of human will upon ecologically balanced systems, has been circumstantially established as commencing in Paleolithic times and has been continuous since then, culminating in the devastating effects of this century.

There is a developing awareness that the anthropocentric bias to the "holocoenotic complex" of environmental factors now requires re-interpretation, for modern man may no longer consider himself as the centre of the holocoenotic diagram, notwithstanding his pre-eminence in the animal world as the only species able to effect changes in his evolution and in world ecosystems by the use of a specialised development of one body organ - the brain. (108)

Consequently, the use of a wheel diagram as illustrating the holocoenotic complex is no longer apt. One could better use a "cat's cradle" as an analogy, a web in which a factor affecting one part has its resultant effect on all others, repositioning man as one factor in the world's ecosystems but in a rediscovered "I-Thou" relationship, foregoing the "I-It" attitude which has caused his present alienation from his environment. (For holoeconotic diagrams, vide Appendix A (i) & (ii)

Over-specialisation resulted in the extinction of innumerable

species in the past, but Homo habilis was one exception. Climatic change and adaptation to habitat was not dependent upon genetic selection of suitable survival traits, as in all other living things. Reason and intelligence working from facts stored within a large neural sensory receptor organ, produced a reasoned response to change. The organism varied little in its adaptation to environmental change, but its "envelopes" of clothing, shelter and space enclosure allowed more varied combinations of climatic control to effectively protect and nurture the puny soft and delicate organism from extinction. Korzybski and others refer to man's "time-binding" (i.e. the unique ability to pass on knowledge gained from one generation to the next.) (108).

Giedion says:"the question of what has been suppressed and driven back into the unconscious, and of what must be restored if man is to regain his equipoise, becomes a prime requirement for any integrated culture. It was the search for the unchanging - the constant elements of human nature (which cannot, in the long run, be suppressed either by mechanization or by the nineteenth century's tragic conflict between thinking and feeling) which led me to primeval art. Certainly one cannot speak of direct constancy, whether in prehistory or today, but rather of an eternal problem of equilibrium. What happens today, what happened yesterday, what will happen tomorrow, depends upon the constantly renewed struggle of the mortal creatures with eternal forces." (50).

It is intended to research into history and prehistory to look for the overt expressions of those "unchanging constant elements of human nature" which are best understood in terms of man's basic needs both individual and social (as well as other human factors which may eventually be identified as basic needs per se) and for expressions of the one constant motivating force that has always been present in human nature. This constant factor has been a continuous search for a means to control the environment by substituting man-made micro-environments better adapted to man's needs.

However, a historical survey involving consideration of the basic human needs must be continuously aware that there is a distinct

bias in the nature of the evidence available. This unintentional emphasis is that given to the artifacts, architecture and history of the minority "elite" in man's evolution.

Those who, having achieved satisfaction of lower needs, by personal effort, birth or other means have, in striving for the satisfaction of the "aggrandisement" (Need 4) achieved positions of authority. They are therefore, the motivators for the design of those elements which perpetuate knowledge of those limited specific factors present in a particular society.

It is possible to imagine the fabric of a society being composed of the woof and weft of elite and masses, completely interdependent and yet Herbert Gans criticises Vance Packard for his overemphasis on a "strong sense of community" in small towns, which he alleges, could only be experienced by "the elite....who had every reason to identify with a community that made them powerful and wealthy"...."there is no reason to believe that small towns of the past were any different".... (209), naturally, because "self-aggrandisement" must be, by its nature the prerogative of a (historical) ruling minority.

Grahame Clark makes a case for the need of a "universal history" and sees "primary prehistory" as the nearest approach to this, making the point that it was not...."until settled life was established sufficiently firmly to make possible the growth of civilisations that the history of different groups diverged; conversely, the only kind of history common to all civilisation is that which preceded them, that is, prehistory and specifically primary prehistory". (26)

In the context of this work, considerable emphasis is given to these prehistorical periods because their study helps to clarify understanding of the effectiveness of the lower basic needs as motivators of action. The effect of the higher needs (ie "self-aggrandisement" and "self-actualisation") being mostly latent in primitive men, waiting upon lower needs satisfaction to be achieved in due hierarchical order (vide Chapter 2).

CHAPTER I ORIGINS

Modern man has biological patterns which serve to equip his body for use as a hunter-gatherer. Stress produces cholesterol (from "fatty acids" of the liver) to be used up in prolonged physical exertion, as in hunting. Stress produces adrenalin to be used for the extreme effort of "flight or fright" and both these physiological processes are aborted by the social mores of modern life. It could be that the present high death rate amongst Western races from coronary heart disease may be natural selection working on a segment of the population that is well adapted to short term success but poorly adapted to survival in our society. Given time, survival would win over such short term success. Evolution would "kill off" those who were adaptively "weakest" and over thousands of years a calm, serene yet efficient race could develop (116). But there is not time. Man is still in the Stone Age emotionally and Rene Dubos (Rockefeller Ins.) has said - "Even when man has become an urbane city dweller, the paleolithic bull which survives in his inner self still paws the earth whenever a threatening gesture is made on the social scene" *ibid.* although Maslow would disagree with his use of the bull as a symbolic metaphor - he considers this one of the worst mistakes in the choice of a "bad animal". (106).

David Hamburg, Professor of Psychiatry, Stanford U Medical Centre Calif., states "one of the best relics we have of early man is modern man." (115). It has been said that "we study ancient man to learn about modern man". "The gap that separates us is small as far as capacities but large as far as culture is concerned. Modern society has the things which primitive man did not and which he discovered - metals, agriculture, domestic animals and written language".

Psychologists and physiologists are currently trying to learn more about the problems of stress and aggression in modern life and how these forces affect the physical and emotional health of people today. The relevance of this to the main theme is that modern man although he no longer lives a hunting life, is still physically a hunter/gatherer. Psychologists ask this question: Is there any

connection between the primitive hunter/gatherer's emotional reaction like aggression and the killing ailments of modern society, like heart disease? Emotions together with technology could eliminate culture.

Although individual impulses on the whole work towards survival of the individual, there are times when the behaviour of a group of individuals can lead to actions, such as panic, which may exterminate the group. (82). Under conditions of social pathology, it is conceivable that situations could arise of a type that science fiction writers dwell upon - we may find the survivors in their natural environment as hunter/gatherers again. "At least we would be doing what our bodies were designed for". (115). Our alternative is to understand our physiological, emotional and higher needs, to use this knowledge to adapt our lives and attitudes to better correlate with our culture.

Prof. Taylor has hinted at an idea which has always been intriguing. One reads of "primitive man - a little man" of capacities and potentials which he appears to deserve, being a proto-hominid, undeserving of being called "Homo sapiens". Yet his brain was adequately sized and equipped to function with neural pathways nearly as complex as our own. The indignity of his status, if undeserved, makes one wish to find out more. Could this primitive ancestor (given the fulfilment of his basic physiological needs and environmental "blessings" equal to modern man's) rise to a dignity, stature and capacity comparable with that of his descendants?

A thorough appraisal of the history of man's attempts to modify his environment should begin with an assessment of -

- 1) the earliest examples and
 - 2) the most primitive progenitors of man
 - 3) what may be deduced as to the motive forces which impelled him to act in these ways.
- 1) For the earliest examples, the problem arises, when, if ever, was the first attempt to modify his environment made and
 - 2) how primitive was this modifier of his environment before one

must reject him as below the status of genus Homo and

- 3) how does one come to terms with the biological criteria of instinct which lacks data.

Maslow has pointed out the serious error made by the "early theorists" in their overstressing of man's continuity with the animal world. Instincts were listed to cover any instinct in any animal, so that an "impulse" found in man, not in animals, "was often thought, ipso facto, to be non-instinctive" (106). Maslow raises the issue that the higher one goes on the phyletic scale, instincts steadily "drop out" until in the human "only instinct remnants and instinct analgen remain".

Maslow must leave the issue (as to whether basic needs are instinctoid) open, but he distinguishes between those which become psychopathogenic when thwarted and the neurotic, habit, addiction familiarisation (learnt) needs.

The need for food is shared with all living things, love with (perhaps) the higher apes, self-actualisation through creativity, with no other organism on the phyletic scale.

In the need hierarchy, the higher the need, the less necessary for survival, it is better able to be postponed in expression and the easier for it to permanently disappear - "respect is a dispensable luxury when compared with food and safety".

A better environment is needed to foster development of the higher needs; the more they develop in individuals the greater the group influenced by them, and the greater the possibility of individualism developing. When a societal group is considered, it must be remembered that the primitive, simpler needs have always been assumed to be in conflict with the higher impulses, but using the hierarchical theory, improvement in man's nature may be achieved by fostering instinctoid tendencies, improvements in his cultural environment giving inner biological tendencies a better chance to actualise themselves. Higher needs, when well established, although being built upon the basis of the lower ones, become relatively independent of them (106).

Consequently, one should continuously review man's status at each

step in his evolutionary journey, from the point of view of the degree to which he successfully interacted with his environment to better express his higher potentialities. "There is no such thing as primitive man; there are primitive resources. The idea is in full sway from the beginning" (146). No longer is there a little primitive ancestor, all men are potential "self-actualisers", each societal group has the dignity and status it has earned by the use of the single organ which has made man an animal set apart, (vulnerable in so many other respects that extinction would have been his fate long ago, had it not been for the evolutionary specialisation of the brain). The biological survival value of culture becomes obvious when the sub-human primates are considered. A system of competitive dominance among adult males may be a satisfactory principle for group organisation at that level. However, man has certain physical characteristics (other than upright posture, specialisation of the hands, development of vision, etc.,) which makes him unique. The development of the cerebral cortex of the brain introduced a vastly greater capacity to use intelligence to achieve satisfaction of basic needs and if this were applied in the sub-human context then the group could become self-exterminating and consequently, of inferior biological viability. Culture is therefore, essential for biological survival.

Maslow quotes Crawford and Yerkes that chimpanzees are "altruistic undominating, friendly and fostering animals" - but concedes that it is for the future to determine to what degree and in what sense, the "higher" animals and primates show urges to "safety, belongingness, love, respect, autonomy, self-confidence, curiosity, understanding or beauty" (106).

The commonly accepted theory has been that instincts steadily drop out as we go higher in the phyletic scale, to be replaced by an adaptability based on vastly improved abilities to learn, think and communicate. If we define an instinct, in lower animal style, as a complex of innately predetermined urges, then this theory seems to be true. Among the white rats, we find by this definition sexual instinct, maternal instinct, feeding instinct and others. In monkeys,

the maternal instinct remains, the feeding instinct is modified and modifiable; the sexual instinct is gone, leaving behind an "instinct-like urge" (106). The monkey has to learn to choose his sexual mate and has to learn to perform the sexual act efficiently. The human being has none of these or any other instincts left. The sexual and feeding urges remain and perhaps even the maternal urge, although very faintly, but instrumental behaviour, skills, selective perception and goal objects must be learnt (mostly in the sense of canalization). Man has no instincts, only instinct remnants and "instinct analgen". (*ibid*)

In regard to the full phyletic scale, of all the primates, only the chimpanzees and apes are nearest to man and should be considered as the origin of the instinctoid needs (48). We know from the work of LeVick and others that they are also interesting because the apes have some remnant urge to make a nest on the ground or a crude platform in a tree. This should not necessarily be assumed as an instinctoid need to construct a shelter but only as an urge to seek safety for the social group. The chimpanzee, closest to man has been quite thoroughly observed to exhibit no aggression but has an amiable and sociable attitude to the group.

J.Desmond Clark refers to the primitive tribes in the Transvaal area of Africa as also exhibiting very little territorial aggressiveness which seems to have become part of the psyche of man after the Pleistocene. He goes on to say "there is thus little evidence to substantiate Hobbes' thesis that the natural state of man was one of '...warre, as if everyman against everyman', there is just as little reason for crediting the earliest toolmaker with the compassion and humanity of Rousseau's 'gentle savage'...." (*ibid*).

The distinguishing feature that marks the human species from other mammals is the power of conceptual thought. Although the development of the cortical region of the brain, together with a freeing of the fore limbs for other activities by the adoption of an upright stance, gradually led to the manufacture of tools, the tool-making that took place by the fashioning of natural objects to form

cutting tools particularly, represents a completely new kind of thought. Animals and birds may use natural objects for tools (chimpanzees may use a stick to reach a banana or a twig to remove ants from their nest) but for early man to deliberately manufacture an implement, imagining the future situation where it would prove useful would be impossible for an animal. The ability represented here is to "think in abstract concepts rather than simply to react to immediate concrete stimuli". This abstract quality preceded, and was an essential part of "fire-making, speech, writing, conscious role specialization in society and all other fundamental activities which distinguished man from his fellow mammals" (86), including shelter building and methods of controlling his environment.

Probable Origins of Man's Needs to Alter his Environment as Demonstrated by Primates.

When one considers the origins of how man may have developed his capacities for constructing shelters to modify his environment, it is necessary to question which of these should be considered "instinctive" and which ones have been learnt (either as a primitive or as a more evolved primate). It is interesting to try and understand the beginnings of the instincts and needs which urged the primates along, thereby evolving the body organs to allow specialisation in the necessary skills required for the survival and evolution of the order.

When Linnaeus (55) chose the name "Primate", to describe the animal order containing monkeys, apes and man, he expressed the idea that here was an order of "chiefs", the leaders of evolution, with the tree shrews at the evolutionary base of still existing species and highly specialised forms like the spider monkey, the orangutan and man on widely divergent branches. The Primates became undisputed masters of the trees because in all cases except the tree shrews, they had the ability to climb by grasping instead of driving claws into the branches). A recent impetus in research into the behaviour of monkeys and apes in their natural environment has made it clear that they "stand much closer to man....in their social behaviour....

than anyone had suspected" (56).

The earliest monkeys began to diverge from a common prosimian stock about 25-35 million years ago. Present day prosimians still show many features of the primitive mammals whereas monkeys and apes show a shift towards an increase in the relative importance of the senses. A large part of the brain became devoted to receiving and interpreting visual stimuli while the sense of smell correspondingly decreased. The nose is small and the sense of touch is transferred from the tactile hairs at the end of the nose, to the hands. The head is held erect to use the superior vision, instead of hanging low to utilise the sense of smell.

These evolutionary traits were the direct result of the stimuli resulting from arboreal life with its need for accurately assessing distance for leaping and locating food by its colour and form. A highly efficient nervous system was evolved as the monkey developed new capacities to move individual digits and the brain became correspondingly elaborated. Acuity and intensity of observation and vision, storage of information by memory & increased agility were factors which allowed monkeys to displace prosimians until by 30 million y.a. they had reached their evolutionary peak, the fundamental structure was set including the sensory system of "the entire post-prosimian order, up to and including man" (56). Man's brain may be a dozen times larger than a monkey's, but only in the portions devoted to memory, association and speech; because of this, it becomes very significant that much may be learnt from observing monkeys and trying to understand their needs.

Anatomically apes and men are quite different from monkeys, while it is very tempting to think of apes as bipedal, they are essentially four-legged, however, their free swinging arms are very similar to man's. In fact, much may be learnt from studying apes, because apart from intelligence, man is physically "closer" to an ape than an ape is to a monkey. He is not a descendant of a modern ape, "long ago....he went his own evolutionary way"....yet...."he has good reason to see in the anthropoid apes of today, a vision of what his

own ancestors may once have been". (56)

Contrary to past results of intelligence testing of chimpanzees and apes, the far more sophisticated tests of today are aimed at determining intelligence in a more complex and varied range and these have produced results indicating that apes and monkeys live "rich and complicated lives" in their natural habitats (56).

They certainly learn from past experience and should not be judged as merely capable of living within their immediate needs (food, safety, "togetherness", child raising, etc.) because this is also the main pre-occupation of human beings. It has been shown that chimpanzees exhibit capacities equivalent to Needs 1, 2 and 3, however, it is important to see these, in animals, as "innately predetermined urges" (106). There is something to be learnt from the chimpanzee about the problem that is yet to be investigated, as to whether man's use of caves for his art was a lower or higher need.

Experiments by zoologist, Desmond Morris recorded in his book "The Biology of Art" (170), concludes that "chimpanzees exhibit a rudimentary sense of composition....and....an urge of some sort which is satisfied by painting"(also to support this idea, Sir Julian Huxley has observed that chimpanzees have "artistic potentialities"). (56).

Successful evolution is gauged by population numbers, and monkeys are second only to man in being the most successful of the primates. In particular, the aggressiveness of baboons and macaques seems correlated with the fact that they have spread over a much larger area of the Old World than any other genus of monkey or ape.

Man also has been able to range widely because:-

- 1) he is a terrestrial animal (unrestricted to forest habitat)
- 2) he can cross natural barriers
- 3) he can exist on a wide variety of foods
- 4) he has developed culture, learnt to make clothes and use fire

which allow him to exist in adverse climates. Monkeys share the first three reasons but climate has restricted them to tropical

habitats. Man too, is obviously a tropical dweller and is "instinctively" aggressive when territorial rights are at issue. Because the only difference between man and the other primates is the fact he has developed culture (vide Reason 4 previous page), it appears there is much that may be learnt from observing the other primates, particularly if one choses the extraverted chimpanzee, which although no more intelligent than the ape, overtly exhibits his abilities in order to please, while the ape is introverted in this respect.

Mellersh has said "...if a gorilla can make a windbrake, we must credit the earliest true men with the ability to make a hut or at least a shanty" (167). "Yet the most primitive man needed a home base far more permanent and substantial than the nightly nests of chimpanzees." (165). The longer the young needed protection and education, the more equipment was needed in daily life, the more important cooking became, the more vital it was to secure a base close to game and water and congenial for living where the tasks essential for human living could be performed.

CHAPTER 2 BASIC HUMAN NEEDS - INDIVIDUAL & SOCIAL.

Abraham H. Maslow A.B. M.A. PhD. was born in New York City, 1st April, 1908 and died at his home in Menlo Park California, 8th June, 1970. He was affiliated with numerous scientific and professional groups and was also a widely published author (103a).

In 1954, he postulated a theory of classification of basic human needs. These he placed in order of prepotency beginning with the physiological; it is these biological needs which, when reasonably satisfied gave rise to a new level of needs concerned with the safety and security of the individual. Proceeding in a hierarchical manner, these are prepotent and when partially or completely satisfied give rise to those connected with the individual's interaction with others, i.e. what could be termed the "social needs". When various individuals have developed a societal identity, "social character" begins to form while interacting with a leader or leaders. These "elite" (q.v.) leaders or leading classes are fulfilling a new set of needs for the individual members of that class. This new set of needs is associated with "aggrandisement" (106), however, for those not privileged or motivated to become members of this class, the equivalent of this could be termed "self esteem" (ibid). This may be seen in pride of workmanship and achievement and this forms a definite psychological base for the next important unfoldment of an individual's character and personality, i.e. the category of needs described by Maslow as "self actualisation". Although this individual psyche growth usually occurs in a favourable social climate, it is not a necessary condition for its unfoldment. Maslow sees "self-actualisation" as growth towards the release of those positive, healthy, creative aspects of human personality which are usually identified with creative pursuits - although these may be of an apparently mundane nature. For the purposes of this thesis and in order to use this theory as an instrument of research, these needs are categorised briefly on the following page where a short form of each category is given so that it may be conveniently referred to in diagrams and when a particular needs category is identified, the identification

follows in parenthesis.

<u>Hierarchy of Need Category</u>	<u>Brief Description</u>
Needs I	Physiological
2	Safety, security
3	Social
4	Self esteem self aggrandisement
5	Self actualisation

At the level of Needs 3, considering the broad social groups, the whole of society begins to function as a separate entity, having needs of its own. (vide Appendix A for the writer's model analysis graphic which diagrammatically correlates these individual and social needs into one statement for use in considering the motivating forces behind historical and prehistorical social groups).

There are three significant facts which should be kept in mind when looking at individual members of social groups, in general these are:-

- A) The hierarchical order moves from the satisfaction of the former needs to the requirement of the satisfaction of the latter needs once the former are fulfilled and
- B) conversely in times of "social disintegration or upheaval" (221) there is a tendency to a reversal of this hierarchical order.
- C) Particularly when looking at diagrammatical presentations of needs theories, it is essential to remember that these needs are seminal in all human beings and the degree of emphasis placed on any group of needs by unfoldment of the individual in interaction with his environment, does not exclude the other needs in the spectrum. All needs are present at all times, the difference being one of psychological growth or environmental influence only.

John Gabriel (221) says "it follows then that people in a poor society will be mostly concerned with physiological and safety needs and Maslow's 'order of prepotency' would move from the satisfaction of Need No.1 as a basic requirement, to No.5 as the weakest".

Erich Fromm's concern for the interaction between man and the "social character" of culture, although orientated to an understanding of mental health of contemporary western man, can be applied in principle to any culture at any historical time. His concept of social character, is not one of being the sum total of all character traits for all people in a given culture, but is more of a "social mind", an entity in itself, a function of which is to "mold and channel human energy within a given society for the purpose of the continued functioning of this society" (116).

"The Social process can be understood only if we start out with the knowledge of the reality of man, his psychic properties as well as his physiological ones, and we examine the interaction between the nature of man and the nature of the external conditions under which he lives and which he has to master if he is to survive....As long as the objective conditions of the society and the culture remain stable, the social character has a predominantly stabilising function. If the external conditions change in such a way that they do not fit any more the traditional social character, a lag arises which often changes the function of character into an element of disintegration instead of stabilisation, into dynamite instead of a social mortar, as it were". (ibid).

This interaction of man with his environment develops the various derived needs which, taken in conjunction with the basic needs, provide the motivation for his construction of shelters. To compile a catalogue of shelters without the background of the society in which they occurred and the motives which were their overt expression would be incomplete and unsatisfactory. Yet it is difficult, if not impossible, to find monographs that have been written in such a way as to integrate a sound theoretical approach to human motives as causes, with their shelters as effects. However, to better understand the motivations that prompted man to modify his environment to better suit his needs, it was necessary to look at the various theories presented by psychologists and social anthropologists and select those which are most useful to aid in understanding the environmental and

social context in which the structures were erected.

In his book "The Study of Society", Alfred Kuhn has said, when speaking of the influence of the human being on his environment, "the human being influences the other persons in his environment. When these things happen in the small, they are subject to much conscious control. Further, the qualitative changes may be much greater and the speed of change much more rapid than when the larger aggregates of a whole society are involved. It nevertheless seems useful to think of these interactions of roles as essentially the same as the operation of the system of culture in the small" (121).

Kuhn, elsewhere takes Maslow to task (ibid) and considers that "Maslow does not seem to offer a particularly fruitful approach", but Prof. A. Taylor, Professor of Political Studies and Geography, Queen's Uni. Kingston, agrees that Maslow's theories are very relevant. (private communication 30.7.71).

It will not be necessary to look at other forms of shelters, e.g. magico-religious structures as their motivations will be obvious when a culture is being considered and they do not add to an understanding of how the shelters that man erected were expressions of his endeavours to adapt the macro-environment to his personal and social requirements.

When it becomes necessary to select a particular psychologist's theory for use in this way, it must be remembered that psychologists deal with single human beings, whereas social groups require an adaptation of any theory or maybe even require a completely separate theory.

When a choice was made of a theory adaptable to single human beings, Maslow's "holistic-dynamic" hierarchical theory of basic human needs provided the most suitable framework on which to construct a normative evaluation of man's spatial enclosures. However, it was some considerable time before it became obvious that it was not a simple matter of extrapolation of a particular psychologist's theory so that it could be extended to include social groups. Due to his untimely death, it was not possible to ask Maslow's opinion as to

whether his theories could be extended to a societal application.

The social, anthropological theory of Branislow Manislowski, who had spent the whole of his life in practical work and then developed a theory of needs from this lifetime of experience, was chosen: he was convinced that cultural phenomena were not the result of capricious inventiveness or simple borrowing, but were determined by basic needs and the possibility of satisfying them.

Maslow's feelings on the relevance of a society's correct outlook on the importance of the higher individual needs is expressed as follows:-

"1) the higher needs and lower needs have different properties.

2) that these higher needs as well as the lower needs must be included in the repertory of basic and given human nature (not as different from and opposed to it) must have many and revolutionary consequences for psychological and philosophical theory. Most civilisations, along with their theories of politics, education, religion, etc., have been based on the exact contradictory of this belief. On the whole, they have assumed the primitive, animal, and instinctive aspects of human nature to be severely limited to the physiological needs for food, sex and the like. The higher impulses for love, for beauty were assumed to be intrinsically different in nature from these animal needs. Furthermore, these interests were assumed to be antagonistic, mutually exclusive and in perpetual conflict with each other for mastery. All culture with all its instruments, is seen from such a point of view as on the side of the higher against the lower.

It is therefore necessarily an inhibitor and a frustrator, and is at best an unfortunate necessity." (106) (emphasis mine.)

In Prof. Taylor's correspondence, he has written, "I have a great respect for Maslow's work, and I would subscribe to his hierarchy of basic needs....as soon as one accepts that every society is a system involved in negative and positive feedback equilibration with its larger environment (ecosystem), and that a society functions

holistically, i.e. in terms of a universal cultural pattern involving Economic, Political, Juridical, Technological, Scientific, Religious and Aesthetic activities and organisation, it necessarily follows that all of Maslow's 5 needs are present in each societal system, be it Paleolithic or 21st century."(Pte.comm.30.7.71, emphasis mine).

"The extension of human settlement over progressively wider territories was made possible by the relatively unspecialised character of Homo sapiens as a biological species, but above all by the possession of culture, by means of which man has been able to adapt himself to the widest range of environments" (165).

Malinowski, has explained how he derived a theory of culture by first describing the basic individual human needs. These were listed separately and may be all generally categorised under Maslow's Needs I (with some minor divergences of opinion).

He then proceeded to list "cultural responses" to these needs. In list "B" below may be seen Needs 2 & 3 of Maslow's hierarchy.

Malinowski's Theory of Social (Derived) Needs.

<u>A. Basic Needs</u>	<u>B. Cultural Responses</u>
1. Metabolism	1. Commissariat
2. Reproduction	2. Kinship
3. Bodily Comforts	3. Shelter
4. Safety	4. Protection
5. Movement	5. Activities
6. Growth	6. Training
7. Health	7. Hygiene

Cairns has pointed out that Malinowski's views have been "subjected to the minute scrutiny of experts attached to rival positions and that they withstood, except for minor modifications, the analysis they have undergone...." which "is evidence of their vitality" (114).

Malinowski, then proceeded to propose a "secondary determinism" imposed by the "primary determinism" of the basic needs already listed. This secondary determinism Malinowski defines in terms of "derived needs" or "imperatives"; however, the simpler conception of "derived needs" favoured by Piddington should preferably be used. (ibid)

Malinowski lists these as follows: (v. Appendix "A"iii) (114).

<u>IMPERATIVES</u>	<u>RESPONSES</u>
1. The cultural apparatus of goods must be produced, used, maintained and replaced.	1. Economics
2. Human behaviour, in its technical, legal and moral aspects must be codified and regulated.	2. Social Control
3. The human material which maintains institutions must be renewed, formed, drilled and provided with full knowledge of tribal tradition.	3. Education
4. Authority within each institution must be defined, equipped with powers and endowed with means of forceful execution of its orders.	4. Political Organisation

The column on the left "relates to the requirements of maintenance of cultural apparatus, regulation of human behaviour, socialisation and exercise of authority (82). The 'responses' to them comprise those of economics, social control, education and political organisation" which to Malinowski are "permanent, cogent, albeit derived needs". (*ibid*). As previously stated, following Piddington's suggestion, "Responses" in this table will be termed "Derived Needs".

These derived needs would then become: (v. Appendix "A" iii)

1. Economics: (for which the term "Socio-economic need" or "Social Needs 1" will also be used herein).
The production exchange, distribution and consumption of "wealth" (whether in a primitive or sophisticated context or not).
2. Social Control: (for which the term "Socio-control need" or "Social Needs 2" will also be used herein).
The social controls of individual duties, regulating people to carry out their duties.
3. Education: (for which the term "Socio-educational need" or "Social Needs 3" will also be used herein).
Mature individuals, as members of social institutions, must work within the value systems of the society or "drop out". (114)

4. Political organisation: (for which the term "Socio-political need" or "Social Needs 4, will be also used herein).

"The rise of direct force by individuals in authority over other members of the group - here there is a continuum of response from group obedience, acquiescence through to tyranny and abuse of power". (114).

These needs may be considered a necessary condition for the survival of "social character" of the social group.

Although he too has reservations about the "universality of any set of basic needs", in correspondence with the writer, Prof. Thomas B. Colwell Jr. has written: "The important questions to me lie in the area of our felt needs and the attempt through experimental enquiry into their consequences to determine their desirability (or undesirability). Of course such enquiry must include an ecological dimension, otherwise, since both our desires and enquiry itself are culturally conditioned, it will merely perpetuate and reinforce the current value base. In other words we can't determine what we 'really' need as long as social enquiry is merely social, i.e. committed to the assumption that human values are the exclusive product of man and society. What ecology teaches us is that men are not the sole creators of their values, their needs....they are(or should be) the result of a conjoint determination in which Nature and environment contribute extensively. But our social thinking has still to be freed from its enlightenment, man-centered, control-orientated view of Man's relationship to Nature." (private communication).

It is suggested that Malinowski's "Imperatives & Responses" could be altered by adding to Imperative No. I- within the dictates of
balanced ecosystems".

No.2 - insert "ecological" as a prescribed
behaviour action and sanction.

No.3 - insert (at end) "and ecological values".

Malinowski finishes his last book with: "The theory of needs and their derivation gives us a more definitely functional analysis of the relation between biological, physiological and cultural determinism,

I am not quite certain whether my brief indication of what the function of each type of institution is, will remain final. I feel more convinced that I have been able to link up functionally the various types of cultural responses, such as economic, legal, education, scientific, magical and religious, to the system of needs - biological derived and integrative"(114).

The suggestion that cultural phenomena be defined in "function as well as form" leads to the interesting idea. Prof. Taylor has suggested (in private communic - 30.7.71) it may be found that "form and function are correlates throughout the man-environment nexus (as they seem to be in sub-human levels of biological organisation)" and it is intended to suggest which architectural forms and societal functions are dominant in any given level or organisation. The general principle of integrative levels of organisation will be incorporated into this work and for this purpose General Systems Theory has been researched (109). Briefly, this may be described as a holistic approach to the study of the phenomenal world. Each level of organisation, from single family units to urban conglomerations, is autonomous and its properties are unique. It serves as a subordinate "mechanism" for the level above, which in turn, cannot be reduced to parts of the level below, because it has "emergent qualities", unique to its organisational level and which are greater than the sum of its parts.

Maslow's theory, with its hierarchical structure, fits into General Systems Theory and for instance, permits an understanding of how at Paleolithic level, while all other needs are still present, Maslow's Need I is dominant, whereas supra-Paleolithic societies were able to subordinate their requirements for subsistence etc., (which were obviously better provided for than previously,) to less physiological needs. Or in terms of Malinowski's derived needs, Level I economics with its higher levels following was established.

In justification for the use of Maslow's theory, it can only be put forward very strongly that for every critic of the theory, one

can find a proponent who endorses his hypotheses and theories.

It should be mentioned that Maslow's work has been criticised mainly from two points of view:

- 1) On the basis of inadequate knowledge of all the work he has published
- 2) On the basis of semantics.

1) Even Lewis Mumford was not immune to making premature judgements on this count. In his book review of Maslow's "Religions, Values and Peak Experiences" (101), he criticises Maslow for not being conscious of the many small "peaks" that occur in everyday life, "little ecstasies", (105). He says this, in spite of the fact that Maslow has quite well recorded his thoughts on the degrees of "peaking" as it occurs from day to day, depending upon the receptivity of the person having the experience.

To read Mumford's review, however is to get the impression that he is in thorough agreement with all that Maslow has done, except in one other matter:

- 2) "the irritating effect, even upon a sympathetic reader of his highly specialised private vocabulary since others may be tempted for convenience to take it over. His neologisms and verbal short cuts, were pardonable in the first stage of expressing a new idea, are in the end a handicap rather than a help."

And so the question of semantics becomes quite a problem with many critics and Mumford takes the matter further when he says, "every sentence should be intelligible in terms of common human experience not attached to any abstract system. Dr. Maslow's vocabulary is false to his essential philosophy. For it is his restoration to psychology of the full gamut of human experience, including religion that gives Dr. Maslow's contribution its great vitality and its significance" (emphasis mine (101).)

While apparent deficiencies in Maslow's work are being mentioned, it is worth while noting one that is typically representative, put forward by Alfred Kuhn (121) where the problems of measuring the degree of needs, in order to determine their appropriate hierarchical

structure, and the problem of "showing how the need is reflected in the nervous system in a form which can control behaviour", is alleged to point to the question of experimentally weak ground for Maslow's hypotheses. Maslow's critics all miss one of the main points of his work viz: that the hypotheses are presented in order to be tested and over his lifetime they were tested whenever possible.

It is only by looking into the maze that behavioural psychologists construct, in order to explain human behaviour, one can see that only in a relatively homogeneous hierarchical structure can an order be brought to any of the theories for the purpose of using them as a tool to develop a normative approach to architecture. In contrast to the many faceted and disjointed approach of the behaviourist, is that Maslow's holistic system "basically poses the question of what people need universally. It seems to me that there is a fair amount of evidence that the things that people need as basic human beings are few in number. It is not very complicated. They need a feeling of protection and safety, to be taken care of when they are young, so that they feel safe. Second, they need a feeling of belongingness, some kind of a family, clan, or group or something that they are in or belong to by right. Third, they have to have a feeling that people have affection for them, that they are worth being loved. And fourth, they must experience respect and esteem" (102).

Maslow likens needs to vitamins, in that they are as essential to psychological health as vitamins are to physical health. Although this was a simplified version of his needs theory, he has omitted speaking about the Need I level of physiological needs. This is because these needs do in fact become quiescent in modern man's context.

Maslow (106) prefixes a statement of his theory with sixteen propositions about motivation that must be incorporated "into any sound motivation theory". Some of his propositions were as follows:-
that the individual must be treated holistically. (This is very much

in line with the holistic approach of the General Systems Theory to the study of the phenomenal world.)

that the hunger drive should not be chosen as a paradigm for all other motivation states, it is unwise and unsound. Although it seems a simple drive, it is far from simple in the long run. (106)

that a motivational state is not a special or peculiar one, "marked off from the other happenings in the organism". It is a complex, fluctuating and never ending state which must be assumed, and "an almost universal characteristic of practically every organismic state of affairs".

Maslow suggests that rather than investigate simple problems associated with drives having a somatic base, that it is much more important to understand the "fearfully difficult" problems.

"THERE IS NOW SUFFICIENT ANTHROPOLOGICAL EVIDENCE TO INDICATE THAT THE FUNDAMENTAL OR ULTIMATE DESIRES OF ALL HUMAN BEINGS DO NOT DIFFER NEARLY AS MUCH AS THEIR CONSCIOUS EVERYDAY DESIRES" (emphasis mine (106).) There may be completely different ways of satisfying a particular desire in two totally different cultures but the main point here is that the "ends in themselves are far more universal" than was previously thought. The culture must be examined to see where motivation finds expression, e.g. a good hunter in one culture may be required to be a good medicine man in another. These should be grouped in the same category rather than into different categories on purely behavioural grounds.

that the drive cannot be studied away from the totality of the other accompanying drives of the organism. Maslow makes a point that "proper respect has never been paid by the constructors of motivation theories to these facts: first, that the human being is never satisfied except in a relative or one-step-along-the-path fashion, and second that wants seem to arrange themselves in some sort of hierarchy of pre-potency". (ibid).

that "we should give up the attempt once and for all to make atomistic lists of drives or needs....such lists are theoretically unsound".

Maslow goes as far as to call such listings foolish because no "listing can be made as an arithmetical sum" in isolation between one drive and the next. (106).

A further problem arises from the concept of drive which has probably emerged from the pre-occupation with physiological needs. Such physiological needs can easily have the instigation, the motivated behaviour and the goal object separated, but it is very difficult to separate the drive from the goal object in a desire for love. In this case, "the drive, the desire, the goal object and the activity all seem to be the same thing".

"IF ONLY BY THE PROCESS OF LOGICAL EXCLUSION ALONE, WE ARE FINALLY LEFT WITH THE LARGELY UNCONSCIOUS FUNDAMENTAL GOALS OR NEEDS AS THE ONLY SOUND FOUNDATION FOR CLASSIFICATION IN MOTIVATION THEORY". (*ibid*) (emphasis mine).

that animal experiments should not be taken as basic data in theorising on human nature. The academic psychologists who rely on such reasoning are assuming that man is nothing but an animal. "Instinct which can be defined as a motivational unit in which the drive, motivated behaviour, and the goal object or the goal effect are all appreciably determined by heredity.....tends to disappear as we ascend the phyletic scale." eg. in the white rat, we find hunger instinct, sex instinct, maternal instinct; in the monkey sex instinct has definitely disappeared, the hunger instinct has clearly been modified in various ways and the maternal instinct is undoubtedly present. By definition, the human being has all three missing as instincts and replaced by "conglomerations of hereditary reflexes, hereditary drives, autogenous learning, and cultural learning in the motivated behaviour and in the choice of goal objects".

In ascending the phyletic scale, appetites increase in importance and hungers decrease. i.e. there is less variability in food choice of the white rat than in the monkey and there is less in the monkey than in the human being. Finally, as the phyletic scale is ascended, instincts drop away and cultural dependence as an adaptive tool increases.

It follows, that the only realistic experiment achieved in the primates that are near to man that any motivation theory should take into "CULTURAL DETERMINATION" (emphasis mine) with one should avoid too much pre-occupation with environment or the situation. Pure situation is a sound motivation theory which must take into account that there is a very practical distinction between what can consciously and unconsciously be achieved and what people are realistic about wishing, which is actual attainment is possible. This is to conscious needs being created then as the attained needs come in which consequently may fall within attainment. In this lies a key to the understanding in various classes and between primitive and modern groups.

that in the past, information on motivation from psycho-therapists treating sick patients, where "we must turn our attention to healthy men," the theorists must become more positive in their

MASLOW'S THEORY OF HUMAN MOTIVATION.

This theory is in Maslow's opinion "a synthesis of the tradition of James and Dewey with the holism of Gestalt psychology and with Freud and Jung. He has termed this synthesis a "holistic-dynamic" and is an attempt to satisfy the theoretical requirements" mentioned previously, at the same time to correlate facts, clinical and observation as well as to the following is a list of needs in order of priority

Needs 1 to 5

- | | |
|------------------------|-----------------------|
| 1) Physiological needs | 3) Social Needs |
| 2) Safety Needs | 4) Aggrandizement |
| | 5) Self-Actualization |

The idea of these basic human needs being in a hierarchy of relative prepotency rests on the fact that when the physiological needs are satisfied other needs dominate the organism which are then in turn satisfied and higher needs to emerge and so on.

So the main theme of Maslow's research is that in other motivation theories, where deficit of a need is critical, satiation of the need is also critical. When a need is gratified it releases the energy of the organism for the emergence of other more social goals.

An interesting hypothesis arises here: "certain needs have always been satisfied" and "one cannot tolerate deprivation of that need in the future." The converse of this would be that deprivation of a need causes the organism to act differently to present satiation. If not been deprived.

"If society creates and inculcates all these needs, only some and not others are psychopathogenic. We learn to eat three times a day, say thank you, and tables and chairs....we keep clean, work for money. And yet all these powerful habits do not hurt and occasionally even with positive circumstances, as on a canoe or camping trip, they are of an extrinsic nature by dropping them all with this can never be said for love, for safety.

Clearly, therefore, the basic needs stand on a physiological and biological status. There is no question of them. The burden of proof that they are not rests upon anyone who denies this.

The Hierarchical Needs No. I Physiological

"It is quite true that man lives by bread
when there is no bread" (ibid)

Maslow's first classification of needs are the physiological ones . A comprehensive list of these is almost impossible because it would be unlimited depending upon the specificity of the selection. However, in general they can be stated as: Hunger, thirst, sleep, sex, body comforts, elimination, these are also known as the "primary needs" in other classifications, because it is from these that the learnt or "secondary needs" arise. "UNDOUBTEDLY THESE PHYSIOLOGICAL NEEDS ARE THE MOST PREPOTENT OF ALL NEEDS. (Emphasis mine 106).

....the person who is lacking food, safety, love and esteem would most likely hunger for food more strongly than anything else". In this situation where all the needs of the organism are unsatisfied (a state in which very few people find themselves) all the forces of the organism are mobilised towards satisfaction of the hunger need. All other requirements of the organism are subdued to the extent that one may speak at this time "but only at this time of pure hunger drive and behaviour....anything else will be defined as unimportant. Freedom, love, community feeling, respect, philosophy may all be waved aside as fripperies that are useless since they fail to fill the stomach. Such a man may be fairly said to live by bread alone". (106) Maslow makes much of the point that emergency and extreme hunger is very rare in most people's experience as it would be in the social context except in times of disaster and famine.

Hierarchical Need No.2: The Safety Needs:

Similar to Needs1, the organism may be completely dominated by Needs2 to the extent that the organism becomes a "safety-seeking mechanism", with the whole of the capacities, ie. receptors, effectors of the whole intellect all orientated towards becoming "safety-seeking tools".

In the adult, these needs become the organism's requirement from society in that when it is a peaceful and good society, the members feel safe and the safety need does not become a motivator. With the near neurotic individual and "the economic and social under-dog", safety needs are only expressed in minor matters, and it is

also possible to see these needs exhibited at this lower level, in philosophies and sciences that seek to order the universe, or religions which try to make life meaningful; all have in part some motivation of safety seeking (although other motivations to scientific, religious or philosophic endeavour also exist).

Social implications of this need are obvious, ie. the society may be mobilised by threat to its safety to the exclusion of the expression of all other need satisfactions. A society structured on, or fixated at the level of Need 2, would be one in which the occupied settlement area would be at a minimum, (probably walled or palisaded) and the social structure, hierarchical.

Hierarchical Needs No.3: The "Belongingness" and Love Needs:

The cycle described for safety now repeats itself with a new centre which is a need for love, affection and belongingness. With the physiological and safety needs relatively satisfied, the organism searches for satisfaction of a place in the group and the absence of close friends or family is felt keenly.

A society structured on this level of needs would generally be one in which the architecture would be centred upon an authoritarian leader, with a structured social system whereby all act as part of, and for the tribe and group. It could be an evolution of the enclosed settlement, into city or town size after the enclosing element becomes unnecessary.

Hierarchical Needs No. 4: The Esteem Needs:

"All people in our society (with a few pathological exceptions) have a need or desire for a stable, firmly based, usually high evaluation of themselves or self respect or self esteem or for the esteem of others". There has been much background work from Fromm, Rodgers, Rand and many others on the dangers of basing self-esteem on the opinions of others rather than "real capacity, competency and adequacy to the task". The most stable and therefore the most healthy self esteem is based on "deserved respect from others rather than on external

fame or celebrity and unwarranted adulation". (106).

These esteem needs exhibit themselves in two sets:

1. "A desire for strength and achievement and mastery and competence with confidence to face the world together with an independence and sense of freedom," (*ibid*).
2. A requirement for prestige or reputation (i.e. from other people) a requirement for status, recognition, attention, importance or appreciation needs that have been stressed by Adler but "relatively neglected by Freud".

In a society, these needs are reflected in the growth of institutions and in the cities by growth towards a grandiose presentation of the city's architecture which goes beyond the needs for walled safety, etc.

Hierarchical Needs No. 5: The Need for "Self-Actualisation":

Given satisfaction of all the Needs 1-4, a restlessness or discontent is often seen in individuals who are not doing what they are best equipped for; unless a talent is realised, there is a lack of peace with the self. Kurt Goldstein ("The Organism, 1939) coined the phrase "self-actualisation" but it is used by Maslow in a more specific and limited fashion - specifically the tendency of a man to actualise what "he is potentially". This "flowering" of the personality is represented socially in the "flowering" of the human spirit as in the Renaissance.

"The main path to health and self-fulfilment for the masses is via basic need gratification rather than via frustration.... Asceticism, self-denial, deliberate rejection of the demands of the organism, at least in the West, tend to produce a diminished organism and even in the East, bring self-actualisation to only very few, exceptionally strong individuals". (104).

"This seems simple enough and yet few people anywhere in the world seem able to assimilate its meaning. Because the lowest and most urgent needs are material....they tend to generalise this to a

chiefly materialistic psychology of motivation, forgetting that there are higher non-material needs as well as those which are also 'basic'." (104).

Basic needs are ends in themselves but there are other pre-conditions for the basic needs satisfactions which are "almost so". They are closely related to the basic needs but are not ends in themselves. Maslow raises the point that they are very important because "without them, the basic satisfactions are quite impossible or at least severely endangered".

Of social importance are the implications of what Maslow terms pre-conditions for the basic needs satisfactions", in particular, dangers that are reacted to as if the needs themselves were being threatened, i.e. the freedom to "investigate" and seek "information", express oneself, "defend oneself, justice, fairness, honesty, orderliness in the group". Although these pre-conditions are reacted to as an emergency response, they are almost but not actually, basic needs. (106).

The Need to Know and Understand: (Not in the hierarchical needs structure)

Maslow often made the point throughout his writings that very little is known of the cognitive impulses. The problem of curiosity and its role as a possible basic need is only partially answered by the techniques for the achievement of basic safety, or in intelligent people for expressions of self-actualisation. There is a strong case for the presence of curiosity as a basic cognitive need: the higher animals exhibit what can be interpreted as curiosity and while it is probable that it is a canalisation of hunger, fear, sex, comfort, status, etc., there is a considerable amount of evidence that healthy people are definitely attracted by the mysterious or unknown, the unorganised and unexplained and there is any amount of historical evidence that facts and explanations are sought for in the face of great danger. The social implication here, is that there can be a time when the flowering of this quality in a percentage of the population, can be sufficient to create a great age of experiment

or intellectual achievement, (eg. the Renaissance, Vide Chart No. I on back cover). Classified under the self-actualisation needs, Maslow separates what he calls:

The Aesthetic Needs:

Maslow is careful to present this hypothesis with the statement that he has attempted to study this phenomenon at clinical-personal, logical level with selected individuals and "have at least convinced myself that in some individuals there is a truly basic aesthetic need" (97). "SOME EVIDENCE OF SUCH AN IMPULSE IS FOUND IN EVERY CULTURE AND IN EVERY AGE AS FAR BACK AS THE CAVEMAN". (Emphasis mine,) (private communication). - Prof. Taylor has raised this point as being an expression in the caveman of the upper portion of the needs spectrum; - as evidence of the ubiquity of these needs in all historical and pre-historical cultures and social groups, with of course, the relevant emphasis on a particular need or needs correlated with the environmental pressures, etc. for the particular cultures under consideration.

A particular point is made of the overlapping that occurs between connotative and cognitive needs such as the needs for "order, for symmetry, for closure, for completion of the act, for system and for structure", which may be assigned to either cognitive, connotative or aesthetic and in some cases even neurotic needs.

Gratification of the Individual Needs as Leading to the Growth of the Social Needs:

It is important to note that Maslow does not present the hierarchy of basic needs as a rigid and inflexible system. He says that "most of the people with whom we have worked have seemed to have these basic needs in about the order that has been indicated". He then enumerates a number of exceptions which although they are presented as exceptions can be seen as personal shifts in the hierarchy depending upon value systems for the individual.

He gives precedence to the possibility that this exception to the hierarchy be favoured by an increased frustration tolerance particul-

early in the first two years of life due to need satisfaction. It is important to see the role of martyrs and "self-actualisers" in their social context as being a source of social change in times when the social "climate" is mature and ready for change. Under these circumstances, these people act as a catalyst so that society proceeds at an unchanging steady rate, then seemingly without prior indication, there is a social re-evaluation of values, ideals, etc., when a great leader or social revolutionary emerges.

Maslow makes the point that on anthropological common grounds, it is a "common experience of anthropologists that people in different societies are much more alike than we would think from our first contact with them and as we know them better, we seem to find more and more of this commonness".

From culture to culture, there may be startling differences in superficial styles in clothing, tastes in food etc., but Maslow's hierarchy of needs refers specifically to a common unity behind this apparent diversity. He makes no claim that it is universal for all cultures, only that it is "relatively more ultimate, more universal, more basic....a closer approach to common human characteristics. Basic needs are more common than superficial desires and behaviours".

Gratified needs play an important role in motivation theories but do not play an active organising role once they have become gratified. Such a need does in fact disappear to all practical purposes once it has been gratified and so it does not become a motivator of behaviour. "This point should be emphasised because it has been either overlooked or contradicted by every theory of motivation I know. That perfectly healthy, normal fortunate man has no sex needs or hunger needs, or needs for safety, or for love, or for prestige, or for self-esteem, except in strained moments of quickly passing threat". Maslow then extrapolates by saying that a man who is deprived of his basic needs may be considered as simply a "sick man" and analogous to someone who has a vitamin or mineral deficiency.

He goes so far as to say that there is no real value measure between a lack of love or a lack of vitamins as the pathogenic effects of each result in a form of starvation. (105)

In its social context, this extrapolation is taken to refer to society as follows:

1. "Since a man is to be called sick when basically thwarted, and
2. since such basic thwarting is made possible ultimately by forces outside the individual then
3. sickness in the individual must come ultimately from a sickness in the society.

The good or healthy society would then be defined as one that permitted man's highest purposes to emerge by satisfying all his basic needs".

This becomes a very bold postulation but one that when applied in the historical context, is very revealing. It becomes an indicator of the social climate that exists at a particular time when a cultural upheaval or revolution occurs apparently unheralded.

Gordon Allport (Holt, "Personality", 1937 and the "The Nature of Personality", 1950, Addison-Wesley) has investigated and formulated the principle that the means to an end can become a satisfaction in itself and need only be connected historically to its origin. This means that learning and change is of great importance in the motivational life and imposes additional complexity on everything that has gone before. The means of achieving a particular goal may come to be needed for its own sake but there is no contradiction between the two sets of psychological principles presented by Maslow and Allport. They are complementary to one another but Maslow's point of view is that the need so acquired and described by Allport may or may not be considered a basic need, depending upon further researches yet to be done. It has already been shown that higher basic needs, after long gratification, may become independent of their "powerful prerequisites" and even of their own satisfactions. An example is given of an adult who, with love satisfied in his early years, becomes more "independent than average with regard to safety, belongingness, love gratification of the present time."

This is given as the most important single example of a functional autonomy in psychology and such a person is able to stand the loss of love and popularity but only because of the chronic gratification of safety, love, belongingness and esteem needs in early life. Such people actually become "independent of the very gratifications that created them". (105)

The application to social theory is very obvious, in that as the environment provides the basic needs satisfactions for its individuals so the greater number of individuals will become autonomous and produce a healthier and stronger society. This will be seen in its historical context later.

In considering social theory and to what extent the society is determined by the behaviour of its individuals (with the consequent development of "social character") the full extent of the principle of need gratification can only be understood in the context of the deprivation of needs, which produces an obsession for the satisfaction of the lower needs in the hierarchy. The exception should be noted that renunciation or suppression of the lower basic needs can produce the emergence of higher needs and very little is known about this in Western culture but Maslow's thesis does not claim "that gratification is the only source of strength of other psychological desiderata"(106). Gratification theory as such is invalid as a limited partial theory and requires structuring with other theories of frustration, learning, neuroses, psychological health values, discipline, etc. Maslow grants that gratification theory is not the whole picture, and that there are determinates other than basic needs gratification, "that gratification and deprivation both have desirable and undesirable consequences and that basic need gratification differs from neurotic need gratification in important respects" (108). There are some important conclusions that arise from the gratification theory, however, particularly as far as they affect the inter-personal relationships between human beings and hence society in general. One can look for historical societies in which the following attributes are exhibited from its

citizens and can validly draw conclusions as to the quality of the "social character" from the character traits of individuals. One would expect to find the "social character" of such a society overtly projected in an egalitarian, social structure with freedom from the structures and enclosures that are symptomatic of lower needs gratification .

Also, one would find such character traits as a liberalism in political, economic, religious and educational principles, respect for minority groups, egalitarian and respectful of the opposite sex, children, minority groups, etc., more democratic, less authoritarian, in religious principles, the loss of a hell concept, the changed picture of heaven such as utopia or the good life. The "social character" would also exhibit hopefulness or an interest in the future as an opposite to a loss of morale, or apathy, or anhedonia and a greater overt expression of a satisfied beauty need. These characteristics are given as phenomena in the large part determined by basic needs gratification and naturally arising from a similar personal list (for individuals) given by Maslow (122) .

The reason for a proper understanding of "social character" and its deterministic effect on individual character becomes obvious when Maslow gives the opinion that culture is a stronger force than instinctoid needs. He then goes on to discuss the question of the instinctoid needs which he has been drawn to do by the environment or hereditary theorists with their "black and white" dichotomous terms, which he criticises as lacking the correct understanding of degree of influence of both environment and instinct.

The instinct theorists' use of animal experiments have, in presenting their results, misled psychologists into the mistake of "failing to look for instincts unique to the human species", as well as the misunderstanding that instincts in lower animals were "powerful, strong, unmodified, uncontrollable, unsuppressible" and therefore, this would apply to human beings as well. From this has arisen cultural misjudgements on historical civilisations. "From this focussing on

animal instincts....for inscrutable reasons that only the intellectual historian may be able to unravel, western civilisation has generally believed that the animal in us was a bad animal that our most primitive impulses are evil, greedy, selfish and hostile....the theologian has called it original sin or the devil. The Freudians have called it 'id' and philosophers, economists and educators all have called it by various names. Darwin was so identified with this view that he saw only competition from the animal world, completely overlooking the co-operation that is just as common and that Kropotkin saw so easily" (122).

In looking at the "good society", one must not accept as intrinsic, an antagonism between instincts and society. Maslow emphasises a conflict between "individual interests and social interests, as a terrific begging of the question". Because Maslow's studies were mainly based on the healthy individual, he makes the point very clear that the main excuse for accepting this antagonism, would be in a sick society and with a sick individual. It does tend to be true, but Ruth Benedict has quite adequately proven (what Maslow contends) in her unpublished lectures on "Synergy in Society" circa 1942, that it need not be true, that individual and social interests under healthy social conditions are synergic and not antagonistic.

The false theory of human nature that has been held up as correct by instinctivists and anti-instinctivists to this day (including humanists, unitarians, liberals, radicals, environmentalists, as well as instinctivists all misinterpreting with horror, in the case of those who hope for a better future, and with a shrug of the shoulders and pessimism in the case of the instinctivists,) has made it necessary to explain why it is absolutely essential to "recognise instinctoid needs as not bad but neutral or good and a thousand pseudo problems solve themselves and fade out of existence". (122).

Such gratification of instincts should not be misinterpreted as implying completely indiscriminate permissiveness, as a minimum of enculturation is necessary, and no permissiveness is implied by

Maslow here in respect of "neurotic needs, addiction needs, habit needs, familiarisation needs, fixations or any other non-instinctoid needs" (106).

The reasoning of this abbreviated summary of points raised in "Motivation & Personality" (ibid) is that basic needs should be considered as instinctoid. They are in some sense and to some appreciable degree, constitutional or hereditary in their determination. Fox and Tiger support this hypothesis in "The Imperial Animal" (205).

The Difference between Higher and Lower Needs.

Because part of this thesis will be concerned with civilisations that are at their Needs 4 and 5 level, Maslow's comments on the higher needs should be noted. He points out that there are very definite psychological and operational differences between higher and lower needs and he goes into the difference between the needs so that he can establish the fact, that the organism itself dictates the hierarchies of values, and it is not the result of a scientific observer projecting his own "tastes and prejudices, intuitions or other unproved or non-provable assumptions" (106).

He effectively proves that the organism chooses the higher needs and consequently, that it is possible to have a value assessment placed on the hierarchy and that there is an order of choice or preference but "it is also an order that ranges from lower to higher values" (ibid).

"The higher need is a later phyletic or evolutionary development... the higher need has more preconditions... Higher needs require better outside conditions to make them possible... The pursuit and the gratification of the higher needs have desirable civic and social consequences" (ibid) ...he emphasises continuously.

Maslow goes into the question of "self-actualising" people, noting that one of the characteristics of this type of person (who are in Maslow's view "the flowering of a society") is "their relative independence of the physical and social environment" (106). In this way, they can be seen as relatively independent catalysts in the

sense already mentioned. In considering societal groups, it is interesting to note Maslow's definition of "the good society" as one that gives "to its members the greatest possibility of becoming sound and self-actualising human beings." This in turn, means that the good society is the one that has its institutional arrangements set up in such a way as to foster, encourage, reward, produce a maximum of good human relationships, a minimum of bad human relationships. A corollary from the foregoing definitions and ideas would be that "good society is synonymous with psychologically healthy society, while bad society would be synonymous with psychologically sick society, which in turn means basic-need gratifying and basic-need thwarting respectively" (106).

In an appendix, Maslow does make the statement that this book (Towards a Psychology of Being) (104) "is unmistakably a normative social psychology. That is, it accepts the search for values as one of the essential visible tasks of the science of society.... from this point of view, society or any institution in it can be characterised as fostering or hindering the self-actualising of its individuals".

He goes on to say, given that a society has satisfied the most basic needs of food, shelter, clothing, etc. there are two sets of values that draw together, i.e. the good of the individual and the good of the society and they come closer and closer to being synonymous rather than antagonistic, a rather "new idea which will startle many people" (ibid).

In his Appendix H, Maslow has said "Finally, because human beings have 'higher needs', in addition to the 'lower needs' they share with other animals, and since these needs, e.g. for safety, belongingness, love, respect, all are satisfiable only by other human beings, then a free choice situation must include these higher need gratifications. This, in turn, brings up the whole question of the nature of the mother, of the family, of the subculture and of the larger culture. 'Good cultural conditions' may be defined in

terms of the same requirement (of the free-choice situation) that we have already used, i.e. the 'good culture' must supply the higher need gratifications as well as the lower-need gratifications.

With this enrichment of the definition clearly kept in mind, it is not necessary to change the description above, although it is necessary to develop a comparative sociology of healthy and rich cultures in order to understand fully all the social implications of the definitions" (105). So it becomes obvious, that to determine the characteristics of "a good culture" from the point of view of the higher need gratifications of individuals, it is necessary to look at its ability to satisfy these higher needs, in particular.

When a self-actualising type of person becomes a leader of a society, the society reflects the attitudes of these "non-Aristotlean" values in that the type of leadership given is done with a "detached perception" (148), and exhibits a great degree of caring for the individuals and the society. So the "psychological level" of the elite, leaders or leader group, is of great importance in determining the "social character" and is one end of the scale, of which the ordinary individuals in the society are the other pole.

The deterministic effect of the environment must be considered in its proper relationship to the individuals and the point is made "that the culture is sun and food and water: it is not the seed" (104).

"Living in a family and a culture are absolutely necessary to actualise....psychological potentials that define humanness" so that the ideal society will bring to fruition in its individuals the capacities that "clamour to be used and cease their clamour only when they are used sufficiently. That is to say, capacities are needs and therefore are intrinsic values as well, to the extent that capacities differ, so will values also differ" (ibid).

This is mentioned here in order to more fully describe the concept of how "we can, in principle, have a descriptive, naturalistic science of human values....but we have seen this can be done fruitfully (at least at this time in history and with the limited techniques at our disposal) only if we differentiate healthy specimens

from the rest of the population. We cannot average neurotic yearnings with healthy yearnings and come out with a useful product." (104).

Some further considerations that better explain the whole of Maslow's approach to psychology are given in the summary of his "Health as transcendence of Environment" section of "Towards a Psychology of Being" . (ibid)

- 1) "We must not forget the autonomous self or pure psyche. It must not be treated as only an adaptational instrument.
- 2) Even when we deal with our relations with environment, we must make a theoretical place for the receptive relation to the environment as well as a masterful one.
- 3) Psychology is in part a branch of biology, in part a branch of sociology. But it is not only that. It has its own unique jurisdiction as well, that portion of the psyche which is not a reflection of the outer world or a molding to it"(ibid).

This defines the limits that Maslow sees as set upon the environmental determinists and the cultural determinists, and separates these unique qualities that exist in all individuals existing beyond the environmental and cultural influences and able to provide the "colour" to the "social character", which cannot be defined from simple considerations of environmental and cultural influences alone. (vide Chapter 3). His research has given a normative method whereby one may assess the effectiveness or "success" of a particular culture and it is by the use of this value system that such judgements are made on man's "progress" per se (in the prehistorical and historical subject matter of Section 3 and in its accompanying Appendix B).

Also, when combined with an attitude on the "man in nature" question, (q.v.) it becomes possible to make value judgements on the present and possibly the future of man's evolution towards higher needs fulfilment without violating the framework of world ecosystems.

CHAPTER 3

Environmental Determinism - (Anthropogeography Geographical Determinism).

Before looking at societies in their historical and pre-historical context, it is intended to review some of the theories and hypotheses that have attempted to explain the interrelation of man with his environment, so helping to assess past societies.

These theories exhibit a bias towards one or more environmental factors as being instrumental in influencing man and society, and all of them exhibit environmental determinism in one form or another. Each has some degree of validity, but insofar as it excludes other environmental factors, it is limited in concept and should be considered only in the context of other theories.

It is in the historical context then, that one can review these various environmental, deterministic theories in order to approach a better understanding of what is gradually becoming a more inclusive world view of man's place in Nature. These are anthropocentric theories, but they at least give us the background of work that has been done in the past and on which one may build to derive a more holistic approach to "Man-in-Nature". (q.v.)

Various theories have been put forward by anthropogeographers from Hippocrates to the present time; Franklin Thomas surveys these (15) and in general principle, they are stated below:

- 1) People that lived in the middle latitudes (temperate zones) were held to be superior to people from north and south of these zones.
- 2) Man needs opposition from the environment to be best able to cope with its exigencies and thereby build in "social character", most beneficial to his societal group.
- 3) There has been an "orderly progression shifting" of the actual centre of the highest civilisation through the course of history.
- 4) A primitive society is more affected by geographic factors than a sophisticated society, which in turn is affected by psychological factors.

- 5) "Isolation and inaccessibility" correlate with "cultural growth and diversification" and Thomas makes the comment, that whatever validity these theories may hold scientifically, they have at least been held over a great period, in some form or other and have "shown a vitality which entitles them to more than passing consideration" (15).

One of the most ancient beliefs was of the superiority of middle latitude civilisations; Aristotle, Vitruvius, Pliny and Vegetius all "drew the line of racial or cultural superiority". Aristotle drew it through Greece, Vitruvius, Pliny and Vegetius drew it through Rome, Khaldun through Arabia, and Bodin through France. In the 13th Century, Aquinas repeated this ethnocentric tradition and it was reiterated a few centuries later by Humboldt and Ferguson. There always has been, and still exists a strong feeling that temperate zones favour the development of civilisation and cultural superiority, (ibid).

The extent of these zones of cultural superiority show a tendency to migrate and Ratzel credited people in the temperate zones with a superiority of political and military power, as well as culture but in his case, he was inclined to draw the line at colder portions of the zones. Buckle and Spencer held the same general opinions but Spencer deviated in his opinion that civilisations originated in hot climates. Guyot's arguments for the advantages of physical and social evolution in a temperate zone were eloquently stated, and De C. Ward held that a stimulating climate with seasonal changes developed thrift and the ability to think ahead and plan for the future, (ibid).

Huntington requires special mention, as his method was to use painstaking research and he found the climate most favourable to human progress was one that had winters quite frosty and not too cold with summers that are warm without being too hot, and to these he added the requirement of a constant succession of electrical storms. He found that the climates of the portions of the United States,

England and Germany, and a very small portion of Australia were ideal for these requirements. J. Russell Smith reviewed the great cities of the world's most important nations and the average latitude for these, in both mean latitude and median, is very close to 45 degrees north for nineteen cities. From Hippocrates, to Smith and Ratzel, there has always been a strong opinion held that adversity produced fortitude and exertion in a race; Hippocrates stated that man was only vigorous and brave because he had a climate which will ruffle the temper and "demand fortitude and exertion" (15).

Ratzel viewed the relation between man and his environment, not as a struggle between two conflicting forces, but rather as a process in which man develops himself as a part of the earth's surface. As he states it, "man belongs to earth as a portion of the earth. But though man is really a part of the collective life of the earth, his progress comes chiefly through dominating and adapting to his use, the other forms of organic life" (*ibid*).

Strabo, in his theory, states that races who are fighters come from barren regions and Herodotus gives his corollary as, "soft countries give birth to soft men". Ferguson summarises these ideas in a most direct way when he says, "men do more when they have certain difficulties to surmount than when they have supposed blessings to enjoy".

It was Humboldt, who held that the inhabitants of the temperate zones overcame obstacles in order to inhabit the tropics. Treitschke asserted that fertile soil and a mild climate fail to bring out the best in people, and this is in line with general theory that has been mentioned before and also the same is stated by Buckle when he says, "bountiful regions do not develop energy in man". Reclus requires that the environment should supply sufficient obstacles to stimulate effort, but not enough to discourage people. Guyot, de C. Ward and Huntington all assert that seasonal change, with periods of plenty and scarcity are sufficient impetus to compel man to struggle but give him the necessary rich reward for his pains and they find in this

compulsion, "the essence of all human progress". When Guyot proposed that the centres of high civilisations shift progressively, he only stated historical facts. He proposed an orderly "march" of the centres of highest culture "in an orderly and north-westerly direction". (15). There is much difference of opinion to account for this shifting however, Ward linking it with the idea of "sympodial" development and not stressing the geographical factor. Herbert Spencer suggested that a desire for knowledge was sufficient cause for man's ability to conquer more difficult environments, and de C. Ward accepted this view, adding that the more difficult environments tend to bring out the best in man. Gilfillan concludes that the progress of civilisation has been "coldward", lower temperatures being conducive to mental efficiency, "upon which the higher civilisations depend". Huntington went to great pains to research the climate of each of the great civilisations at its peak and pointed out that the climate north of the equator is growing warmer. All writers, except Huntington, carry the centres of civilisations forward into colder and colder climates as a prognosis, whereas he tends to select an ideal climate, and proposes shifts in climatic emphasis which move with the centre of civilisation.

There is a great variety of differences of opinion, as to the importance of geographical factors in social causation; however, most agree that the primitive peoples are most affected by geographical factors and that advancing civilisations are characterised by a diminishing importance of physical influences, and an increasing importance of psychological and cultural factors. Conventionally, Buckle has been given the credit for this view but his opinions were clearly foreshadowed by Montesquieu and Humboldt, and definitely have been formulated by Ritter before the "History of Civilisation" made its appearance. Spencer re-iterated the idea, as did de C. Ward, Thomas, Ellwood, Hayes, Todd and others.

Lester F. Ward repeated the same opinion, also describing the process as a "transition from the unconscious stage of social evolution

into the advanced and conscious stage.... of collective telesysis". (15)

Kirchhoff, while admitting the growth of man's power over nature, dissents from Buckle and others in his insistence that even today, geographical influences "are more important in human society than psychological and cultural influences". (*ibid*). Recent times have seen an increase in incidence of the use of a very ancient doctrine, which states that accessibility and isolation affect people for better or worse; Strabo, Caesar, Cicero and Aquinas all wrote that a location by the sea was undesirable for a civilisation, because it corrupted "good morals, stimulated luxury, and produced an over-refinement of manners". They saw bravery and ruggedness of character as products of isolation. Montesquieu, and later others, have stressed the difficulties associated with isolated location and its causal connection with the shortcomings that people exhibit. Conversely, they stressed the broadening effect of accessible environments; isolation is seen by Ritter, Peschel, Reclus, Ripley and Giddings as being productive of political and cultural backwardness whereas contact with many cultures has caused progress and enlightenment in a civilisation. There are several writers, who have suggested the possibility of an extra-terrestrial interpretation of human affairs and this has caught the imagination of people as time goes on, the effects of solar flares and cycles seem to be a likely explanation for some factors that have been observed in the fluctuation of climates and races. Others connected with these ideas are Jevons, Leffingwell and Moore.

Modern theories are much broader and take into account climate, geographic location and natural resources, sunspots, climatic oscillations, weather changes, etc. (*vide* Appendix A), whereas ancient writers, predominately looked upon environmental influences as direct and immediate and as "operating on the individual" (*ibid*). The environment is generally regarded as being helpful in the creation of cultural situations to which man adjusts himself, although Huntington and Dexter

disagree and emphasise the direct effects of climate and weather as does the ancient writer Strabo, who also generally stressed the indirect effects of the physical surroundings. These are fairly representative of modern theories which look on the influence of the environment as being indirect and secondary as compared to the main bulk of all theories through history which consider that the influence of the environment was simple and direct.

Anthropogeographers like Huntington, De C. Ward and Moore compiled a vast amount of scientific and technical source material, not previously available to earlier writers. This has included advances in astronomy, meteorology, bio-chemistry, statistical procedure and more developed standards of information about lands and peoples, together with more accurate systems of measurement of temperature, humidity and atmospheric pressure.

As a general summary, it could be said that modern social scientists regard climatic, meteorological and geographic factors "more as conditioning influences than as determinates and to hold that man and culture, primarily, are the dynamic and determining factors". (15.). Most sociologists consider that social causation is the "scientific description and evaluation of all the factors which condition and determine the collective life of man....they regard the social process as a unity and look upon the geographical factor as constituting only one element in that process".

Ratzel has said, that it is not a matter of "man versus nature but of man and nature evolving together through reciprocal influences". Thomas goes on to say, "every historical situation must be examined in the light of its geographical setting, while all geographical influences must be studied in the light of their changing incidence and importance with the developments and vicissitudes of culture". (ibid).

It would be impractical to go into all the hypotheses that have been propounded by anthropogeographers, but the work of Huntington

should be looked at particularly, as it represents an excellent example of the anthropogeographers approach, when carried out with scientific data as evidence. Huntington's work will be reviewed, followed by some of his critic's statements, because, of the American anthropogeographers, Ellsworth Huntington is the most thorough and scientific. While he has become chiefly known because of his work on climatic influences, his most important scientific contributions have been made as an explorer and observer. His theoretical opinions, however have been highly influential, and have done much to stimulate interest in the study of environmental influences by social scientists. His concern with environmental influences considered holistically is expressed: "One of the most important requisites of an enlightened study of geography, anthropology, psychology, sociology and history is the universal recognition that every human situation depends upon the combined effects of heredity, physical environment and cultural endowment. Progress in such studies has been hampered in the past by the tendency of most students to ascribe special or even complete potency to one of the three factors at the expense of the others" (20).

Huntington defined the purpose of his book as being the study of the effect of the environment (and climate), together with heredity, upon cultural events. Huntington contends that there can be a loss of 5-10 years of a life span due to birth and then residence in an inclement climate. He averages the life-span loss in the U.S.A. through birth in summer to four years and the time of birth is seen by him as the key to this. This is an extreme example of climatic and geographic determinism and the conclusions he reaches are these:

- 1) There is a "selective process" present in nature whereby the physical type best adapted to a particular climate is preserved biologically, and other types are eliminated.
- 2) As a consequence, of some process described in (1) the "climatic conditions under which people are now conceived or born as well as those under which they live, have much to do with vigour and achievement throughout life".
- 3) Maps of climatic efficiency are of basic importance for the study of civilisations.

- 4) Taking the correlations of the effects on human vigour and the progress of civilisations, the overall effect of climate on human culture becomes evident.

Huntington's methods are quite scientific and his painstaking research, although it may have been chosen to "colour" his results (a charge which has been very difficult for his critics to prove) nevertheless, makes him a very significant anthropogeographer and his efforts are more impressive because of his concern with the significance of the earth's delicate ecological balance.

This was an unusual concern for his time and he has stressed the rarity in the solar system of habitable planets and the stability of life on the planet which we inhabit as being based on a fine balance of the world's heat budget and hydrological cycles, which require particular care and understanding from man with whom they are interwoven, all working together and comprising the world ecosystem.

Huntington formulated "laws of migration" as he calls them, which he describes as follows:-

- 1) "Migration is systematically accompanied by selection (some small selection of relatively weak types occurs for destruction as the result of a death rate alteration when migration is forced by conquest, flood or other disaster.)
- 2). The degree of difficulty of the migration, the more effective it is as a selector of human types", thereby producing the most suitable emigrees.
- 3) Racial, national and social characteristics, "lose their sharpness in accordance with the degree of difficulty of the migration".
- 4) The social level of the pool of migrants varies with the strength and nature of the impulse to migration. He draws a comparison between the so-called upper classes who fled Russia and the "vicious and ignorant" criminals shipped to Australia.
- 5) "The impulse towards migration, i.e. the gradient down which migration flows, derives its strength partly from the conditions at home and partly from those in the place towards which the migration is directed," (20).

He says: "These five laws, with numerous corollaries which spring from them seem to apply to all human migration. Their combined action has been one of the major factors in history" and proceeds to illustrate these laws with examples.

Huntington gives as his reason for bias towards research on climate, that it is "the factor over which man has the least control" (20). He then tries to estimate the influence of these climatic factors, how they affect cultural conditions through the health and vigour of individuals. He points out that without the aids of fire, clothing or shelter of any sort, obviously the progress in medicine, surgery, hygiene and diet would be of little advantage and little progress would have taken place, and says, "it must be remembered, however, that elsewhere even more than in the United States, non-climatic factors play a prominent part in giving shape to the map of civilisation. Density of population and diet are particularly important in this respect. In countries like Japan, they reduce the level of health much below what would be expected on the basis of climate alone". (Such comments must be read in the light of the fact that this book was published in 1947.)

He then investigates which temperatures are most conducive to vigour in the population and his figures are interesting in that regardless of body fat, pigment and other minor differences, the best average temperature is 63 deg. F. (17 deg.C.) during the night and 73 deg.F. (23 deg.C.) for the day. In general, the best midday temperature is 63-73 deg.F. (17 deg.C.-23 deg.C.) and the best night temperatures for rest being, 70 deg.-77 deg. F. (21 deg.C.-25 deg.C) the best total average for day and night is 65 deg. F. (approx. 18 deg.C) and the best noon average is 68-75 deg.F (20-24 deg.C). He draws attention to the significance of the fact that the Khmers, Mayans, Cingalese, etc., all migrated from cooler climates, where the climate was more stimulating, to where the ruins of the ancient cultures now exist. In the case of Egypt, Babylonia and the Indus regions, these are often cited as civilisations which developed in hot climates but they are not considered by Huntington as exceptions to the rule,

Although here his arguments become more difficult for him to substantiate.

These civilisations first "flowered in latitudes 25 to 35 degrees F." (-4 deg.C. to approx. 2 deg.C) In each of these places, at least half of the year brings temperatures of the kind well adapted to people in the early stages of civilisation....moreover, because of the very low humidity.... months as warm as October and May at Cairo for example, with averages of 75 and 77 deg.F(24-25 C.) seem no hotter than June in Philadelphia, which has an average temperature of about 70 deg. F (21C.) coupled with high humidity."(20)

He develops this theme and also point out that a consistent ideal temperature, all year round, actually lessens human vigour. Huntington summarises his tables on preferred temperature optima by saying -

"if all other influences were eliminated, we should expect civilisation to advance more rapidly in climates that have few or no months with temperatures above the optimum and many below, but none far below, the optimum. As a matter of fact, the actual distribution of civilisations approaches this pattern but departs from it in some respects because mean temperature is only one of the physical factors of environment, and the effects of physical environment are modified by cultural environment ". (Emphasis mine)(20).

It should be pointed out here that average temperature is more meaningful in human biology and animal biology than in plant biology because plants are very dependent upon critical temperatures at which their metabolism fails whereas the human being has a much wider range of tolerance, being able to protect himself by his own ingenuity within the critical extremes of temperature.

Huntington makes some interesting observations about seasonal agriculture as a cultural stimulant. He says that it is important to realise the tremendous effect that cereals and seasonal flooding, had on those civilisations whose agriculture was based on cereals. The idea of sowing grain on a flood plain laid the foundation of the most important civilising agency ever invented. It had its

effect on "social character" in that a premium was at once placed on "foresight, intelligence, thrift, industry and self control - as well as on the faculty for invention". There would have been an obvious division of the groups into those who laughed at the agriculturists for "throwing out good food where the birds could eat it" and they probably pointed out "that even if the seed grew, much of the scanty crop was sure to be eaten by rodents, insects and birds or stolen by human beings"- consequently, a social division into two groups, would have arisen parallel with agriculture, (20).

On the one side were the conservatives who still lived by hunting or gathering wild plants. On the other side, were the relatively intelligent, determined people who were willing to go to considerable trouble and self-denial in order to gather seed at the proper season and save it for many months. It required much self-control to refrain from eating the seed when hunger pressed them severely. It required "faith and courage to plant the seed, guard the crop, and wait patiently in confidence that in due time, a profitable harvest would be reaped". (ibid)

Finally, the ultimate effect of a concentration of populations into areas that would support more people, was a necessity for storage, special interest in definite pieces of land, construction of permanent houses and villages (with all that they mean in the way of putting an end to the nomadic life and stimulating progress through co-operative effort) - all these effects also produced foundations for civil government, to protect the important property rights.

Huntington finds this initial separation between the agriculturists and the primitive hunter-gatherers as being the most probable cause of inter-marriage within these basic groups with the establishment of innate traits in "kiths" through selection. He says, "we should expect that kiths which were developed through agriculture which would exceed the hunting and food gathering kiths in their innate endowment of the kind of temperament that tends towards foresight, industry and thrift".

He concludes that, although a climate with any kind of unprod-

active season provides a stimulus to invention and thrift, the effect appears to be at a maximum when both winter and summer present a challenge; nevertheless, the difficulties must not be too great. He qualifies this, by saying that the contrasts must not be too demanding but must be stimulating enough to have the necessary cultural effect. He suggests that at the earliest stage of agriculture, the best combination was a humid winter, cool enough to prevent the ripening of crops, not very cold, and the summer should be warm and dry, such conditions prevail pre-eminently near the Mediterranean sea. Egypt had, of course special advantages but its floods were not essentially different to those of Babylonia and the Indus region. In all these places, great civilisations arose and seasons have apparently encouraged inventions and practices which are not only connected with irrigation but with the laws on the regulation of the water supply, protection of food that has been stored for future use, and the division of land.

These seem to have been very important factors in stimulating the evolution of law and government, and the consequent flowering of civilisation. Huntington concludes this section on the seasons by saying, that three things are clear to him, "first, the challenge of the seasons has been a great incentive to progress in civilisation. Second, at any given stage of civilisation, there is a certain degree of seasonal variation which is most effective in promoting further advances. In other words, from the purely cultural standpoint, there is a definite optimum amount of seasonal change for each stage of progress in civilisation. Third, the cultural variations from season to season, seemed to be intimately connected with physiological conditions that manifest themselves in reproduction and rate of work"(20).

In fact, the situation can be summarised by saying that as the optimum climate varies with the stage of technical development, the colder climates are more suitable to the advanced societies. However, "not even the most stimulating climate ensures the presence of a high civilisation. It merely aids in the attainment...." (*ibid*).

Huntington contends that advances of civilisation require that the temperature must rarely fall below 60 deg. F. (approx. 16°C) with a noonday average of 75 deg F. (24°C) but much higher temperatures can be withstood provided clothing is dispensed with. In fact, "the controlling factor in....the migration of advanced civilisations has been man's ability to create comfortable, healthful, artificial or indoor climates in cold and stormy weather" (20).

Other authorities (i.e. Gilfillan, Stefansson and Markham) agree that man's growing control over nature, has led to a "coldward" march of the centre of active progress of civilisation and Huntington points out that the movement is not only towards the cooler but towards the more stormy areas, these being as important as temperature.

He also uses the theories, to explain how man's gradual conquest of cold, damp and unpleasant weather by means of fire, clothing, shelter, window glass and other means, has gradually made it feasible to live comfortably in parts of the earth, where the climate is highly stimulating.

"Looking at the centre of civilisation during the past few thousand years, it has gradually shifted from the warmer to the cooler climates, as well as from those with few cyclonic storms to those with a maximum of these stimulating conditions. This appears to be one of the vital elements in the history of civilisation" (20)

The interesting thing about Huntington's work, is that although he does qualify his facts by saying that climate is not the only influence on the "social character", he uses most of his 600 page book to document the case for climate.

SECTION 2.

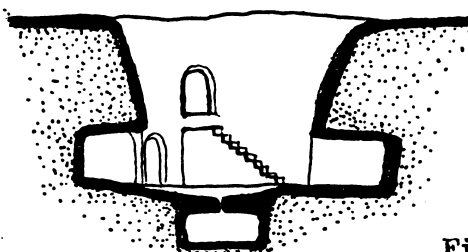
"Psychology, too, is important. It seems probable that man as a thinking being has changed but little during immense periods of time. Real progress is not concerned with the mere harnessing of natural forces,....it is of a far more intangible, perhaps even "spiritual" nature. In the past, civilisations have arisen and fallen, material prosperity has grown and waned, desires have arisen and found their fulfilment, but the thread of real progress which many of us believe does exist, is hard to follow and difficult to define. It would appear then, that if real change in human mental progress is so gradual, information obtained today by the psychologist through study and experiment will be to a large measure applicable to prehistoric man, during, at any rate, much of our period, and so it is necessary that the prehistorian should not neglect what the psychologist may have to offer from this point of view". (45)

"Only when primitive civilisations are studied in terms of their positive achievement and the facts....duly recognised, will it be possible to assign the civilizations primitive man devised, their proper place in the history of social evolution and to appreciate the nature of the contribution which aboriginal philosophers and theorists have made to the history of thought". (300)

INTRODUCTION

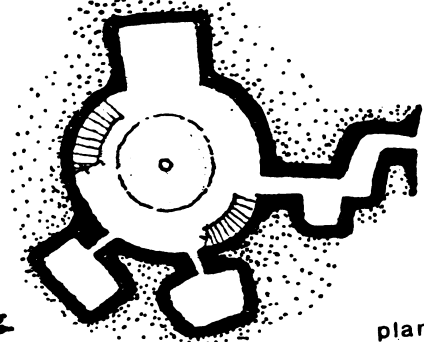
In the following summarised analysis of various prehistoric and historic periods, more emphasis is given to prehistoric periods than is usual when considering this subject. The intention is to give due emphasis to these periods, because they represent an immense span of time, during which man's primary drives were dominant and influential in evolving his forms of shelter and enclosure. These forms in some ways, were archetypal or germinal, in that they appear in later races much modified and altered but having basically similar root causes, i.e. in man's inner nature, his needs for physical security and physiological well-being, (Needs 2 and I respectively).

In Paleolithic times, the log-covered hole in the ground provided a totally enclosed micro environment and has its counterpart in the troglodyte desert dwellings. "This dwelling-type has been in constant use for many centuries; descriptions may be found in the writing of Herodotus and Aristotle." (143). It is also reflected in contemporary times in the underground community at Coober Pedy, S.A.; the common motivating force being the harsh environment. The cave form reappears in the primitive Egyptian mud dwelling, and later again in the grotto, in each case as an escape from the rigours of the environment (as well as for security from man and beast). The "thorn enclosure of the hunter" reappears as the "fenced enclosure of the herdsman" to protect him from his own herds, (122) and again as the "fence of thorn bush" around the Cretan orchards and vineyards mentioned by Homer (223), as the palisade around the small Celtic Iron Age settlement, as the wall around the courtyard of Egypt, Sumer and pre-Islamic Persia and as the protective moat and wall in Medieval times.



sectional elevation

Figure 1
Troglodyte Desert Dwelling
 (143)



plan

The study of the micro climates that man devised for his own use is essentially a study of his dwellings and to a lesser extent, his external structures and plantings intended to modify the environment to suit his needs. To understand how man devised or adopted various devices to alleviate the effects of an adverse climate, one must first find some historical or archeological record of them. However, if the period concerned is prehistorical, and the time lapse extensive enough to involve glaciations or pluvial periods, only stone and petrification of organic materials remain resistant enough to withstand the destructive effects of the vast period of time that has elapsed since the Pleistocene.

Timber construction leaves only its impression in the soil, its burnt ash as carbon or its forms in prehistoric rock art. Consequently this period is very interesting because masses of cultural material may have been erased, leaving only the stone remnants. Consequently, with so little evidence upon which to base investigations, it is a considerable challenge to try and understand the effectiveness of the climate control methods used in these primitive times. To compare their effectiveness, there is one constant indicator with which a link between past and present may be made, i.e. the physiological effects of heat and cold. There seems to be general agreement that the effect of temperature extremes are consistent on the human body, regardless of skin colour or racial differences. It is not meant to imply that all body structures are consistently effective in coping with climatic extremes. This is well documented to the contrary, the elongated body and large hands, ears and feet of the Massai function as cooling devices while the small, compact frame and limbs of the Eskimo retain body heat. However, if given relatively constant anthropometrics, human beings will react in a similar way to extremes of heat and cold (13).

At certain very low temperatures, daily living would be intolerable and men would slowly expire. However, this tolerance level is much better than first thought. In 1957, "eight Norwegian students volunteered to camp out for six weeks on a high mountain range, clad

only in light summer clothing....At night when the temperatures ranged from 5 deg. C to freezing, the boys lay naked in sleeping bags consisting of one blanket and a thin outer covering. The first few nights were unpleasant, the boys shivered so much that they could not sleep. But they gradually became acclimatized, and were soon able to sleep soundly through the night. After their six weeks of hardening, the students returned to a base laboratory, where their reactions to sleeping out of doors were compared with those of a control group. Measurements of skin temperatures showed that as the temperature of the air fell throughout the night, the experimental group stayed warm from head to toe, while the controls' skin temperature dropped steadily, especially in the case of the feet....the experiment was conducted at temperatures which require an increase in metabolism of about 50 per cent. to maintain normal body heat" (219).

However, basic physiological needs motivated the more resourceful primitives to devise various systems to maintain body heat and relative comfort. That this occurred, is a matter of archeological record and the order in which these systems were devised or adopted was probably as follows:

- 1) Windbreaks and rock-shelter overhangs reduced the velocity of air in contact with the body, and the evaporation of the skin moisture with its consequent lowering of surface temperature and drain on body heat.
- 2) Caves provided cryptoclimates more comfortable to the body than that experienced in the adverse glacial macro climate. These would not have been permanent habitations until the use of fire assured safety from large carnivorous animals.
- 3) Pelts of animals roughly covering the body created a microclimate at the zone of the skin, retained body heat.
- 4) Fire, first naturally occurring and transported (then artificially made - much later in the Mesolithic).
- 5) Pit dwellings, semi or completely sub-terranean, created another efficient form of microclimate.
- 6) Clothing was sewn or bone-pinned to roughly fit the body - a more

efficient form of 3).

- 7) Other forms of wooden shelter with various refinements to alleviate climatic extremes (e.g. sod roofs, small windows to keep out or retain heat).

In all cases, there is one overriding qualification to what appears to be man's logical attempts to derive answers to the challenges of his environment. Inconsistently, the pragmatic answer to his comfort and security needs was often ignored. To us, it appears that he irrationally avoided using methods and devices which must have presented obvious solutions to his accommodation problems. Caves were not occupied when one would expect them to have been, shelters were abandoned for considerable periods of time - these and similar apparent irrationalities have their contemporary counterparts. Rapaport draws attention to the socio-economic and magico-religious motivation for the misuse of construction methods which are ill-adapted to climate, (84), while it is well known that the Australian aborigine avoided occupying caves wherever possible, notwithstanding their obvious comforts compared to windbreaks and rock shelters (*vide* pp.67,68).

In all cases, the magico-religious social beliefs take precedence over the basic physiological needs, probably ~~in spite~~ of their origins in safety needs. These are cultural motivations, learnt needs, which are able to dominate and suppress the clamourings of the primary survival needs, probably because of the body's transfer of anxiety through the cerebro-spinal nervous system to the autonomic nervous system, resulting in a negative physical effect requiring relief e.g. stomach cramps, palpitations, visceral disturbances, etc., an equivalent physiological effect to that provided by a Need I deprivation.

The Pleistocene Period - Its Time Boundaries & Races.

Although the Paleolithic covers an immensely long period, in many ways it is possible to say that less happened in man's evolution than in any other major period in prehistory, What did happen however, was that he evolved from his animal background and assumed the highest status in the animal kingdom. He became a hunter using artificial weapons which together with his hunting methods, slowly but consistently

improved, learnt to construct shelters, devise clothing and to use fire. These very important steps in his evolutionary experience were critical factors in his learning to modify the environment. In fact, once a microenvironment was able to be created in proximity to his skin, by draping animal hides over his body as an adaptable and "portable" shelter, and another microenvironment within the few feet of space surrounding him, by constructing a rough shelter and using fire, the way had been prepared for the following great stages in his evolutionary experience. These occurred in the Upper Paleolithic and Mesolithic, during which time, societal groups began to evolve as nuclei for the next great evolutionary step which could only be taken because man became a member of a societal group and from these the great civilizations formed. During the Upper Paleolithic, man also learnt to transmit his ideas, presumably by speech. This "time binding" or the ability to transmit ideas from generation to generation (95) is a capacity unique to man. A comparison of the manual skills necessary to make Acheulian hand axes, and that required to fabricate the Upper Paleolithic tools, has been likened to the skills necessary to make a steam engine, compared to those needed for a nuclear powered machine. These capacities could only have been achieved through the above mentioned ability to pass on ideas. In his discourse with Leakey, Ardrey says: "speech....in moderately grammatical form-emerged at a fairly late date, let's say, before the big brain, in your Homo habilis stage, because of the necessity of transmitting social wisdom....there was a tremendous necessity for the hunter-to-be, to learn verbally from his elders." Leakey agreed, to the extent that he says; "Homo habilis definitely had the potential for speech"....but he qualifies this by...."this was two million years ago....I cannot see that men or women, until they had fire, were able to develop speech to any degree,".... and of course it follows, that social precepts would not have been transferred until this time either(208). Consequently, a link may be formed between the advent of fire and the beginning of the social imperatives which produced the learnt social needs. However, Leakey's son, Dr. Richard Leakey has (since his father's death) discovered a 2.5 m.y. old fragmented skull

east of Lake Rudolph in Kenya which has provided "clear evidence" that rather than evolving from Australopithecus, a "large brained, truly upright and bipedal form of the genus Homo, existed contemporaneously with Australopithecus more than 2.5 m.y.a." (220). Perhaps the potential represented in this skull could mean that man's technological abilities evolved even earlier than present theories acknowledge.

However, knowledge of the Early Paleolithic is very limited. Stone tools become the main source of information and as these are mainly found scattered as erratics in river gravels, it is not possible to learn much about the origins of them, or the shelters and caves with which they may have been associated. Also, because so little is known about the makers of these tools, or how they were used, it is not possible to refer to "cultures" or "industries" - only to a number of "traditions". However, later in the Middle and Late Paleolithic, tools of stone, horn and bone are found in caves under original circumstances. Consequently, the term "industry" may be used in this later context, and when considered in conjunction with other evidence, the term "culture" is loosely applicable (without precise definition relating it to specific groups).

In all cases, references to the tools man uses, are an essential part of discussion about their needs or habitations. Before considering the evolution of man's developments of shelters, and the unfolding of abilities to satisfy his basic needs, it is interesting to consider the seminal manifestations of needs fulfilment possibly exhibited by his primate ancestors. There still remain some single extant instances of the very early needs of primates, for comfort and security. The earliest examples of the satisfying of security needs, perhaps may be seen in the primate's construction of tree platforms, and in the social hierarchy of primates and other animals, one sees the rudimentary traits necessary for the evolution of the human social needs (vide Introduction). A.E. Hoebel states that, "the homes of the most primitive peoples of modern times are hardly more ingeniously devised than are the nests of the great apes. They are little valued and readily abandoned - hardly to be considered as real property.

However, they have possibilities. Elaborations of these little hove of grass and sticks have served to house the greater part of mankind in the eras of pre-civilization." (154).

Early Paleolithic Traditions 500,000-150,000 y.a.
As Giving Rise to Satisfaction of Needs 1 and 2.

A pebble-tool, or preferably "chopping-tool" tradition, followed by a core or biface tradition (Chellean-Acheulean in Africa, Abbevillean in Europe) comprise the successive phases of the Early Paleolithic. The Chellean-Acheulean is identified by the presence of the roughly pear-shaped hand axe or cleaver, with a cutting edge around the small end; (together with small flakes, not having a definite tool form) these are associated with fossil men of Pithecanthropus (Homo erectus) type.

Although the Acheulean industry lasted from about 50,000-75,000 y.a., Homo erectus is last recorded 300,000 y.a. (except for a few teeth and jaw bones which seem to belong to the species, erectus).

However, 2 skulls, the Swanscombe and the Steinheim, bridge the period between 50,000 and 25,000 years ago. These fossil skulls show the cranial capacity of modern man (Homo sapiens) with a face, having brow ridges and forehead somewhere between Homo sapiens and Homo erectus. Pfeiffer thinks that hunting would have been the stimulus to the development of the frontal area of the cortex (fore-brain) and he suggests that "the ability to carry out an ordered sequence of activities should make shelter building possible" (7). However, this must now be reviewed in the light of the recent findings of the larger cranial capacity skull previously mentioned. (220).

With the growth of the cranium, other evolutionary changes would have to occur. The female pelvis would have become modified to accommodate this larger cranium, thereby restricting mobility.

However, it appears that natural selection resulted in the compromise of a wider pelvis (although not wide enough to inhibit flight) coupled with a cranium size which, at birth was adequate for survival of the infant within the practical limits of the pelvic size.

The rhesus monkey is born with a brain approximately $3/4$ of its

adult size and becomes relatively independent within a few months. In comparison, the Homo erectus brain modified to adapt to the hunting way of life, resulting in infant maturity being delayed. The infant had evolved away from the primate hand structure which clung to the mother involuntarily, the opposed thumb being a tool-using evolutionary development. Prolonged infancy, prolonged childhood, maturation and continuous (instead of seasonal) female oestrus, together with decreased mobility of females, were the stimuli to the beginnings of family and societal groups, signifying the evolution of the neural pathways necessary to express the Social Needs 3. No doubt, this evolutionary step was accompanied by its overt signs of more substantial living floors, but very few remains of human group habitation have been found, (7).

How The Climates of the Pleistocene Affected Man
with Special Regard to His Shelters.

The climatological events of the Paleolithic period are vast and dramatic compared to our present limited experience. During this "slow, vital formative phase" (161) the foundations for man's flexible and adaptive capacities were formed, capacities which have brought him through evolutionary competition to become the most evolved animal. His resourcefulness and capacity for change were evolved under the stimuli of predominately hostile climates and environments, which he was required to continually modify to suit the comfort requirements of an extremely sensitive and vulnerable body. This developed the brain, as it built in more cerebral pathways to cope with environmental problems.

As any other adaptive measure taken by the body during this period, may have meant the extinction of the human mammal long ago, as was the case with many other animals, only man's ingenuity and adaptability has made it possible for him to survive in such a vulnerable and puny body over such a vast period of time and through so many vicissitudes. Climate fluctuations during the Paleolithic, supply perspective and chronology, to what is sometimes loosely termed the

Ice Age, and it is absolutely essential to use the latest chronologies and references when researching this period, (21).

There were four main ice ages or glaciations, divided by warm periods called interglacials, each containing substantial temperature oscillations within themselves; the periods of milder conditions during these interglacials are called interstadials. These are important because they made land inhabitable, however, they also contained periods of cold which are not fully understood. To comprehend this period, the imagination is required to accommodate such vast scales as a "wall of ice anything up to a mile thick, relentlessly advancing as far south as London, and tropical zone animals in North Britain" (161). During interglacial maxima of the Pleistocene, sea-level was much higher than today and in glacial periods, glacier-locked water lowered the level by several hundred feet. The vast changes this made on the exposure of land bridges, their consequent inundation, the reversal of flow in rivers or their drowning, has made the geological reconstruction of the Pleistocene a difficult problem; superimposed deposits with glaciations tending to obliterate or damage them, present vast difficulties. The correct reading of such a record is important, because man inhabited the land during favourable periods and his artifacts and industries are to be found in the appropriate Pleistocene deposit; however, until the end of the Lower Paleolithic, only a few living floors have been found.

This is not surprising when one considers the innumerable geological disturbances that have intervened to complicate or obliterate the record of events, but it does lead one to conjecture upon that which still remains unknown. Whole races of men may have lived without our knowledge, and at present one imagines the known races of this period as being only the tip of a population "iceberg", the lower part still being concealed. When one considers the latest find, it is easy to postulate a previous "cycle" of human evolution in advance of Australopithecus with an evolutionary curve parallel to the one previously accepted, but beginning millions of years before it.

Glaciations provide effective geological markers in Europe, but because they never occurred in Africa, there is a problem in correlating African and European chronologies. African chronology is based upon pluvial and interpluvial periods and the correlation between African pluvials and European glacial periods (or the intervening periods of each) is contentious, and far from agreed upon. (161).

African anthropology has created its own time scale from Olduvai gorge deposits which are recorded from the fluctuation in water level of an extinct lake, together with intervening volcanic activity. In this context, artifacts have been dated back approaching 2 m.y., and at a site on the Moroccan coast, it is claimed that datings older than Olduvai have been obtained. This relative isolation from glacial events, has also probably made possible Dr. Leakey's discovery.

MAN'S ATTEMPTS TO MODIFY THE ENVIRONMENT

There is a small amount of evidence of man's ability to come to grips with the problems of his environment, in the very ancient period. It is interesting to find references to the use of caves and primitive wind shelters, in writings on African discoveries. Pfeiffer (7) notes the use of "a crude wall-like structure which shows that, although he lived in the open, he may have been learning to protect himself from savanna winds", and he considers that there was a probable itinerant use of caves, by "early African hominoids" who would not have been able to permanently drive out large carnivorous animals who were more efficient killers and therefore, not having the use of fire, they could have used them only in the absence of animal occupants.



Figure 2

Probable reconstruction of a windshelter of branches anchored with a base of stones. (16).

..Effectiveness of this semi-permeable construction has been shown to give "reduced turbulence and an extended zone of influence" (222), and hence would have provided a more efficient form of protection from winds, than an impermeable solid construction which would result in "high turbulence" and "a reduced zone of influence" (*ibid*).

Geiger (1) quotes experiments with reed screens 2.2 m. high in the Fur Valley, near Zurich which could be considered a reasonable facsimile of the above wind-shelter and a penetrability of 45-55 per cent. produced a more efficient leeward wind reduction zone.

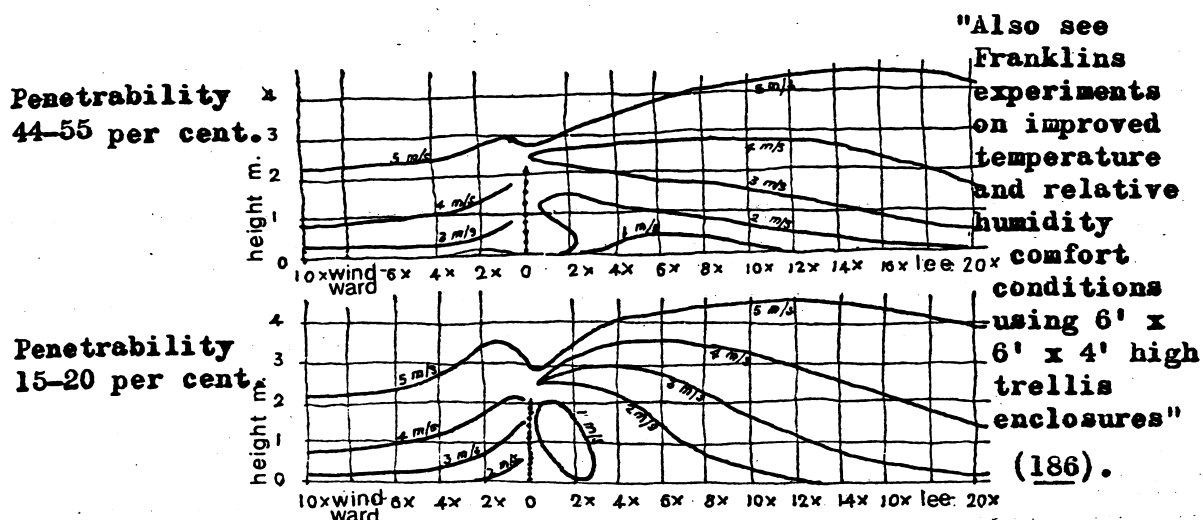


Table I - Isotachs for a reed screen 2.2 m. high-of different densities. (1)

From the above diagrams, it may be seen that an open lattice type of wind shelter would reduce the wind velocity for a greater effective area, hence accommodating more people. Increases in permeability improve the effectiveness close to the screen and would be more suitable for one or two people. It could be inferred that the long term effect would favour the congregation of larger groups of people - stimulating an appreciation of the value of a social group, (Need 3). This seems to be borne out by circles of base stones considered by Pfeiffer (7) to belong to wind-breaks from 2.5 m.y.a. of sizes larger than required for practical protection of one or two people.

Mary Leakey excavated 3,400 sq.ft. of living floor of approx. the same age (2.03 m.y.) in which was a large pile of bones broken for their marrow, between this and the main "dining area" was located an arc-shaped area "which may have been a wind-break of branches" lying in the path of prevailing winds of the present, the barrier could also have been a protection from predators. The point is made, that this was definitely a home base occupied for years, and a place where "traditions and techniques and taboos could be developed" (7).

This is an unusually early manifestation of Need 3, with Need 2 being well catered for, and one must recall Richard Leakey's recent find, (220) indicating a potential for technical skill in the cortical

region of the larger cranial capacity skull, well in advance of Australopithecus, all indicating the capacity that could be correlated with an evolutionary level represented by such a base.

Figure 5



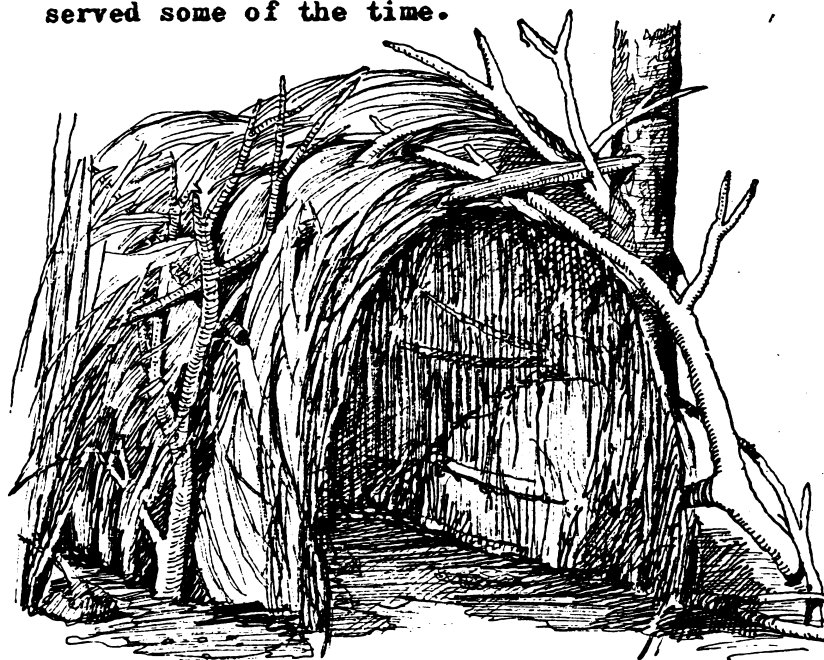
Remains of the oldest known structure, possibly a windbreak uncovered at the foot of Olduvai Gorge (7). Note the scale given by the figure indicating a very large structure. (vide (48) and (69) for supporting opinions.)

From evidence on the time of eruption of teeth in Australopithecines who used this shelter, the young were very dependent on adults. (to the same extent as modern man) and it is this delayed maturation which correlates with the need for a home base and the beginnings of a social group (Need 3). The living sites of this period give evidence of a considerable variety of animal species used as food, indicating that the shelters were not "places of purely ephemeral occupation", but would have been a base for considerable periods.

(48)

As long as he was content to use natural shelter, man had to make

seasonal changes of habitat. The sites chosen were usually as near as possible to a supply of water, usable stones for tools and game. Sites lower in the valleys were generally chosen for this reason, and also as warfare was uncommon, but probably in times of trouble, higher caves were preferred as the environment became more threatening (46). Such caves may occur in Triassic sediments or granite but most usually in limestones. As well as relatively permanent sites, it is also known that in warm weather, windbreaks and shelters were used in the simplest of forms, i.e. sloping timbers with leaves, branches or fur pelts lashed together, or domed huts made of branches, must have served some of the time.



(224)

Figure 4

Paleolithic man was a nomad hunter, forced to wander and to retreat from the severely cold climate. His ingenuity extracted from the environment, the building elements needed for shelter building.

A domed hut is made of antlers, grass and branches

Figure 5

Of particular interest from the point of view of micro climates, were the underground dwellings - A rough hole in the ground roofed over with branches and sods.



(224)

Evidence of the earliest forms of shelter which appear to have been constructed is associated with the Australopithecines who ranged widely through Africa and Asia. They had an almost upright posture, and teeth similar to those of modern man being primarily, although not exclusively vegetable eaters, and of the five forms of Australopithecines, Australopithecus, Paranthropus, Zinjanthropus, Meganthropus africanus and Meganthropus paleojavanicus, Australopithecus and Zinjanthropus seem to have developed some degree of social need satisfaction.

Banks considers that the Australopithecines did not use caves as dwellings, not having the use of fire to remove large carnivorous animals. (195). The Zinjanthropus horizon at Olduvai gives evidence of huts or other structures; it seems that from 20-200 people would have lived in a communal group close to water and depending mainly on natural vegetation for food, only later in mankind's history could smaller family groups survive.

In the Third Glacial Period, man began to occupy cave sites, having discovered the use of accidentally occurring fire (Choukoutien is an example of such an occupation which Leakey considers ahead of its time) (208). This made it possible to develop some degree of satisfaction of the social needs. In this intermediate age, 30,000-40,000 y.a. hunting was done in bands, fire being used to trap animals in grass fires and suffocate them. The use of traps was known and although they had no clothing, they had simple utensils and specialised tools. These people were physically similar to Neanderthal man, as also was the type represented by the human remains from Broken Hill, N. Rhodesia.

The Type and Frequency of Shelters in Lower & Middle Paleolithic Periods and a Correlation with Climate, the Use of Fire and Seasonal Occupation.

C.S. Chard draws attention to the problems that occur in dating middle and lower Pleistocene periods, and the fact that various authorities have chosen a boundary line between these two periods that can vary from 750,000 y.a. to 400,000 y.a. (153).

Chard suggests that the most meaningful divisions are those related to climatic history, and he makes the point that these should become the focus of attention in speaking of these prehistoric periods (132). There is an interesting correlation between occupation sites and the then contemporary climate (153). Hrdlicka has compiled some interesting statistics drawn from the records of the "skeletal remains of early man", (12):-

Table 2 - Incidence of Occurrence of Open & Rock Shelter Living Sites.

Period	Sites in the Open		Rock-Shelter or Cave	
	Number Recorded	Percent	Number Recorded	Percent
Pre-Chellean	11	100	-	-
Chellean	32	94	2	6
Acheulean	36	78	10	22
Mousterian	45	34	88	66
Aurignacian	24	18	112	82
Solutrean	10	14	62	86
Magdalenian	17	10	148	90
Azilian & Tardenoisian	4	9.5	38	90.5
Accompanying Neolithic	22	22.5	76	77.5

From these figures, it can be seen that for the selection given, there is evidence that man began as a dweller in the open but, commencing with the Chellean period, he began to use rock shelters and caverns for a small percentage of his dwellings. This has a correlation with a warm climate; An interesting accumulation of rubble that has been carted to some sites, suggests that the foundation of a home base was provided on swampy ground as a protection from predators. (48).

In the Acheulean, there was an increase in the use of rock shelters occurring during the great inter-glacial, i.e. the Holstein climatic phase. The recording in pre-Acheulean sites is interesting as subsequent to 1924, information on this vast period of time has improved, and it appears that some caves could have had occupation extending back into the Lower Pleistocene.

In fact, it can be generalised that since the warm Chellean period, man commenced to use rock shelters and caverns, and as the climate

cooled, gradually took more and more to the caves (with the limitations imposed upon him by the availability of fire.) As has been seen in the previous table, there was an increase in the frequency of the use of rock shelters and caves as man evolved, and a decrease in the use of shelters in the open. This can probably be correlated with the increasing use of naturally occurring fire, because it seems that, "until men had fire at their disposal, regular occupation of caves and deep rock shelters was too hazardous. In such situations, small groups of human beings would have been extremely vulnerable to attack by predatory beasts unless they had fire as a protection" (25). Apart from the above, very few living sites showing any form of shelters are established as being lower Acheulean. Acheulean sites that belong to the middle Pleistocene give evidence of a "greater awareness" (48) and capacity to cope with environmental exigencies.

There is also considerable evidence that the Bed 4 Olduvai sites were occupied for long periods; the best evidence for this, is derived from the necessity to shape spheroidal missiles which were made by bouncing them off other large base stones. These base stones show considerable amounts of wear, indicating their use for long periods. The camping places were, in fact occupied more intensively and seasonally by Homo erectus, they belonged to the Upper Acheulean period and occurred mostly along stream and river courses, around lakes and on the seashore. Caves were also occupied over long periods, as in the Cave of Hearts in N. Transvaal where there are deposits, thirty feet thick.

During the period, in which the Cave of Hearths was being occupied, (later Acheulean times), there appears to have been a long fairly stable time, of somewhat wetter and more humid climatic conditions than those of the present time and it is probable, yet unproven, that the earlier stages were contemporaneous with a series of wet and dry fluctuations. Other evidence exists at Olorgesaille, where there is a sharp delineation of the outer margin of the occupation wastes, which suggests that it had been contained with some type of fence or windbreak. (48).

Also at Kalambo Falls, there is a semi-circle of stones that are thought to have formed the base of a windbreak, somewhat similar to Lower Acheulean habitations of Terra Amata (q.v.) (48).

It has been suggested, that most caves would have been cool in the summer and pleasantly warmer than the outside air in winter - "with an average temperature of between +11 degrees and +14 degrees C. compared to perhaps, -50 degrees C. outside" (46).

The aspect of a particular cave was of considerable importance and "preference was given to those facing south or east over those facing north or west".... "the choice was different in milder regions, or with rain-bearing winds and in the Southern hemisphere" (48).

Some Evidence of Seasonal Occupation of Caves and Rock Shelters.

Evidence is available that caves and rock shelters were not occupied all the year round, at least in regions influenced by glacial climate. It appears that they were only used from approx. November to March (winter in Northern hemisphere) and evidence is found in the form of reindeer antlers. The antlers found have been of two types, naturally shed and young horns still attached to the skull. Young antlers are shed only in the spring, while in fully grown reindeer, they fall at the end of autumn, except for females in foal. Caves in the Pyrenees and Dordogne have never yielded antlers of grown reindeer, killed between July and November or shed antlers of young reindeer, so the conclusion may be drawn that, during that part of the year, the communities using the caves had migrated to hunting grounds elsewhere, perhaps following reindeer migrations towards, or returning from the Atlantic and Mediterranean coasts.

The season of wandering, was a difficult one to establish any evidence of the itinerant use of shelters, previously mentioned. The one dominant motivation, "the ceaseless search for food and raw materials (flint)" (46), prevailed.

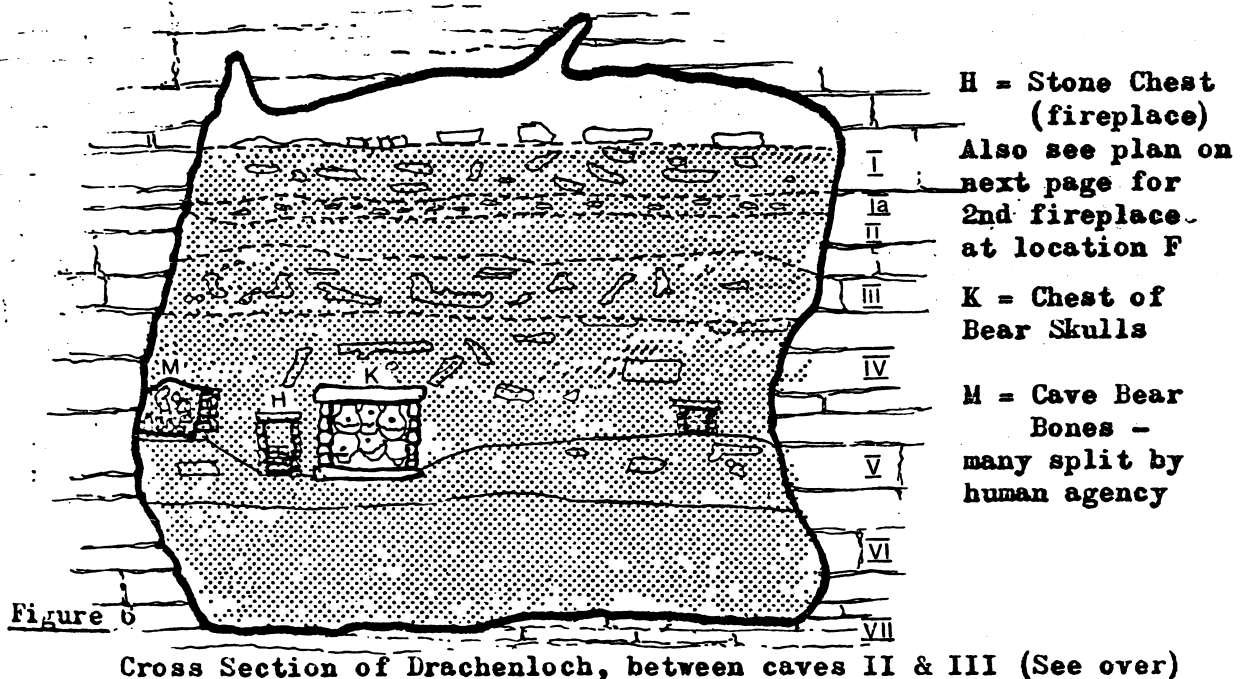
Use of Fire in Connection with Man's Use of Caves.

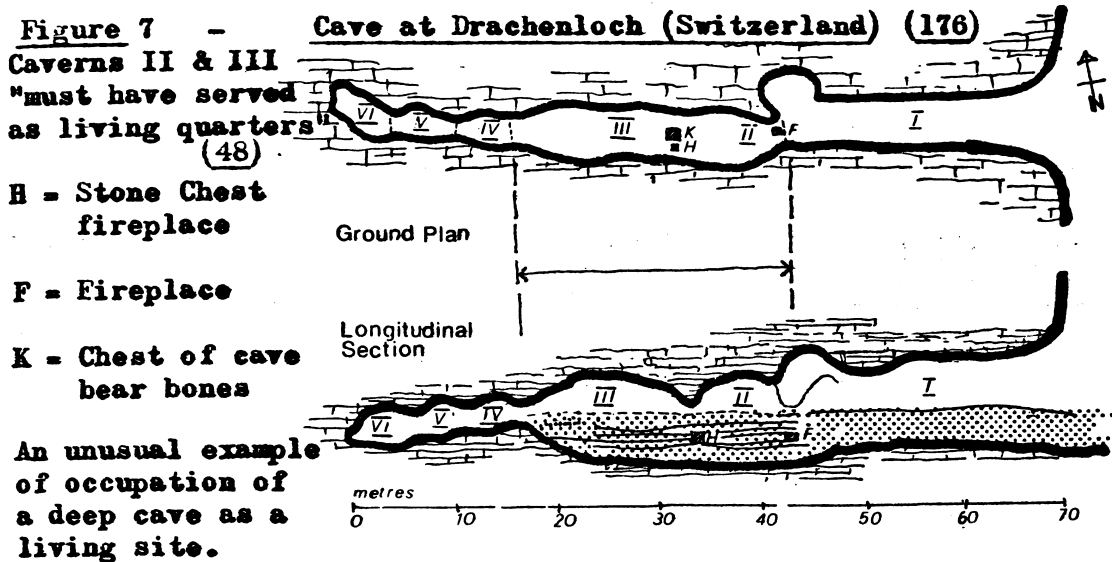
Once man had mastered the use of fire, deeper caves could be cleared of animals, but he always occupied the area at the entrance to a cave as a living site. Here, the fires would probably have been

kept burning to keep out animals, and for warmth. It is at the cave entrance, and in the apron or terrace outside, that layers of living debris and ash accumulated through the ages. As the cave mouth gradually collapsed over the course of time, the living floors were forced further back into the cave's depth, so that later levels of occupation retreated, with living floors much more sparse in archeological remains, and with much thicker bands of rock debris.

The caves entrance was often modified and improved by a wooden palisade, large rocks or thorn bushes, and as collapsing occurred, as was often the case during the Paleolithic, the rubble debris rose in level, which resulted in the available living area being pushed further back with "consequent deprivation" of sunlight and even daylight. (48)

Apart from a preference for daylight available near the entrance, living floors were mainly located there, because fires used at the entrance to the cave were limited in their location by the need for smoke to rise out of the exit, and this would have been a requirement in spite of external air movements; this rising warm air would also have drawn air from deeper in the cave, thereby forming convection currents and freshening it for use further in. However, some exceptions to this do occur, as in the cave at Drachenloch (Switz.) where traces of a fire are found 325 m. inside the cave (48)





The position of the hearth was also required to be in a location where the fire would never go out, located in front of a rock, but far enough away for the flames to have free play; it had to be sheltered from draughts and rain. Rarely are caves found not having these ideal conditions of comfort and safety. Later, in the Paleolithic period, internal warmth, as well as facilities for cooking meat and plants, were provided in the form of stoves. Evidence for cooking of some type, is found in the presence of unbroken shells of the shellfish Littorina and Trochus, for in being found intact, they provide evidence that the shellfish must have been removed using heated water, probably in a skin or wooden bowl (or a skin bundle containing water, also small animal skulls, calabashes, etc. or wet leaves may have been used for boiling or heating water - removal by any other method would have fractured the shells) (48).

Apart from very early evidence of the use of fire, already noted, further evidence of the existence of cooking facilities, (which would also have provided some heating of cave interiors, is found in the Cave at Isturitz (Basses-Pyrenees). In certain layers, ("FL" & "E") fireplaces show little difference in design. These were located in depressions in the clay silt, smoothed by hand and filled with "very greasy ash" containing little charcoal. This clay became baked by the fire, and obviously some knowledge of pottery

was derived from such circumstances, because these processes would have yielded glazed "stoneware" of some type (however, pottery containers should they have been made, were not convenient for carrying on the hunt). At level "E", built-up fireplaces occur, comprising small slabs of sandstone forming a paved base, with limestone surround to retain the fire (some larger limestone blocks probably serving as seats). At this level, "forward of the great reindeer bas-relief is spread a "vast bowl shape hearth, full of greasy black residue" and surrounded by large stones. and flakes, with a stone industry in sufficient abundance to establish the use of the area as being a workshop. Similar hearths occur in a high altitude shelter for bear hunting in Mousterian caverns of the Wildkirchli (dated after the Riss-Wurm interglacial period) at Bos del Ser and Pre-Neuf (Correze) - in all cases, the fires were made on a small paved area where some corners were protected with stones on end. Baking ovens have also been found in archeological remains of prehistoric civilisations. In the cave at Drachenloch, there is a dry stone oven 30-40 cm. diam. still containing a 34 cm. thick pine charcoal bed, and the bones of a cave bear's paw (hunted at great altitudes in autumn).

Also at La Coumba, Pre-Neuf, Hoailles (Correze) a braising oven was found, rectangular in plan, with stones set on end, inclined inwards at their tops, with small stone infills set in a clay limestone and sand mixture to fill the corner gaps. This small receptacle was completely and thickly covered with black ash from surrounding fires.

A Circumstantial Example of the Use of a Particular Cave as a Climate Control Device During the Main Wurm Glacial Period.

Hoebel (154) holds a rather ill-considered opinion that primitive man would have preferred shelters in the open to the use of the cave. He holds that caves, damp and cold, were less likely to be used because of the incidence of arthritis and rheumatism which he assumes primitive man was able to correlate with "damp" caves. He takes trouble to extrapolate from lower primate nest building to man's preference for shelters in the open - apart from the fallacy

of the argument, man is "nothing but" an animal. This is an absurd extrapolation, for it takes no account of the types of caves available to primitive man. It is interesting to see this error repeated continuously, although in this case, there is a description of orang nest building, which makes one grateful that Hoebel took the trouble to state his case - it is quoted here for its general interest in the context of Chapter I of this thesis. "Just before dark the animal stands upright on a forked branch, using one arm as a support and with the other drawing in distant branches, breaking them and piling them up all around him until he is in the center of a circle of twigs 45 cm. or more in height. He then breaks off smaller twigs and puts them across to form the floor of the nest, next comes a process of stripping leaves from the branches to line the nest. These are pressed into the crevices. Finally, the orang lies down and draws over himself and interlaces the remaining twigs, which are piled up, so that a domelike roof covers him completely." (154).

In the following, the case of the Homo rhodesiensis skull found at Broken Hill is an excellent example of the correlation of data taken from various sources which may be brought together to circumstantially disprove Hoebel's thesis as follows:-

- 1) From varve analysis, palynology and other scientific disciplines, it has been established that the main temperature fluctuations were consistent throughout the world. Oakley (25) gives an A3 dating of 30,000 BC. for Rhodesian Man's skull.(found S.Africa, 1921).
- 2) A carbon dating of 30,000 BC. is given from M. Barbetti's finds in carbon deposits from aboriginal living floors at Lake Mungo, N.S.W. These also show that the last reversal of the earth's magnetic field was at this time, a period of major upheaval which correlates with:
- 3) The onset of the main Wurm glacial period (25).
- 4) The type of cave in which this man lived was a "sack" or static cave similar to that which may be seen at Wellington, N.S.W.

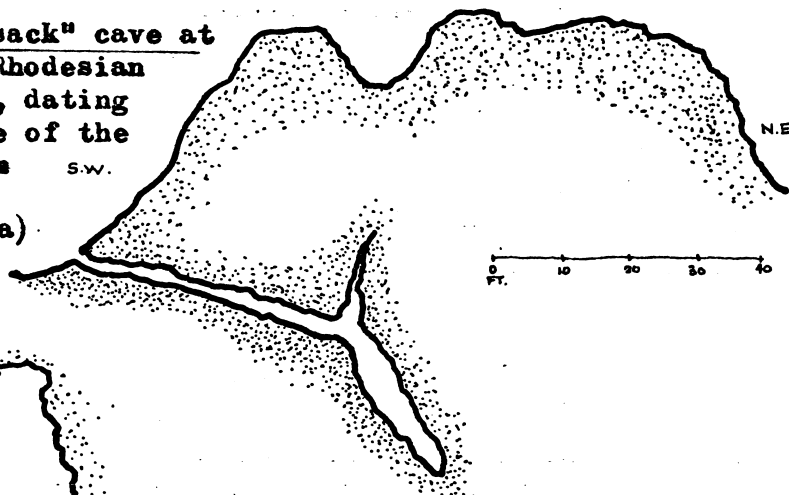
This cave type has been established by personal measurements of wet and dry bulb temperatures as being a reasonably comfortable one for

occupation in cold or hot conditions because it has reasonably stable air conditions due to the absence of secondary air currents, and the accumulative effect of the stored ground heat. This radiates almost unchanged by ground surface, diurnal or seasonal fluctuations of temperature, provided the overburden of ground thickness is somewhere in excess of 750 cms, at which depth, the reasonably constant earth temperature for the region dominates (q.v. Geiger reference for discussion on geothermal effect with depth (I)).

In the Broken Hill example, the cave is located at least 900 cms. below ground, making it quite habitable and useful in such times of environmental extremes. STATIC ("SACK") CAVES (q.v.p.81 ff.)

Section through the "sack" cave at Broken Hill in which Rhodesian man's skull was found, dating at c.30,000 BC. - time of the onset of the Main Wurm glacial period.
(Rhodesia, South Africa)

(64)



Plan of cave at Wellington, N.S.W.

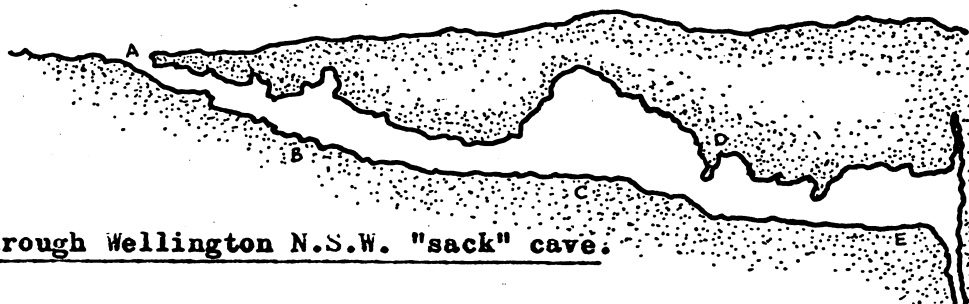
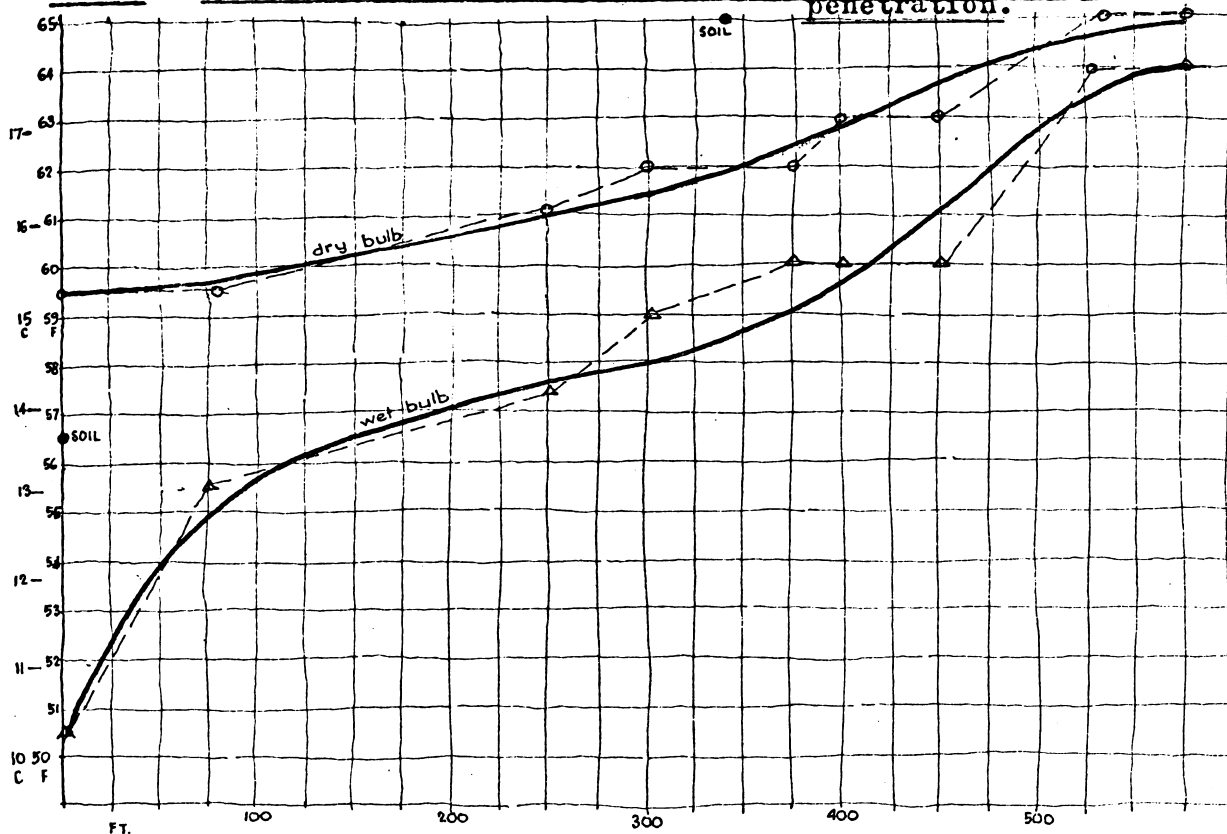


Figure 8

Section through Wellington N.S.W. "sack" cave.

Table 3 -Variation of cryptoclimate temperature with depth of penetration.



Static ("sack") cave at Wellington N.S.W.

Dry and Wet Bulb temperature varying with depth of penetration into cave - illustrating increased comfort of the cryptoclimate when winter conditions prevail in the macroclimate. This situation is analogous to that which prevailed at the onset of the Main Wurm glacial when the similar morphology of the Broken Hill cave resulted in a corresponding modification of the macroclimate better suited to the survival of Rhodesian man.

This effect is reversed in warm weather, so that the cave provides a cool environment. Provided the volume of such a cave was not too great and it was free of seepage, it produced ideal shelter conditions for survival in climatic extremes.

Caves as Shelters in the Paleolithic - (Crypto-climates)

Rock shelters, which could be termed "dynamic caves", within the definitions quoted by Geiger (1), are relatively efficient climate control systems when properly sited and modified by weather screens; however, the cryptoclimate of the true rock cave provides an even better system of modification, so that an adverse macroclimate may be tolerated by living things.

Brevil and Lanther, without stating how they derived their figures,

suggest that "very cool in summer....caves must have become pleasant places in winter, with an average temperature of between 11 and 14 degrees centigrade, while it was perhaps minus 50 degrees outside"(46).

Obviously, such efficient shelters provided a consistently acceptable means of coping with extremes of climatic fluctuation. Crawford's study of caves, suggests that inhabited natural caves may be divided into three functional zones, 1) the forecourt - "the ground outside immediately in front of the entrance", used in fine weather where sun and light are plentiful. This area is sometimes partially enclosed and even paved after the Upper Paleolithic. 2) Mouth or entrance - usually "barred with a rough stone wall", this is the portal (and is symbolised, according to Crawford, by the passage to the burial chamber of the above ground cave simulation in the form of artificial "burial-caves", (ibid). 3) The cave itself - in which the front portion is reasonably lit and used for work and the rear portion used for sleeping and storage.

Morphology of Caves & the Dynamics of Air Circulation

The microclimate within a cave system is related to the topoclimate outside, since the one or many significant openings between the cave and the atmosphere, through entrances and air shafts, determine the climate within the cave, which is also dependent upon form and shape.

The number of connections a cave has with the exterior, is an important factor in cave morphology and cryptoclimates, i.e., whether it has one connection or two or more. R. Oedl is quoted by Geiger, (1) as making a basic division between caves having one opening, and those having two. The former, are sometimes called static caves, in which the only air exchange occurs in some degree of turbulence at the entrance, and in some cases an inward and outward air flow occurs as a result of temperature differences. The latter are sometimes called transit caves.

In transit caves, there is a circulation of air occasionally reaching considerable velocities where the cross section becomes narrow. Openings located at substantially different relative levels, stimulate air circulation, these can be of a minor or major nature.

CAVES with One Opening(A) Static Caves.

In this type of cave, the static condition maintains a relatively constant humidity and temperature (cave painted art would be best preserved in these conditions). Habitation of such a cave, would be reasonable in hot and cold macroclimates (q.v. Drachenloch, pp.75-6).

Micro climate of a Sack Cave - Falling Shafts.

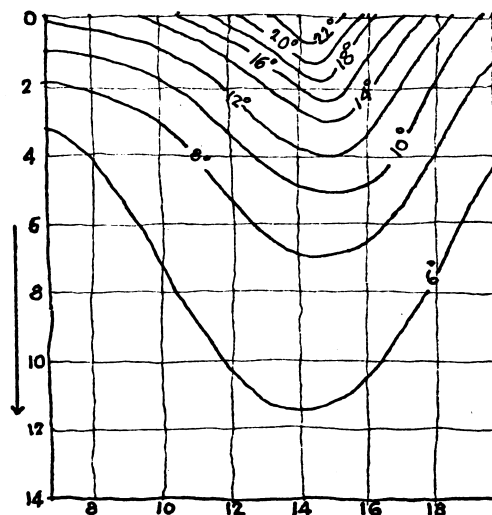
A cave which slopes downwards from the entrance and has no other connection with the outside air is called a sack cave. (q.v. Broken Hill, Rhodesia Cave, South Africa).

Geiger has given an applicable example, where he derives a graph from measurements made by A. Baumgartner, giving the diurnal temperature varying with the depth of penetration into the interior of such a cave. (c.f. Wellington & Broken Hill Caves and Wellington temperature graph, table 3, p.80). S.Africa.

Table 4

Depth inside
cave (metres)

(I)



Variation of diurnal
temperature with depth
of penetration.

Hour of day (late summer)

Geiger comments, "The characteristics of this type of cave are easy to distinguish. Below 15 m., temperatures remain between 4.5 and 5.5 deg. C., high midday temperatures in the air outside are able to penetrate downwards by mixing only for a few meters, and rapidly decrease in intensity. The relative humidity behaves inversely, reaching saturation point at a depth of 15 m....there is often a sharp decrease in temperature at the entrance to a sack cave". (I)

Obviously, this type of cave would be ideal for the high day temperatures of Rhodesia, and also for warm shelter at the onset of the Wurm glacial (q.v.). A rising shaft, sack cave usually exhibits a temperature rise at the entrance (I).

(B) Transit Caves - Two or more Openings:

Geiger remarks that caves such as Pêche-Merle (see below) with a number of openings are, to a certain extent included in the atmospheric circulation. "The main entrance is usually at a low level and the links with upper levels are made through air shafts....the altitude of the openings, the temperature differences inside and outside the cave, and the dynamic processes taking place in the outside atmosphere determine the kind of circulation inside the cave." (ibid.)

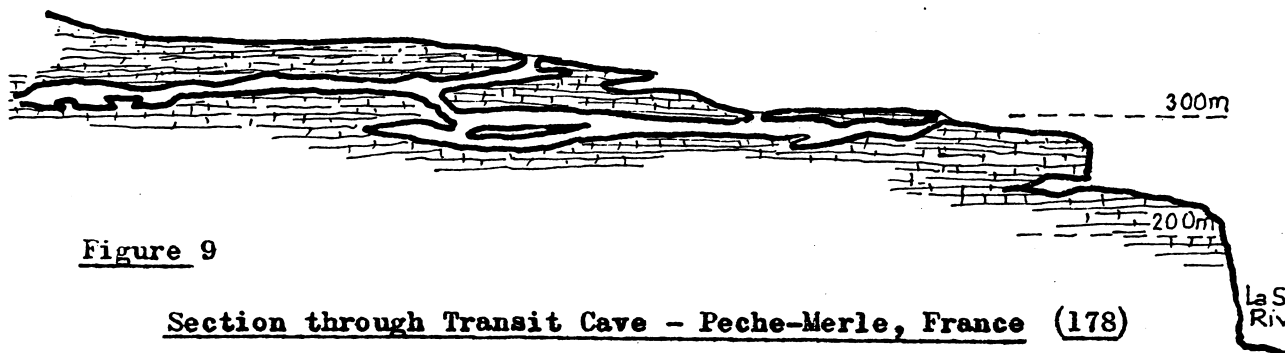


Figure 9

Section through Transit Cave - Pêche-Merle, France (178)

Warm external temperatures "are hardly felt" within a cave such as this. The example quoted by Geiger, at the "Eisriesenwelt" at the Dachstein Mountains, Germany, ranges between -1 deg. C. and +1 deg. C. through the whole warm summer. Cold winters will penetrate the cave and warm summers will hardly affect it at all. The effect of air vents in a dynamic cave, is such as to have been commented upon by Geiger, who quoting M. Hell, proved that the addition of 6 m. long shafts cut into the mountain at the rear of Kaltenhausen cellars near Hallein, Salzburg, so that they reached natural air vents, was to ensure air circulation and attain a temperature of 4 deg. C. internally when it was 20 deg. externally.

However, notwithstanding the evidence of the Australian aborigine

in his abhorrence of true caves, it would seem that, from Geiger's figures on the "Eisriesenwelt", there is another very good reason why cold climate European caves of this type were not very well used for their full depth, even after the use of fire was established. vide Geiger's figures (quoted from R.Oedl, R.Saar, etc, for cold climate conditions), (I).

The direction of the air current in such a cave is decided mainly "by the difference in temperature between the air outside and inside and the movement of the air, has in turn an effect on the temperature of the cave", (ibid).

In winter, from about December to March, cold air streams in through the lower entrance, cools the rock of the cave and escapes upwards. "This cold air is comparatively dry, relative humidities down to 40% have been measured. The ice that is present in the lower part of the cave, therefore evaporates strongly. Cave temperatures fall below 0 deg.C....Continental weather, with very cold winters which are able to penetrate into the cave and warm summers, which go by leaving hardly a trace of their existence, therefore further cooling within the cave promotes the formation of ice." Consequently, if such a cave has more than one entrance and is located in a cold climate (as in a glacial period) - it would reasonably only be used for shelter from enemies and only by the hardiest of races. The transit cave, with more than one opening may therefore be classified as relatively uninhabitable for all practical purposes in very cold climates.

Man often occupies or builds dwellings which are not rational answers to his environmental problems. As an extant example of a Stone Age culture, the Australian aborigines' abhorrence of caves as dwellings, is a good example. Some caves in N.S.W., which were never used as occupation sites, would have been ideal, particularly since the Australian aborigine had the capacity to use and make fire. Several cave sites have been visited and measurements taken, which show the effectiveness of these shelters as climate control devices. The obvious advantages that caves would have presented to nearly naked men, in the winter and the relief from heat that they provided

in the summer, must have been obvious to the resourceful Australian aborigine; one would expect to find potent and dominant, learnt cultural needs, dominant enough to subdue the powerful and demanding basic physiological needs. That these influences existed, and still exist in the magico-religious beliefs and rock art of the Australian aborigine is well known. Similarly, the use of caves for similar purposes and the restrictions on their logical use as dwellings in the Stone Age is also a matter of record.

However, the rock shelter appears to have never held the same capacity to inspire awe or fear as the cave. Rock shelters are reasonably efficient climate control devices, although they are obviously subject to climatic influences much more directly than caves.

Although, they too have been used for rock art, having magico-religious significance and therefore, are considered by the Australian aborigine to be unsuitable dwelling places, there are many more examples of their use, as living sites than there are of caves.

OVERHANGING ROCK SHELTERS - as analogous to those used by man in the Pleistocene.

When one wishes to consider civilisations such as the Roman to assess the efficacy of their climate control methods, there is considerable information available. However, the further back in time, the more difficult it becomes, until in prehistory, one is faced with vast periods of time, sparse records and very little except speculative theory, on which to build an understanding of the methods then used by man, to modify the climate.

However, there is one approach to this problem, which may be used to clarify the understanding of simple, prehistorical rock shelters, which would not be applicable to the more complex forms of construction. By analogy, one may reasonably suggest, that should it be possible to locate contemporary rock shelters which by their form and construction material are similar to those used in historical periods, then some comparison could be made between climatological measurements.

Vast changes have occurred in the macroclimate from Pleistocene

times to the present, yet during the interglacial climatic phases, conditions similar to those of the present, were known to have existed. During these periods, although temperatures were different, temporary shelters in the open and shelters in the rock were man's usual habitat. The simple social structure and hunter-nomad life of people of those times, was directly interwoven with the fabric of the natural environment. In a direct relationship with nature, unbuffered by the societal structures that social man devised later, and over vast periods of time, sound practical solutions to problems of the environment were developed and passed on through the generations.

Particular methods of manufacturing stone implements, termed "industries", were perfected and inherited for thousands of years unchanged. Similarly, knowledge of shelters in the open and under overhanging rock must have had their lore developed over centuries of sound empirical knowledge. They must have been successful homesites, or man would have been motivated to have developed alternatives.

When similar rock shelters are considered, such as those used by the contemporary (Paleolithic) Australian aborigine, the reasons for the success of this system of climate modification becomes clearer.

As has already been noted, the majority of these shelters and caves, were chosen near a source of water, food (game) and lower in valleys than were necessary for defence in times of threat, during which periods, retreat to higher shelters occurred.

The east or, in Europe, south slopes were preferred and it is obvious, that a simple and direct appreciation of aspect, topography, valley topoclimate, and other environmental siting advantages were implicit in the choice of homesites. The East Coast Australian aborigines also responded with a strong sense of appreciation of environmental factors.

In the various aborigine rock shelters, in which microclimate measurements have been taken by the writer, there have been shelters which may be broadly categorised as winter and summer sites. Given sufficiently low densities of population, an intriguing refinement of the quality of living conditions becomes possible by the use of the seasonal shelter.

This is well exemplified in Curracarong Shelters I and II near Wattamolla, Royal National Park, Sydney.

Curracarong, is approached from the scrub covered ridges, typical of the Sydney coastal region, with their sandy soil and sclerophyllous vegetation. Down gradual, valley slopes, a descent is made into the remnants of a typical, rain-forest gully with Curracarong Creek at its low point. The complete environmental change that occurs as one walks into this valley, even with the intrusive group of shacks and man-made tracks, gives one a sense of timelessness. It is very easy to allow the imagination to slip back to a time, when a tribal group would use one shelter or the other, so obviously sited as a summer or winter quarters. The winter quarters (Shelter I) sited some 60 ft. above valley floor, facing between east and north, looking seaward, close to a creek and within $\frac{1}{4}$ mile of the coastal rocks where shellfish are abundant. So man found many resources he could use, he must also have had a feeling for the beauty of the land and for the hard-won security of standing with a solid wall at his back and looking out over a river valley. The effect of all this on a mild July day, is all that is needed to convince one of the wisdom of choice that was exhibited by these "primitive" peoples.

The "summer" shelter II, shows a similar finesse of appreciation on the part of the occupants for those climate control "devices" which were to become so popular in the Renaissance, the grottoes.

Here, is the ideal form of summer residence, open to the sea breeze, angled away from all sunshine, except the sunrise itself, with a roof and walls made of a material unique in its insulating capacities and with the presence of trickling seepage water at one end to keep the stone permanently cool. Under such ideal conditions, given the seasonal choice of shelters and the possibility of the use of windbreaks in inclement weather (for which there are plenty of precedents in European and African living sites), this group can be seen to be the epitome of how stone age man could live in unison with his environment, it may also provide one reason why he was not motivated to change conditions for such a great span of time.

"Even in the Pleistocene, families seem to have been highly selective in their choice of a home. Occupied caves are always those on the sunny side of a valley, with water near at hand. Some caves seem to have been 'desirable residences' for thousands of years." (78).

Social and Esteem Needs in the Paleolithic.

During the Middle Pleistocene, social hunting had the effect of involving groups of men into mutual co-operation which transcended the family. This involved the adoption of rules, conditioning relations between the sexes, including the prohibition of incest and the practice of exogamy. The home base became the shelter for the young, during the lengthy period spent in acquiring culture, and the place to which food was brought for sharing. The same social hunting may be seen in a highly organised and expert form in the Middle Pleistocene - this was of a type which "distinguishes men from the primates". (47) It involved planning ahead, and careful preparation with skills, in co-operation which mark this period as being clearly established in the satisfaction of Social Needs 3.

At Kostienki IV, (47) pestle rubbers and grinding slabs, point to the gathering and preparation of plants for food, probably by the women in social groups. In this way, the female became independent to some extent, and probably began to control the stockpiling of food and this would extend to distribution. The female, then would have become a centre of focus of the social group, of cultural activities and procreation. This would explain the re-orientation of religious rituals towards the mother-provider and the appearance of the Venus figurines so well known from the period.

The stability of this life style tended towards continuous occupation of home bases, and rock shelters show evidence of continuous occupation for tens of thousands of years.

It seems reasonable to hypothesise on the dignity and esteem of the CroMagnon shaman, who directed the magico-religious rituals centred around the propitiation and fertility of the animals, upon which their lives totally depended. However, the artists who executed the cave paintings and sculptures, must have enjoyed tribal esteem as well.

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Torralba and Ambrona, and was probably located on the migration route of herds of large mammals (deer, horses and aurochs, elephants, etc.). There was an enormous concentration of elephant bones, and considering the fact that a dead elephant cannot be moved easily, it is suggested by the positions of the bones, that dismembering had occurred, and the presence of widely scattered remains of fires, together with evidence of a bog, suggests that animals were driven into a bog by fire and there killed. This would explain the concentration of remains, together with stone tools of the Homo erectus association in Africa.

Fire made it possible for man to invade caves and evict the animal occupants, introduce a warm environment into smaller caves with cooking to convert them into a home base; the night light and warmth induced social gathering, encouraged the extended family and made possible the magico-religious ceremonies and cave art. The co-ordinated use of separate hunt fires in such a drive mentioned above, required a high degree of intelligent and planned social co-operation which would have greatly stimulated Needs 3 tendencies. In fact, Needs 1, 2 and 3 required fire as an agent towards their complete satisfaction.

A series of paintings have been executed by Stanley Meltzoff based on Clark-Howell's findings at diggings in the Ambrona valley (224). These are imaginative, and in some cases go beyond the archeological evidence but apart from this very little further is known of Homo erectus, other than the fact that over hundreds of thousand years, his culture changed, and a more modern kind of man appeared.

Except for the evidence of two peculiar skulls (q.v.) nothing is known of this period of time; it is not known whether clothes were worn, whether any shelter was used other than a natural cave or rock overhang; there is no evidence of art, religion or any kinship system, and nothing is known as to what became of Homo erectus. The hopelessly, vague pre-history of this period makes it necessary to move on to a time of about 110,000 y.a., when Homo sapiens had appeared and over the next 75,000 years became widely distributed over the whole of the old world.

EVIDENCE OF THE EFFECT OF FIRE ON THE ENVIRONMENT

"It has been customary to assume that before man introduced agriculture, he lived in his environment, but had no effect on it. That this should be so, when we know that he possessed fire was put down to the fact that the population was so small and scattered that even if he did start a fire, it would be on a very local scale. But, once started, fires are not as easily contained as that, and it is significant that the vegetational record is now beginning to show the sort of evidence that one would expect."

Rarely do circumstances allow us to detect the influence of Paleolithic man, but such a case seems to have been revealed by West (H.G. West, "The Quarternary Deposits at Hoxne Suffolk", Phil. Trans R. Soc. B239 (265-356), from the Great Interglacial deposits at Hoxne. Here, the pollen sequence showed a marked drop in tree pollen accompanied by a corresponding rise in grasses and other light-demanding species. At the same level, charcoal occurred and Acheulian flint tools were tied in to the same horizon." Absolute proof of association is seldom possible and the coincidence of evidence here is as complete as could be hoped for" (109).

The Use of Fire in the Paleolithic (or in The Pliocene and Pleistocene)

It is interesting to read how, according to M.J. Herskovits "we can say with confidence that the early European Lower Paleolithic beings did not have fire" (152), when, taking into account the previous paragraph concerning the destructive effects of climatic extremes on artifacts and deposits, it must yet remain for the future to be so certain, when the present evidence is so sparse and incomplete.

Robert Ardrey, has presented an argument against the Transvaal caves as being Australopithecine living sites and bases it on Kenneth Oakley's idea that "until man could guard the entrance of a cave with fire, and thus keep predators away, such a cave would prove more of a trap than a refuge". (156) Does it follow from this, that should a cave be found to have had substantial evidence of continuous occupation, then the use of fire is a necessary precondition?

This is surely an unwarranted assumption, when barriers of stick and stones may have served a similar purpose. It seems more reasonable

to only correlate cave occupation with the use of fire when evidence for both existed contemporaneously..

In 1948, Prof. Raymond Dart expressed his conviction, that from the associated evidence in one of the caves in the Makapan Valley (near Sterkfontein, S.Africa) "he was convinced that this 'ape-man', (described by Dart as resembling Australopithecus africanus) had known how to make fire" (166), Leakey and Goodall do not contradict this claim and so it would appear the use of fire in Africa could pre-date that in Europe. Pfeiffer reports (7), and this appears very strange, that both Leakey and Dart, as well as other anthropologists, consider that Australopithecus belong to genus Homo and Dart's claim on A.africanus' deliberate use of fire is amazing, considering its age is 4-5 m.y.a..

Opinions on the Origins of the use of Fire

Pfeiffer gives his opinion that the first known hearth occurred in Escale caves, S.E. France 750,000 y.a. and (the first known artificially made fire in Belgium, 15,000 y.a.). "Man had wandered about as far north as he could at the time....he was living where no normal primate should be, nearly within the shadows of alpine glaciers". The more one reads of the various uses of fire (not necessarily artificially made) by the hominids, the more one is inclined to leave open the whole question of the earliest date at which hominids had sufficient intelligence to observe the value of fire in food preparation, safety and comfort (7).

Further evidence of the use of cooking facilities which would also have served as a source of heating for caves will be covered later. Fire probably enabled Peking man to take possession of the Dragon's Hill cave, as the first evidence of man's use of this cave show many signs of fire in carbon residue.

Particular Case - Evidence of the Existence of a Social Group
Having Satisfied Needs 1, 2 & 3 - 300,000 y.a.

Although, the lower and middle Paleolithic covers a vast period of time during which extreme climatic fluctuations occurred, there is very little archeological evidence of the techniques that man gradually developed to help him adapt to these climatic extremes.

However, there is a site in Southern France which has been excavated recently and from which much may be learnt. With this early example of construction of a dwelling 300,000 years ago, primitive man was already modifying his environment, using his skills to erect structures for climate control and demonstrating his evolving ability to satisfy, not only simple needs 1 & 2, but now Needs 3 - the probable beginning of the societal group.

Henry de Lumley writes, of uncovering a "Paleolithic camp at Nice" in 1966, containing traces of huts that were built some 300,000 years ago, (162) The site is now known as Terra Amata and the climate at the time these huts were constructed was temperate but "brisker" and more humid than at present. "Terra Amata" (a contemporary name in the area) means "beloved land" and the results of the pollen studies certainly appear to substantiate that it was aptly named, even 300 millenniums ago. The Alps were still present, then as now, but the plain of Nice was covered with sea, penetrating into the present valley of the Paillan River. Fir and Norway Pine grew further down the slopes of the Alps than at present. Heather, sea pine, Aleppo pine and Holm oak covered Mt. Boron and its neighbouring coastal mountains. A small cove had been cut by the sea into the limestone of Mt. Boron's western slope, the mouth of the cove facing south. Within this cove was a sand and pebble beach (sheltered from north and east winds). A small spring provided fresh water and the stream flowing from it contained water lillies (Euryale genus, found only in Asia to-day) and a few seashore plants (grasses, "horsetails," short-stemmed plantain) and various shrubs grew in the cove.

There were three separate areas containing living floors (A) one located on a beach which had been a sandbar until the sea level dropped,

this contained four living floors (B) one on the beach seaward of the former sandbar contained 6 floors and (C) the third, on an inland dune contained 11 floors.

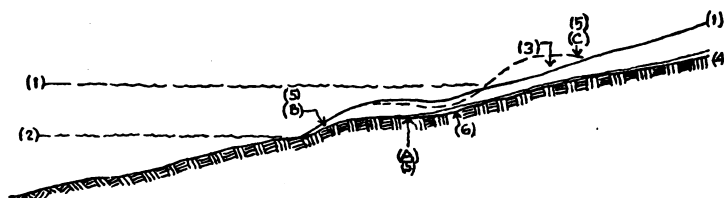


Figure 10:

Writers Diagram of Chronological sequence of site formation Terra Amata

- 1) Beach formed and bar formed with Mediterranean 85' higher than present
- 2) Sea level dropped
- 3) Dune formed
- 4) Major erosion occurred
- 5) Hunters visited site in temperate climate, land snails occur at interface of eroded sand and soil (6)
- 6) Reddish brown soil covered eroded sand surface.

All huts had an elongated oval plan shape, 26' to 49' long x 13' to 20' wide. This outline is able to be traced from the imprints of a series of stakes, approx. 3" diam. driven into the sand to form the walls of the hut. A line of stones parallels the stakes or appear to buttress the walls. One of the earliest huts is perfectly outlined by an oval of stones up to 12" diam. and sometimes stacked one on the other. Interior posts approx. 12" diam. were located on the long axis centreline. A hearth occurs in the centre, either pebble paved or shallow pits 1' to 2' in diameter. Dwarf walls, apparently wind-screens, were built around the hearths to protect them from the north-west wind which prevails to the present. This makes it very obvious that the huts were not draught free and were probably constructed of leafy boughs. Paved hearths (together with one other European site at Vertesszolos, Hungary) are the oldest yet discovered in the world. No human fossils were found at Terra Amata, however, it is possible to state the time of year when the temporary shelters were used, because human coprolite found near the huts, show in Baillieu's analysis as

containing pollen from plants such as Genista ("Broom") that shed pollen at the end of spring or early summer.

The food these people used, consisted of smaller animals of the following species in order of abundance in fossil remains:

stag (Cervus elaphus), extinct elephant (Elephas meridionalis), wild boar (Sus scrofa), ibex (Capra ibex), Merk's rhinoceros (Dicerothinus merki) and wild ox (Bos primigenius).

Although they did not exploit the food resources of the sea, they knew some seafoods such as oysters, mussels, limpets and fish. (Because there are no fossil remains, the best hypothesis as to the size of the human inhabitants, is based on a 9½" footprint to which the formula previously applied to Neanderthal prints found at Toirans, Italy may be applied to give an approximate 5'1" tall person).

These people occupied themselves during their stay by making stone and bone tools, hunting nearby and gathering some seafoods, which can be proved from artifacts and fossil remains, however, amongst these remains is a projectile point made of volcanic rock found only near Esterel S.W. of Cannes, 30 miles from Nice. This indicates the minimum roaming distance.

The pattern of their visit has been reconstructed as follows: Arriving in late spring or early summer, the sheltered cove being chosen for fresh water, the inhabitants constructed their hearths and windscreens and hunted for a few days, made a few tools, collected some seafood, then departed. That their stay was so brief, is proved by the absence of compaction of the living floors together with some evidence to indicate that the huts collapsed shortly after they were built.

In the autumn, leaves covered the site and wind-blown sand covered it further to some 2" deep. Rain then spread the sand and packed it, obliterating most of the evidence of their stay when they returned the following year. Some objects such as the windscreens still protruded, yet the fact that they occupied the same living floors year after year, suggests that the dune huts sheltered the same individuals for more than a decade and that they "possessed stable and even complex social institutions". (162)

Camille Jullian, the French historian, wrote of this settlement -(162 "the hearth is a place for gathering together around a fire that warms, they need periods of preparation and afterwards long moments of repose beside the hearth. The family, the tribe will arise from these customs and I ask myself if they have not already been born";300,000 y.a. this group was probably satisfactorily providing for the physiological safety and social needs of the group, it is little wonder that over the next 250,000 years, sufficient potential creative energy could build to produce the works of art of the Upper Paleolithic; although it must be acknowledged that the latest opinions on this art, give as their motivations an agglomeration of many and varied needs, present amongst these must be need 4 (and 5?) motivation which have been described as "mixed personal social motives" and represent a suitable development to evolve from such early examples of man's ability to modify his environment to suit his needs, as are represented in the Terra Amata camp sites (163).

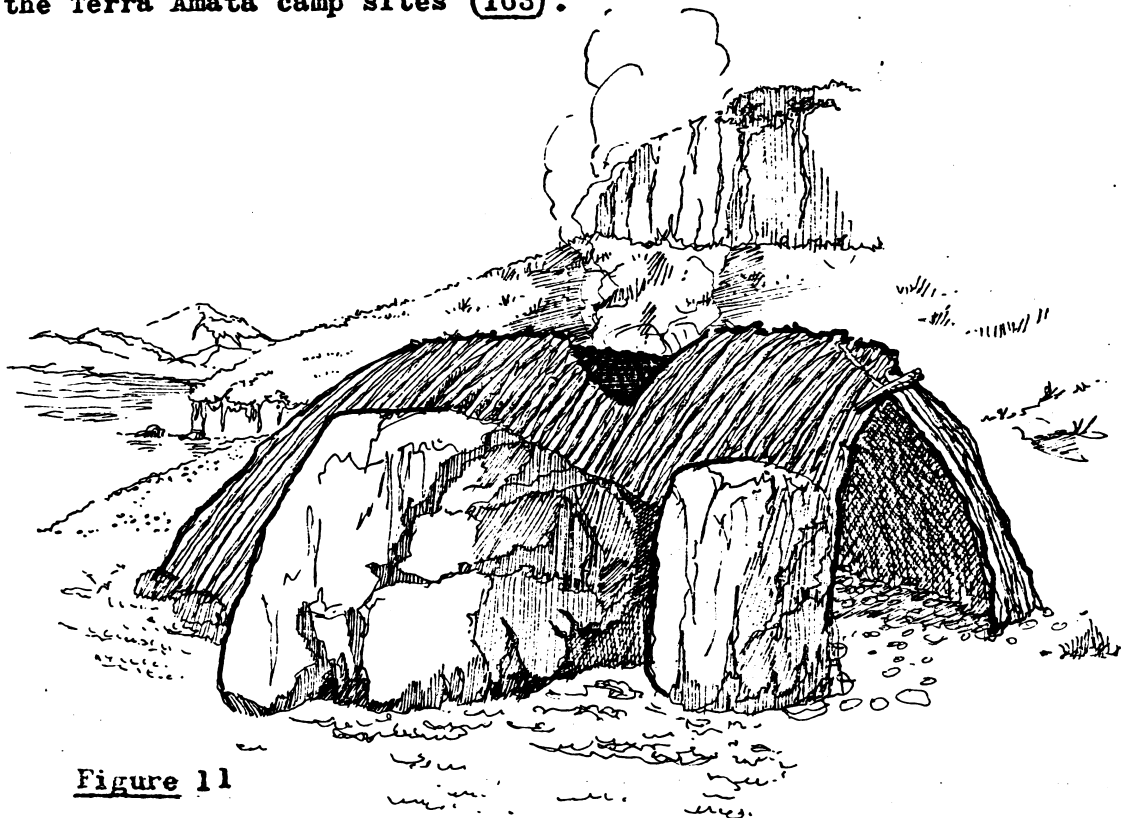


Figure 11

Terra Amata Camp Site - Hypothetical Reconstruction (7)

(For Alternative reconstruction see (162).

THE MIDDLE PALEOLITHIC

(And the Opportunity it brought to Inhabit Rigorous Climates)

For hundreds of thousands of years, tropical Africa played the dominant role in the prehistory of the Early Pleistocene. The Mousterian phase was then ushered in, which was to occupy some hundred thousand more years. "The origins of the Mousterian culture are still very imperfectly understood" (161) but both the Mousterian culture and Neanderthal man burst upon the scene fully evolved and alarmingly unheralded. The phase associated with Neanderthal man and his cousins, lay in a broad belt from the Atlantic to Inner Asia, mainly between 30 deg-50 deg. latitudes north of the Equator.

The technical change most symbolic of this period was the appearance of the flake industry. The flake was not like the hand axe which was an implement resulting from continuous working upon and refining of a primitive chopper-tool. The flake required foresight, the forming of a mental image of the design of the required tool, then the skilful use of a single blow to produce a required result. The technique permitted rejuvenation of a single core by striking off more flakes, a great economy of labour and material. In addition, flakes could be retouched to form implements in a variety of shapes to suit their purpose.

Small and disc-like flakes were found at the French rock shelter of Le Moustier, giving name to a Mousterian tradition, allowing detachment of the flake without rejuvenation of the core. Caves in Libya and Western Asia yielded Levallois-Mousterian industries, sharing elements from each. The side-scraper and point were the leading forms of flake tools of S.W. Asia and N. Africa and burins were found at Mt. Carmel; however, Neanderthal man's advances in technology were relatively unspectacular. Yet, the abundance of flint scrapers indicate that skin clothing could reasonably be inferred as being used extensively and it was probably of a rudimentary type that did not need sewing. This had a marked effect on dispersion of populations by introducing the possibility of occupying territories in rigorous climates, in fact the flake tool industry permitted occupation of

areas under glaciation, (47).

In the provision of clothing, the possession of proven hunting skills and from ample evidence of the occupation of rock shelters and caves, Neanderthal man, Homo neanderthalensis, was obviously well able to satisfy the Physiological Needs 1 to a great extent, (with the use of fire) the Security Needs 2, and also to a large degree, the Social Needs 3.

Neanderthal man had a sure control of fire. He used it regularly, presumably could create it when he needed it, and had progressed to the point of digging hearth holes in the floors of caves. He was also a home builder, as well as a cave dweller. There are several sites in Russia which gave evidence of having served as dwellings of Neanderthal man. One such is marked by a rough ring of hearths, outside which is a large circle of heavy elephant bones and tusks, which may have served, along with wood, which is no longer preserved -- as a framework to support animal skins. (vide Appendix B.7 & B.7a).

"Apart from this, Neanderthalers undoubtedly made other kinds of perishable shelters, just as hunter-gatherers like Australian aborigines and African bushmen will do. These are simple affairs of sticks and grasses, some of them were windbreaks which quickly disintegrate and vanish after their builders move away" (115). It is from the evidence of a skeleton found in the cave of Shanidar (height, 2,500 ft. in Zagros mountains) that much may be deduced as to their attainment of satisfaction of Social needs. The skeleton is that of a forty year old man, a condition of "old age" for that time, who had an undeveloped right arm and shoulder, the arm, in fact had been amputated below the elbow. The teeth (unlike other of his race who were predominantly meat eaters with very little wear) showed extreme wear, indicative of their use, probably to compensate for the lost limb. That this individual, disabled since infancy, had attained manhood and old age, argues for "a degree of concern for the individual" who could hardly have shared in hunting activities "...and yet needed to be fed....in spite of the small numbers of 'meat winners'. The concern manifested for the cripple of Shanidar, shows that love and compassion....especially necessary for men because of the need to

inculcate and transmit an ever growing body of culture to succeeding generations....were already operating in Neanderthal society". (47). That this degree of concern was shown for an individual, indicates an advanced stage in the satisfaction of Social Needs 3.

The departure of Mousterian cultures from the scene is even more abrupt than its beginnings. In western Europe especially, the Mousterian vanishes with barely a trace, at the arrival of Homo sapiens and the earliest Upper Paleolithic cultures. Although the situation is less clear in the USSR, this sharp transition is also present in S.W. Asia and the North African coast, (161).

UPPER PALEOLITHIC CULTURES.

For years after the discovery of Lascaux caves, the Spanish land-owner who effected the discovery, had great difficulty in convincing an incredulous world that the paintings were not either a hundred years old or fakes. Familiarisation has made present day people the opposite, so much has been published that we now accept such artistic merit without any wonder at all.

Geoffrey Bibby would have created a more receptive state of mind to appreciate the capacities that Cro-Magnon exhibited in adapting to his environment and in modifying it to suit his needs. Bibby says (139) "Cro-Magnon man, taller, stronger, more handsome than ourselves, wandered into Europe when the Ice Age was at its height and succeeded in carving out a living for himself, not only in the face of an extremely adverse environment but also in the face of an inimical rival race, the Neanderthal, over which he had no obvious material advantage....The only point at which he was already head and shoulders above his Neanderthal adversary, was in artistic sensibility with the greater imagination and breadth of conception which it must have induced, that decided the issue between them"....or at least the majority of archeologists think so. In fact, there is a limited number of them who consider that the case is far from clear. In 1968, the Sydney Morning Herald, carried an article reporting how Mme. le roi Goirhan of the Museum of Man, Paris, had found in soil

samples from a Neanderthal burial, the pollen traces of at least eight species of wildflowers. Scattered evidence such as this is gradually establishing a case for a degree of sensitivity in the Neanderthals and some archeologists and anthropologists consider them quite "civilised" as in this case, they had a reverence for the dead and "could hold a 'funeral' of a type". Their cranial capacity averaged 1,600 cc. compared to modern man's 1,450 cc. (although brain size is far from an established measure of advancing evolution.) Consequently, when looking into the capacities of this race to alter its environments, one must keep in mind that, there is a school of thought which considers they may have merged with Cro-Magnon man into the mainstream of developing humanity, and that modern man may be descended from one or other, or both races.

"The end of Paleolithic Man, that is to say of his way of living, was miserable. He did not go out spectacularly, rather he retired grumbling. There is little sign that he wanted to change, that he had any inner urge to do so; if environment and climate had not altered, he would in all likelihood have been content to remain a savage and a hunter until the end of time. But the environment and the climate did change, as it must do sooner or later and the incentive came from without", (167).

"The arrival of the first Upper Paleolithic cultures is....every bit as sudden as that of Neanderthal man and the Mousterian," (161). Whereas, Mousterian cultures were based upon flake techniques, Upper Paleolithic cultures used "implements manufactured from blades rather than flakes". Although blades are flakes, these were very refined, flat, narrow implements, struck from a core of fluted or prismatic appearance, with the aid of a punch rather than by direct percussion, (ibid).

The place of origin of the first Upper Paleolithic cultures or of the first true Homo sapiens is not known yet. Roe suggests that it may lie in a relatively (archeologically) unexplored area between the Levantine coast and the Himalayas, (ibid).

SEASONAL SHELTERS IN THE TERMINAL PLEISTOCENE:

Reconstruction of a Magdalenian (Borneck II) winter tent complex c.11,500 y.a. (63) showing two circular tents. The larger was 4 m. in diameter of furs and hides with a base of laid rocks, a deep hearth in the middle and insulated by earthworks around the base. Smaller tents



Figure 12 -
Reconstruction
Magdalenian winter
tent complex

probably served for storage. Built in a warmer climate (Allerod interval) "this tent suggests a winter occupation" (ibid).

A summer tent made of furs and hides dated about 15,500 y.a. (15,200 \pm 800). An interior oval tent 2.5 m. x 3.5 m. in plan, was

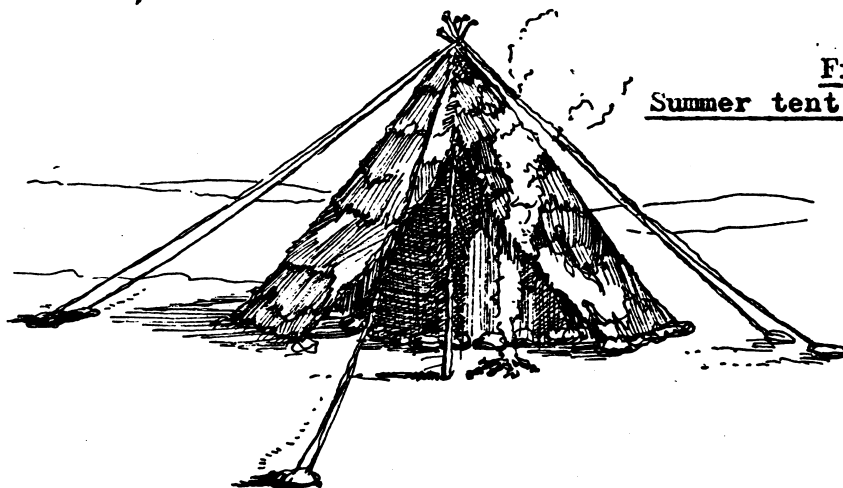


Figure 13
Summer tent of furs & hides
(63)

encompassed by a horseshoe shaped exterior tent 5.5 m. diameter. (63) & (21). Although the size of small social units of the Middle Paleolithic does not seem to have increased in the late Paleolithic, the population density of sites and faunal remains indicate a "much greater over-all population" with a "considerable degree of territoriality... practiced" (ibid) - an indication of a considerable advance in need fulfilment to the Social Needs (political) level.

Radio-carbon dates for early occurrences of Advanced Paleolithic culture.. "all bunch together around the time span 35,000-30,000 BC and between 40,000 and 29,000BC or a little after, fully evolved

early blade-using cultures first appeared during a milder part of the Wurm glaciation. This phase was not continuously mild and may not even be described as a single interstadial, it may have been two minor warm oscillations with a colder intervening period, (161).

Because of the "higher pitch" of the "arts of hunting and catching" that these people attained, their time became freer for its better use in exploring "avenues of feeling and self expression which foreshadowed unmistakably the achievements of modern man" (47)... It is indeed, no coincidence that the original centres of food production and urban civilisation in the Old World grew up precisely within the territories of these Advanced Paleolithic peoples". Cro-Magnon man was "tall, erect and well built...the brain was strikingly above the modern average in capacity.." (ibid). Clark and Piggott suggest that the extent and duration of industries in the Mount Carmel caves, Iran and Afghanistan, "present an excellent case for the main influx coming from the east, through the Balkans and Central Europe," (ibid).

Cro-Magnon man lived between approx. 28,000 - 10,000 BC and had a sufficiently sophisticated way of life to appreciate and encourage his artistic and observational skills and to work them into his rituals. His paintings and carvings appear to be closely tied with his spiritual life, this is exemplified in the places he chose for his wall paintings. This is restricted almost exclusively to true caves, deep underground fissures with long galleries and passages which contain little or no evidence of having been lived in. From a practical point of view, this is understandable, also light would be lacking, although "fat-filled, stone lamps or torches were known" (119).

In the Dordogne, the rock overhang shelters were used as living quarters and there were over 70 other true caves containing cave art. The shelters were more or less open, facing out over the valleys and made more livable by the addition of stone walls to keep out wind and snow. Hearths abound in these shelters, tending to become larger during later periods. They contain little or no wall decorations.

Fluctuation in the supply of game was probably a continuous problem which was apparently dealt with by magic ritualism emphasising

fertility of the beasts that were painted. Although, the scarcity of food probably eased during the colder episodes of the last glacial periods, during this time mammoths, woolly rhinoceros, ibex, steppe horse and reindeer flourished in the tundra environment.

During the Upper Perigordian and the Solutrian, 25,000 to 20,000 years ago, the weather ranged from cool to cold. In the cold periods, it was bitter in the extreme, particularly on the eastern European plains but, regardless of these conditions, there was a reasonable density of population. Houses were constructed in shallow pits, covered with hides or other roofing materials and the vague outlines of the walls still remain.

The Magdalenian period, 15,000 to 10,000 BC, was less sedentary and the climate was bitterly cold. Furs were used for clothing and for the first time, bone needles were used to sew them to fit, this permitted a finer control of the body microclimate with the advantage that Magdalenians were able to move with the reindeer herds in spite of the severe winters. However, this also meant that their dwellings were those of itinerants.

The Gravettian, overlaying the Aurignacian in western and central Europe, differed profoundly from it at the technical level and was in several respects more richly endowed.

In western and parts of central Europe, the Gravettians were able to occupy caves and rock-shelters however, but over most of south Russia these were not available and they had to camp in the open where they constructed artificial dwellings as protection from the severe cold of most of the late glacial period. (vide Appendix B.11 & B.12).

Extensive use was made of the skeletons of mammoths, this was carried to extreme lengths in a dwelling excavated at Mezhirich. The area of this dwelling was approx. 23 sq.m. built from the bones of at least 95 mammoths, the roof constructed of long bones and the walls of skulls. The roof is presumed to be of animal skins supported on a frame of mammoth tusks, tree branches, all kept in place by the weight of tusks and reindeer antlers, with mammoth shoulder-blades arranged as paving on the foundation of skulls which held down the periphery.

Towards the end of the Ice Age, the reindeer hunters of the North European plain, made tent-like structures which had the great advantage of mobility and were supported on wooden poles and held down by glacial ice or boulders in round or pear-shaped formations.

The skin coverings could be rolled up on poles for carrying to the next camp, the only remains being the fireplaces and the boulders. Obviously, these techniques of erecting temporary shelters would have been excellent when applied to the terraces of rock shelters. Living in the mouths of caves or under rock shelters would have been very difficult if it had not been for the use of such screens in the glacial conditions of the time.

The arts of relief carving and cave painting were carried to the ultimate stage of development in the Advanced Paleolithic. This was during the Solutrean (17,000-15,000 BC).

Over much of western Europe, north of the Cantabrian mountains and of the Pyrenees, Solutrean industries were succeeded by Magdalenian ones. The beautifully made barbed and tanged flint arrowheads were used to hunt reindeer during a period in which the "climate became markedly colder", (47) (vide Chart No. I, top, back cover).

"We take leave of the Advanced Paleolithic hunters of western Europe when at the peak of attainment, their whole world was about to disintegrate with brutal suddenness before the impact of environmental change. In their art, applied to small objects and to walls and roofs of their caves and shelters alike, they left behind a legacy widely recognised as one of the supreme achievements of mankind, superior in significance to the more parochial attainments of the civilized peoples of antiquity, because it was more universal in its relevance. Both conceptually and physically, the Advanced Paleolithic peoples were true representatives of modern man, representatives who tried out as it were for the first time the faculties by which, during the astonishingly brief period of 10,000 years were shaped all the diversities and intricacies of civilisation itself," (47).

"MAN-ENVIRONMENT NEXUS": SUMMARISED ANALYSIS DIAGRAM NUMBER A

(see appendix A for details)

CULTURAL EPOCH:
TIME PERIOD :

PALEOLITHIC
PLEISTOCENE

METHODS USED TO MODIFY THE ENVIRONMENT AS OVERT EVIDENCE OF NEEDS SATISFACTION

Individual:

- Nomadic existence, itinerant use of living sites (seasonal sites).
- Use of naturally occurring shelters, caves & rock overhangs and unknown degree man-made fire use.
- Man-made crude shelters (wind-breaks, thorn & branch enclosures).
- Total limitation imposed by crude tool & weapon techniques.

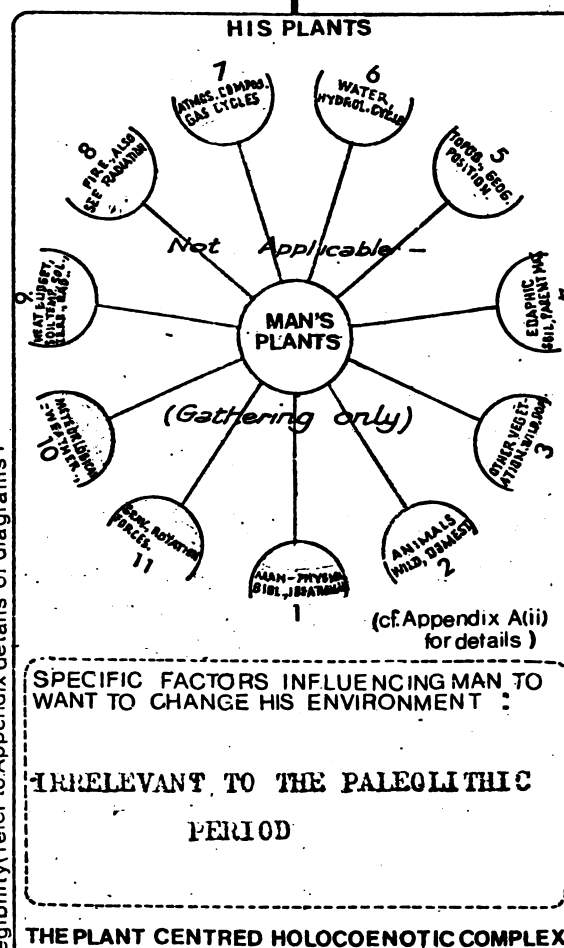
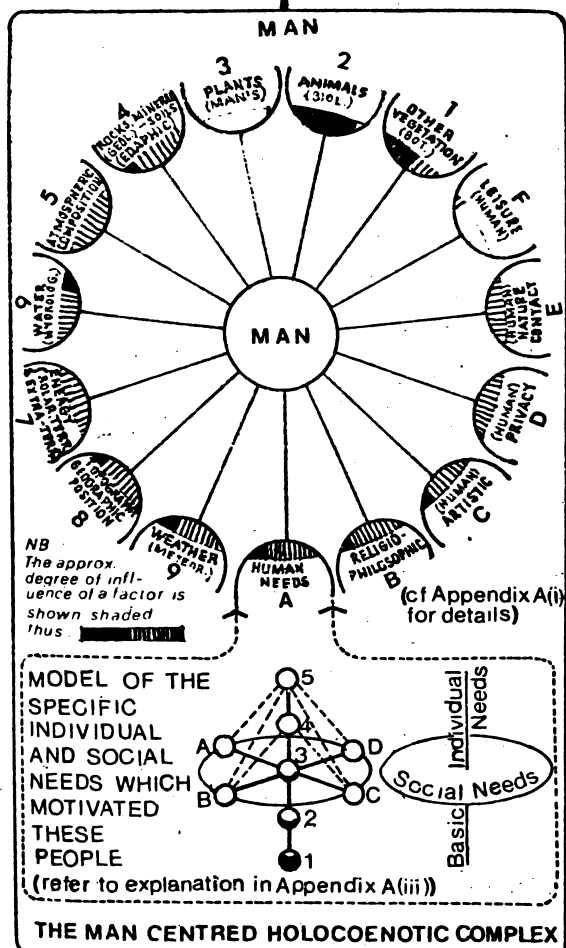
Social:

- Simple social groupings began under stimulus of hunting.
- Co-operation from (a.) produced haphazard use of fire for herding of hunted animals prior to kill.
- Simple groupings of crude dwellings.
- Minimal effects on the environment.

DESCRIPTION OF THE MACRO ENVIRONMENT GENERALLY:

In all periods the effects of Pleistocene glacials and pluvials were dominant. Minimal progress occurred mainly interglacials.

FACTORS HAVING A BEARING ON MAN AND HIS PLANTS AND INFLUENCING HIM TO ALTER HIS MACRO-ENVIRONMENT (AS THEY PRINCIPALLY AFFECT HIM AND HIS PLANTS)



(All factors continuously interact, only those which are dominant have been included in the diagrams.)

Table 5.

MESOLITHIC CULTURES

In Appendix B. Chart I (Back cover) extracts from Derek Roe's table 4, p.90 (161) are given and it may be seen that there is no clear demarcation, no 'marker-horizon' for the beginning of the Mesolithic Period, some authorities prefer to omit it altogether, in fact between the fully Upper Paleolithic cultures and the fully Mesolithic ones, there are those which belong neither with one or the other and Roe says that the "sensible name of 'epi-Paleolithic' is sometimes given to them."

The various epi-Paleolithic cultures may be regarded as ending with the close of Late Glacial conditions and the beginning of the Pre-Boreal phase. To say that they ended, merely means that they become merged into their more fully Mesolithic successors; the real change that took place was climatic and environmental, not cultural and it was characterised by the growth of forests in response to the warmer postglacial climate. This forest development gives the name to Pre-Boreal and Boreal phases and is the underlying cause of most of the changes in tool types to be seen in the accompanying Mesolithic industries. The most obvious example is the appearance of the first true axe tools as a response to the increasingly urgent need for tree-felling and woodworking. There was also a greater use of open-air shelters although caves and rock shelters were not completely abandoned. Social groupings led to the clustering of huts and in siting these, a lively appreciation of environment was exhibited, for instance preference was given to sandy soils, clays that became muddy after rain were avoided.

The first main axe-using cultures was the Maglemosian, combining the use of flint axes with microliths, the latter being typical of the Mesolithic.

The earliest stages of this culture are seen at such sites as Klosterland, Jutland and Star Carr, Yorkshire during pre-Boreal times. A radiocarbon date of 7,500 BC. was obtained for Star Carr where hunter-fishers lived on a birchwood platform at the marshy edge of a lake; an excellent example of social Needs 3 having been satisfied to the benefit of the community, (161).

Figure 14

Star Carr, Yorkshire, Britain. (257)

Hypothetical reconstruction of a temporary camp of Mesolithic hunters and Fishers on a birchwood platform at the edge of a lake. Bones of slaughtered animals, litter the site and are worked into tools and weapons.

The waterlogged conditions effectively preserved many details of the Maglemosian settlement, pollen analysis enables their landscape and environment to be imagined with fair accuracy. This Culture, in its later stages, extended from Britain to western Russia and north to Norway and Sweden and it appears to have existed until the end of Boreal

times and probably the late Mesolithic Coastal culture developed out of it. It is interesting that, without disturbing the Mesolithic background, the Neolithic made its appearance into this culture. This is evidenced by "two features, traditional hall-marks, as it were, of the Neolithic spread, pottery and axes with a cutting edge sharpened by grinding instead of chipping", (163).

As the English Channel did not exist before approx. 6000 BC. the Maglemosians must have inhabited the land mass in its place. South of this, another Mesolithic culture, the Azilian, appeared in the cave area of S.France, one that closely followed the Magdalenian. This Culture was merely an echo of the grand Magdalenian art and the painted pebbles which were its only artistic artifacts, are only roughly painted geometric designs. There are however, a few animals and anthropomorphic representations, all of this indicating what could have been the residue of a skilled (Magdalenian) race, or the privations of climatic change with a consequent effect of forcing the Maglemosians to be continuously pre-occupied with Physiological, Safety and Social Needs without the freedom to undertake the satisfaction of Need 4 pursuits. There is a difference of opinion however, for Clark and Figgott hold that the Maglemosians were "no mere survivors of an outworn tradition"....they were innovators....and pioneers" which could indicate some Need 4 satisfaction (47).

In S.W.Asia, there are several post Pleistocene microlith-using cultures in evidence, the most well known of these being the Natufian, these first appeared as cave dwelling hunters, 10,000 BC in the vicinity of the Levant coast.

The significance of this culture relates to the appearance of flint blades which show the "readily identifiable lustrous polish and wear" (161), resulting from their use as sickles to cut cereal blades although it is unknown whether the crops were sown or wild and hunting was still the main source of food supply. The Natufians have been acknowledged as the first permanently established agrarian community. The Natufians have been identified as the earliest settled occupants of the site of future Jericho. They had established a permanent village and probably a shrine well back into 10,000 BC..

In fact, their descendants who still were not fully Neolithic, showed themselves capable of erecting a remarkable and massive stone-built defensive wall around the settlement at Jericho with towers approx. 30 ft. high - this site was contemporary with Star Carr. This contrast of human achievement is enormous and Derek Roe contends that probably this is an indicator of the influence of the environment on culture (161), although this seems an oversimplification of the anthropogeographical argument (vide Chapter 3).

The climatic changes which occurred during the Pleistocene had a continuous impact on the way of life of Paleolithic races, the Advanced Paleolithic races were, however, distinguished by their responsiveness to change and their consequent adaptive abilities. An anthropogeographer would consider it significant that within the areas where "ecological changes were most clearly marked....the next great breakthrough in human awareness and technical prowess occurred", (47).

This continuous adaptation of man to his environment (and adaptive response by "feedback") resulted in an evolutionary improvement of the brain (vide Chapter I). C. Darlington in his "The Evolution of Man & Society" describes this evolutionary cyclical effect of natural selection when he says: "It is not difficult to see that improvement of the brain in man has a self-exaggerating effect with positive feedbackevery improvement in the brain by its nature leads to new ideas and new inventions".

The "cyclical" and "self-exaggerating" effects of natural selection on variation in the human brain lead to orthogenesis in paleolithic times and contrasted with the neolithic effect where invention often led to disruptive selection.

"MAN-ENVIRONMENT NEXUS" SUMMARISED ANALYSIS DIAGRAM NUMBER B

(see appendix A for details)

CULTURAL EPOCH: **MESOLITHIC**
TIME PERIOD: **Early HOLOCENE**

METHODS USED TO MODIFY THE ENVIRONMENT AS OVERT EVIDENCE OF NEEDS SATISFACTION

Individual:

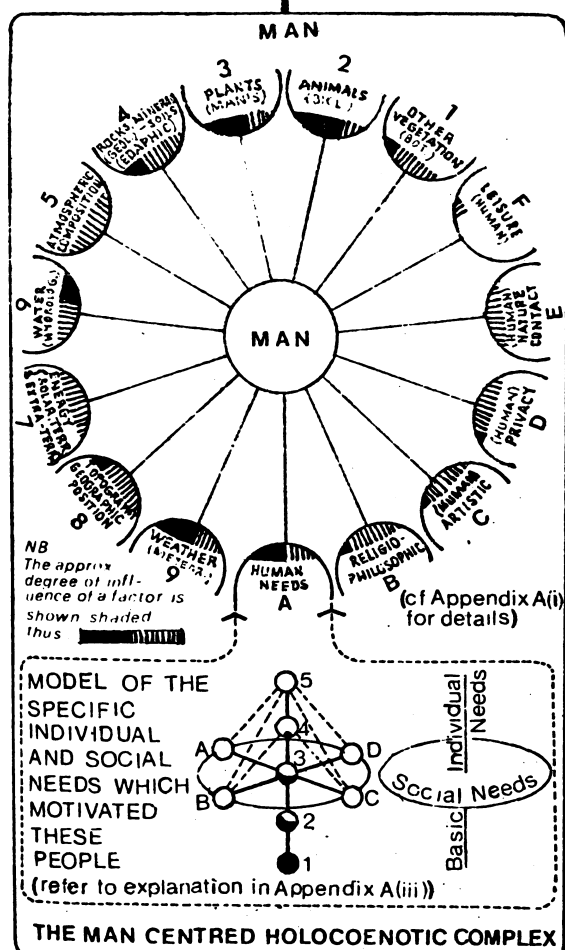
- Increasing use of shelters in the open, deeper penetration into caves - man-made fire.
- Occasional burning of naturally occurring vegetation.
- Fishing, gathering, domesticated dog.
- Longer periods of use of dwelling sites.

Social:

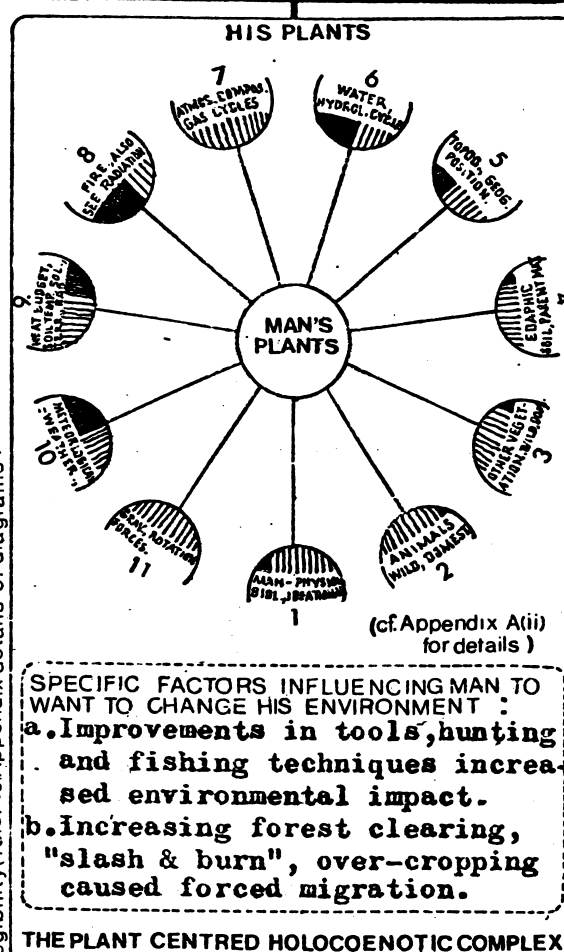
- Increased individual social needs satisfactions produced larger settlements.
- From (a.) specific purpose "factories" developed for tools, hunting and fishing equipment.
- Migratory seasonal inter-cultural exchange improved social needs

DESCRIPTION OF THE MACRO ENVIRONMENT GENERALLY:
Gradually modifying climatic effects of late Wurm Glacial produced corresponding changes in usable trees and plants.

FACTORS HAVING A BEARING ON MAN AND HIS PLANTS AND INFLUENCING HIM TO ALTER HIS MACRO-ENVIRONMENT (AS THEY PRINCIPALLY AFFECT HIM AND HIS PLANTS):



note: these are simplified diagrams adapted from 108 p.9 and the complex and holocoenotic interactions between the environmental factors are omitted for legibility (refer to Appendix details of diagrams)



(All factors continuously interact, only those which are dominant have been included in the diagrams.)

Table 6.

THE TRANSITION FROM PALEOLITHIC TO NEOLITHICVarious Theories on the Physiological Needs which Motivated this Transition after Changes in the Environment Occurred:

Near East: Banks, among others, believes that the culture changes of this period were a reflection of the climatic ones. He notes a change in cave use patterns, as in the Shanidar cave, Iraq; commenting upon the Zargian culture (approx. 10,000 B.C.-8650 B.C.) as resembling the extended Gravettian in Europe "except that people lived in caves, not in tents and subterranean houses". He then notes, that after the Zargian "came a culture like the Natufian with a shift out onto the cave terrace," (195).

In the Near East, the climate changed, from one which supported grasslands to a semi arid climate, with about 10"-20" of rain per year. However, there had been dry periods before, the reason for a "revolution" seemed to be related more to a "cultural readiness" - Banks objects to the "circular reasoning" here, "the people accepted the new way because they were culturally ready, and the reason we know they were culturally ready is that they accepted it." (ibid).

Briefly, there are at least three other theories as to how the food-producing revolution occurred.

- 1) Challenge and response - a theory old in Western thought subscribed to by Arnold Toynbee, among others. It proposes that men gathered in groups to work together, to cultivate the river valleys when the highland began to dry up. The main objection to this, is that groups of approx. 60 maximum would be much too small to achieve the riverine cultivation that occurred - this is augmented by the empirical argument that "agriculture in the river valleys is younger than in some other places".
- 2) The "hilly flanks" theory. This is Braidwood's favourite theory, and states that the rainfall pattern changed and the places for habitation of men and animals dried up. They retreated to mountainsides where rain was more plentiful, and by the time they reached approx. 2,500 ft. ASL, men had domesticated plants and animals, (ibid).

- 3) The "propinquity, or oasis theory" - Mortimer Wheeler and Kathleen Kenyon associate their names with this theory, which states that as watering places dried up, men and animals converged on waterholes as they do in dry spells in Africa at present, when animals enter the villages and walk through the streets. So man began to care for the animals which consequently stayed and became available for slaughter - a symbiosis based upon availability of water, (195).

The results of such a revolution of living patterns, were that a sedentary way of life developed, based upon co-operation and planning ahead. Continuous traditions developed, and specialisation of crafts was possible for the first time - all these factors made it possible for man to develop diverse ways of satisfying the social needs, and the patterns were established for the future satisfaction of the self esteem needs of larger numbers of people.

Following the Neolithic, or food producing revolution, greater efficiency was achieved in agriculture, animal husbandry and social organisation, these developed to the point where the valley bottoms could be cultivated, creating the conditions for the urban revolution and civilisation. At this time, the essential elements of culture were developed, writing, metallurgy, number systems and mathematics, astronomy, religions, social class system, structural elements such as the arch, and the wheel, the plough, etc. It is interesting that Man's concept of good and evil which has changed little to the present day, also arose at this time.

Transitional

Dwellings in the Earliest Neolithic in Mesopotamia, E. Mediterranean & Europe

As evidence stands at present, it appears that the most ancient town was built at Telles, Sultan, Jericho. The site is exceptional, being an oasis 840 ft. below sea-level and fed by a perennial spring, already frequented by Mesolithic food-gatherers soon after 8,000 B.C..

By 7,500 BC, the site had become a proto-Neolithic village, and within 700 years had acquired the character of a town. Two main building stages have been identified during the pre-pottery Neolithic at Jericho. The earliest recognisable houses, dating from about

6,800 BC. were made of mud bricks, lens shaped in section, which have been called "hog-backed bricks". The houses were round in plan, with walls inclined inwards, suggesting that they may have been domed. Alternatively, the roofs may have been made of plastered branches, as there are many traces of timber and wattle in the walls, the floors being of tamped mud, (194).

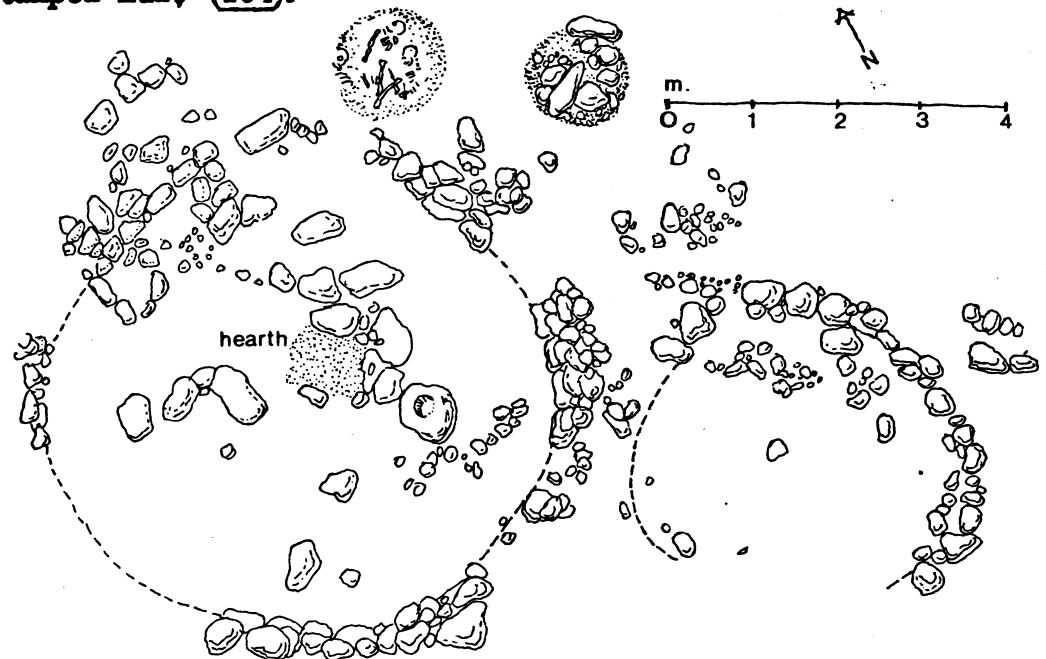


Figure 15 Type of House Plan which Bridged into the Neolithic (21)

The above plan is that used by the Natufian Culture, of 7-8 m. diam. partly sunken into the ground, with walls of polished red-painted plaster. It is probable that the same technique was used in the first occupation of Jericho site, although later in a long series of subsequent phases, early mud-brick oval single-roomed huts became rectangular many-roomed houses (*ibid*).

The houses of the second Jericho pre-pottery phase were rectangular in plan, built of thumb-impressed bricks and with well-surfaced plaster floors and walls, the radiocarbon date for this phase being about 6250 B.C.. Social organisation was obviously well advanced, and security needs well catered for by the provision of a total of five successive town walls. It has been suggested, that the "hog-backed brick people" were defending themselves against the "plaster floor people" who succeeded them, (194).

The wall associated with the former, was backed by at least one solid stone tower of 40 ft. diam. with a 28 ft. wide x 8 ft. deep (193) ditch in front, cut out of the solid limestone bedrock. (c.f. (194) where size given 25ft. x 10 ft. x 20 ft. high, population 3,000). At this stage, the town probably occupied 8-10 acres, and may have had a population approaching 2,000. Jericho had the first known public building, probably a temple (there are no further examples in the Near East until the Bronze Age). The retention and decoration of skulls suggest a religion which together with fortifications, complex architecture and large population, indicate an advanced level of individual and social needs satisfaction at an unusually early date. Kenyon says that domestication began at places like Jericho and that primitive sites like Jarmo "were simply on the fringes of this new advance" and the C 14 dates favour this interpretation rather than Braidwood's which uses Jarmo to base his "hilly flanks" theory. (194).

At Jarmo in the Kurdish Hills, Iraq, (near modern Kirkuk) the site covers about 4 acres and lies 2,600 ft. above sea level. It is a primitive civilisation level compared to Jericho, its C 14 dates, based mainly on snail shells eaten in Near East and N. Africa during most of Mesolithic and Neolithic, are grouped from 5,000-9000 B.C. clustering around 6,500 B.C - the erratic results are still a puzzle, and are intimately involved in the Braidwood-Kenyon controversy. The houses at Jarmo were rectilinear and built on stone foundations made by building up layers of "touf", an Arabic word meaning "puddled mud". These building units were essentially large bricks made in place, the use of stone being commoner later. Floors were plastered and covered with reed mats and there are ovens and basins made of fired clay baked in situ.

These Middle East houses exemplified by Jericho and Jarmo, all have thick dense walls (and possibly roofs in some cases) which would effectively exclude the heat for the major part of the day. There would be an unpleasant build-up during the day which in the afternoon and night would make the internal microclimates very unpleasant, although the contained courtyards at Jarmo probably helped control the

climate, to some extent.

The construction of Neolithic villages varied according to environmental factors. In the open plains of Mesopotamia, first, homes were made of pressed mud, sun-hardened and roofed with loose branches and a thin clay layer to allow air circulation.

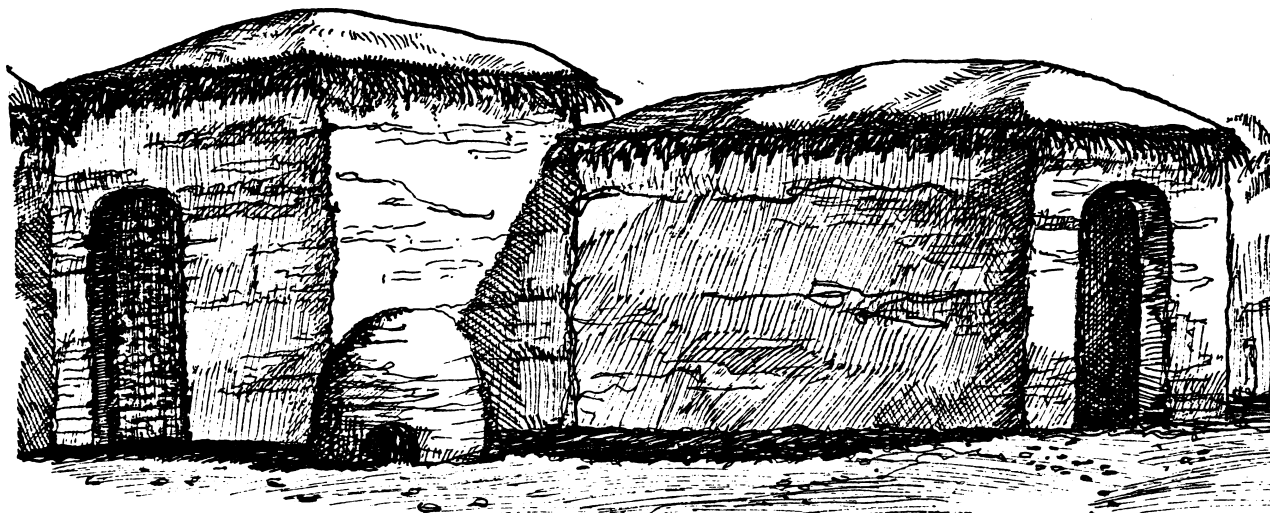


Fig 16 - Mud dwellings c. 4,500 B.C. counteracted by thick, dense wall construction, and a very low density roof insulation, although accumulated and re-radiated heat would have been unpleasant, (224).

The economic advances made possible by the Neolithic village, quickly raised standards of living, populations increased and life spans were lengthened.

Magico-religious patterns also changed from hunting shamans, to wind and rain priests, and temples were constructed. Villagers co-operated together, and with other villages, and this way of life so satisfied the needs that it lasted for centuries, accumulating primitive wealth without suffering or the destruction of war, coming closer to the ideal community than any later examples. As the village became a town, it developed as a market centre for surrounding villages located on a riverbank, inundation dictated levee and flood control, co-operation involved many people and foreplanning; the common welfare of these riverine civilisations forced village co-operation to form the prototypes of nations. Needs 1-4 had the potential for development and full expression, under some circumstances "as

civilisation drew near; the town builders completed its necessary foundations; settled communities where human beings could work in organised security...." (224).

"The Neolithics appear as the first Men who succeeded in breaking away from a passive attitude towards their physical environment, who attempted to render nature subservient to their needs by exploiting the forests, cultivating the plains and capturing animals, in order to make of them valuable auxiliaries. Hence a new upsurge of the spirit of invention. Hence, too new social organisations leading to fixed agglomerations of dwellings, true villages,"(159). In approx. 4,000 B.C. at Eridu in S.Iraq, archeologists have established that a Neolithic was well-established and developed over the ensuing thousands of years to a Sumerian city. It is significant that the buildings in this town of 2,000 people were constructed of brick and attempted a form of climate control by having open ends

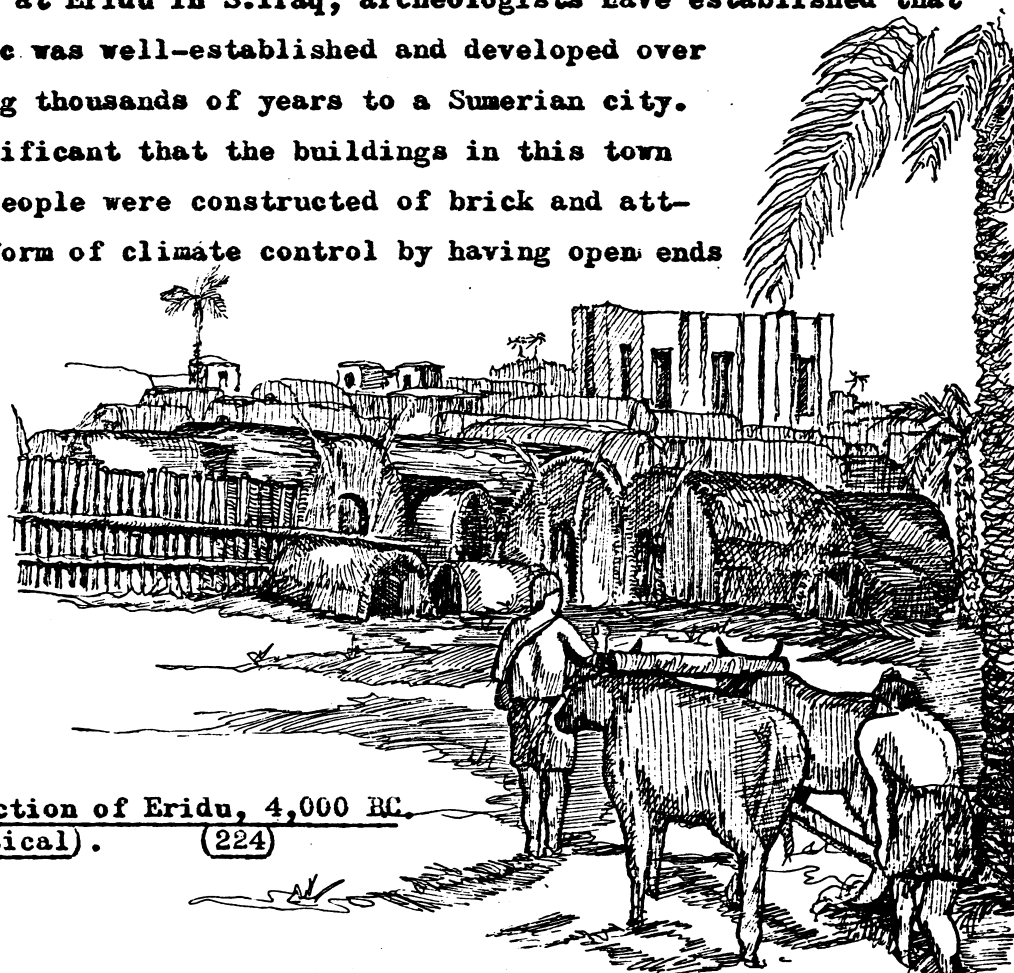


Figure 17

Reconstruction of Eridu, 4,000 BC.
(Hypothetical). (224)

with simple arched roofs of reeds and clay. In such a village as this, Needs 1, 2 & 3 gradually became satisfied, thus permitting emotional and mental evolution to proceed. (c.f. Bronze Age, Sumer)

"For centuries after he invented agriculture, Neolithic man

continued to dwell and prosper in the pleasant highland villages of Mesopotamia. Then, because of population pressures....he began to colonise the plains of the Tigris and Euphrates....In times of drought dikes built to retain the flood, were pierced and ditches were dug to irrigate the crops....such engineering enterprises resulted in villages making alliances," (224).

Not as early as Natufian Jericho, Khirokitia, Cyprus is an interesting little township of several thousand people at the same stage in man's development; C 14 dating is about 5,500 BC., sheep, goats and possibly pigs were domesticated and evidence of sickle blades and querns, points to the existence of agriculture. Forty-eight domed huts have been excavated: the reconstruction below shows part of this town, with the roof of one hut cut away to show the interior.

"On a circular limestone foundation and core, mud-brick walls are raised, topped of with a domed roof and covered with mud plaster. From a wooden-framed doorway plastered steps lead down to a beaten mud floor, in the middle of which a fire burns in a baked clay hearth. Two square limestone pillars support a partial upper floor of wooden beams, brushwood and beaten mud" (40).

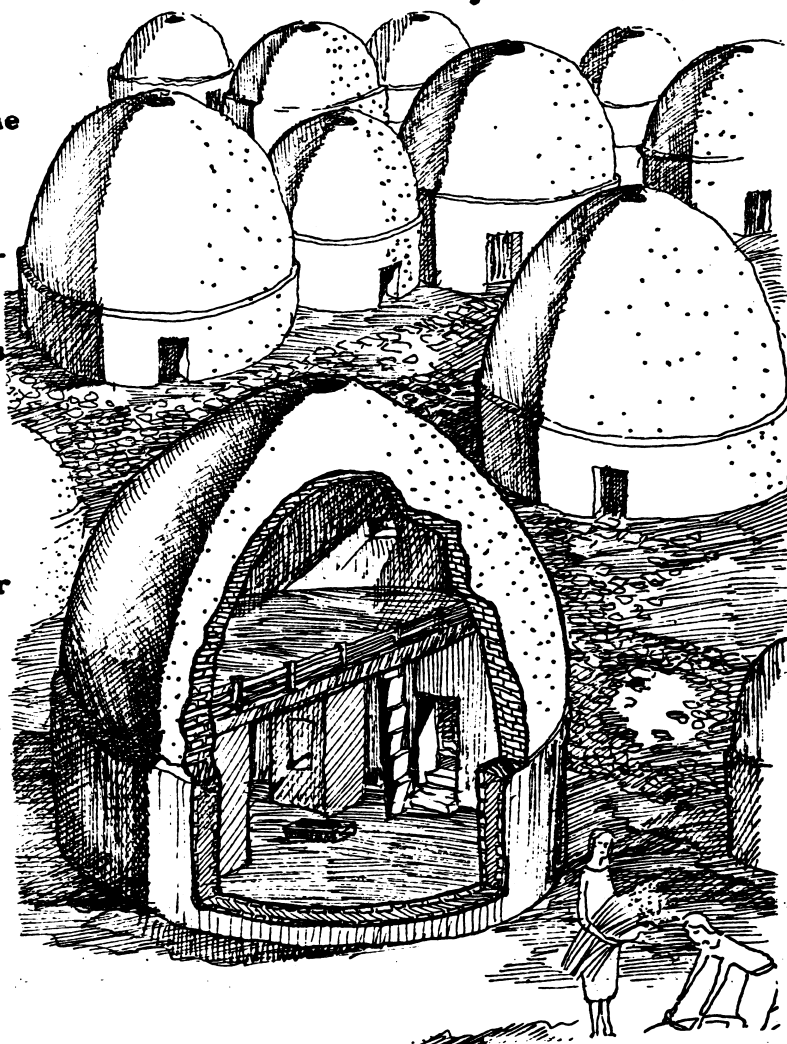


Figure 18

Township Khirokitia
Cyprus, 5,500 BC. -

It is interesting to note the inefficient structural system for "over all this scene one must imagine the blinding Mediterranean light, the heat, the dust - and the flies" (40). Rapaport also comments on the overriding influence of social custom on this type of construction, which was not the product of climatic determinism, "under conditions of weak technology and limited environmental control systems" (84).

This is one of many examples of unsuitable building forms because "man may build to control his environment, but it is as much the inner, social, and religious environment that he is controlling-- these choices, and the criticality, will result in varying dominance of one or another of these variables. It is for this reason that one must find the 'flavor' of a cultures' true meaning and beliefs before one can understand its houses" (*ibid*).

However, as in Khirokitia (previous illustration) one can reasonably find evidence of Need satisfactions 1-3 and can suggest Need 4 expressions in the varying dome heights of individual dwellings.

Dwellings in the Neolithic - Europe

"With their hafted stone axes they built huts of branch and bark. Ingenious craftsmen, they perfected the fishhook, fish nets and traps, trident and the feathered arrow to bring down flying game."

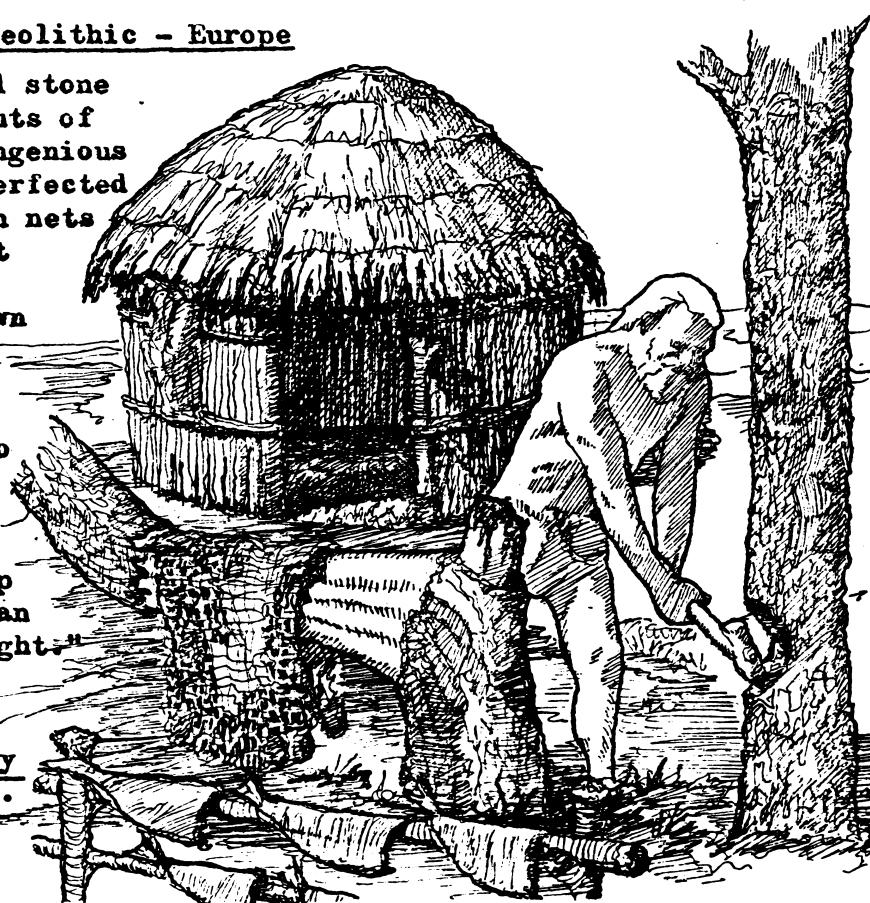
(224)

"With some food to spare, man acquired his first tame dog who justified his keep by protecting human settlements at night."

(*ibid*)

Figure 19

Seacoast Community
N. Europe 7,000 BC.



In Russia and Central Asia, village houses were and still are, constructed of turf and woven grass. The drawing below shows 3 excavated houses from European "tell" settlements.

Construction involved a light framing of poles and wattles as well as baked mud, roofs were gabled or pitched but not flat. "What we are seeing is in part a modification in architectural modes in response to changed climatic conditions.

Effective mud-wall construction and maintenance demands hot summers and dry winters, and just as agriculture itself was extended beyond the original natural habitat of the wild cereals with the consequent

emergence of new hardy forms, so house-building was changed in character to fit the less clement weather....

In all instances the village plan of scattered single houses, barns and byres, contrasting as it still does with the Oriental close-packed settlement unit, seems to go back to the earliest farming cultures of Europe" (21).

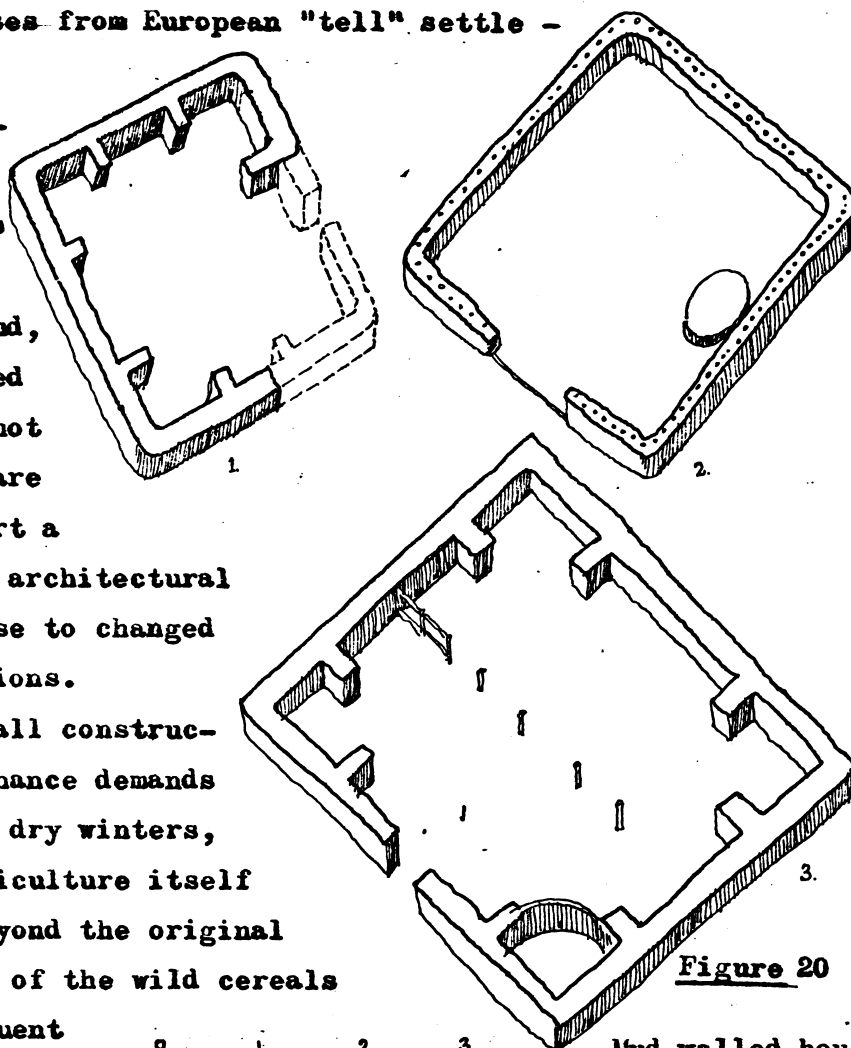


Figure 20

Mud-walled houses,
sixth-fifth millennium BC,
1. Otzaki-Magula, Thessaly,
2. Karanovo I, Bulgaria
3. Tsangli, Thessaly.

There is a sequence in the use of natural materials where commencing with naturally occurring enclosures such as caves, shelters and pits, there evolved techniques to modify these, ie. enclosures to the cave terrace, roofs to the pit and windbreaks to the rock shelters.

From this, the next step was to use these building techniques to construct simple isolated structures such as stone windbreaks and timber shelters, using mud, thatch or reeds. With improved technology, this proceeded to the next phase, that of the more expertly tooled timber, mud-brick construction and reeds with mud plaster finishes.

The techniques of the latter methods were expressed in forms of construction used in the next phase, wherein reed forms were carved from timber and stone to form columns, and also moulded into mud-bricks. Timber forms were given expression in the newer stone and brick construction methods.

Through all phases of this growth in technology, there is apparently a secondary form of environmental (and geographic and climatic) determinism, whereby the materials used tend to answer the problems posed by the environment. However, overlaying this, there is a social determinism which is directly connected with the private and social needs of the culture. Consequently, although the wood and mud plaster construction required dry cold winters to repair and restrict rain damage, the dwellings would have overheated in summer and were not provided with adequate openings for release of built-up heat. Again, socio-religious customs probably required orientation to the sun rather than away from it, so social customs were the main instigator of shelter forms, as they have been to the present, logic and reason being secondary influences on design.

When one considers recent societies at similar technological levels, it seems a reasonable analogy to infer that the tasks of women would have included spinning, weaving, cultivation (without the plough), pottery-making (without the wheel), while men would have done the herding, mining, axe-making, tree-felling and building.

Artistic expression never reached the heights of the Paleolithic

cave paintings and Neolithic people were not literate. So it seems that the Paleolithic either gave more leisure for artistic pursuits, or the artistry was an essential part of their hunting subsistence requirements, as in propitiation and animal fertility magico-religious requirements.

It seems that the Neolithic concentrated all energies on the physiological, security and social needs because out of these were building the social needs of future urban civilisations. Their religion appears to have been founded on worship of the Earth-Mother goddess and it is in this direction that most Need 4 expression occurred in the form of Megalithic stone tombs (as well as decorated pottery).

Except in naturally irrigated areas, Neolithic farmers using simple "slash and burn" methods of cultivation, frequently needed to move to new land as the soil became exhausted. This was a natural pressure on Neolithic populations to spread slowly from their nuclear areas in the Middle East to the Mediterranean and then up the Danube valley and over the Lowlands of Germany as far as the Middle Elbe before 3000 BC..

The building of sound social groups and the satisfaction of the social needs allowed some leisure, freedom and specialisation. Activities of these people included systematic mining of flint and obsidian, manufacture and trading of polished axe-heads and their use in clearing forests for agriculture and new crafts were developed including basketry, making stone vessels and pottery, spinning and weaving. Mobility was much easier due to the use of containers for carrying goods but the stability of the group made for the development of strong social bonds and preparation of a nucleus for civilisation and its consequent potentials for social needs satisfaction.

The earliest Neolithic of the Middle East was contemporary with Mesolithic Europe; the later Neolithic of north-west Europe existed at the same time as the Bronze Age urban civilisations of the Middle East.

The Neolithic Stage lasted from about 7,500 BC. to 3000 BC. in the Middle East, and from 2500 BC. to 1800 BC. in Britain.

Microclimate Methods Adopted by Man during the Neolithic:
(a) Caves, (b) Clothing, (c) Dwellings .

(a) Caves as dwellings during the Neolithic:

Caves must have been particularly welcome once the last glaciation had begun especially in the winter months, as they were very well adapted for temporary shelters away from the permanent settlements, as such, they would be used for seasonal activities such as fishing and sealing which would be carried on at intervals during the farmers' year.

Examples of this type of use, suggest themselves from Neolithic times include Skipshelleren near Bergen, Huskenesset, and Stora Forvar on Stora Korlso off Gotland. They continued to be used freely by the food gathering groups of Post-Glacial times and beyond the northern limit of Upper Paleolithic settlements.

The Mesolithic and Epi-Mesolithic used caves and rock shelters at least seasonally as among the Obanians of Western Scotland and the hunter/fishers of Viste near Stavanger, (180).

Caves also served for permanent occupation as with the Iberian cave dwellers, the people concerned although formerly Neolithic, seemed mainly to have existed on hunting. The caves of the Bukk mountains of Northern Hungary, sheltered Neolithic communities whose material culture and mode of subsistence compared quite favourably with those of other Danubian groups of the same period, and the Eukian people occupied open settlements as well as caves; there is no suggestion of any difference in the economic level represented at the two classes of site. These cave dwellers not only kept the usual domestic livestock but also harvested three kinds of wheat, together with millet, beans, lentils and peas. So it is obvious that the cave was considered an adequate and reasonable form of shelter quite well adapted to climate control necessary in the different type of climates represented by the above examples.

It was during the period of settled farming that caves were important as refuges during periods when stress was present as a result of ethnic movements. (There is a late Bronze Age hoard of wealth in the Heathery Burn Cave at Durham which probably represented all the

possessions of refugees fleeing from the La Tene invaders and another example can be found in the extensive evidence of occupation that occurs in the Mendip caves by Celtic people of the Glastonbury culture and this probably reflects the Belgic influence of the South West towards the close of the pre-historic period.)

J.G.D.Clark suggests (180) that the troglodyte population in Britain seems to have reached its peak during the Romano-British period. It is not unlikely that even in Upper Paleolithic times, some kind of screen probably of skins was set up before rock shelters or cave mouths. This had its modern counterpart in France and Spain and the Alpine area in particular where cave dwellings have survived to modern times and are still in use in some cases for stables but in other cases for dwellings. Generally, the fronts of such inhabited caves were built up with dry stone or other walling in which doors and windows have been set and the beginning of this is seen in the Paleolithic.

(b) Body Microclimate Control Using Clothing in the Neolithic

"Plant cultivation led to the discovery of spinning and weaving, at first almost exclusively from vegetable fibres, particularly flax. Although spinning is a simple process, weaving requires a loom; this was one of the great inventions made in the Neolithic stage", (184).

This invention made it possible for man to optimise the use of herded animals by making their hair and wool into cloth, thereby facilitating the making of clothes to control the body's microclimate, without resorting to the rapidly diminishing practice of hunting for skins. So, the less actively mobile life of the Neolithic was able to be integrated with the sedentary activities and methods of maintaining body heat, and required less exertion to provide than previously.

This began the long train of events which has culminated in this present age, with the possibility of man living a totally sedentary life within a body with organs best adapted to hunting efficiencies, an ambivalence responsible for many of contemporary man's health problems.

(c) Dwellings, as Methods of Climate Control in the Neolithic
 (for Early Neolithic in SW.Asia & Middle East, pp112 & 156) Europe:

Although topography exerted a considerable influence on the choice of a particular site for habitation through its surface relief, subsoil and water supply, climate also is significant in the amount and character of sunshine and precipitation that it imposed. The direction and intensity of prevailing winds may dictate the design of the roof, positions of openings and the construction of the walls but the predominant factor was the availability of raw materials.

For ordinary dwellings, the materials used were normally those at hand and these imposed their own structural limitations; of course this did not apply to magical or religious structures which had a rationale of their own. It is important that one takes into account the factors of cultural and socially determined choice, for although geographical factors influenced the location of houses or settlements, the choice determined ultimately by the economic and social needs of the community, and by cultural traditions which may have arisen in quite different geographical situations. For example, although a heavy rainfall required a pitched roof, it could have been needed for other reasons including cultural ones; cultural factors became very important in correlation with the raw materials.

Mud may have been used, unprocessed, either alone or as a plaster coat to walls made from organic materials. If the climate allowed, it could have been dried in the sun and, only if the economy was more advanced than that which prevailed in pre-historic Europe, would it have been made into kiln-dried bricks or tiles. Stone could have been employed and dressed or shaped into a great variety with or without mortar and its influence on the form and character of structures would vary accordingly.

With organic materials, there was an even wider range from which a selection might have been made and an even greater diversity in use. Where cereals were grown, the use of a cereal straw made it possible to reinforce the mud; the use of this material became dependent upon the attainment of a certain level of economy.

Again the extent of animal materials used, ie.bones for roofs and

frames, guts for windows, dung for plaster and skins for coverings, depended in part upon the ecology of the district, and on the degree to which hunting and stock raising was conducted. It seems to be a general rule, referred to by Clark (180), that in a single geographic zone, it is possible to trace progressive changes in the raw materials used for building, i.e. that it appears that inorganic materials were substituted for organic ones, the process beginning with the foundations and working up to the roof.

"In temperate Europe and more particularly on its Atlantic fringes, ecological changes, brought about by forest clearance and by the effects of climatic deterioration during the sub-Atlantic period favoured the replacement of timber by earth and stone", (180).

Although the geographical and economic factors were very important, in the social motivations and in the dictation of the type and siting of structures, the shelter that a house provided was its primary purpose. Consequently, the plan and the structure of the family are closely interrelated and this also extrapolates into the way in which houses are grouped in settlements or alternatively occupied as isolated units. This becomes part of the larger organisation of social communities. Going further than this, it is possible to say that the character of the early settlements and their sites was more or less strongly influenced by the interrelationship between different communities, with the over-riding questions of security predominating.

This included actual methods of warfare in use among neighbouring peoples and it is also necessary to remember that competition between communities engendered needs for defence, (the competition was usually socio-economic in its basis.)

Here, it is interesting to contrast the relatively peaceful conditions which prevailed during the opening stages of the Neolithic colonisation of temperate Europe, when almost limitless, often unoccupied tracts of loess and other easily worked soils opened before the pioneer peasants, with the period of stress which marked the beginning of the breakdown of the initial phases of extensive farming.

Generally, it seems that the competition between groups became more intense with the increase in the density of population, with every advance in social cohesion, material well-being and means of waging war.

It is hardly surprising that as a general rule, considerations of defence came to play a progressively greater part in determining the location and planning of settlements. Consequently, the predominating security needs seem to be the main motivating forces of this period. Information about houses and settlements of prehistoric Europe is scanty and unevenly distributed, mainly because it is a comparatively recent event that any importance is attached to information about them or the economic and social conditions of the remote past.

Although caves and lake villages have been investigated extensively over a long period, it is only in the last thirty years or so that really purposeful efforts have been made to locate and investigate houses and settlements. For instance, in Britain, it is only in the Highland zone where the old rocks provide plentiful building material of a kind that is able to survive, that any considerable body of information about prehistoric houses exists.

In Lowland Britain and over much of the temperate zone of Europe, houses were built largely of timber and other destructible materials. They are not only harder to find but much more difficult to excavate and the amount of information that is retrieved largely depends on the standard of the archeological technique that prevails in a particular region. It is only rarely that a whole settlement has been excavated although much more is known of single houses; however, it is from the work done on settlements that most valuable information is obtained about the size and social organization of prehistoric communities.

The only other source of this information is what can be learnt from burial mounds. Another difficulty exists because of the problems to be overcome in attempting to reconstruct the building from residual elements of their ground plans, the roof is often restored in several different versions from the same arrangement of postholes and it should also be remembered that quite a complicated system of construction

can be derived without sinking a post in the subsoil. As far as the walls are concerned, there is the problem associated with determining the type of construction and the original height since the materials were often earth, turf and wattle which soon disintegrate; obviously with the present state of knowledge it is misleading to attempt to systematise what is really only fragmentary evidence, randomly located.

Houses of oblong, or more or less rectangular plan have predominated since the first beginning of farming in the Mediterranean or temperate zone of Europe. The round house or hut, although it does appear occasionally, seems to have played a subsidiary role in this area and there is some evidence of round buildings (other than tombs) such as in early Crete "where hut urns" from Knossos, Phaistos, dated from the end of the Minoan period, being small circular structures with low conical roofs which were probably thatched (180). These have been interpreted as dwellings but it is more likely that from the door fastenings located on the outside, that they were really used for storage.

On the Greek mainland, the great majority of prehistoric houses were oblong with a few exceptions. These exceptions have been found at Thessaly near the main settlement of Sesklo where they were found in association with pottery from the earliest Neolithic period and also a number ranging in diameter from 2.1 to 6 m. occurring from the earliest occupation of Orchomenos. Further west in Europe, the Neolithic peasants of the Foggia plain in Apulia excavated circular ditches inside large enclosures but no evidence has yet been found of their actual houses. Although Neolithic roundhouses have been claimed, they are not properly documented in Iberia. On the other hand, numerous round huts with thick walls faced with stones are known from Languedoc. Round huts have also been located at Ville Vieille, Gard. These have internal diameters of only 2½-3m. and are associated with irregularly quadrilateral ones. They do not really belong in the true Neolithic style and seem to be more associated with copper objects, including dagger blades and round based "Neolithic" pottery suggesting a date of 2nd millennium BC..

On the Greek mainland, houses were normally made from sun-dried bricks of mud mixed with grass or straw and built upon a foundation course of flat stone slabs, or more commonly of small stones set in mud plaster. Wattle and daub was often applied to wooden frames and the commonest plan to which the earliest Neolithic people built their houses seems to have been a simple oblong, with an entrance placed off-centre on one of the long walls. Unlike Crete, Greek houses appear to have been provided with rigid roofs and from the beginning of the Neolithic settlement, the Thessalian peasants were sufficiently settled to have occupied their villages permanently.

"At Tsangli, some of the houses were nearly square in plan and were provided with internal buttresses in opposite pairs, evidently designed to carry crossbeams."

(180)

(1) = Cross beams

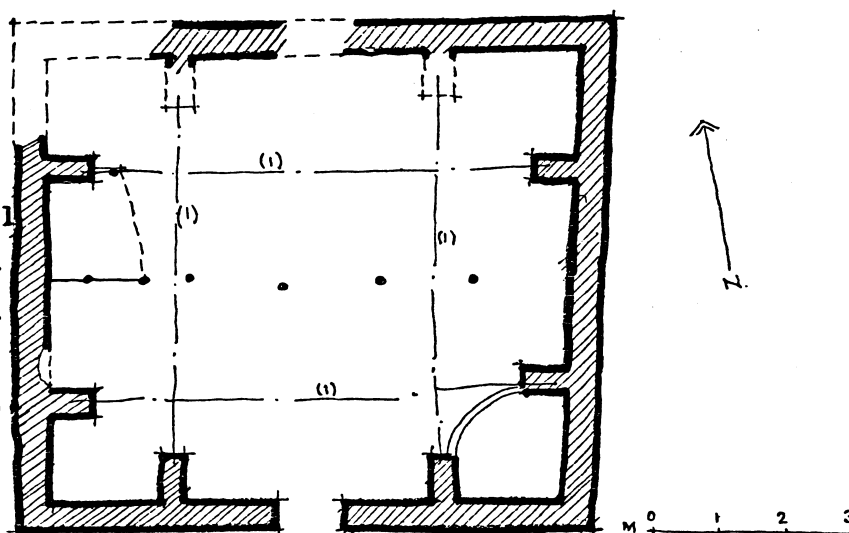


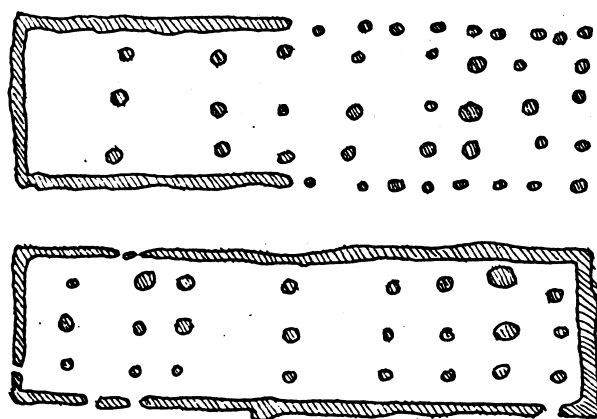
Figure 21 Neolithic (Thessalian A) House, Tsangli, Greece:

Although there was a wide range of forms and modes of construction of houses among different communities at different periods of time, in the temperate zone of Europe, there was one element constant in all cases, ie. the use of a sloping roof to carry off the rainwater. Over most of this area, timber was the main structural material as well as being the only source of building material.

In territories beyond the forest, such as the Orkney islands, earth, stone and turf together with whalebone were the principal building materials already in use into the Neolithic period; these became more important as, on an increasingly larger scale, disafforestation took place under the influence of clearance and grazing and later climatic

deterioration. Although the earliest peasant communities in different parts of temperate Europe occupied nuclear settlements, their villages were often quite large and it was only in the S.E. of the middle Danube, that their sites were occupied for sufficiently long periods of time to allow settlement mounds to arise. An example of this is located on the south bank of the Danube, Vinca which accumulated to a height of 9 m., half of this height being attained during Neolithic times, (180).

Clark notes, that it was long thought that the earliest Danubian peasants, who introduced farming to the Loess lands of middle Europe, lived in some form of pit dwelling. The excavators of Koln-Linderthal (vide Section 3, Appendix B.36 & B.37) a large settlement on the western outskirts of Cologne, thought that the irregular hollows filled with rubbish, often surrounded by traces of some form of light fencing served as dwellings. Peculiarly, the great buildings associated with these were from 10 m. to as much as 35 m. long and from 5-7 m. wide and were thought to be signs of some other unknown function; critical examination of the plans of this settlement (particularly the one at Arnsbach near Borken, Cassel) has shown fairly conclusively that these long buildings were, in fact houses, and that the nearby hollows were, in origin no more than quarries from which the material was obtained for plastering the walls. The floor, was presumably of wood, apparently raised up on three rows of stilts or piers and this resulted in a lack of "domestic" features. in the long buildings which created this uncertainty amongst archeologists. Once heated, these were reasonably efficient microclimate control devices



▬ = Wall Trench

● = Post Hole

Figure 22.

Long Buildings from Koln-Linderthal (Danubian II).

(180)

The fencing that was constructed around the pits from which the raw material was removed was apparently intended to prevent people from falling in, or to contain pigs to feed from the garbage. It would have seemed peculiar for men capable of building such reasonable buildings of this scale to have housed their families in such obviously low standard quarters. In conclusion, the few "pit" dwelling which can be established were of minor status, such as the conical huts from Frauenberg near Marburg, comprising a central hollow within a setting of eight posts sunk obliquely into the subsoil. The long buildings previously referred to, were in some cases formed entirely of timbers set into slots cut into the subsoil.

Often, these were restricted to one end only and the rest of the building was defined by a single or double row of posts. The construction of the long buildings seems to be divided into two halves, which when taken into account with their great size, suggest that there may have been two functions involved besides sheltering the family, there was probably some other function, the nature of which is difficult to determine.

As far as is known, the Danubians used no bulky equipment such as ploughs or waggons and the only obvious alternative is that parts of the long building were used for storing produce. Although, it is known that at Koln-Linderthal, the peasants had small, separate storehouses mounted on piles, possibly for keeping seed grain.

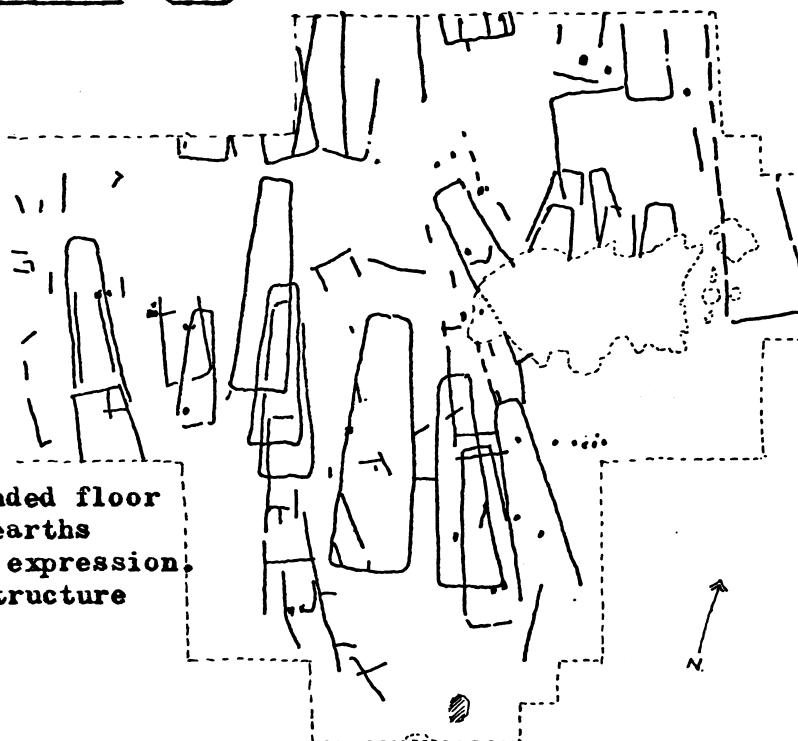
There is a variation of the basic Danubian form which is the trapezoidal shaped plan of house, with one end substantially broader than the other. An example which has been explored at Beiringsen-Ruploh, nr. Soest, Westphalia, has been attributed to the Rössen people of Danubian II age, it is $7\frac{1}{2}$ m. broad at one end against only 5 m. at the other with three rows of post holes located between the wall slots. Similar houses in which no internal post holes have yet been found, occur in Poland, associated with the late Danubian II groups, notably at the great settlement of Brzesc Kujawski and Dobre, nr. Kieszawa.

Figure 23

Superimposed plans of trapeze-shaped Neolithic Houses,
Brzesc Kujawski, Poland. (180)

(vide
 Appendix B.34)

Evidence of extended floor
 area and extra hearths
 indicate Needs 2 expression.
 Walls and roof structure
 unknown.



At the first site, the house varied from 15 to 39 m. long and wall slots were 2 m. deep. Evidence as to the extensive occupation of the settlement is obtained from the fact that there are three intervals of occupation indicating a well consolidated system of social needs satisfaction, as a consequence of the extensive system of agriculture that was carried on here.

The earliest peasants who occupied the Black Earth of Roumania and the Ukraine, lived in houses which were 20 m. long. A complete village plan has been exposed which contained between 26 and 31 houses set radially in a great circle with two entrances of more houses in the middle, in extensive excavations at Kolomyszczina near the village of Khalepje, Obaukhov, Kiev province.

Some of these houses appear to have been no larger than 30 sq. m. in area, but there were several from 90-140 sq. m. However, little is known of the details of their construction but it has been noted from a study of the floors which were commonly made of layers of baked

clay slabs and clods of coarse clay bearing impressions of timbers, that some of the houses had been enlarged and the number of hearths increased as though the original family had expanded through children setting up house with the parents.

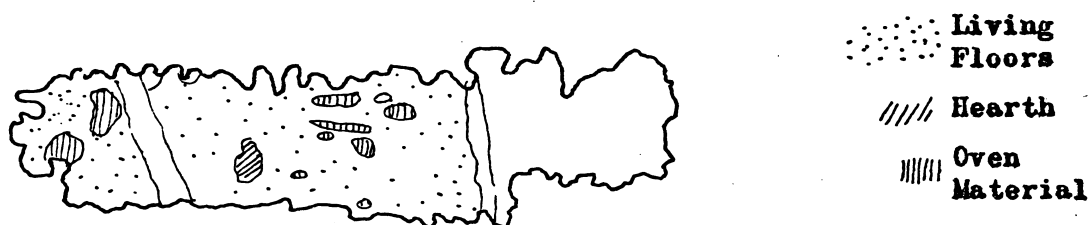


Figure 24: Plan of long house of the Tripolje People, Kolomyszina, Khalepje, Province Kiev. (180)

At Kolomyszina, it has been observed that post holes or charred stumps occurred round the margins of the clay floor (at house 24) and again at Bely Kamen, this occurred but no conclusions have been reached about the character of the walls or roofing. It can be seen from the well-known clay model from Popudnia in the Ukraine that the interior of the Tripolje house was furnished with a low bench on which store-jars were set. A saddle quern was located near the door and a great domed oven was built in as shown in the clay model (over). These ovens were a very common feature in Tripolje house plans. Their use was accompanied by the domed kiln used for firing storage-jars and other pots, of which models were found at Erosd, where a painted pottery culture existed in the Alt valley in the Carpathian mountains.

The Erosd people used rectangular and probably, or almost certainly, gabled houses grouped in village communities. The settlement was sited on a loess spur, cut off by a defensive ditch. Within the area excavated, a row of 7 houses was found and there was room for another 14 in the unexplored portion. The houses, being built of wattle and clay daub were supported on a frame of wooden posts each consisting of an inner room and an outer porch (q.v. megaron plans) roofed over but probably open at one side as well as in the front.

In the illustration below, note the piers on which this house seems to have been elevated "rather perversely interpreted by Butler as a pile dwelling", whereas Clark seems to be of the opinion that they were "the feet on which the model house rests", (180) .

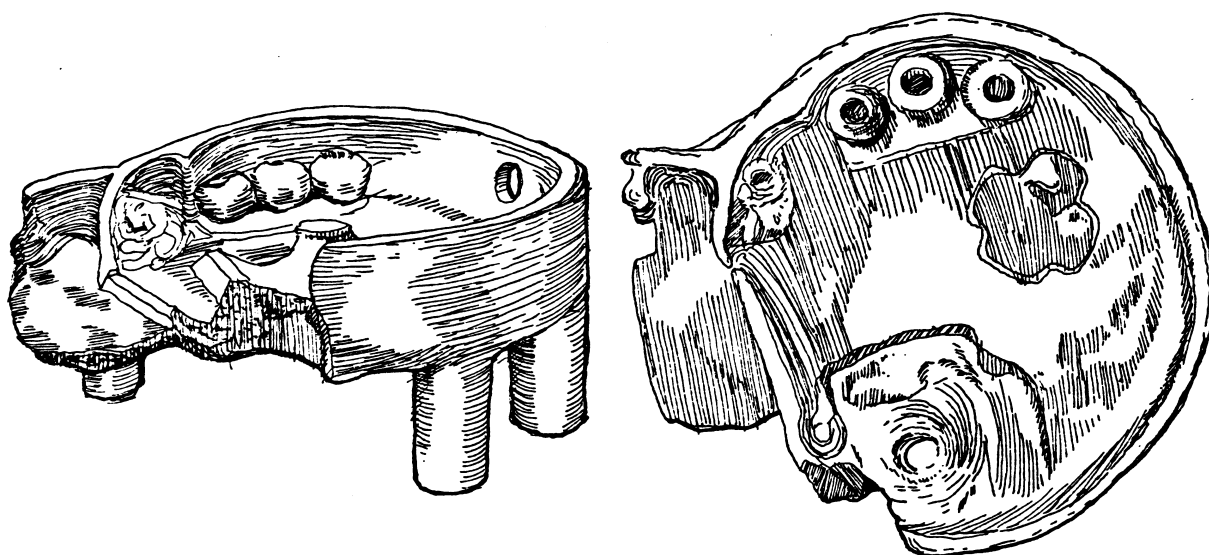
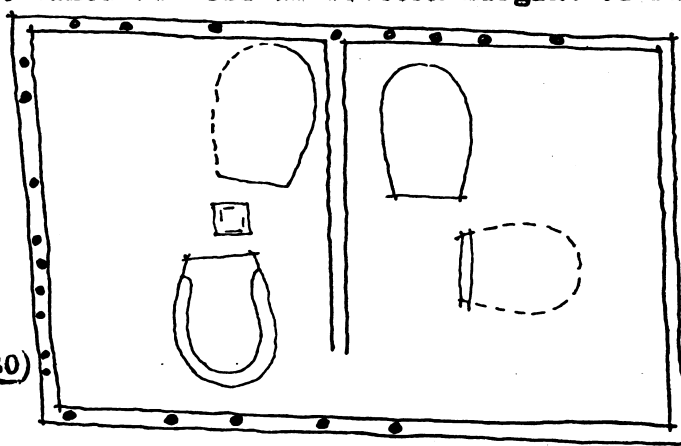


Figure 25: Model from Popudnia showing internal features of a House of the Tripolje Culture. (180)

Houses of a similar character but much smaller than those at Erosd, were built in the Danubian I form and found in the Upper Neolithic level at Vinca as well as western margins of Danubian II territory.

(See Figure 27 for detail of oven).

Figure 26:
Late Neolithic
House at Vinca,
near Belgrade (180)



M. 0 1 2 3 4 5

The clay ovens that were a marked feature of the internal arrangements of these houses would have served as excellent heating when one compares the size of oven with the small size of the spaces to be heated.

Consequently, these small huts, with large ovens would have been quite efficient microclimate systems for the cold climate locations (provided the side walls were not open as may be indicated by the absence of some post holes).

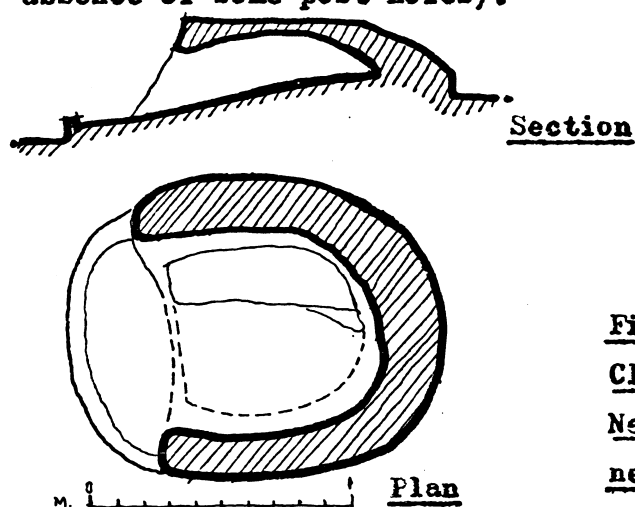


Figure 27.
Clay Oven from Late
Neolithic Level, Vinca
near Belgrade. (180)

It is interesting to note that a rectangular plan need not necessarily imply an elaborate type of house, because the clay hut models from Kodza Dermen, a neolithic mound culture site in Bulgaria, indicate tent-like forms in which the ridged roof was carried down to the ground as well as the gabled one with the side walls.

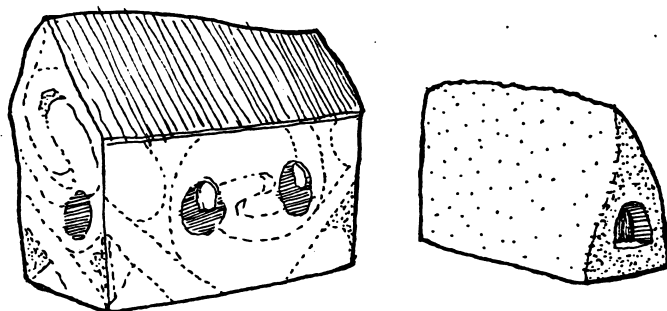


Figure 28:
Clay models of late
Neolithic Houses, Kodza
Dermen, Bulgaria. (180)

Some archeologists consider that the Danubian II settlements at Kopanca, Hungary, were actually roofed without side walls, but the best traces of Danubian II houses are those found round the Federsee, Wurttemberg and correlated with the Aichbühl people (vide Section 3, Appendix B, figs. B.38, 39 & 40). At this site there are 22 rectangular houses and two other buildings arranged in irregular rows along the shore of an outlet to the lake.

Although the houses vary in detail, they conform very carefully to a common plan, (vide Appendix B, Fig.B.40). The plan of the settlement, with its irregular rows along the shore indicates a settled and successfully organised community with a potential for well organised socio-economic needs satisfaction.

Each house was built on a frame of vertical posts arranged to form a rectangle 7-10 m. long, provided with a row of central posts to support the gable roof. There was usually an internal division separating the inner from an outer room. The walls were most often made from split timbers, set vertically with the convex face outside and the floors from planks with a loam covering. The entrance was located in the middle of the narrow end of the house and approached by a planked forecourt which was unsheltered except for the overhang of the roof and by the forward extension of the side walls.

On the right hand side of the door, on entering the front room, there was a hearth and a clay oven which rested on sheets of birch bark and built of daub on a foundation of wattle. Ashes from the hearth were probably placed on the vaulted clay roof of the oven to provide sufficient heat to bake cakes of flatbread, laid upon it and also to provide heat to the room, a successful microclimate system.

On the actual outlet of the Federsee, the Aichbühl settlement of Riedschachen exhibited two phases of occupation, the earliest stage houses were of 9-10 m. in length and 4-5 m. in width, built up on piles either from the edge of the lake or more likely within the area likely to be flooded. Between the two phases of occupation, peat had time to grow over the abandoned pile settlement, so that the later houses were then erected on frames laid directly on the bog. The second phase houses were much smaller, from 7-8 m. long and from 3-4 m. wide, lacking the forecourt entirely, or at most were provided with a few planks at the entrance.

Again, they were bunched closely together with no less than ten in the same area as two of the pile dwellings underlying. Childe and Clark both noted the progressive trend towards a reduction in the size of the houses in the Danubian territories, starting with

the great long houses of Danubian I to the oblong structures of Danubian II and finally, the relatively small one of Danubian III.

The houses of the late Neolithic, Altheim on the Goldberg, were not more than 4-5 m. square. The floors were sunken up to a foot or so below the surface and a hearth and pit were located near the centre and the walls were constructed from thin, fairly closely set saplings which probably converged towards the apex of the roof.

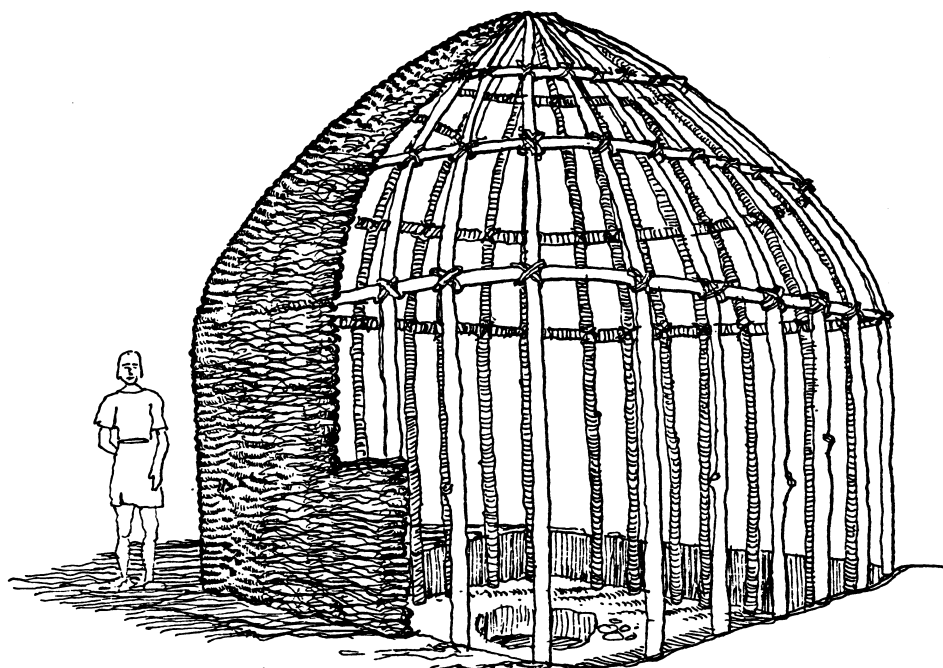


Figure 29. Reconstruction of House of the Altheim, Danubian III Culture, Goldberg, Wurttemberg, (180).

The general principle of using a sunken floor occurred elsewhere in later Neolithic times, examples at Mulheim near Koblenz at Mayen on the Eifel and somewhat similar houses were associated with the contemporary Baden culture at Praha-Bubeneč and Homolka in Central Europe.

Excavation in the Wauwilermoos, near Luzern at Schotz I and at Egolzwil II show that the peasants occupied houses around 8 m. x 4 m. At the Michelsburg settlement of Weiher near Thayngen, the rooms were single and small and the houses were smaller, down to 5.3 m. x 3.2 m.

The wall uprights of the narrow end were morticed into the cross beams defining either end of the floor.

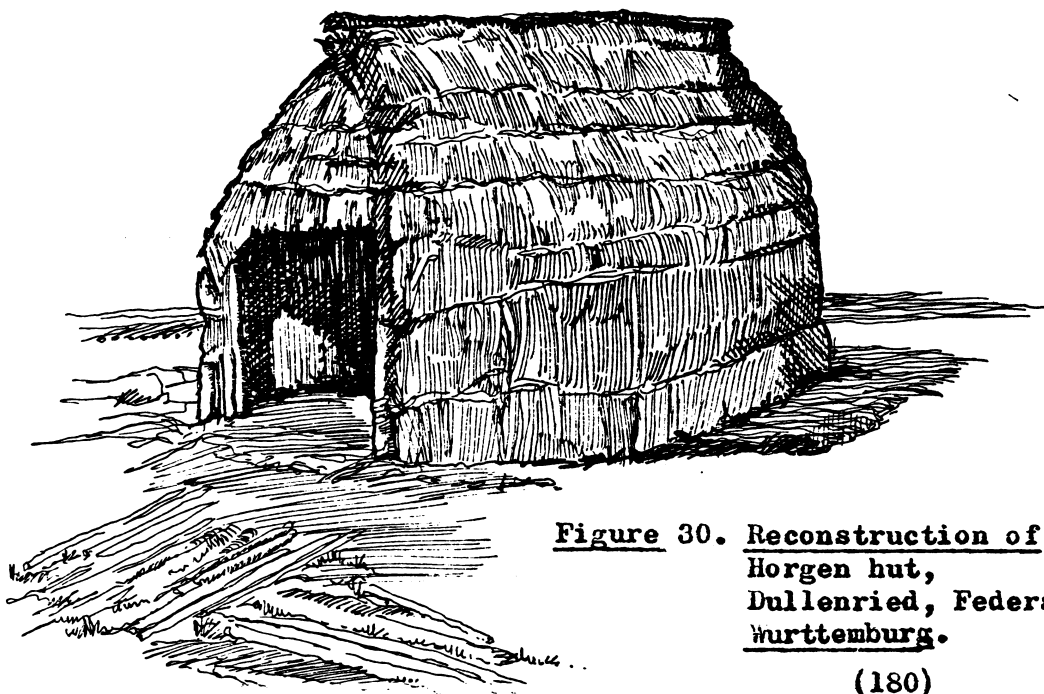


Figure 30. Reconstruction of
Horgen hut,
Dullenried, Federsee,
Wurttemberg.

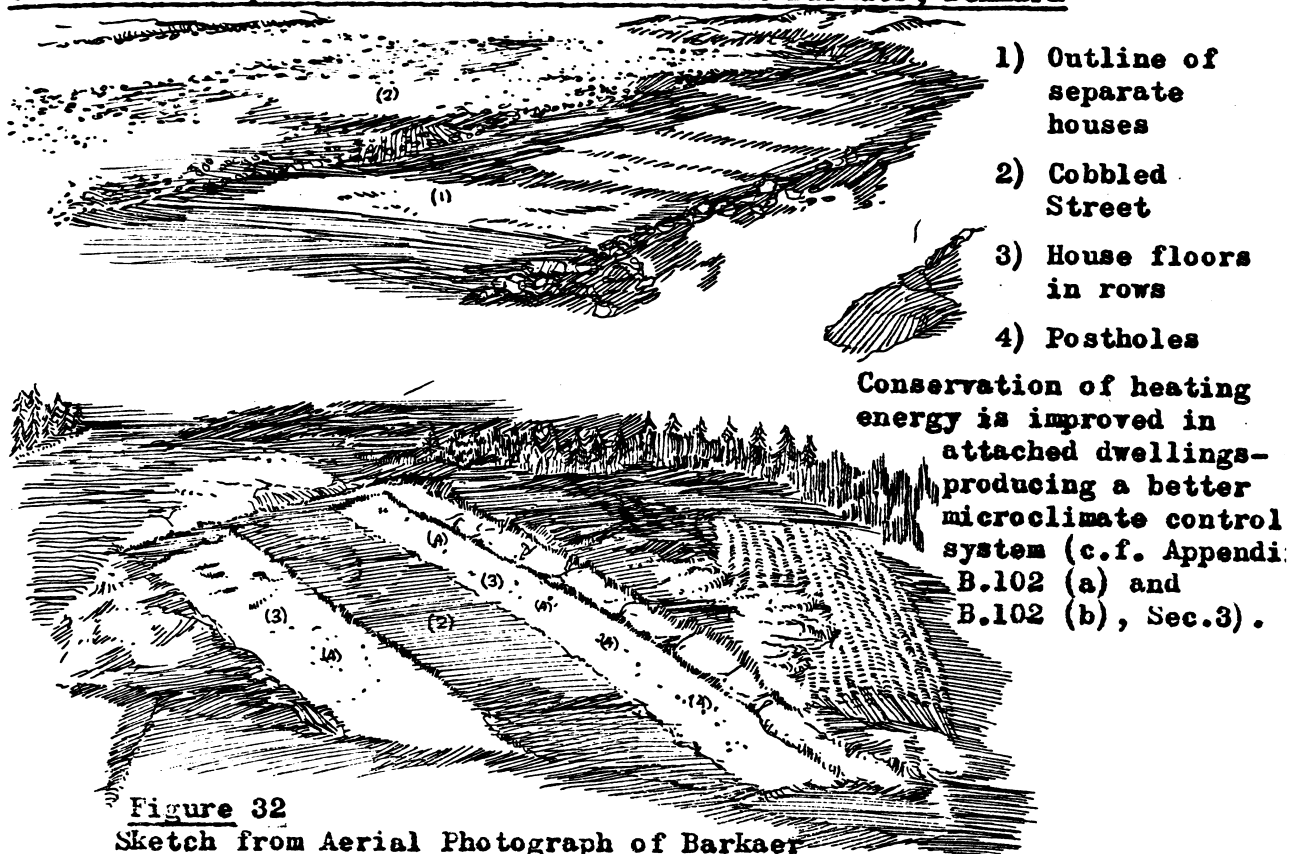
(180)

There was a settlement (Dullenreid) which comprised a cluster of huts of approx. oblong timber flooring, and the superstructures were made from light branches arched over to form roof and walls, then thatched with bundles of reed tied by cords.

These huts were seasonally occupied by hunter/fishers or alternatively, they may have been inhabited by persons lower in the social scale, than those who lived in the timber-framed houses.

It is important to consider the possibility that as constructions changed, there could be a social grading represented rather than a change of culture.

Clark notes that prehistoric houses in Northern France have not had worthwhile scientific research done on them and the same unsatisfactory stage of research exists in the lowland zone of the British Isles, (180).

Figure 31**Outlines of separate houses to settlement at Barkaer, Denmark****Figure 32****Sketch from Aerial Photograph of Barkaer**

In Denmark, there are no traces of the houses of the earliest farmer immigrants recovered as yet. Although, there is a rectangular house plan about 10 m. x 4 m. which has been defined by stone wall footings at Standegaard in SE. Zealand and occupied by Ertebølle hunter/fishers who nevertheless seemed to have lived alongside the immigrant farmers and borrowed elements of culture from them. Of much greater interest, is the settlement of Barkaer in Djursland occupied by peasants of the third and last phase of the early Neolithic period of Denmark.

In Neolithic times, these were situated on a small island and supported themselves by cultivating the soil and maintaining livestock on the neighbouring mainland. The traces of the structures that have survived, were sealed in by sand at an early stage. This sand was probably blown from areas cleared by the prehistoric farmers, because traces of burning and tillage activities have been recovered from the bed of the neighbouring Korup lake.

There were two basic types of buildings separated by a road some 10 m. wide. The southern range of buildings has survived better than the northern but except that the northern one was a metre or so broader, they basically resemble each other quite closely. The southern range was built in two sections, the first a structure some 67.5 m. long and 6.5 m. broad and sub-divided into compartments each about 3 m. wide.

Later, probably when the next generation set up house, another 17.5 m. was added on a slightly different alignment and using a slightly broader plan. If this interpretation given by Clark (180) is correct, the smallness of the extension argues for a comparatively brief occupation of the site. In the original building, there were 22 compartments each of which seems to have served as a family dwelling. In the extension, another six giving a total for both ranges of between 50-60 families. This is an extensive family grouping for the period and seems to be a good indicator of a well-developed social need consciousness.

There is a strong impression at Barkaer of rigid organisation and discipline as could be expected probably from immigrant pioneers where a new form of economy is being established in a territory already occupied by hunter/fishers. A very obvious and significant parallel is given by the rows of houses, each covered by a common gable roof packed within the defences of the early iron age fortress of Biskupin, Northern Poland (Vide Appendix B.102 (a) & (b)).

For the period described as the middle Neolithic in Denmark, settlements have been excavated but there have been none that have yielded adequate house plans. However, there are clear indications at Troldebjerg on Langeland Island of two distinct types of structure. On the lower slope of the morain hillock, there is a range of buildings close to the margin of the bog extending over some 71 m. though bent slightly out of alignment near the middle.

The outer margin is marked by a well-defined wall-slot and the interior by a single line of stone packed post holes reinforced at the northern end by a second, in places by a third parallel row. This is incomplete and the layout reminds one strongly of a Danubian longhouse.

It is significant that the excavators at Troldebjerg should have noted a difference of usage between the two ends of each of the main units indicated by the absence of occupation rubbish. Immediately east, traces were found of at least two and probably more buildings of horseshoe form which resemble in a general way, a group of middle Neolithic structures with low walls of loam and stones excavated early in the century at Klein-Meinsdorf in Schleswig-Holstein.

Britain:

Because the northern part of Britain was covered with ice during the Glacial periods, and was probably too bleak and desolate in the Interglacials, settlers were not attracted until the ice had finally retreated in Neolithic times. France was ahead of Britain, being free of glaciation for the greater part of its area.

The earliest part of the Neolithic in Britain may be traced in the kitchen middens of a "beachcomber" type of culture which possessed dug-out canoes, skin-covered boats, harpoons and rough and ineffective flint implements. Probably, the crudeness of tools forced man to the seacoasts as the weather improved after the Ice Ages. The trees grew and man could not yet make sufficient clearings to start agriculture. There is evidence pointing to this beginning some 7,000-10,000 y.a..

The dog was domesticated by these midden people and they may have extended domestication to other animals, becoming a herder. With all the new problems of this way of life, including finding pasture, storing milk, keeping the stock alive in winter, he had increasing environmental pressures placed upon him to plan ahead and organise his social systems. It is not known whether the midden people died out or were absorbed by the influx of migrations from the more advanced east at a time when there was a land bridge where the Straits of Dover are now located. This land link with continental Europe, began to fill with water after the last glaciation of the Pleistocene, however, it would have existed in that form or as a narrow channel well into the early Neolithic.

The first Neolithic people to enter Britain were the Mediterranean stock, later migrations of this same stock were responsible for

the Megalithic monuments which spread from India to Britain. These dolmen builders retreated before the round-headed Bronze men, who appear to have come from the Eastern Mediterranean, arriving in Britain about 2,000 BC. About the same time, the "Beaker" people arrived on the north and east coasts, coming from around Kiev on the Dnieper and were mixtures of Alpine and Nordic stock.

Probably about 700-500 BC, the first Celts arrived, bringing the first iron implements, these were followed by the Belgae of Celtic stock in 75 BC. (covered in Appendix B, Chart I, back cover).

Probably, the earliest huts built were pit dwellings. These could only be built in dry soil and this being found, they "were (196) doubtless warm in winter and cool in summer" (vide Appendix B. 58-74 consecutively.) These deep pit huts were first excavated, the spoil being heaped around the periphery.

Apart from traces of what appears to have been a rectangular house disturbed by subsequent occupation of the site at the Easton Down Flintmines at Wiltshire, the only house attributable to the Western Neolithic tradition of England, is that uncovered on Haldon Hill near Exeter. It is represented by a rectangular arrangement of post holes set in the middle of stone footings of a turf or wattle wall with a couple of central posts that probably helped to support a gable roof.

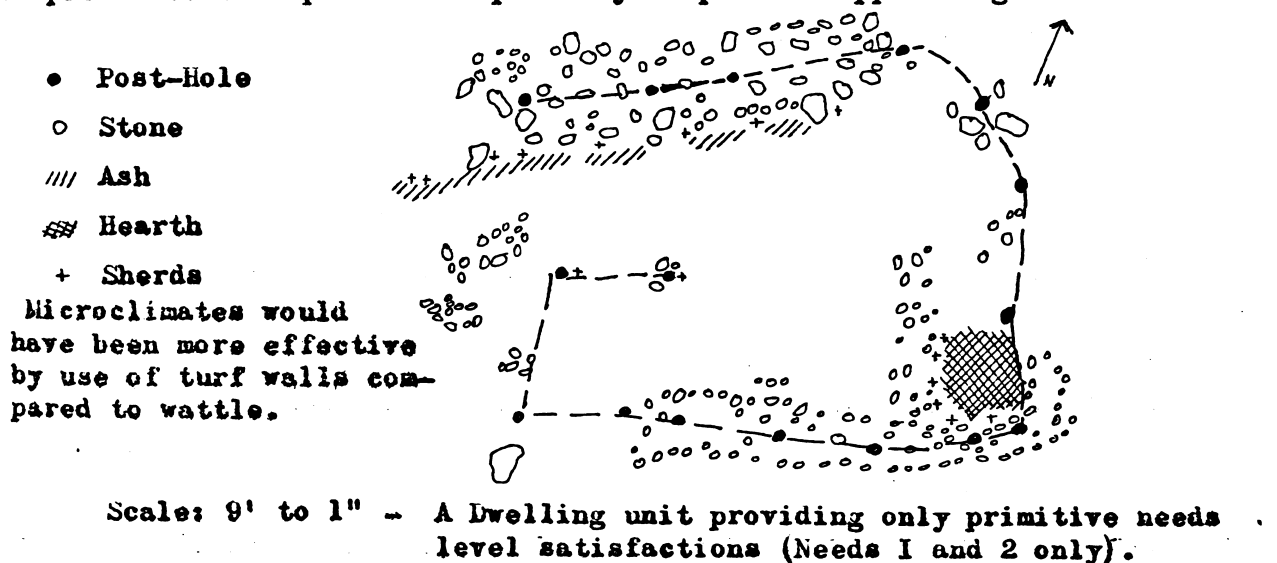


Figure 33: Ground plan of Neolithic House on Haldon Hill, Devon. (180)

Excavations at Knockadoon, on the shores of Lough Gurr in County Limerick, revealed Neolithic houses at this site of a rectangular plan, having internal dimensions of $9\frac{1}{2} \times 4\frac{1}{2}$ -5 m..

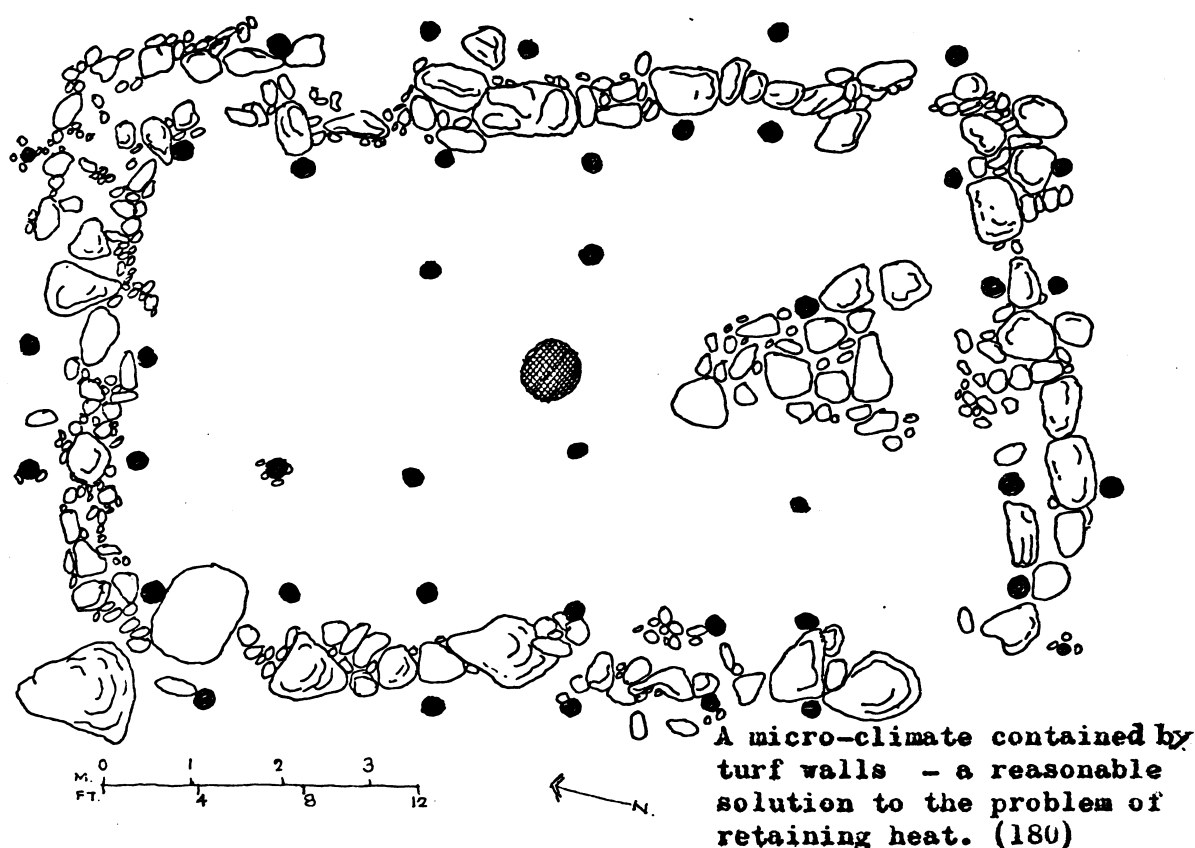


Figure 34: Ground-Plan of rectangular Neolithic House, Knockadoon, Lough Gur, Co. Limerick. Post-Holes, shown black •
Central Hearth cross-hatched ■

The walls of this construction were probably of turf and are defined by stone footings and by a double row of post holes. In these post holes, were set the uprights of the wooden frame and there was a central hearth and two rows of posts dividing the house into aisles, probably these helped to support the roof.

Also at Knockadoon, there were round houses found which were defined by concentric rows of postholes apparently dating from the time when Western Neolithic pottery was current in that part of Ireland. There is more known of the dwellings of the Neolithic groups outside the Western tradition in Northern Britain, ie. Ronaldsway in the

Isle of Man, where a single long house has been found with the floor sunk into slightly rising ground to a depth from 1½-2½ ft. below the contemporary ground level. The rectangular frame of this house was defined by post holes, others of which may have been designed to support a smoke hole over the central hearth. The late Neolithic settlements (explored mainly by V.G. Childe at Skara Brae and Rinyo on Orkney Island) are probably adaptations to the windswept and treeless landscape on the margin of the temperate zone, one that supported sheep rather than swine at this period. (vide Appendix B.67 & B.68).

The houses were basically squarish or oblong in plan, although they had rounded corners and ranged in size from 20-21 ft. x 11-15 ft. internally. Walls were constructed of local flagstone laid horizontally to 2 courses deep and this type of construction lent itself to corbelling and even from the surviving walls, it is evident that this method, was in fact used, though an overhang of as much as 2'8" was achieved at a height of 9'6" from the floor, there is no sign that the houses were completely roofed over by lofty corbelled vaults. Although, there is a probability that the aperture was appreciably reduced by corbelling and then spanned by whalebones or timbers heaped over with turf.

The problem of a rigorous climate was reflected in the lowness of the door openings and by the way that the houses at Skara Brae were clustered together. Indeed, in the course of time, the whole settlement seemed to have accumulated into a low mound in which the individual houses linked together with low covered passages or tunnels were heaped around with ash, excrement and sand.

These were virtually sub-terranean villages and well-protected against the winds, provided with drains to carry off superfluous water particularly at Rinyo, which was situated at the foot of a steep brae. They would have been quite snugly protected for the pastoral communities who inhabited them, and efficient microclimate systems with good heat conservation.

Because of the rarity of wood and the ease with which the local stone could be worked, the furnishing of these houses are exceptionally well preserved. Their uniformities of technique are interesting -

In the middle of the floor covered with clay, helped out with a few stone slabs, were set the stone lined hearth and at Kinyo, an oven consisting of a clay dome was set on a slate base placed immediately next to this, (180).

Beds were located on either side and over these were stores or "keeping places" located in the thickness of the walls. Stone dressers, constructed of two tiers of stone shelves, were erected against the rear wall and three slate-lined boxes, probably for keeping limpets were commonly let into the floor at one or more corners (*ibid*), (*vide* B.67 and B.68, Appendix B).

The overwhelming predominance of rectangular plans is very striking in all the initial surveys that have been conducted so far of houses occupied by Neolithic peasantry in temperate Europe. In Central and Northern Europe, the oblong house persisted during the Bronze and Iron ages with modification in the form and the mode of construction, but on the other hand, in the British Isles, these later periods were marked by outstanding developments of the round house.

To the end of the Neolithic period, the study of man's micro-climates has necessarily comprised a study of his shelters. However, in the Bronze Age, particularly in Egypt (and concurrently with the Neolithic of Europe), specific deliberate attempts were made at environment modification to suit man and his plants (as in Egypt, q.v.)

Before leaving the Neolithic, there is one aspect of present research into its beginnings which should be noted. This is the work being done in connection with the origins and development of plant species.

Edgar Anderson (140), is a scientist who is in the process of "violating academic frontiers" (as the dust jacket of his book phrases it.) He has developed a theory which requires the elapse of immensely longer periods of time to develop cultivated crops from wildling strains than was hitherto supposed. In referring to Professor Asen's work, he states that "either agriculture must have had incredibly early beginnings, or primitive man as a plant breeder must have been incredibly smarter than modern man..." because "in the 5000 years of

recorded history, man has not added a single major crop to his list of domesticates", (140). When one considers his arguments in conjunction with recent work which is pushing back the date of man's appearance on the evolutionary scene, it is wise to leave the whole question open on the antiquity of man's geneology and of his agricultural origins - it would now be unscientific and rash to draw definite conclusions in the light of this type of research; consequently all definite and seemingly absolute dates quoted in this thesis from various authorities, should be accepted with these provisions in mind.

"MAN-ENVIRONMENT NEXUS": SUMMARISED ANALYSIS DIAGRAM NUMBER C

(See appendix A for details)

CULTURE :
CULTURAL EPOCH: **NEOLITHIC**
TIME PERIOD : **Early HOLOCENE**

METHODS USED TO MODIFY THE ENVIRONMENT AS OVERT EVIDENCE OF NEEDS SATISFACTION

Individual:

- Cutting, burning of naturally occurring vegetation.
- Agriculture began, large areas single species of plants.
- Improved standard of dwellings
- Domesticated animals

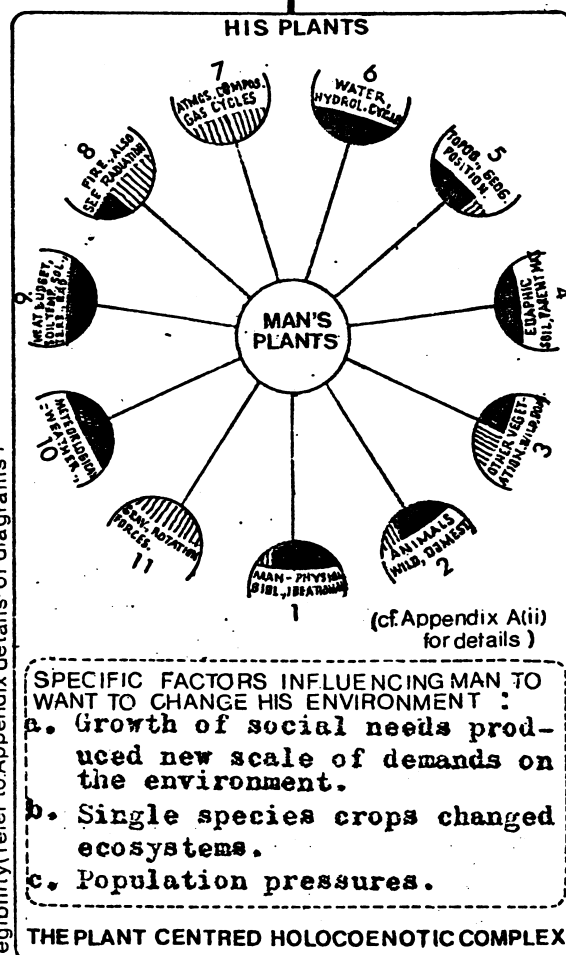
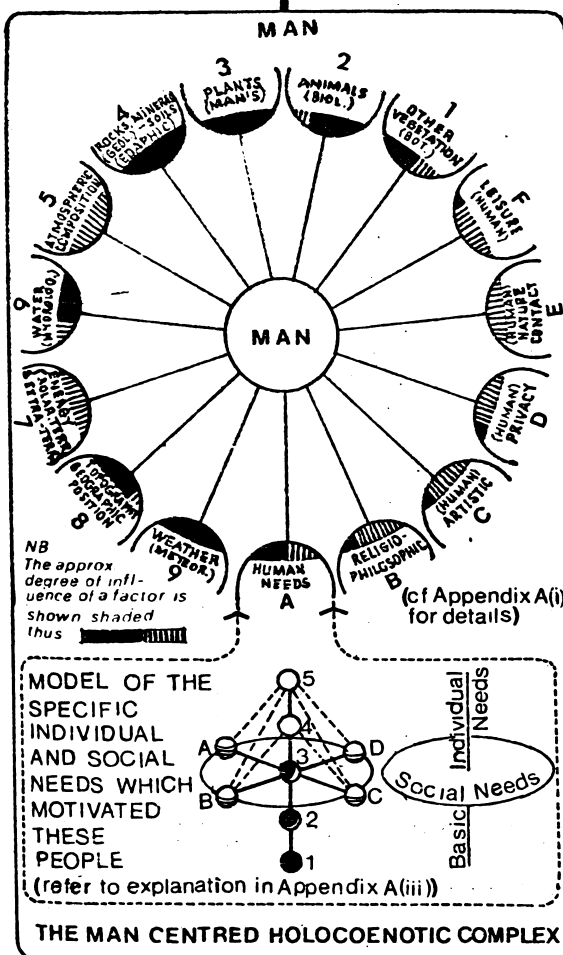
Social:

- Increased food supplies, storage supported increased populations.
- Because of (a.), group projects eg. irrigation (social needs grew)
- Beginning of socio-economic and socio-educational needs.
- Cultivated areas only limited by population and use of stone tools.

DESCRIPTION OF THE MACRO ENVIRONMENT GENERALLY:

Climate entered pre-boreal phase, agriculture dependent communities totally at mercy of hydrological cycle (Fertile Crescent)

FACTORS HAVING A BEARING ON MAN AND HIS PLANTS AND INFLUENCING HIM TO ALTER HIS MACRO-ENVIRONMENT (AS THEY PRINCIPALLY AFFECT HIM AND HIS PLANTS):



(All factors continuously interact, only those which are dominant have been included in the diagrams.)

Table 7.

Early Bronze Age:

The Bronze Age introduced a new factor into the evolution of basic human needs unfoldment. With the metallurgist specialist's knowledge, was gained a new prestige arising from skill in craftsmanship (Needs 4 beginning for the masses) as well as a stimulus to social centralisation and consequent urbanisation. With this, came the potential for societies to evolve towards higher individual and social needs satisfactions specifically evidenced in the "riverine" (185) civilisations. Also providing a stimulus to social interaction, was the new demand for raw materials (copper and tin) from which bronze was made, resulting in expansion of trade with its associated advantages arising once trade between communities (ie. socio-economic need expression) overcomes the more primitive demands of the individual social Needs 2. The Bronze Period saw the rise of vast construction projects arising from the elite's drive for self aggrandisement Needs 4 expression and in the form of immense city-states (vide, B.48- 56(b) incl., Appendix B. Section 3).

Europe:

Much less is known about human settlement in temperate Europe during most of the Bronze Age than during Neolithic times, for example, the best clues to the houses built during the great period of the Northern Bronze Age, are those given by the funerary houses under round barrows in Schleswig-Holstein. Examples at Sottorf, nr. Harburg and Grunhof-Tersperhude, nr. Lauenberg, date from period II and III, respectively and were based on rectangular settings of stout posts. Another at Baven, nr. Celle, had a roofed porch as well.

It should be noted here that in Britain, the roundhouse continued to be used in the Bronze Age, its origins being unknown, future excavations are needed to determine them. In the Mediterranean area, there appears to have been a fusion of the relatively rare, circular house plan with the more common rectangular, which is suggested (180) did not occur until this Age. The apsidal or double apsidal plans from Early & Middle Helladic contexts in Thessaly seem to exhibit this fusion (vide B.21 (b) Appendix B.).

A very inadequate structural system for micro-climate efficiency, probably dictated by paucity of alternatives to timber(of which there was plenty in response to the type of climate.)

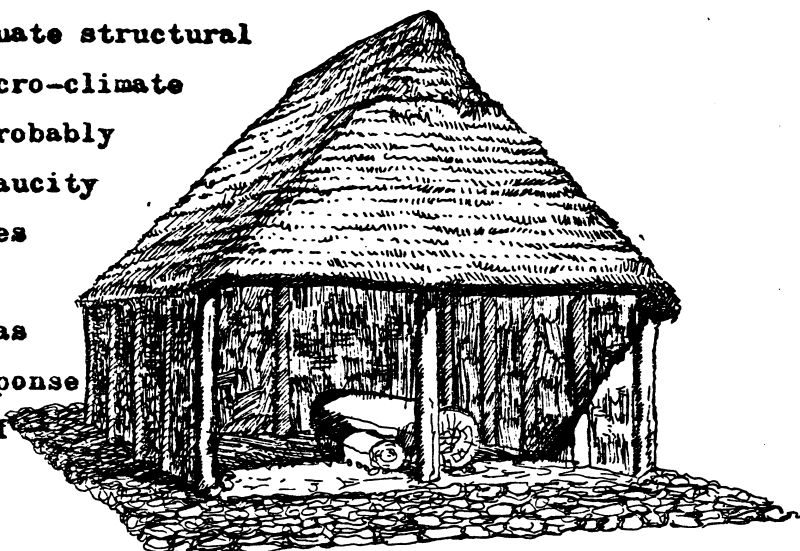


Figure 35: Reconstruction of Mortuary house under Bronze Age barrow at Grunhof-Tesperhude, Schleswig-Holstein (180)

Late Bronze Age: Europe

There is more evidence available on the Late Bronze Age in temperate Europe than there is on the Early period. In both the settlements excavated in North Central Germany, Hasenfeld, nr. Levis and Buch near Berlin, the houses were substantial, up to 10 m. x 5 m. and of a type with a hearth in the inner room, known as the megaron type. The best preserved site of this period is Wasserburg, Buchau in the Federsee Moor, Sth. Germany. There were two settlements here that followed one another, on what was then an island in the lake defended by a multiple palisade. (vide B.98, Appendix B.) (180)

Some of the houses of the earlier phase were made with walls of wattle mounted on a frame of vertical timber posts; however, all of those of the latter phase were built on the loghouse principle, by which the component timbers interlocked by means of notches cut near either extremity of each. In the first settlement, 37 of these 38 houses are single roomed and rectangular in plan. By contrast, the later settlers occupied 9 farmsteads and each comprises aggregations of 3 rooms with hearths together with ancilliary buildings and granaries

of short rectangular form. (Vide B.100, Appendix B).

These settlements indicate a strong motivation (ie. security Needs 2) which would have created compact complexes ideally suited to accomplish individual social Needs 3 satisfaction, which in turn would have begun the development of the social needs.

The most likely explanation of the alteration of the plan type is that probably it reflected a change in the socio-economic conditions, indicating a possible trend towards a more markedly agricultural type of farming. There are also traces of another blockhouse from the same period mounted on stone boulders. These were recovered at Riesi on Lake Hallwilersee, Switzerland. Roundhuts that have been mentioned in the Late Neolithic, also proliferated on some of the Western Mediterranean Islands, although their building date is uncertain. Those which cluster round the towers of Sardinia, are the product of a provincial Late Bronze Age lasting to the end of the prehistoric period (Vide B.90, Appendix B), (180).

Greece:

On the Greek mainland, settlements continued from the Neolithic with little or no break into the Helladic Bronze Age, for example the mound of Tsangli attained a height of 10 m. and was about 200 m. in length and breadth. From the beginning of the Neolithic settlement, the Thessalian peasants were sufficiently settled that they could occupy their villages permanently and the Thessalian B people had already brought into use the megaron type of house plan with its great rectangular living room opening out through a portico into a courtyard and surrounded by sleeping and servants quarters and between the two, an intervening gap contained space for rainwater to fall from the eaves.

By this time also, considerations of security Needs 2, made it necessary as at Dimini (Vide B.93 (a), Appendix B) to defend the inner courtyard. It was between the concentric walls of the defences, that the lesser dwellings of the settlement were packed. This rather well-developed form of architectural house plan showed a properly catered for individual social Needs 3 and security Needs 2 together

with a capacity to accommodate proper development of simple social needs satisfactions and also was a good expression of satisfied security needs. By Mycenaean times, an urban architecture had grown up on the mainland as on the Islands, complete with drains and wells and well-established social patterns adequate for social needs fulfilment.

Spain:

In S.E. Spain, the earliest metalurgists lived either in concentrated settlements such as those at Los Millares (situated on the tip of a steep promontory between the Anderax river and the Huechir stream) defended by a rampart and ditch, or in small mining camps like Parazuelos or El Officio. These consisted of conglomerations of a few rooms, generally on isolated promontories or hillocks.

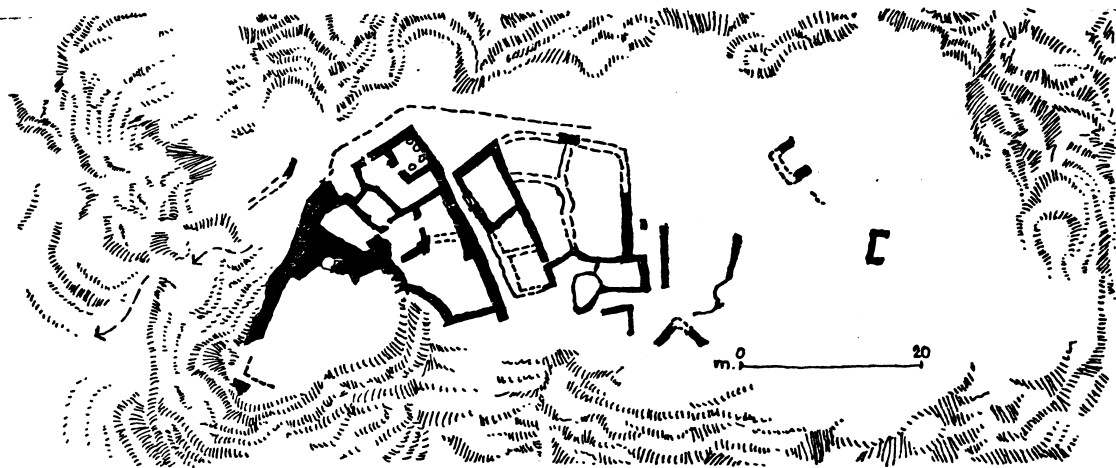
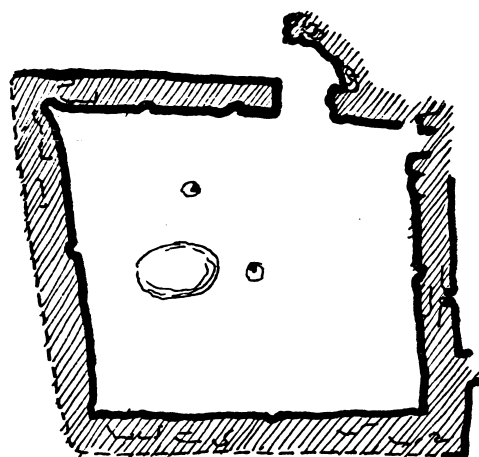


Figure 36: Defended Settlement, El Officio, Almeria (180)(c.f.B.145 Append. B)

There were two brothers by the name of Siret who did research on the Spanish excavations and although they published lavish illustrations of flints, stone objects, metal object and shards, they were very vague about the settlements and structures and one of the few illustrations from Los Millares was an irregular, oblong building having pairs of slots in the inner walls, probably to contain wooden uprights for carrying roof supports.

In plan, this resembles the early Thessalianian one at Tsangli already mentioned (in Neolithic), although in the Greek structure the roof beams were carried instead by pairs of wall buttresses.



With the use of an oven and fire to heat the interior, probably a reasonable micro-climate would have existed in this thick walled dwelling. Note the wind deflector entrance. (c.f.B.60, Append.B)

Figure 37: Oblong buildings at Los Millares, Almeria (180)

The Iberian buildings resemble those of parts of the Eastern Mediterranean in their general angularity of plan though it must be noted that in the West Mediterranean, little attempt seems to have been made to keep to a rectangular plan, oblique or even curved walls were used freely where convenient. The walls, at least in their lower courses were made either of stone with stone facings as at Los Millares and Parazuelos or as at the Bronze Age settlement of La Bastida, Murcia being of undressed stones set in clay. Though showing insular features like the stone roof supports, architecture of the same general character exemplified at Capocorp Vell, Mallorca, is exhibited by the aggregations of buildings which from the end of the Bronze Age were associated with round or regular towers in the Balearic Islands.

Britain:

There was a great surge of new confidence and power given to men by the use of the bronze Celt. It could cut trees down quickly and could be hand-beaten cold to sharpen it. However, it did not come as a fully developed stage at a particular date but was obviously a very slow and gradual one. Probably, the first flat Celts were brought to Britain by traders from the Continent, the art of bronze working having come from the East by way of Italy and Gaul and having been widely spread (except for Africa which never had a Bronze Age). In fact, it is associated with what have been called the Bronze Men, more

powerful physically than the Mediterranean race, they were probably not all armed with bronze weapons, but in any case they finally conquered the Neolithic people. It was not a conquest of extermination because we find round-headed men (brachycephalic) in the round barrows, buried side by side with long-headed (dolichocephalic) Mediterranean types.

Refinement in the development of control of body heat and its microclimate by the use of carefully cut fabrics for clothing, had been well established at an advanced stage in the Bronze Age in Britain. In a barrow in the East Riding, Yorkshire, the remains of a linen winding sheet was found under a skeleton and woollen fabrics have been found in others which could only have been woven on a loom.

Hill forts and camps were the rallying places of the people and it is probable that places like Badbury, Maiden Castle and many others which had been commenced in the Neolithic, were improved upon in the Bronze Age. The trackways on the hilltops between the camps would have been more defined as traffic and trade routes developed under the stimulus of trade in the raw materials for bronze and decorative ornaments, although these defensive systems express the ever-present threats

Man's influence on the environment was exaggerated more than ever by the possession of the bronze Celt with its better cutting powers, he could make larger clearings in the forest, grow more corn and keep larger herds. The bronze sickle was also an aid but the use of the bronze plough is in considerable doubt as Britain was an outpost of civilisation and it is not adequately established that it reached there during this age although it would not have needed as much skill to make the plough form as that needed to make the Celt, once the idea was known.

It is certain that people lived in social communities because if there was not the threat of aggressors, there was always the wolf as an enemy, this meant that buildings were grouped together to satisfy security Needs 2, thereby producing the means of satisfying individual social Needs 3.

The early round-heads carried on the building traditions of the Neolithic, hill-camps were improved and they may have had some hand in

(This lightweight type of construction was far from an efficient form of microclimate control - a technology of triangulated construction would probably have arisen in answer to the new requirements for side walls.)

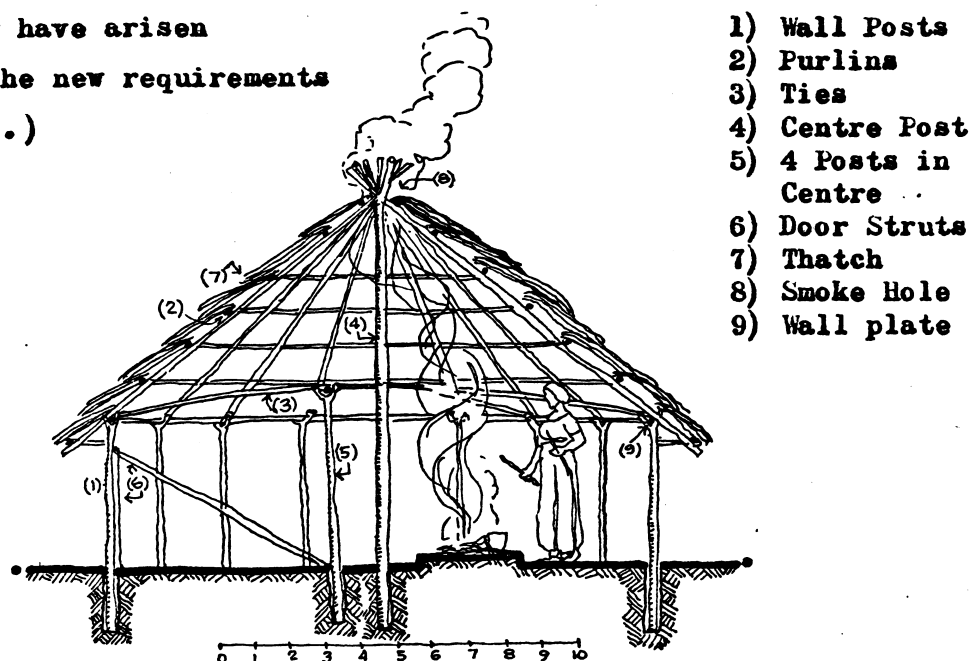


Figure 38: Hut Section with walls - suggested reconstruction (196)

the completion of Stonehenge but hardly a trace of bronze has been found there (although the presence of the Mycenaean dagger symbol is very significant there).

The hut as used in the hut circle of Bronze Age Britain was much the same as in Neolithic times, built in the same manner, but becoming less pit-like and rising out of the ground with vertical sides (Fig.38).

As metal became more plentiful, larger clearings were made in the forest, more crops were grown, more cattle kept and social units were more stable as they accumulated possessions. This was the opportunity for the individual, if a man was harder working than his fellows or more far-seeing, he could become a man of property and founding a family, become the chieftain. The tribe was gradually forging to a nation and the chieftain became a petty king....as a man began to have more possessions, he became alarmed for the safety of his own or envious of that of others. The elaborate planning of the later hill forts, points to the necessity of being prepared to withstand raids and it may be, we must look to the Bronze Age for the beginnings of organised warfare", (196).

There was a strong drive to social co-operation at this time and the beginnings of Needs 4 expression (self esteem of the individual and aggrandisement of the elite) would probably be exemplified by the subtle planning and construction of the entrances of Maiden Castle at Dorchester (q.v.) which also gave evidence of the ability of the Bronze Age man to work together under the stimulus of rudimentary socio-political and economic needs.

There must have been a strong sense of code and tradition in the community of a hill fort, (otherwise it would have degenerated into unco-ordinated rabble), and thus the beginnings of a form of government (socio-political needs expression). Probably it is not too far from the facts to think of the Bronze Age as being one in which there were many examples of the common people, under kings and nobles, being given some share in the framing of the law.

Altogether, a very sound consolidation of solutions to the individual needs and including the beginnings of satisfactions of Needs 4.

"MAN-ENVIRONMENT NEXUS" SUMMARISED ANALYSIS DIAGRAM NUMBER D

(see appendix A for details)

CULTURAL EPOCH: **Chalcolithic and BRONZE**
TIME PERIOD: **Early HOLOCENE**

METHODS USED TO MODIFY THE ENVIRONMENT AS OVERT EVIDENCE OF NEEDS SATISFACTION

Individual:

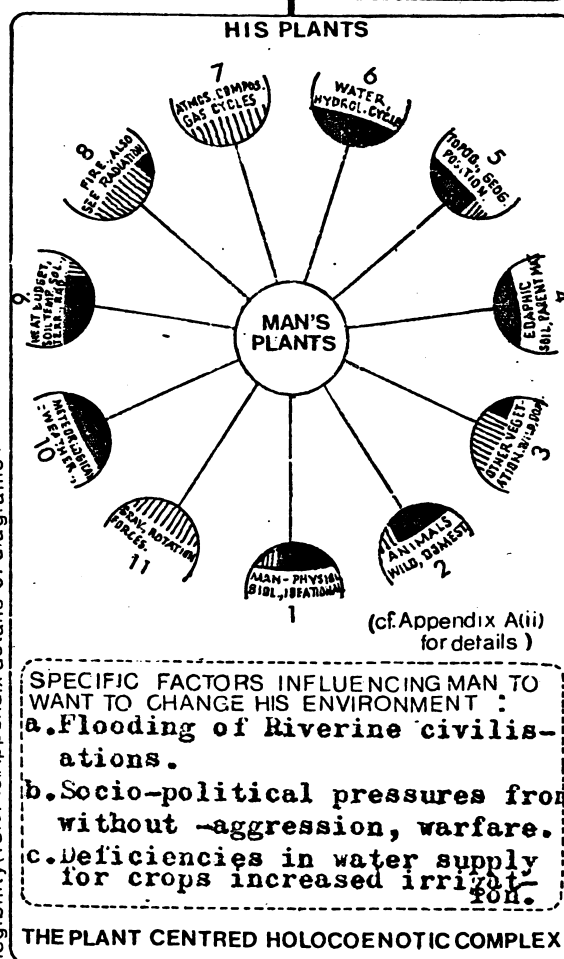
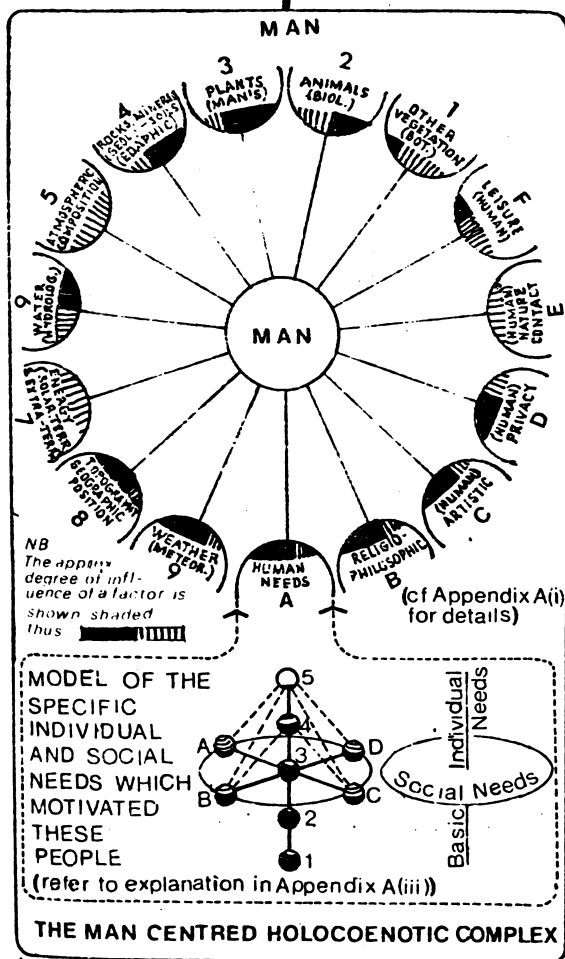
- Increased agrarian efficiency from non-ferrous metal tools.
- Improved self-esteem from growth of metal work arts resulted in improved dwellings of artisans.
- Immense increase in demand for natural materials for metal-workers' use produced first major mining & increased quarrying.

Social:

- Large scale socially organised schemes changed ecosystems.
- Concentrated populations needed vastly increased agricultural land use and storage.
- Socio-political & Economic needs required fortifications, port facilities and commissariat.
- Immense "self-aggrandisement" of royalty at expense of masses, - growth of citadels.

DESCRIPTION OF THE MACRO ENVIRONMENT GENERALLY:
warm dry climate of Boreal period, increased timber availability & use. Intrusion into colder zones modified by heating.

FACTORS HAVING A BEARING ON MAN AND HIS PLANTS AND INFLUENCING HIM TO ALTER HIS MACRO-ENVIRONMENT (AS THEY PRINCIPALLY AFFECT HIM AND HIS PLANTS):



note: these are simplified diagrams adapted from 108 p.9 and the complex and holocœnotic interactions between the environmental factors are omitted for legibility (refer to Appendix details of diagrams)

(All factors continuously interact, only those which are dominant have been included in the diagrams.)

Table 8.

A SPECIAL CASE IN THE CHALCOLITHIC & BRONZE AGES - EGYPTThe Historical and Social Background:

"They tremble that behold the Nile in full flood,
 The fields laugh, the river banks are overflowed.
 The Gods' offerings descend.
 The visage of men is bright, and the hearts of
 the Gods rejoiceth". (181)

Five thousand years ago, these verses were composed by an unknown Egyptian poet, acknowledging the debt of his country to the great river which perennially nourished the crops and re-invigorated the black soil in the fertile valley of the Nile.

Egyptian and Sumerian "social character" compared:

Both Giedion (50) and Barnett (181) hold the anthropogeographic view that the earliest civilisations evolved by man, i.e. the Sumerian and the Egyptian, "cradled on the banks of mighty rivers", had their diverse "social characters" (116) formed by the differing nature of these rivers. Although each was a riverine society, it is interesting to compare the two civilisations to see how their social characters were engendered by the characteristics of these rivers.

In the case of Egypt, the Nile river was reliable, predictable and conveyed a sense of benign nature. Its course was situated within natural obstacles, which deterred invasion; the Libyan and Sinai deserts on the east and west, the rocky fastnesses of the six cataracts of the Nile to the south and the Mediterranean in the north, were natural bulwarks against attack, making it possible for the Egyptian people to feel secure and "at the centre of their world" (181).

From the earliest times, they enjoyed an environment which provided potential satisfactions of Needs I, 2 and 3 and, as will be seen later, the stability and predictability of their environment provided suitable circumstances in which a large proportion of the middle and upper classes realised fulfilment of the higher needs as well.

The leit-motifs of Ancient Egypt were peace, common unity, optimism, self-confidence, love of nature and life. With a degree of serenity and equipoise derived from close integration with a reliable

environment, having guaranteed inundations of the Nile to renew the fertility of the soil, the Egyptians may be contrasted with the Sumerians who, living on the banks of the Euphrates, were exposed to continuous threats to their security Needs 2. Civilisation in the Tigris-Euphrates basin depended upon the floodings of these rivers for renewal of the top soil, but these inundations were completely unpredictable. When this is considered in conjunction with their geographical vulnerability to invasion, it is possible to see how a "social character" was formed with pessimism as its major trait, combined with anxiety, frustration and hence violence. The Sumerian saw himself as a pawn of capricious gods, who required propitiation and blood sacrifices.

The urbanisation of Sumer probably commenced some few centuries before Egypt's historical period and there is a strong possibility that Sumerian cultural elements may have catalyzed the simultaneous events of national union and civilisation in Egypt. Sumer's transition to urbanisation was more a livening of the spirit of civilisation which had existed in Neolithic conditions for thousands of years. When this acceleration began, it proceeded with quickened cultural activity directly dependent upon and completely pre-occupied with the satisfaction of security Needs 2, which evolved through Needs 3 into social aggregations and burgeoned into socio-political needs requiring a city-state political environment, with the citadel as its expression. (v. Appendix B. 48, 49, 50, 51 (a), 51 (b), 52, 53, 54, 55, 56 (a) and 56 (b).) Needs 1 to 4 became better balanced and reasonably satisfied under these conditions and to a restricted degree, the privileged "elite" then realised their higher needs within the limits imposed by conditions of constant anxiety and stress.

In contrast to Sumerian civilisation, Egypt's progress was limited to the security of predictable natural rhythms in the environment. Egypt experienced three rainfall maxima which have been documented as occurring in 7000 BC, 5000 BC and 3000 BC. (94), the mid-Holocene moist interval having terminated about 2350 BC. (v. p. 162,

Table 9, for the correlation of these times with Egypt's cultural evolution.)

The Neolithic and Chalcolithic societies were dependent upon

the Nile for hunter-fowler-fisher and later, agrarian pursuits. They comprised the Tasian (5th mill.BC.), Badarian (4th mill.BC.), Amratian (late 4th mill.BC. - also called Nakada I period) and Gerzean (36) cultures, with the Nakadian culture (on which Baumgartel (292) reports,) corresponding to the period when the Nile level had dropped to the extent that the villages moved from the valley spurs down to the valley floor.

The Development of Irrigation and its Links to Evolving Needs Satisfaction.

The Libyan desert was fertile when the Nakada II people occupied the Nile Valley, at a time when the Nile level was dropping. Sir John Myers has a theory (quoted by Baumgartel ibid), in which he accredits the beginning of irrigation with this earliest time; Myers holds that the water level of the Nile dropped, leaving patches of dry land which then became a network of high and low topography with meanders equivalent to canals. As time passed, these were joined by excavated ganats, thereby building networks from which the rigid land divisions of dynastic Egypt were to evolve. The use of this primitive canal system resulted in arguments and much bloodshed (290) thereby stimulating the formation of socio-political systems.

Later, with the beginning of flood control and networks of irrigation, the rights of the weaker had to be respected, and systems of distribution of water had to be co-ordinated, indicating that the country had accepted, at least a beginning of socio-political organisation analogous to that which it acquired later. The Nile stimulated the development of the burgeoning socio-political needs as well as providing for the physiological needs of the population. It was thereby instrumental in effecting an evolutionary development from a primitive level of simple lower Needs 1 and 2 satisfactions through individual social Needs 3 fulfilment to an expression of all the Social Needs - bringing an extra dimension to the healthy development of the individual's social needs experiences (vide Appendix A(iii) model analysis). The "elite" further developed their higher needs satisfactions, in exceptional cases extending to Needs 5 as in the domestic artforms of the Middle Kingdom (vide Table 9).

The Growth of the Social Needs through the Pre-dynastic Periods

In late Pre-dynastic times, there seems to be reasonable evidence that a well developing individual Needs 3 followed by socio-political and socio-economic needs became well established with the stimulus of trade in connection with silver, gold, lapis lazuli and obsidian. Individual self-esteem needs were developing under what had become a superior art of metalworking enjoying ample resources of copper.

Aldred (36) differs from Baumgartel (292) in the interpretation of a large part of this prehistoric period. However, there is agreement on the general principle that climatic change initially halted nomadic hunters and forced them into closer proximity with one another, producing greater concentrations of population on the verges of swamps and alluvium.

The effect of "corralling" low density nomadic populations into higher density groups within limited areas of the river valley, produced a mingling of the blood and languages of various Mediterranean races. Huntington would have approved of this racial mixing as a sound basis for increasing the vigour of racial stock to the eventual benefit of the future Egyptian civilisation.

Concurrent with increased skills connected with metalworking, was the inception of a new Need 4 for self expression and identity of the newly developing "upper class" in the population. Kantor, quoted in (50), points to the adoption of Sumerian motifs in an "eager seeking of a new means of expression....a groping and searching".

Social Needs development was accelerated by the natural abundance of crops from continuously renewed soil, for which a minimum physical effort was required and excess food could be successfully stored, due to the dry climate. By disturbing the balance of nature, man was temporarily relieved of the necessity for a constant search for a means of subsistence and had leisure in which to specialise in various skills and develop a complementary branch of agriculture, including the raising and breeding of domestic animals. The great increases in population which occurred as a result of these stimuli required more irrigation, draining, clearing and a corresponding development in all the social needs so that the critical moments when the floods began could be properly

co-ordinated to the benefit of society.

The role that the Nile played in preparing societies by stimulating the growth of all the social needs was unique in history. This fact made it possible (although experts cannot say why) for the next spectacular phase of a socially mature and complete civilisation to flower.

The Growth of the Social Needs through the Dynastic Period.

Originally, the country had been divided into communities whose members were supposed to have descended from the same seed (Pâût) and to belong to the same family (Pâîtû). The Chiefs were called Kôpâîtû, the guardians, and in later times, nobility generally, were known by this term. Families were combined under a head chief, a hereditary lord who dispensed justice, levied taxes and later, these prerogatives were dispensed by the princes of the nomes during the Middle and New Kingdoms. This group, together with a chosen group of upper middle class people became the privileged elite, for whom the satisfactions of Needs 4 and 5 became a definite possibility.

In the pre-dynastic period, familiar gods appeared, some of the most important gods of later Egypt, eg. Min (q.v.), Neith and Horus; Baumgartel (292) comments that there is no evidence of sun worship before the end of the pre-dynastic period, and in the dynastic period Min became Min-Amun, religious vigour closely linked to social needs development, and had an interesting degree of correspondence with the fluctuations on a graph of basic needs fulfilments (Vide Table 9 this chapter).

The unstable condition of "groping and searching" (50) for social identity that occurred during the 1st and 2nd Dynasties was followed by the "breakthrough" (ibid) of the 3rd Dynasty, which was short but impressive with an eruption of imagination which culminated with a high point on the graph of Egyptian social progress during the 26th century BC. (vide Table 9, p.162).

Abruptly and inexplicably, the Nile valley, from the First Cataract to the sea became welded into one political entity and Egypt became a nation. Traditionally, the person responsible for this was Menes, who founded the First Dynasty, about 3100 BC. Between the 1st and 3rd Dynasties little is known, but the 3rd Dynasty ushered in the glorious old kingdom, during which the national culture was formed and set

patterns for the later epochs to follow. This 3rd Dynasty opened with a fully developed system of government, taxes, annual census, technological skills and a mature and a flexible written language. They invented ink and paper, made the first medical diagnoses and studies of anatomy, and wrote the first medical books. They were superb craftsmen in all mediums from wood to alabaster and were obviously a resourceful, creative people.

It was in the art of architecture that the Old Kingdom Egyptians excelled, they were responsible for the first monumental architecture in stone, inventing the column, colonnade and floral capital. The highest attainment of Old Kingdom architecture was in the construction of kings' tombs, 22 major pyramids of which the grandest was the Great Pyramid at Gizeh, erected by Khufu, second king of the 4th Dynasty, approx. 2600 BC. Constructed with amazing accuracy, and skill, it was suitable for the use of a king who was god incarnate.

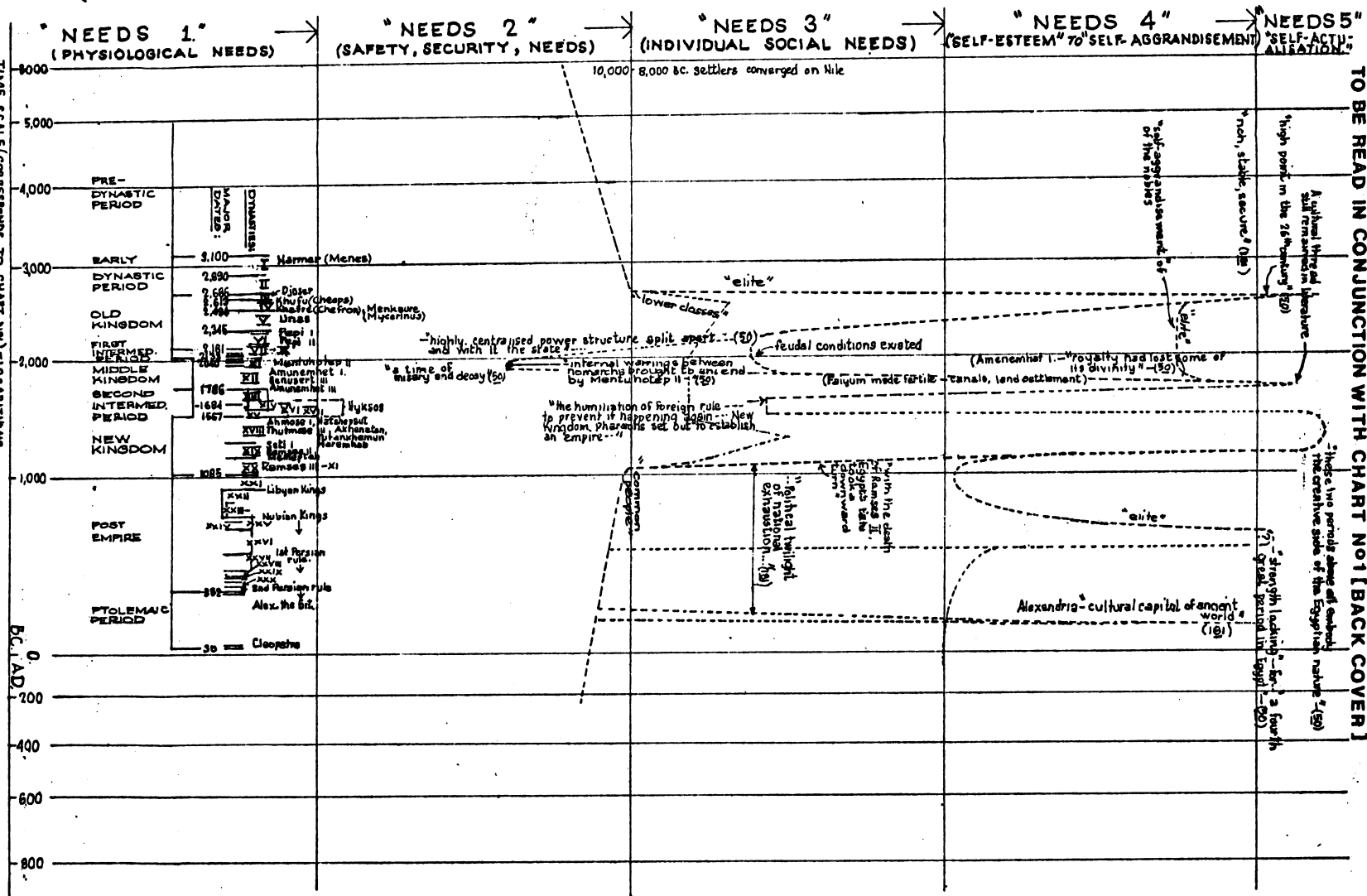
Unlike Sumerian kings, who were considered agents of the gods, the Egyptians regarded themselves as blessed by the presence of their god amongst them. Divine kingship motivated their lives, Taylor sees this as a "pyramidal" societal structure (117), which was expressed outwardly in symbols and inwardly in the deep faith held in life-after-death. The temporal world was a passing image of the perfection of eternity and this belief, together with the reliable seasonal fertility from the Nile, imparted a sense of security which would have given them fulfillment of the lower needs through the satisfaction of the "aggrandisement" needs of the elite to individual expressions of creativity. The creativity shown in the ingenuity of construction of the Great Pyramid must have also applied to other areas of their enquiry into perfection of techniques suitable for the use of a divine king.

Consequently, it is not surprising to discover the remarkable efficiency achieved in modification of the macro-climate to maintain a completely stable cryptoclimate condition in the king's chamber of this pyramid. This has been measured at 68 deg. F.(6), although the result would probably have varied at the time of construction due to the different albedo of white limestone casing compared to the yellowish limestone core.

Table 9 . Fluctuations in levels of satisfaction of the basic human needs, EGYPT.

A. MASLOW'S CLASSIFICATION OF BASIC HUMAN NEEDS IN ASCENDING HIERARCHICAL ORDER

(VIDE CHART N°1, BACK COVER, FOR FURTHER DETAILS)



Taylor's "pyramidal gestalt" (117) for this nation is very apt as a symbol of this period, a time when all power flowed from above, through the priest-king, to the people and country.

Following this peak period, there was a decline in the 5th Dynasty which accelerated in the 6th until the highly centralised power structure split apart. This was followed by an intermediate period, a time of misery and decay leading to anarchy and the rise of feudal overlords in the provinces.

The Middle Kingdom saw a time when Egypt had recovered, this was the shortest of the great periods of Egypt. Reunification with Lower Egypt came from Thebes, internal warrings being brought to an end by Mentuhopet II. By the 12th Dynasty, the notion of royalty had lost some of its divinity. The Amenemhats (or Amunemhets) and Sesostrises (or Senusertrises) carried out immense land settlement projects including canals, transforming the area around the Faiyum into a fertile region. It was only towards the close of the Middle Kingdom that art rose to its highest intensity; if one considers that art is an expression of Needs 4 and 5 (and perhaps the "metaneeds"), then its quality may be taken as an indicator of the elite's status of achievement of these needs. In this sense, the "elite" would include the artist, architect, and others risen from the lower classes by having their skills acknowledged by the Pharaoh. Temple statues and portraits of this period fall between the unapproachable severity of the Old Kingdom and the somewhat effeminate expression of the Akhenaton portraits. They combine a portrayal of bitter experience and lofty majesty which has no counterpart in other Egyptian art. The significant appearance of facial anxiety was indicative of stresses at a time when security needs were continuously threatened from within, whereas "self-aggrandisement" Needs 4 had become a neurotic need. In contrast, the other side of Egyptian life, the domestic and private, was expressed in extremely delicate and subtle colours and a refinement which was never to be surpassed.

With the New Kingdom, the 2nd Intermediate Period had set in furthively. It is difficult to find the limits of this kingdom and the Egyptian tendency to adopt the ways of his forebears without practical

improvement had developed into an inertia, which in its positive aspect guaranteed the longevity of the Egyptian civilisation but in its negative aspect, made Egypt very vulnerable to the Hiksos invasion. The Hiksos brought the horse and chariot and improved the technical efficiency of weapons of war so that an up-to-date arsenal was in readiness for the New Kingdom's world conquests. Goaded by the humiliation of foreign rule and to prevent it happening again, the New Kingdom Pharaohs developed strong socio-political and socio-economic channels of needs fulfilment by focussing the energies of the nation into the establishment of what was then, a world empire.

The great period of the New Kingdom covered the 18th-19th Dynasty (1550-1198 BC.) which included years of transition, but which lasted about half a millennium comparable in length and brilliance to the Old Kingdom; however, these two periods, more than any other time, embody the creative side of the Egyptian temperament; consequently, they represent a high point in the evolution of the fulfilment of the individual basic needs and in providing for highly sophisticated social needs channels of satisfaction.

In the 18th Dynasty, Tuthmosis I, Hatshepsut (1492-1469 BC) and Tuthmosis III, saw a period when the attack on the Nubians thrust them back to the 4th Cataract and the grandiose Temple of Amon was erected at Karnak, with the development of systems of large scale and long term planning (culminating in the festival hall of the east end of the Karnak complex which is probably the ultimate in structural skill attained in Egypt). (50). During this period, Queen Hatshepsut's mortuary temple at Deir el Bahari was a mastery of spatial architecture adapted to a vast landscape and showed a great independence of architectural style and creativity. Giedeon considers that Egyptian architecture will never again reach "such a majestic and, at the same time, so definite a command of spatial relationships" (50). This also would apply to art and landscape art in particular, indicative of the degree of higher needs fulfilment achieved by a majority of the gifted elite in this remarkable period.

Tuthmosis III expanded the socio-political and economic power of Egypt over the greater parts of Western Asia and achieved dominant

power for Egypt for a longer period than either Babylon or Syria were able to achieve. This was a period when the "self aggrandisement" Needs 4 as well as Needs 5 were at their peak.

With the 19th Dynasty, the Ramessides introduced the last dynasty of world renown. Ramessis II (Ramses, 1290-1224 BC), was equally famous as a general and fanatical builder (50), his most colossal work being the Hypostyle Hall at Karnak, an expression of exaggerated "self-aggrandisement" Needs 4 with its obvious bearing upon the socio-political and social control needs.

In the largest representations of portrait statues accompanied by smaller statues at the knee of the colossus Ramses, it is only in the latter where one sees the original Egyptian grace again exhibited. With the death of Ramses II, Egypt's fate took a rapid downward turn and by the following 20th Dynasty (1198-1080 BC) of the nine kings who bore the great name of Ramses, only one of them, Ramses III (1195-1164 BC.) had much character.

Egyptian culture did not come to an abrupt end. It had proven itself stronger than its conquerors, and after the fall of the New Kingdom, priest kings ruled and divided the country, all Libyan and Nubian pharaohs being dominated by the Egyptian influence, taking on the culture of the Egyptian ruling class. Obviously, satisfaction of Needs 4 and 5 were so much part of the Egyptian temperament that invaders and immigrants underwent enculturation.

The Saite Period (664-25 BC.) was an interesting phenomenon of the late part of the 26th Dynasty. This period should not be seen as an effete attempt to borrow from the remains of the old Dynasties with a cosmetic application of their styles (that occurred in later historical periods like the Victorian or even the Renaissance) but as a virile effort to integrate the present with the past, to inaugurate a fourth great period which failed because strength was lacking.

(vide Table 9).

Egyptian Religion as a Factor in the Holocoenotic Complex (vide Table 13)

It is an amazing fact that, from Alexander the Great, through three centuries under the Ptolemies and finally to Roman Egypt, the

religio-cultural structure persisted and was maintained until almost a millennium after the New Kingdom. The Egyptian culture was able to absorb all conquerors and it was probably the Egyptians' mytho-poetic imagination with its vitality which achieved this effect.

The notion of kingship changed, from a divine king of the Pyramid Age to that of a king being an instrument of favour of the gods in the late period. However, the king's direct relationship with the gods was always maintained, and the strong ritualist tendencies were continued by the conquering leader who even adopted the garments of the pharaoh.

The Egyptians exhibited a continuous link between their pre-history and their history with an inseparable link between the probable and the improbable (logic, science and mysticism) and exhibited similar bonds between the animate and inanimate worlds, (this suggests the sense of intuitive ecology which is awakening to-day).

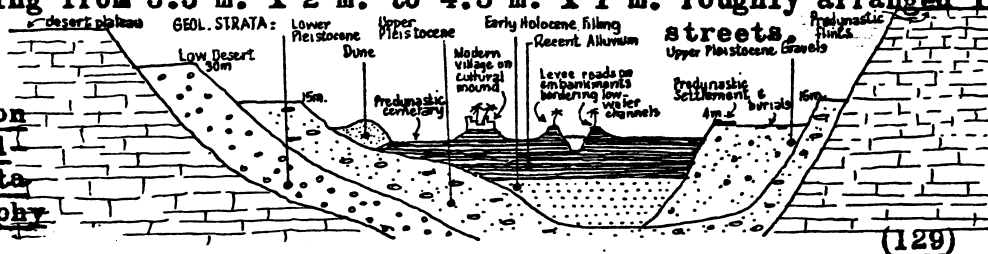
Mentally, it is possible to survey this and understand, but emotionally, it is a condition into which the present modern man cannot enter. It has been established among some primitive people that they have a strong reverence for animals with a link with natural species. The Egyptians maintained the strongest link with the pre-historic conception of the oneness of all life. Our present-day acceptance of the supremacy of man and his dominion over plants and animals, with its strong reliance on the Judeo-Christian concept of creation, contrasts with the Egyptians who were able to identify the highest gods with the most insignificant creatures; this provides a good idea of their imagination, rooted in the physical world and yet with an unbroken link to all living creatures (similar to the beliefs of the Eastern Jain and Buddhist).

Siting of Egyptian Dwellings: In the Pre-Dynastic and Dynastic Periods

With the onset of the drier pluvial period, the Nakada I people moved to the Nile valley floor, they left the spurs and ridges and occupied areas subject to annual flooding. The typical valley section shown gives a diagrammatic idea of the topographic location of these and subsequent settlements which were usually located on the east side of the valley and orientated to take advantage of the prevailing up-valley northerly wind which beginning "as a slight breeze at sunrise-increases steadily until it reaches a moderate or fresh breeze in the afternoon, falling to a light breeze again at or soon after sunset" (211). Dwellings as micro-climate devices during the Pre-Dynastic period:

The Nakadian I culture was the first Pre-Dynastic society with which a particular circular form of dwelling type has been definitely associated, made of a mud base, and a superstructure of reeds and straw. These were small, ranging from 3.3 m. x 2 m. to 4.5 m. x 1 m. roughly arranged in

Figure 39
Nile Valley
Cross Section
showing geological strata and topography



Very little remains of Nakadian II settlements, although the rectangular brick base of a house and some circular ones were found under the Temple of Badari. One circular house with a rough stone wall and a model of an angular house were found at El-Amrah, indicating that rectangular houses were introduced during this period. Petrie⁽²⁹²⁾ speaks of a fortified wall at the pre-dynastic town of Nubet, probably correlating with the threat to security Needs 2 resulting from struggles between Nakada I and II people. Nakada I houses provided a low density insulation which, although uninhabitable during hot days, cooled quickly at night. Nakada II dwellings, (forerunners of the dwellings of Dynastic common people) had dense mud-brick or puddled mud walls. These dense structures would have been reservoirs of radiant energy to be released at night, forcing the occupants to sleep outdoors, where most living was done also.

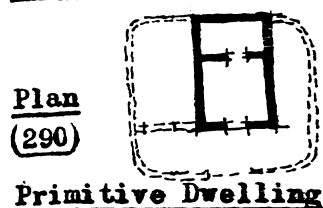
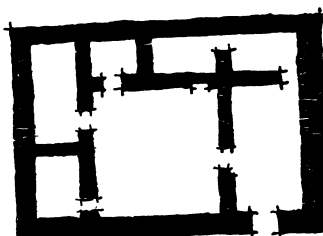
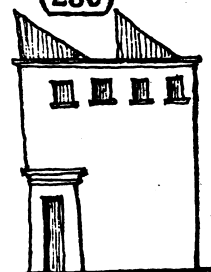
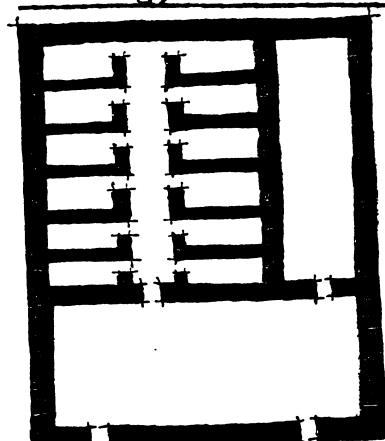
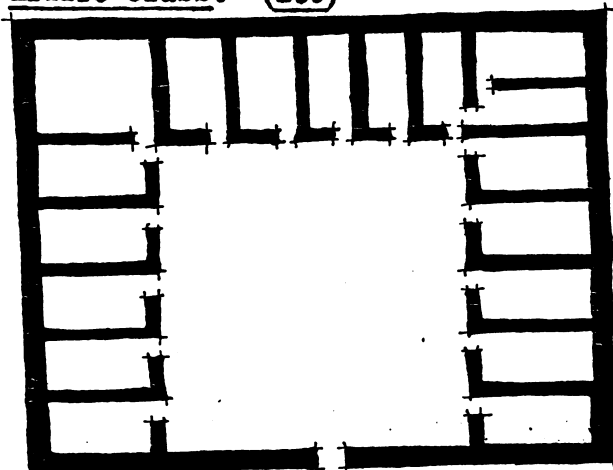
It is interesting that reed dwellings are still used in the Middle East particularly Mesopotamia because they are very successful low density insulating structures, which cooling quickly, permit night use.

The less permanent Nakada I (Amratian) dwelling type would have been more efficient yet was abandoned for dense mud construction. One can only surmise that reeds became insect infested.



Figure 40
(36)

Reconstruction of an Amratian Village - c.3,800 BC. Beehive huts superseded by mud in Nakada II, (possibly because of Needs 4.)

Figure 41**Figure 42****Figure 43: Middle class dwelling, 11 m. x 7 m.****Figure 44**
(290)
Elevation of middle-class dwelling. Note wind-scoops.**Figure 45: House of the more affluent middle class. (290)****Figure 46: House of the "elite" upper class.**
(290)**b) The Dynastic Period**

If properly sited, the courtyard wall would shadow and shield the simple hut but the microclimate within would have been oppressive (v.Figs.41-2).

Middle and Upper classes slept on the roofs of dwellings with "wind scoops to catch the breezes. (v.Figs.44,47 & 48).

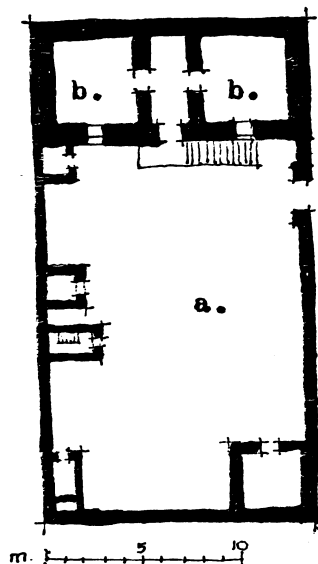
Ground floors of rich mens' larger houses contained stores, stables, and servants' quarters in virtually unventilated conditions, with bedrooms in upper floors. Windows were small without glass, thick, dense walls kept out morning heat, re-radiating at night making bedrooms unpleasant, forcing people to sleep on roofs at night. (v.Figs 45-6).

a) Elements used in dwellings to create micro-climate control.

1. High density mud-brick walls - reservoirs of heat and inefficient heat control devices in an arid climate.
2. Small windows- to limit penetration of light, heat and dust. Glass was used in very limited circumstances.
3. Due to low rainfall, flat roofs could be occupied particularly at night, and shaded with a loggia or awning in middle and upper class houses. (v.Figs.44 & 48). These had various functions:- a) to catch

the night breeze for sleeping outdoors and b) possibly as a deflector to channel any cool breezes down the stair-wells into the interior. (Gothein (223) agrees with this).

Figure 47:



Plan of a rural dwelling

- a) Garden court
b) Bedrooms (52)

(right) Figure 48: (52)

Early House of the Upper Class

Note roof awnings, canals and garden surrounds.

4. Rock-cut houses (v.Fig.49). These provided the ideal environment for arid zone habitations. Having an immense volume of rock as insulation and to minimise diurnal temperature fluctuations, their microclimate would have been that of a horizontal shaft static cave (v.Chap.4 pp. 78-80).

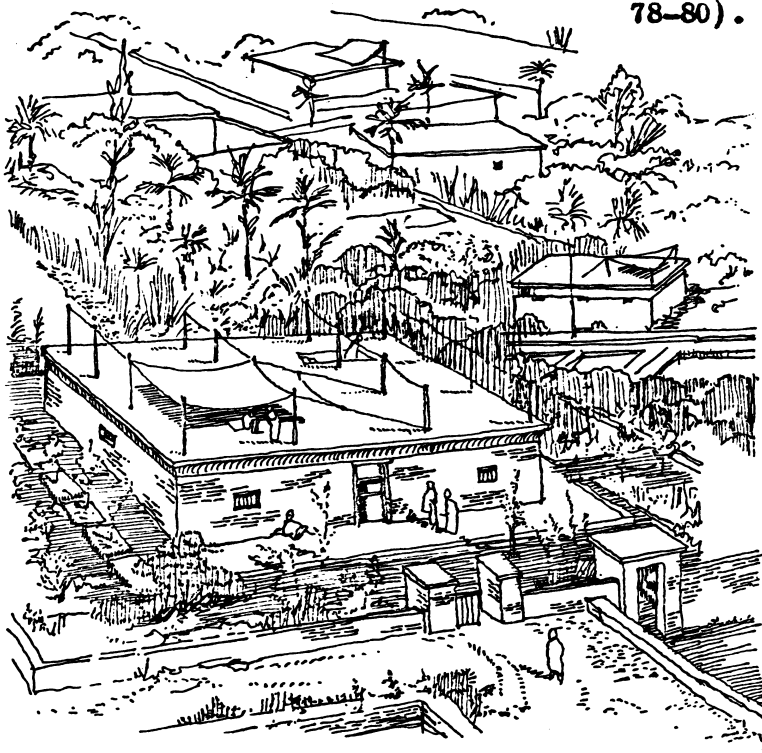
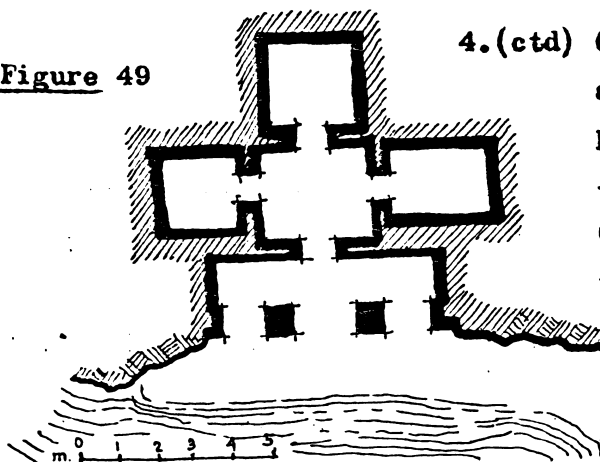


Figure 49



Plan of a Rock-Cut Dwelling (52)

4.(ctd) Given some form of reasonable control at the entrance, these rock-hut houses would have enjoyed moderate temperatures with little fluctuation. Originally, dwellings occupied natural grottoes in the rocky hills flanking the Nile (52), population increase necessitated a change to man-made facsimiles.

b) Elements used in Temple Courts to create micro-climate control.

Shade awnings were used on temple roofs to provide day shade to open courts, slung from roof masts and also functioning as wind deflectors to channel the prevailing breeze into the court as on private houses. (temples were the houses of the gods). The high rigging of the court awnings functioned to give clearance to tall processional banners as well as leaving a clerestorey slot for ventilation. (52).

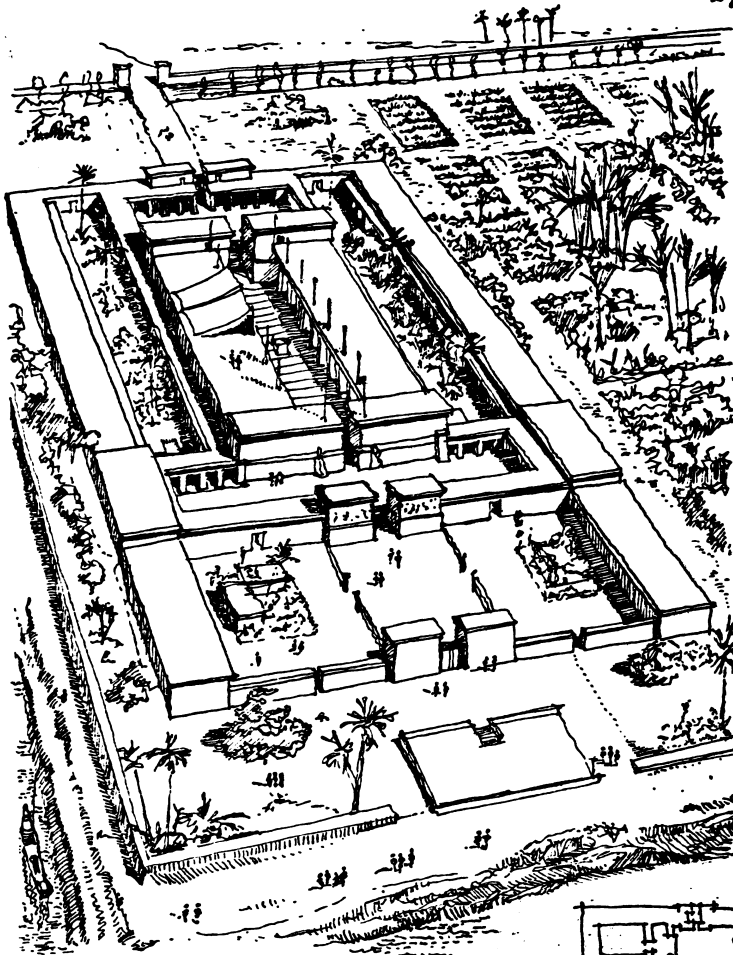


Figure 50:
Aerial perspective (hypothetical reconstruction) of an Egyptian temple, showing shade awnings, irrigation canal and siting on the banks of the Nile (52).

(right) The cross-hatched walls indicate the extent of climate control awnings at roof level, (expressions of Needs 4 & 5 satisfactions)
(v. Figs. 52, 53)

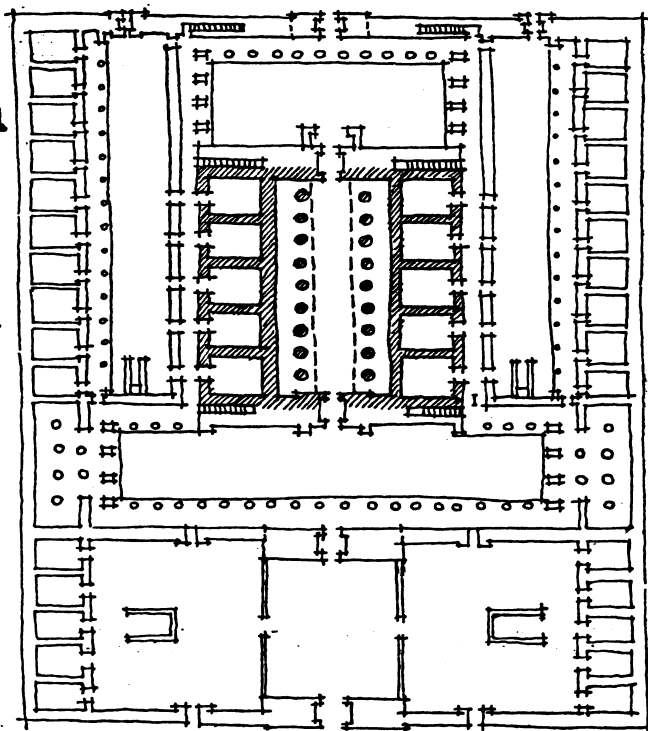
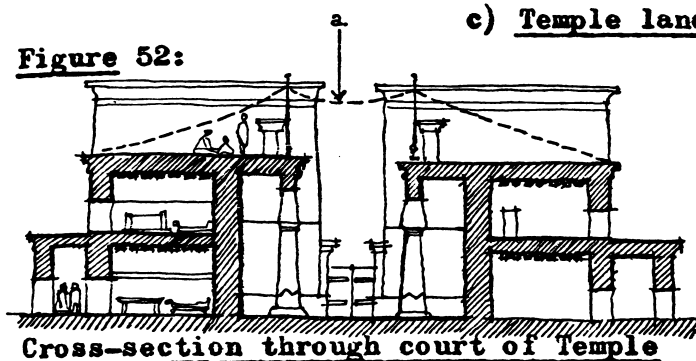


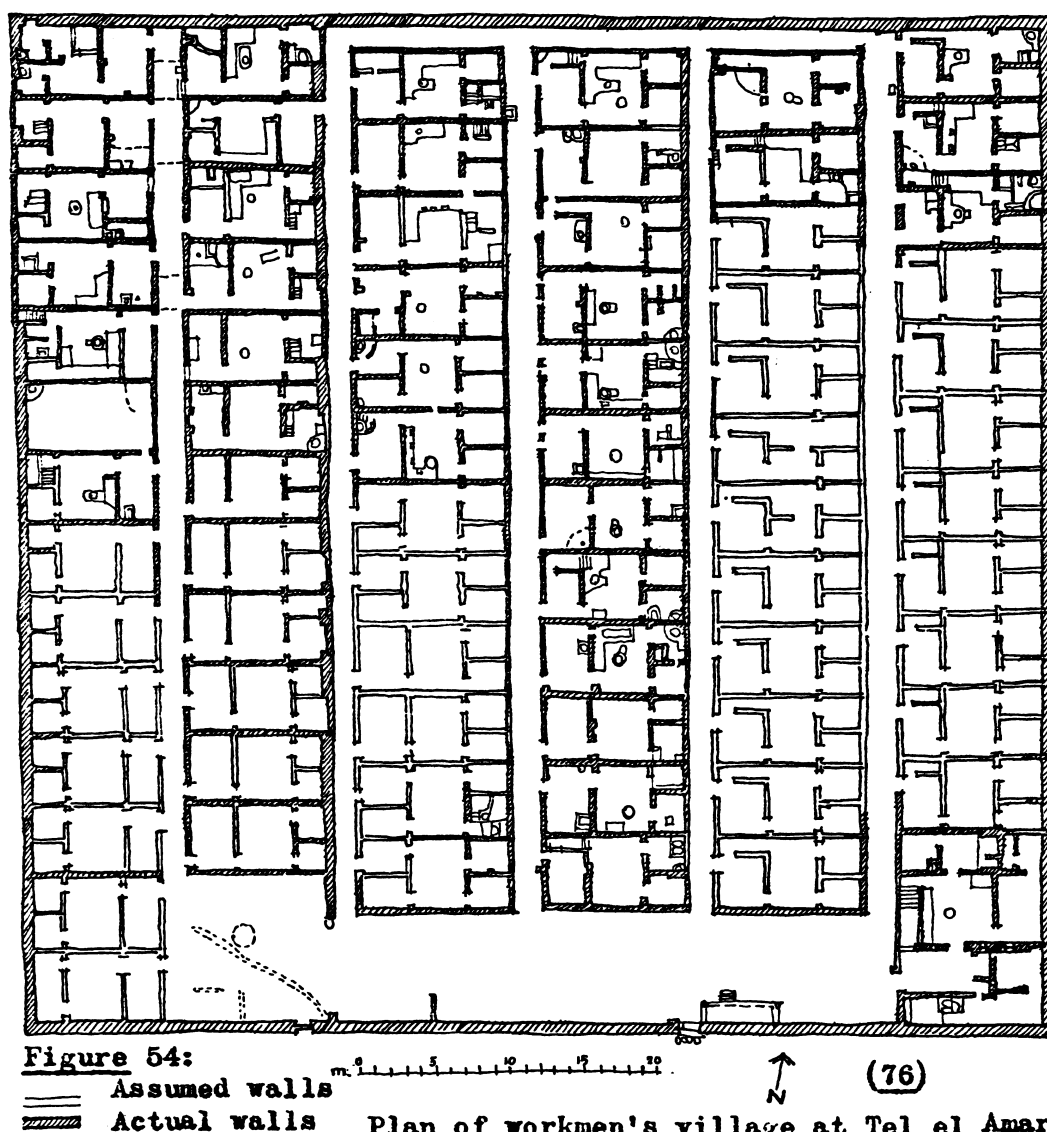
Figure 51: Plan of an Egyptian Temple
(52)

Figure 52:

Cross-section through court of Temple
(v. Fig. 51 for plan) (52)Figure 53:
Interior of courtyard to temple showing
shade awnings and/or wind scoop deflec-
tors and ceremonial table. (52)c) Temple landscaped Gardens— The garden was

used in conjunction with the temple to supply ceremonial flowers, medicinal herbs, fruit and vegetables for offerings. The environment was dominated by sacred shade trees and pool within symbolic rectilinear planning. Sited on the Nile banks, they would have been subjected to the cooling north-westerly breeze. The thick stone wall constructions, narrow apertures, deep overhangs, and the practical value of the internal courtyards for heat release and "through" ventilation, would have created much more effective micro climates than in the dwellings of the population. (Stone used in the construction of "dwellings" associated with the after-life was chosen to outlive the ordinary mud-brick dwelling for the transitory phase of the Egyptian's earthly life). The priests lived in the temples and practised "not exactly science as we understand the word, but at any rate, the raw material of science....an immense fund of useful practical knowledge."

It is interesting to compare these workmen's houses of the New Kingdom with the back-to-back houses that were built for mine workers in Britain during the Industrial era (c.f. (136)p.92).



This walled village, 64 m. x 64 m., had what appears to be dreary layouts of identical houses, back-to-back along straight streets, all single storey and giving the impression of a penal colony. However, from house to house, there is much interior variation (indicating Needs 4 and possibly Needs 5 expression as is evidenced by the variety of wall decorations including tile mosaics).

Egyptian Courtyard Gardens - symbolic functions, with an explanation of some symbols used.

The courtyard gardens of private houses of the elite and temple gardens represented a geometrised formal order in a disordered and inhospitable environment. Sylvia Crowe categorizes them with the Arabian, Persian and Indian gardens, as expressing "the idea of paradise centred on the fruitfulness of the oasis. Water became the central motif....by necessity and symbolically, as representing the river of life." (267) They served both sides of man's dual nature, the physical and spiritual, as did the fenced hunting parks of the Assyrians and the medieval monastery gardens.

The symmetrical and orderly geometry of the planning conveyed the sense of order being created out of chaos in the formation of the world. The four sides of the courtyard wall enclosure may have represented the ordered world of a) the 4 limbs of Nûît supporting the heavens, guarded by 4 gods,

b) the 4 elements of earth, water, fire and air,

c) the 4 cardinal points,

d) the 4 nearby principalities - or any combination of these.

Four, being a significant number representing the base of a symbolic pyramid whose section was the triangle symbolising the sacred number three, - Osiris, Isis and Horus, from the One - Amon, at the pyramid apex.

When one considers the symbolism used in Egyptian landscape and architecture, it is important to remember its significance as an attempt to evoke or reproduce elements which may be irrelevant to the symbols used. Although a difficult form of expression for the Western mind to grasp, it is present in the cruciform of churches and is continuously present in most Eastern architecture and landscape. The strong emphasis on the symbolism of Egyptian work must be kept in mind because the plant material grown for offertory tables and symbolic ceremonials was an essential requirement of the temple gardens all year through. If correctly used, the Egyptian believed that the god, on seeing that his symbols were satisfactory and correctly interpreted would enter and "become one with his statue, in his favourite place....satisfied

with the monument....that the king has erected for him" (296). It must also be kept in mind that the efficiency of the symbolism was pre-eminent and beauty was a secondary consideration. Although it was present in the minds of the architects and garden designers, it was very much a by-product of the building form and the layout plan of the garden, (in a way very similar to the modern idea of beauty being a by-product of functional building).

Because an Egyptian temple was the habitat for the statue of the god, it was considered as his "castle". However, the speculation did not stop there, otherwise temples would have been no more than idealised houses or palaces, with little involvement with symbolism. Not only did they regard it as the house and garden of the god, but also the materialisation of the celestial horizon from which he emerged to bring light to the primordial earth. This first emerged following the act of creation from original chaos (primordial ocean) on which the first of the gods supported himself to pursue his creative work - a concept which occurred in the texts of all periods.

The temple buildings and grounds were the dwelling place of the god and had to represent both this world and a divine palace, a stage on which the meeting occurred between god and the king representing the people of Egypt. In fact, it symbolised Egypt and the world in microcosm, representing the entire cosmos, where the encounter of god and man took place. Although this idea occurred in other civilisations, it played a key part in Egyptian architecture and landscaping.

Such symbolism seems complex, but it obeyed simple laws that it must evoke an episode in the god's activities, or a scene of one of his exploits. The purpose of the evocation was to facilitate the renewal of the act and consolidate his power.

Unfortunately, little has been preserved of the layout of temple grounds. Invariably, they included a sacred lake, on which grew plants, also symbolic, eg. the papyrus represented Lower Egypt as well as the place where Isis took refuge to give birth to her son Horus, the lotus was the flower which sprang from primordial chaos to support the young sun with his creative powers and the palm was associated with the sacred town of Buto.

These sacred lakes in temples and pools in private courts were surrounded by trees and other plants, forming groves and bordering avenues. Their function was not so much to enliven the landscape, but to have direct connections with particular gods, mythological episodes or religious centres. Only scanty evidence remains of the symbolic planting but it is well established that sacred lakes were present at Karnak, Medinet Habu, Denderah and the temple of Mentuhotep at Deir el Bahari.

Climate Control Devices Occurring in the Courtyards of Egyptian
Dwellings of the Upper Classes (excluding temple courtyards, q.v.)

Trees were evenly spaced in avenues of rectilinear and axial design. Prof. Spooner (222) sees this as an expression of man's "ability to annexe the earth and superimpose upon it a formal order in complete contrast to the surrounding wilderness". The water supply was carried through ganats to tanks within the courtyard and which also received roof water (250). Shadoufs were used to elevate water to the necessary irrigation levels.

The environment within these courtyards would have contained various micro climates as a result of the presence of a higher density of plant material in combination with 1) various shading devices ie. enclosing intermediate garden walls, arbors, pavilions and shade trees, and also 2) the environmental influence of sheets of water.

1. The Wall - enclosing and dividing:

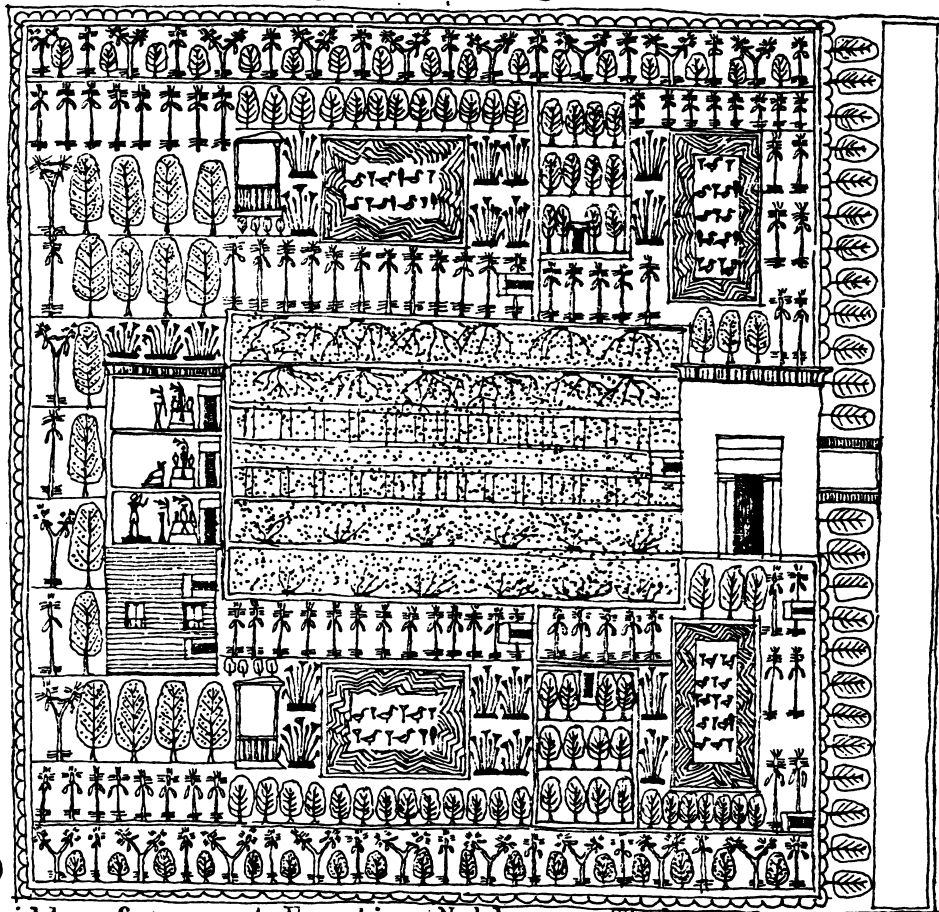
This wall was from 3.3 m. to 4.5 m. high (222), penetrated by a main gateway for ceremonial purposes called a propylaeum. This was the formal entrance with a doorway varying in size, commensurate with the degree of self-aggrandisement of the owner. It was of monumental brick construction, the opening framed with white posts and doorposts of stucco covered with hieroglyphics, a dedicatory inscription being included. Hinged doors were massively constructed of cedar, with heavy bronze hinges; there were other entrances for general use, other than the main entrance used for visitors and ceremonial purposes. The wall itself was often capped with a wave profile termination. (v. Fig. 56).

Referring to Fig. 55 as a typical example of the private court garden used by the upper classes, a careful study of this layout indicates that the double line symbolising wall thicknesses was used (other than at the perimeter) to divide the interior into smaller areas, also this appeared to apply to the vine arbors.

If walls were used to support the pergola beams, extremely effective micro climate control devices, (producing shadow for the plants to reduce the effects of the sun, and re-radiating heat at night to offset the adverse effects of very low night temperatures) would result.

This wall is bordered by a screen of common date palms and cassia trees alternating with doum palms to produce a shelter belt for the deflection of desert winds.

Maspero (200) has calculated that the courtyard layout shown below is near Abusir, on the Memphite plain, this would have made it subject to a more arid topoclimate than valley sites. It was 350 ft. square owned by Amen who rose from obscure origin to the highest honours.



(right)

Figure 55:
(200) & (223)

Plan of the villa of a great Egyptian Noble, on Theban
Tomb of XVIII Dynasty

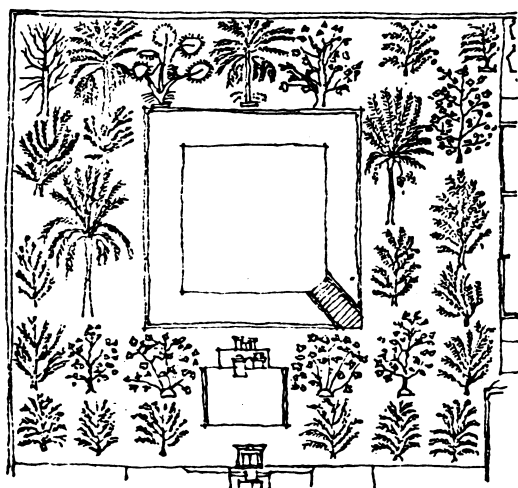
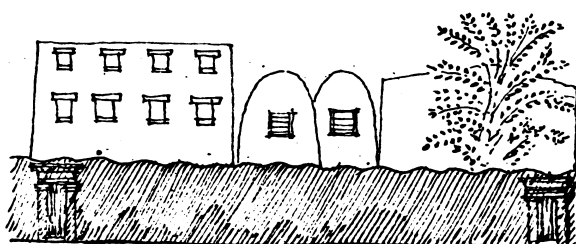


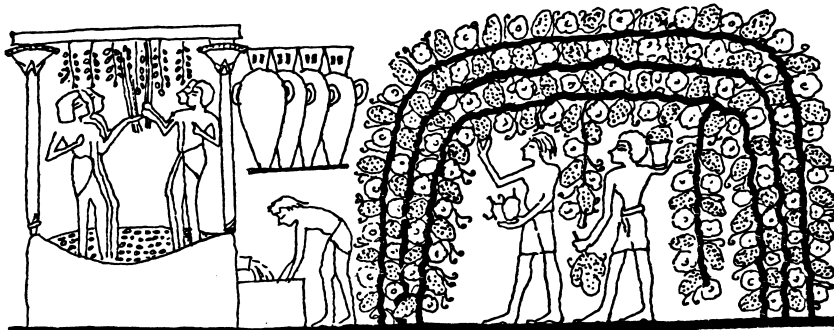
Figure 56: (left) - Portion of the Grounds
of Merire The High Priest, El-Amarna. (223)

Figure 57: (below) - Garden wall surrounding
the house of an Egyptian Lord. (200)



2. Arbors

Pergolas, trellises and arbors were associated with the incidence of viticulture from earliest Dynastic times. The arbor was combined with the landscaping of the courtyards for practical and decorative purposes, often bridging the entrance walk between the propylaeum and the residence (c.f. Fig 55).



(247)
Figure 58:

Picking grapes in an Arbor - New Kingdom. Treading grapes in a garden pavilion.

In Fig. 60, below, the arbors appear to form a continuous hemispherical dome although the interpretation of the two-dimensional effect of Egyptian art could be misleading.

The Sumerian pergola was adopted and "elaborated into a complex of arbors, later its poles were carved and painted; finally it was made of decorative brickwork".

(281) (c.f. The Wall

(I) (right) Figure 59: Gelger notes how grapes ripen better with reflected radiation

off water - a

possible combin-

ation of uses (ie ponds

and arbors.) Note

glyph for water (a)

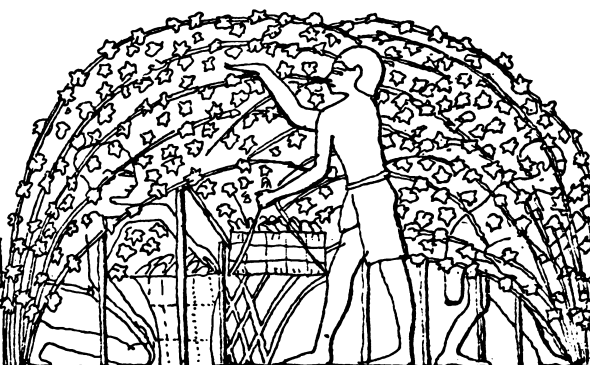
above the head

of the carrier.

Figure 60:



Early Egyptian Fruit Arbor - Old Kingdom (142)



Harvesting Grapes beneath a trellis of arched or domed construction Beni-Hassan (223)

The illustration below (223) indicates the use of several courtyard elements ie. a simple pergola, raised garden bed with what appears to be a stockpile of potted plants. The garden beds are either retained by a framed construction with infill panels or this may be the division of the garden space into "houses".

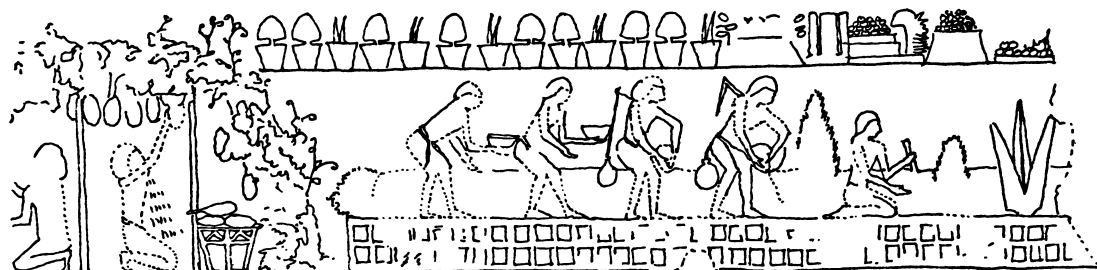


Figure 61: A Vine Arbor and Vegetable Garden at El-Bersheh
Gothein notes that a pond or canal would be included but this section is missing. (223).

3. Water

Water was conducted to the garden using qanats or irrigation canals and its important purpose in practical and religious matters was emphasised everywhere. Water in Egyptian art and texts symbolised the river along which the Egyptian travelled through life and the after-life.

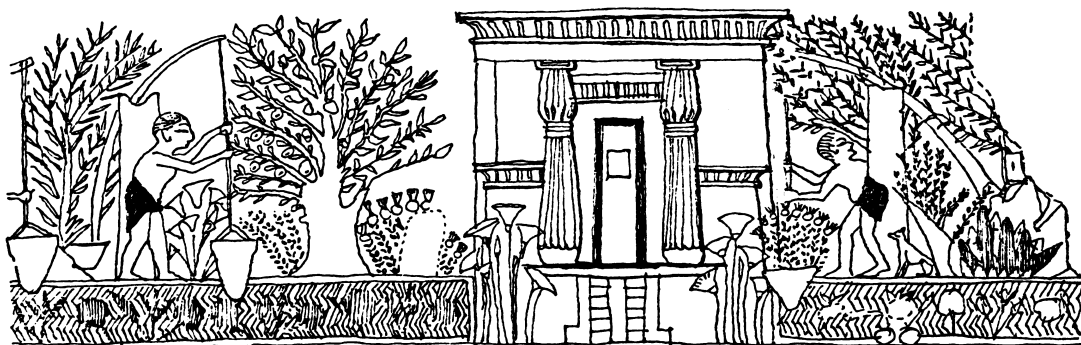


Figure 62: The Garden of Apoui, Thebes
(200)

A building in the middle of a large garden flanked by high density vegetation and canals. Two fellahin work the shaduf by raising the buckets to knee height, then tipping.

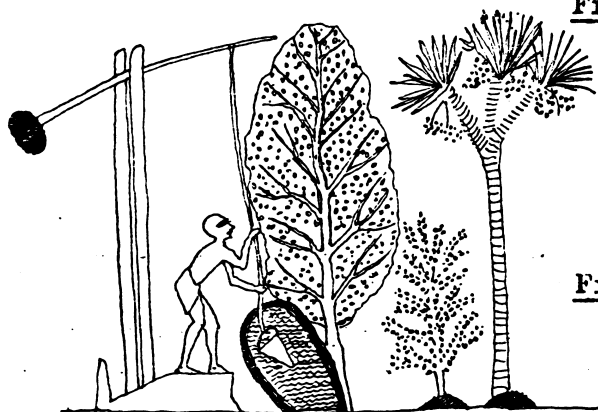


Figure 63: (left)
The Shaduf - balance for drawing water. (200)

After the water was tipped into buckets for carrying, it was conducted through trenches which led to the gardens which were divided into the small embankments called "houses", each containing a single species of vegetables. Passing from house to house until it reached the end of the field.

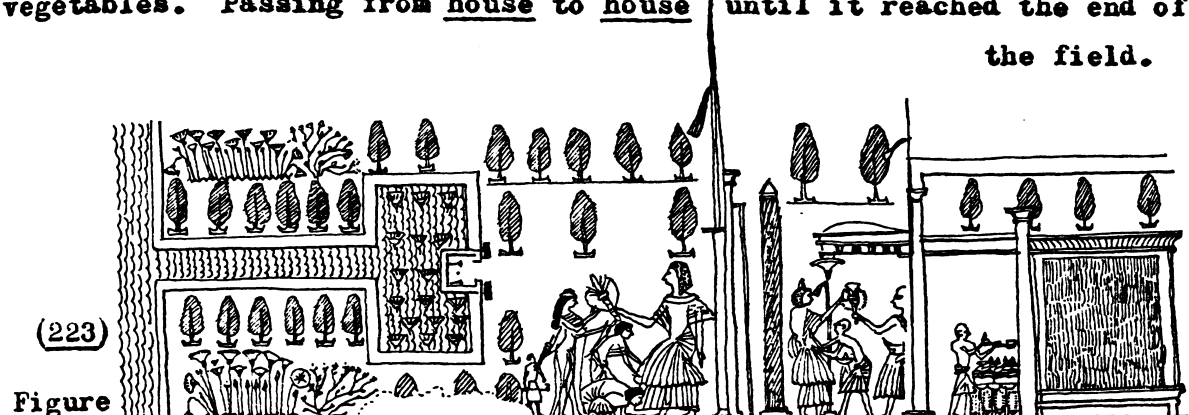


Figure 64: A villa with a garden at Thebes. Note main canal at left of "T" shape (Tau) pond, a significant religious symbol in the Ptolemaic Period.

The overflow was carefully collected in pools and this was used for cattle and human consumption. In the main courtyard, pools were constructed as water tanks and for decorative purposes containing papyrus, lotus, and waterlily.

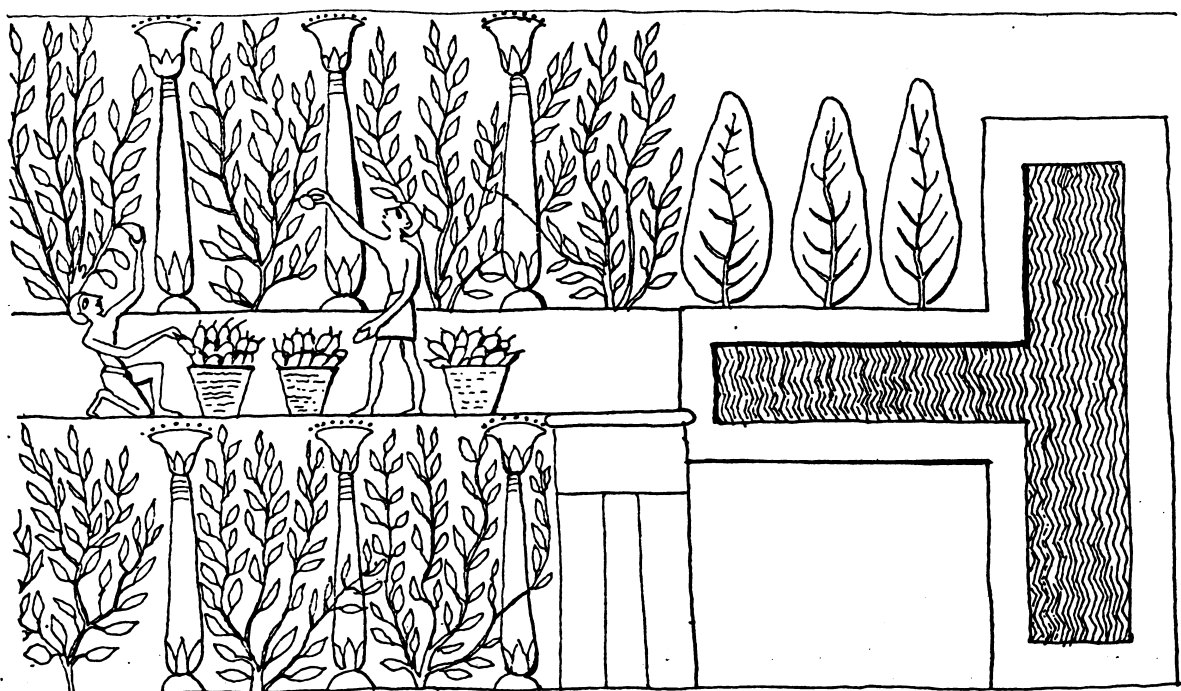


Figure 65: An orchard or vineyard with another "Tau"-shaped tank

4. Raised Beds:

A consistent method of constructing a garden bed involved the use of a raised kerb around its perimeter. This would have been very effective in assisting drainage and for ease of maintenance.

If the kerbs were of timber or porous bricks, they would have had the effect of converging water flow on to the back face of the retaining kerb in contact with the soil and with the use of a reasonably porous construction system to retain the soil, evaporation would have been accelerated, thereby lowering the kerb and soil temperature at the interface between retaining kerb and soil.

5. Mounds:

It has been recorded in many places, that mounds were constructed within the environs of the towns but it is unusual to find an illustration within a courtyard. However, although illustrations similar to those shown in Fig.56 have been said to be bathing pools or watertanks, it is considered more likely to be a raised mound, probably for private worshipping of Amon whose physical aspect was the sun. Pictures have been found of these mounds in the hunting parks planted with formalised trees, it has been recorded (222) that they were constructed of loose materials. (Trees depicted as planted on the slopes of such mounds would have been subject to the advantages and disadvantages associated by Geiger (1) with slopes inclined towards and away from the sun).

The symbolism associated with these mounds is connected with the myth of creation which took place at Heliopolis. The new god Shû came from the primeval waters and separated the two lovers Nûît and Sîbû. The goddesses' starry body extended through space with the head to the west, loins to the east, feet and hands to earth, as four columns supporting the heavens. (200) Maspero says "certain legends added that in order to get high enough, the god Shû had been obliged to make use of the staircase or mound, situate in this city". (ibid) one is reminded of other mound symbols--the ascent to the spiritual plane (Elysian fields) that the priest-king undertook to commune with the gods or Mount Meru (later Olympus), Valhalla, mount of Moses, with a possible connotation with the pyramid mountain of Sth.America.

MICRO CLIMATES WITHIN EGYPTIAN COURTYARD GARDENS

It was originally intended to research the success or otherwise of micro climate control devices used by the various civilisations. Because the subject was so vast, it was decided to limit the field of investigation and restrict it to a civilisation upon which very little or no research of this type had been done.

Egypt was chosen because it was a civilisation which existed virtually unchanged for 30 centuries, with a relatively stable climate, predictable meteorology and a clearly consistent religious philosophy. In addition to this, the documented evidence of the Egyptian's knowledge of herbs and plants was considerable, considering the fact that the race was at its zenith at a time 30 centuries before the Neolithic had finished in Britain.

This reasonable continuity of organisation for political, economic, educational and social control, which commenced in the Old Kingdom, made it a reasonable choice, as it would have engendered continuous (although very slow because of its conservatism) technological innovations connected with agriculture and gardening.

There was also the magico-religious requirement for the use of plants with a form of sympathetic magic whereby the botanical shape was symbolically and empathically associated with part, or all of the human body. This would have created demands for new species to be brought from other lands, as well as indigenous species to have been improved. When this is considered in conjunction with the need for planting the garden as an extension of the symbolism of the temple, it seemed that an indicator plant would show that the methods used for modifying the microclimate within courtyards were significant in altering the macro climate to favour the survival of that plant.

Although meteorological observations form the basis for an understanding of human environments, it is misleading to apply the same category of information to the habitat climate or to use Geiger's term "the ecoclimate" (1). Below the standard 2 m. height of macro climate measurement, it is a familiar occurrence to find that the combined effects of soil moisture content, ground slope and vegetation

have caused a ground frost which was not indicated in meteorological records. Such incidents make it clear that macro climate measurements are not sufficient evidence from which to predict that temperature or frost sensitive plants should survive when factors which can change the climate near the ground may create conditions in which those plants could fail.

Unlike the animal's adaptive capacities, plants have limited tolerance to heat, cold and desiccation, beyond which cell death occurs. Consequently, it is reasonable to hypothesise that there would be a causal connection between the evidence for the presence of a certain plant and the fact that the temperature must never have violated certain limits. A climate sensitive indicator plant then, is one which by its survival, is circumstantial evidence for particular micro climatic conditions which if not present in the macroclimate, could only have been effected by the use of climate control devices.

It has also been established (2),(215) that some life cycle events of certain plants are correlated with environmental temperatures, eg. the common grape, (Vitis vinifera) fails to set fruit unless it has a limited period of cold temperature at a critical time in its life cycle (297) & (57). Because of the possibility that the grape vine could be an indicator plant, its susceptibility to temperature changes was investigated, but this proved fruitless as Egypt lay within a temperature zone in which grapes may be raised naturally. It is interesting that this zone correlates with the 70 deg.F. isotherm of Huntington (v. Sec. I, Chapter 3).

Research was then carried out on many ancient Egyptian plants, some species being identified with their Latin equivalents, whilst others remain unidentifiable. All the identified species were checked for any critical temperature events in their life cycle which could have made them useful as indicator plants and all were eliminated, except one.

Prof. Dixon (pte. comm.) commenting on my search for indicator plants, said "the idea is well worth keeping in mind for future investigation, however, until archeologists show considerably more interest in the less 'glamorous' aspects of their work, it will be some time before the information of the kind you require becomes available".

Prof.Kantor (pte.comm.) also said that she suspects "in some cases, the evidence upon which answers could be based, simply does not exist".

However, lists of plants were compiled from many sources including an original 1652 copy of Kirscher's "Oedipus Aegypticius" published in latin(207).This search for specific indicator conditions was complicated because the information required did not occur in standard references. Another problem was that species identified from contemporary sources were not necessarily primitive species and may have been subjected to cross-fertilisation and mutation in the intervening centuries.

One species was finally isolated which had, during its life cycle, a particular critical event that would not take place unless a specific set of climatic conditions prevailed. Apparently Lactuca sativa , common lettuce,does not develop satisfactory heads if the temperature rose above 80 deg.F. and fail to form heads in the range 70-80 deg.F. developing into an open leaf structure. A phenomenon known as "bolting" (the premature formation of seed stalks) may occur if either higher or lower temperatures occur (2). Daubenmire (215) says "preliminary studies indicate that high temperatures (70-80 deg.F.) prevents head formation....and materially hastens seeding"....in lettuce. He also notes that an experiment in U.S.A. showed that lettuces produce heads at temperatures less than 70 deg.F. and inflorescences above this temperature (v.Table 10,next page, for critical temperature summary).

The horticultural firm of Arthur Yates and Co.Pty.Ltd. were consulted when doubts arose that these experiments had been carried out with modern strains of lettuce, instead of the more primitive strain "Cos" which had been identified. While not commercially grown in Australia, they were able to obtain seeds which were used for a "growing on" experiment.

The one reference that had occurred in many replies from Egyptologists, was Keimer's book on the garden plants of Ancient Egypt (203). Being unobtainable in any library in Australia, a micro film was obtained from America in its original German form. Fortunately, the variety

of lettuce which had been identified by Keimer in many Egyptian texts was the "Cos" (Lactuca sativa), "wild lettuce" (Fig.66 below).



(See Page 202
for comments on
experiment with
this variety).

Figure 66

Lactuca sativa var.Longifolia Lam.
"cos lettuce".

from "the Botanical Gardens of
Dahlem, Berlin (Sept.1919)." (206)
Note the difference between the morph-
ological characteristics of the two
varieties (Figs.66 & 67).

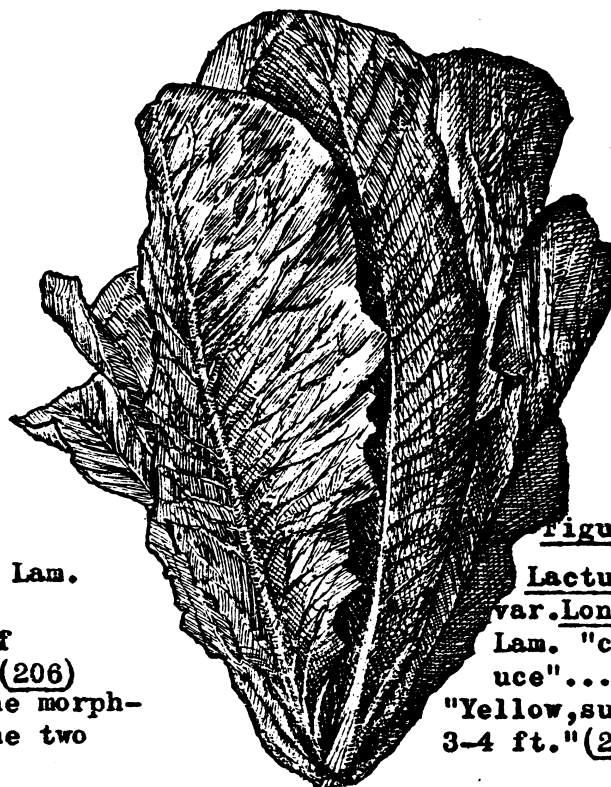



Figure 67

Lactuca sativa
var.Longifolia
Lam. "cos lett-
uce"....
"Yellow, summer,
3-4 ft." (294).

It was necessary to research the incidence of lettuce plants in Egyptian Art to establish that they occurred in both forms, lettuce with heads and lettuce with open leaves and seed stalks.

If it could be established that lettuce with heads were a dominant form depicted by the artists and scribes, then a circumstantial case could be established that necessary micro climatic conditions existed which would produce lettuce in this form, needed throughout the year for ceremonial offertory tables.

There is an obvious case that can be established for the significance and importance of the lettuce plant in Egyptian culture from the evidence of its consistent use as part of the hieroglyph text identifying several Dynasties. Keimer (206) quotes Dynasty XVIII as $\rightarrow\phi, \rightarrow\alpha, \rightarrow\beta\phi$, XIX as $\rightarrow\beta, \rightarrow\alpha$, XX as $\rightarrow\phi, \rightarrow\alpha$, XX - XXI as $\rightarrow\phi$ and the forms which became characteristic as representing lettuce in general texts were: , (often shortened to a prostrate feather).

An Assembly of lettuce Illustrations from Egyptian Texts

The lettuces illustrated in Fig.68 are from the 4th Dynasty and the form shown occurred right through to the later eras, (including AD) They are shown with a rounded leaf tip with red lines on the white stem, indicating leaf scars. Referring to Fig.68, grid reference 1-a Keimer identifies the plants growing beneath the offertory tables as lettuce, but he has not indentified the objects indicated by grid reference 3-a .

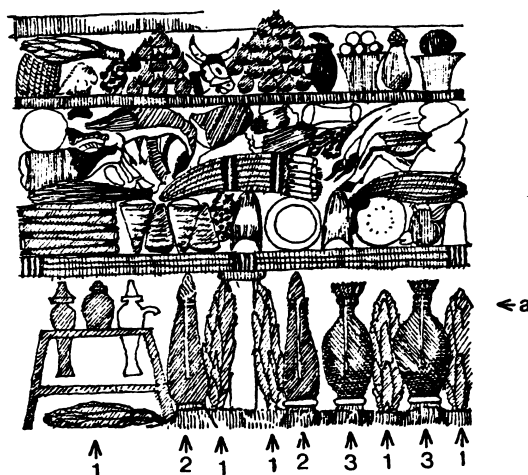


Figure 68: Offertory Table of the Middle Kingdom (206)

It is suggested that these could be "Cos" lettuce plants that are being blanched by tying with a bast (294). This process is illustrated in a contemporary gardening book (c.f.Fig.69) where the similarity in shape is probably more than coincidental (the lines at the top of these



Figure 69:

Blanching of the "Cos" lettuce (*Lactuca sativa* var. *Longifolia*), with "bast around the outside, a week before use" (c.f.3-a Fig.68)(302).

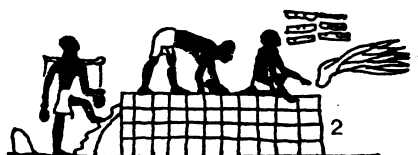
little representations could indicate the tying cords).

If this is accepted, then it is also possible that the two objects indicated, grid reference 2-a could be lettuces tied in the same way, with their seed heads projecting out of coverings, but this is purely hypothetical.

The raised beds illustrated in Fig.70 are those referred to as a possible means of controlling the temperature of the soil, and the lettuce illustrated in Fig.71 is interesting in its relative size in scale with the kneeling figure. The "Cos" lettuce, noted by Keimer (206) as the "long-leaved wild lettuce", 1 to 1½ m. high in the botanical gardens in Berlin (*ibid*). This example also shows an

Figure 70:

(206)



Watering and Harvesting in the Lettuce Fields,
Beni Hassan (Middle Kingdom).

interesting relationship of the lettuce-planting to the adjoining canal. This presence of a body of water immediately adjoining the plants would, if located on the south bank, be effective in helping to cool the prevailing and "very constant north breeze" (211), before it reached the plants thereby cooling the microclimate in the vicinity of the beds. It is the writer's opinion that lettuce plants must have been grown in

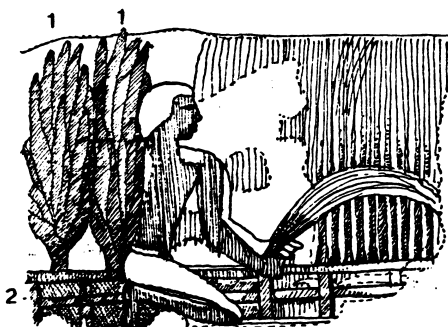
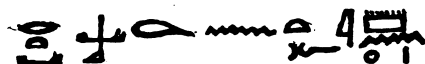


Figure 71:





the immediate vicinity of water and this is given weight by Keimer's statement that "the forms of the hieroglyphs for lettuce which we have learnt to recognise are:-



Removal of Unidentified Plants in a garden
containing lettuce on the left, on the banks
of a canal - 5th Dynasty. (205)

and in these the repeated use of the glyph

"water": , is very significant, suggesting a close connotation between the plant and water. Particularly notice the sign  strongly suggesting the raised bed alongside the water (c.f. Fig.71).

or:



Keimer makes comments on these extracts from Egyptian texts:- (206)
 (a) is closest to the natural appearance (in the Berlin Botanical
 Gardens) and also shows leaf scars;
 (b), (c) and (d) do not show leaf scars, but have pointed leaves.
 These are from the Old and Middle Kingdoms. However, in the Middle

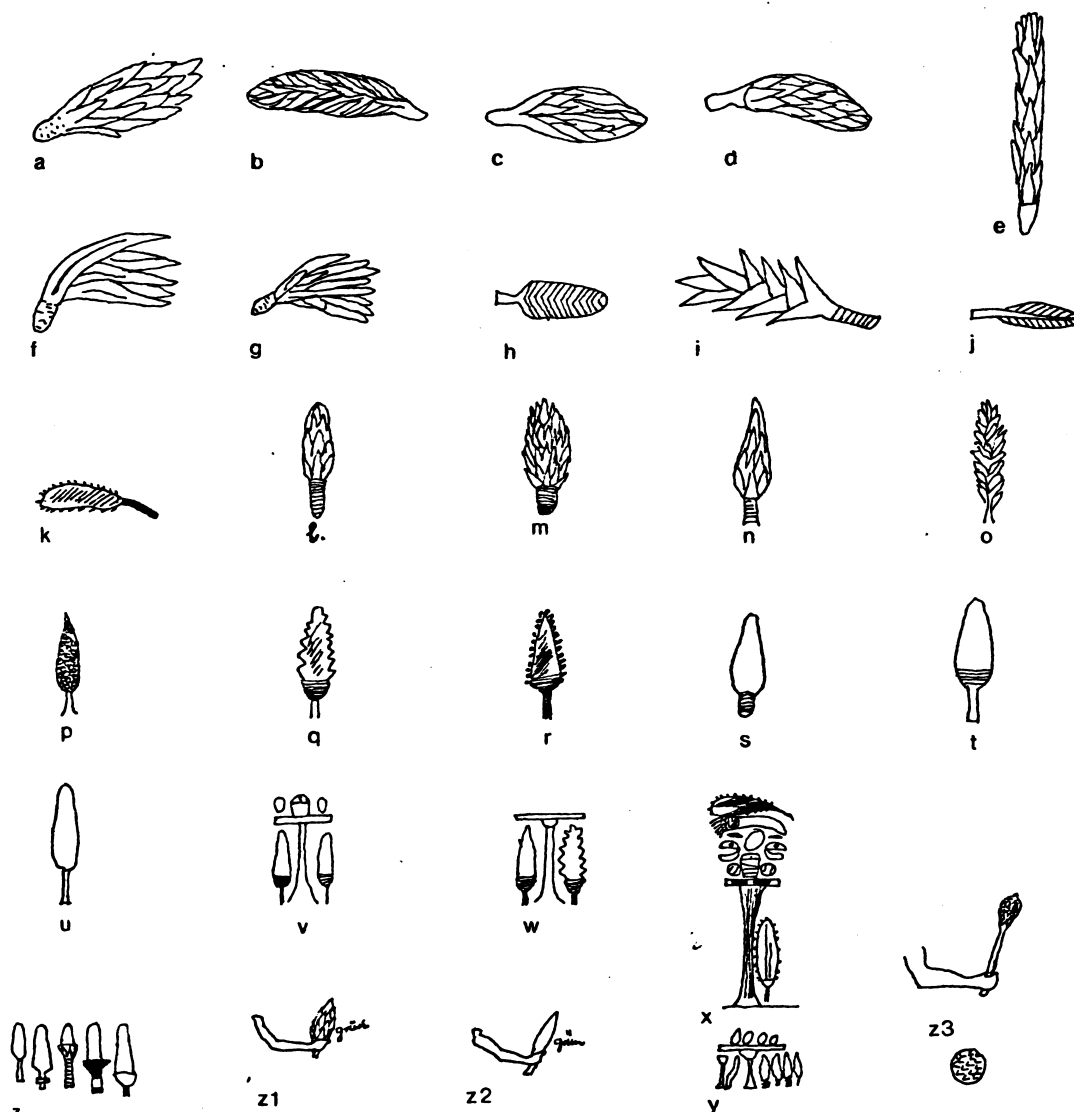


Figure 72: Various forms of the lettuce as used in Egyptian Texts from the 4th Dynasty to AD. (206)

and New Kingdoms, the representations vary from the earlier ones, and Keimer notes that only a careful back-referencing can identify the likeness to "Cos" lettuce. Illustrations "l" - "x" inclusive show examples of the gradual degrading and change from original shapes which were closer to the natural form. Example "y" shows roughly

sketched small shapes under an offertory table. These are in the shape of small trees, which Keimer identifies as lettuces again showing leaf scars on their stems. The seed head is illustrated occasionally as in Fig.72, "z3" and perhaps in instances as on the top of the offertory pile of food in "x" and elsewhere in "r", although this is uncertain.

It is noted that in the art forms of the New Kingdom, the artist was highly stylistic, (c.f. Fig.72, Fig.z1, z2 and z3). Also in this illustration, notice that Figs."f" and "g" represent lettuce reaped from the fields (c.f. Fig.70) and Fig."w", right hand side of offertory tables represent the open-leaved form of the lettuce.

Keimer draws attention to the use of the lettuce plant in conjunction with the gods Min and Amon, (Min becoming the god Amon in the New Kingdom). To establish the case for the continual recurrence of lettuce plants through all Egyptian history, further research was conducted and the result of this is indicated in Figs. 73-88 inclusive.


All these examples occur in conjunction with offerings to the god Min or Amon; consequently, it is possible to identify forms which Keimer has not recognised, by focussing on examples of tree-like shapes in conjunction with these gods. Such examples occur in Fig.81, grid references (a-a), (b-b) and in Fig.85. Examples of the stylised and degraded tree forms of the lettuce can be seen in Fig.78 (1-1), Fig.80 (1-1) and Fig.87 where shown in heavier line.

It has also been mistakenly identified as a pine cone, palm leaf and an artichoke but Keimer notes: these explanations have been dropped altogether, he gives credit to Loret as first identifying the hieroglyph and to Bissing and Muschler (206) for supporting his opinion.

From the foregoing, it has been circumstantially established that lettuce had been used by the Egyptian civilisation probably through the Old Kingdom definitely through the Middle and New Kingdoms from the 3rd Dynasty to the Ptolemaic Period. These plants were required continuously throughout the year, as offerings to the god Min, later Amon and, needing specific micro climate temperature conditions to successfully form the phallic head shape necessary for the symbolic offering, "Cos" lettuce then had to be researched to check that it "headed" consistently throughout the Egyptian year.

An interesting fact emerges from the ancient Egyptian's use of the lettuce plant which is consistently depicted in conjunction with the god Min or Minu (200). This is one of the most ancient of the Egyptian gods and is depicted as ithyphallic linked to the morphological characteristics of the headed lettuce and the sap that was collected.

Prof. Lewin is quoted by Keimer (206) as explaining that the lettuce sap was potent and was used by the Greeks and Romans (Lactuca sativa, L. scariola and L. narcoticum), the thickened juice being called Lactucarium was slightly narcotic although not as strong as opium. The temple priests would no doubt have used Lactucarium in their ritual offerings.

It is reasonable to conclude that such a plant must have been quite familiar and indeed probably formed part of the daily experiential patterns of at least the priestly caste connected with the worship of Min, who together with his later counterpart Amon were so important that they would have required votive offerings throughout the year. However, the pharaoh was also portrayed ithyphallic at Karnak, Medinet, Habu and Edfu and there is a possibility that fresh lettuce may have been used as an aphrodisiac, although evidence for this is not as reliable (206). The pharaoh was often depicted in conjunction with the presentation of very tall bunches of flowers containing Lactuca, and poppies, cornflowers, etc. This must have been a consistent event because the offering shows lettuce in association with the glyph for "bunch" of flowers: .

Because of the continuous and probably daily use of the plant, a problem arises, as will be shown later, the macro climate varied greatly from the necessary temperature conditions required for the successful growing of the head form of lettuce. It follows that the priest must have had some means by which temperature control could be achieved, otherwise all Lactuca specimens would have had heads which seeded and the fully mature head without seed would have been either unknown or at least an exceptional circumstance arising from fortuitous, naturally occurring climate control device(s). The priests with their sagacity and capacities could have empirically produced the necessary conditions.

The following illustrations 73-88 incl. are assembled here to complement the quantitative compilation of Keimer reproduced in Figure 72.(206). In some cases, lettuce forms have been indentified which had not been documented by Keimer.

Grid Reference

1 = lettuce in head form

2 = head form (probably bound to retain phallic shape.

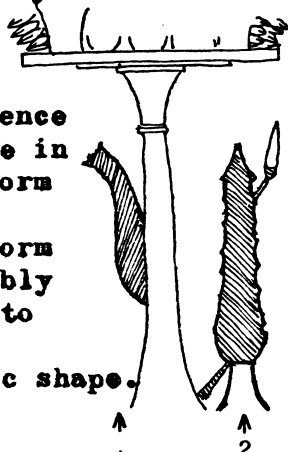


Figure 73:

(91)

Egyptian Offering Tables

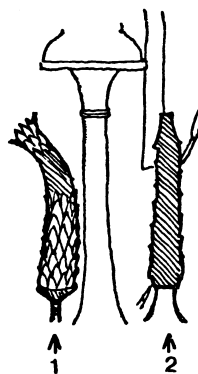


Figure 74:

(91)

Sometimes interpreted as an oil jar, (Grid ref. 2) more likely lettuce (c.f. Fig.68, 2.a with comments.) Base seems to have a root growth curve.

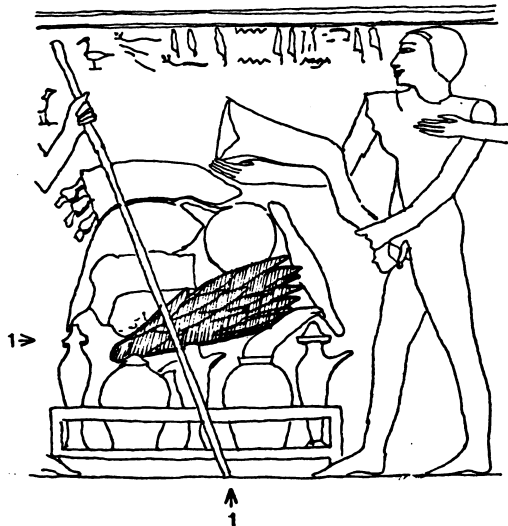


Figure 75:

Painted Limestone Relief
Tombstone of Khui, from
Abydos - Middle Kingdom
12th Dynasty.

(92)

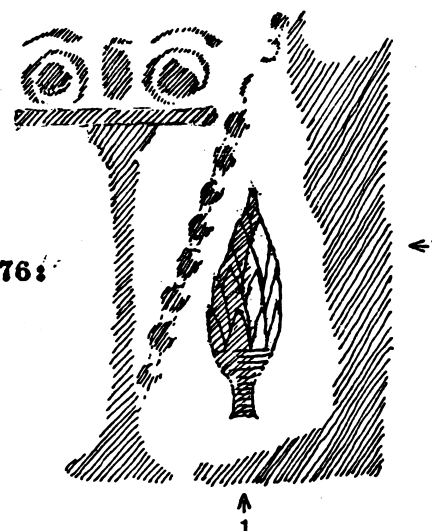


Figure 76:

Fragment of a sarcophagus from
Thebes - New Kingdom, 20th
Dynasty.

(92)

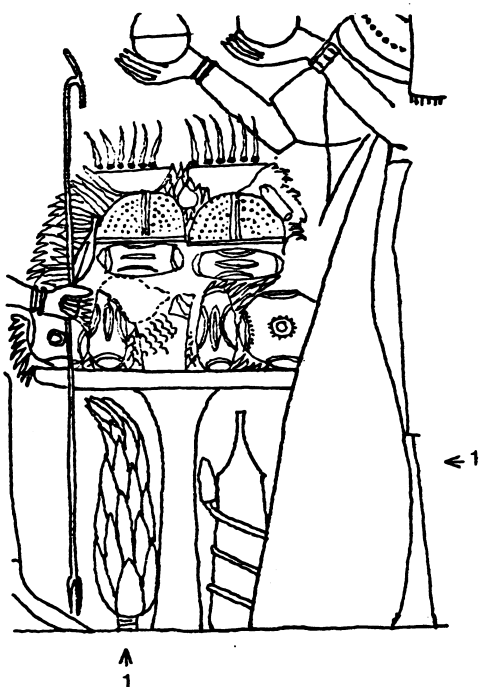


Figure 77 :
Offertory table to the Goddess
Hathor - 19th Dynasty (57) (289)

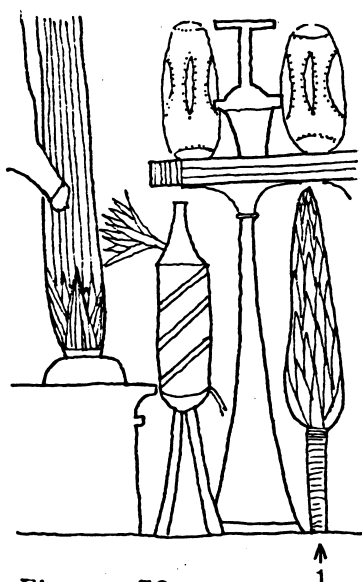


Figure 79:
Offertory table to the God
Osiris - 20th Dynasty
Tomb painting, Sen-Nedjem.
western Thebes. New kingdom
 (72)

Supporting evidence for the continued use of lettuce (grid ref. 1.1) is given additional weight by such examples of its use in association with offerings to other gods. (See comments on Figs. 73-4 concerning right hand object)

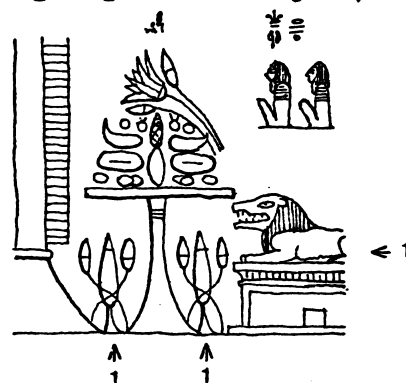


Figure 78:
Offertory Table in the
Judgment hall of Osiris
 (280)

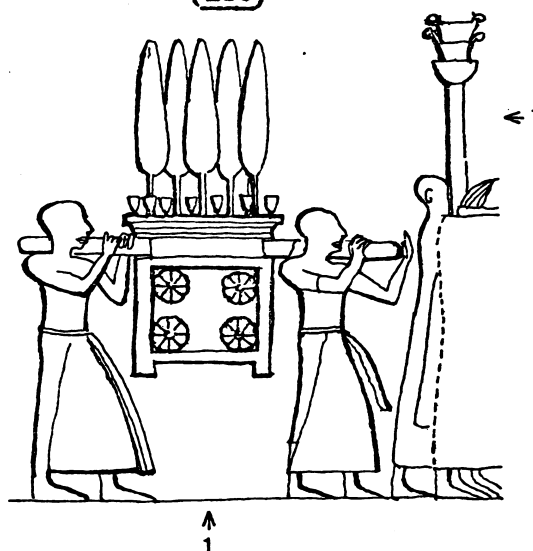


Figure 80:
Wall Relief - Mortuary Temple of
Ramesses III, Medinet Habu
Part of the festival procession
to the god Min. Lettuce(grid ref.1.1)
is carried on a portable flower box.
20th Dynasty. (72)

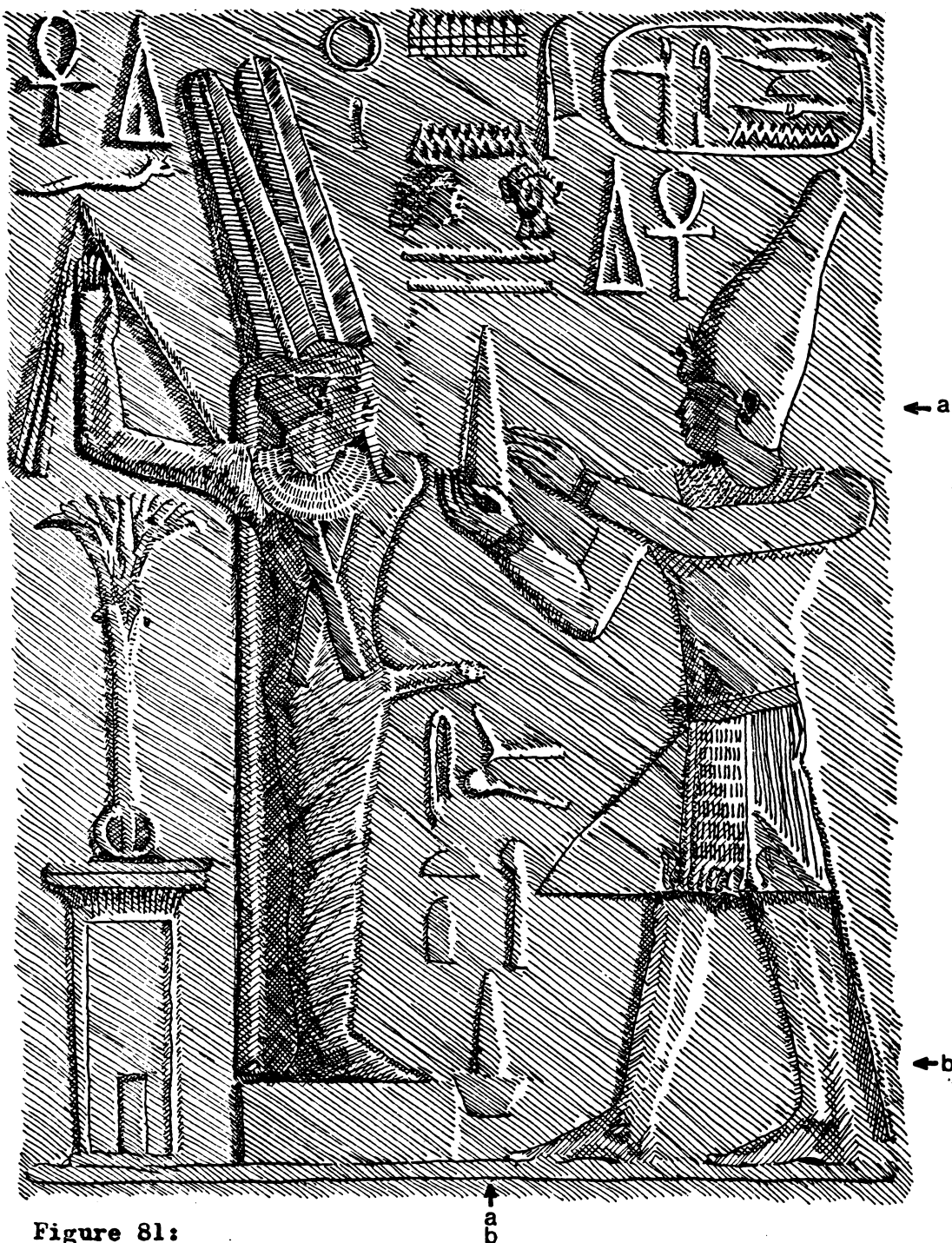


Figure 81:

Pillar Relief, Sesostri I's temple at Karnak - 12th Dynasty
Sesostri I presenting a votive gift to the god Min. (182)

Note: Previously unidentified form of lettuce, Grid ref. a.a
" " b.b

Pre-Dynastic:

The Min statues from Coptos are fertility idols, they are direct descendents or can be directly compared with hunting symbols which use antlers as symbols of fertility in the Magdalenian Period. The

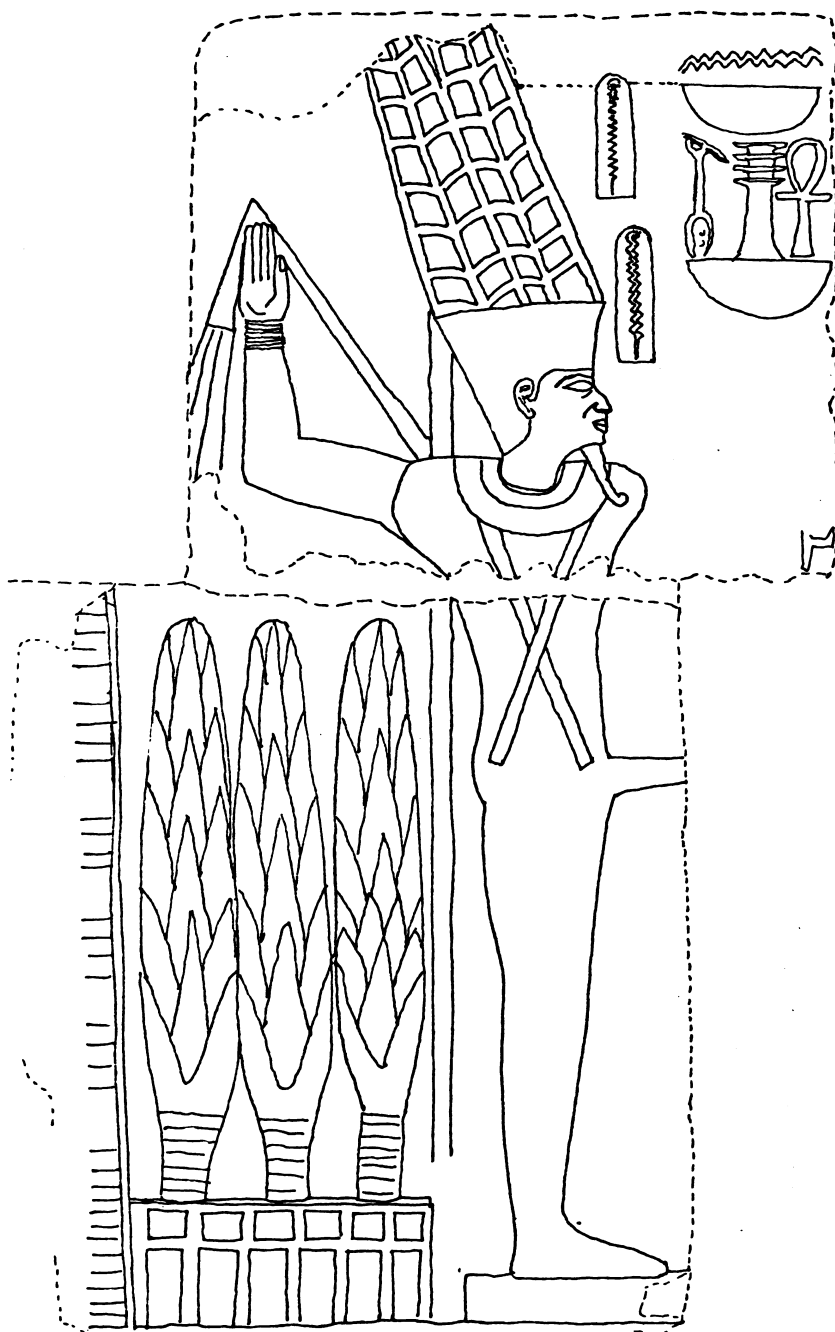


Figure 82:

Limestone Relief depicting Min in characteristic attitude - 17th Dynasty.

Note: Headed lettuce with leaf scars

feathers are phallic, the body is formed like a pillar, covered with many cupules in the very ancient statues, symbolising vulvas, pointing to an androgynous being. Min became Min-Kamutef "bull of his mother" meaning "self-creator".

Dynastic:

Min became Min-Amon with all the ancient traditions incorporated, although he "remained a stranger in the community of the gods of light such as Horus and Isis with whom he was sporadically associated." Later, in the Middle Kingdom the highest god Amon assimilated Ra, becoming Amon-Ra and finally incorporated Min, the ancient fertility god. Even in 12th Dynasty, Amon assumed an ithyphallic form with the same associated symbols. (50)

There is considerable debate as to the identity of the forms shown in grid ref.1.1 because of their obvious appearance linked to tree-forms. Keimer (206) completely disproves this contention.

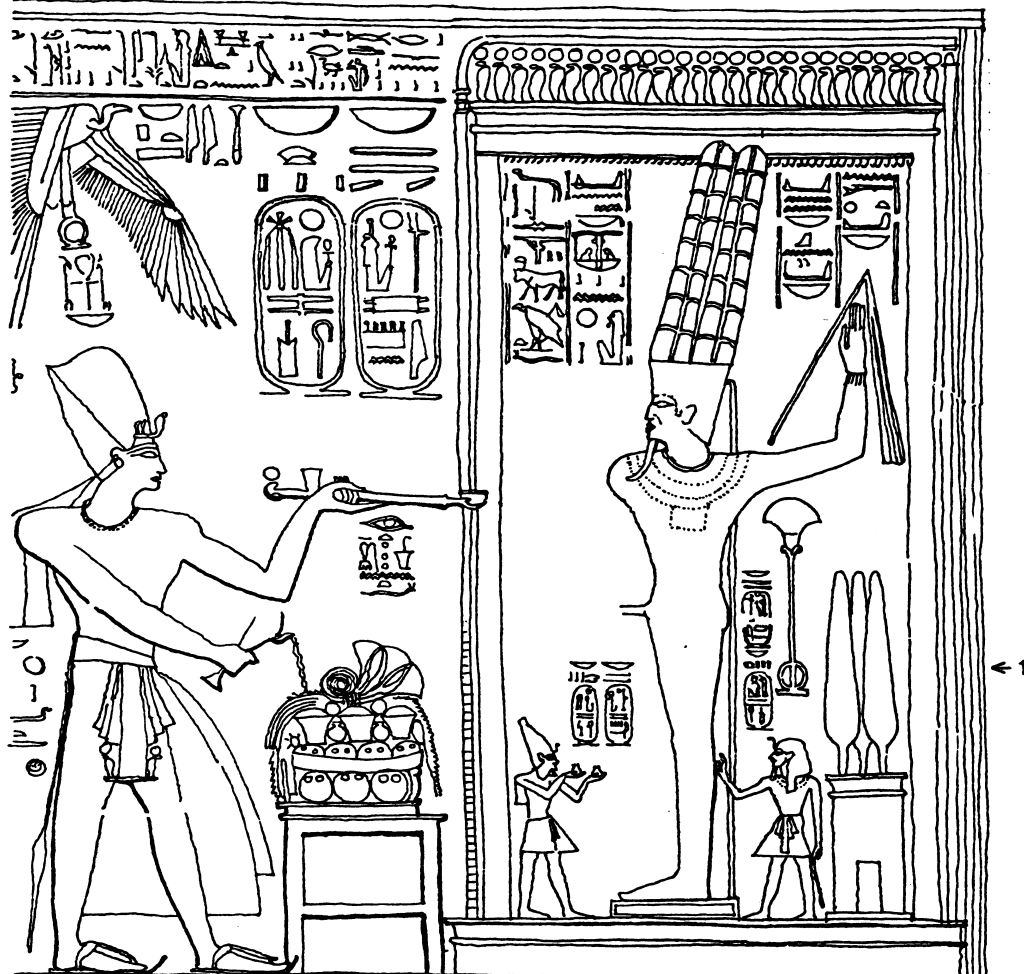


Figure 83:

Wall Relief - Part of festival scene of Ramesses III
Medinet Habu- 20th Dynasty, (50). Pharaohic offering to
Min.



Figure 84:
(200)

Wall Relief - Hypostyle
Hall at Karnak, Seti I
presents "bouquets" of .
lettuce to Amon-Minu,
Isis stands behind.
Note: various forms of
lettuce, headed and open
leafed - probably the use
of lettuce that has dev-
eloped the seed stalk
would be avoided due to
the absence of readily
flowing sap and the con-
fused symbol which would
result.

All illustrations shown hereunder are lettuce plants in various forms where marked - "a."
(c.f. Keimer's ref. sketches reproduced in Fig. 72)

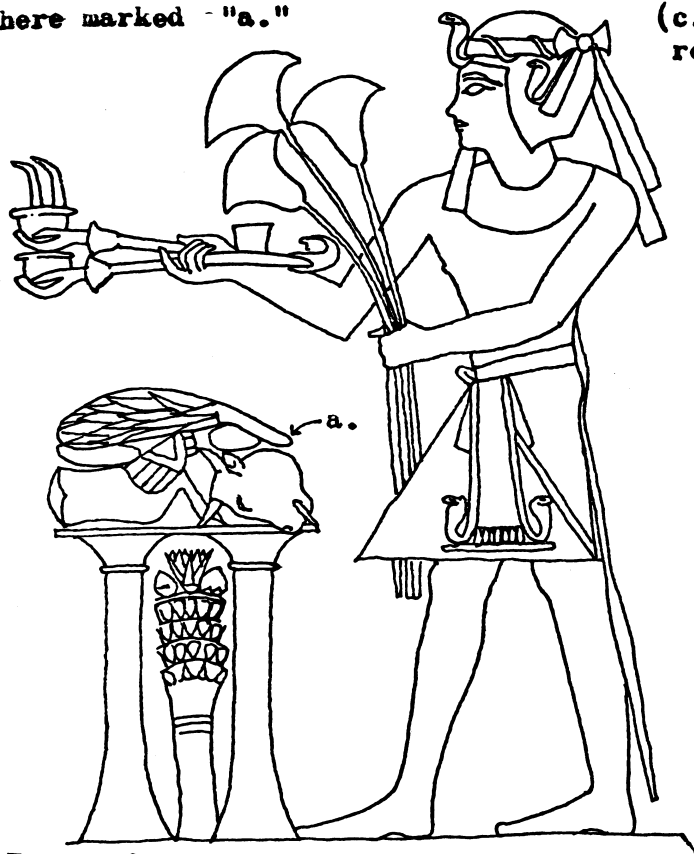


Figure 85:
Pharaoh offering a sacrifice (276)

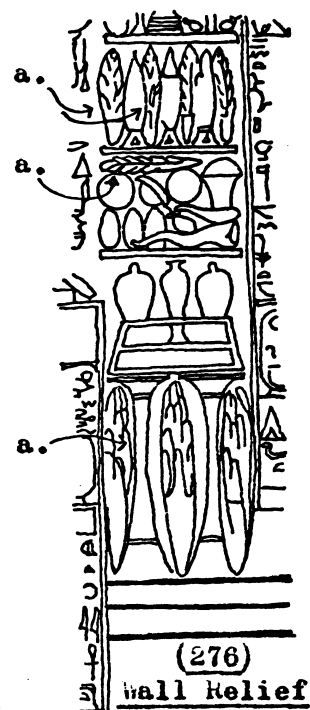


Figure 86: Deir el Bahari
to the goddess Hathor.

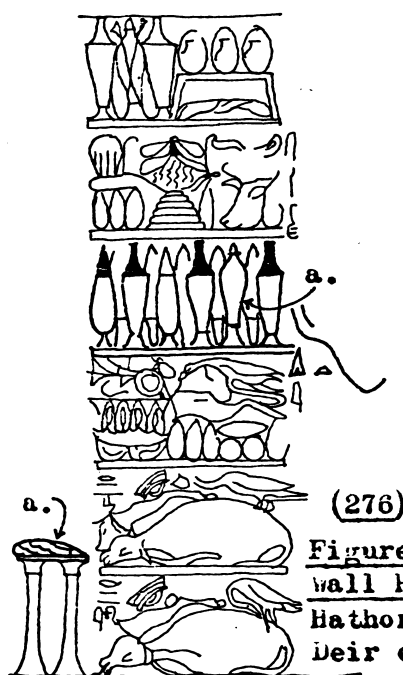


Figure 87:
Wall Relief
Hathor
Deir el Bahari

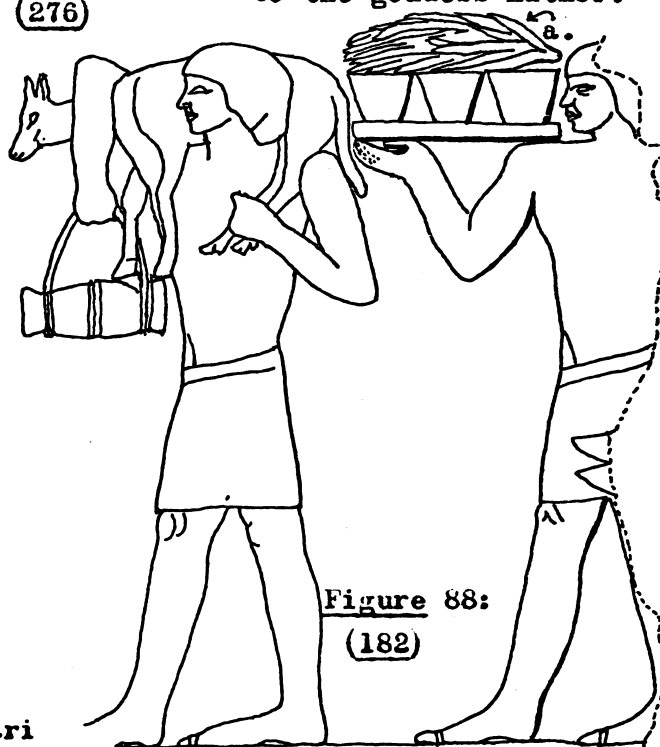


Figure 88:
(182)

Limestone Relief - 5th Dynasty
presentation of gifts, Abu Sir

The Macroclimate of Lower Egypt and the Nile Valley

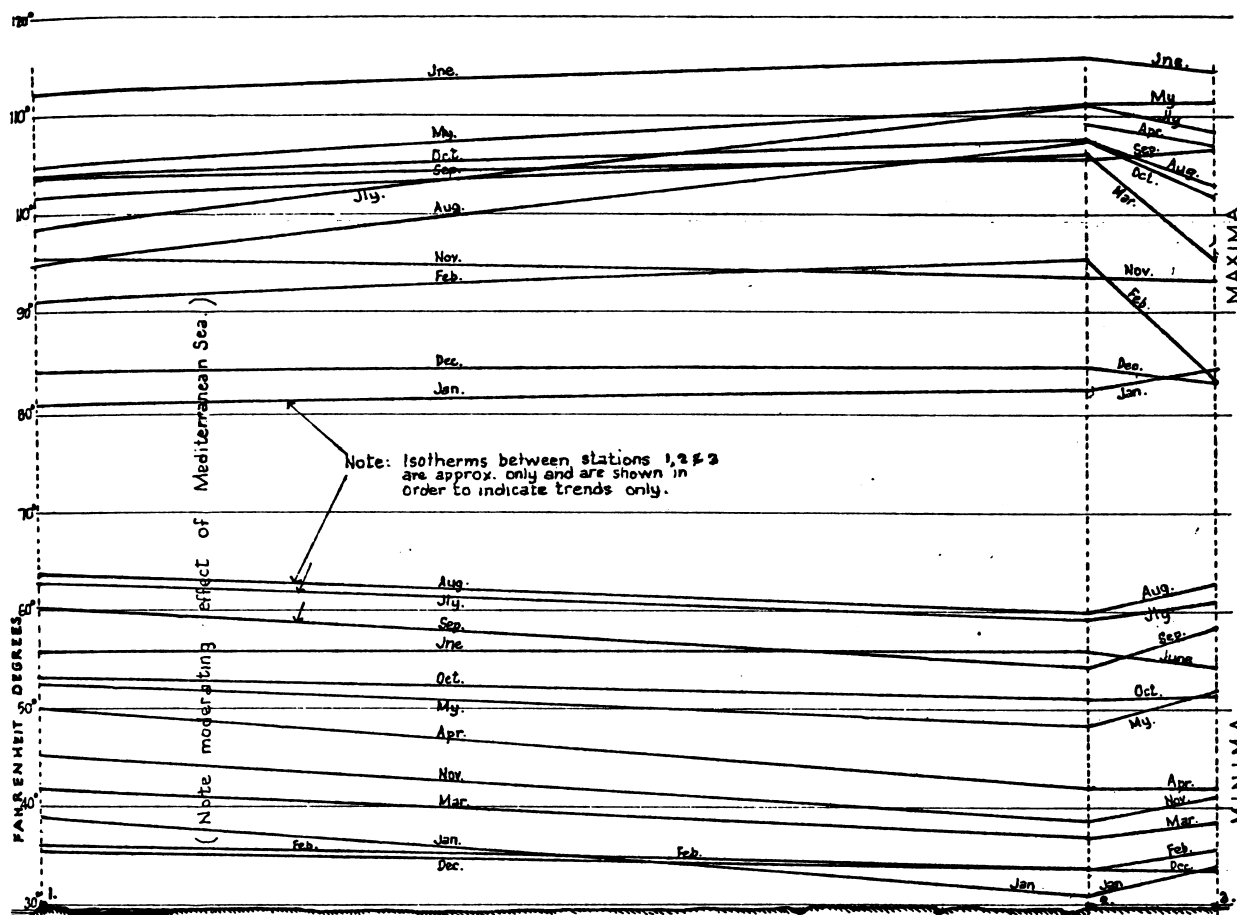
The territorial division of Lower Egypt is represented in the area of the complete Nile Delta, it is divided from Upper Egypt (The Nile valley) at the parallel of 30deg. N. just south of Cairo. The climate is characterised by a hot summer tempered somewhat on the coast by the waters of the Mediterranean, a mild winter, a scanty rainfall in the winter months which does not extend southward beyond the delta of the Nile. The relief of the country is low, a system of comparatively high atmospheric pressure exists throughout the year over that part of the North African coast which lies to the west of Egypt so that all the conditions are favourable for the development of the arid and semi-arid types of climate. Although, in winter the weather is at times unsettled during the passage of depressions over the eastern Mediterranean, the weather conditions of northern Egypt are very stable in their character and remain the same for days and sometimes weeks together. November to February are the winter season having cloudy skies, occasional rain and south-westerly winds; March and April are months of transition to the summer conditions which are established by May and continue into September and October which is the month when the change from summer to winter conditions takes place.

The normal air circulation over Egypt is northerly and the winds blow round the north African high pressure system over Egypt and the Red Sea towards the low pressure system which at this season exists in the Sudan. In Lower Egypt, this normal circulation is interfered with by the cyclonic depressions which traverse the Eastern Mediterranean and cause S.Westerly and Westerly winds, however, in Upper Egypt, northerly winds blow steadily throughout the year. These cyclonic depressions acting within the 70 deg. isotherm would give Huntington (v.Sec.1,Chap.3) his necessary pre-conditions for the growth of a virile civilisation.

Air temperature is of special interest because of the critical role it plays in the growth cycle of Lactuca sativa, (v.Table 10.) Maximum and minimum temperatures were compiled (211) for three meteorological stations in Lower Egypt and isotherms were drawn from these figures, plotted in Table 12(a), the isotherms correlated with topography are shown in Table II on p.197.

Source Ref.		Vegetative growth -heads formed without inflorescences at temps.		Premature seed stalks(bolting) could be form- ed at temps.		Reproductive growth inflorescences heads at temps.		"Open leaf" growth heads do not form at temps.	
		> °F	< °F	> °F	< °F	> °F	< °F	> °F	< °F
(120)	(A)	-	70	-	-	-	-	-	-
(2)	(B)	-	-	-	-	70	80	70	80
(2)	(C)	60	70	80	60	-	-	-	-
(215)	(D)	Day length increase 60 enlarges	70 head size	70 to seed 1 month early	-	70 "materially hastens seeding"	-	-	-
(215)	(E)	50 Heads formed one month earlier than (D) above.	60	-	-	-	-	-	-

Table 10: Summary Table of various temperature ranges quoted by various authorities (given as a bibliography reference) as being critical in the vegetative and reproduction cycles of *Lactuca sativa*.



SECTION ALONG a.a (below) SUPERIMPOSED UPON VERTICAL °F SCALE

11(a)

°F. MAXIMUM AND MINIMUM MONTHLY TEMPERATURES.

Readings for Alexandria (station 1), Cairo (2) and Helwan (3) are taken from "Notes on Climate and other subjects in Eastern Mediterranean and adjacent countries", Admiralty and War Office, H.M.S.O. London (21).

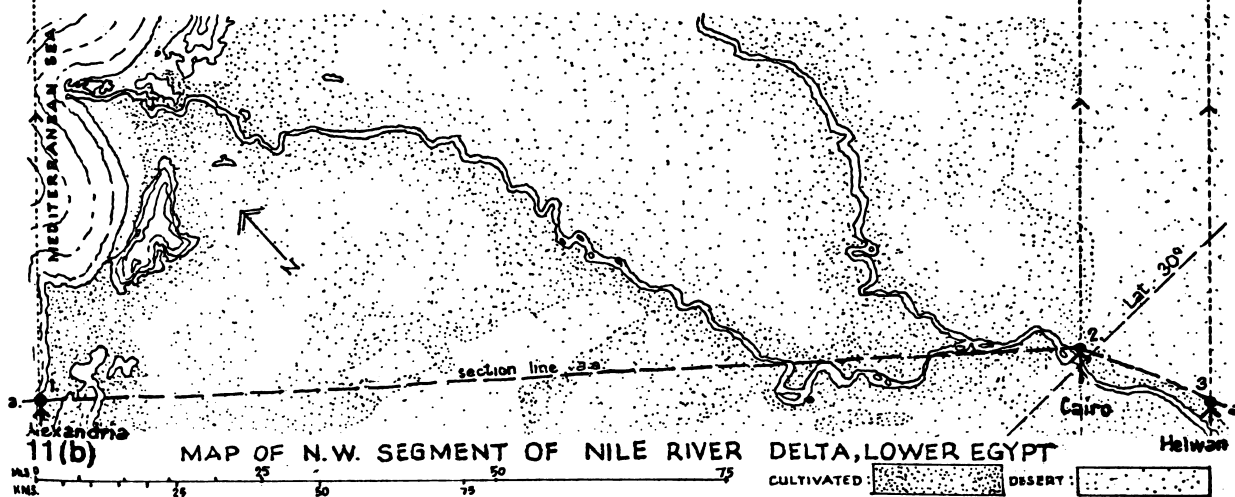


Table 11. Correlation of isotherms with topography of Nile Delta in Lower Egypt.

The absolute maximum monthly temperatures which occurred in Cairo, over the stated number of years (and from which Table II was compiled) were as follows:-

were as follows:-

30-45						
Month	Alexandria years		Cairo 18-45 years		Helwan 9 years	
deg. F.	Max.	Min.	Deg.F.	Max.F.	Min.	Deg.F.
Jan.	81.0	39.2	82.6	30.7	84.9	34.9
Feb.	91.4	37.4	95.5	34.2	84.2	37.2
March	102.9	41.9	106.2	37.8	95.7	38.1
April	102.2	50.0	108.7	42.3	107.8	42.3
May	104.9	53.6	111.6	48.2	111.2	52.0
June	112.8	56.8	116.0	57.2	114.8	55.4
July	98.6	63.5	111.7	59.0	108.3	60.8
Aug.	95.0	64.4	106.9	59.9	103.6	63.0
Sep.	104.0	60.3	105.8	55.4	106.2	58.3
Oct.	103.8	54.0	107.8	51.4	104.5	50.7
Nov.	95.0	46.4	94.1	38.3	93.2	42.3
Dec.	84.2	37.4	84.9	33.8	83.8	34.3

Table 12 (a) Macroclimate of Egypt - monthly temperature maxima/minima at three meteorological stations in Lower Egypt, Nile Valley

Month	Alexandria	Cairo	Helwan
Jan.	44.4	35.9	38.3
Feb.	42.6	39.3	39.7
March	48.2	43.0	43.3
April	52.0	47.1	48.0
May	58.5	54.3	55.0
June	64.9	61.9	61.2
July	68.7	65.1	64.0
Aug.	71.1	66.6	65.8
Sept.	66.0	60.9	61.9
Oct.	58.5	56.8	55.6
Nov.	53.4	46.4	47.8
Dec.	46.8	41.0	42.8

Table 12 (b) Macroclimate of Egypt - mean monthly temperature minima (F.) at three meteorological stations in Lower Egypt, Nile Valley
(211).

Table 12(b) was compiled (211) for comparison with a statement made by the Plant Division of the N.S.W. Dept. of Agriculture. From this source, it was found that lettuce had been established as growing heads in areas where the mean monthly temperature is not greater than 55-60 degrees F. Some allowance for acclimatisation should probably be allowed here but the acclimatisation of the "Cos" lettuce would not have had such a long period to occur from the original primitive strain to Egyptian times when compared with the period of time elapsed to the present day. It appears that lower temperatures are not critical compared to those higher than 70-80 degrees F.

Climatic changes which may have occurred since the Old Kingdom were taken into account. The changes that have occurred since the 4th mill.BC., were related to pluvial maxima which occurred in 7000, 5000 and 3000 BC., at which time (2350 BC.approx.), the mid-Holocene dry and warmer period commenced (94). Reference is also made to the fact that from 2350-870 BC. was a "hyper-arid climate with accelerated aeolian activity". (ibid)

Refer to climatological fluctuations on the top of Chart No.I (back cover) for average temperature differentials which give some idea of the changes that have occurred compared with the present day climate. For the temperature in a) 4000 BC.deduct $2\frac{1}{4}$ deg.F from present temps.

b) 2500 BC. " 1.8 " " "

c) 500 BC. no change

However, these differentials appear to be insignificant when compared to the 10 deg.F. temperatures ranges shown in Table 10 and for the present purposes, they will be ignored.

From Tables 11 and 12(a), it is clear that it would not have been possible to raise lettuce to form heads in any other months than January or December, considering the maxima of temperatures, and July or August, considering the minima. However, as they were raised in Egypt, the required range of 60-70 deg.F., had to be incorrect in one or both particulars.

From Table 12(b), it is apparent that lettuce may be grown during January, February, March, April, November and December. However, the remaining months would have presented problems to the priests requiring offertory lettuce for Amon (q.v.). Consequently, to have these important plants all year round would have required a considerable degree of micro climate control. It is possible, that by the use of shading devices some temperature control was achieved. However, there is no way in which plants could have been prevented from going to seed in any of the months other than December and January in Alexandria and Cairo, and December, January, and February in Helwan.

Considering the trend of the isotherms on Table II, it appears that conditions for lettuce growing improved if the growing sites were located further south, in Upper Egypt. Making an approximate allowance for this trend, it may be concluded that headed lettuce plants would have been available for temple use in Upper Egypt during the months of December, January and February (with a remote possibility of success in November).

When the funerary plants of Egypt were being researched as possible indicators, the subject was unresolved because of them being transported by sea, packed in sand (suggested by Gothein (223) as the method used for bringing roses to Egypt in the Roman period).

It would not have been possible to apply this method to the preservation of lettuce heads (because of their extreme perishability), so it must be concluded that the plants were grown indigenously and would have needed microclimate control methods to have been used during the months of March, April, May, June, July, August, September and October. These methods had to be efficient enough to have reduced maximum temperatures as follows, (comparing from Table 12(a) and using the potentially successful months of January, February and December as criteria):

March	16 deg.F. approx.	July	23 deg.F. approx.
April	23 "	Aug.	19 "
May	26 "	Sep.	21 "
June	30 "	Oct.	20 "

There is an obvious disparity between the results of experimental work that has been done overseas on other varieties and the circumstantial facts of the survival of "Cos" variety in Ancient Egypt. I am indebted to Dr. Nichols of Massey University, Palmerston North, New Zealand for his comment "that the problem is made more difficult by the general absence of "Cos" lettuce from the world growing markets and the consequent lack of a commercial stimulus to research." Yet the variety is, in the opinion of some English people, palatable, crisp and preferable to the soft "cabbage" types. From climatic tables supplied to him by the writer, Dr. Nichols concluded: "In Egypt the lettuce might be expected to head only in January, February, March, November and June, and would go to seed at other times."

It is dangerous to extrapolate from the morphogenetics of commercial lettuce to "Cos" lettuce, but it is a tempting hypothesis and seems reasonable, remembering that "Cos" seems to have been a wildling strain from cold climate countries.

As Dr. Nichols has observed "butterhead" and other types grown in the Imperial Valley, California, where temperatures soar to 100 deg. F., and if these high temperatures prevented head formation, then it seems reasonable to infer that "Cos", a cold climate genotype, could not withstand 115 deg. F. (vide Tables 12 (a), 12 (b), p.198) without exhibiting reproductive growth, if in fact, it could survive at all. There is obviously a circumstantial case for the existence of devices known to the Ancient Egyptians, which by use during at least three of the critically hot months, were sufficiently effective as a microclimate control methods to modify ambient temperature conditions by a reduction of at least 15 deg. F. and possibly even more.

Two factors remain, that the morphogenetic characteristics of various genotypes could differ and the possibility of acclimatisation. In the former case, it appears that not enough horticultural and genetic facts are available, in the latter, some considerable range of temperature tolerance could have occurred as the result of selectivity over centuries of careful horticultural empirical observations

carried out by these people.

The case for the Egyptians use of control methods which could have effectively changed the microclimate in the vicinity of their sacred plants, appears to be circumstantially established as does their continuous need for fresh specimens.

The type(s) of methods used are, however, far from clear. No method depicted on texts or in artforms seen by the writer, to date, could have achieved the degree of control which was apparently necessary, although proximity to water and shading devices can modify a microclimate but not to the extent required. Prof.

Milthorpe and the State Meteorological Bureau have both commented that shading devices could not achieve the necessary temperature differential.

In order to better understand the effect of temperature on the growth of Lactuca sativa, a "growing-on" experiment was conducted by the writer using var. Longifolia Lam. ("cos" lettuce) with morphological characteristics which ultimately bore a close resemblance to Keimer's illustration (206) Fig.66, p.183.

Detailed records were kept for a growing period which commenced 7th June, 1973 and terminated, for all practical purposes, on 1st December, 1973. These figures are in the writer's possession and consist of a daily maximum and minimum temperature recording together with an observation of the morphological changes in four specimens as they progressed through the vegetative and into the reproductive cycles of growth. Other recordings were also taken concerning the microclimate of the soil. However, these figures do not form part of the observations which follow. The experiment is only briefly summarised here due to the limitations of space and the fact that the work only has a very general application to the conditions that may have existed in Ancient Egypt.

The climates of Helwan Egypt is (and was) extremely hot compared to Sydney, Australia and yet some general observations may be made from the experimental results.

		Maximum	Minimum
1973	July	78 deg. F.	37 deg. F.
	August	83	34
	September	90	41
	October	87	49
	November	96	52

It is interesting to observe that "bolting" occurred during the course of this experiment and appeared to correlate with the incidence of a period of temperature in the range of 78-85 deg. range lasting several days.

Comparing the figures on P.196, a reasonable correspondence was observed, bearing in mind that this information refers to Lactuca sativa in general. Some correspondences can be seen between the monthly maxima for Helwan in Egypt (v.p.198) and those obtained experimentally for Sydney, Australia.

If one subscribes to the various theories correlating a change from vegetative to reproductive growth with an elevation to 80 deg.F. and higher temperatures then it must be concluded that the Egyptian (Helwan) summer months of March to November would have produced an impossibly hot environment to raise lettuce to heads, while the remaining three months also record maxima above the apparently critical 78-80 deg. F. range. It seems reasonable to conclude that some climate control devices were used in Ancient Egypt, otherwise these sacred plants could not have been raised to form "heads".

When the extent of the Ancient Egyptian's empirical knowledge of hydraulics is taken into consideration, there remains an interesting possibility that the equivalent of the modern mist spray method of temperature control could have provided both the necessary abundance of water, as well as the only practical means of depressing the macroclimate temperature by the necessary differential of approximately 30 deg.F. However, this is circumstantial and conjectural and must remain as such until further evidence is uncovered to support or refute these ideas or, as Dr D.M. Dixon of University College, London has written (pte.comm.) "until archeologists show considerably more interest than hitherto in the less 'glamorous' aspect of their work."

"MAN-ENVIRONMENT NEXUS" SUMMARISED ANALYSIS DIAGRAM NUMBER E

CULTURE

: **Pre-Dynastic and Dynastic Egypt.** (see appendix A for details)CULTURAL EPOCH: **Chalcolithic and BRONZE**TIME PERIOD : **Early HOLOCENE**

METHODS USED TO MODIFY THE ENVIRONMENT AS OVERT EVIDENCE OF NEEDS SATISFACTION

Individual:

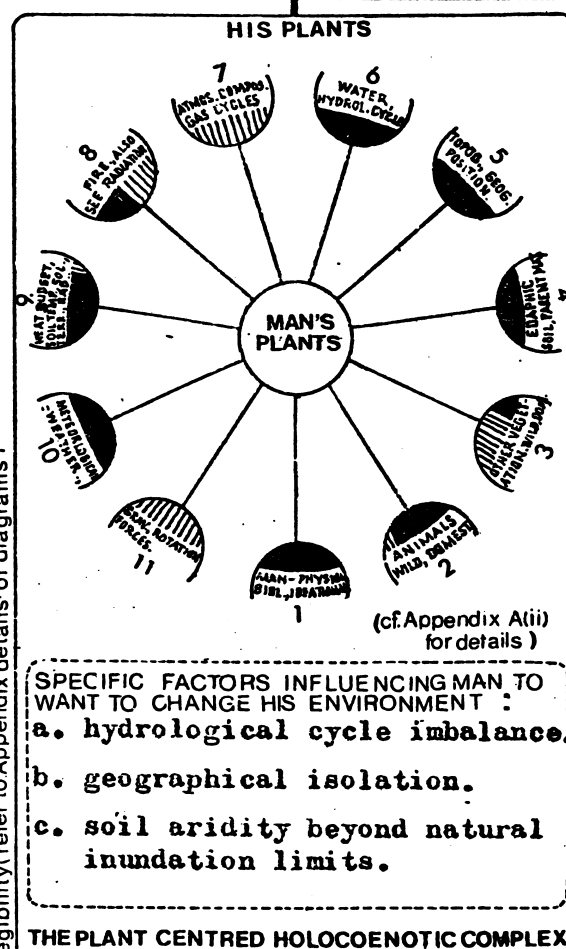
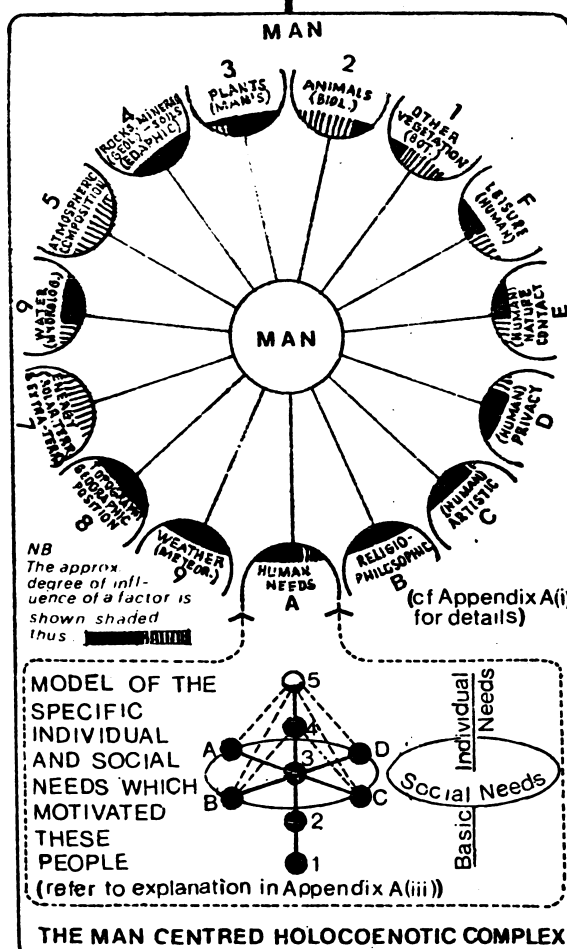
- Selection of sites for topographical advantage.
- Irrigation methods.
- Courtyard elements.
- Structural systems.

Social:

- Selection of sites for satisfaction of socio-economic and socio-political requirements.
- Security needs and socio-political protective elements.
- Structures.

DESCRIPTION OF THE MACRO ENVIRONMENT GENERALLY:
Riverine Civilisation: Arid desert. Hydrological cycle dominated by flooding of Nile river. Minimal rainfall and cloud.

FACTORS HAVING A BEARING ON MAN AND HIS PLANTS AND INFLUENCING HIM TO ALTER HIS MACRO-ENVIRONMENT (AS THEY PRINCIPALLY AFFECT HIM AND HIS PLANTS):



(All factors continuously interact, only those which are dominant have been included in the diagrams.)

Table 13.

CHAPTER 9

Having attempted to review the historical and archeological evidence of the results of man's motivation to fulfil his basic needs, it appears there has been a continuing gradual upward trend in his evolution curve towards the fulfilment of his higher needs. This has occurred regardless of the minor fluctuations and declines of individual societies.

The one constant motivating force has always been his search for a means to control his environment by substituting a micro environment of his own.

Of necessity, the summary in Appendix B (to illustrate Chart No. I on back cover) is far from exhaustive of the research material available. It has been chosen to illustrate man's efforts at individual and social needs fulfilment through his employment of man-made environments. Chart No. I indicates fluctuations in levels of achievement of needs satisfaction in correlation with a scale showing the basic needs as categorised by Maslow in ascending hierarchical order. Maslow's classification of basic human needs designates "self esteem" as a necessary component of the healthy personality. Its deprivation, he likens to the withholding of minerals and vitamins in relation to the health of the body.

However, self esteem arising from pride in work, necessary to the mental health of, say, a medieval stonemason, is also, in an exaggerated form, the "self aggrandisement" of Le Roi Soleil.

"Self aggrandisement" requires a sustaining social environment in which to exist. Should such an environment, by birth or circumstance, provide an excess of esteem, then it becomes a secondary or derived need existing in its own right, without being a necessary condition for the health of the organism. So kings, nobles, priests and the "elite" in general, are prone to this deflection of a basic into a neurotic need. History abounds with examples of "self aggrandisement" carried to excess, requiring the support of the "masses" for such symbols of immense pride to be effective and it has always been the fate of the common people to provide this raw material from which grandiose

schemes are brought into being.

For tens of thousands of years, the common man's labour brought little in return - other than simple levels of needs fulfillment. Consequently, the graphical presentation of his gradual improvement in needs satisfaction (vide Chart No.1, back cover), shows a very slow upward trend which, with occasional exceptions, was dependent upon political, religious and social leaders being able to introduce humane reforms which brought better living conditions, dignity or self respect to societies retarded by the absence of suitable environments for needs satisfactions and healthy growth.

Civilisations were born, peaked and died with human energy as the reservoir upon which the "elite" drew to realise their egoistical schemes. However, with Roger Bacon, Wycliff and other enlightened teachers and leaders, the Renaissance and Reformation saw a substitute for superstition and priestly power. Slowly, scientific method provided the technology for the development of energy sources, other than human, which were to liberate man from various forms of physical enslavement and bring social reforms to cater for his higher needs. In this new knowledge, factors were present for liberating the masses from the necessity of providing the means for the "elite" to realise their grandiose schemes.

With the industrial revolution, the potential for man's liberation had begun, at present the "haves and havenots" are polarised into countries, not just classes. With exceptions, the "advantaged" countries now contain a majority of the "elite", a new upper middle class; the "disadvantaged" countries contain the underprivileged poor. One country uses others for its "self aggrandisement" needs satisfactions in the way that the "elite" used the masses in the past; except that there are now many more teachers and leaders presenting philosophies of self esteem and individual worth and socio-educational aids communicate these ideas to the underprivileged. This creates resentment and frustration when "what could be" is contrasted with "what is", from this the motivations to action follow once the physiological needs are taken care of. Perhaps the countries that are at present

underprivileged will receive help from the advantaged ones on a larger scale than at present, as their developing social conscience (as a new Needs 5 fulfilment) unfolds.

For the first time in the history of the human race, it is possible for large numbers of people to be born into advantageous circumstances, adequate for the fulfilment of their lower needs from birth, and so provide a fertile field for the development of the higher, in natural progression and correct hierarchical order.

From good social environments, it is possible for whole communities to achieve "self-actualisation", the only completely healthy condition for man and yet one which is ignored in the negativism of emphasising the sick, neurotic and psychotic that has been the basis of psychiatry and most of the psychology of the past.

In this new condition of enlightened social environment, there still exist the same old barriers to man's proper "self realisation". At present, socio-educational systems are inadequate to allow the common man to cope with new factors, some of which have existed in the past for the "elite" only; a new flexibility to accommodate continuous change is necessary and survival may depend upon a new natural selection, no longer by aggressive competition but by gentle co-operation and care for others with its attendant stress reduction and conservation of the human organism.

In such a context, it is not inconceivable that Erich Fromm's new age could arise. (116)

"It is not too far-fetched to believe that a new religion will develop within the next few hundred years, a religion which corresponds to the developments of the human race; the most important feature of such a religion would be its universalistic character, corresponding to the unification of mankind which is taking place in this epoch; it would embrace the humanistic teaching common to all great religions of the East and the West; its doctrines would not contradict the rational insight of mankind to-day, and its emphasis would be on the practice of life, rather than on doctrinal beliefs. Such a religion would create new rituals and artistic forms of expression, conducive to the spirit of reverence toward life and the solidarity of man. Religion can, of course, not be invented. It will come into existence with the appearance of a new teacher, just as they have appeared in previous centuries when the time was ripe. In the meantime, those who believe in God should express their faith by living it; those who do not believe, by living the precepts of love and justice and - waiting".

Only lately, has the young science of ecology made it possible for the beauty of exquisitely balanced natural systems to be appreciated. These systems, having taken millions of years to evolve, have only taken 600 generations of human interference to become radically altered.

Two crises have evolved simultaneously. One crisis is focussed upon the anxiety and aggression resulting from the frustration of unfulfilled needs and the effects of misdirected needs (as in the neurotic, addiction, habit, familiarisation and fixation needs) (106). These once retarded the evolution of the tribe, now they affect the world community; it is a difference of scale only, the basic unit, the human being, remains unchanged. The man who hunted, burnt and planted unbalanced single crops 10,000 years ago, still eats basically the same foods, is subjected to the same basic needs and associated glandular responses, expressing them in successful or thwarted actions as did his pre-historic counterpart.

The other crisis is focussed upon the result of man's scramble to the top of food pyramids, an unnatural and ruthless domination of the trophic levels, which can all exist without his presence. It was a parasitic invasion of natural systems motivated by a desire to change them for reasons of self interest (later justified by Judeo-Christian ethics.) Man has created sickness and disorder in such natural systems in the same way that any parasite depletes its host. The difference being, the balanced mutualistic parasite-host relationship so common in nature, is not present in man's relationship to nature. This is the lowly position from which man must, by knowledge ascend, before being fit to intervene and attempt to reverse the problems he has created.

It is proper respect, awe, wonder, love and even fear of the intricate web of natural order upon which he has the privilege to depend for his life and happiness. It is the same respect, awe and love that St. Francis found in nature, the same respect, awe and fear of nature that Cro-Magnon man portrayed on rock faces and the same awe, wonder and fear that prompted the worship of "Earth-mother, Sky-father." (200).

It can be sensed as impending in the completely new attitude of increasing numbers of people towards care for their planet and for their fellow beings, in the fullest sense of the word.

It could be a new type of religion, I prefer to think it is.

SECTION 3.

"I counsel thee, shut not thy heart nor thy library".

Charles Lamb.

"Cultures, the intricate, highly patterned systems of social inheritance through which each group of human beings attains and maintains the separate special version of the humanity of its members, are from one point of view - human psychology writ large. The differences between the aristocrat and the peasant, the most hypersensitive esthete and the toughest-minded man of affairs, the brooding descendant of a thousand remembered ancestral deeds and the man to whom the past is nothing, the present everything - all the myriad differences which artist and writer find among the members of a complex society like our own can be found embodied in the whole ways of life of other peoples, of other times. (301).

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APPENDIX "A"

The following explanations are given in connection with the "Man-Environment Nexus, Summarised Analysis Diagram" appearing at the ending of various periods. These charts contain three main concepts. The total environment of the age or period being discussed, is described by considering

- 1) its interacting factors related to man
- 2) its interacting factors related to man's plants.

These concepts, when combined, describe the totality of physical, biological and ideational environmental factors.

- 3) The factor "man", is taken in greater detail by deriving a model of the interrelation of the individual and social needs which, when seen in graphic and summarised form, are a visual description of the evolutionary level of that civilisation; the specific overtly expressed needs of a particular civilisation are shown graphically (in a simplified form and shaded on each analysis) and are then read in conjunction with the relevant environmental factors (shown shaded for a particular civilisation).

These interact with man to stimulate his needs and drives, so that he wants to change his environment and these innate ideas and stimuli become expressed in overt acts, many of which change the environment and produce new micro-environments depending upon his technological knowledge and skills. (vide diagrams A1, A2 and A3 listed hereunder)

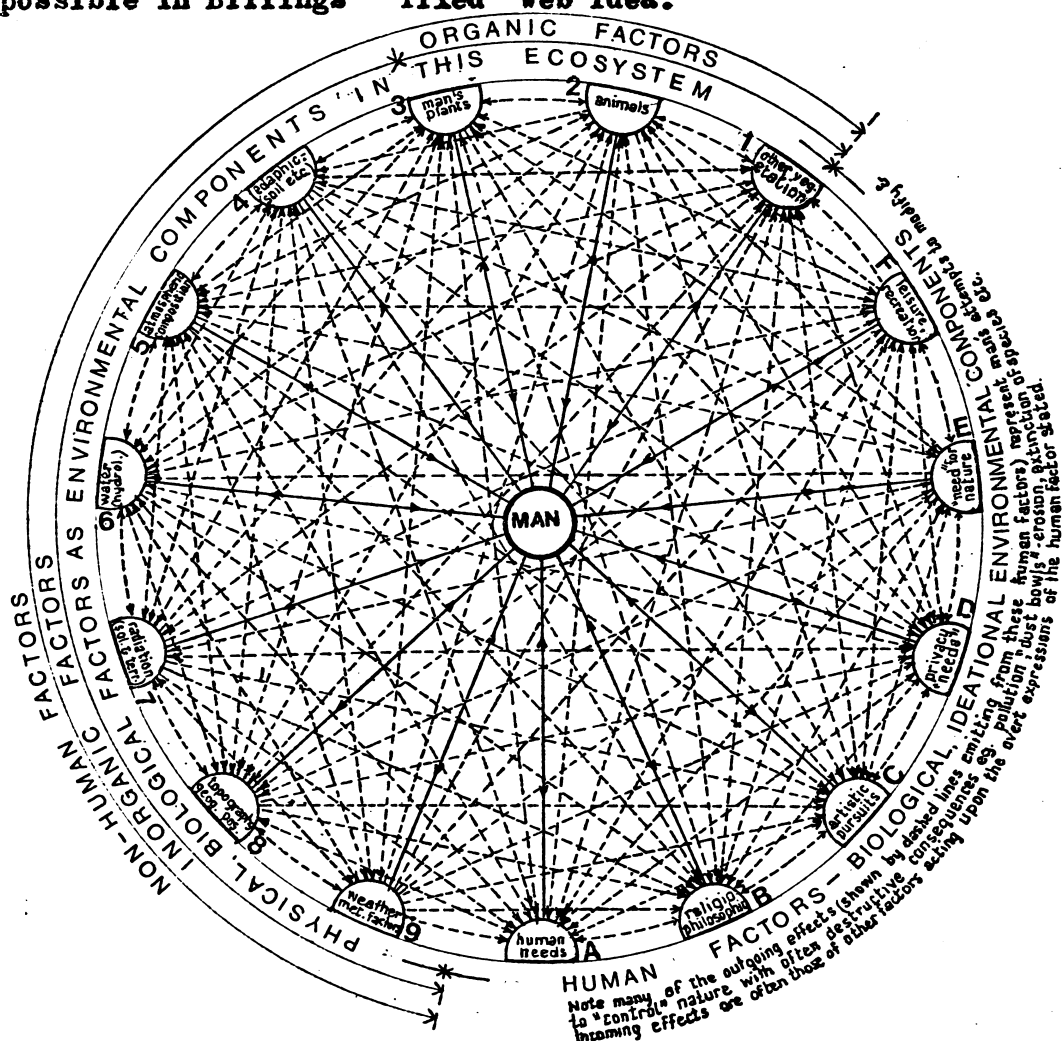
Fig. A.1 - The Interacting Environmental Components of the Holocoenotic Complex considered from an Anthropocentric View p. 228

Fig. A.2 - The Interacting Environmental components of the Holocoenotic Complex considered in Relation plants man grows p. 231

Fig. A.3 - Diagrammatic (3 dim.) Model illustrating the Interrelation of Maslow's Hierarchical classification of the Basic Needs of Individuals with Malinowski's Classification of Social Needs p. 235

Appendix A(i)

DETAIL OF DIAGRAM FORMING PART OF "MAN-ENVIRONMENT NEXUS, SUMMARISED ANALYSIS DIAGRAM" AND ENDING EACH AGE OR PERIOD. Below is a diagrammatic presentation of the complex of environmental factors, physical, biological and ideational (at individual and societal levels). The environmental factors, interact holocoeonotically with man and together form an environmental complex which some ecologists divide into two parts, the physical and biological, but to which the ideational is added here. This diagram is designed as a web but it has been said that it would be better in the form of a "cat's cradle" vide Chap.I. Billings' original diagram may not have intended this but it is suggested here that both concepts may be amalgamated if each factor of the diagram becomes a node with the strands passing through as if unattached. So the web would function as a "cat's cradle" whereby one factor could influence another through intermediaries, a concept not possible in Billings' "fixed" web idea.



THE INTERACTING ENVIRONMENTAL COMPONENTS OF THE HOLO-CŒNOTIC COMPLEX CONSIDERED FROM AN ANTHROPOCENTRIC VIEW.

Adapted from W.D.Billings' diagram ref.106 p.9 – to be read in conjunction with next diag.centred on man's plants

APPENDIX "A" (i)

The following information is given in explanation of the various factors indicated on the Holocoenotic Diagrams (shown in the lower portion of the Environment Diagrams for each civilisation or Age).

HOLOCOENOTIC COMPLEX - MAN CENTRED

HUMAN FACTORS

A. Human Needs

see Appendix A (iii) for interrelation of individual basic needs and social needs.
some of these may later be shown to be new "Needs" per se, or belong to already categorised needs - (A)

Other Human Factors:

B. Religio -Philosophic (pursuits)

C. Artistic (pursuits) - as expressions of individual Needs 5 or of (B) or other, as yet undetermined motivations.

D. Privacy (requirements)

E. Nature (contact requirements)

F. Leisure, Recreational (pursuits)

NON-HUMAN FACTORS:

Organic Factors:

(1) Interaction with vegetation (other than Man's plants)

- (a) Positive factors - sufficiency of vegetation - gathering, collection permanent or semi-permanent living sites (built of plant material)
- (b) Negative factors - deficiency of vegetation - itinerant populations, temporary living sites. (adverse factors in other categories)

(2) Interaction with animals

- (a) Positive factors - sufficient food supply (domesticated and/or wild), permanent (or semi-permanent) enclosures, stockades, etc.
- (b) Negative factors - deficiency of food supply -

Appendix "A" (i) ctd.

enclosures and pits for trapping.
Seasonal living sites for hunters.

- (3) Man's Plants - Agriculture, etc.
 (a) Positive Factors - Sufficiency of plants, crops, etc.-
 cultivation of plants, domestication of
 wild strains, storage structures,
 permanent structures, enclosures etc.,
 more complex social units dependent upon
 greater food storage capacities.
 (b) Negative Factors - Deficiency of plants, etc. -
 lack of technology to change environment,
 itinerant populations (hunter-gatherers,
 etc.) - correlates with other negative
 factors.

Inorganic Factors:

- (4) Soil, Rocks, Minerals, etc (and related geological factors)
 (a) Positive Factors - Supporting plant growth-
 eg. (6.a), mineral rich parent rock,
 organic content, etc.
 (b) Negative Factors - Inhibiting plant growth
 eg. (6.b), over cultivation, over-grazing, etc
- (5) Air
 (a) Movement - (i) wind
 (ii) anabatic and katabatic movements
 (b) Pollution - (i) dust content) As they affect
 (ii) chemical content) solar radiation &
) heat budget.
- (6) Water
 (a) Positive Factors - (i) Natural supply sufficiency -
 eg. rivers, lakes, streams, rainfall,
 ground water, etc.
 (ii) Man-made supply sufficiency -
 eg. aqueducts, canals, field irrig-
 ation technology, qanats, (subterr-
 anean conduits), cisterns, etc.
 (b) Negative Factors - (i) Deficiency of natural supply-
 motivation of construction of items
 in(6.a.ii).
 (ii) Inadequacy of natural supply and of
 knowledge -
 ie. to provide technology for rectifying
 situations.

Appendix "A" (i) ctd.

- (7) Terrestrial and Extra Terrestrial Energy Factors: - Gravity Forces, Rotational Forces - for brevity, the environmental factor having the most obvious overeffects, ie.

Radiation (heat)

- (a) Positive Factors - (i) Seasonal balance with consequent helpful effect on (6).
- (b) Negative Factors - (i) Seasonal imbalance of heat budget producing plant desiccation unless modified (hence food deficiency).
- (ii) Fire - natural or man-made,
(Available world-wide energy budget figures are not complete enough for comparisons to be made.)
- (8) Topography - (vide Section I, Chapter 3, Anthropogeography^{*})
- (a) Positive Factors - (i) Advantageous geographical position
- (b) Negative Factors - (i) Inhospitable geographical position
- (9) Meteorological Factors - Motivating man to modify the environments:
- (a) Positive Factors - "Helpful"
- (i) Temperatures
- (ii) Cloud cover
- (iii) Humidities
- (iv) Incidence of storms (see * above)
- (b) Negative Factors - "Harmful"
- (i) Temperatures
- (ii) Cloud cover
- (iii) Incidence of storms

APPENDIX "A" (ii)

The following information is given in explanation of the various factors indicated on the Holocoenotic Diagrams (shown in the lower portion of the Environment Diagrams for each civilisation or Age).

HOLOCOENOTIC COMPLEX - PLANT ORIENTATED.

ORGANIC FACTORS.

(1) Interaction of man's crops and plants with man

- (a) Positive Factors: eg. Agricultural societies dependent upon protection and storage of large quantities of plant material to support increased populations - motivating many new technologies.
- (b) Negative Factors: Overcropping without corrective technologies.

(2) Interaction of man's crops and plants with animals

- (a) Positive Factors: eg. Adequate technologies to construct enclosures to crops to keep out animals; spread of strains by dung from herbivores, etc.
- (b) Negative Factors: eg. Inadequate technology to protect crops from wild animals.

(3) Interaction of man's crops and plants with naturally occurring vegetation.

- (a) Positive Factors: eg. New strains occur.
- (b) Negative Factors: eg. Competition of crops with naturally occurring plants, result in loss of crops.

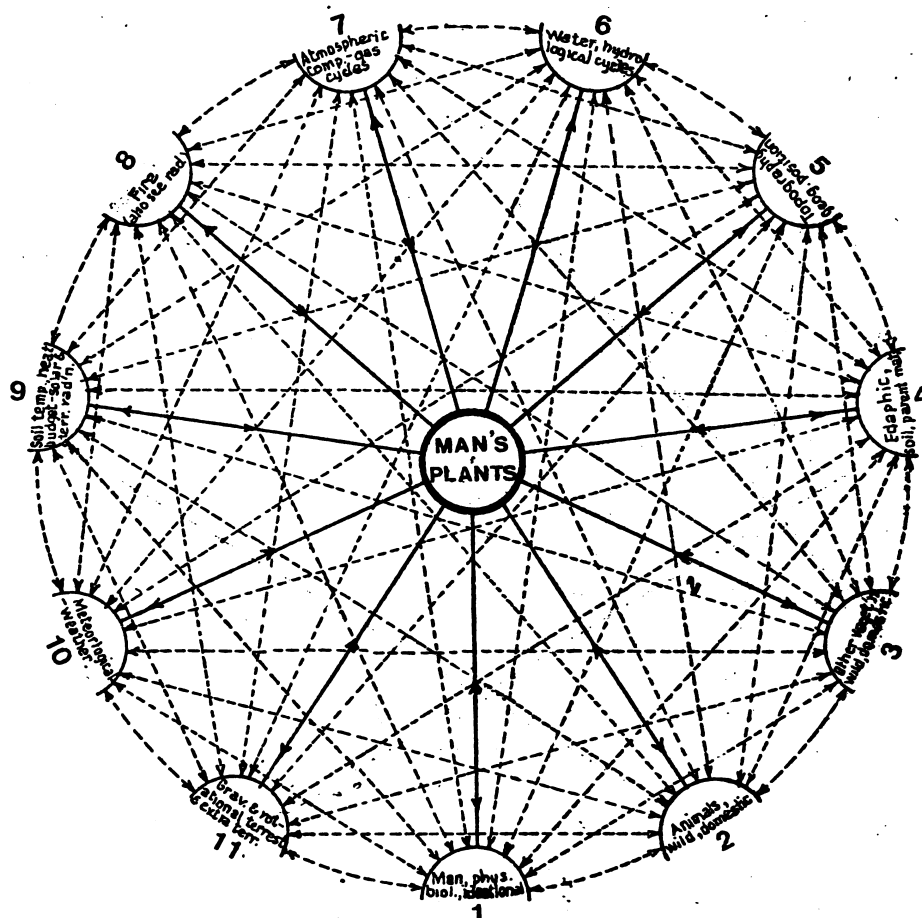
INORGANIC FACTORS.

(4) Soil (and related geological factors, eg. parent material).

- (a) Positive Factors: eg. Depth of topsoil (and rejuvenation), organic content, structure, availability of nutrients, mineral and gas cycles, correct pH requirements for growth - or adequate technologies to produce the necessary conditions.

Appendix A(ii)

DETAIL OF DIAGRAM FORMING PART OF "MAN-ENVIRONMENT NEXUS, SUMMARISED ANALYSIS DIAGRAM" AND ENDING EACH AGE OR PERIOD. On the previous page, the man centred complex, was shown as containing interacting physical, biological and ideational factors. In this case, the environment is shown as centred on man's plants, with man as one physical factor. The factor "man" would contain all the "human factors" shown in the previous diagram including man's creation of the many micro-environments and micro-climates which he devises to improve growth conditions for his plants. In the same way, the previous man-centred diagram contains, under the factor "plants," all the concepts shown here. Together they are summarised, in a simplified form, to describe the man-environment nexus, in the diagram appearing at the ending of each historical or prehistorical age or period. When read together, both these charts describe the totality of factors which make up the macro environment as man knew it, at that particular historical time.



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THE INTERACTING ENVIRONMENTAL COMPONENTS OF THE HOLO-CŒNOTIC COMPLEX CONSIDERED IN RELATION TO PLANTS MAN GROWS

Adapted from W.D. Billings' diagram ref. 106 p.9 — to be read in conjunction with previous anthropocentric diag. Fig. A2

Appendix "A" (ii) ctd.

- (b) Negative Factors: eg. deficiency of topsoils, incorrect pH for growth, ("sour" soils), unavailability of nutrients (or absence of), inadequate technologies to alter these conditions.

(5) Topography - Geographic Position

- (a) Positive Factor: Encouraging growth, eg. river valley.
- (b) Negative Factor: Discouraging growth, eg. desert.

(6) Water - Hydrological cycle

- (a) Positive Factor: (i) Natural supply sufficiency - rivers, lakes, streams, rainfall, ground water, etc.
- (ii) Man-made supply sufficiency - aqueducts, canals, field irrigation technology, qanats, cisterns, etc.
- (b) Negative Factor: (i) Soil - water imbalance (due to factors such as (4), (5) and (7)).
- (ii) Evapo-transpiration imbalance.

(7) Wind

- (a) Positive Factor: Encouraging growth, eg. bringing regular and helpful rain.
- (b) Negative Factor: Discouraging growth, eg. producing desiccation.

(8) Radiation - Fire

- (a) Positive Factor: (i) Encouraging crops, agriculture (related to human needs).
- (b) Negative Factor: (i) Discouraging crops, agriculture (related to human needs).

(9) Radiation (Involving Solar and Terrestrial Heat Budget, particularly soil temperature (including Billings' concept of extreme high and low soil temperatures "compared with relative lack of daily variation" in atmospheric temperature. (108))

- (a) Positive Factor: (i) Encouraging plant growth or stimulating experiments with control methods. (possibly further effects, as yet undiscovered, of extra-terrestrial radiations, etc.)

Appendix "A" (ii) ctd.

- (b) Negative Factor: (i) Discouraging plant growth or inadequate technologies to counteract effects of adverse temperatures.

(ii) Producing cell death due to cold, heat or drying out.

(10) Meteorological Factors:

- (a) Positive Factor: (i) Encouraging and supporting plant growth

- (b) Negative Factor: (i) Discouraging plant growth

(ii) Producing failure and death in plants, eg. frost, cold, desiccation, etc.

(11) Terrestrial gravitational, rotational forces.

- (a) Positive Factor: (i) Moon's influence on plant cycles.

- (b) Negative Factor: (i) " " " " "

(Possible further effects as yet undiscovered)

APPENDIX "A" (iii)

GRAPHICAL PRESENTATIONS OF THE FACTORS WHICH HAVE MOTIVATED MAN TO MODIFY HIS ENVIRONMENT.

"An organism likes to be active and control its environment".

- Devendra Singh's research on humans and animals with his conclusions that an organism chooses to work to control its environment rather than have it arranged for it, concludes that "the important thing appears to be, not that human beings get food, water, shelter" - (i.e. biological basic needs), "but that they get these things in waysthat he does control what happens to him." (217) i.e. It could be a "basic need" for man to re-arrange and "control his environment" or, if it is not a basic need, it is obviously an overt expression of other needs requiring satisfaction, because it is present in the earliest archeological records associated with man's living sites.

Amos Rapaport has listed factors, which he terms "genre de vie" of a culture as

1) some basic needs	2) family
3) position of women	4) privacy
5) social intercourse.	(84)

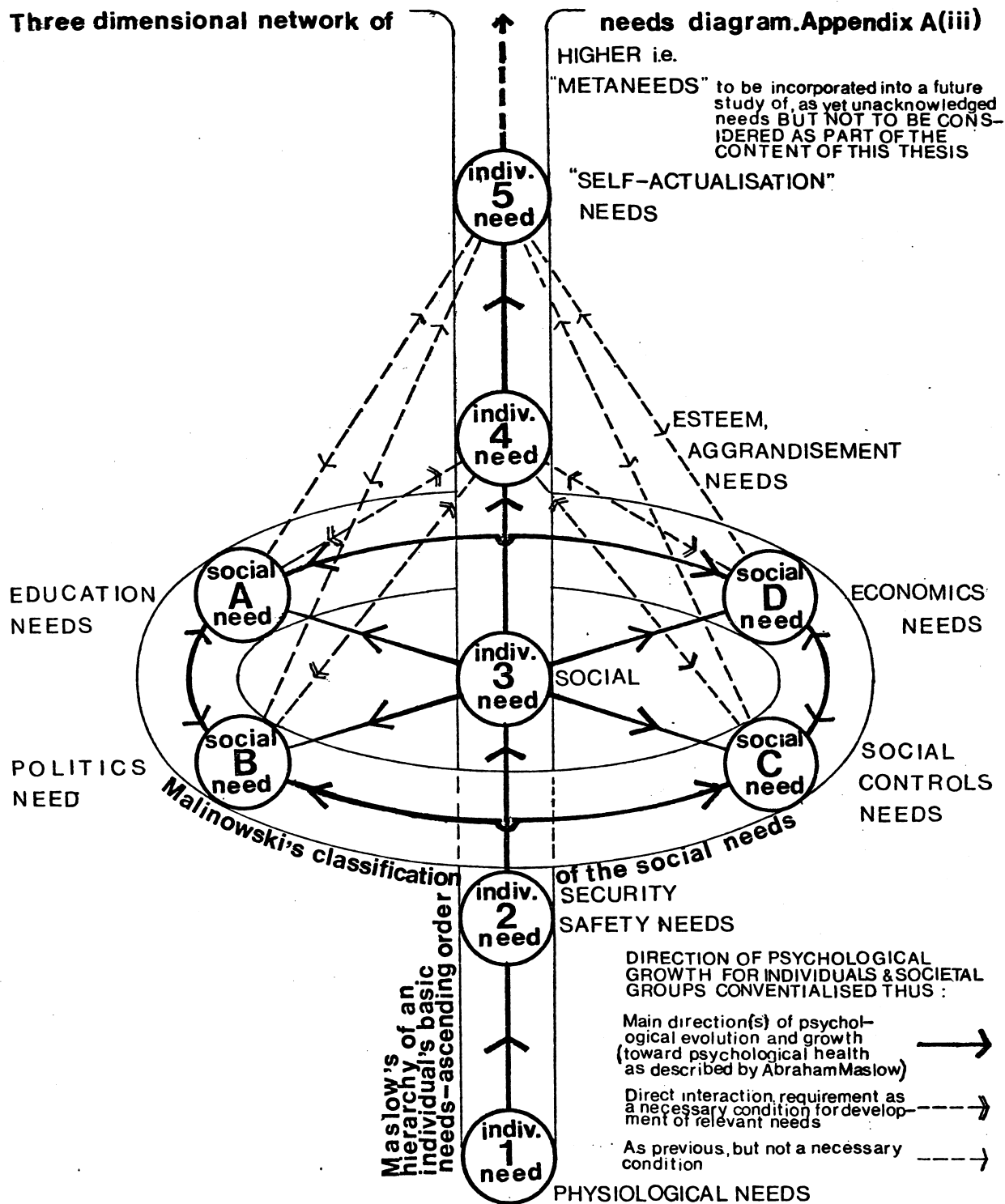
These factors are expanded in his book but the contention here is that they are extensions of the needs classifications summarised in the model (q.v.) together with the imprecise concepts of "privacy", etc. mentioned as other "human factors" in the holocoenotic diagram.

EXPLANATION OF MODEL PRESENTATION SHOWING THE RELATION BETWEEN MASLOW'S CLASSIFICATIONS OF INDIVIDUAL NEEDS AND MALINOWSKI'S (AND OTHERS') CLASSIFICATION OF SOCIAL NEEDS.

(Refer to Man-Environment nexus diagrams for each civilisation or age, where this graphic is included in an explanatory holocoenotic graphical presentation.)

Malinowski's classification of social needs has not been documented as being hierarchical in structure. Maslow's classification of individual needs is completely hierarchical.

The model has been designed so that it is possible to convey (ctd. p. 235)



DIAGRAMMATIC (3 dim.) MODEL ILLUSTRATING THE INTERRELATION OF MASLOW'S HIERARCHICAL CLASSIFICATION OF THE BASIC NEEDS OF INDIVIDUALS WITH MALINOWSKI'S CLASSIFICATION OF SOCIAL NEEDS.
 -to be read in conjunction with the "Man-Environment Nexus" summary page, beginning each historical period or age.
Fig. A3

Appendix "A" (iii) ctd.

graphically (by shading in the needs which are satisfied for a particular civilisation) the growth level of psychological development of a societal group.

The vertical axis is to be considered as a "tube" continuum of needs placed in ascending hierarchical order of prepotency and as described by Maslow (106). The numbered circles are not meant to exist in isolation but are sections of "maximum focus" of expression of the need shown in the continuum from 1 to 5. (These Maslow numbers are referred to in Chapter I, Section I).

The ellipse is meant to indicate a circle located in the plane of the sectional circle (3) i.e. "individual social needs" - an out-growth and development of which would correlate with the growth of the social needs A, B, C and D. These social needs have been described by Malinowski (114) and others, and all have their embryonic potential for growth rooted in the need of the individual to grow in psychic health and development by fusing his needs with those of others in bonds of friendship. (v.P.21, Chapter I, Section I).

All social needs are symbolised as equidistant and equipotential in growth, relative to their single source Need 3. Although the healthy development of Needs A,B,C and D, mean the healthy growth of society, there is still a need for leaders to guide. These arise due to Needs 4, requiring expression in individuals with Needs 1, 2 and 3 already satisfied. (referred to elsewhere as the "elite"). So the development of the "elite" of leaders is dependent upon and interdependent with, the growth of the society which fosters them. Needs 5, however, occurring after the satisfaction of the majority of the lower needs, is more an individual and isolated development and growth pattern.

However, because it is a pre-requisite that for most people, the lower needs should be relatively quiescent and satisfied for some time before these creative needs can actualise, then the individual is really dependent upon the whole supporting social structure in which he lives.

Appendix "A" (iii) ctd.

This tenuous relation with social groups (symbolised by broken lines with one arrow) involves input and feedback flows of less necessary strength than those existing between Needs 4 and the social environment (symbolised by broken lines with 2 arrows).

Finally, there is no upper limit to the individual's development of the "metaneeds" but this work is not intended to proceed as far as this. (Vide Maslow's published works in bibliography, this section, ie. (44), (98), (99), (99a), (100), (101), (103), (104), (105), (106).

APPENDIX "B" - ILLUSTRATIONS (B.1 to B.207 inclusive)

The following graphics are to be read in conjunction with Chart No.I (assembled in pocket on back cover.)

The various prehistorical and historical events shown on the chart are illustrated here by cross referencing e.g. fig. "B.I", "B.2", etc. referring to Appendix "B" and illustrations numbered "B.I" and "B.2", etc., elsewhere in this thesis, reference is shown: "vide B.2". These examples are chosen because they exemplify steps in man's development of devices and techniques which he devised to modify his environment so that it was better suited to satisfy his basic individual and social needs.

For each example illustrated, there is shown a subjective graph assessment of the status of the hierarchical needs relevant to the environment control method(s) or relevant to the particular need--thereby satisfied. It is important to realise that when referring to a particular needs status or "level", it is intended to highlight a focussing of "growth pressure" at that level without excluding the other needs in the complete spectrum of the hierarchy. These are present in potential in all individuals, some of whom may separately express these higher needs atypically.

Consequently, examples given may illustrate the overt expression of a relevant need of the majority, as in some prehistorical societies, or of the "elite" (q.v.) as in more advanced civilisations depending upon whether the example cited is typical for one or the other dominant group. (or two lines are shown where both are of interest).

Grahame Clark observes that "the new world community, if it ever emerges, will comprise, not only all the members - not merely the elite - of each of the great civilisations extant, but in addition all those numerous peoples who until yesterday were prehistoric and preliterate....It is the story told by primary prehistory, the tremendous struggle over tens or even hundreds of thousands of years, culminating in the discovery of farming and the beginning of settled life, that reveals the previously hidden foundations on which all civilisations alike were reared. This is the true epic of man, underlying and setting in perspective the histories of all his

various civilisations. All men, whatever the colour of their skin and however recently - or long ago - they emerged from prehistory, can recognise in the archeological traces of their remote prehistoric forebears symbols both of their common kinship and of the glorious fact of human progress." (26).

This approach is adopted, notwithstanding the objections to the concept of "progress" per se as put forward by Frankfort (76) where he quotes from Collingwood's "Idea of History" (Oxford 1946, 328-30) in order to attack Arnold Toynbee for adopting a similar concept.

It is the writer's opinion that "progress" can be assessed subjectively if it is based on a carefully selected instrument of assessment, viz. Maslow's hierarchical theory of basic human needs in conjunction with a realistic theory of social needs. Appendix B has been compiled to illustrate this "glorious fact of human progress" (26), and Chart No. I has been compiled to give a quantitative evaluation of it.

COMMENTS ON APPENDIX B. CHART No.I

(vide Chart No. I in pocket on back cover)

Chart No.I presents a subjective assessment of the hierarchical "level" of prehistorical and historical societies as they gradually evolve, and give overt expression to their individual and social basic needs. Maslow's hierarchical theory of basic human needs has been used as a method of quantitatively assessing "progress" up the 5 unit scale on the ordinate axis reading against a logarithmic time scale or the abscissa.

Examples from the archeological remains of these societies are chosen for the degree to which they represent overt expressions of attempts to satisfy these needs for a given society or social group. (vide Appendix "B" for illustrations of these selected examples).

It is important to read this chart as graphical presentation of a series of bars on a bar graph, each representing a particular social group in time and each giving a "level" at which that society is focussed. All levels are able to be realised by separate individuals, but the quantitative assessment is typical for the socially dominant group, whether the "hoi polloi" or the "elite".

Needs below the graphed curve, are those which have been mostly fulfilled and unless threatened, form a quiescent base upon which depend the further unfoldment of higher needs. Needs graphed above the curve are those into which man evolves as those lower on the hierarchical scale become satisfied. Given satisfactory environmental conditions, this evolution may be quickened so that, provided the lower needs are given time to have been adequately fulfilled, the potential it is the one, continuous, dominant drive because it encompasses all others. It follows that his attempts to modify his environment may be taken as signposts to the achievement of evolutionary "progress".

However, the whole question of "progress", per se, is based upon subjective assessments only and it is in this context that this graphic is presented.

It shows the basic needs within the frame of reference of the individual in society. To correlate this with social needs, the interrelation of the two is diagrammatically shown in Appendix A.(iii).

Aggregation of food for the use of society, communal co-operation towards the organisation of water resources and the control of environmental factors for the common good, accelerated the growth of social needs fulfilment. Consequently, the graphic also illustrates the socialisation of man as he evolved toward the creation of civilisation (however it may be defined). From scattered low density populations of the Paleolithic - (designated $L_7TS^0(p)$ *) above the "cerebral/conceptual Rubicon" of self-consciousness, by Prof. Taylor) (117) through the experiments in social grouping of the Mesolithic, the village life of the early Neolithic (designation $L_8TS^0(n)$), (ibid,) to the town life of riverine societies (L_9TS^1), and eventually the citadel and city life ($L_{10}TS^2$), there was a continuous pressure towards more stimulating environmental conditions in the climate of which man could better fulfil his individual basic needs and hence lead a fuller life.

In each case cited, Prof. Taylor sees a "quantum shift in socio-technological organisation" (ibid). From very primitive beginnings to the present day, environmental change has been the catalyst, providing the field and stimuli for the release of man's individual growth potential. Obviously, the major factors in environmental changes, other than man-made ones, are related to climatic fluctuations. Refer to Chart No.1 top, where climatological fluctuations are correlated with the main graph below, so that the interrelation of climate and human evolutionary events may be clearly seen.

On the climatological graph, cultural epochs and geological periods are also shown to complete the correlation of events. As in all graphical presentations of such events, there are vast differences in the opinions of various authorities. Significant variations are shown for comparison purposes and as in all other graphics, the relevant reference is given thus (1), referring to the bibliography.

* These designations are Prof. Taylor's own particular approach to General Systems Theory which is in itself a whole field of study.

To be read in conjunction with Chart Number 1:
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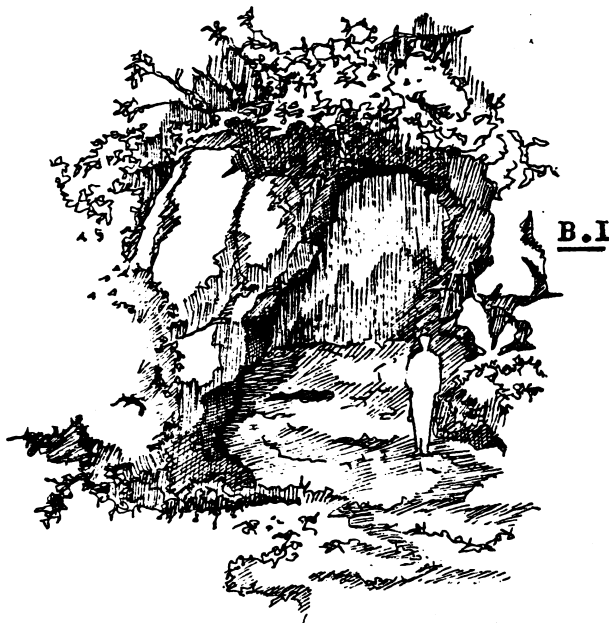
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APPENDIX "B"Physiological Needs I are dominant - some beginnings of solutions to security Needs 2,

Vallonet Cave, near Monte Carlo-
S.E. France, oldest known cave
occupation in Europe (7),
 - after H. De Lumley .

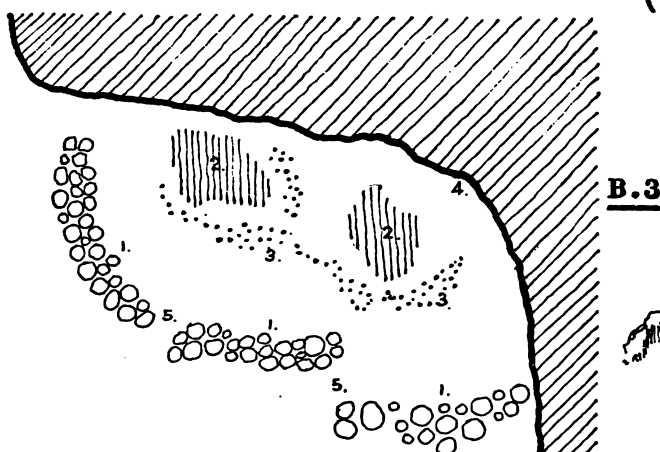


Rock Shelter at Krapina, Croatia ,
C.150,000 B.C. (ref. "Histomap of
History" - pub. Rand, McNally, Chic.)

- B) Rock forming the shelter
- A) Alluvial Deposit
- B) Miocene Sandstone debris from weathering.
- F) Hearths, bed where human remains were mainly found. (159)

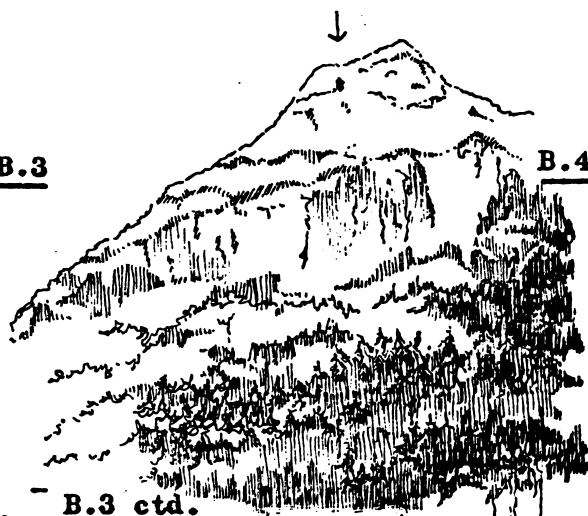


Drachenburg, nr. Ragat, St. Gallen,
Switzerland (158) Cavern of
Drachenloch is near summit (vide
pp. 75 & 76) - an example of
retreat to caves for warmth
during glacial period,
(see below) .



Les Eyzies Rock Shelter Nice,
S. France (not to scale) Less than
100 yds. from sea shore, 115-130,000
B.C. (80)

- 1) Large stones to anchor lean-to screens of animal skins to provide warmer micro-environment in glacial climate.

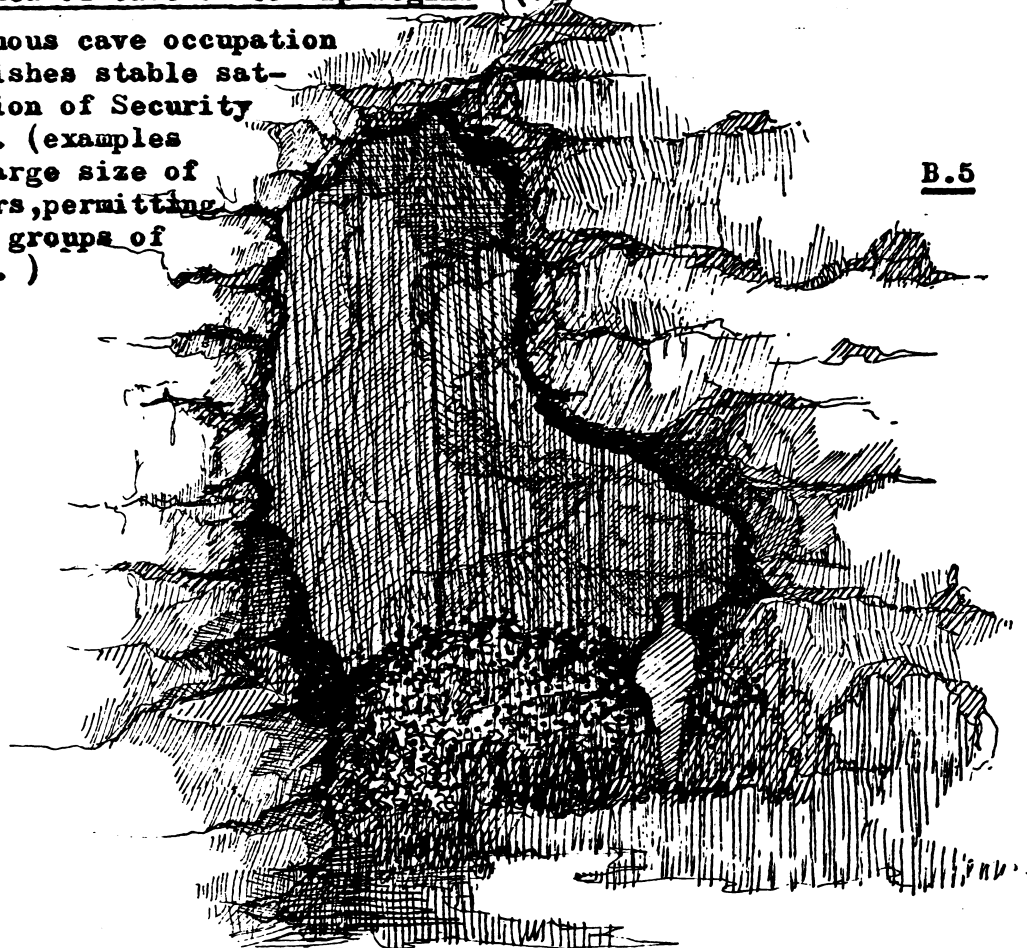


- B.3 ctd.

- 2) Carbon residue 3) Seashells attached to seaweed - could be mattress. 4) Rock surround to shelter. 5) Entrances.
- (An example of retreat to caves for warmth during glacial period.)

"The idea of cave ownership begins" (75)

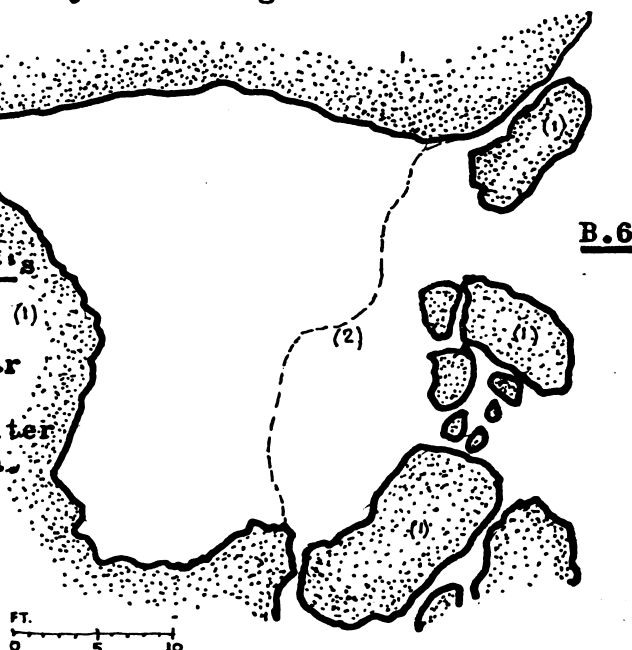
Continuous cave occupation establishes stable satisfaction of Security Needs 3. (examples show large size of shelters, permitting use by groups of people.)



Cave of Tabun, Mt. Carmel, Palestine - Expressive of satisfied Needs I and 2 and a precursor of Needs 3, 120,000-70,000 BC. (75)
Communal co-operation was necessary in hunting due to the crudeness of the tool traditions.

Jerf Ajla - "Cave of the Heifer's Outwash", Palmira, (171) 43,000 BC. Standing 50' above the valley, facing the sun and near water, it has its parallel in a cave investigated by the writer in the Buchan Valley, Victoria.

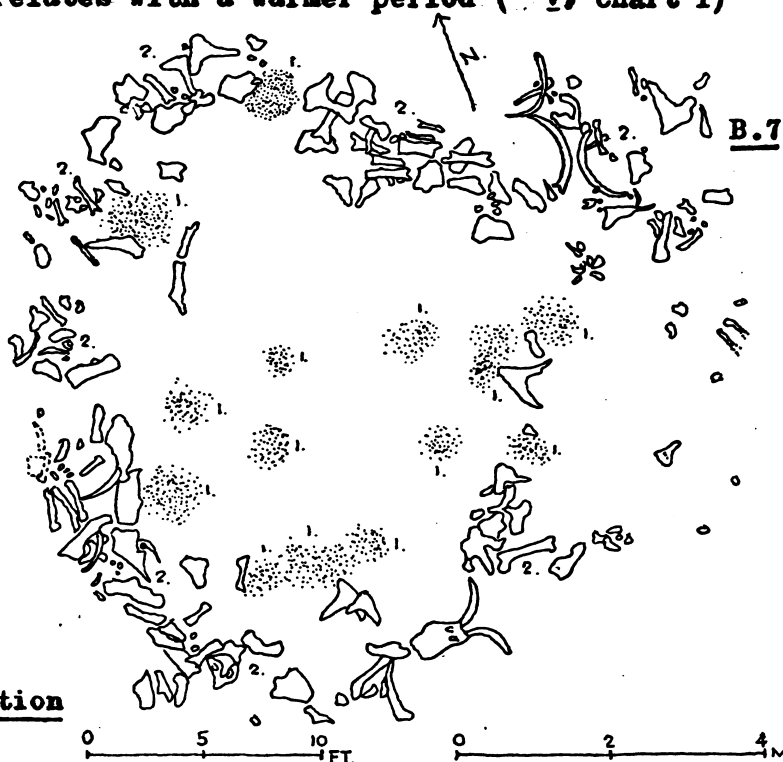
- 1) Bedrock & fallen boulders
- 2) Overhang above.



A warmer climate made tent structures practical

Moldova, Sth. Russia. Middle Paleolithic, remains of a tent stance
(21) c. 40,000 BC., correlates with a warmer period (Y, Chart I)

- 1) Hearths,
- 2) Mammoth bones and teeth



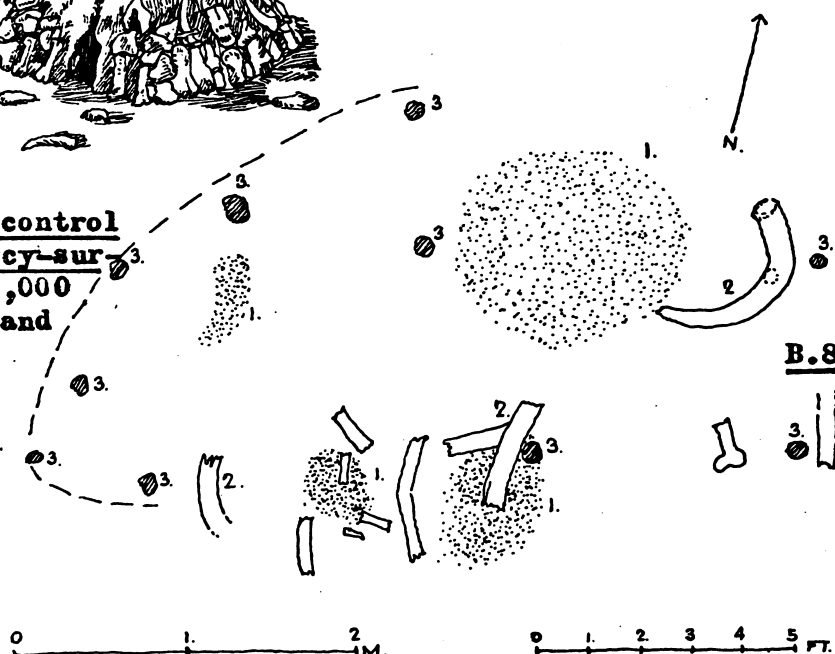
Hypothetical reconstruction
of Fig. B.7 (115)



B.7a

Remains of a climate control
structure in cave; Arcy-sur-
Cure, France (21) c. 30,000
BC. - probably hides and
tusks structure.

- 1) Hearths
- 2) Mammoth tusks
(probably also
used as posts).
- 3) Post holes.

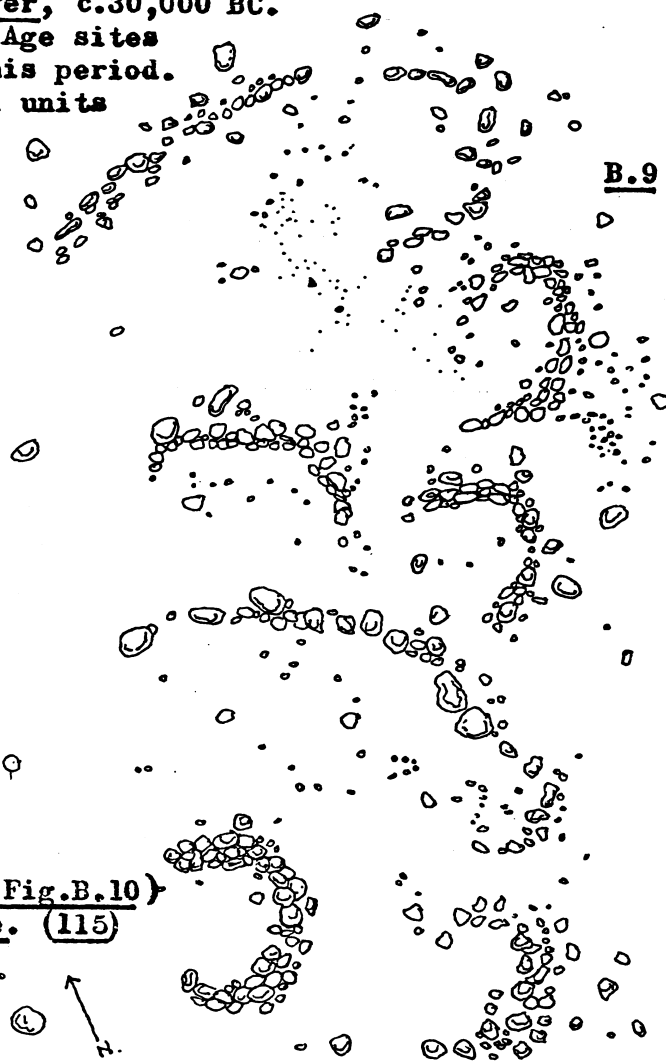


Social groups emerging - Camp site of eight
windbreak foundations using cobbles.

South Africa, Middle Orange River, c.30,000 BC.

One (of two only) Middle Stone Age sites
in South Africa belonging to this period.

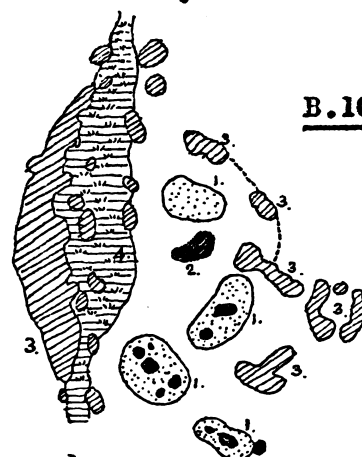
A social grouping of individual units
(48).



B.9

(Below) B.10a

(Hypothetical reconstruction of Fig. B.10)
Czechoslovakia, Dolni Vestonice. (115)



B.10

A social grouping of huts, c.23,000 BC. Bone

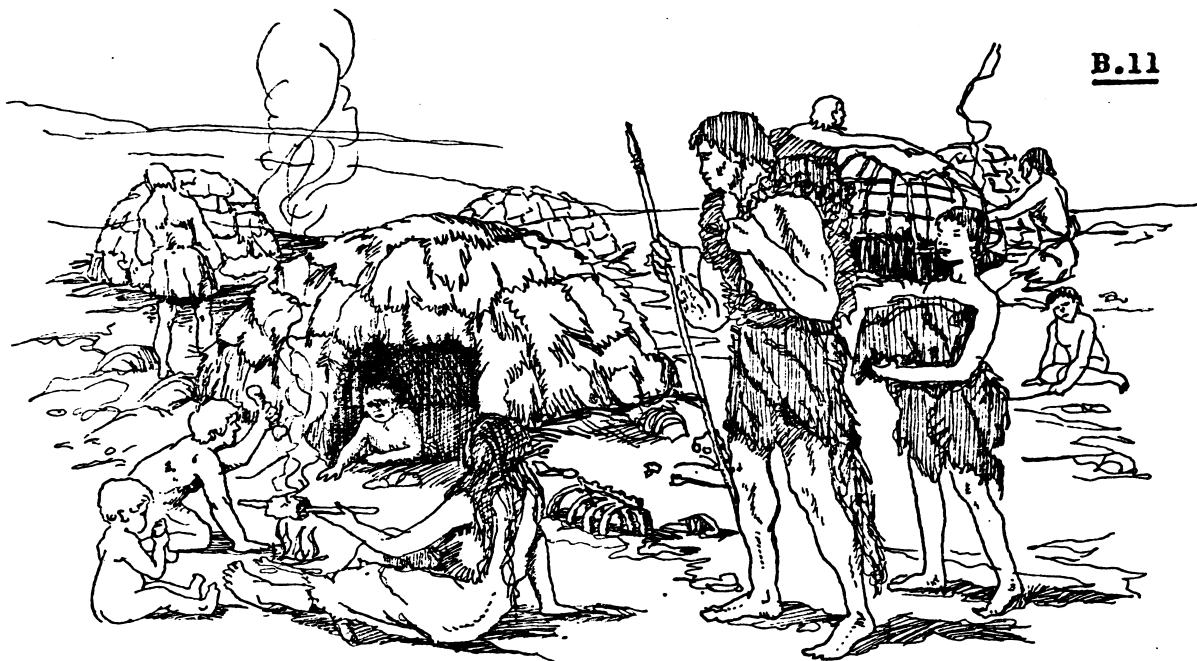
and hide huts. 1) Huts and hearths

2) Hearths only

3) Mammoth bones

4. Swamp

Social groupings of huts -(Precursors of Needs3 expression).
Pit huts retainer of warmth at onset of wurm Glacial Period



B.11

Aurignac skin and branch hut constructed of hides and branch framing-
(reconstructed from Aurignac drawings) (16) c.25,000 BC..

Reconstruction of an Advanced Paleolithic (Gravettian) Settlement
Moravia, Czechoslovakia.

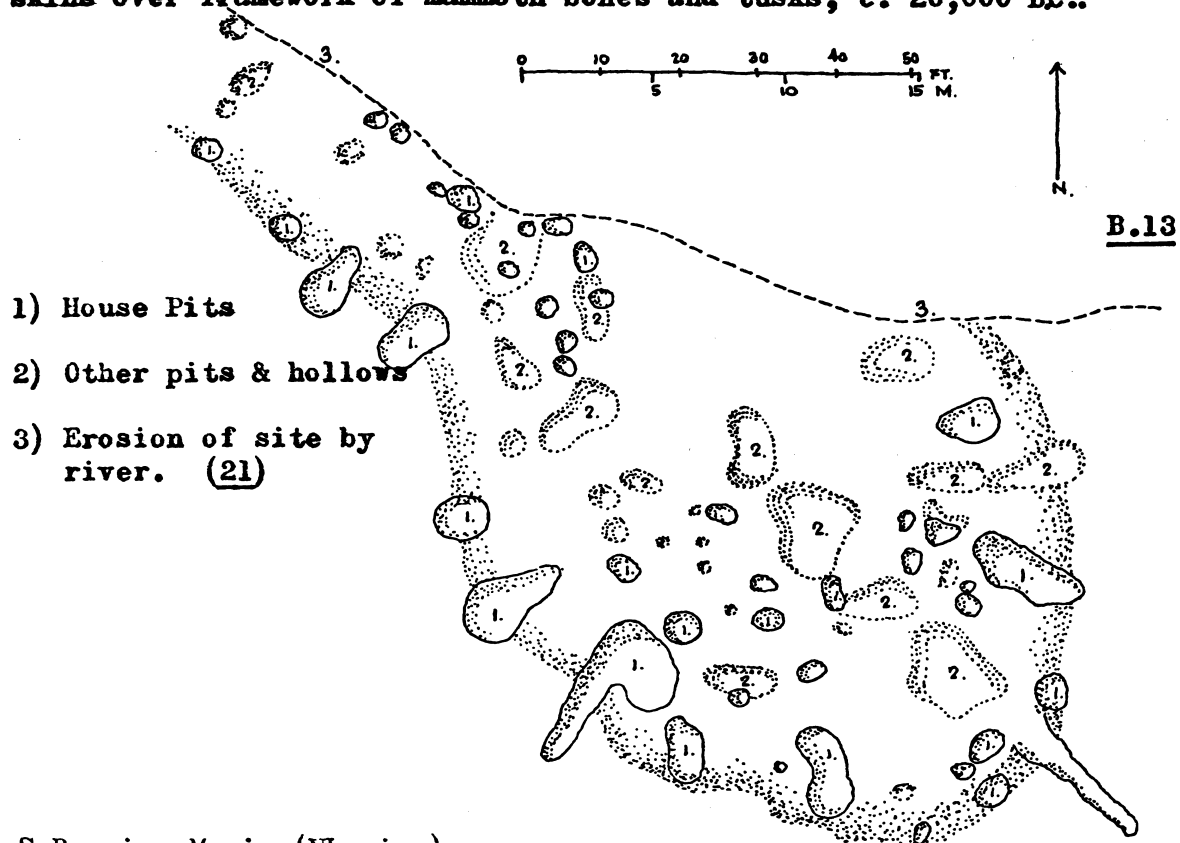


B.12

Caves were normally used in this period of glacial onset but where unavailable, as on the loess of Moravia, combined pit and hut structures were used in social groupings (47) c. 20,000 BC..

Primitive social groupings - early expressions of developing social needs. - S. Russia, Avdeevo.

Upper Paleolithic settlement partly dug into the ground, roofed with skins over framework of mammoth bones and tusks, c. 20,000 BC..



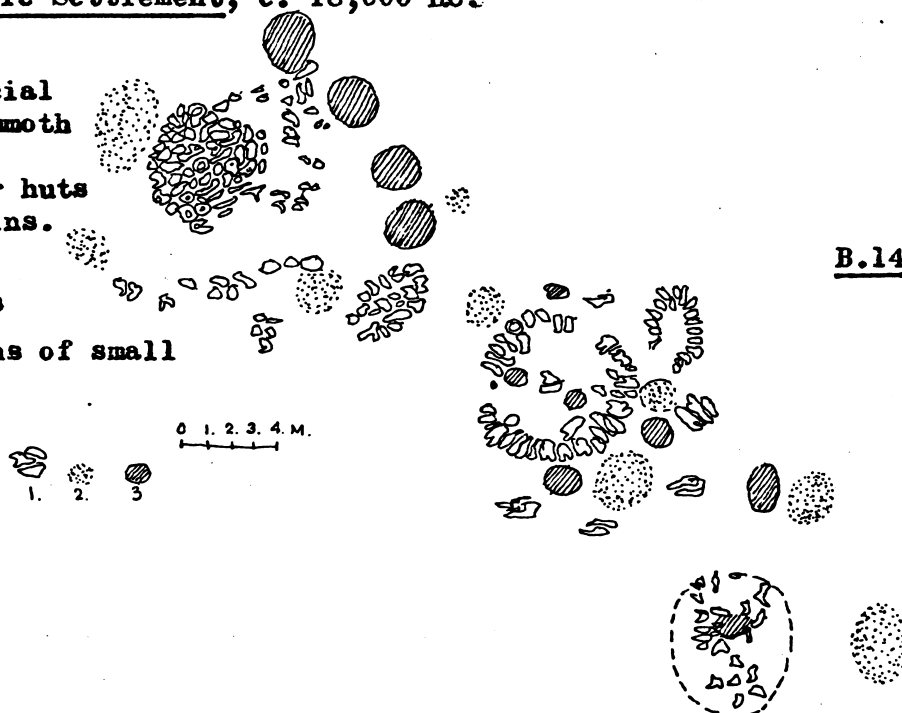
- 1) House Pits
- 2) Other pits & hollows
- 3) Erosion of site by river. (21)

S. Russia, Mezin (Ukraine)

Upper Paleolithic Settlement, c. 18,000 BC.

A primitive social grouping of mammoth bone and tusk framed circular huts roofed with skins.

- 1) Animal bones
- 2) Accumulations of small objects
- 3) Hearths (153)



Retreat to caves and rock shelters at onset of Main Wurm glacial period.

France, Laugerie Haute Est
Rock shelter, showing cross
section through deposits commenc-
ing with occupation in cold-
est period of Main Wurm
Glacial. F.P. (1) & (1a):
Final Perigordian.

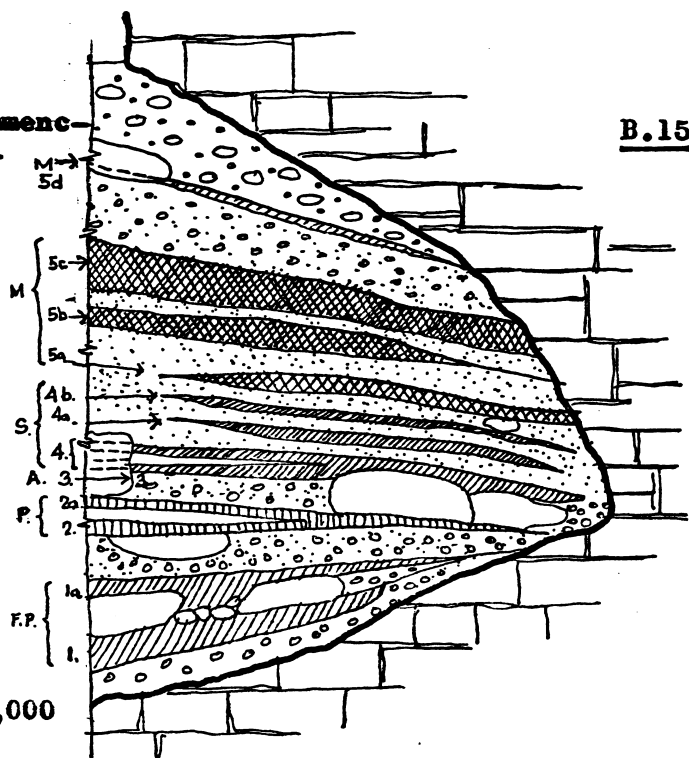
P. (2) & (2a): Protomagdal-
enian.

A. (3): Aurignacian

S. Solutrean: (4) Lower
(4a) Middle
(4b) Upper

M. (5a): Magdalenian
(5b)
(5c)
(5d)

Occupied 22,000 BC. to c.13,000
BC., (153).



France, Cave of Aurignac, c.26,000 BC. occupation in Aurignacian Epoch.
(Later used as burial cave in Neolithic).

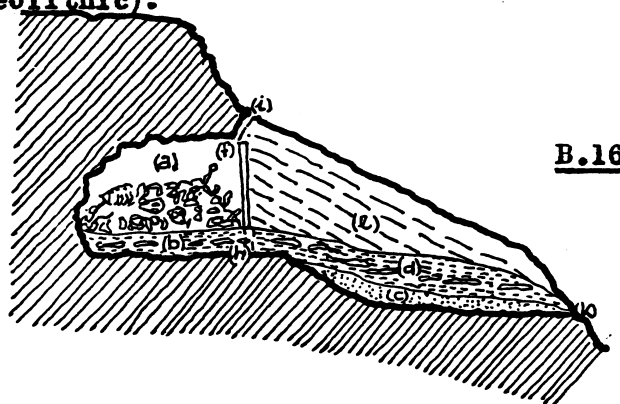
a) Neolithic burial, 17 human
skeletons.

b), c), d) Aurignacian deposits

e) rubbish talus from hill
above

f), g) stone slab erected to
protect burial sepulchre

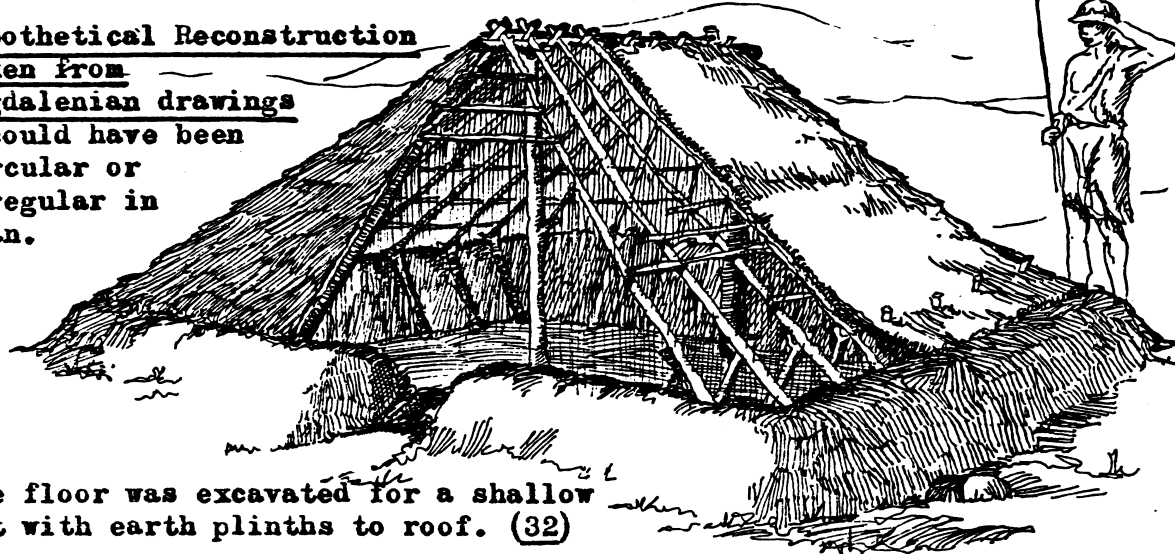
f), i) rabbit burrow which led
to discovery in 1852,
(158).



Magdalenian huts - In a period when glaciation was beginning to wane, these huts were used as summer quarters - caves being used in winter. An excellent adaptation of building methods to environmental requirements.

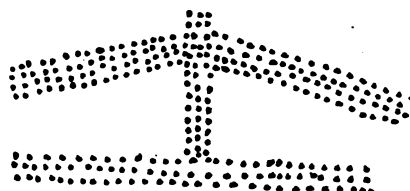
B.17

Hypothetical Reconstruction
taken from
Magdalenian drawings
- could have been
circular or
irregular in
plan.

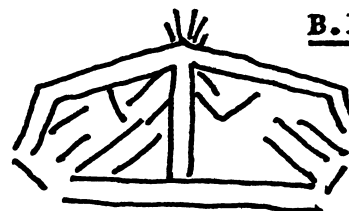


The floor was excavated for a shallow pit with earth plinths to roof. (32)

Some of the tectiforms probably of
Magdalenian huts drawn on the walls
of the cave at Font de Gaume, Dordogne,
France (32).

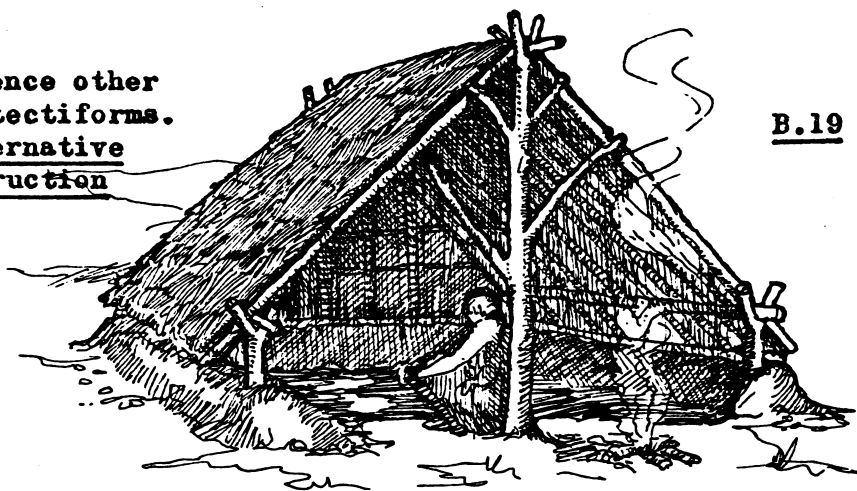


B.18

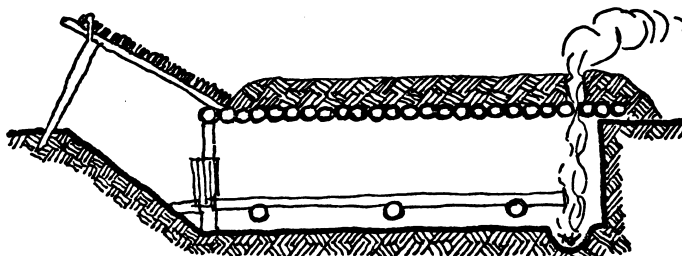


There is little evidence other than post holes and tectiforms. Consequently, an alternative hypothetical reconstruction is included. (16).

B.19



Although the climate was still cold, temperatures were rising. The insulating effect of masses of earth or stone was necessary in Russia although summer tents and huts (vide Section Two and B.17,18, 19) were used in combination in South Europe.



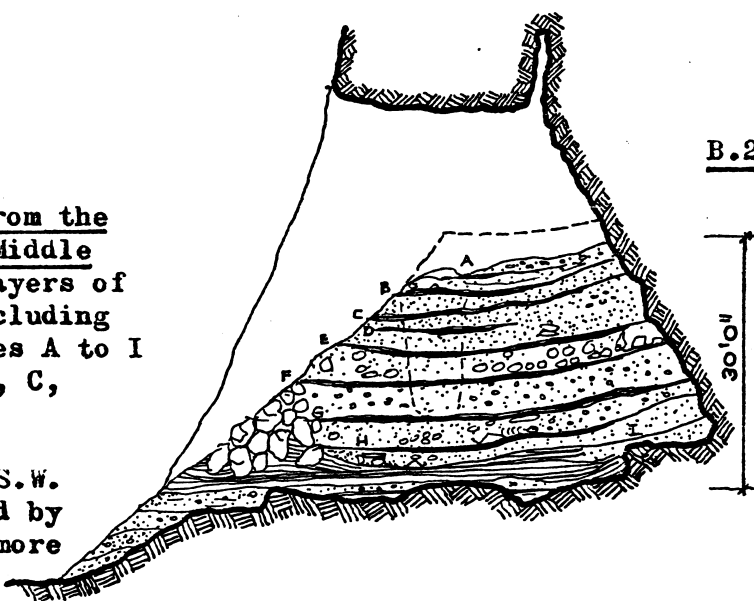
B.20

Reconstruction of an underground dwelling (length 30ft.) - effectively insulated with earth for the glacial conditions of its environment at Timonovka, Russia (87).

Grimaldi, Italy. (87)

A Rock shelter used from the early through to the Middle Paleolithic showing layers of occupation debris (including ash layers, black lines A to I and five burials at B, C, H and I.).

Similar to several N.S.W. rock shelters measured by the writer, they are more susceptible to macro-environmental changes than caves.

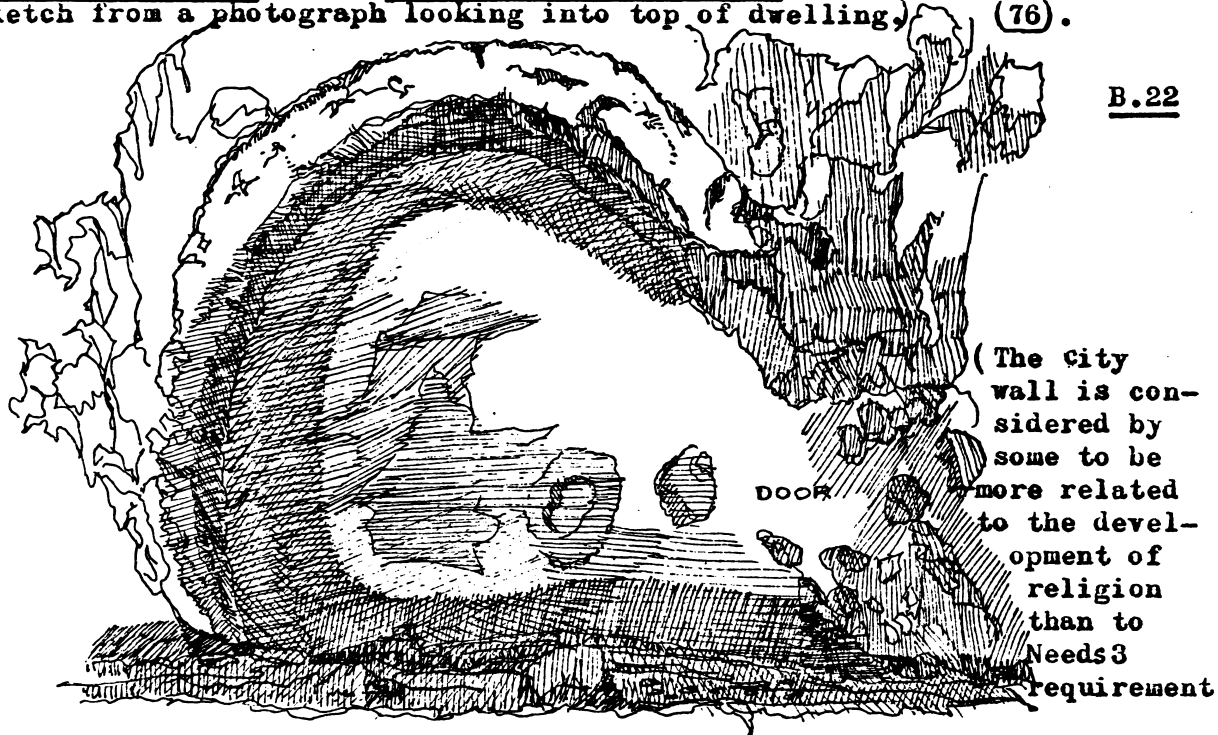


B.21

They were mainly occupied during reasonable climatic conditions, as probably existed at this Mediterranean site.

Divergent rates of development of stable social groups separated Great Britain and Eastern Europe from the Middle East where Needs 3 and Needs 4 satisfaction was attained thousands of years earlier.

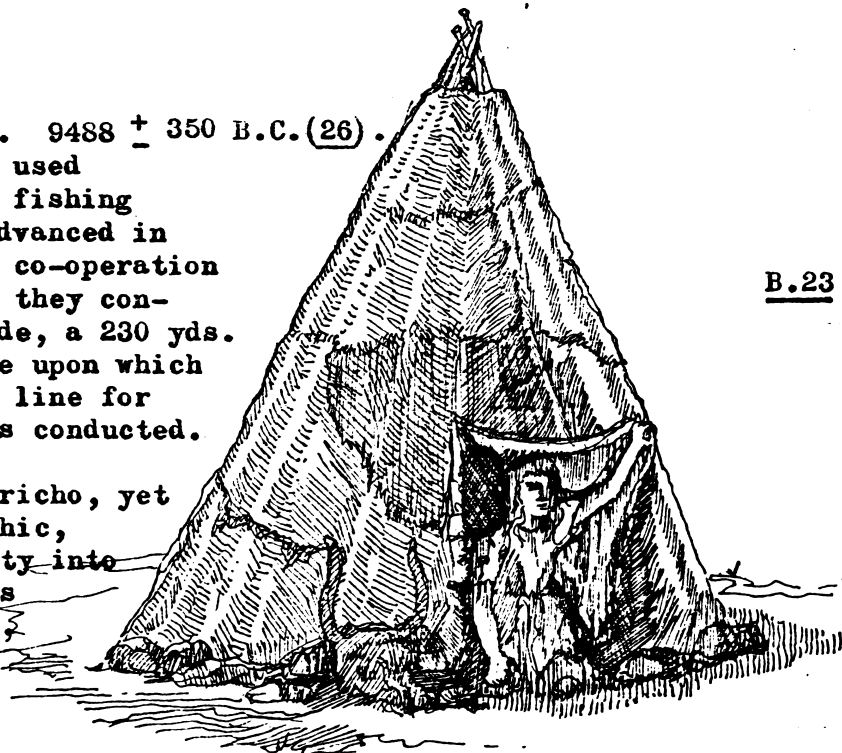
Jericho 8,000 BC. (24) - built against city wall in the Neolithic,
(sketch from a photograph looking into top of dwelling) (76).



Star Carr, Yorkshire. 9488 ± 350 B.C. (26).

Primitive tents were used although hunting and fishing equipment was well advanced in technology. Social co-operation was well developed - they constructed on a lakeside, a 230 yds. square platform stage upon which a virtual production line for tools and weapons was conducted.

Of similar age to Jericho, yet still in the Mesolithic, "the growth of society into fixed communities was still in the future" (115).

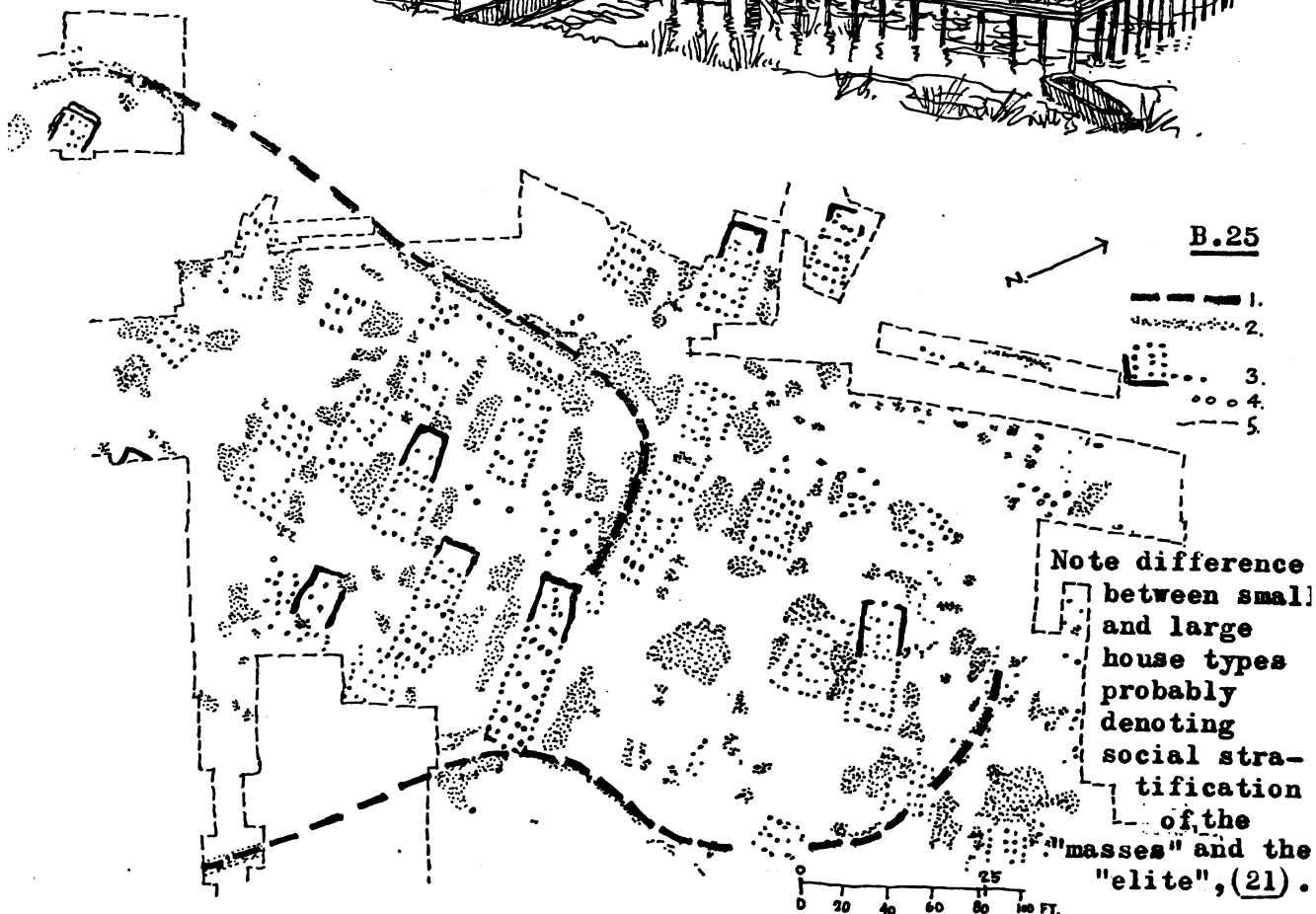
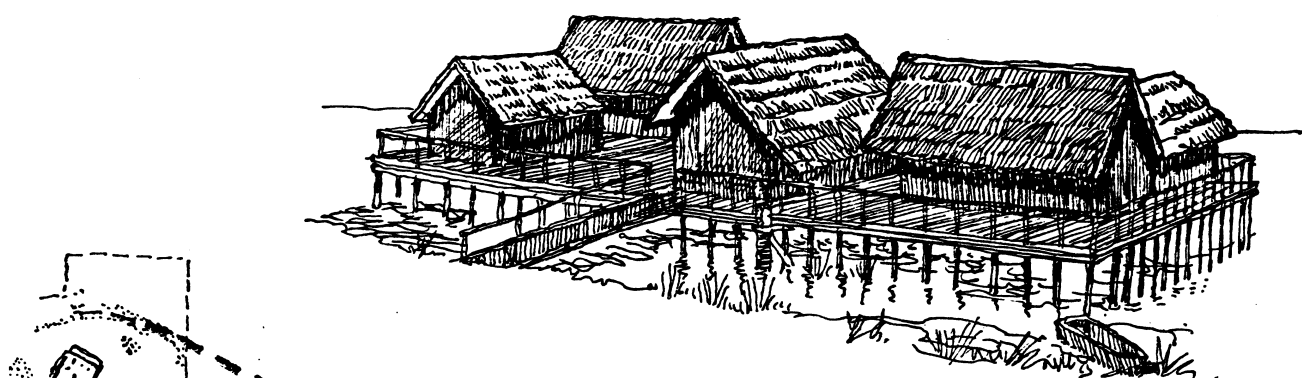


Village environments in Europe - utilising the environment to supply the needs of the communities.

Swiss Lake Village (184)

A mesolithic social group based on a hunter-fisher culture.

B.24



Part of Danubian I settlement Sittard, Netherlands (21) & (47).

Larger houses 100' x 25' approx. - timber and wattle walls, mud-daubed. 1) Hypothetical zone boundaries-ditches perhaps fences or defences as at Tripolye (qv).

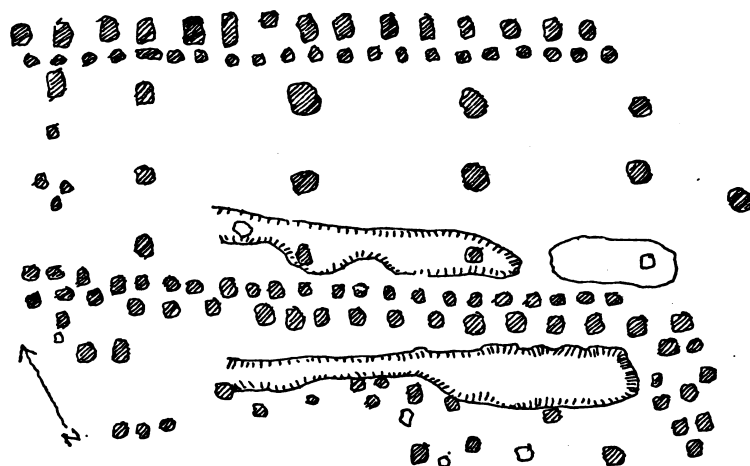
2) Hollows & ditches (incl. borrow pits for mud)

3) House plans 4) (Possible) fence holes -many theories

5) Extent of excavation. (y. B26 for details of a house.)

Exploitation of the environment:

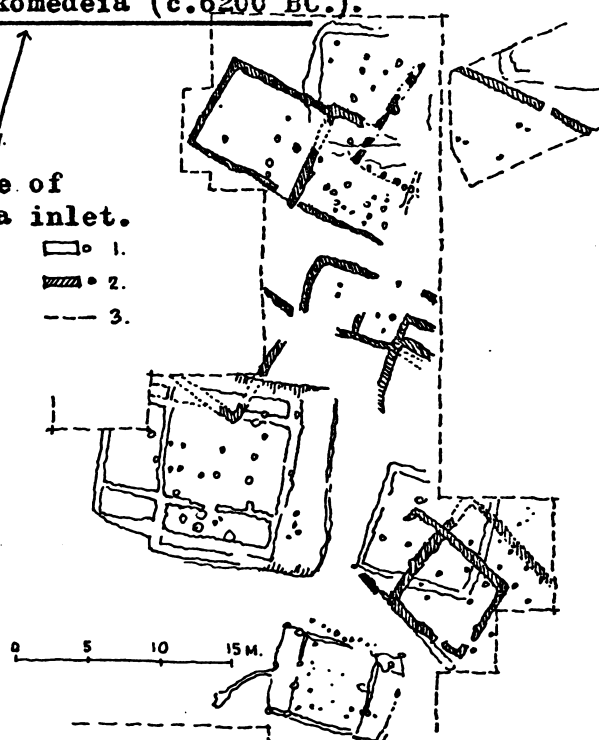
Small Danubian I house from Saxony, the walls marked by a double row of posts, (scale $\frac{1}{250}$). Gable roofed, post framed, mud and daub and wattle walls. These settlements were based on the cultivation of barley, corn and perhaps summer wheats, beans, peas, lentils and flax, tilled in small plots with stone hoes. Settlements were short lived due to the extreme over-exploitation of the loess soil fertility, (35), (47), (40) & (21).



B.26

Macedonia, Nea Nikomedeia (c.6200 BC.).

Settlement on edge of
marshy lake or sea inlet.



B.27

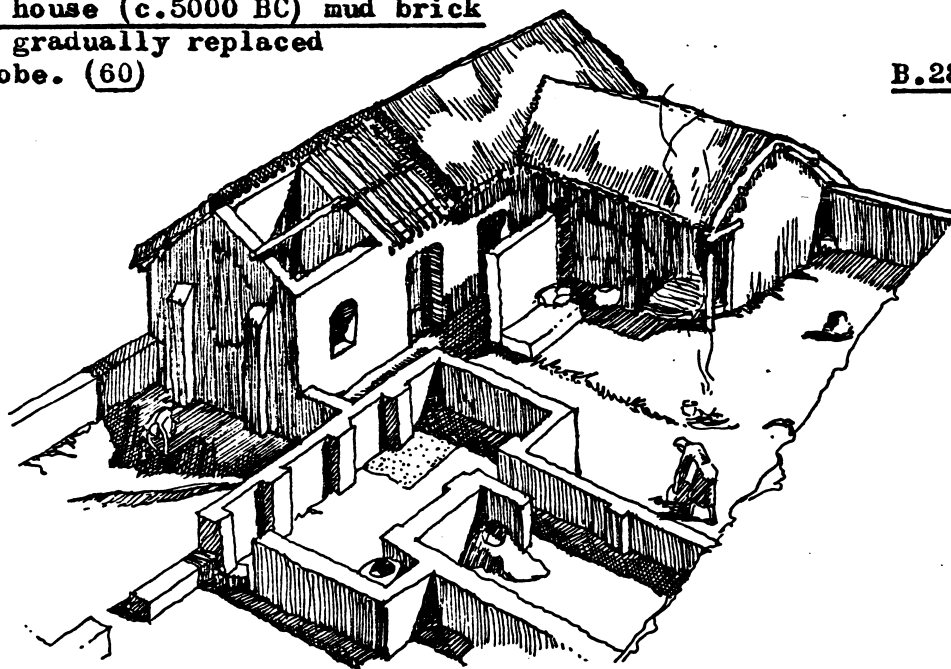
"by far the most advanced architecture of the early Neolithic" (197).

- 1) 1st building period.
- 2) 2nd building period.
- 3) extent of excavations to date.

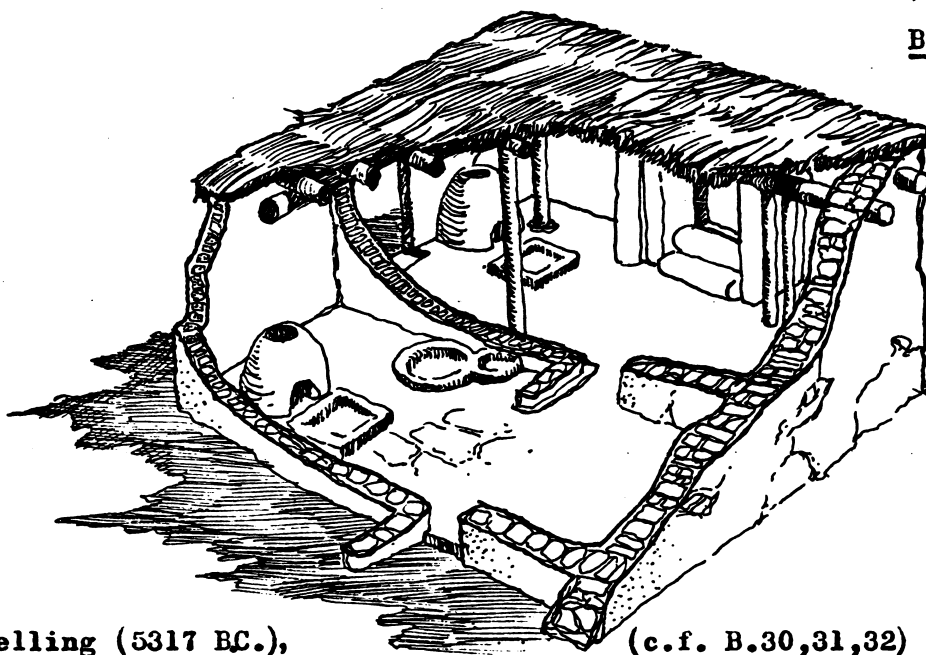
As Needs 3 diversifies into Social Needs satisfactions, improvement of building technique from pise to mud brick construction or stone construction depending upon availability of material from the environment - urban life appears and becomes specialised and more complex.

Hassuna farm house (c.5000 BC) mud brick construction gradually replaced primitive adobe. (60)

B.28



B.29

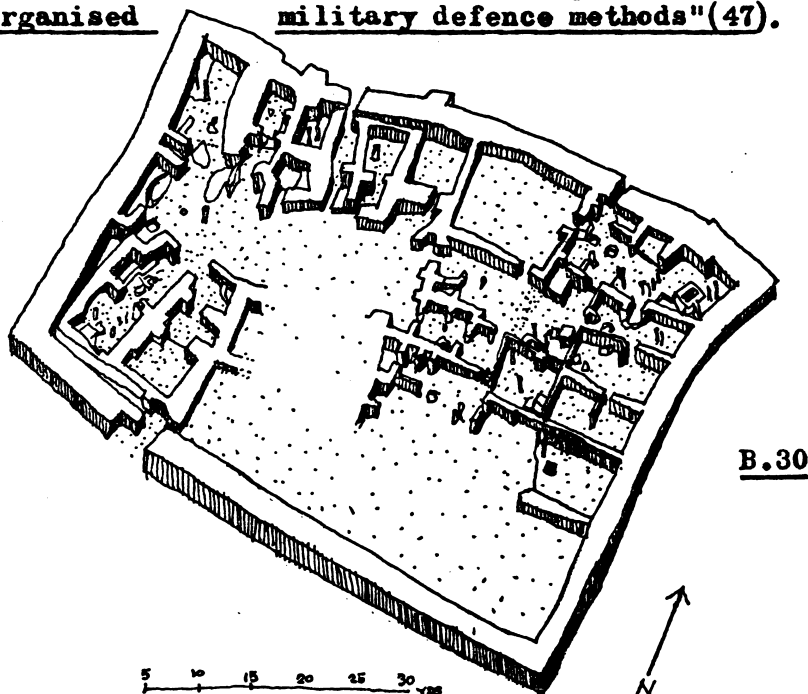


Hacilar dwelling (5317 BC.),
(160).

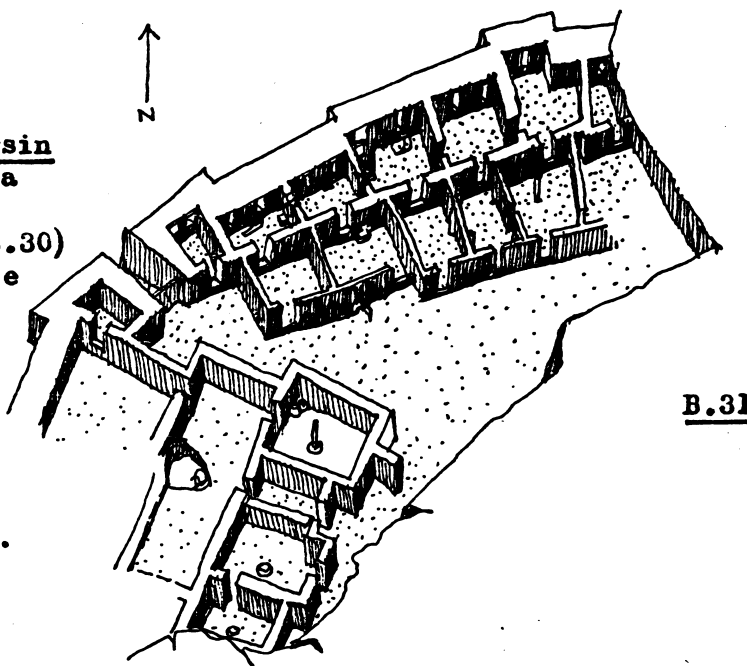
(c.f. B.30,31,32)

Simple villages became towns and were then walled to form citadels as urbanisation proceeded. Needs 4 were being expressed as aggrandisement of elite classes (priests, kings, etc) and walled cities inferred - threat to safety Needs 2 although other authorities see them as more Needs 4 expressions; Clark & Piggott refer to them "as the beginning of a long Anatolian history of organised military defence methods" (47).

Plan of settlement of Hacilar II after it was changed to a fortress (c.5317 BC.) (47) and deserted by 5000 BC., (160).



Plan of settlement of Mersin (c.6070 BC.), converted to a chalcolithic fortress similar to Hacilar (c.f.B.30) "but in both the principle was the same - the building of a defensive circuit wall with a ring of buildings forming an integral part of its internal structure in such a way as to leave a central open area" (47).

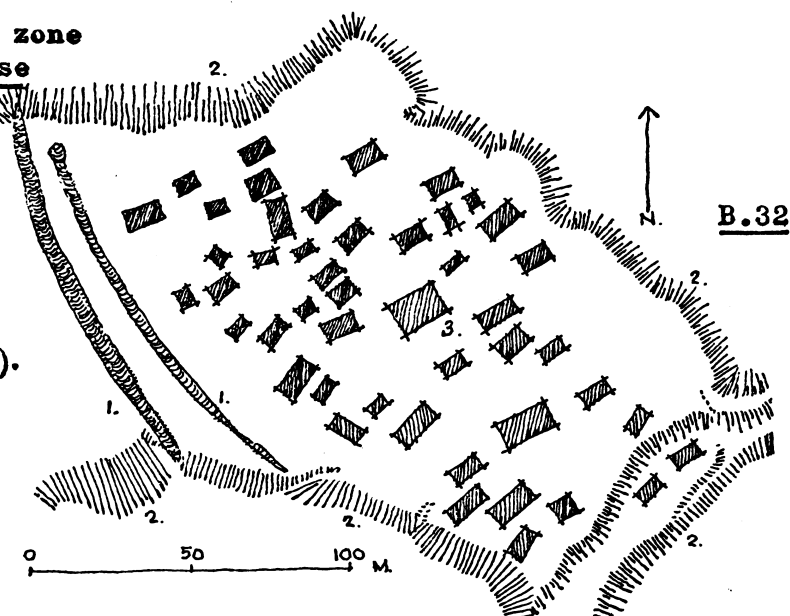


Social Needs 3 being developed from the extended family to the well organised village with protective earthworks.

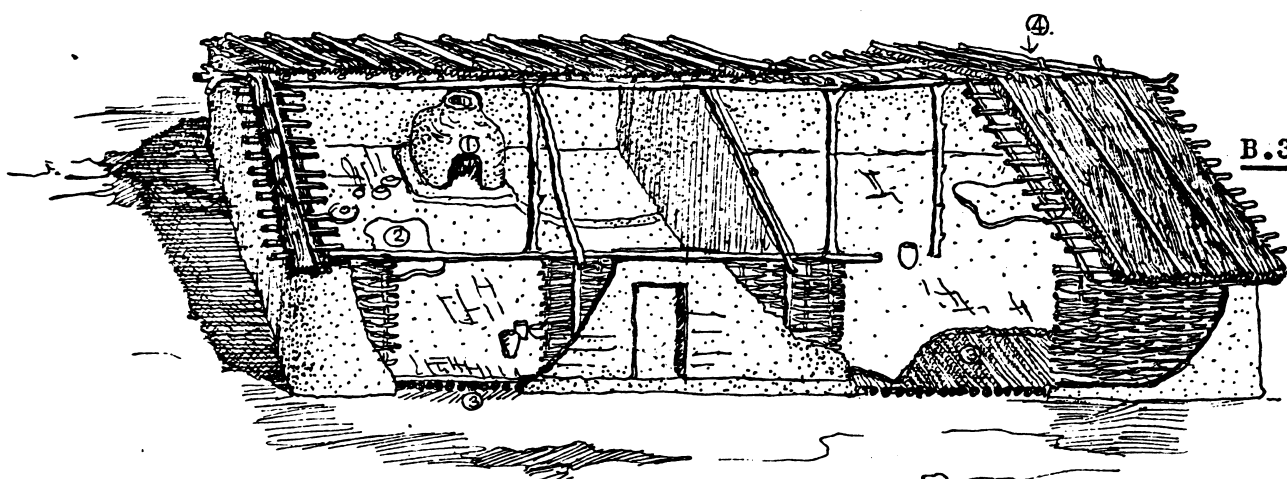
- rudimentary social needs are developing.

In the forest-steppe zone of Ukraine, long house settlements with Oriental traditions.

- 1) Defence ditches.
- 2) Embankments (defence).
- 3) Houses (see below).
(21)



B.32



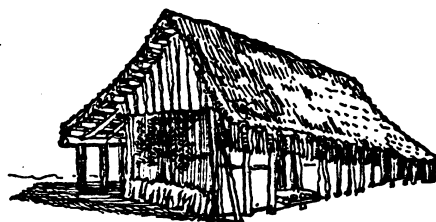
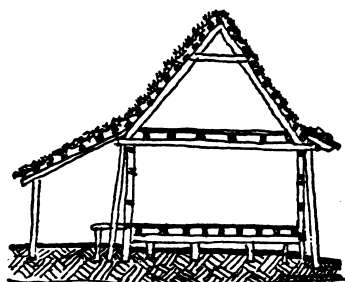
B.33

Long-houses on baked clay base, sometimes internal divisions indicate social units of extended families, 30 to 50 houses to villages of this type of 12 to 20 persons each. Walls of post construction and wattle and daub (or of compacted earth).

This reconstruction is from the remains of a 2 room Tripolyan house at Vladimirovka (34).

- 1) Clay oven for cooking & heating.
- 2) Altar platform.
- 3) Floor of clay or trodden earth on close-set timbers.

Steady but slow improvements towards satisfaction of the Social Needs, in Europe.

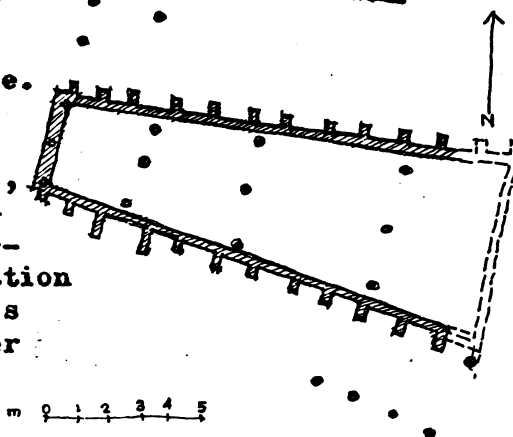


B.34

Rossen House at Deiringsen -
Rüploh, Westphalia.

Trapezium shape plan of house. The later replacement of the Danubian long-house by small single, or two-roomed cabins, suitable for the more independent and patriarchal households, indicates a fragmentation in the social structure. This plan also occurs in the later Neolithic villages of Poland, vide B.36.

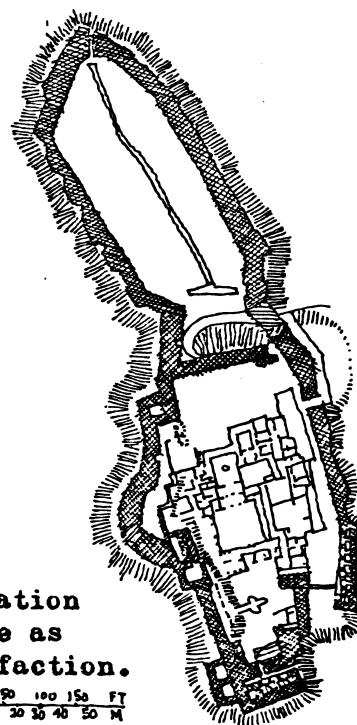
(180) & (40).



Mycenean & Minoan civilisation represent a considerable impetus towards realising Needs 4 potentialities.

Plan of Citadel of Tiryns, Greece,
(230).

Physical size should not be a measure of potentiality for social growth, which was in fact, becoming linked in the Bronze age, to the availability of copper and tin deposits and to the proximity of amber routes, (111). Population is a better indicator than physical size as a measure of socio-economic needs satisfaction.

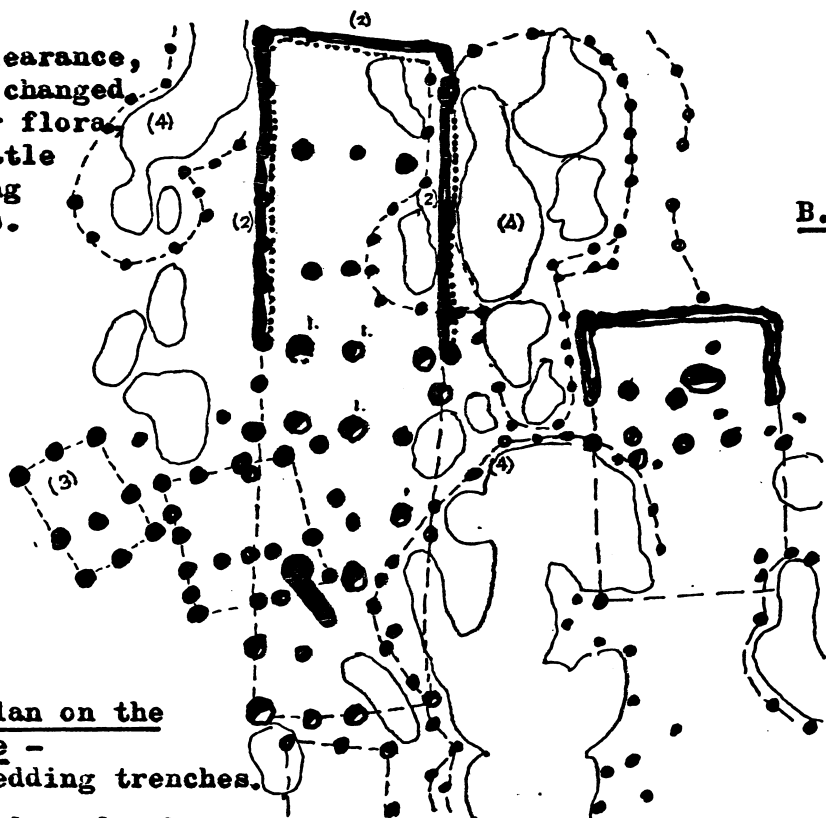


B.35

0 50 100 150 FT
0 10 20 30 40 50 M

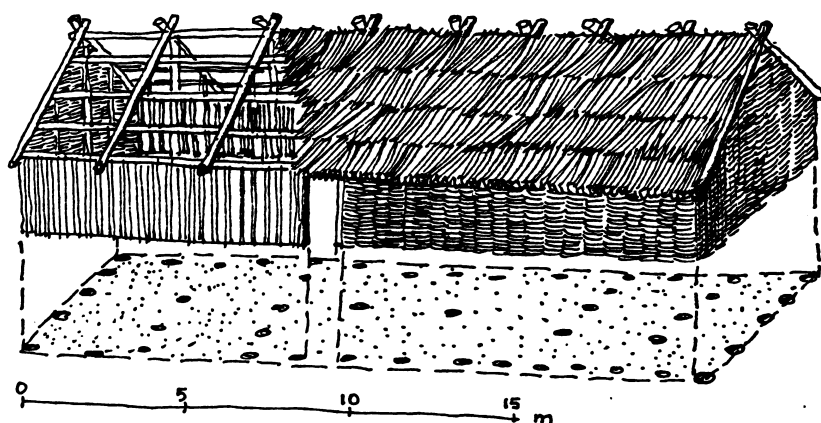
Needs 3 steady growth. Simple long house settlements in forest-steppe region of Europe.

Increasing forest clearance,
land exhaustion and changed
ecology with lighter flora,
leading to large cattle
pastures and manuring
of cultivation plots.



Part of a village plan on the
Outskirts of Cologne -

- 1) Post holes and bedding trenches.
- 2) for long rectangular plan houses.
- 3) also square granaries
which were
of timber construction.
- 4) irregular pits and stake holes have been thought by others to be
for animals, (90).



Koln-Linderthal: Ground plan and reconstruction of typical early Danubian
Neolithic "long-house" from a lakeside settlement (c.f. B.33 - a con-
tinuous tradition of timber long houses reflected the change towards
Boreal climate,) (40).

A return to simpler houses probably related to the emphasis on pastoralism rather than cultivation - in the Late Neolithic, Social Needs 3 slowly evolving into basic social needs.



Only a Boreal Climate could have permitted comfortable living in this type of split plank light timber structure. (32) & (47).

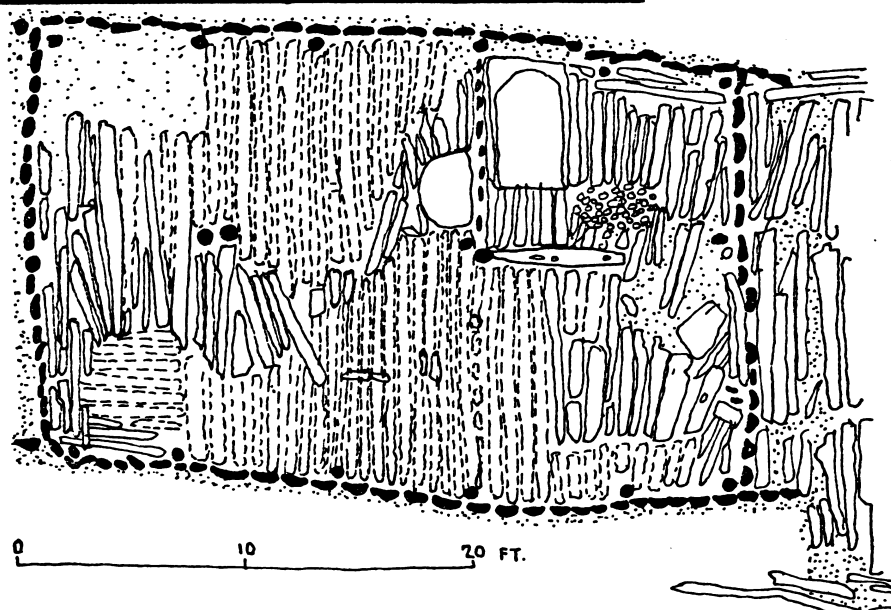
B.38

Aichbühl, Württemberg, Neolithic Lake-side Village, (194).



B.39

Reconstruction of the Aichbühl Village, (16).

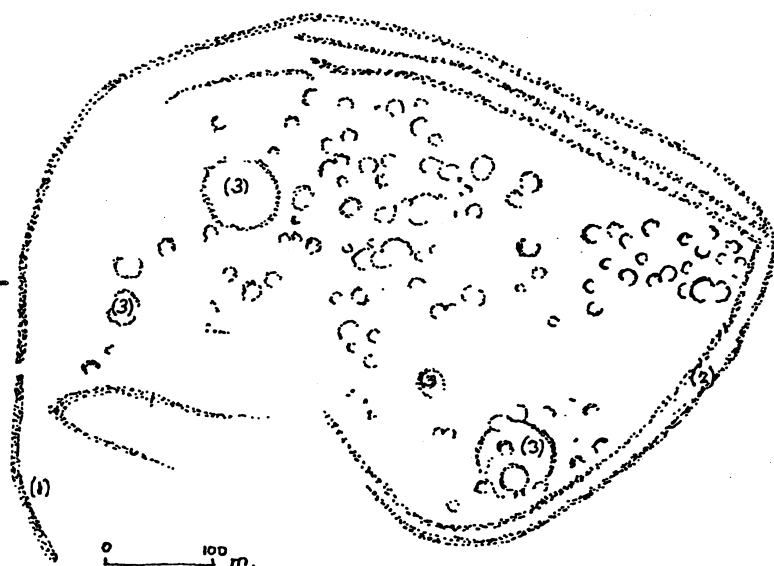


B.40

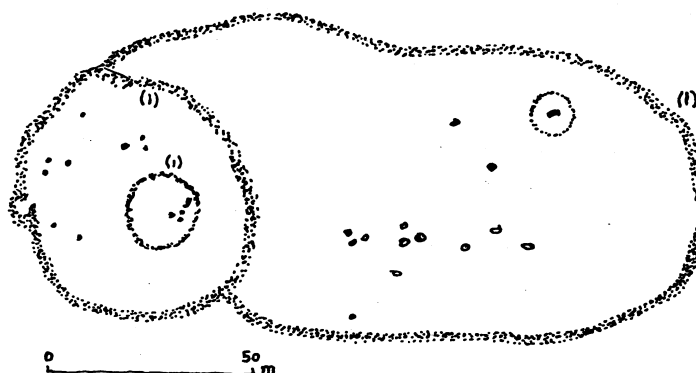
Dwelling hut from Aichbühl settlement (16).

Settlements enclosed with ditches - early 4th millenium, in Sth Italy - simple social needs began to be expressed .

- 1) Ditches
- 2) Double ditches
- 3) Circular enclosures 45'-100' dia. containing house sites.



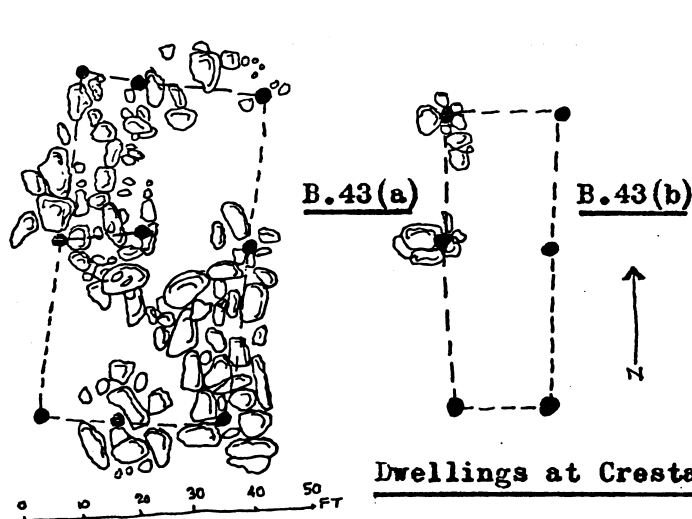
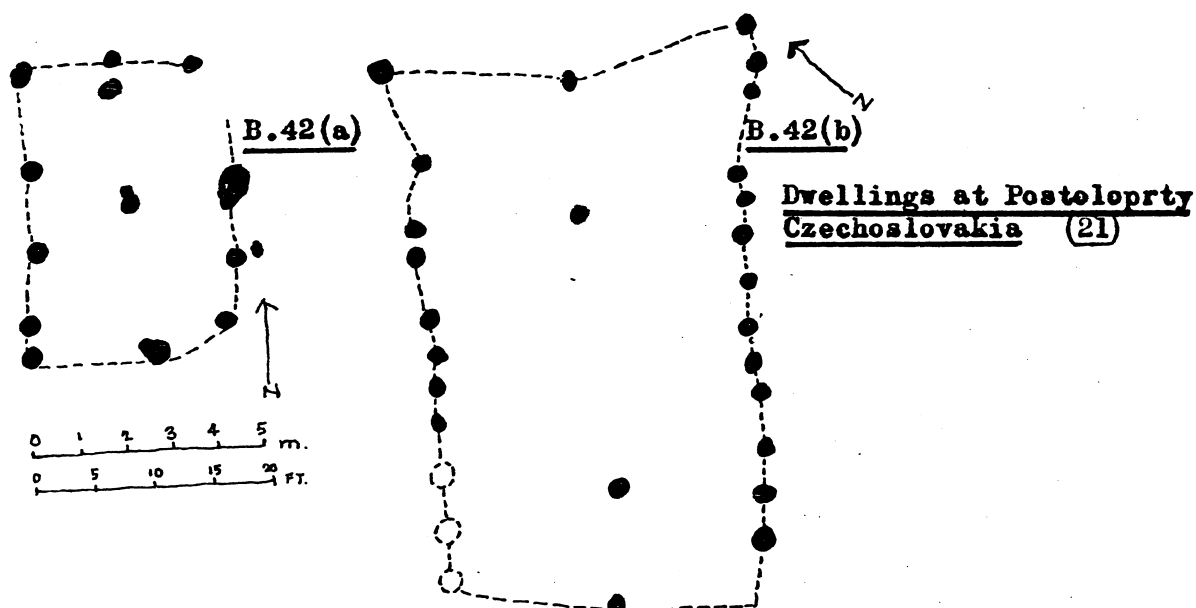
B.41 (a)



B.41 (b)

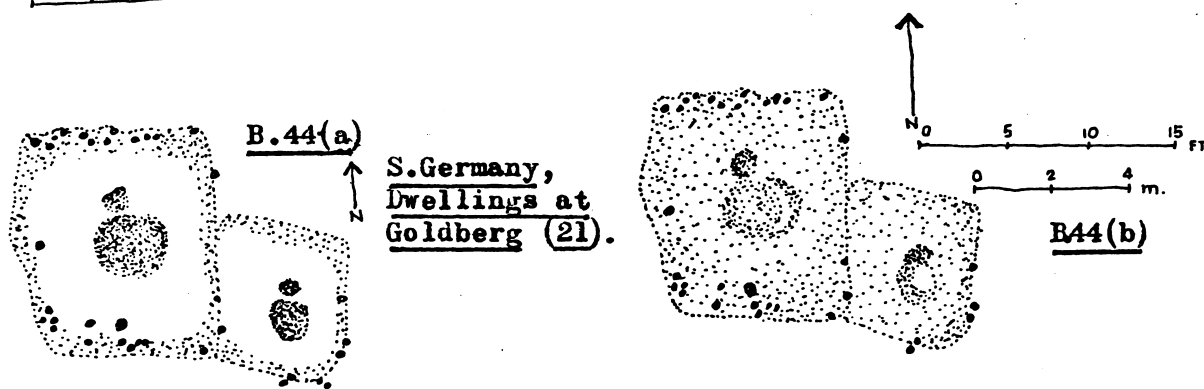
Neolithic enclosed settlements in South Italy (47).

Early Bronze Age dwellings (post holes locate timber frame posts).
 "Change and adjustment....over a large area of Central Europe" (21).
 Nuclear families become well established, abolishing the extended
 family (and long houses), often accompanied by fortifications. (Needs 1,2,3)



Continuous and unremitting change could have produced anxiety with its resultant social withdrawal into nuclear family groups.

When Needs 2 is threatened, some regression must result unless Needs 4 has produced a strong elite who link self-aggrandisement with the defensive growth of the social unit as in the citadel. (v. B.35).



An early breaking down of extended family units into simple nuclear groups.

Bronze Age in Europe and Crete - Social Needs are relatively fulfilled and the "elite" are evolving into Needs 4 satisfactions: some achieving expressions of creativity (precursors of Needs 5). These are usually present in the vanguard of society in all cultures.

(83)

B.45

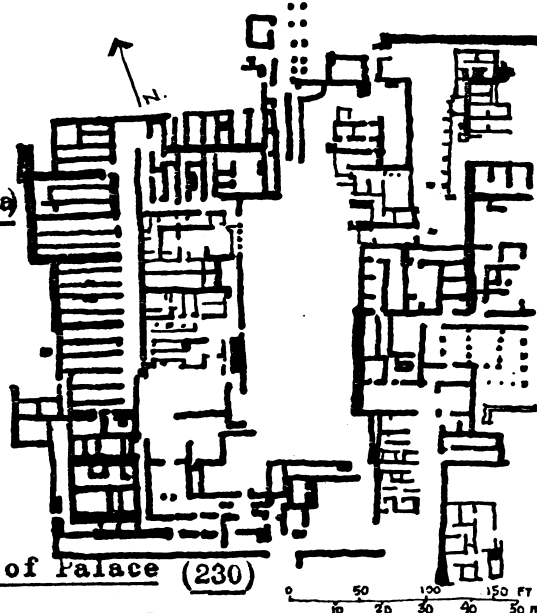
Plan of

Minoan Town of Gournia, c. 2000 BC.

"described as the most perfect Minoan town yet discovered...the houses were generally of 2 storeys the lower floor flush with street, basement rooms connecting with a back door on the down hill side. They commonly comprised 6 rooms, but these were increased in number to correspond with the status or social position....clearly shows the completeness of the Minoan domestic economy" (83).

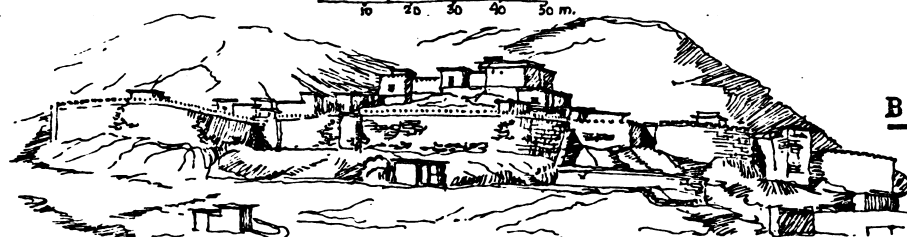
B.46 (a)

Plan of Palace (230)



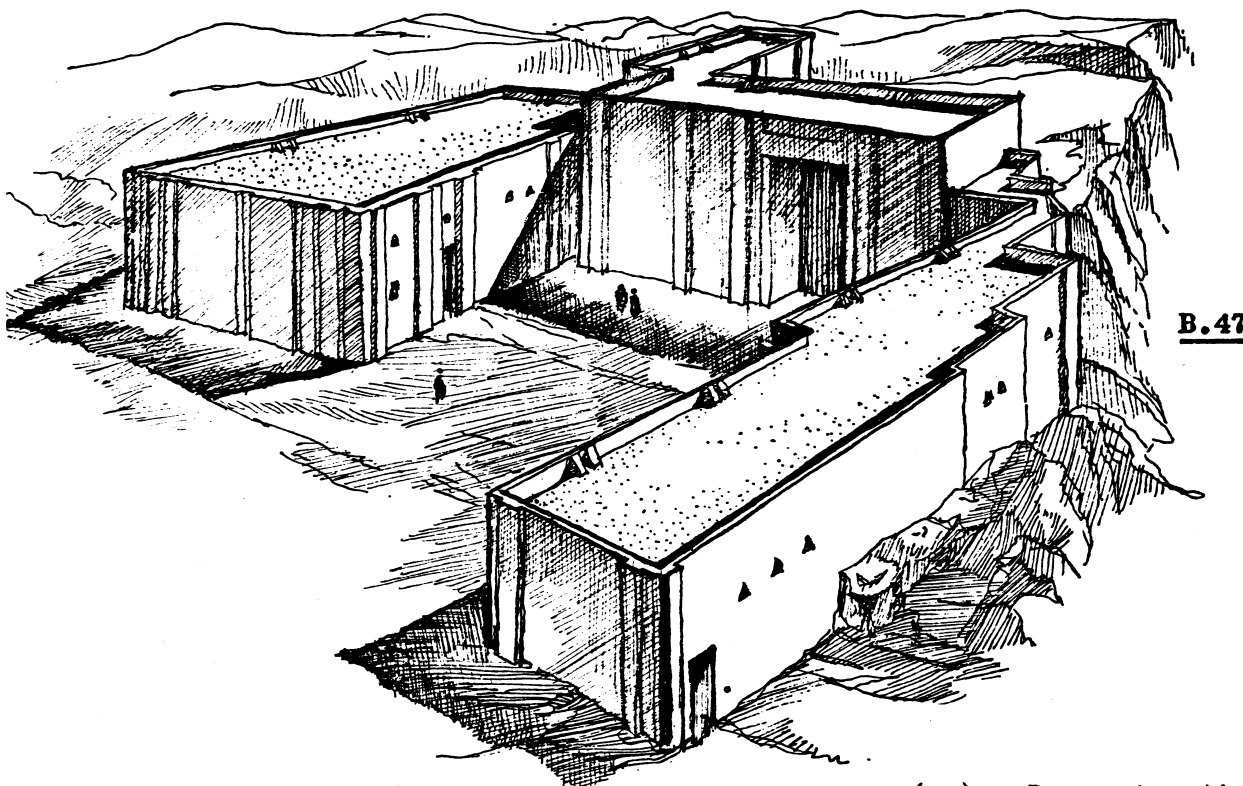
Palace city of Minos, Knossos, Crete, (reached cultural peak 2000-1550 BC., (83).

A town which contained "spacious and grandiose apartments, (as well as simple ones) 4 to 5 storeys in height, docks, harbour roadways, necessities and luxuries for the Knossos population and its royal controller", including a complete drainage system with water-flush for the sanitary fixtures.

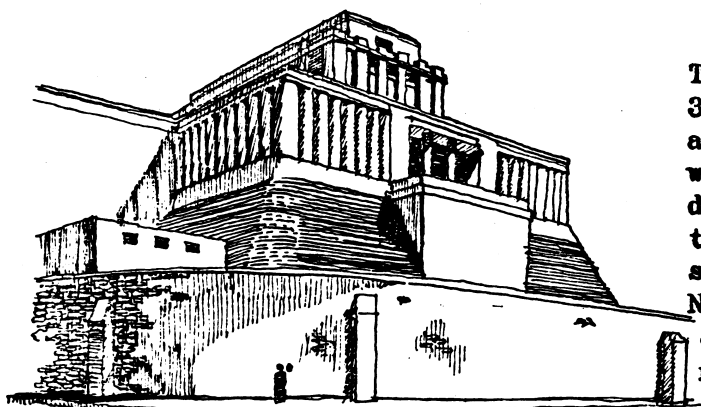
Reconstruction (230)

B.46 (b)

THE BRONZE AGE IN SYRIA, PALESTINE & ANATOLIA & EARLY DYNASTIC AGE IN MESOPOTAMIA: this commenced much earlier than in Europe and was accompanied by "a greater complexity of social organisation".... "increasing size of settlements and development of fortified sites""city-states" (47).



Mesopotamia Temple at Tepe Gawra, c. 4000 BC., (74) - Reconstruction .

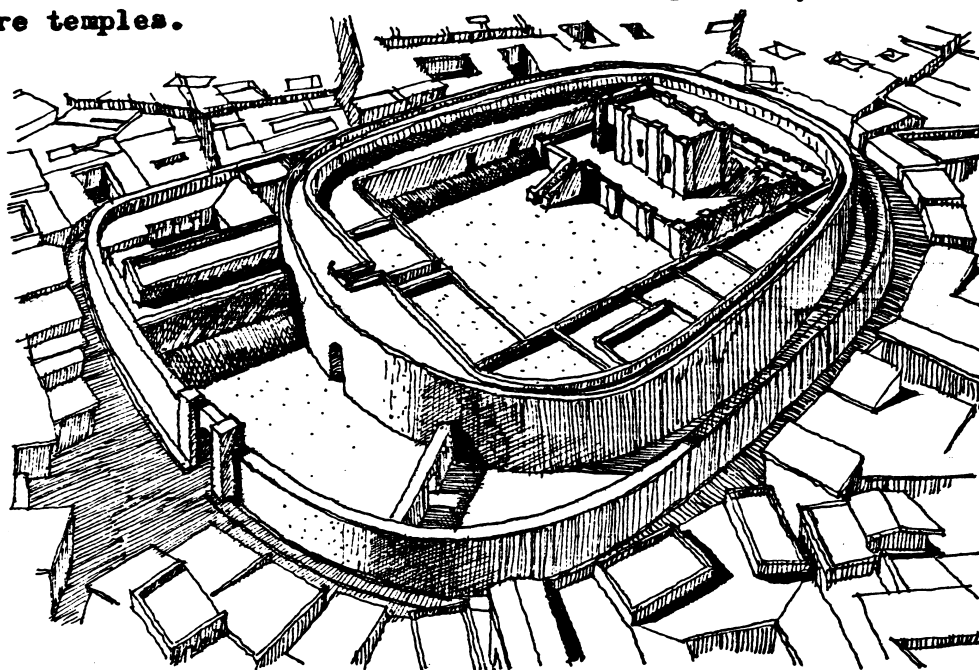


B.48

The centuries immediately before 3000 BC. saw the first conscious attempts at architectural design which culminated in buildings designed for grandeur to impress the masses through religion and state power, the elite achieved Needs 4 fulfillment - at the expense of the physiological needs of the masses.

Mesopotamia Temple at Eridu - Reconstruction (74).

With the influence of war, metallurgy was developed under the stimulus of a need for weapons. This brought in the Bronze Age. Walled and fortified cities arose in Mesopotamia, dominated by one or more temples.



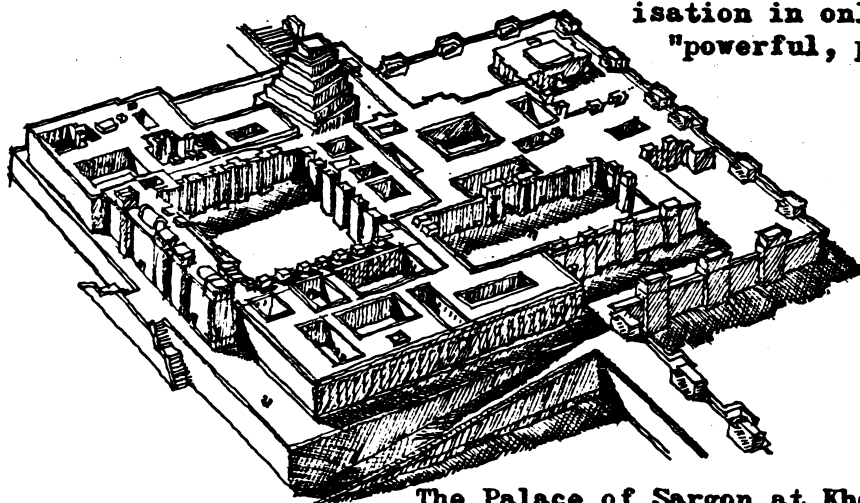
B.49

Khafajah Temple(overlooking the city, 40 ft. below)- Reconstruction (224)

Conflict between city-states initiated full scale war, which developed the prime elements of culture, science, art and reflective thought.

After c.1275 BC., invasions from Assyria changed the focus of Needs 4 overt expressions to warrior-king palaces instead of temples.

Henri Frankfort observed that, in Sumer, "in principle, all members of the community were equal"...."a fact unparalleled in the ancient world". Nature was capricious in floodings of the rivers, children were flogged and slavery was normal, (reminding one of Margaret Mead's Arapesh tribe) the resultant distortions of personality possibly could explain why this society appears to have achieved self-actualisation in only a few ie. of its "powerful, priestly caste" (230).

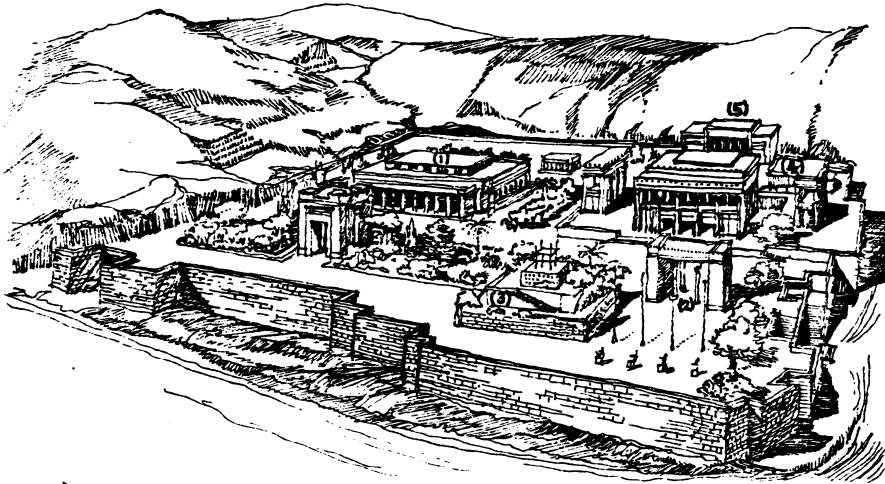


B.50

The Palace of Sargon at Khorsabad-Reconstruction.

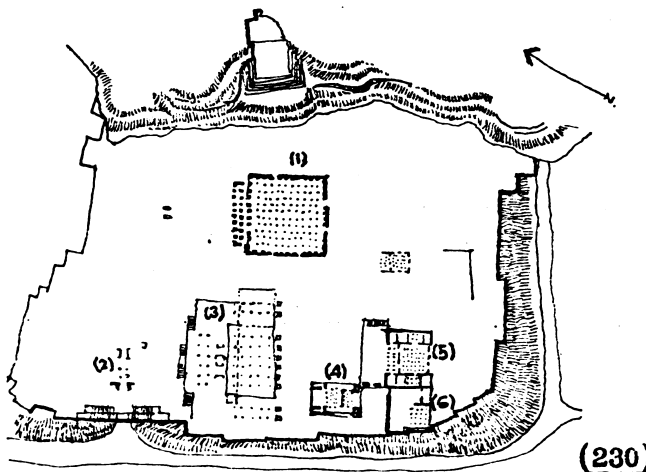
Needs: 5 expression was achieved by the elite, a creativity expressed in "flower gardens, orange groves and summer pavilions" and "luxurious surroundings"..."the outcome of a love of beauty" (230).

The Palace Platform Persepolis- Reconstruction, (view from north-west)
Many elements of which the Persians probably adopted from the conquered Assyrians.



B.51 (a)

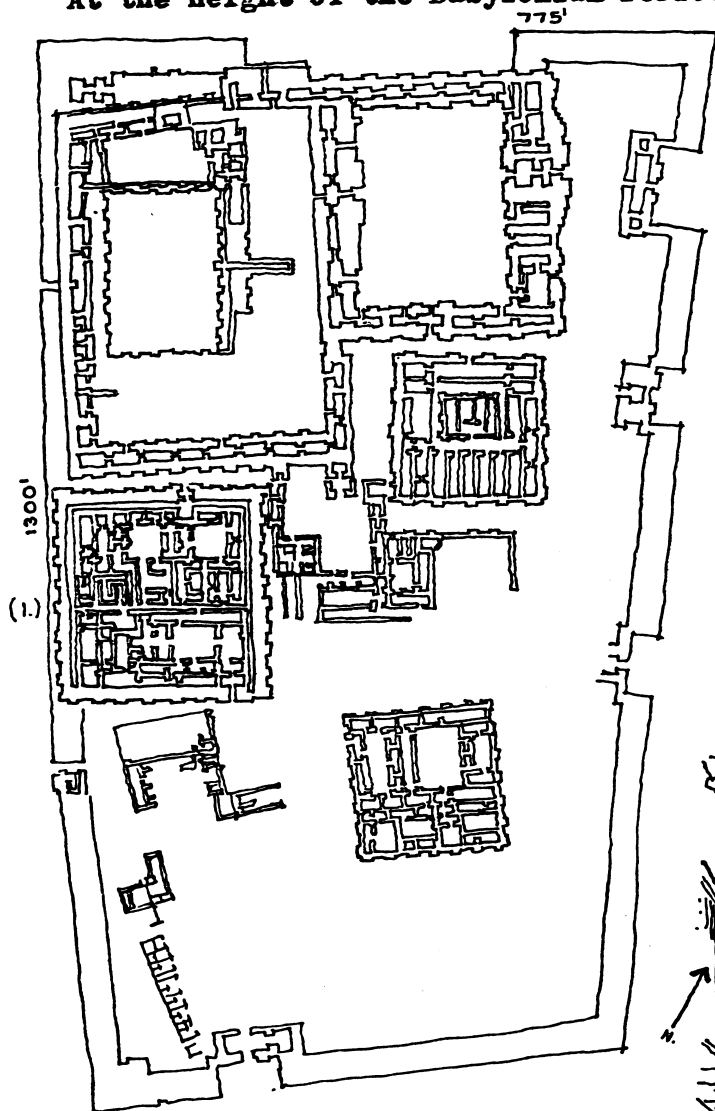
- 1) Hall of 100 columns, Darius
- 2) Propylaea of Xerxes
- 3) Hypostyle of hall of Xerxes
- 4) Palace of Darius
- 5) Palace of Xerxes
- 6) Harem



B.51 (b)

Plan of Palace platform (1,500 ft.x 1,000 ft., 40 ft. above plain).

At the height of the Babylonian Period, the City of Ur represents the peak of Sumerian standards of urban living.



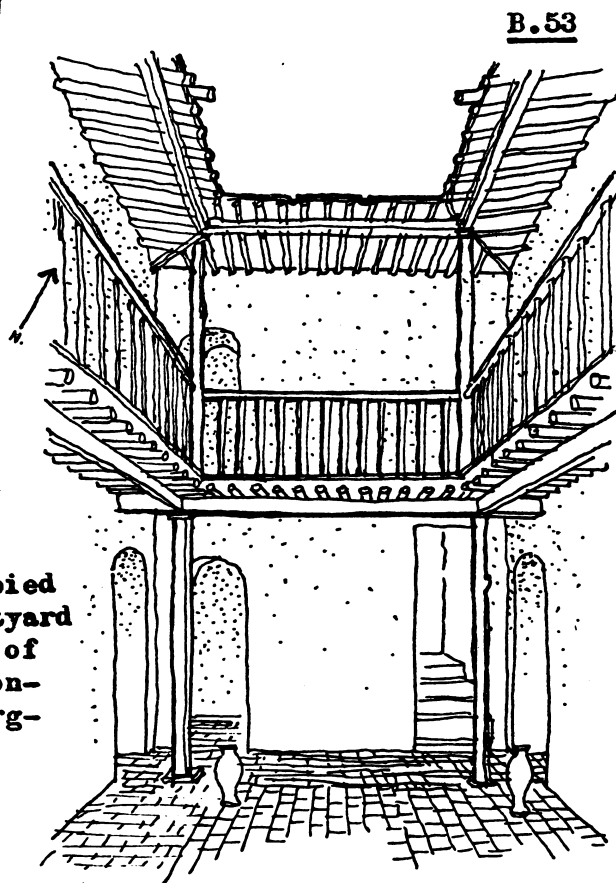
The Temenos of Ur (83) - located in the N.W. segment of the City of Ur - a prototype of the Acropolis or Citadel.

I) The Ziggurat B.52

(this sacred area 1300 ft. x 755 ft. was not finally completed until 600 BC.).

Needs 1 to 4 were well catered for and individuals were given excellent living conditions.

The residential quarter was occupied with predominately 2 storey courtyard houses for the "middle-classes", of varied size and type and often containing 13-14 rooms and a well organised waste and sewer drainage system. (83)



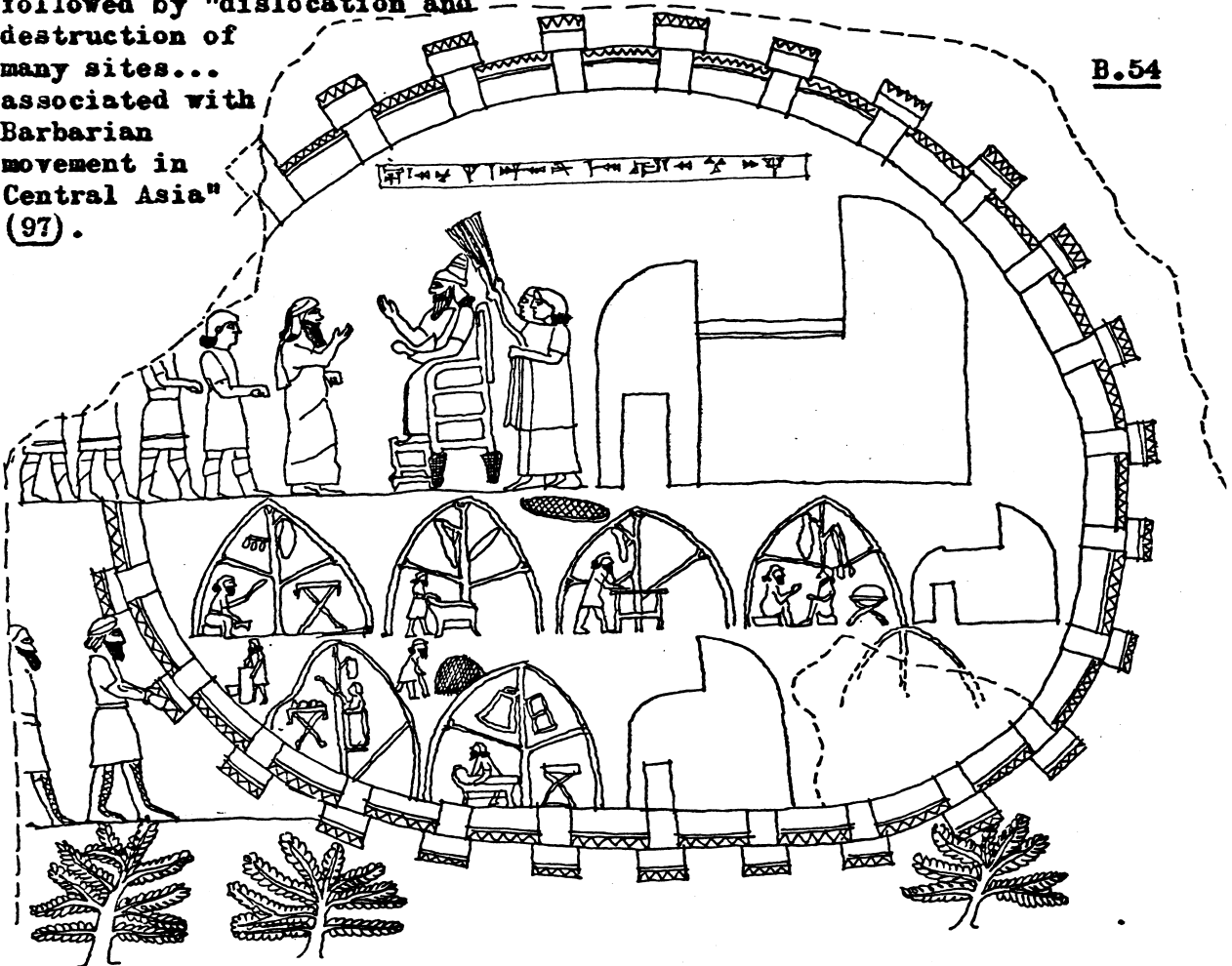
Fortified Towns- A period of crisis - "realignment of powers and movement of people" - social needs expressions.

Trade and arts had flourished in the 2nd Dynasty, Ur fell in 2050 BC., followed by "dislocation and destruction of many sites... associated with

Barbarian movement in Central Asia"

(97).

B.54

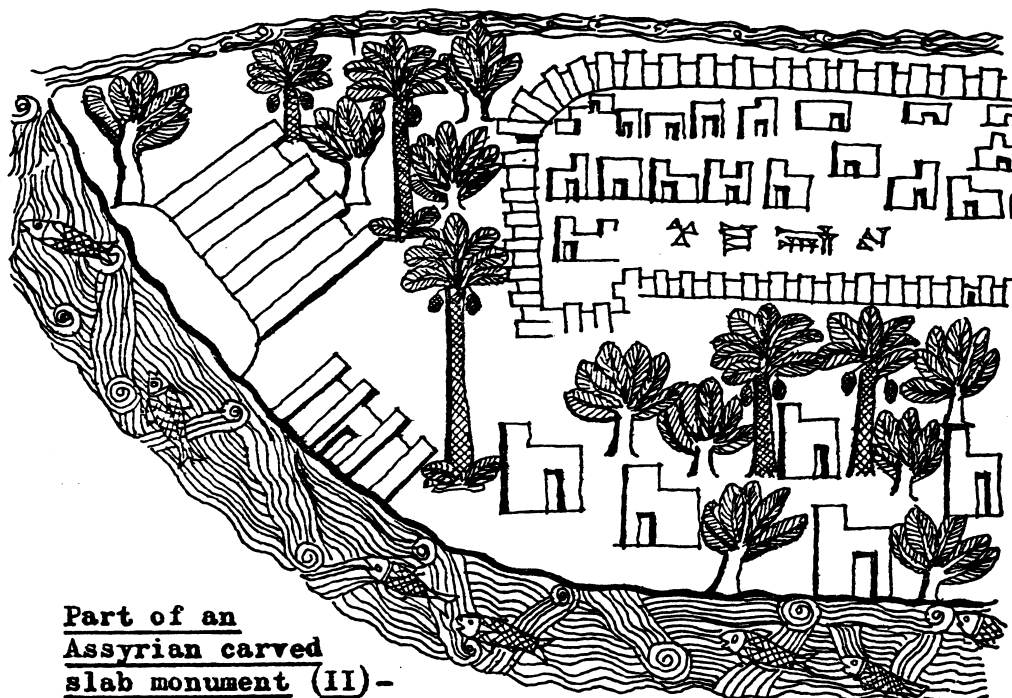


Nippur on the Euphrates River (II) -

The first cartographic city plan from Ninevah interpreted by Kramer as canals, walls, gates (and with the citadel omitted), Mumford asks whether the disused citadel may have become a city park or pleasance. The large building is perhaps the palace and the tents or huts are the working quarters indicating the value of the individual artisans in the economy; (evidence of a Needs 4 expression for the common people equivalent to that of the medieval craftsmen.)

Continuous warfare between city states would have induced constant

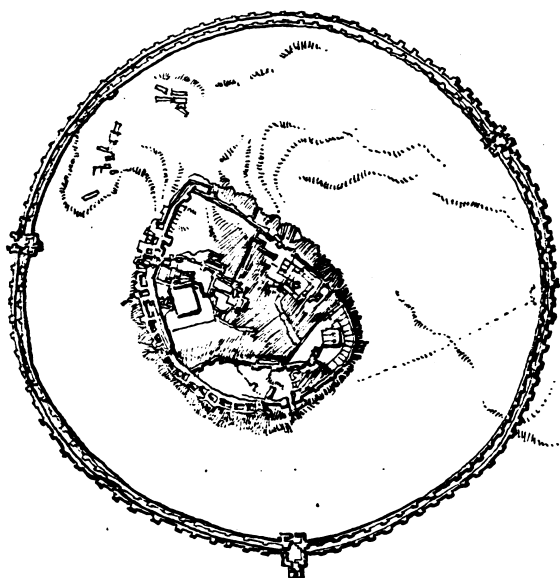
anxiety in the populations and this was expressed in Needs 2 (security expressions- precedents for medieval towns.



B.55

Part of an Assyrian carved slab monument (II) -

showing protective river and canal, around a heavily walled port. Security needs were continuously threatened but within the protected area, the houses are individually different and surrounded by gardens and palm trees. The political and cultural social needs were largely directed towards internal control and external domination.

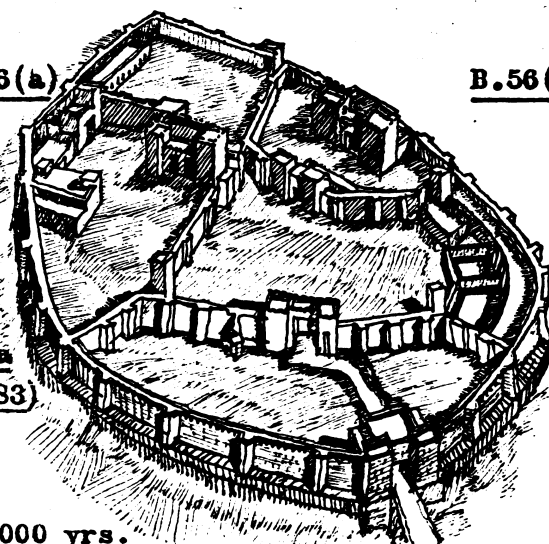


Interior citadel at Sinjerli (83) - Reconstruction.

Politico-social needs dominant, security Needs 2 threatened.

B.56(a)

B.56(b)



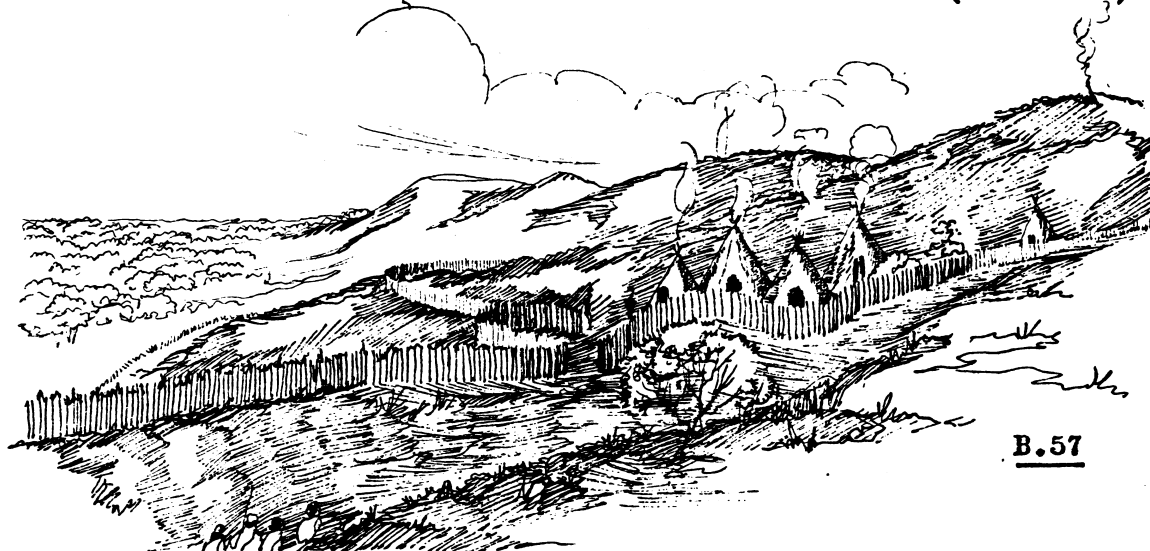
Plan of Sinjerli, N.W. Mesopotamia Reconstruction. c.1800-1200 BC. (83)

A complete reversion to Needs 2 requirements - precursor of the solution to problems expressed in the form of medieval hill-towns 2000 yrs. later when the castle, civic and religious centre had become traditional.

Constant threats to Needs 2 (security) kept England in a state of anxiety which suppressed the expression of potentialities of the individual beyond Needs 3 level.

Camps on Pitstone and Ivinghoe Hills, Bucks., England. (16)

This type of hut had been in constant use by primitive man and was the type usually found (in conjunction with the "hut circle" - a depression in the ground with edge banks to take the place of walls y. B.62), throughout England, including in the defensive earthworks (see below).



B.58(a)



Badbury Rings, (BI fort) earthworks near Wimborne, Dorset (196).

Perimeter: 1 mile, (Maiden Castle at Dorchester $1\frac{1}{2}$ mile).

Starting, perhaps as cattle enclosures with ditch and bank surround, these were gradually improved. The banks were then elaborated and the entrances made into ingenious mazes.

This was a "BI" classification fort, using the natural hill contours (i.e. a "contour fort").

B.58 (b)



(left)

Sections

B.58 (c)

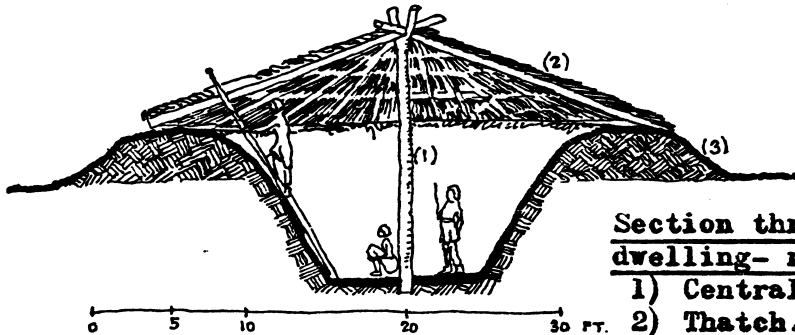


-Illustrating the economy of "cut & fill" which assisted in the immense labour content of the construction work.

- 1) Rampart (Vallum, Agger) earthen wall
- 2) Ditch (or Fosse)
- 3) Escarpment
- 4) Counterscarp
- 5) Berm and undisturbed contour of ground.

The slower pace of needs satisfaction in Neolithic England is expressed in these simple dwellings, (Prior to the arrival of the Beaker Pastoralists from Europe)

B.59



Section through a Neolithic pit dwelling- reconstruction (196).

- 1) Central post support.
- 2) Thatch.
- 3) Deep pit and embankments.

The form of this dwelling suggests concealment as a reversion to Needs 2 (security from prowling enemy bands - wolves would be reluctant to jump into such a pit) Although the insulation achieved from earth walls may have helped in the winters, the climate had become warmer and drier during the Sub-boreal, (also easing the problems of drainage, although these pit dwellings would only have been practical in well-drained soils).

B.60

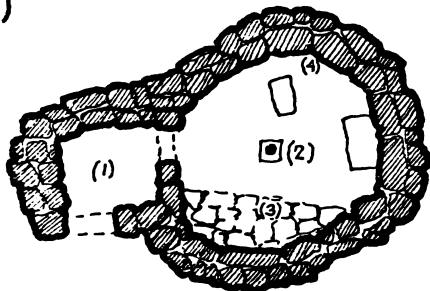


Neolithic hut - used in small communal groups, this would have been a reasonably efficient climate control system.

- 1) Porch-acting as a draught lock.
- 2) Central post support.
- 3) Hearth.
- 4) Thick Stone walls (196).

Reconstruction.

(a)



Plan
(b)

The evolution of the conical shelter and the pit dwelling, in combination to produce the nuclear family dwelling suitable for satisfaction of Neolithic man's physiological needs.

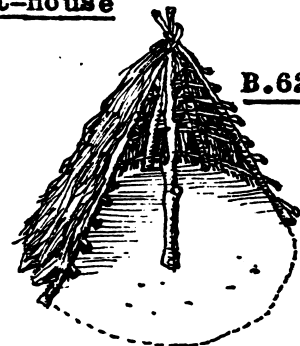
Ancient underground dwellings (136)
(Cornwall, S.W. England)

B.61



1st Phase in the Development of the Round Pit-House

The primitive conical shelter constructed on the surface of the ground (136).

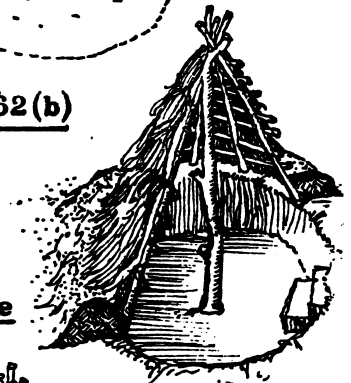


B.62(a)

2nd Phase in the Development of the Round Pit-House

Improved headroom and weather exclusion in the pit dwelling.

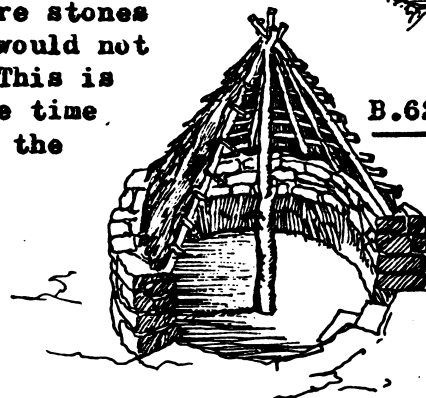
B.62(b)



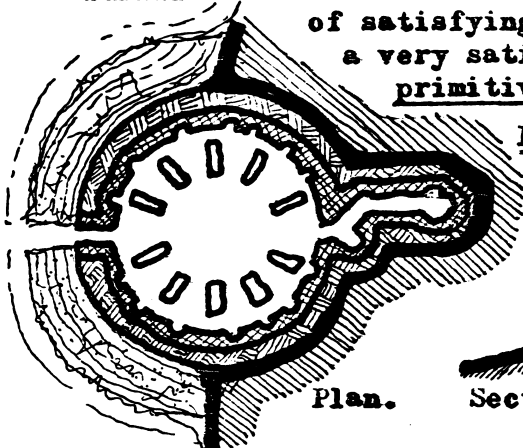
Final Phase in the Development of the Round Pit-House

A round pit-house, stonewalled where stones are available, with roofing which would not be like the present day thatch. This is because the cereal plants of the time were too weedy, small and short in the stalk.

B.62(c)



Stone circular dwellings used in environments where timber was scarce and probably having some links with "chambered barrows" (167) "burial mounds and tumuli" (230). These house forms have the potential of satisfying Needs 1 and 2, and as such would have been a very satisfactory dwelling unit for England at this primitive stage of prehistory.



Plan.

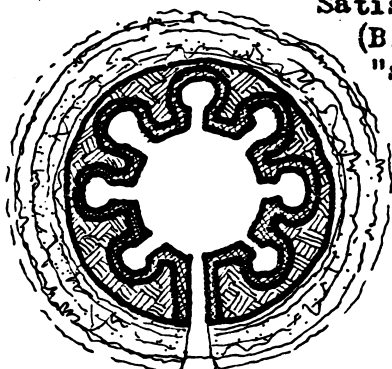
Picts House, Scotland - An earth house at Usinish, SouthUist Hebrides, (196).



B.63

Section: showing how the siting is based on "cut & fill" of the existing ground slope.

Satisfactory microclimate control devices (B.63 being equivalent to the very efficient "sack" cave q.v.).



Plan

B.64
Section

A Picts House, Sutherland, Scotland (196).



B.65

Beehive huts, Lewis, Scotland (230).



B.66

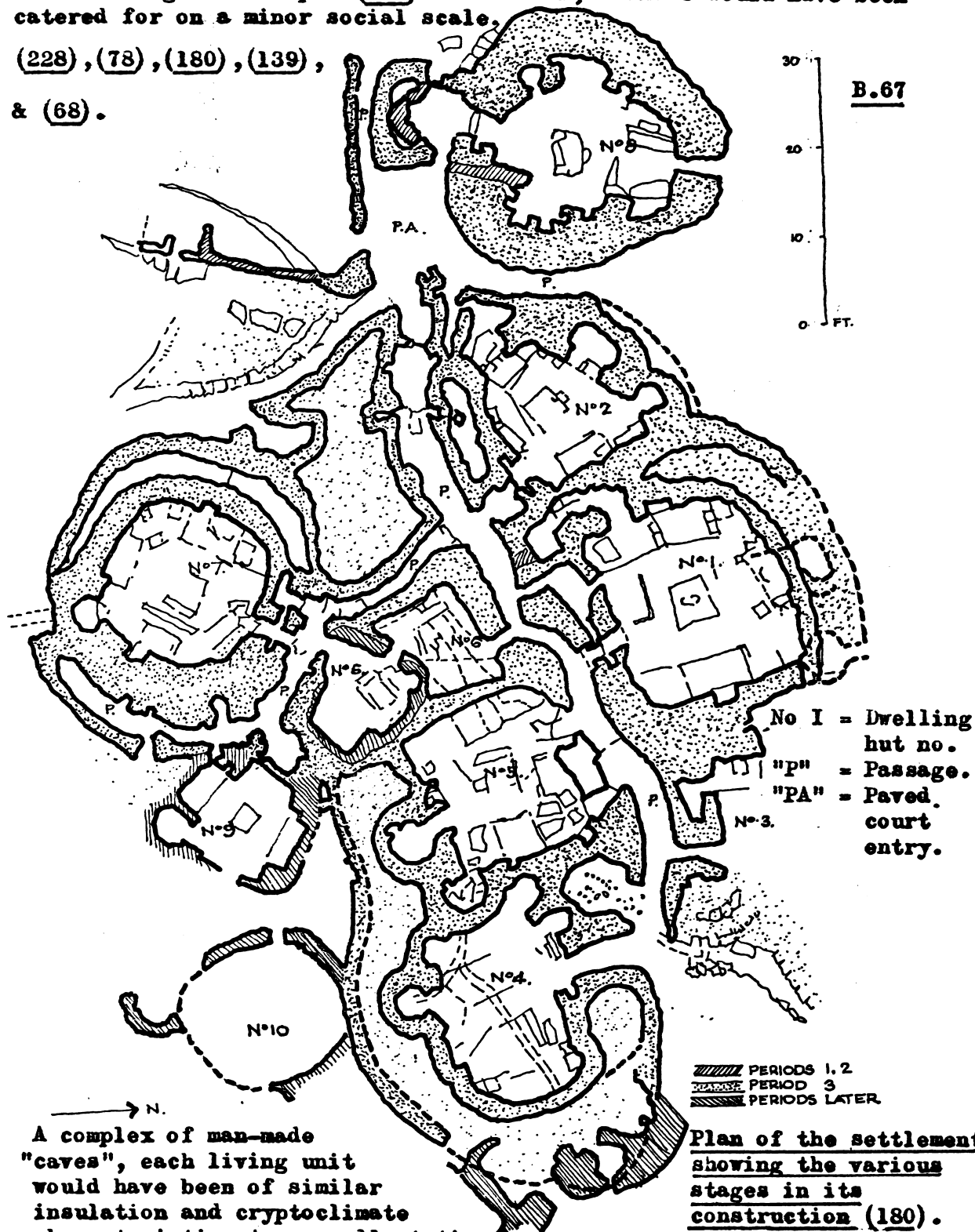
Beehive Huts: Ireland (230).

Probably derived from burial mounds or tumuli in Wales, Scotland, Ireland and Cornwall.

Skara Brae, Orkney, c. 2000 BC, has been described as "the most perfect Stone Village in Europe" (228). Needs 1, 2 and 3 would have been catered for on a minor social scale.

(228), (78), (180), (139),

& (68).

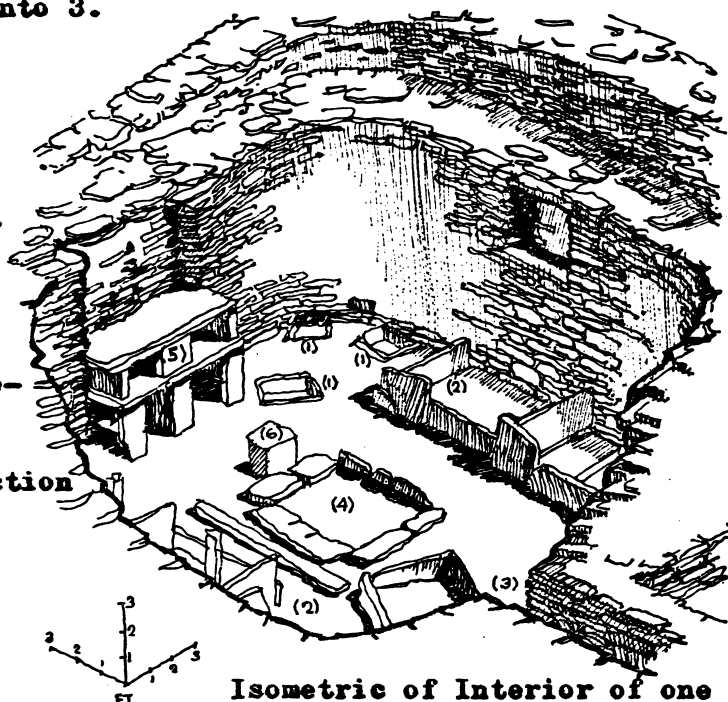


A complex of man-made "caves", each living unit would have been of similar insulation and cryptoclimate characteristics to a small static cave (vide Section 2), heat conservation would have been very efficient with shared walls between dwellings.

Skara Brae, ctd. - Representative of the development of the circular hut plan in England at this time, c.f. B. 69, for the introduction of the rectangular plan, probably brought from Europe. Both represent simple, social structures, slowly evolving through the levels of Needs 1, 2 and into 3.

- 1) Floor boxes
- 2) Bed
- 3) Doorway
- 4) Hearth
- 5) Storage unit
- 6) Seat

Roof: probably corbelled over to a smoke hole—perhaps some whale bone or timber construction with turves.



B.68

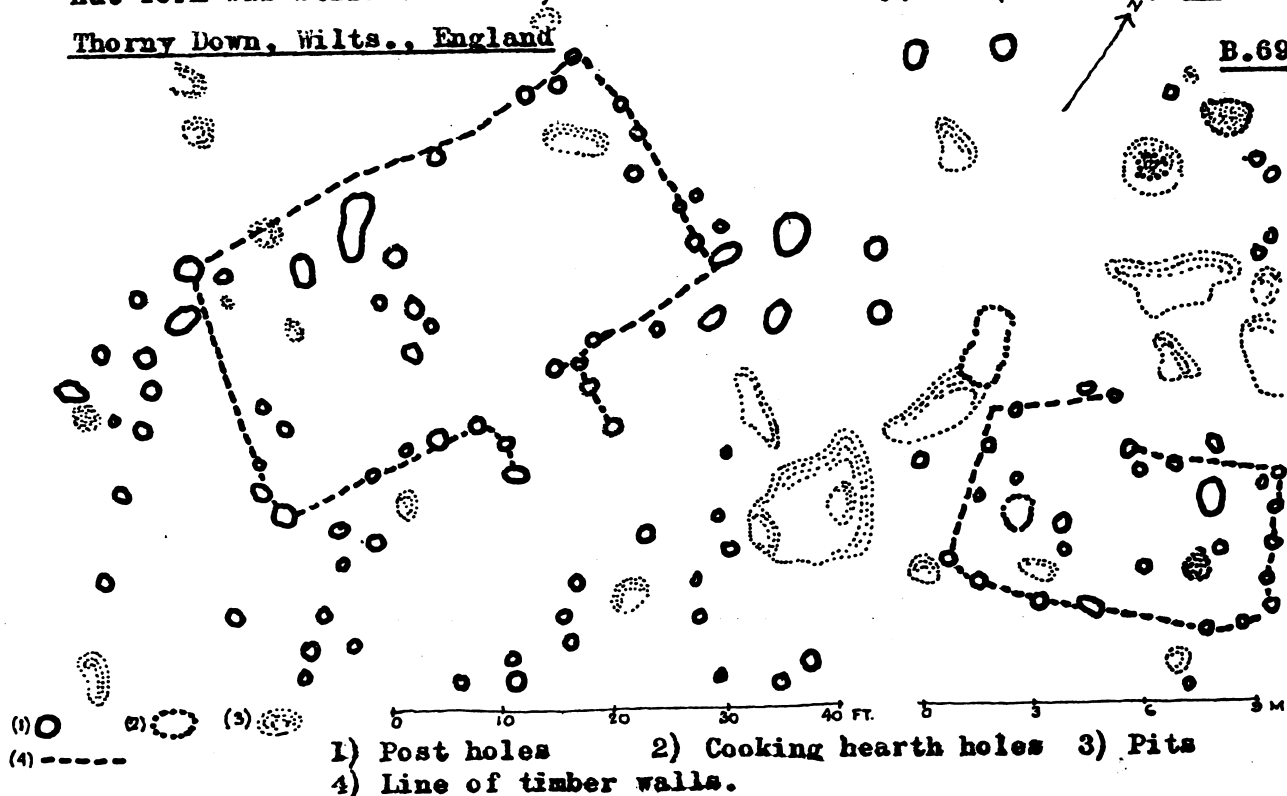
Isometric of Interior of one Dwelling Unit.

(78)

Rectangular hut plans also appear, although the dominant hut form was still circular, c. 12th–11th century, BC., (c.f. B.70), (21).

Thornycroft, Wilts., England

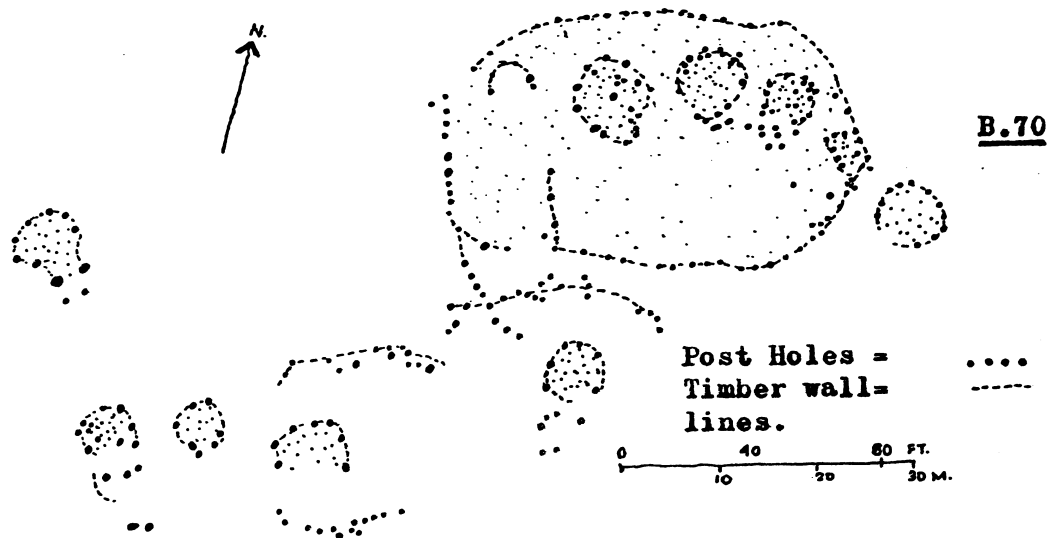
B.69



- (1) ○
- (2) ●
- (3) ●
- (4) - - - -

- 1) Post holes
- 2) Cooking hearth holes
- 3) Pits
- 4) Line of timber walls.

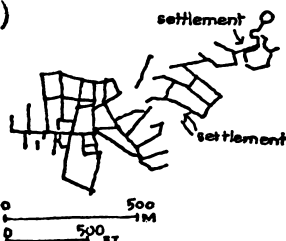
The most common plan of the period (12th-11th century BC.) was circular and was most often associated with earthworks, (v. B58).



Itford Hill Sussex, England (21) -
Settlement showing the post-holes of timber-built houses.

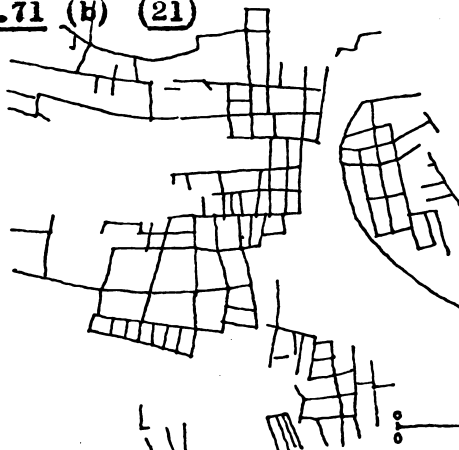
In many instances, dwelling plans (such as above) were associated with "more or less rectangular arable fields", their form pre-supposing plough agriculture with the light 'ard' " (21).

B.71 (a)



Ancient field system at Plumpton
plain, Sussex, Eng. 12th cent. BC..

B.71 (b) (21)



Ancient field system at Figheldean Downs
Wilts. England. c. 2nd-1st cent. BC. to 1st cent. A.D.

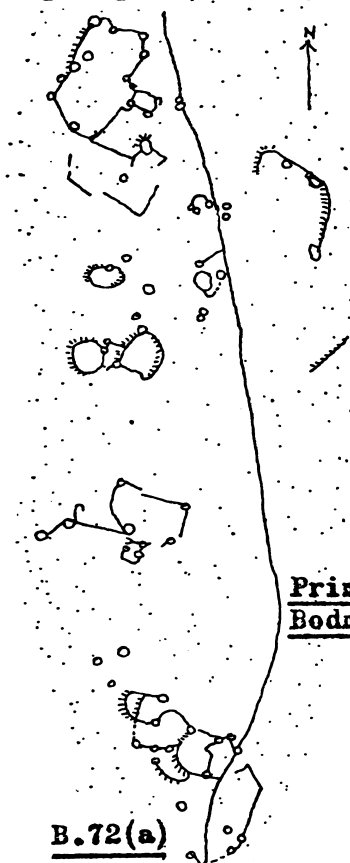


Ancient field system shown in this context
for comparison purposes, at Skjbaek, Jutland
Denmark, 2nd-1st cent. BC., to 1st cent. A.D..

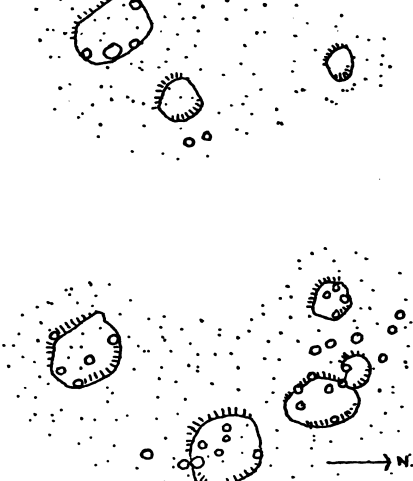
The use of enclosures of a rectangular repetitive type began open space enclosure. Eventually, becoming an integral part of the English landscape. (21)

Circular enclosure and broch - two interpretations of threatened Needs2for security, i.e. from intrusion on to cultivated fields and from invasion, expressive of two different types of threat from the environment

Forest clearings were made by burning, corn was planted in plots, probably fenced to keep out animals - such enclosures probably predate those shown in B.71 as these corn plots indicate that the Belgae introduction of the plough had not yet occurred.

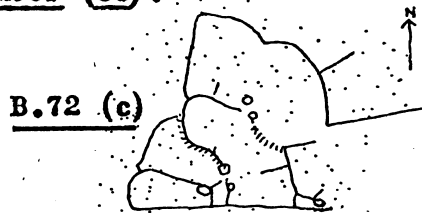


B.72(a)
Rough Tor, Bodmin
Moor



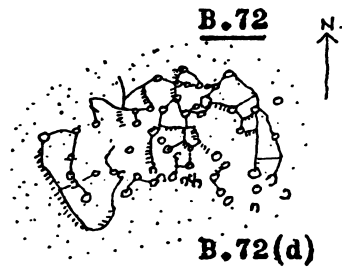
B.72 (b) White Ridge,
Dartmoor (88)

Primitive corn plots in Dartmoor & Bodmin Moor (88).



White Ridge, Dartmoor

O ROUND HUT.
TTTTT FENCE AND SMALL LYNCHET.
0 100 200 300 400 500 600 700 800
FT.



Standon dow,
Dartmoor (88)

o=1) Huts

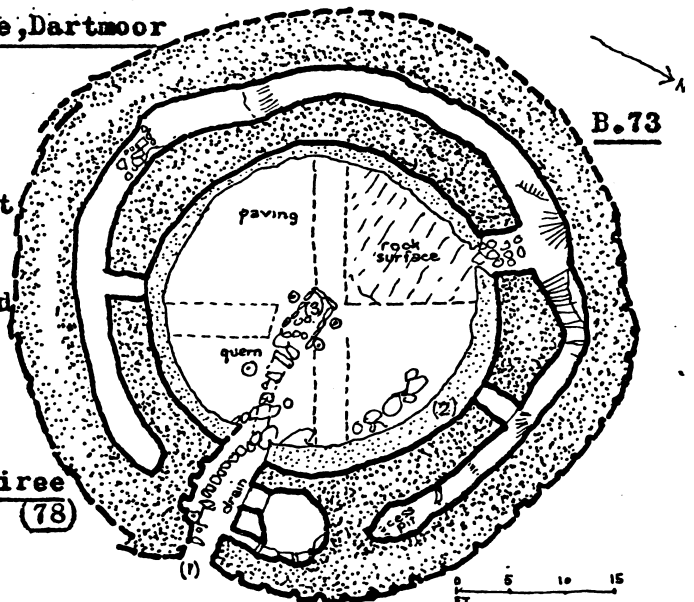
ω=2) small lynchets
formed by cult-
ivation of top
soil.

(date given is disagreed
by writer-suggest ear-
liest date c.2300 BC).

The cavity stone wall permitted construction to approx.30ft.high. These permitted farmers to inhabit the central part at ground level and to move away from the original seacoast cliffs to the inland for more practical farm sites. The builders and occupants may have been Picts, but this is far from sure.

Plan of a Broch: Don Mor Vaul, Tisree

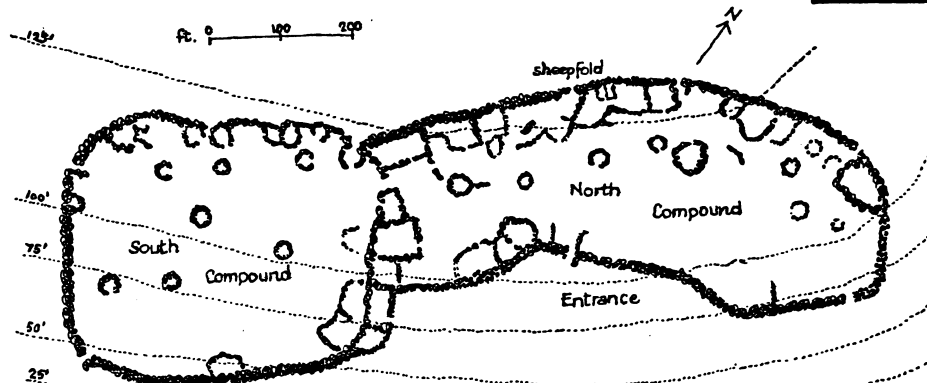
- 1) Door hinged on pivot stone.
2) Paving. 3) Water Tank.



(78)

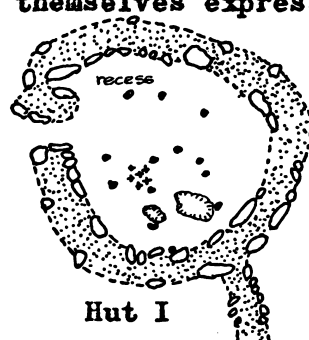
Bronze Age societies in Britain show some degree of social groupings into enclosed settlements, but the enclosures show little evidence of extensive cultivation (258). This indicates individual social Needs 3 development and some beginning of socio-economic needs development.

B.73 (a)



Enclosures to a settlement at Riders' Rings, Dartmoor (258)

The enclosures were probably for the security of cattle from the environment. Plans such as these indicate a strong empathy with site and round huts are in themselves expressions of this innate sense for appropriate organic forms.

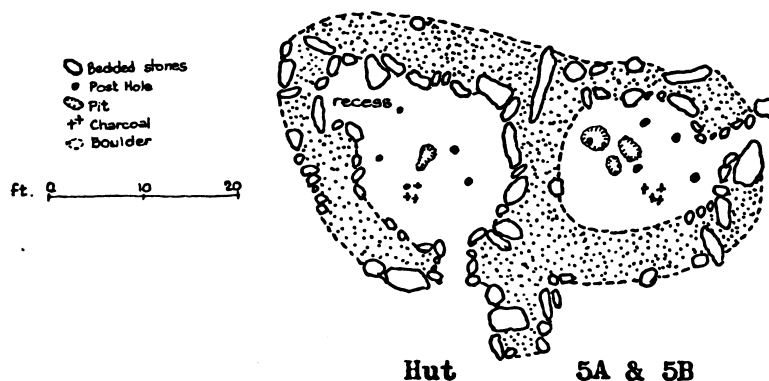


Hut I



Hut 2

B.73 (b)

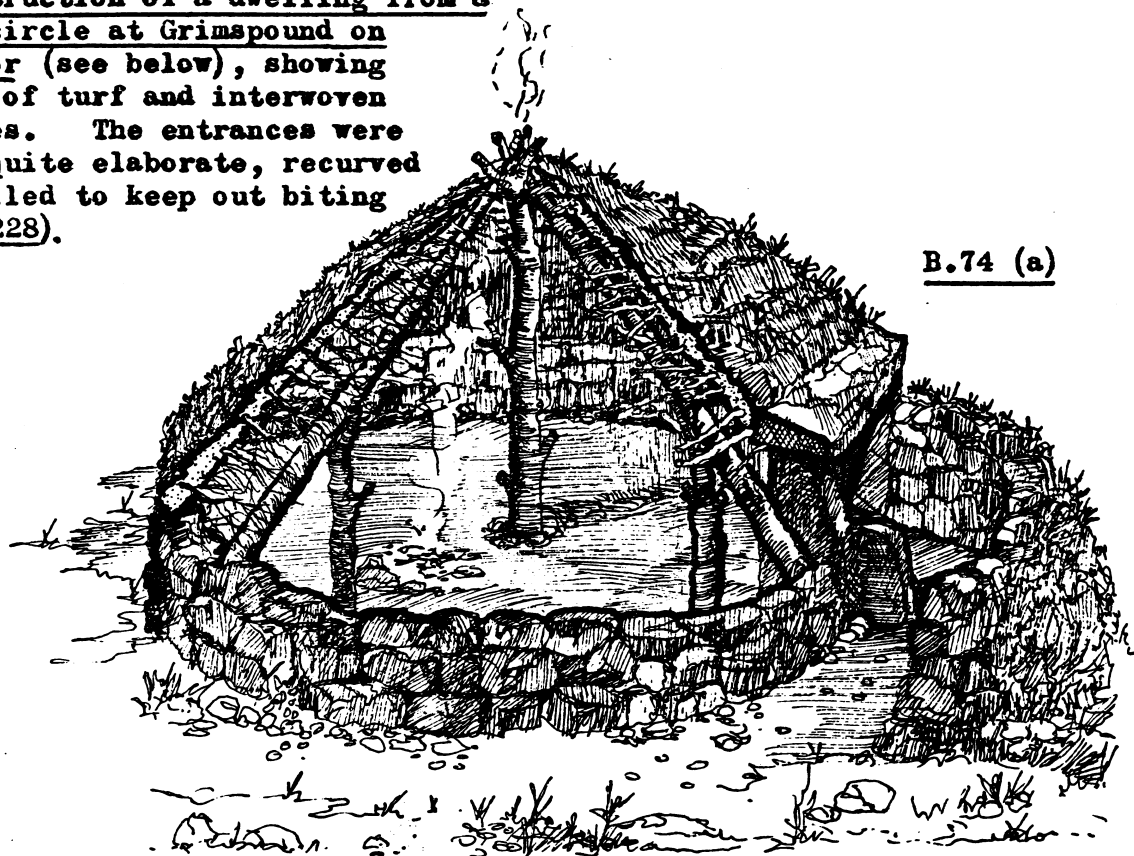


Hut 5A & 5B

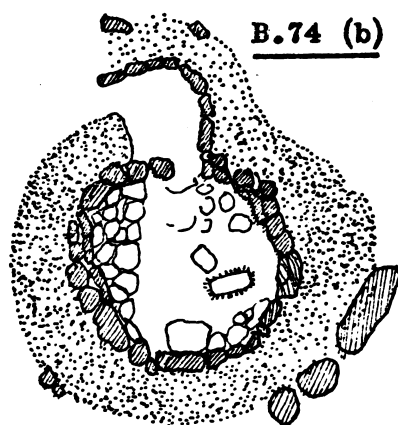
Further hut types from enclosed settlement (similar to Riders' Rings) indicative of the strong tradition of round huts that continued well into Roman times. (Dean Moor settlement, Dartmoor) (258).

Economic and social change came to England c.2000 BC. as part of widespread migrations on the continent "caused by improved living conditions and by expanding populations." (228).

Reconstruction of a dwelling from a stone circle at Grimspound on Dartmoor (see below), showing a roof of turf and interwoven branches. The entrances were often quite elaborate, recurved and coiled to keep out biting wind (228).



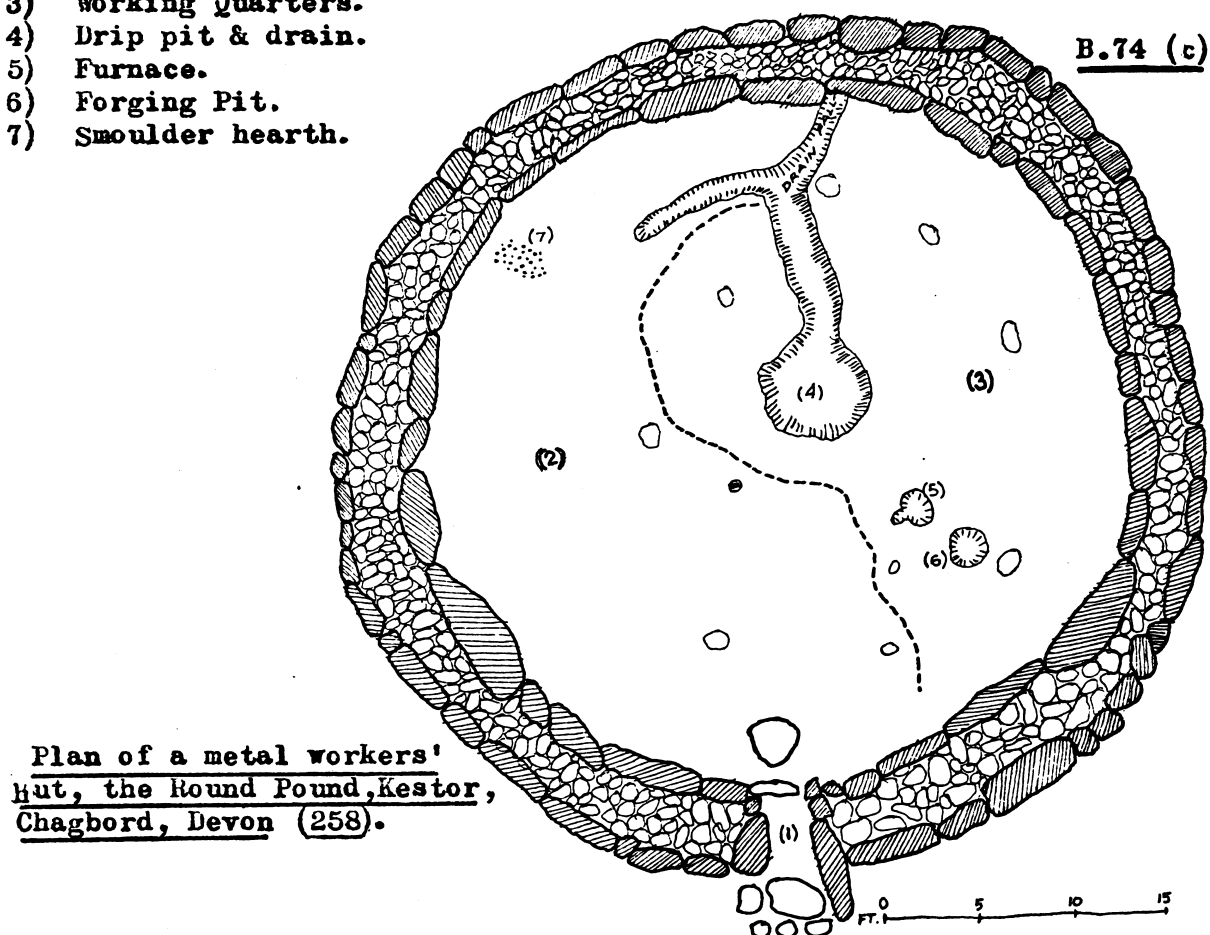
"The antiquity of the round-house in lowland Britain is still shrouded in gloom". (180)....."until more work has been done on domestic sites of the period" (i.e. Bronze Age).
"both in south-eastern England and on contiguous parts of the Continent".



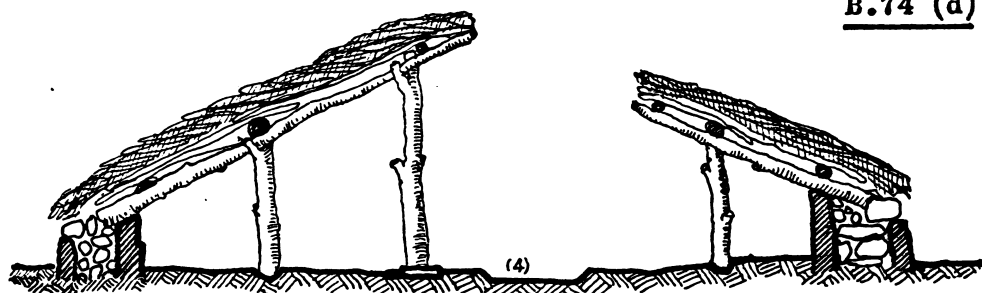
Plan of the hut circle (above).
Dartmoor

Further hut plans from the Late Bronze Age in Britain, indicated the growing influence of metal, allowing specialisation of metal crafts which was necessary for the development of embryonic socio-economic needs. Pastoralists and agriculturalists were both present in areas such as Dartmoor and some family holdings expanded and multiplied until their fields coalesced, extending over nearly a mile of moorland.

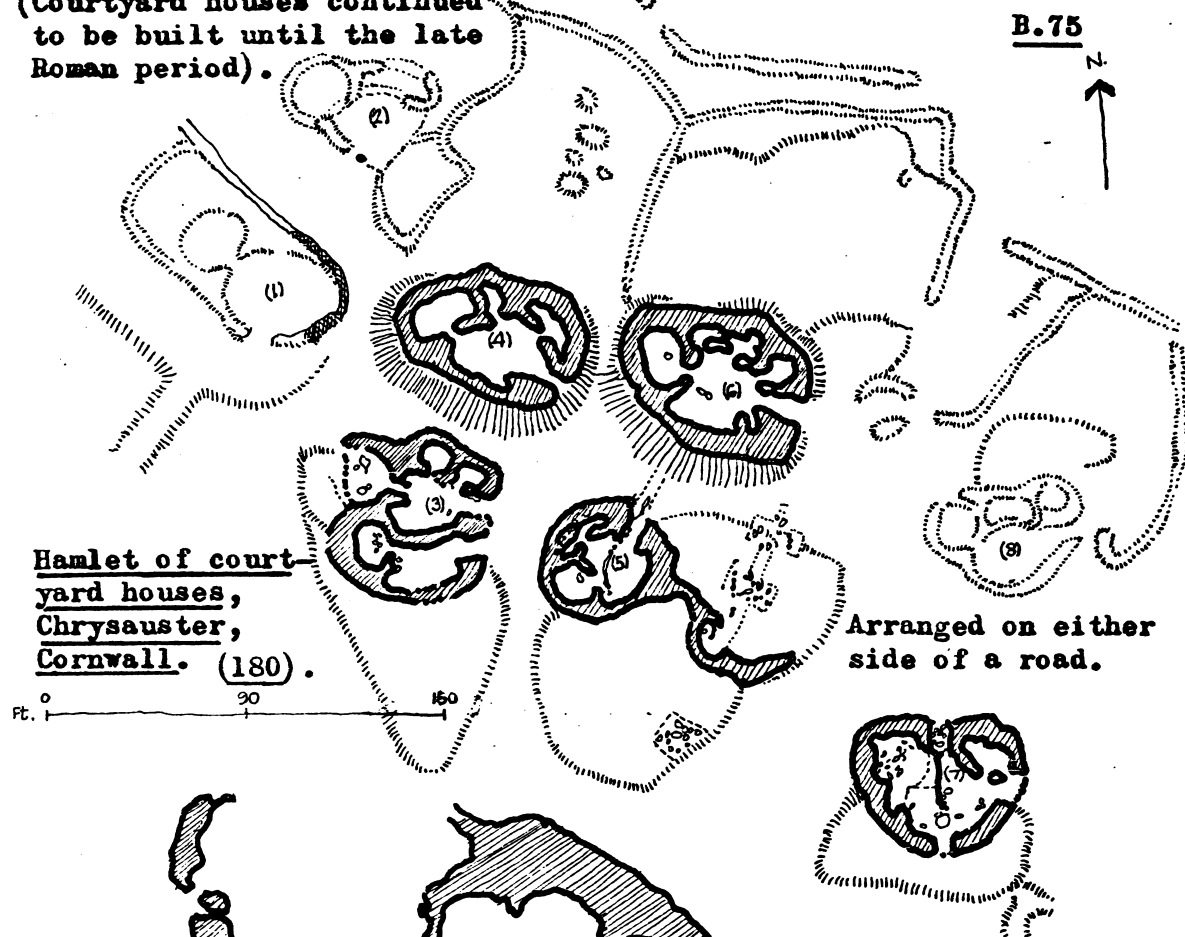
- 1) Entrance.
- 2) Living Quarters.
- 3) Working Quarters.
- 4) Drip pit & drain.
- 5) Furnace.
- 6) Forging Pit.
- 7) Smoulder hearth.



Section through the metal worker's hut above.

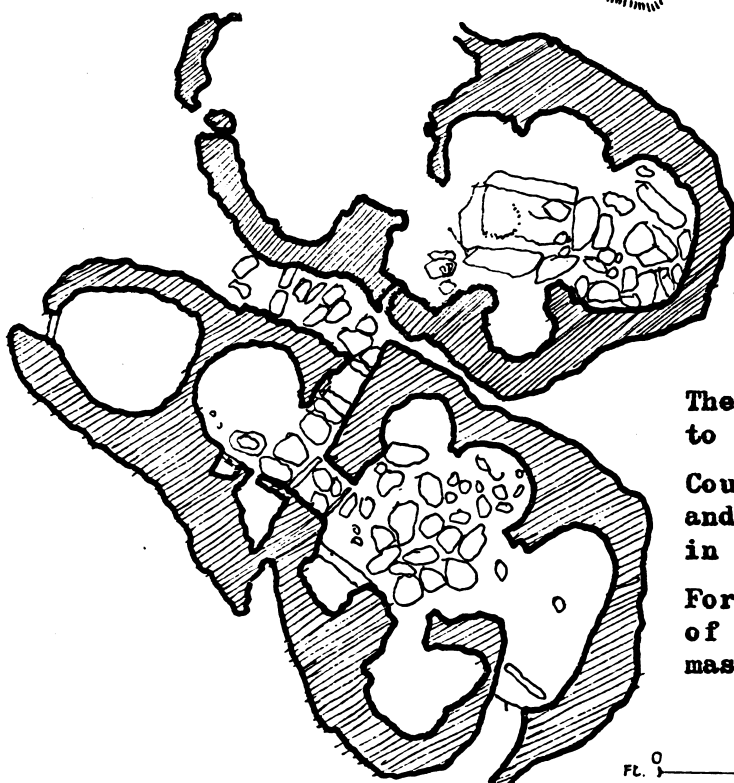


From the Late Bronze Age, the round house- here adapted to incorporate open courtyards, remains constantly present, being adapted to different structural methods suitable to the solution of climatic problems. (Courtyard houses continued to be built until the late Roman period).



Hamlet of courtyard houses,
Chrysauster,
Cornwall. (180).

Arranged on either side of a road.



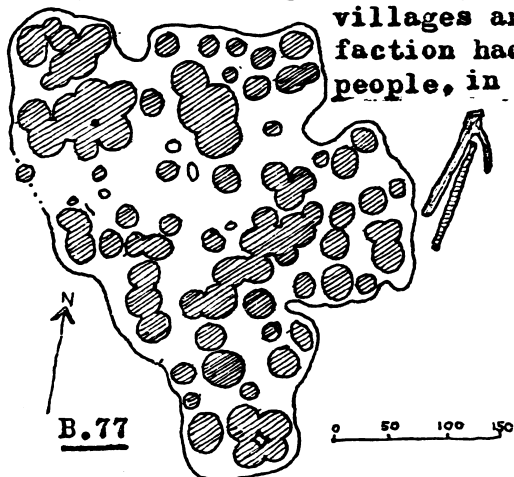
B.76
Plans of Courtyard Houses
I (lower) and V (upper) at
Jarlshof, Shetland, (180).

The rear room of house V seems to have been used for cattle.

Courtyards were open to the sky and a cattle stall recess appears in some houses.

For climate control, the cluster of houses is contained within massive earth-stone walls.

There is a question as to whether agglomerations of houses were really social groups, forming a village (Needs 3) or whether they were clustered together because of political insecurity (Needs 2). This appears to be answered in favour of the former because of the presence of hearths reconstructed several times and the character of the clusters as determined by the presence of evidence of leather-working, wood-turning and weaving artisans, makes it appear that these were real villages and not just clusters, ie. Needs 3 satisfaction had become possible with these groups of people, in rudimentary form but presaging the growth of Social Needs.



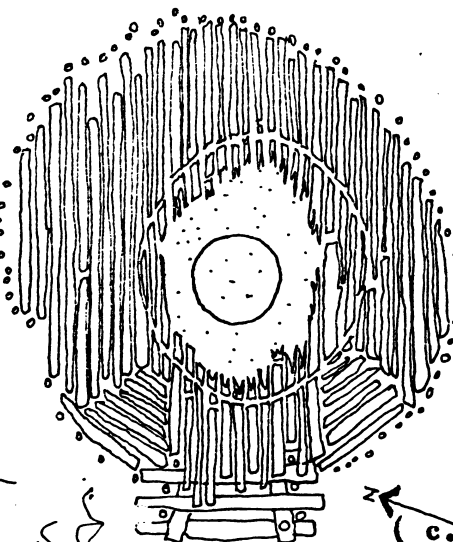
c. 60 BC., (55)-

Plan of Marsh Village of Glastonbury (180). On an artificial island or crannog, 70 dwellings, 3½ acres.

B.78

Floor of hut at Glastonbury marsh village (180)

It is likely, these were "little more than wigwams," (180).



B.79

(c.f.B.81 ff.)



Reconstruction of the village (196).

Comparisons may be made between the Needs 3 motivations for Glastonbury compared to the Needs 2 motivations of crannogs (and hill forts, brochs, etc...."the product of political insecurity") (180).



B.80

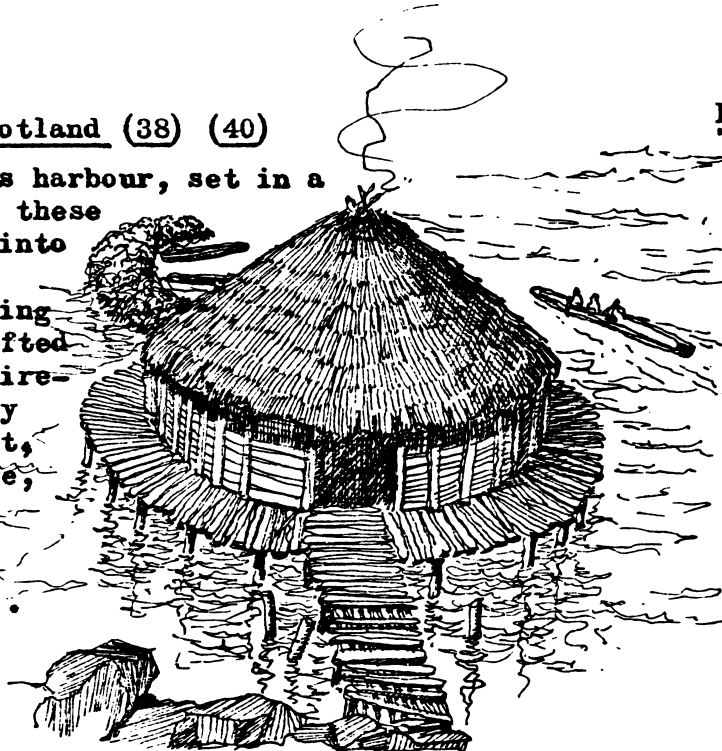
Glastonbury Marsh Village.

Reconstruction of a hut and social group. (Although shown as a hut, J.G.D. Clark (180) considers they could have been "little more than wigwams.")

Milton Crannog, SW. Scotland (38) (40)

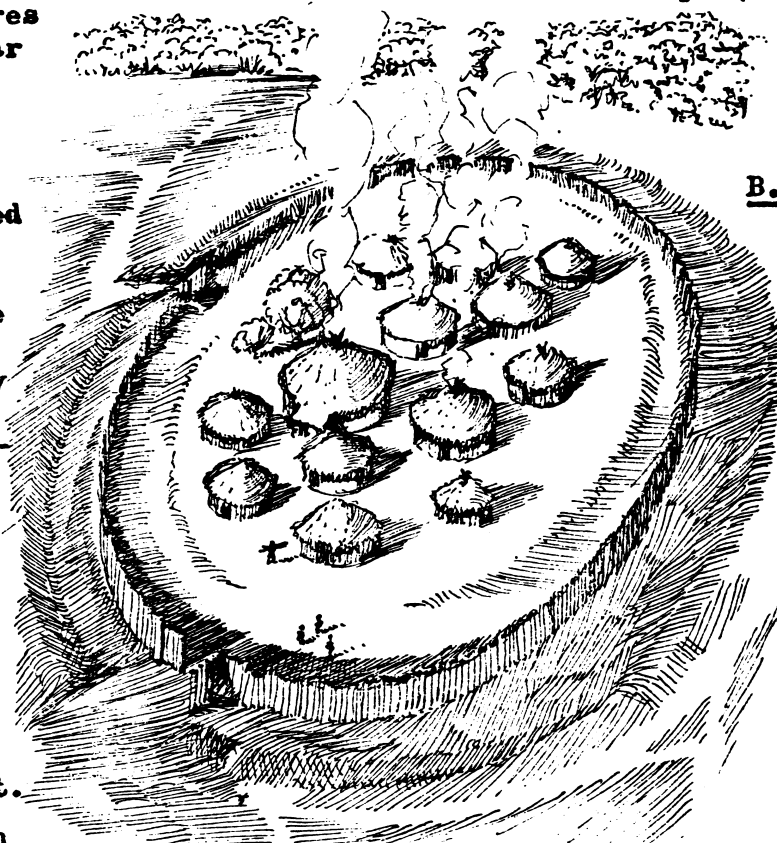
B.81

A crannog house and its harbour, set in a bog or lakeside site - these continued to be built into the Middle Ages - for 1000 or more years during which the emphasis shifted to security needs requirements in a continuously threatening environment, (clan or tribal warfare, cattle thieving, family feuds, etc. Needs 2 motivations being involved here).



From the beginning of this Early Iron Age, although marked by the introduction of the Hallstatt and La Tene traditions from Europe (ie. rectangular houses, byres and barns), the circular house was still the dominant structural form.

Continued threat from the environment retarded development in Britain for over a thousand years. Palisades were the overt signs of this threat to security (Needs2).



B.82

Reconstruction of a village with Palisade and earthworks (180).

The village or hamlet became the exception and the isolated farmstead became more the typical settlement unit.

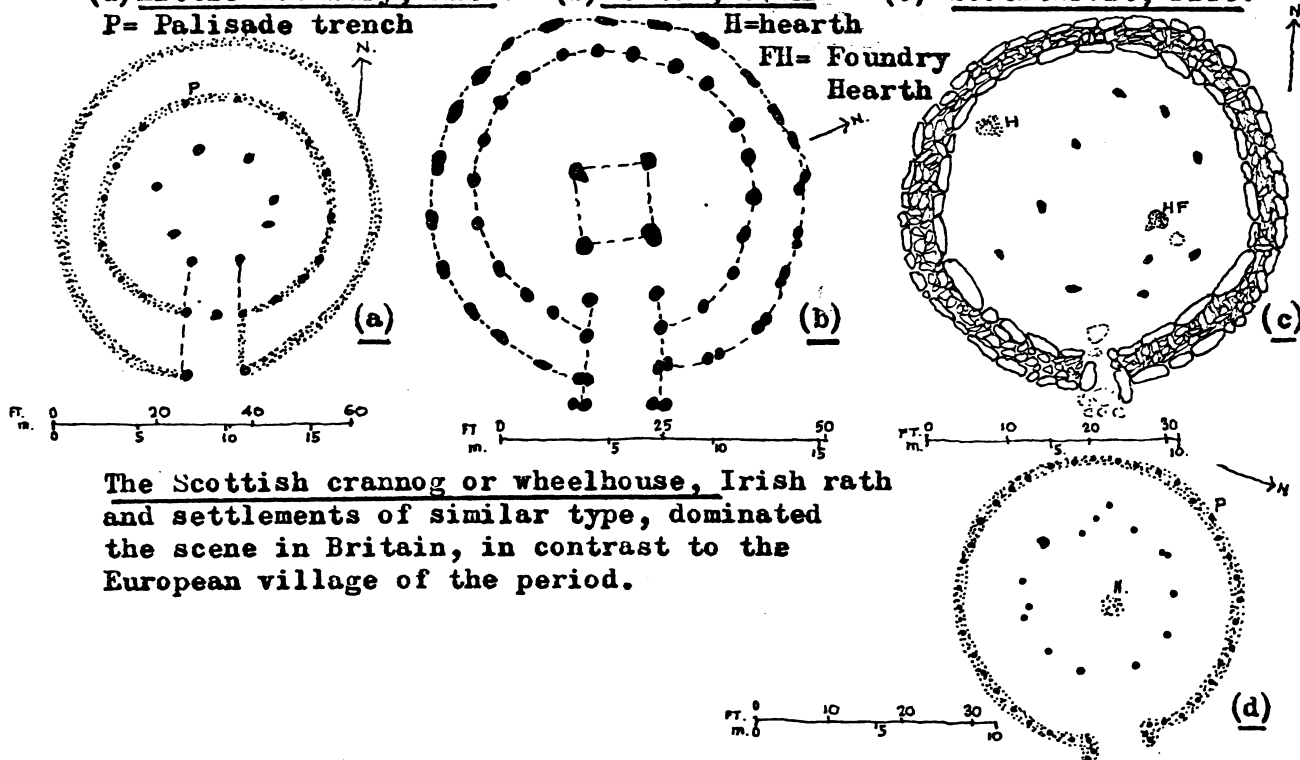
Circular house plans in timber and timber-stone (21).

(a) Little Woodbury, Wilts. (b) Kestor, Devon (c) Scotstarvit, Fife.

P= Palisade trench

H=hearth

FH= Foundry
Hearth



The Scottish crannog or wheelhouse, Irish rath and settlements of similar type, dominated the scene in Britain, in contrast to the European village of the period.

c.100 BC. Belgic tribes, who had close contact with the expanding Roman Empire and adopted many ideas of Roman administration and customs, conquered the south-east country and large and stable kingdoms were established for the first time.

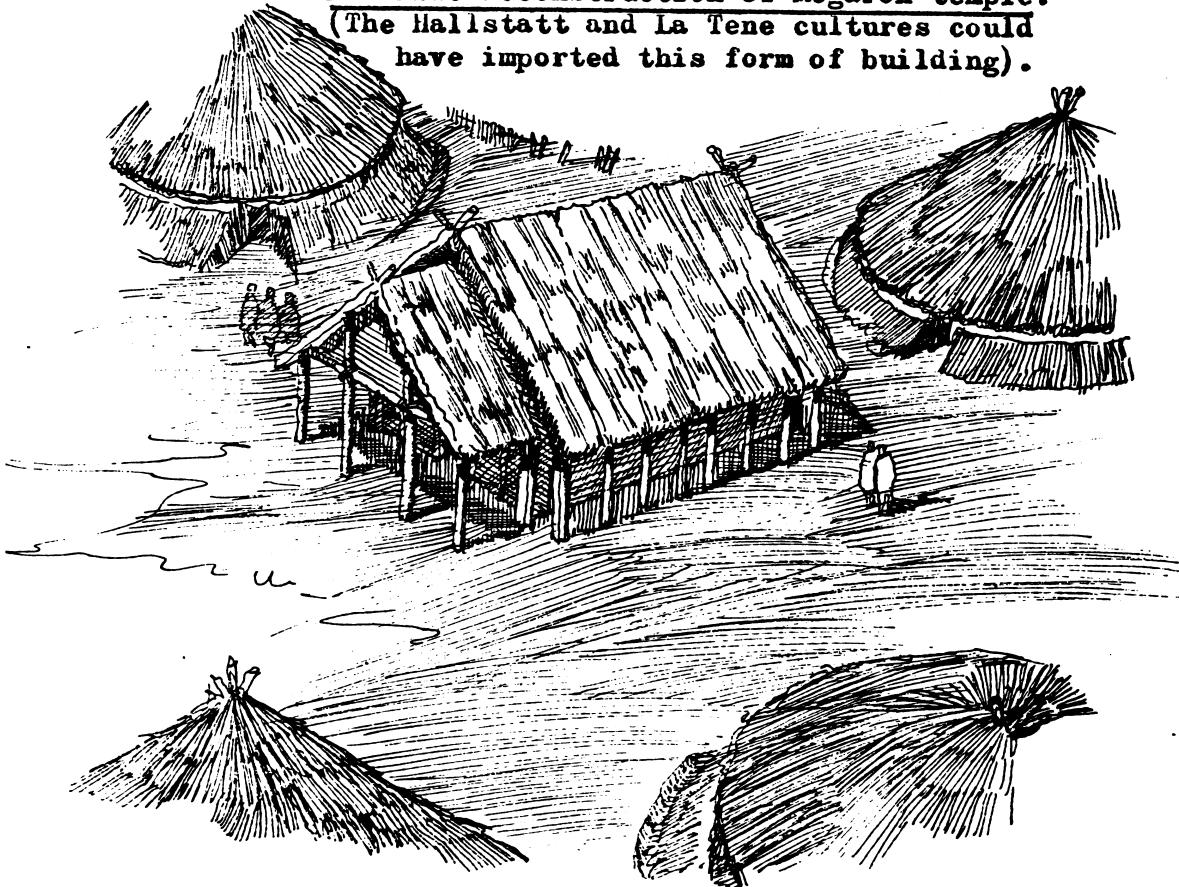
B.83

In a village at Heath Row, Gt. Britain, c.400-300 BC., a rectangular building occurs amongst circular dwellings. Piggott (21) considers this to probably be a temple, as is perhaps Goldberg (B102).

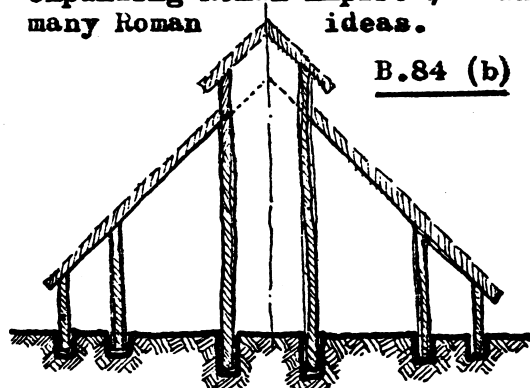
There are many indications of the variety of cultures in pre-Roman Britain.

Heath Row, Gt. Britain (160).

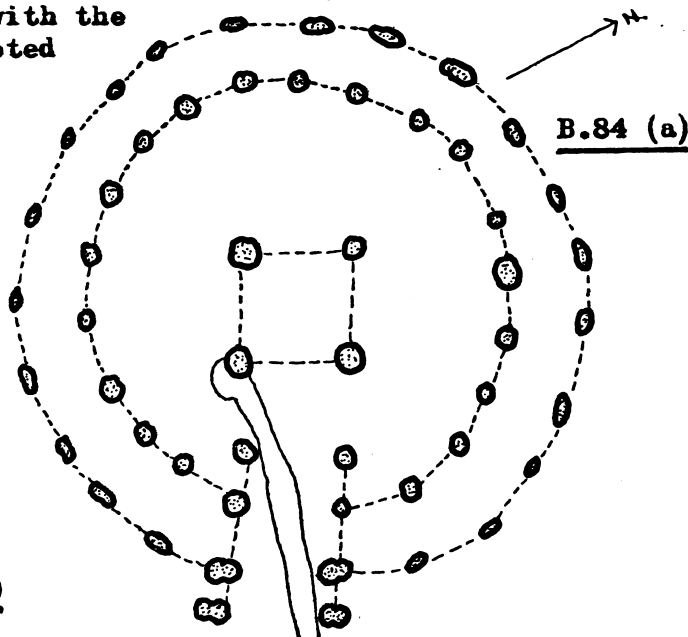
Possible reconstruction of Megaron temple.
(The Hallstatt and La Tene cultures could have imported this form of building).



Immigrant Celtic farmers arrived c.500 BC., followed by Celtic chieftains c.250 BC. who brought the war chariots of the Mediterranean with them. Hill-top forts were thrown up and the Celtic chieftains were resisted except in Yorkshire where they enslaved the local population and imported the "La Tene" style of artistry. The Belgic tribes in c.100 BC., who had been in close contact with the expanding Roman Empire, adopted many Roman ideas.

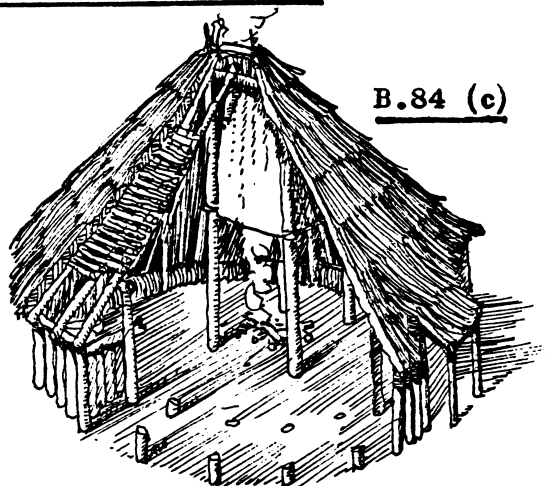


B.84 (b)

Hypothetical Section (161)

B.84 (a)

Plan of the original Iron Age House at the Little woodbury farmstead site, near Salisbury, Wilts. (180)



B.84 (c)

Suggested Reconstruction of dwelling-
(40)

Reconstruction from Post-Hole evidence (141)
(40)

This single family fortified unit is to be contrasted with the highly organised "oppida" of the continent



B.84(d)

The fortified single farmstead became the typical Early Iron Age expression of the small social unit which probably resulted from a return to the nuclear group under threat to the security Needs 2.

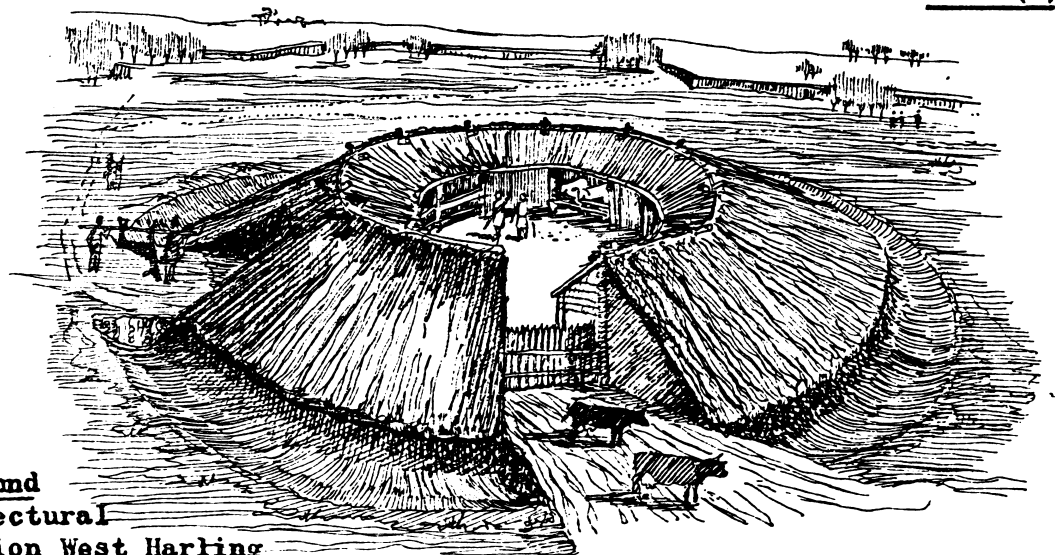
Penannular plan forms have been hypothetically proposed. (266) & (257) These would have produced internal courtyards with ideal micro-climates for bleak localities.

B.84 (e)



Reconstruction (alternative to B.84 (b) & B.84 (c) of Iron Age farmstead at Little Woodbury, Wiltshire, Britain (257). The circular farmhouse stood inside a compound surrounded by a wooden stockade. (a) corn drying racks, threshed, parched in oven and stored in pits (b).

B.84 (f)

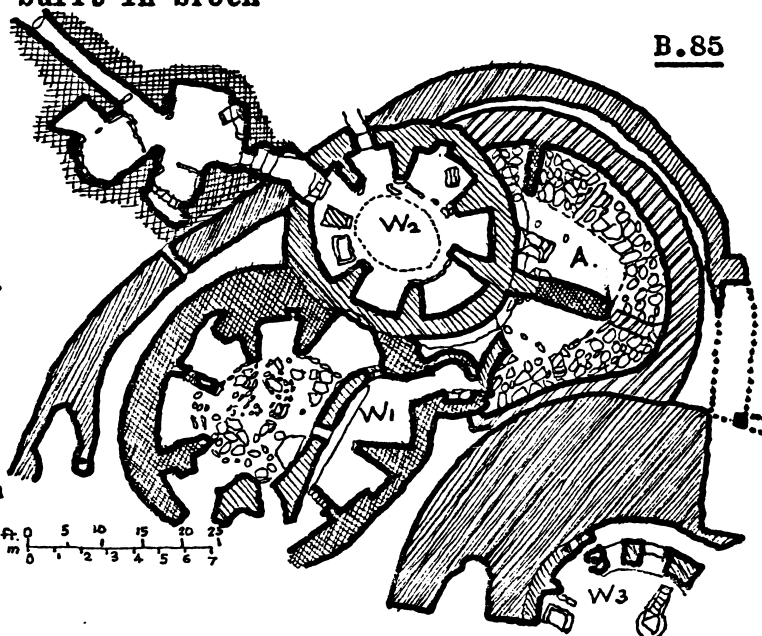


Iron Age round House- conjectural reconstruction West Harling Norfolk (266) (alternative to B.84 (b), (c) & (e).)

Defensive dwelling construction to satisfy the requirements of security Needs 2 and in environments in which there was a dearth of timber and in which stonemasonry was the dominant construction material (as in the Highland zone in the Early Iron Age). Wheel houses are dated from 1000 BC. to 200 AD. (78), (and from C₁₄ dates (26).)

Wheelhouses constructed within the courtyard of a broch at Jarlshof, Shetland. (161) (also c.f. B.86.)

A = aisled house built then W₁ and W₂ = wheelhouses, built-in courtyard then W₃ = Wheelhouse built in broch

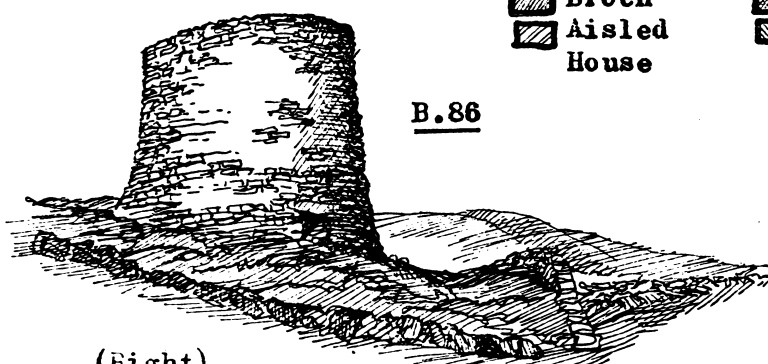


B.85

(Below) B.86:

A Broch or Picts' Tower (196). Also called a doon and is found in Sutherland, Caithness, Orkneys, Shetlands and the Hebrides.

An example of the broch or Picts' Tower (q.v.) which may be considered as "first cousin to the Nuraghi". (q.v.) (196).

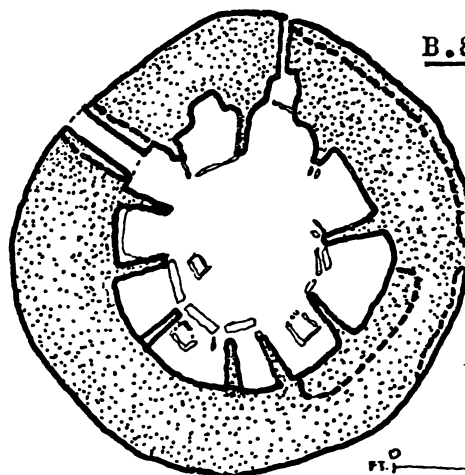


B.86

Broch
Aisled House

Early Wheelhouse
Late Wheelhouse
Passage House
Medieval (and later)

(Right) Early wheelhouse, Calf of Eday, Orkney. (180) Refer to B.84 for equivalent to this in timber construction. Posts are here replaced with radial stone piers.



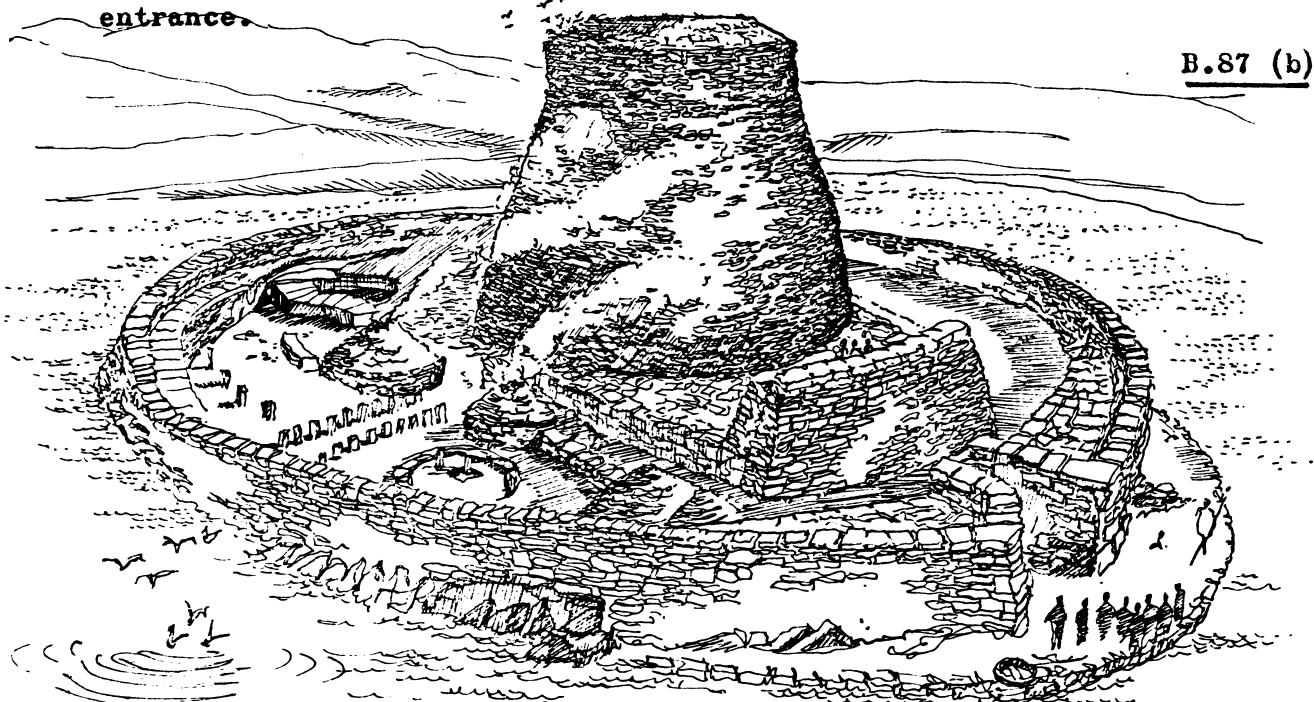
B.87

Typical of the fortified farmsteads, examples of threat to security Needs 2, found in the north of Scotland, in which various adaptive enclosure techniques are illustrated as they were adapted to suit the needs of occupants over long periods of time.

Reconstruction of Clickhimin showing fort wall and blockhouse in dry-stone walling with storeyed timber ranges (vide B.87 (c)). The enclosure at this period, contained the remains of the late Bronze Age farmstead. The earlier Iron Age roundhouse was retained (right centre) by the fort dwellers (262).

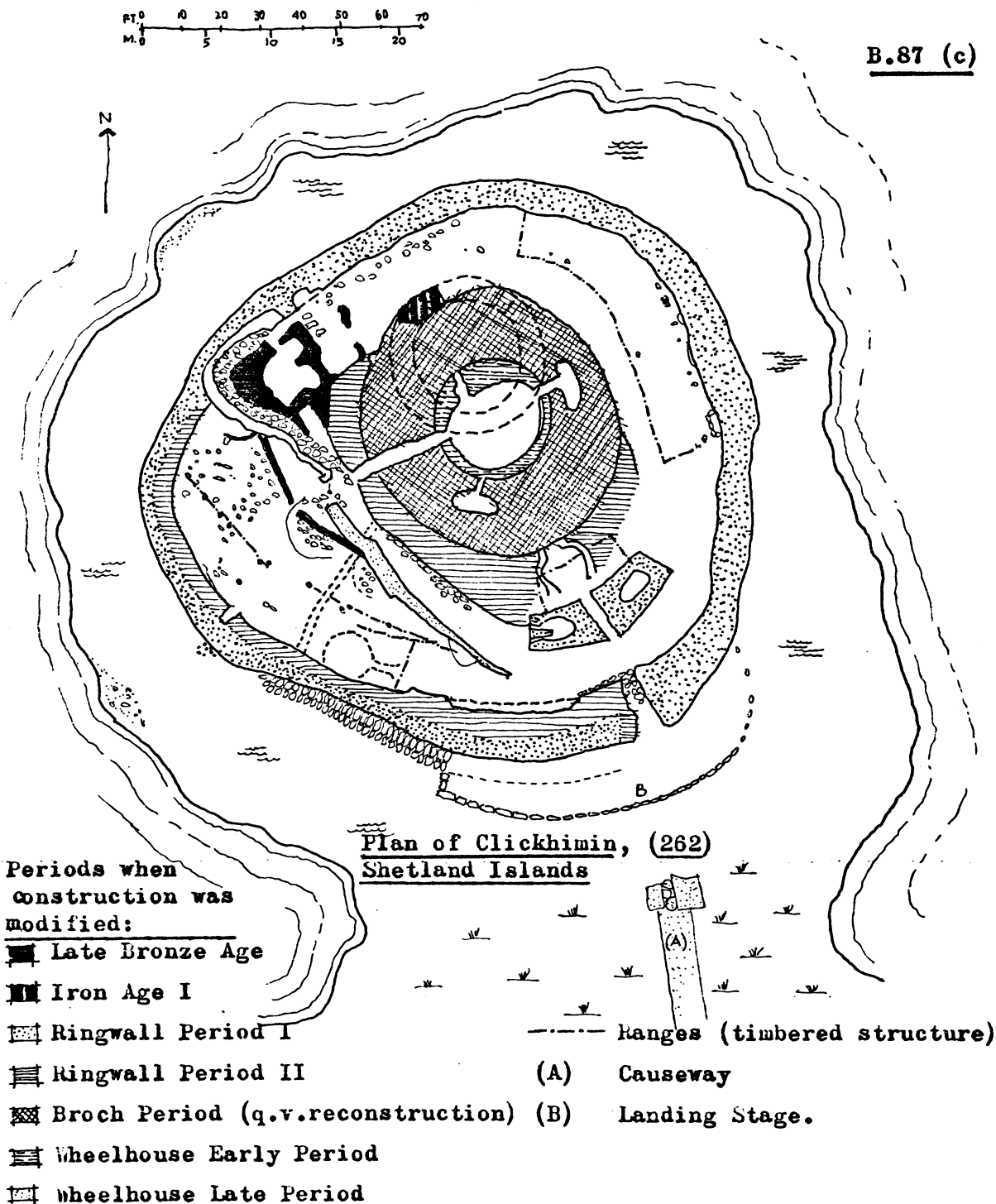


Reconstruction of Clickhimin during Broch Period (257). The tower was about 40 ft. high and enclosed a central courtyard with only one small entrance.



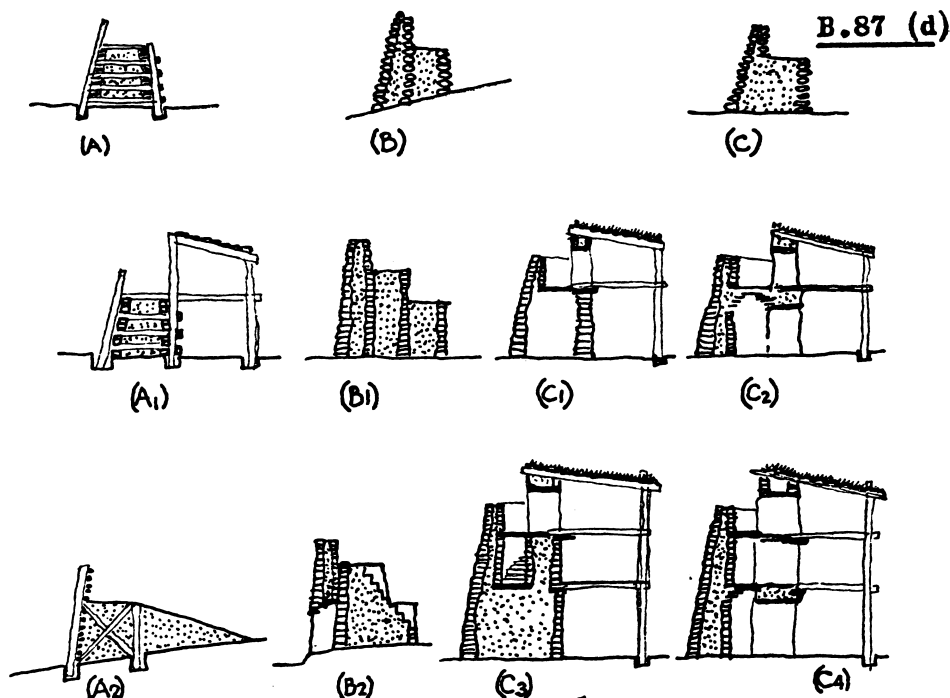
Internal staircases gave access to galleries in the internal walls. A well or water-cistern has been found in many brochs indicating ability to withstand siege.

Retardation of progress towards needs satisfaction in Britain is exemplified by the long periods of time during which security (Needs 2) was always threatened. This is illustrated by the evolution of Clickhimin through centuries of modification incorporating various fortification techniques (vide B.87 (d),) and taking advantage of the marsh and surrounding water as a further protection from invasion.



Enclosures in Iron Age Britain were typified in the evolution of fortification techniques. These are obvious expressions of the threat to security (Needs 2) which prevailed at the time, and which kept Britain in a retarded condition of needs fulfilment, (at Needs 3 level).

- (A)-(AI)-(A2) = Timber-laced forts. (B)-(BI)-(B2) = Murus duplex forts, (stepped ramparts).
 (C) = Drystone rampart forts. (stepped ramparts).
 (CI)-(C2) = Western duns. (C3)-(C4) = Galleried duns.
 (C5) = Broch.



Sections through structures illustrating Iron-Age fortification techniques (262).

A, B & C: illustrate three basic methods of rampart construction.

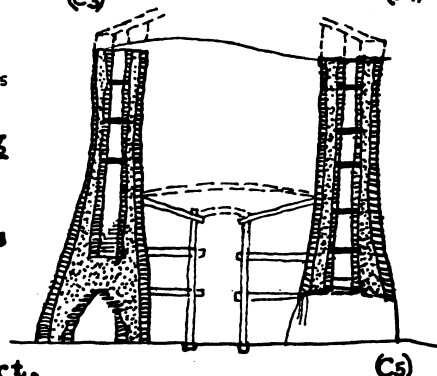
A : Timber-laced Rampart (Preist type).

B : Murus duplex or stepped rampart.

C : Drystone-built, wall rampart.

AI : Preist type with peripheral timbered range (when these were destroyed by fire, they resulted in Duntroon-Finavon Rahoy vitrified forts).

A2 : Hollingbury rampart in Southern Britain.



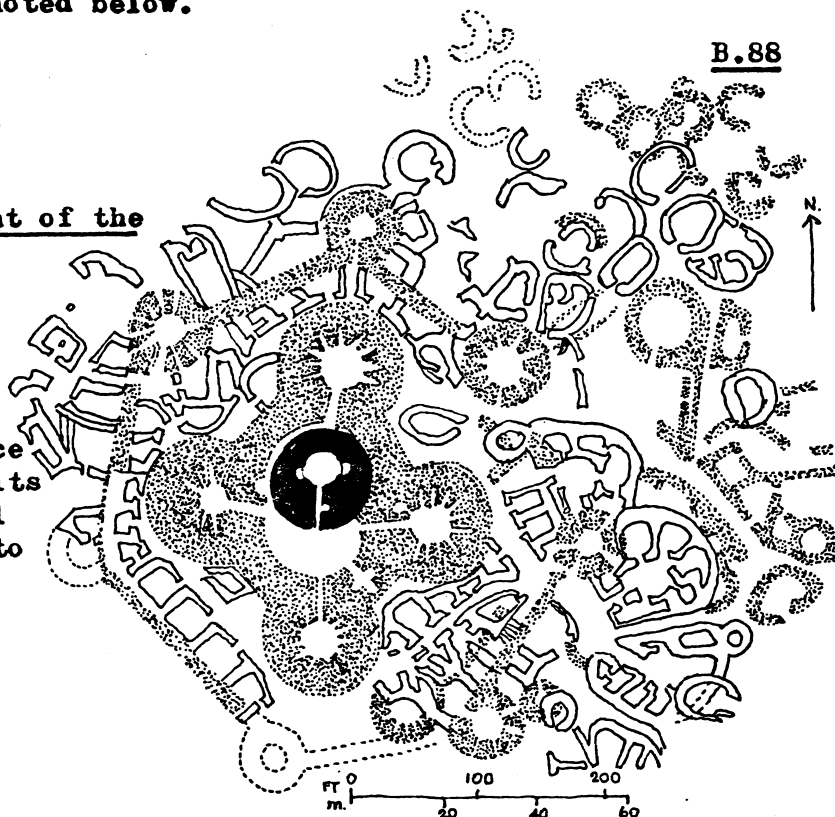
Returning to Bronze Age Europe, the threat to security (Needs 2) was present in Sardinia and Corsica in the 2nd and 1st mill. BC. This is expressed in Sardinia with the dwelling-fort Nuraghic culture (which is to be compared with the broch, c.f. B.86 & B.73). The cluster in the Sardinian village indicates evolving higher standards of Needs 3 expression in which the population increased between the periods noted below.

c.15th Century BC.
to 6th " BC.

Stone-built settlement of the Nuraghic culture at Su Naraxi, Barumini, Sardinia, (161).

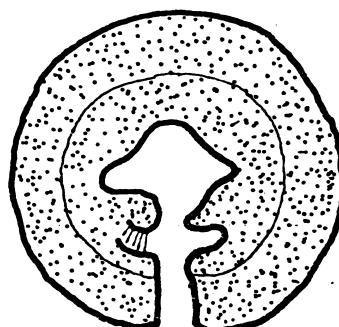
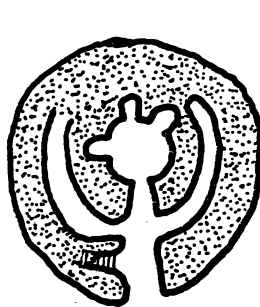
Three periods from 15th century to 6th century BC..

(Probably the presence of rich copper deposits drew more than normal conflict situations to these countries).



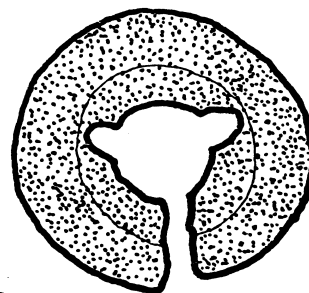
Stone-built towers, second half of second millennium BC..

Nuraghi at Murartu (161).



Sa Coa Filigosa, Sardinia.

Torri at Foce, Corsica.



Torri at Balestra, Corsica.

ft 0 30 60
m 0 10 20

Needs 2 or Needs 3 requirements were met by the Nuraghic villages in Sardinia where they proliferated during a provincial Late Bronze Age. However, the circular dwelling was the exception on the continent, and the quadrangular plan seems to have always been present since the first peasantry built their dwellings (like those of the first townsmen of the Aegean area.) Round huts are also present.

Elsewhere on some Mediterranean islands at Languedoc, at Fontbuisse (in association with rectangular ones), Foggia Plain in Apulia (Neolithic) and possible in Iberia.

The development of the megaron plan seems to have been linked to withdrawal of nuclear families from a hamlet orientation - probably as a need for security - or as a privacy requirement.

Nuraghic village of Serucci, Sardinia, c.f. B.88, (180).

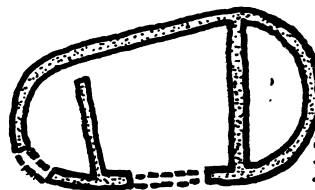
"It may well be that....the apsidal and double apsidal houses from early and middle Helladic contexts in Thessaly....reflect the influence of rectangular or round houses and it is suggested that this fusion did not occur until the Bronze Age." (180).



B.91 (a)

scale:
1:220 (180)

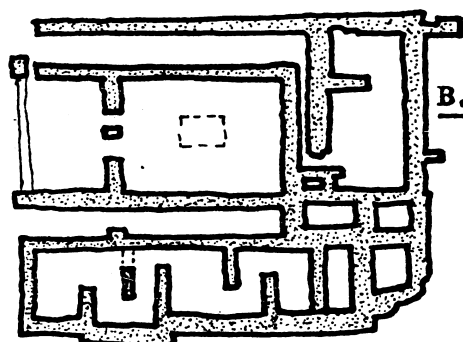
Oval House from Khamazi, Crete



B.91 (b)

scale:
1:100 (180)

Apsidal house from Rini, Thessaly



B.92 (a)

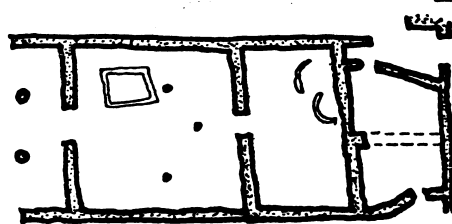
(180)

Megaron type of House from Phylakopi III (Mycenaean).

Megaron from Sesklo II, (Thessalian B)

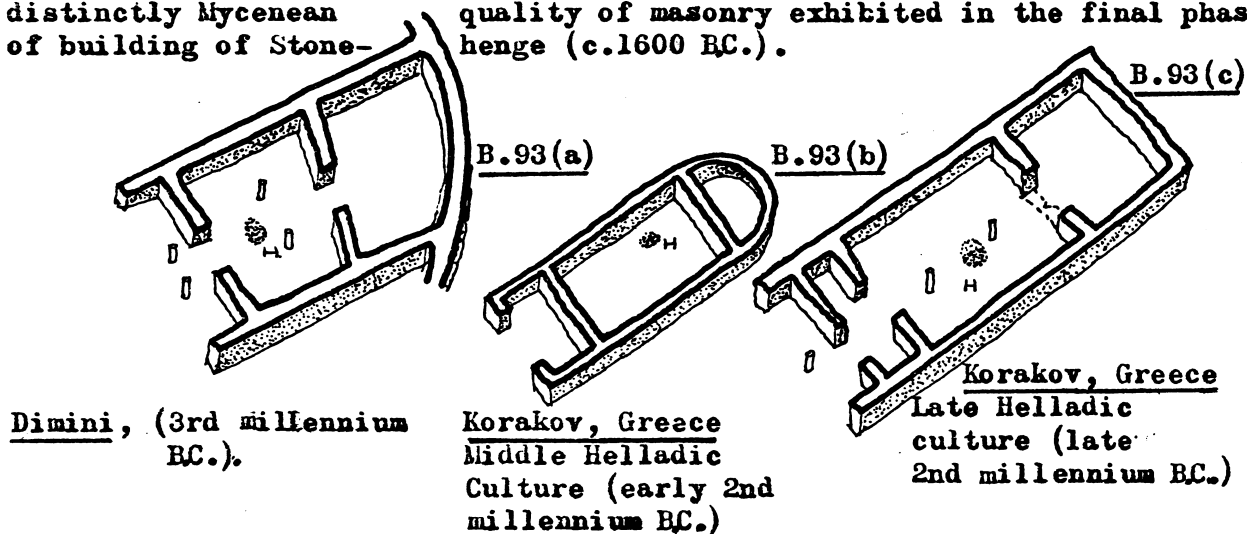
Scale 1:2000

B.92 (b)



(180)

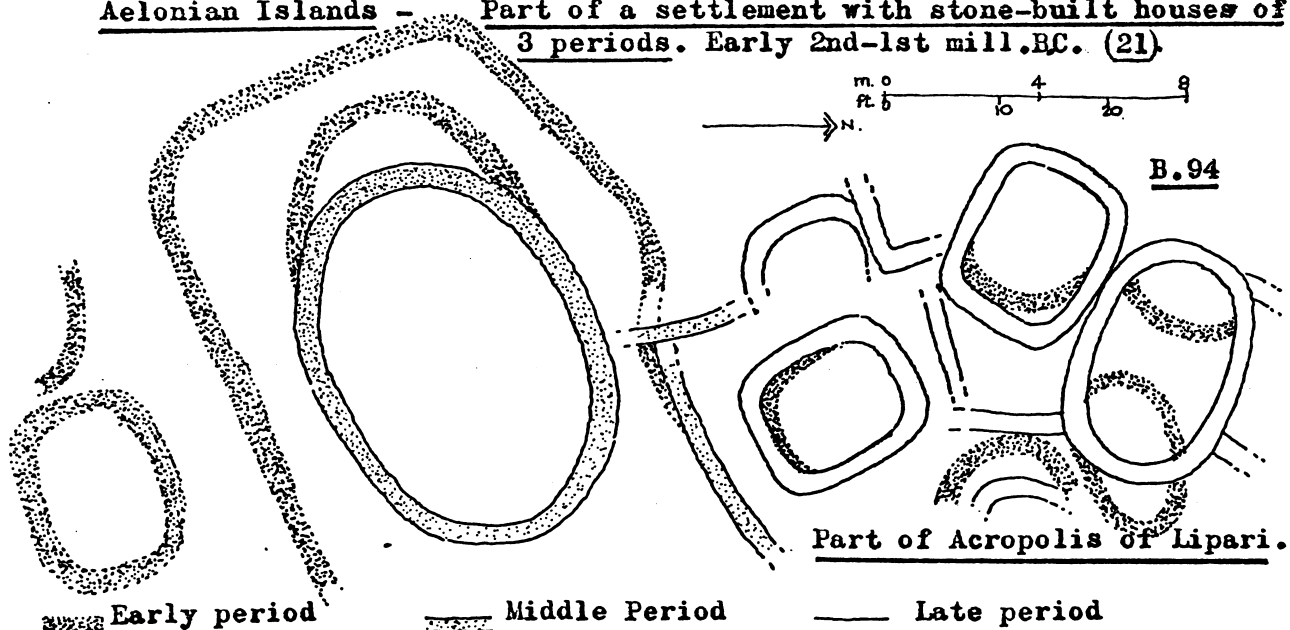
Simple individual social needs satisfactions (.. Needs 3) in nuclear family groups. The round plan persisted in the Mediterranean islands beyond the time when the rectangular plan had become common (q.v. apsidal plan for fusion of rectangular and round plans). J.G.D. Clark. (180), considers that the amber trade links between the Mediterranean and Britain in the mid-2nd millennium B.C. could be the reason for the distinctly Mycenaean quality of masonry exhibited in the final phase of building of Stone-henge (c.1600 B.C.).



Megaron (ie. "hall and porch") plans with stone and mud walls c.4000 B.C.. (180)

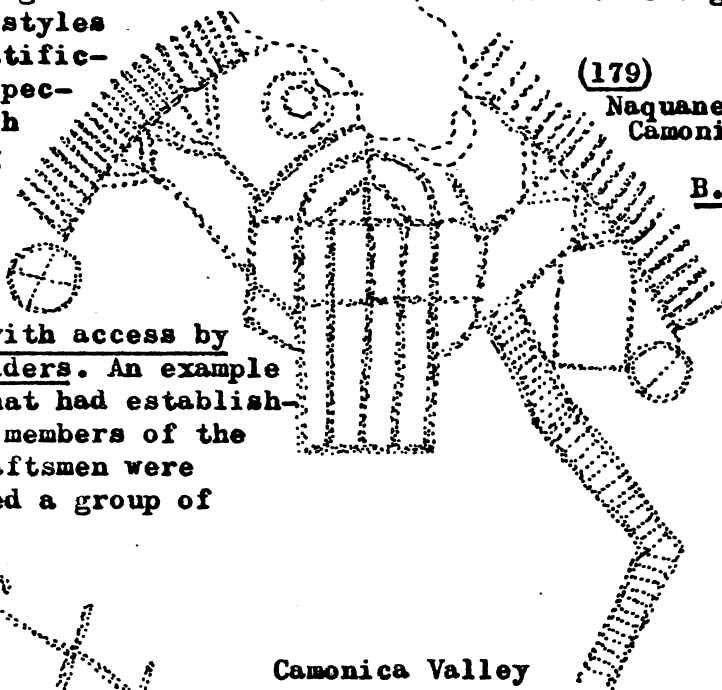
It is also possible that the use of wheelhouses in Britain could be linked to the form of the double apsidal house (q.v. B.91 (a) in Crete).

Aelonian Islands - Part of a settlement with stone-built houses of 3 periods. Early 2nd-1st mill.BC. (21).



Here there is a tendency towards a fusion of quadrangular and circular plans as in the apsidal forms (c.f. B.91 and B.93).

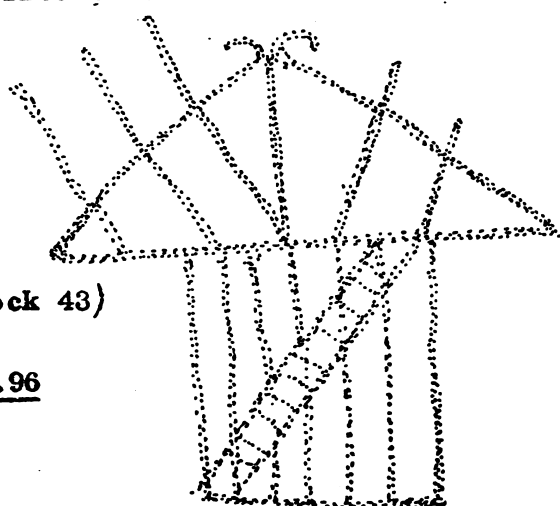
Twenty thousand petroglyphs have only begun to be assembled to derive some idea of life of the "Camuni", in the Camonica Valley, N. Italy, c. 2000-1000 BC., (and perhaps later). These people achieved social organisation, indicated by the size of temple projects undertaken together with the fact that houses are depicted in social groupings of a moderate size. For an isolated community, they also show some progress towards a degree of social needs satisfaction. The great variety of building styles indicate social stratification and a rather specialised society which continued for a long period of time.



(179)

Naquane, (rock 73)
Camonica ValleyB.95Camonica Valley

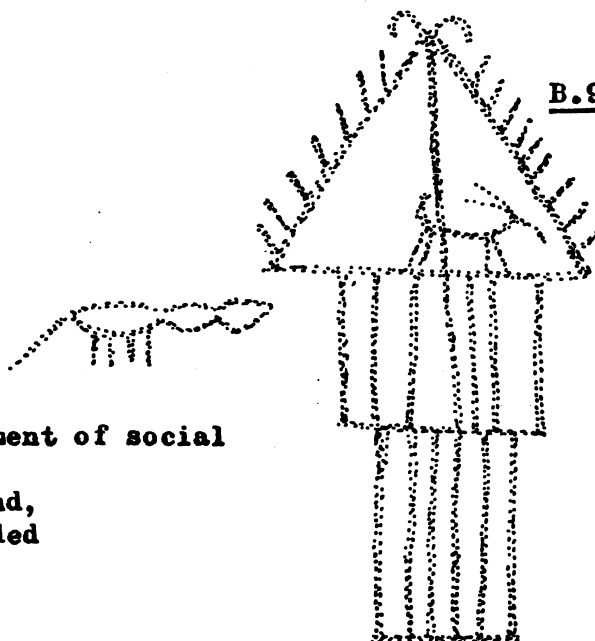
Huts on high piles with access by fixed or movable ladders. An example of the "hierarchy that had established itself among the members of the community" (43). "Craftsmen were privileged and formed a group of 'elite'."



(Rock 43)

B.96Camonica Valley

Hut with portable ladder. Probably the need for piles indicates some continuous threat to security. Needs 2, the overhanging platform construction deterring intruders.

B.97Camonica Valley, N. ItalyHut on High Piles.

There could have been the "stirring of a national consciousness" (43) due to

1. a reasonable level of achievement of social needs satisfaction,
2. ethnic and linguistic unity and,
3. isolation in a valley surrounded by precipitous mountains.

An island village defended with palisades, Piggott (21) observes that it has a main building with "the same size and proportions and indeed layout, as an average smallish English medieval house".

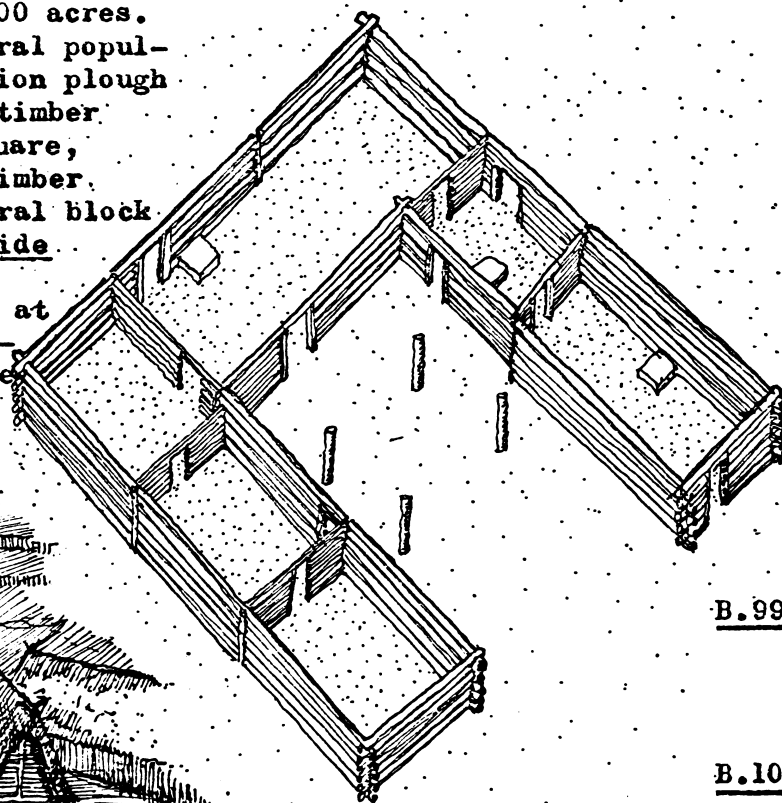
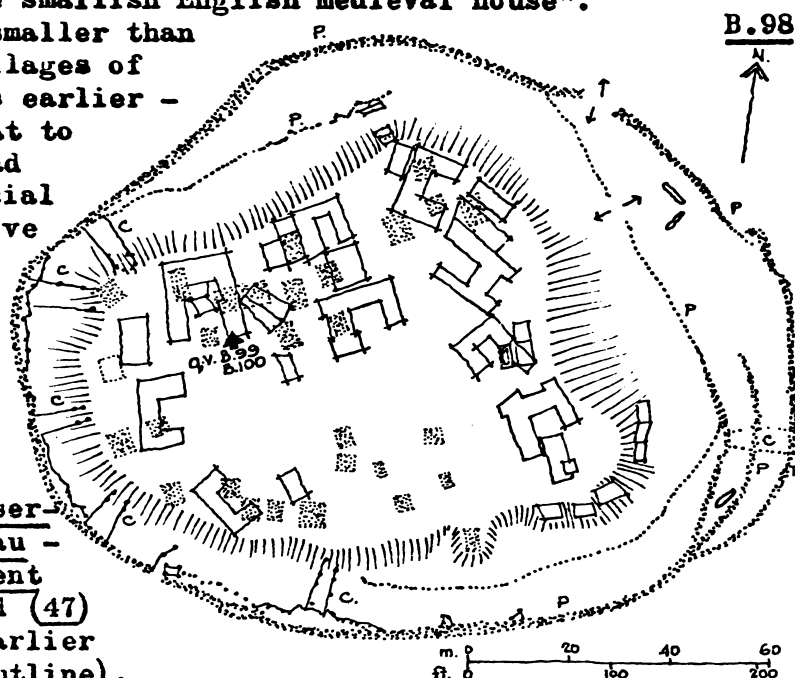
These villages were smaller than earlier Neolithic villages of the Danube 3000 years earlier - indicating that threat to Security (Needs 2) had possibly focussed social energies upon defensive (political) social needs.

C = Causeway

P = Palisade

S.Germany, at the Wasserburg, Federsee, Buchau - Timber-built settlement on an island (21) and (47) 12th-9th cent.BC. (earlier houses stippled in outline). Population approx.120-150 and arable land approx. 200 acres. A sedentary agricultural population using the traction plough c.11th-10th cent., 38 timber houses about 15 ft.square, c.9th cent. - 8 lge.timber houses each with central block and flanking wings.(vide B.100).

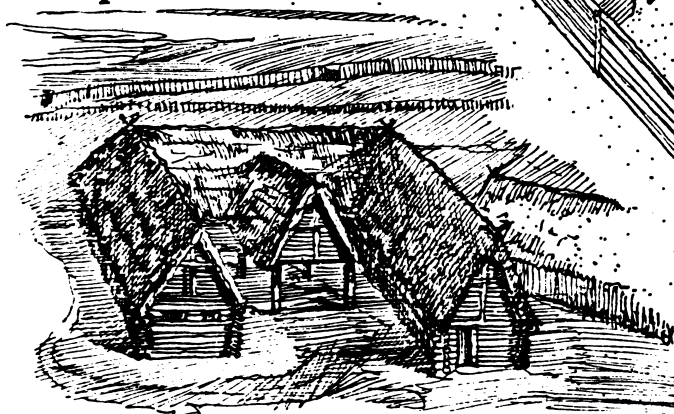
House construction as at Wasserburg.Timber construction was possible with the abundance of trees in that period.



B.99

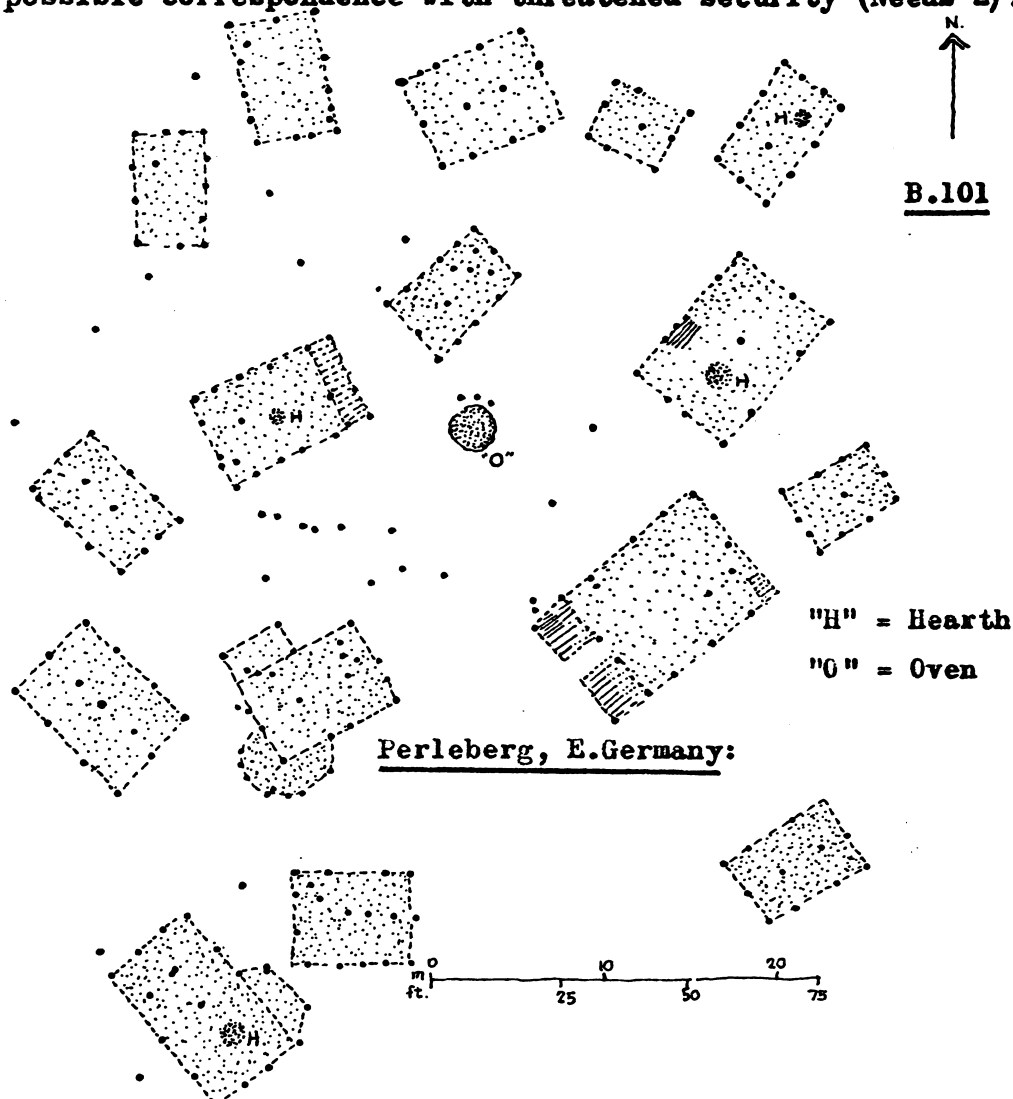
B.100

Reconstruction of the farmhouse (vide B.99) (21) and (40).



A village group which incorporates five megaron type houses (c.f. B.93) with a communal baking oven - this was at a time when house forms were circular in Britain with oval and subrectangular plans in the Mediterranean (21).

A smaller social unit than B.98, indicating some continuity in size with a possible correspondence with threatened security (Needs 2).

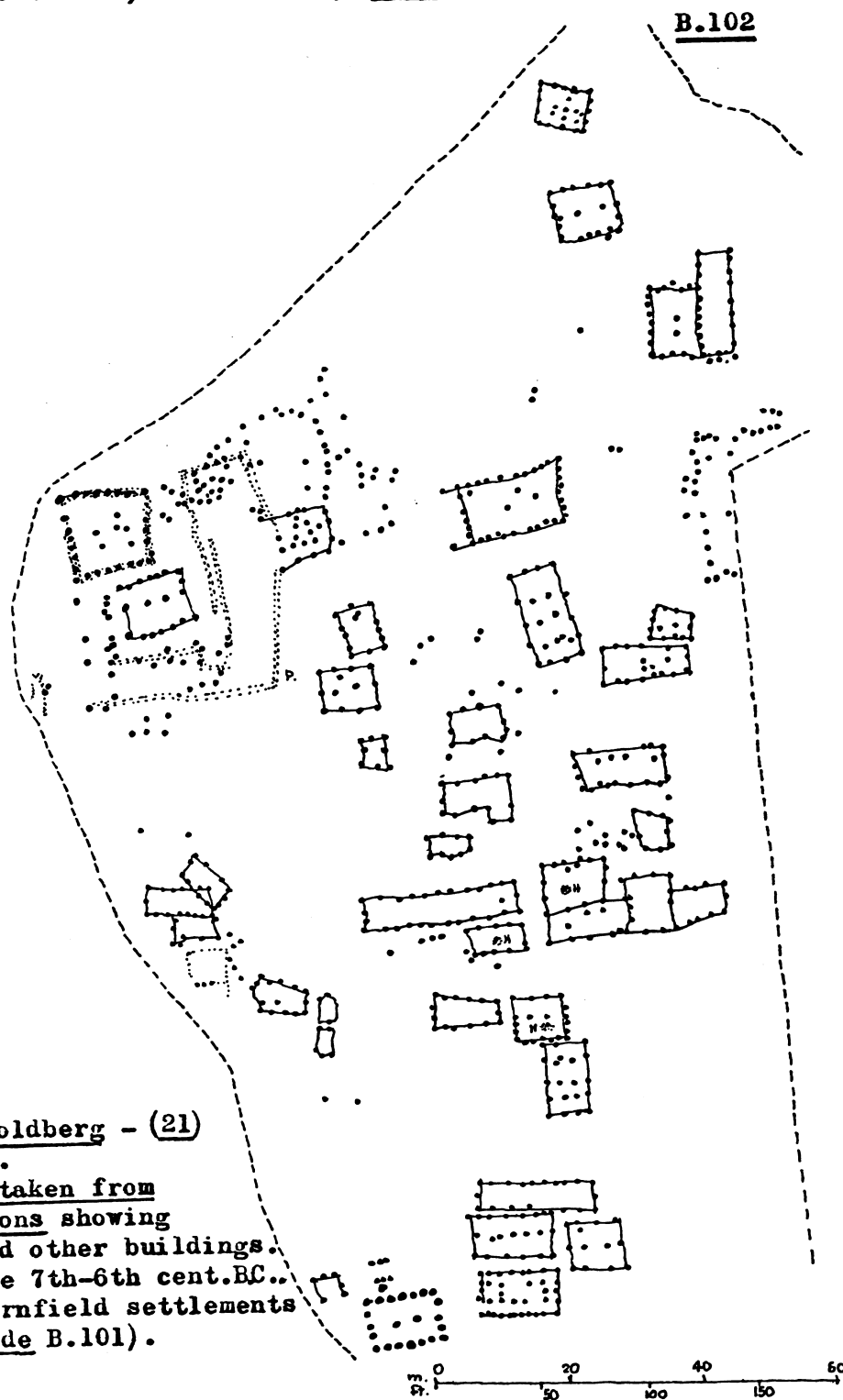


Settlement with post-holes of timber-built houses, Urnfield culture, early 1st millennium BC. - this village "may have housed no more persons than a single long-house of Danubian type and have drawn its corn supplies from no more than 35 to 40 acres of arable" land (21).

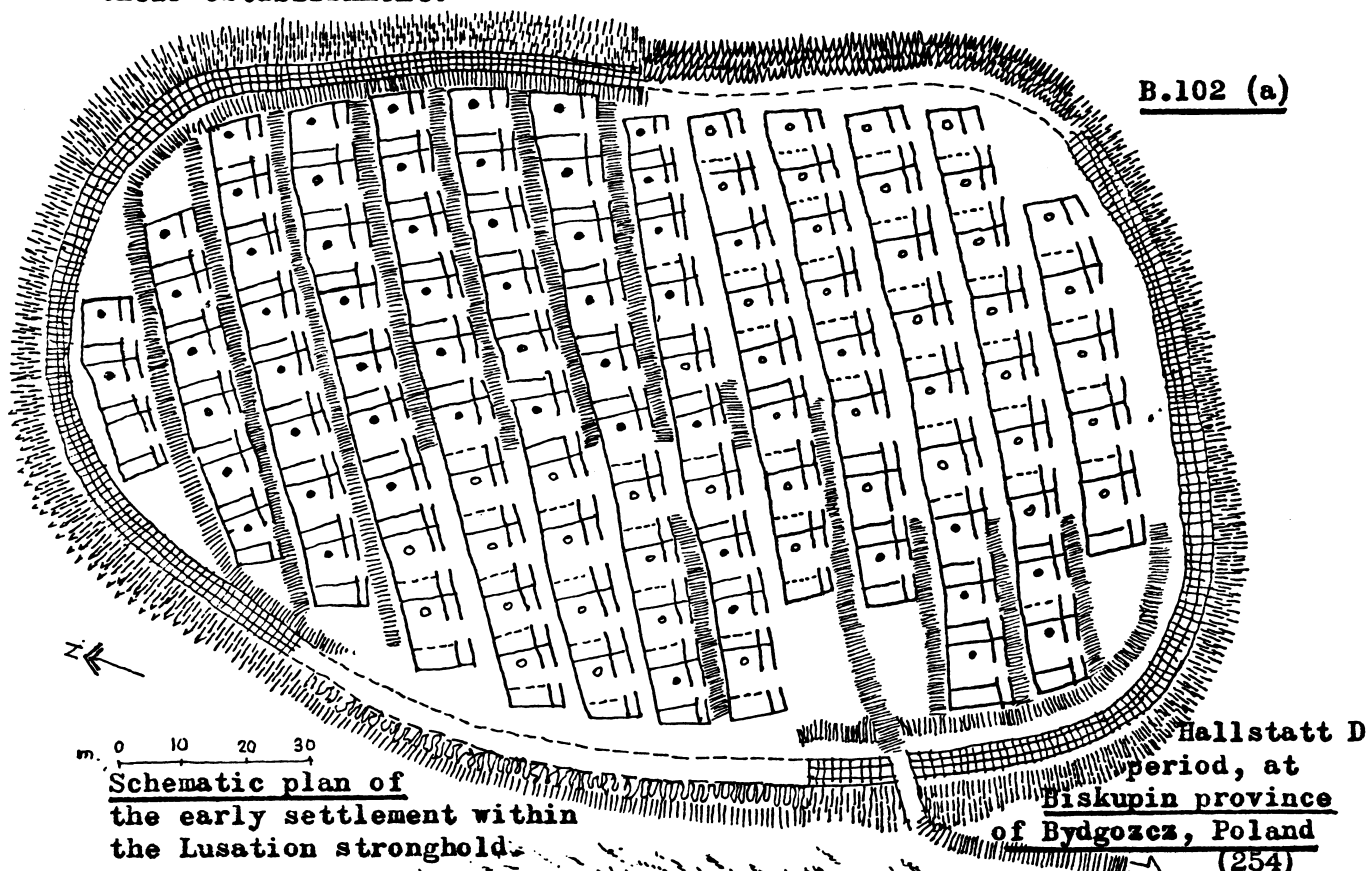
Although no remains of a palisade are extant, fortifications were general in this period, security was continuously threatened and social units became smaller as the nuclear family group shelter became the normal dwelling type.

A village of considerable population with large longhouses and some megarons. The presence of palisades around a "chieftain's palace" (21) is significant as security seems to have been threatened (Needs 2) although this could have been a temple as interpreted for a village at Heath Row, Gt. Britain, (vide B.83(a).)

S.Germany, The Goldberg - (21)
 approx. 12 acres.
Settlement plan taken from
post-hole positions showing
 timber houses and other buildings.
 Hallstatt culture 7th-6th cent.BC..
 Similar to the Urnfield settlements
 at Perleberg (vide B.101).



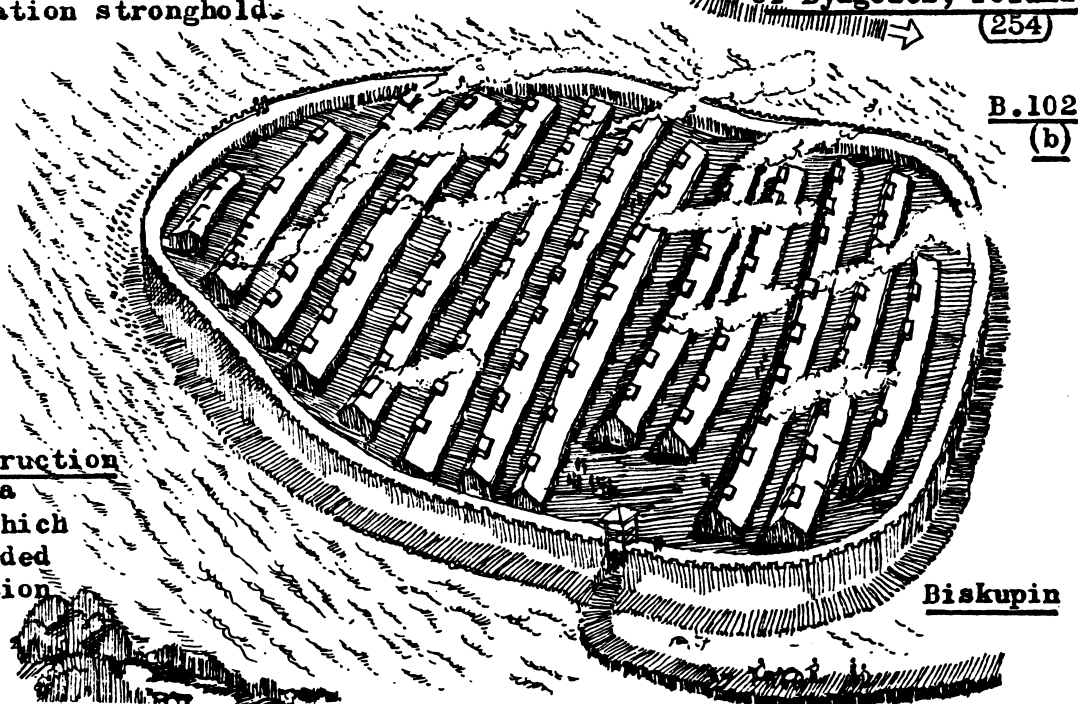
Prior to the Roman Empire reaching its full glory, massive defensive systems were employed throughout Europe. These are predominantly expressions of threat to (a) security (Needs 2) and (b) the socio-political needs - tremendous social co-operation being necessary for their establishment.



Schematic plan of
the early settlement within
the Lusation stronghold.

Hallstatt D
period, at
Biskupin province
of Bydgoszcz, Poland
(254)

Reconstruction
within a
marsh which
gave added
protection
from
attack.
(254)



B.102
(b)

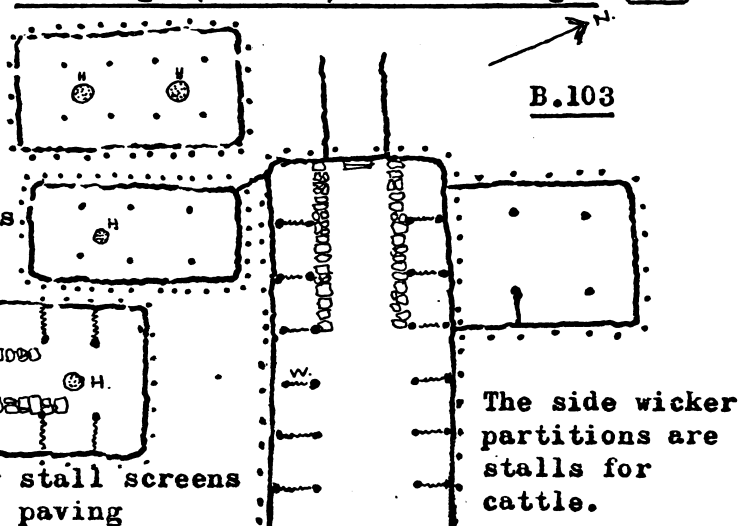
Biskupin

The accumulation of the structures and debris of a settlement, built a terp or rise in the ground surface. Here a West Fresian terp is shown located between the Zuider Zee and the Elbe estuary in a marsh-land. A bleak, hard existence for little more than an extended family with very limited satisfaction potential for Needs 2 and 3, it is reminiscent of the withdrawal to individual existence of the farmstead as in Wiltshire, Gt. Britain (q.v.).

Plan of structures on the original "terp" at Ezinge (level V) near Groningen (180)

"Ancestor of the Lower Saxon peasant house.... corners were sometimes rounded through the bending of the wattle and dung-plastered walls.... the main weight of the rafters was carried on a pair of up-rights set at intervals in the interior.... the roof was carried over the walls and supported on either side by rows of small external posts" (180)

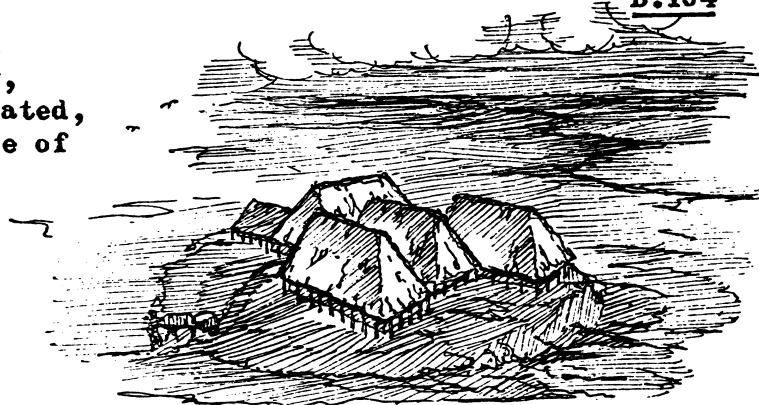
W. mmm = wicker stall screens
 ooooo = " paving
 ⊙ H. = hearth
 ... = walls and posts.



Reconstruction of the above Groningen Settlement (180).

B.104

Although horses, sheep and swine were kept and barley, flax and beans were cultivated, cattle were the main source of wealth.



Section through the Ezinge terp - (180)

B.105

I = Clay capping added with arrival of Saxons

400 AD.-5 m. high mound, max. dia. $\frac{1}{4}$ mile

II = 200 AD.-Dung layer

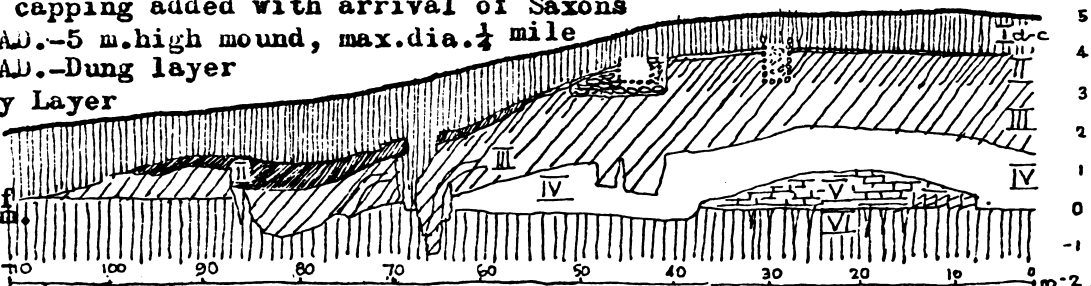
III = Clay Layer

IV = Dung

V = Mound

1 of turf
 1 m. x 35m.

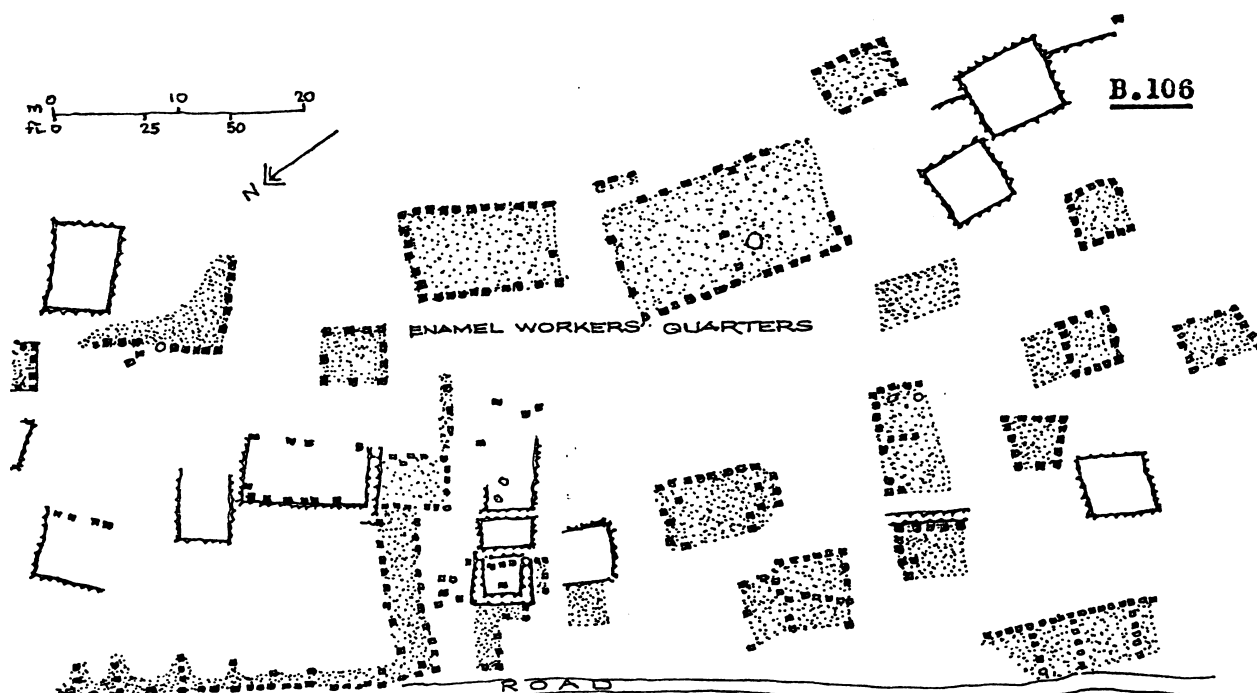
VI = original ground surface.



The La Tene culture oppidum occurs in Europe and in Gt. Britain, large scale fortifications indicating the problems of threat to security (Needs 2), presented in the Celtic world from Iberia to the Carpathians. Highly organised social structure with specialisations of tradesmen indicate successful progress towards fulfilment of individual Needs 3 and towards Social Needs satisfaction in spite of threats to security (Needs 2).

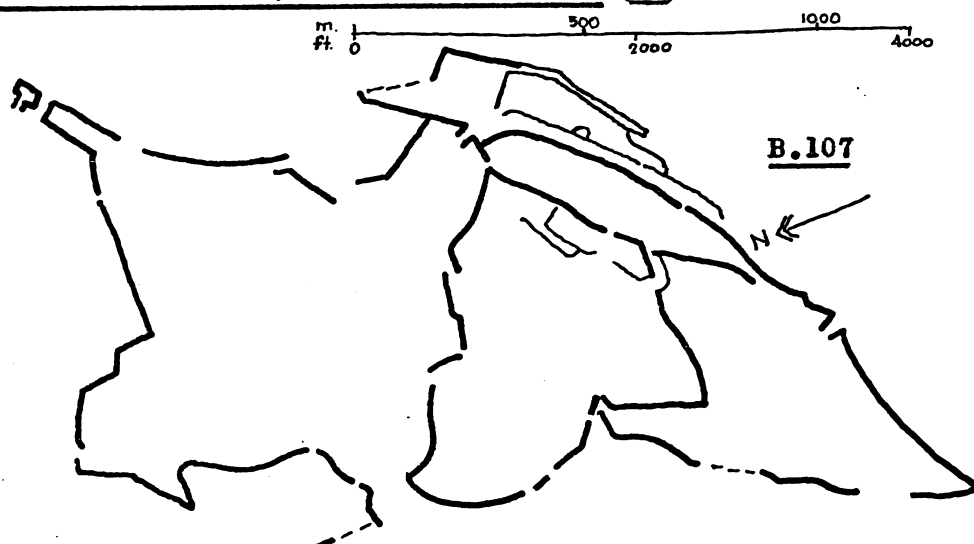
Oppidum of Bibracte (Mont Beuvray), Autun, France (21)

Remains of burnt buildings with squared timbers - includes a pre-Roman native quarter with "bazaars" along a street.



"Elsewhere, in Britain there are a few large forts of probable oppidum status, i.e. Maiden Castle in Dorset" (21) (vide B.108)

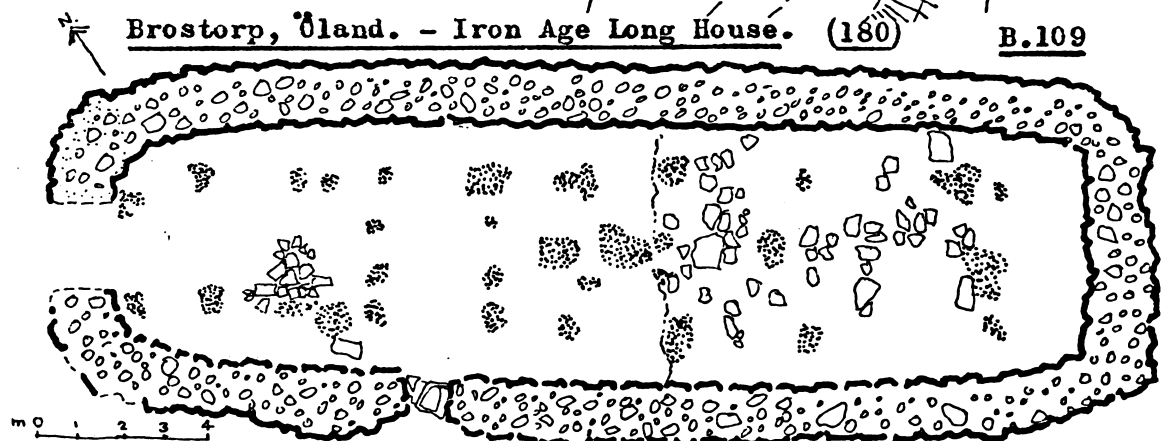
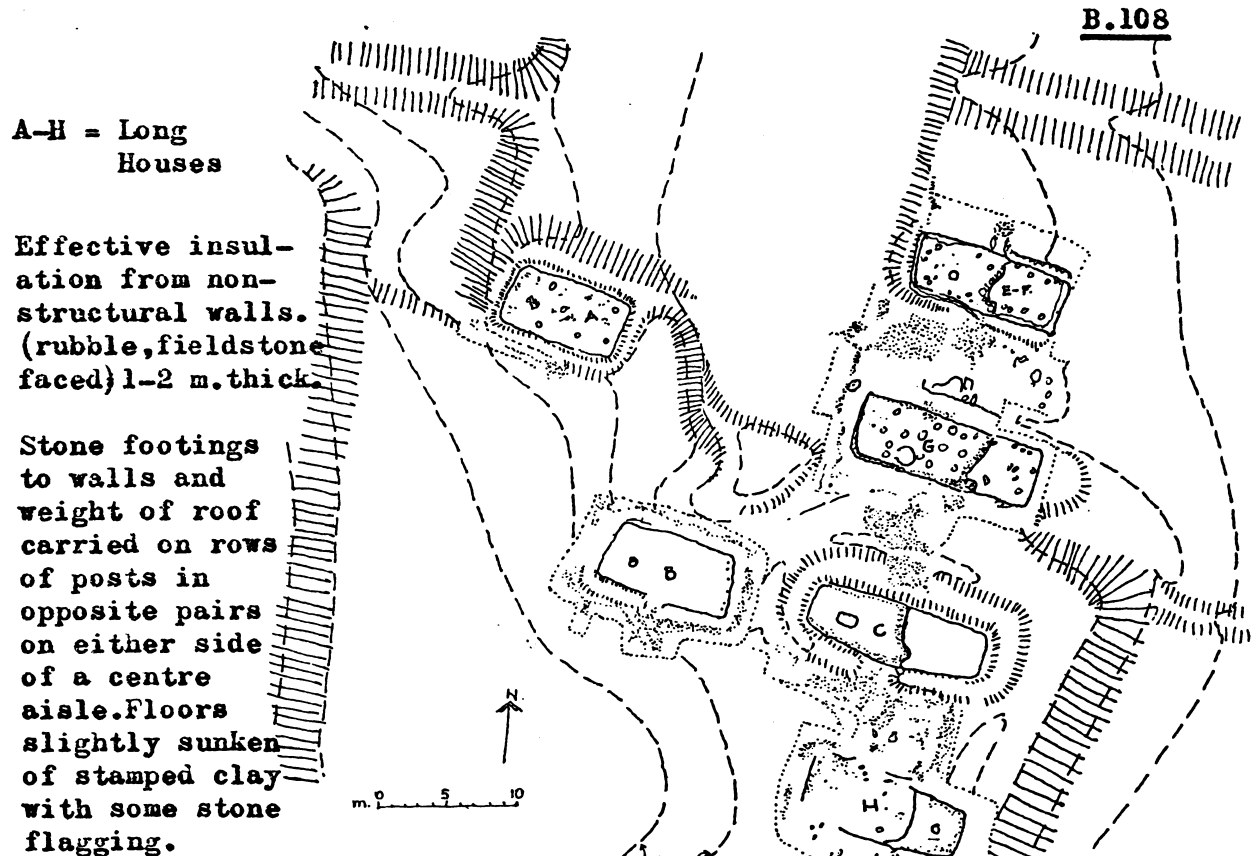
Oppidum, Late La Tene culture, fort at Stradonic (21)



Although the Roman Empire invasions accelerated satisfaction of the Social Needs requirements for the more primitive settlements, there were still many societies continuing along the steady lines commenced in pre-Roman times. These houses seem to have been commonly sited with a south long wall facing the sun to increase the day warmth and with living quarters at the end opposite entrances to reduce draft.

Nth. Jutland, Skørbaek Heath (180)

Plan of Iron Age Settlement - Long Gabled houses varied greatly in construction. Stone was used for wall footings. Commonly 40 m. (occasionally 50 m.) long x 5-9 m. wide.

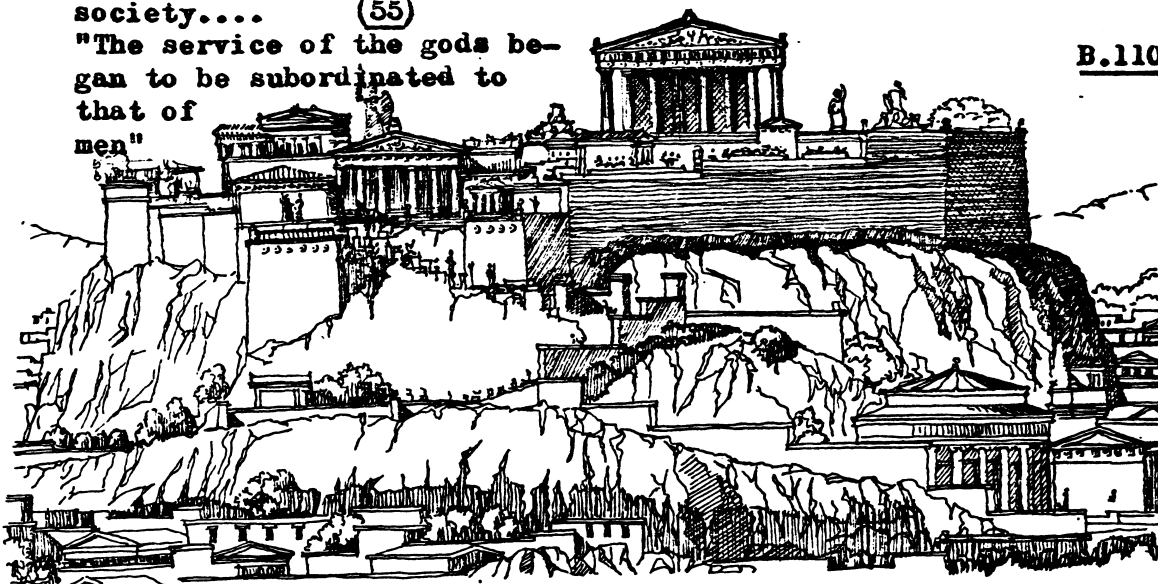


In 449 B.C., Athens signed peace with Persia and architecture and sculpture reached its zenith. The Greek citadel (or "acropolis") was generally built on a hill and fortified to command the city and surrounding territory.

Social Needs satisfactions became possible for the egalitarian society.... (55)

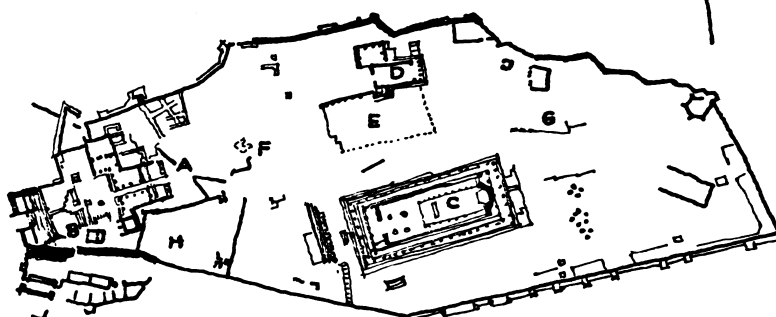
"The service of the gods began to be subordinated to that of men"

B.110



The Acropolis at Athens- Restored. (450-400 B.C.). (231)

- A = Propylaea.
- B = Temple of Nike Apteros.
- C = Parthenon.
- D = Erechtheum.
- E = Foundations of the Temple of Athena prior to the Persian Wars.
- F = Base of the Statue of Athena Promachos.
- G = Altar of Athena.
- H = Precinct of the Brauronia Artemis.



B.111

Plan of the Acropolis. (231)

During the Claudio-Julian period in Rome, there was an extreme cleavage between the elite and the main population. Prodigality was the outcome of a satiated upper class who developed derived needs which became major motivations for goal-less and pointless activity. Needs 4 were indulgently catered for and the social needs were well organised on a vast scale using thermae and vast public areas for social intercourse.

Physiological comfort requirements were met by artificial micro-climates on a grand scale in Rome and in individual dwellings in colder (colonial) locations.

A = Shop and baths

E = Xystus

B = Frigidarium

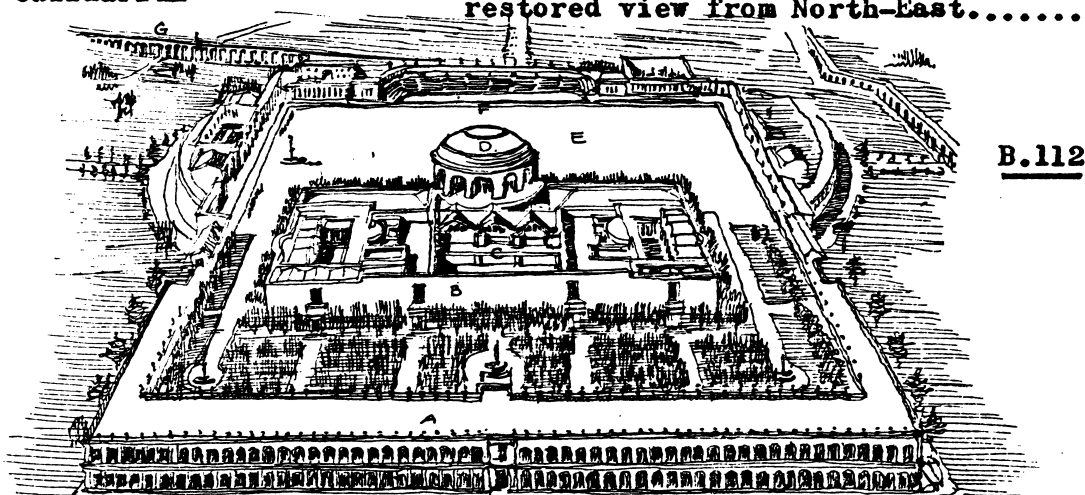
F = Stadium

C = Tepidarium

G = Aqueduct

D = Calidarium

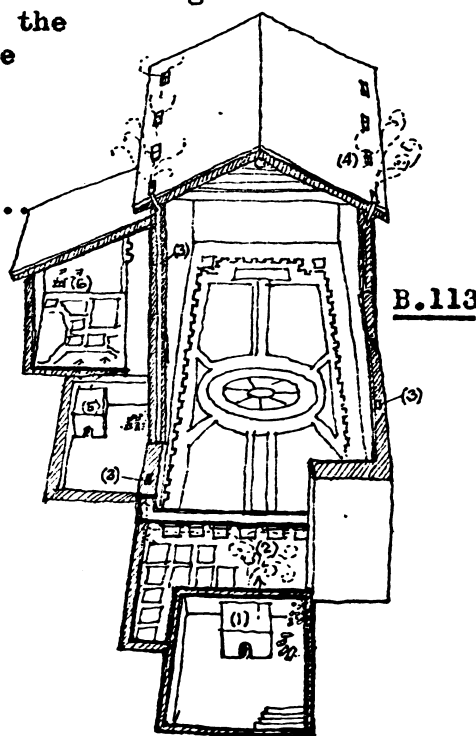
The Thermae of Caracalla, Rome (230)
restored view from North-East.....



The use of hypocausts in civic and private buildings is considered by Huntington (20) to be a "major reason for the expansion of the Roman Empire beyond the 70 deg. isotherm".

A typical Roman hypocaust system (30)

- 1) Wood burning furnace
- 2) Sub-floor plenum
- 3) Wall flues
- 4) Roof release holes
- 5) Separate charcoal furnace
- 6) Fume-free air passing into room.

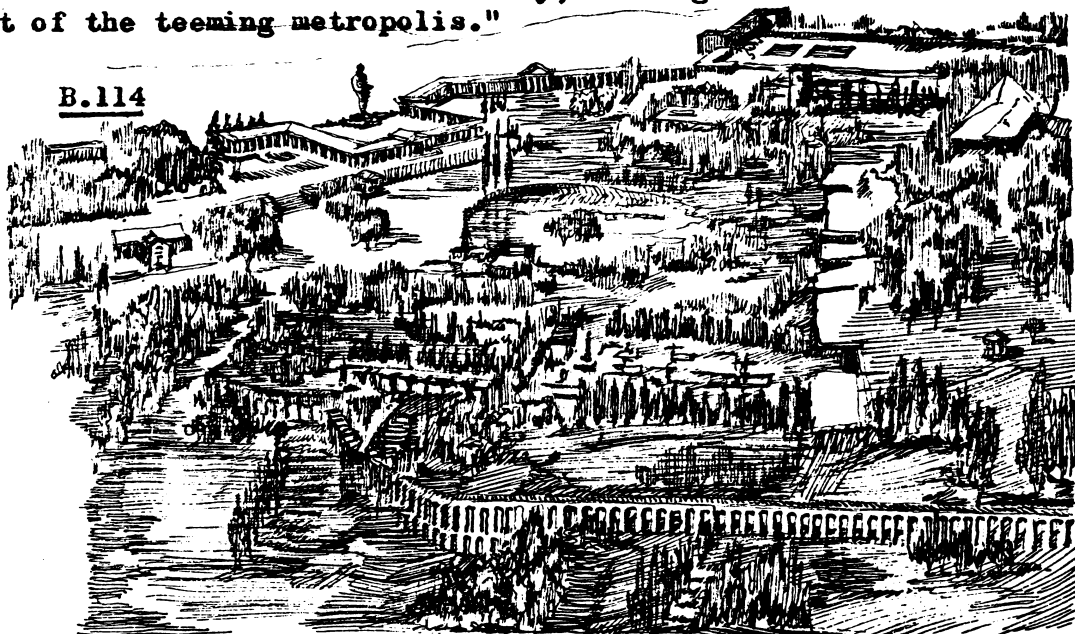


Nero's Golden House, Rome (67) - To the very few who designed these landscaped areas and engineering masterpieces, Needs 5 fulfilment was probably attained.

B.114

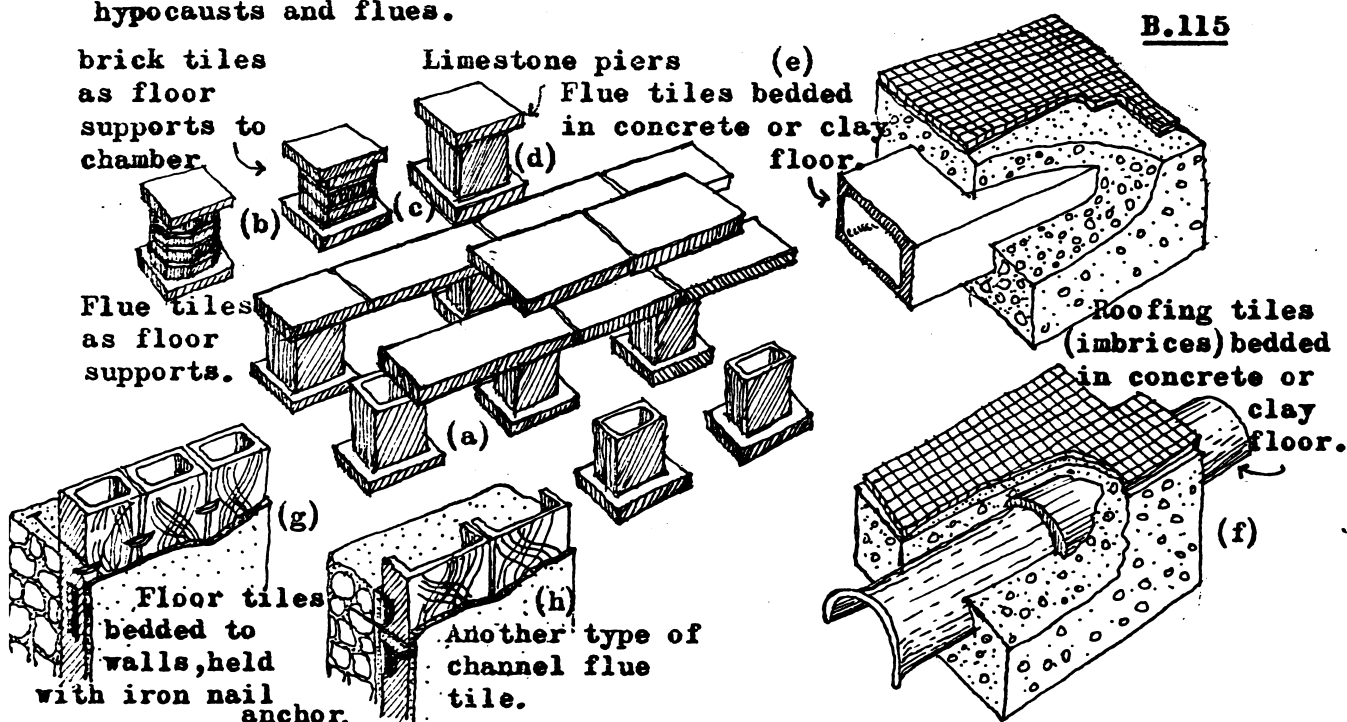
In this reconstruction, the complete area showing the immense system of "parks, with lawns, groves, pastures and zoo....within these grounds, twice the extent of the Vatican City, was a great Versailles in the midst of the teeming metropolis."

B.114



"A monstrous extravagance.... but as we focus our attention on the excesses of court and of metropolis, we ought not to forget that in the municipal towns of Italy and the Empire, life went on, more modestly" (67). (Of this latter, Pompeii is an excellent example). Comfortable environments were achieved by the use of heating involving hypocausts and flues.

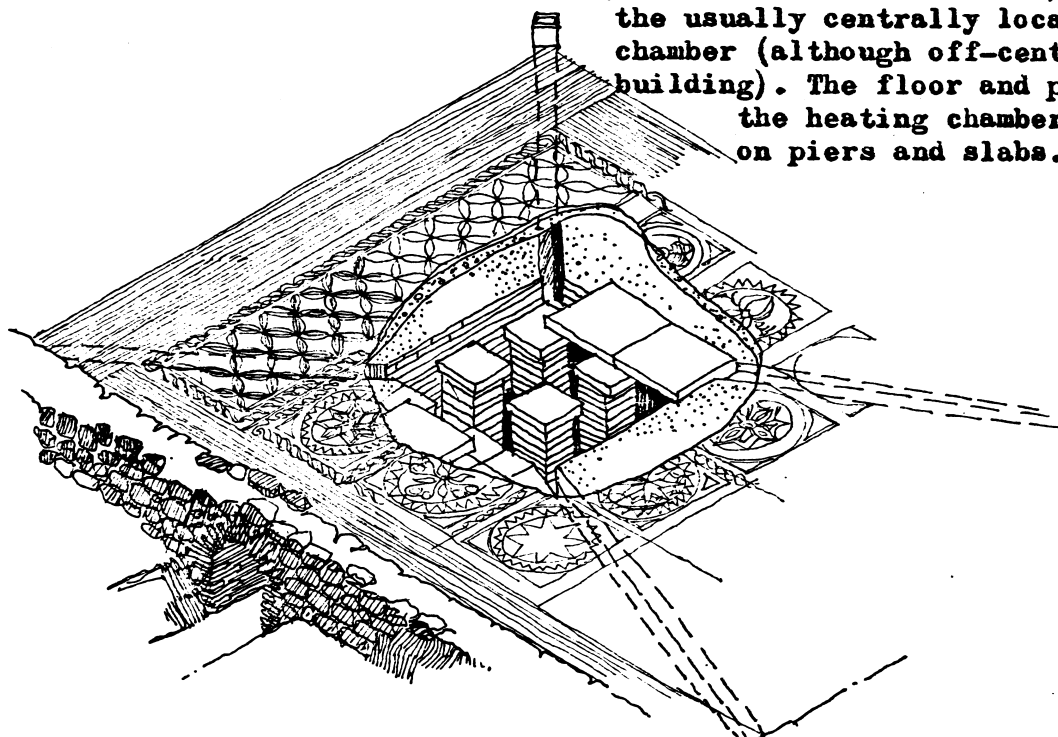
B.115



Heating system details used in buildings in Italy and Britain. (32)

Physiological comfort requirements and needs satisfaction were achieved to an advanced degree, for the upper classes - and occasionally for the masses.

Verulamium (32) Floor Construction - Heating chamber or hypocausts beneath a mosaic floor. The hot gases from the timber or charcoal fire kindled in the stoke hole (left side of illustration) passed into the usually centrally located sub-floor chamber (although off-centre in this building). The floor and pavement above the heating chamber was supported on piers and slabs.

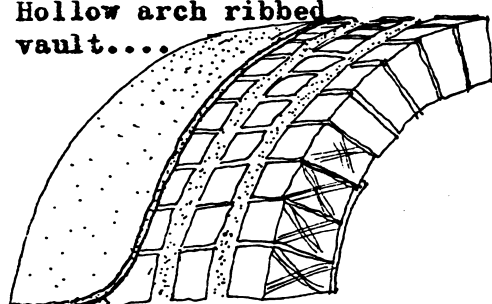


B.116

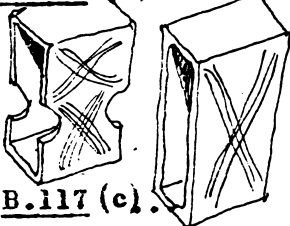
Ceiling Vault Construction for Roman Bath Buildings - (Heating Ducts)

B.117 (a) (32)

Hollow arch ribbed vault....



B.117 (b) Hollow voussoir clay blocks

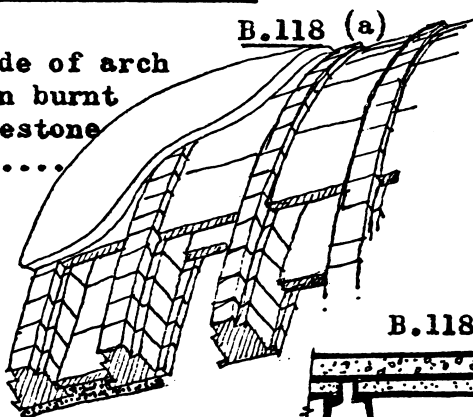


B.117 (c)

Lateral hot air circulation between arched ribs for uniform distribution.

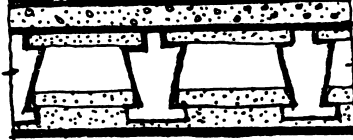
Vault made of arch blocks in burnt clay, limestone or tufa.....

B.118 (a)

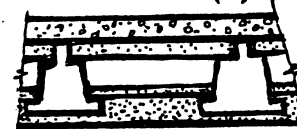


B.118 (b)

A stronger type of block made of calcareous tufa 5½" top, tapered to 4½" bottom.



B.118 (c)



Block made of oolitic limestone

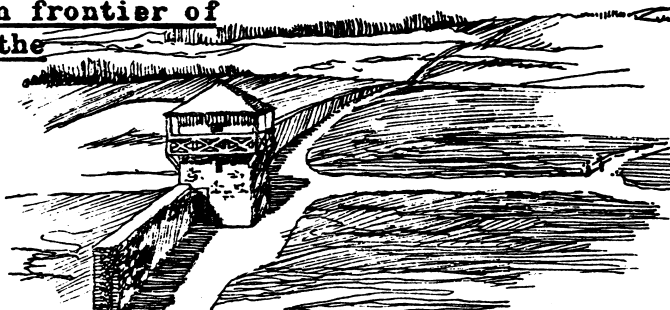
Fortifications:

Vast resources and energy were directed through well organised government and military channels which provided the means for social needs satisfaction of a large proportion of the population. The Empire required extension of the political body into occupied territories which required immense fortification undertakings (Needs 3 and Socio-political Needs expressions).

Roman:

Germany-Roman wall on frontier of Northern boundary of the Roman Empire (87).

B.119



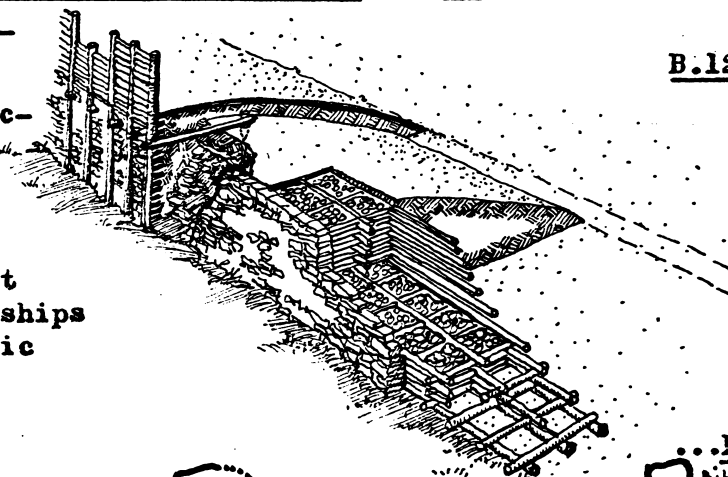
Pre-Roman:

Bavaria, timber-laced defences at Manching. (47)

Gallic Wall Defences -

These immense earth, stone and timber structures in this example covered an area of 1000 acres - a Celtic oppidum.

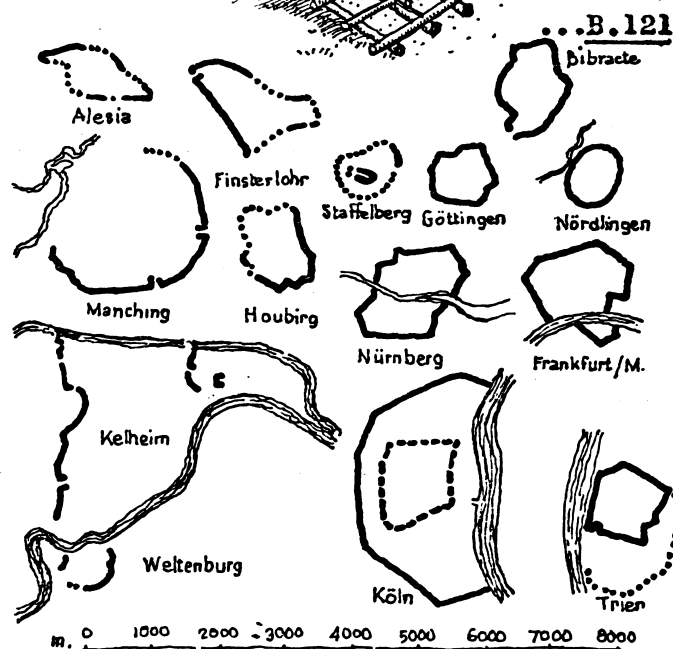
These were the nearest approach to real townships in the pre-Roman Celtic world.



B.120

German and French Hill-Forts.

Plans showing comparative sizes, (47).

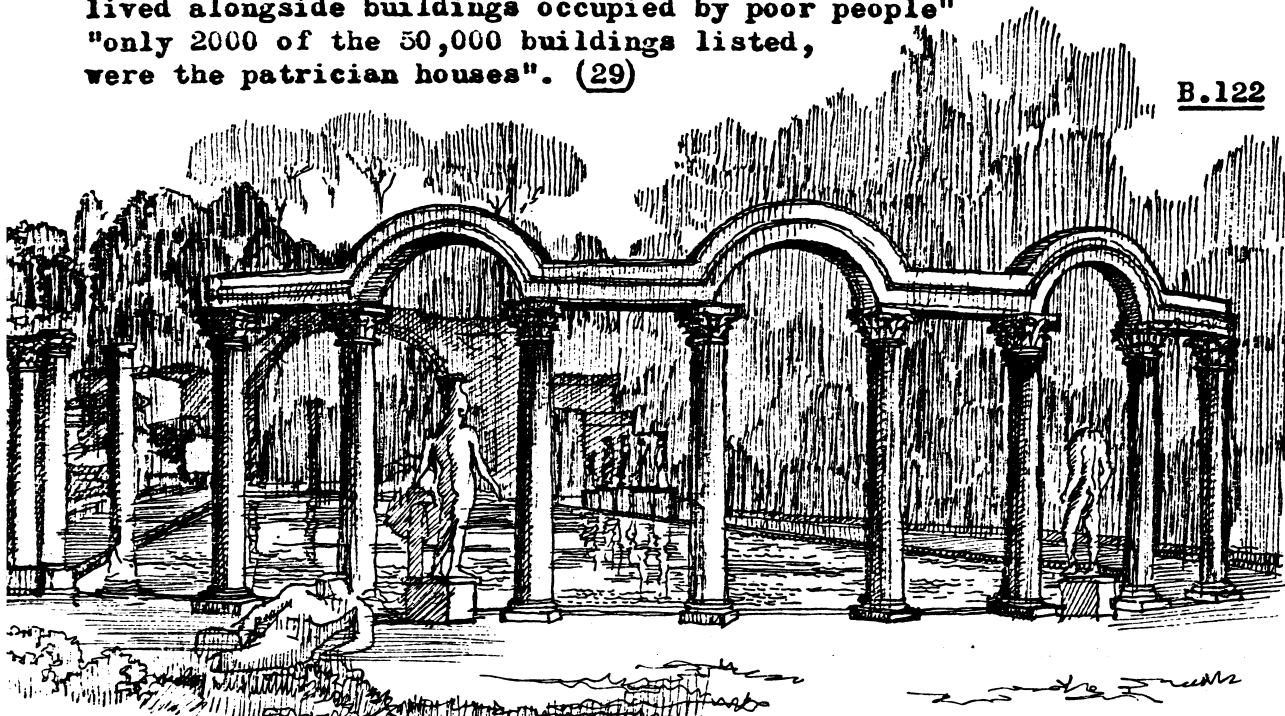


The following elements for catering to the physiological Needs I and what may be a requirement of the organism for contact with nature, were basically for the use of the "elite" (vide B.112).

"Ancient Rome had its great houses where famous men and noble families lived alongside buildings occupied by poor people"

"only 2000 of the 50,000 buildings listed, were the patrician houses". (29)

B.122



Tivoli,

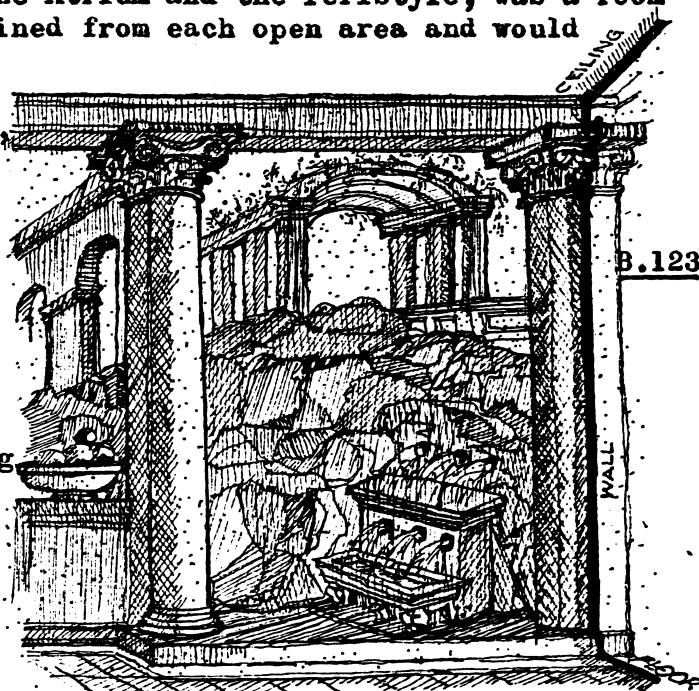
The pool sacred to the nymphs in the canopus of Hadrian's Villa (223).

At Pompeii, there are examples of urban gardens in Atrium houses belonging to the leisured classes. Between the Atrium and the Peristyle, was a room called the Tablinum. It was curtained from each open area and would have functioned as a "breezeway".

"It was only through the influence of Greek peristyle houses in Italy, with open court and unlimited power of extension, that the garden was able to penetrate into the town house as an attractive spot with shrubs, flower-beds and other beauties and luxuries" (223).

"A grotto made out of unhewn rocks that are around piled rose-covered pergolas; there is a stream foaming into a much decorated fountain and falling down into a bright basin" Cicero, (223).

"this is probably something like Cicero's amaltheum (or perhaps nymphaeum) that he much admired in the garden of Atticus".



B.123

A fresco from Boscoreale (223) .

With the Roman's emphasis on the intellect and later on enjoyment of sensual pleasures by an intellectual contemplation of them, he created his own idyllic environment within the isolation of the villa. Clifford (122) says "the Roman temperament was that of a countryman and a sensualist. In place of the Greek intangibles, they introduced Roman intangibles of their own." ie. a distinctively Roman appreciation of the "aesthetics of fine growth of trees, the contrast of the foliage and the sensation of coolness and peace."

Essential Elements used in microclimate control:

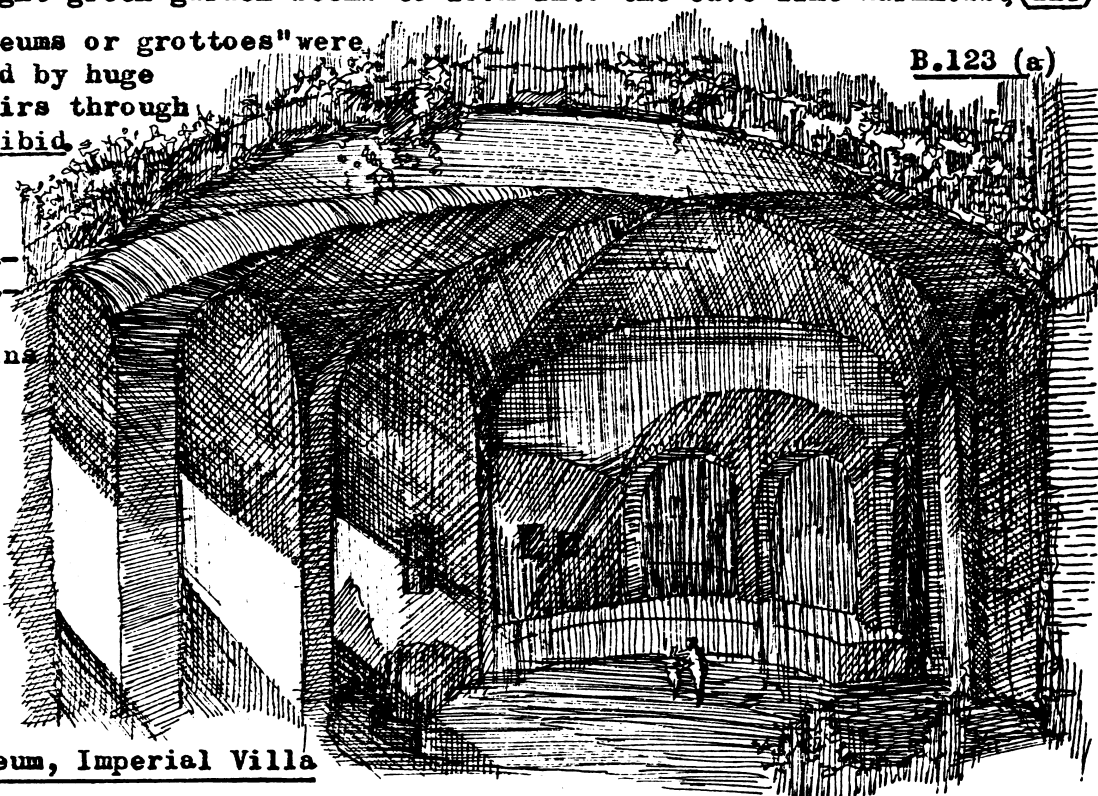
- 1) Pools (q.v. B.120).
- 2) Pergolas.
- 3) Arbors
- 4) Various forms of outdoor rooms, (eg. Triclinium, see House of Sallust)
- 5) Enclosed courtyards (q.v.) "they were yards transmuted into sanctuaries.... Architecturally, they were open air rooms, spiritually they were harbours, sheltered from sun, wind, and the noise and dust of the streets" (122).
- 6) Garden Rooms: These were rooms located "half underground" ... One of the cool rooms for use in the hottest hours of summer" as at the Auditorium of Mecnas and at the Villa of Livia in which the room is 3 metres below ground floor.
- 7) Nymphaeums: (vide Imperial Villa Albano, below)
- 8) Grottoes and Amaltheums (the latter being an older term).

..the place was kept cool by fountains and waterfalls..from the opening the bright green garden seems to look into the cave-like darkness,"(223).

"Nymphaeums or grottoes" were supplied by huge reservoirs through canals" ibid.

B.123 (a)

From
Goethein-
a paint-
ing of
the ruins

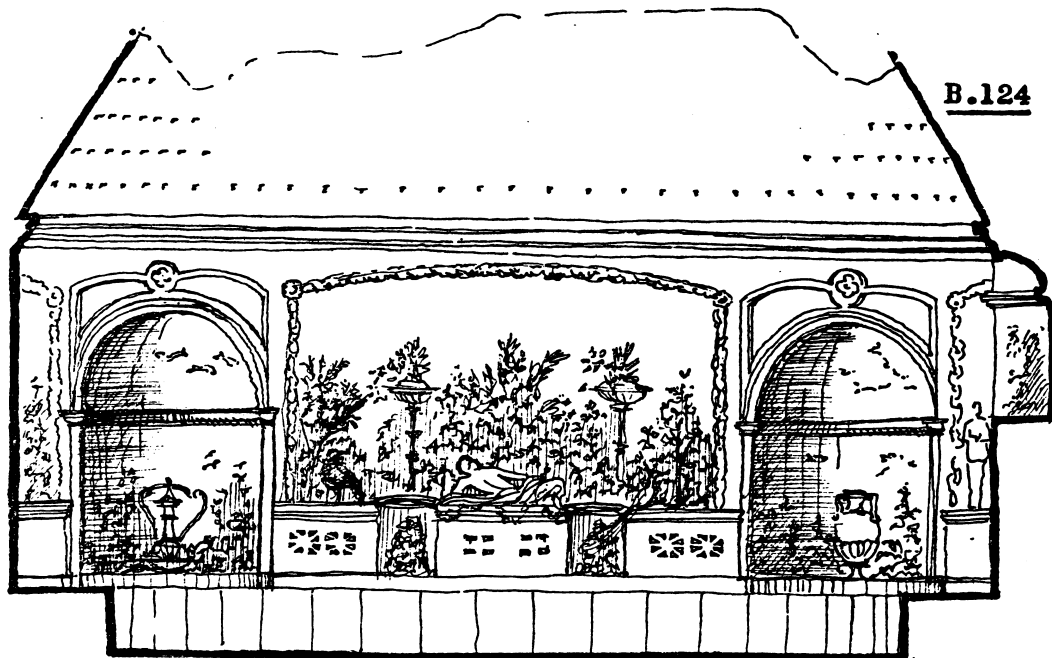


Nymphaeum, Imperial Villa

"One of the grottoes, still recognisable by its decoration....and at the time of the Piranesi, still giving a good impression of the magnificence of the emperors....natural grottoes were altered into elegant rooms,"(223).

It must be remembered that the lower classes were not content in spite of an outward appearance of prosperity. Various religions that preached righteousness, equality, salvation and immortality (eg. Mithras, Isis, Christian) became popular. Eventually, Christianity was to succeed because it "gave hope to the slaves and down-trodden and restored some measure of their self respect" (234).

Climate control methods used by the Romans, tended to favour a final application of cold temperature to stimulate the body after exposure to higher temperatures (29). They chose to endure cold at night and sought out cool places (eg. by sleeping alongside a fountain, where air movement was induced in summer.)

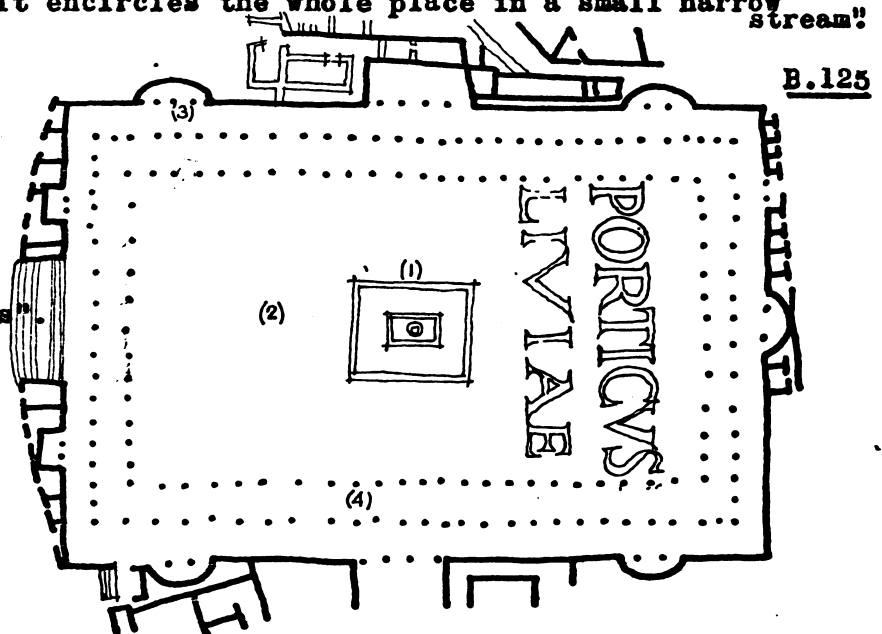


(223)

A "Garden Room" - frigidarium of the Stabian Baths, Pompeii... "circular, letting in the light overhead..water starts from one small recess and from its round basin it encircles the whole place in a small narrow stream".
Porticus Liviae.

- 1) "great tank".
- 2) sunken lawn 115 m.x 75 m..
- 3) niches alternate rectangular & semi-circular
- 4) "The paths were shaded with pergolas".

(From a town plan of Rome) - this later became the Baths of Trajan, (223) (42).

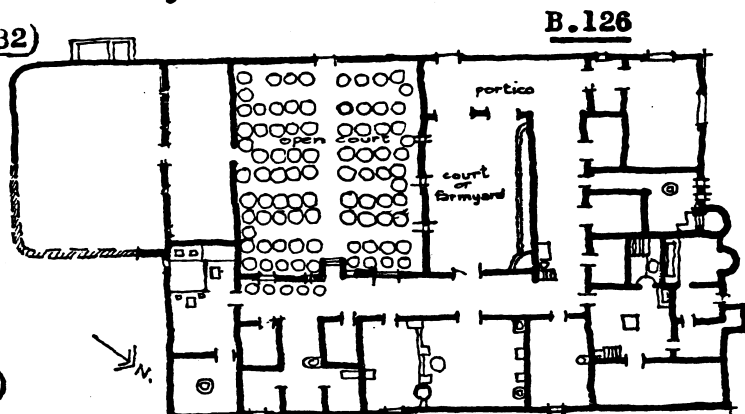


A comparison of Roman dwelling types (A-E incl.) and a correlation with the individual needs which they fulfilled.

The Villa Rustica at Boscoreale (nr. Pompeii) (232)

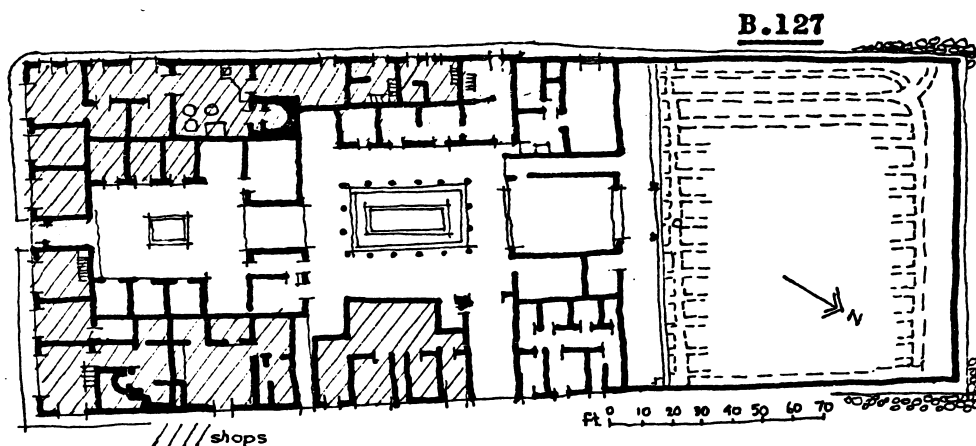
"so long as Romans were content with this simple rusticity, the nation prospered....a combination of summer home and farm", (142).

A. c. 1st Century BC. (233)



House of Pansa Pompeii.
"the Domus", (230).

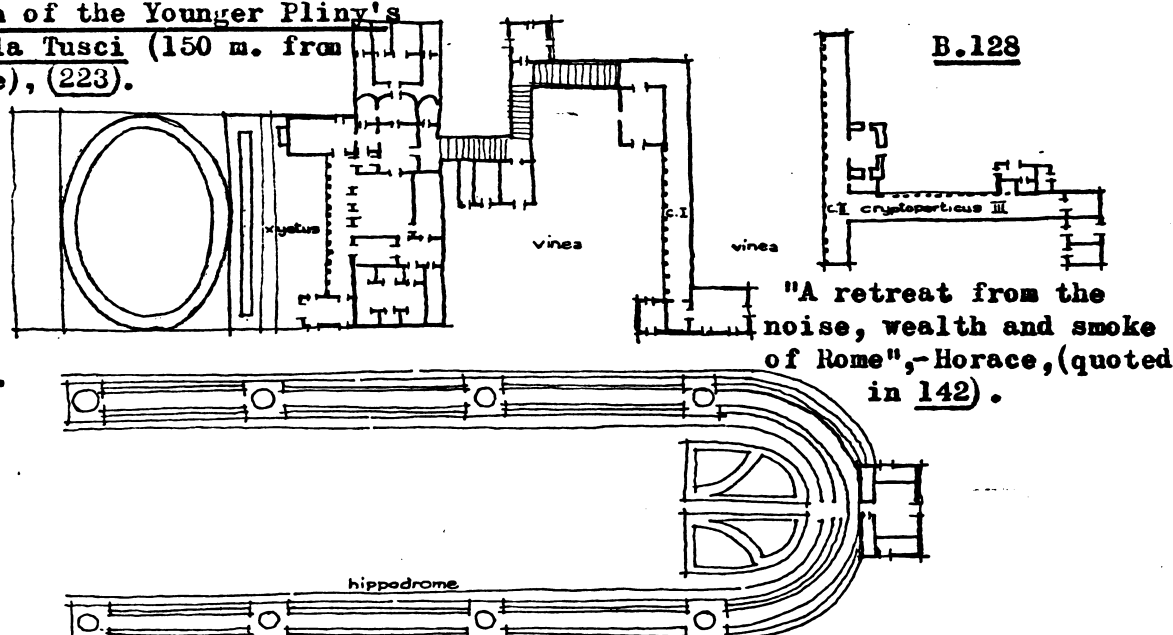
B.



"Villa Urbana"

Plan of the Younger Pliny's Villa Tusci (150 m. from Rome), (223).

C.



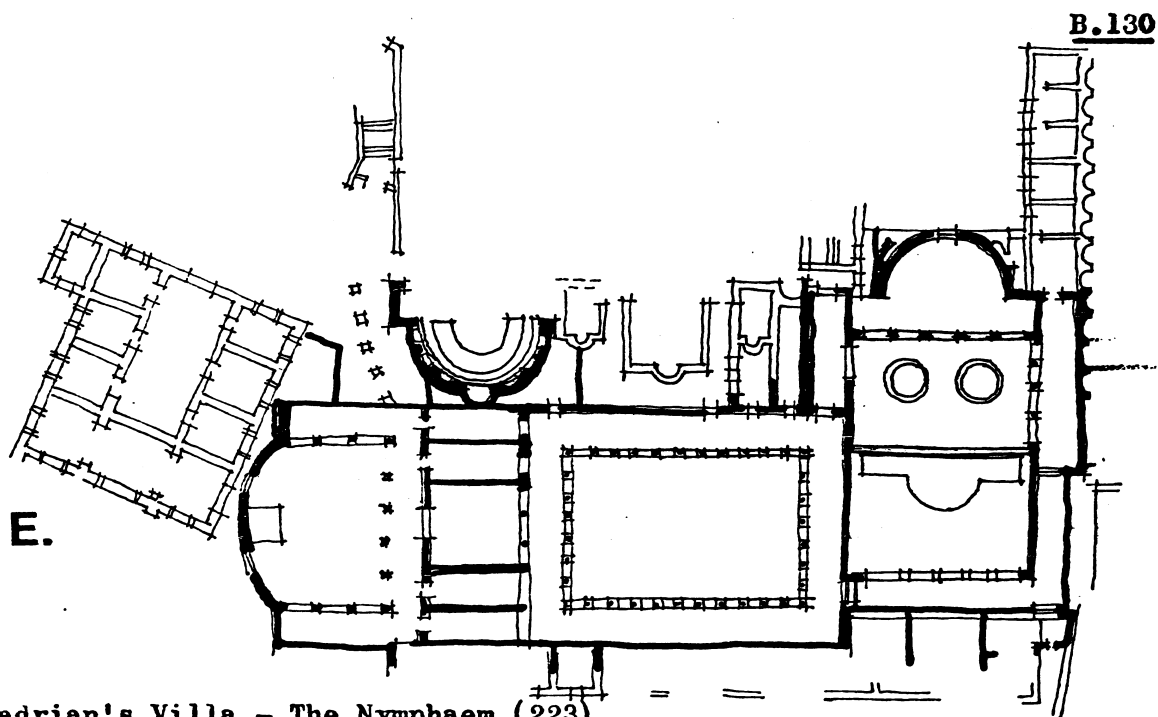
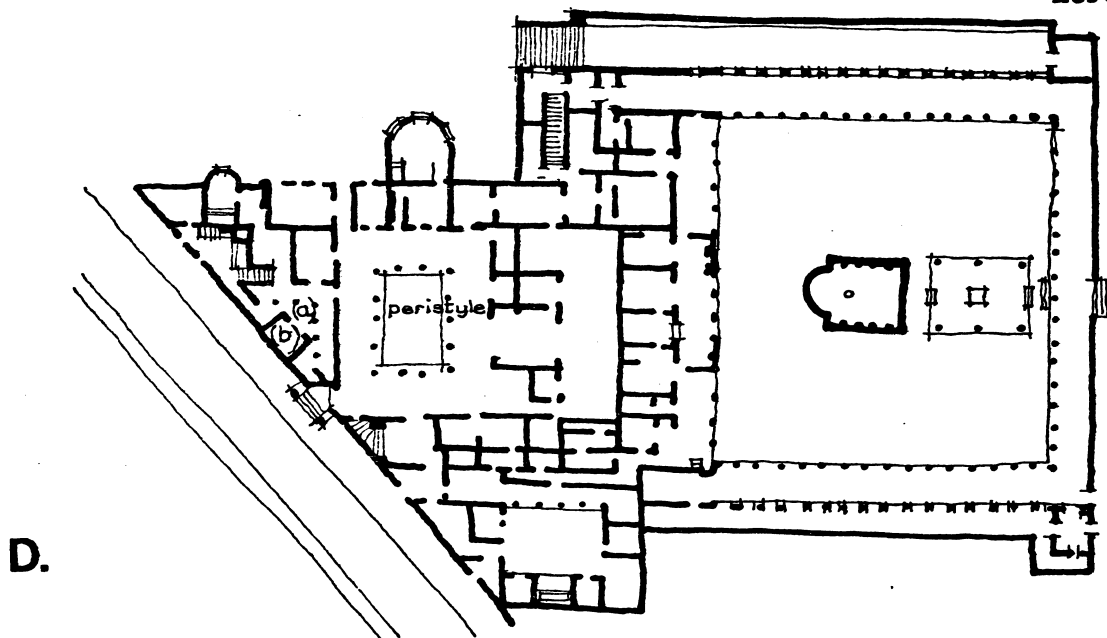
"the 'cryptoporticus subterranea'....Pliny describes" in the midst of the summer heats, retains its pent-up chilliness and enjoying its own atmosphere, neither admits or wants of refreshment of external breezes", (223).

Roman Dwellings (ctd.),

Diomedes' Villa Suburbana, (232), (223), Pompeii.

(a "modern" approach compared to Vitruvius' requirement of an atrium, however, his requirement of entering from street to peristyle is met here).

B.129



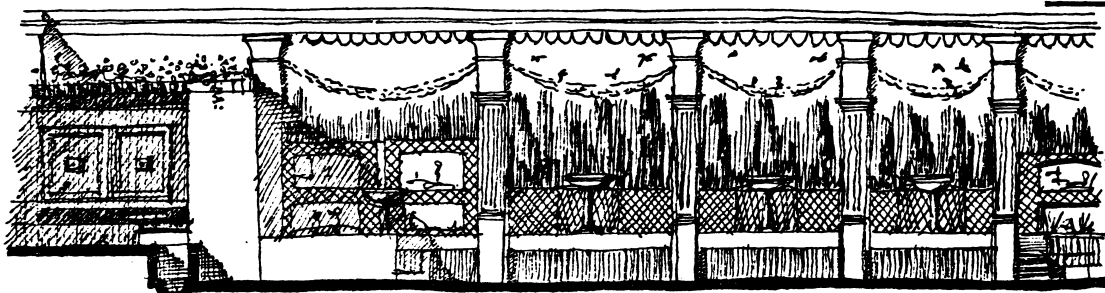
B.130

Hadrian's Villa - The Nymphaeum (223)

Gothen, calls this a garden court, she quotes Ligorio as referring to it as a "nymphaeum", in the Renaissance meaning of the word.

An Atrium house (with peristyle added later) - as an example of the higher standard of housing throughout Pompeii. The patrician used to being in contact with nature, brought the need for nature contact into his town house. His requirements for privacy were catered for by using an enclosing wall to create a microenvironment of his own, a peristyle, upon which rooms opened including the triclinium, where he dined.

B.131



Triclinium Elevation of Garden Wall (223)
(Outdoor dining)

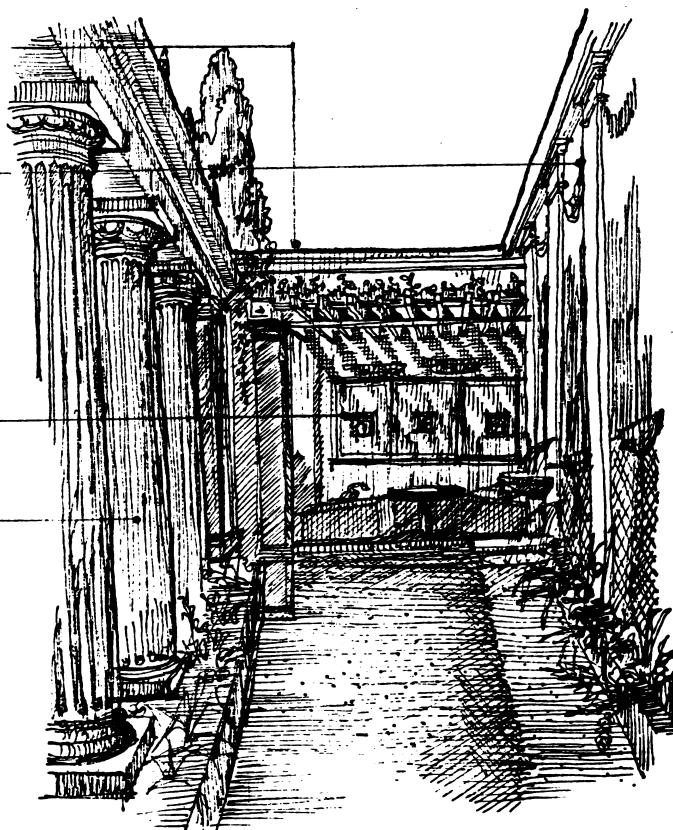
House of Sallust. Pompeii - An Atrium House

B.132

The Pergola
(The Garden "was made to look wider by paintings on the walls", from these and the walls of garden rooms, we learn of "the wealthy Romans' idea of a garden")- (122).

"A triclinium under a pergola", (223).

-portico "almost equally as wide" as court.



House of Sallust, Pompeii - Looking towards Triclinium.
(223)

When the Romans arrived in AD.40, they found a comparatively united country with a good network of tracks for chariots which later Roman roads usually followed (mostly 14'-16' wide with some 8' wide). Colchester, St.Albans (originally a headquarters of the Belgae) Lincoln and Gloucester. In addition, London was founded and Bath (as a spa) in 76 AD.. More than 100 forts were built, and manned along the borders of Wales and Scotland (Hadrian's wall 122 AD). Originally, town life was encouraged but later, Romans and Romanised British lived in "villas" - self-contained economic units (vide B.132). (These fell into decay in 4th and 5th centuries AD. after the penetration of the Anglo-Saxons).

The Roman Empire had difficulties everywhere in 3rd and 4th centuries AD. and in 367 AD., a Picts', Scots' and Saxons' attack on Britain was reasonably successful. After more invasions, the Romans departed leaving Britain to the conquerors who were not town dwellers, so that the Roman town remained in ruin for 500 years, (234).

The Roman Empire developed "because the idea of citizenship held it together", the basis of the rights and privileges of citizens.

In fact, the citizen was willing to voluntarily yield his individuality and make sacrifices for Rome. Even as early as the Punic Wars, this sense of citizenship was being undermined by the growth of wealth and slavery.

The Roman Empire was a "primitive organisation" - socio-educational needs (48) were inadequately catered for. There was no school network or distribution of news "to sustain collective activity...the spirit of citizenship died of starvation....All empires, all states, all organisation of human society are, in the ultimate, things of understanding and will. There remained no will for the Roman Empire in the world". Its demise was followed by the rise of the Latin speaking Catholic Church...which "appealed to the minds and wills of men", (135).



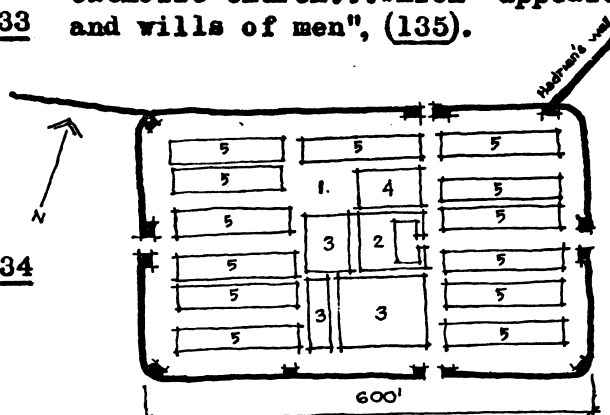
Main gate of a Fort



Barracks of a Fort

B.133

B.134



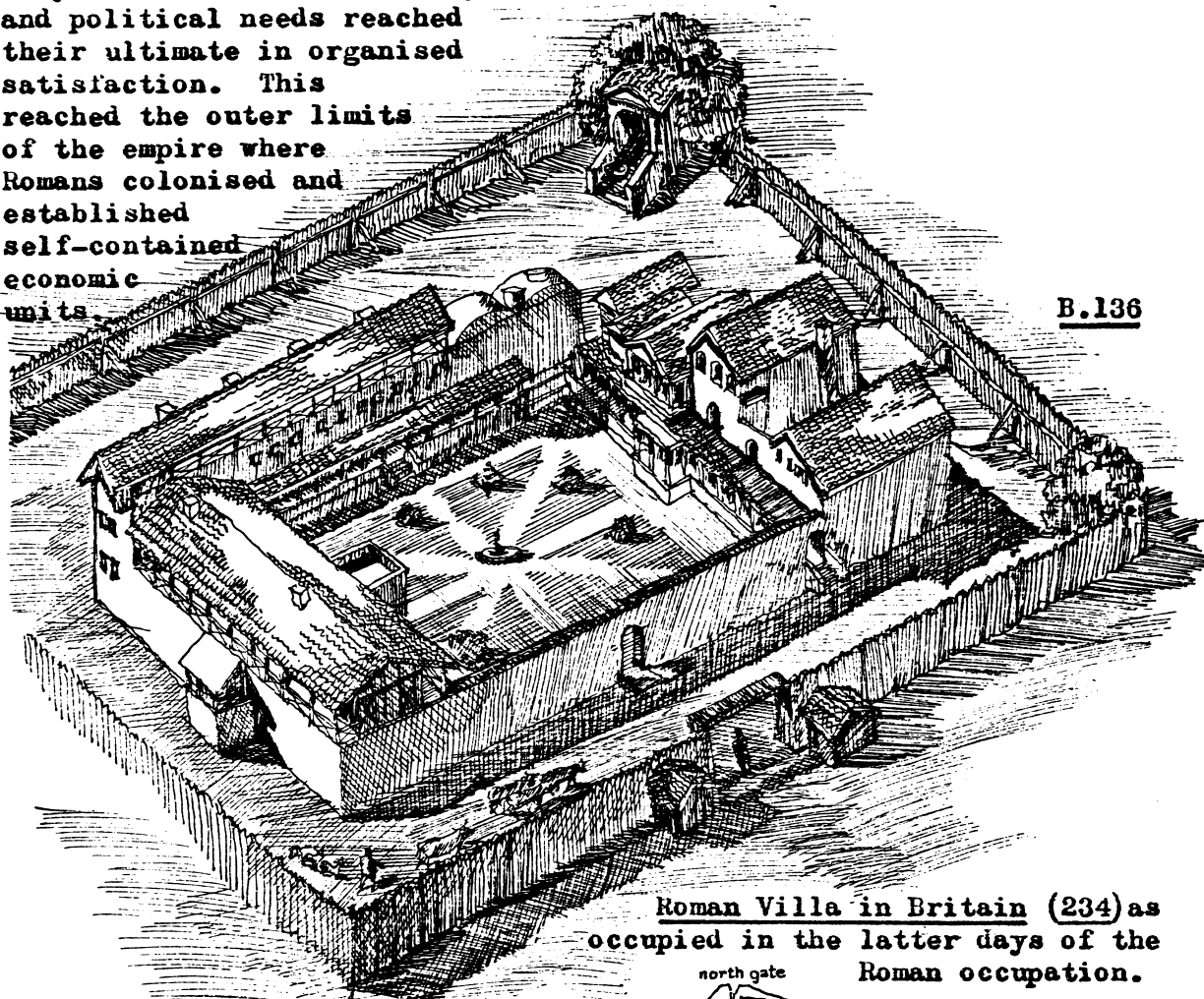
B.135

(234)

A Roman Camp, 1st Century, AD.

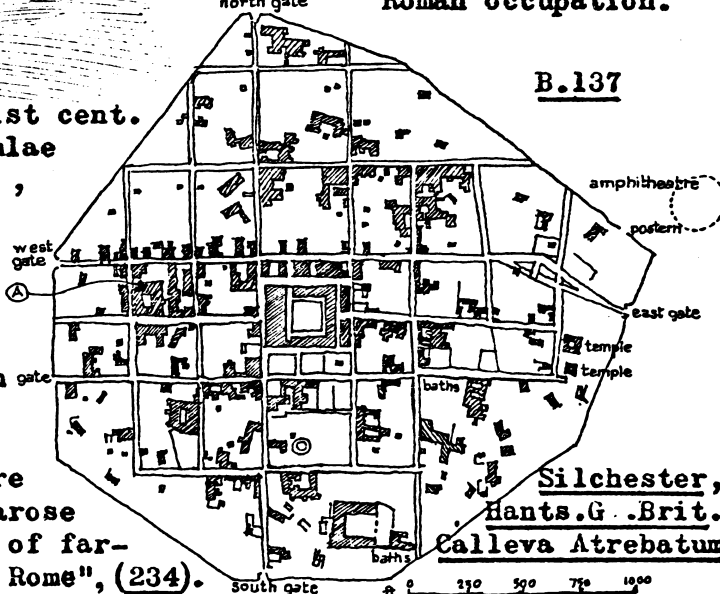
- 1) Parade ground. 2) Headquarters. 3) Officers quarters. 4) Storehouses. 5) Barracks. (note: temples, baths, theatre, etc. located outside walls).

After Caesar, there was a decline in the capacity of the Romans to provide satisfactory social needs solutions until Trajan, succeeded by Hadrian organised the "greatest and a most skilfully managed" (87) army to defend its carefully chosen frontier limits. Socio-economic and political needs reached their ultimate in organised satisfaction. This reached the outer limits of the empire where Romans colonised and established self-contained economic units.



Roman Villa in Britain (234) as occupied in the latter days of the Roman occupation.

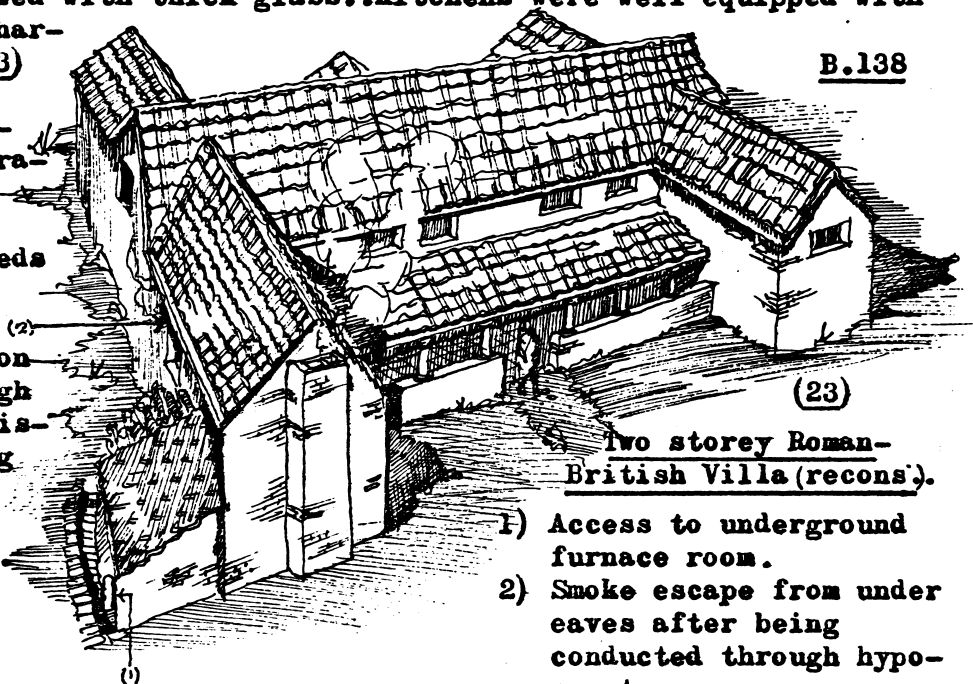
Founded in the 2nd half of 1st cent. AD- grid plan of square insulae (According to Robertson) (233), villas of the corridor and portico types and one example of a four sided corridor type (marked "A"). An example of a country population taken into a town and the house forms showing that they resisted urbanisation. "As camps became more permanent, elaborate towns arose colonised by compact bodies of farmer emigrants sent out from Rome", (234).



Silchester, Hants.G. Brit. Calleva Atrebatum

With the colder climate of Britain, Roman hypocaust systems were included in dwellings. In the South-east particularly...."wealthier ..homes, were comfortable and elegant with separate rectangular rooms, pillared corridors, tiled and mosaic floors, plumbing and heating.. windows were glazed with thick glass..kitchens were well equipped with brick or stone charcoal ovens.." (23)

A completely suitable environment for Mediterranean dwellers emigrated to a cold climate. Needs 1,2 & 3 being catered for the (2) elite by extension of Rome's thorough methods of organisation for meeting the social and individual needs of its colonists.



B.138

Two storey Roman-British Villa (recons.).

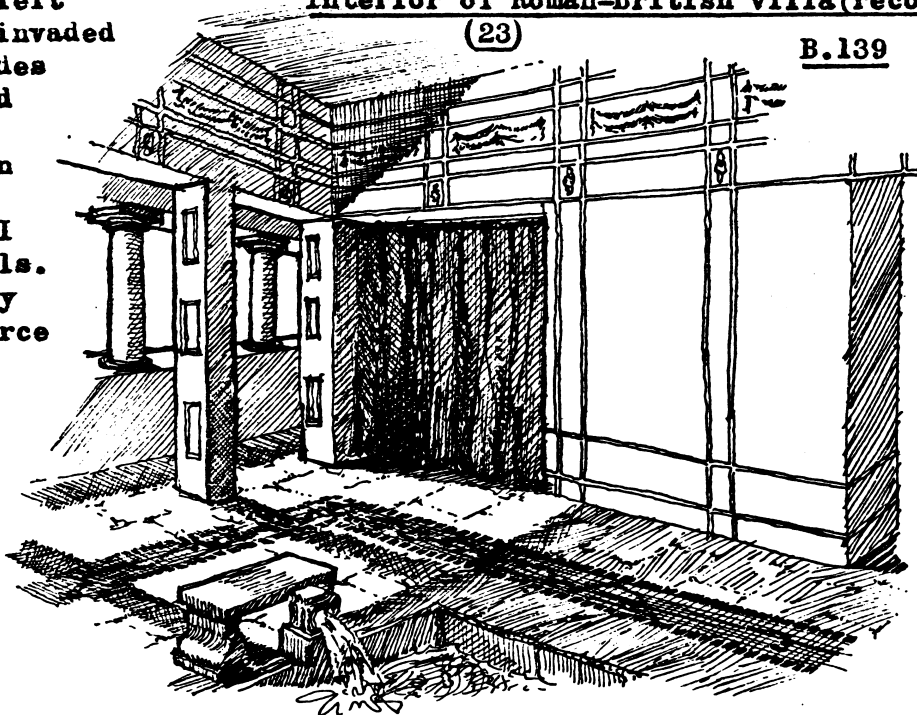
- 1) Access to underground furnace room.
- 2) Smoke escape from under eaves after being conducted through hypocaust.

When the Romans left Britain, it was invaded by barbarian hordes who burned, sacked and pillaged - returning Britain to centuries of living at Needs I subsistence levels. Yet, they probably introduced a fierce independence, lacking in the Roman.

Interior of Roman-British villa (recons.)

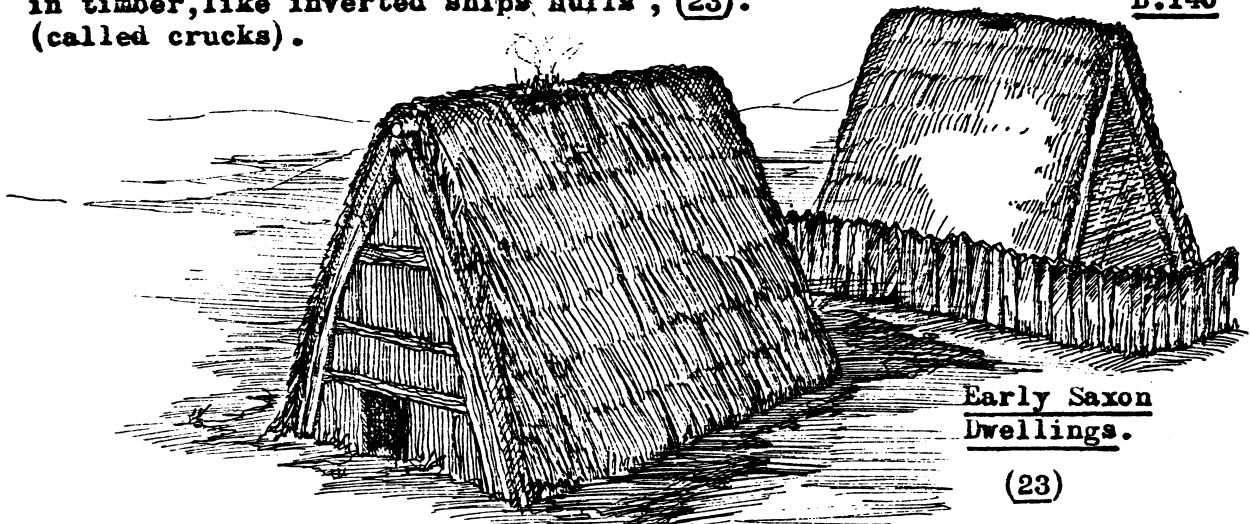
(23)

B.139



After the collapse of Rome, "darkness descended over most of Europe and the Mediterranean countries" (136), including a neglect of skills in the construction of dwellings and methods of controlling environments. Safety of the individual was the dominant need (Needs 2) and Britain fell easily to invading Picts and Teutonic Angles, Jutes and Saxons, who became predominant. The Saxon was a shipwright and built in timber, like inverted ships hulls, (23). (called crucks).

B.140



Early Saxon
Dwellings.

(23)

These dwellings lacked privacy and were dirty, smoky and drafty. (Needs I subsistence level only). By the end of this period, a societal pattern developed - beginning the feudal system. Villeins were subject to an overlord or thane, who lived in the central hall surrounded by outbuildings including a bur for the women; (the beginning of privacy).

B.141



Showing the hall of the chief in megaron form.

There was a complete reversion to the lowest Meso-Neolithic standards of comfort - constant threat from the environment produced a regression to Needs I & 2 expressions.

Constantine changed the capital of the Roman Empire to Byzantium re-named Constantinople in AD. 324. Byzantine architecture adapted to the Eastern climate by using flat roofs, combined with oriental domes, with small high windows and sheltering arcades surrounding open courts.

Before occupation as the capital, Byzantium was known for profligacy, laziness and viciousness (230) - this introduction of corruption into the Roman Empire must have precipitated its decline.

Threats to security from Huns, Goths and Saracens was ever present hence the use of encircling water and walls as Needs 2 devices.

Organisation of Social Needs and prosperity for the "elite" gave a potential for satisfaction of Needs 4 and possible Needs 5, which was only realised for a select few. Corruption from within and attack from outside, finally collapsed the city in 1453, after many vicissitudes through the centuries.

Constantinople - Plan (of XVth cent. city) B.142

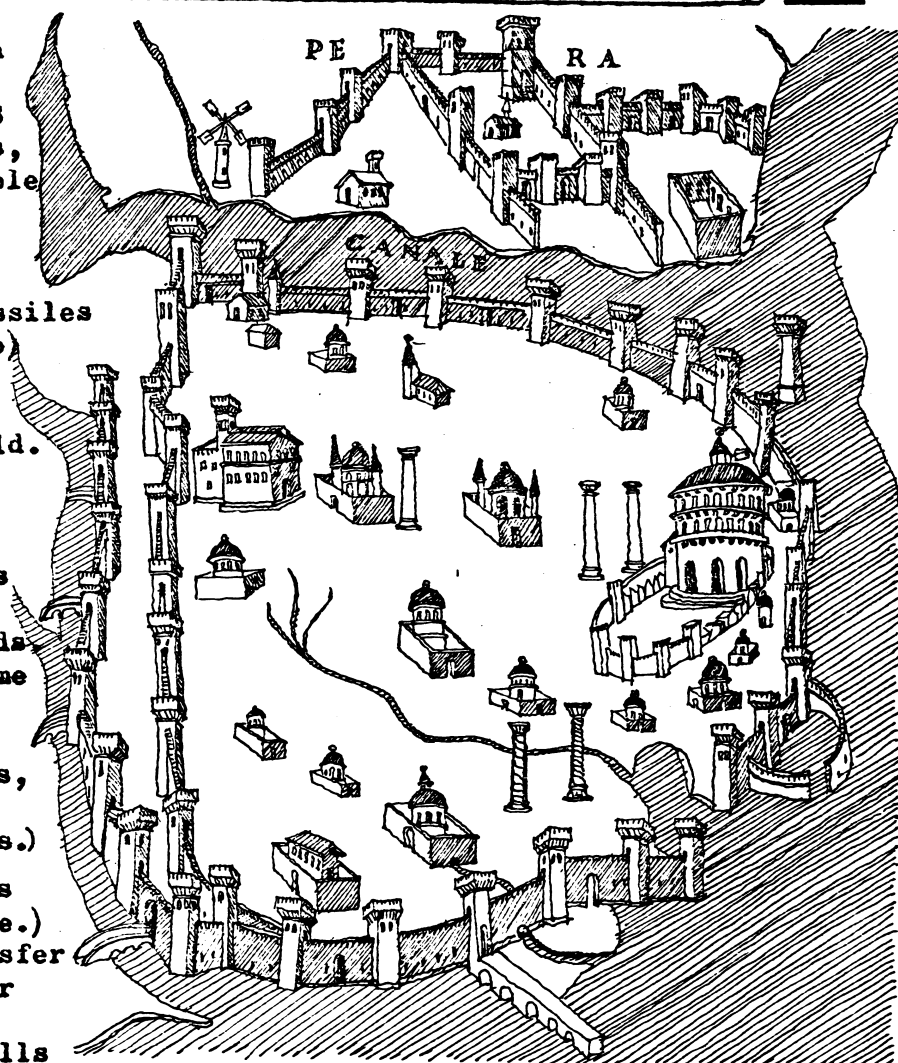
At the end of the reign of Justinian (565 AD.) there were 11 forums, 23 baths, 4 circuses, 30 palaces, a triple ring of fortifications (with the inner ring tall enough to fire missiles over the other two) and 500 churches covered with a thick layer of gold.

The palace contained gardens with pavilions, pergolas, fountains flowing with rose water, & lily ponds.

The hippodrome was the centre of public life (ferocious horse races, executions and political meetings.)

(S. Sophia was built at this time.)

In the transfer of political power to Constantinople "the minds and wills of men" (135) were given new ideals, which again, as in the Roman Empire were undermined and sapped of energy by wealth and luxury, to which was added a new degree of savagery.



Owing to England's insular position, the only progress in culture occurred under the influence of the Christian church. First, individual Christians withdrew into seclusion and religious communities began. Under the influence of monasteries, art, music, horticulture and literature was raised to a high level, in spite of continuous raids and threats to security (Needs2).

Nendrum County Down, Ireland (below)
Plan of an excavated monastery
 (Probably 6th - 8th century AD.).

A. 0 60 120 180

B.143

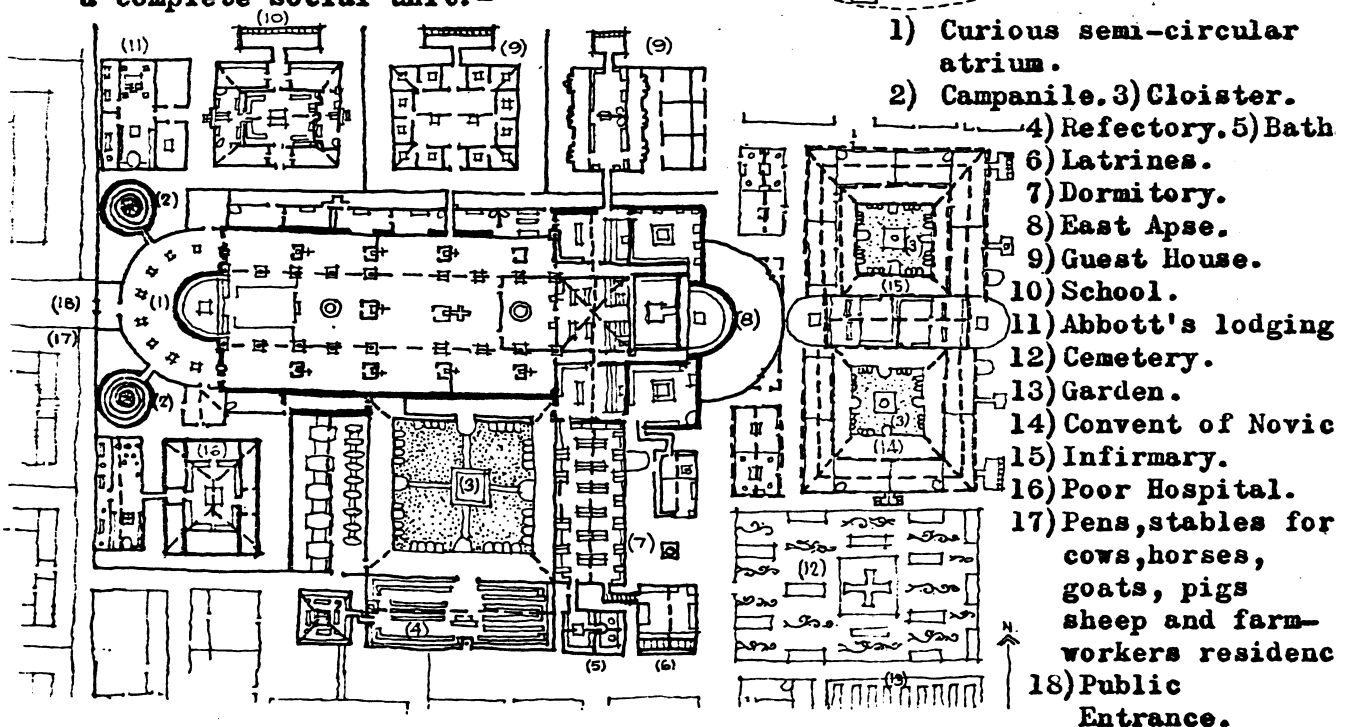
(230)

Below B.144, (230), c.819 AD..

Schematic plan for the Benedictine
Monastery of St.Gall,Switz..

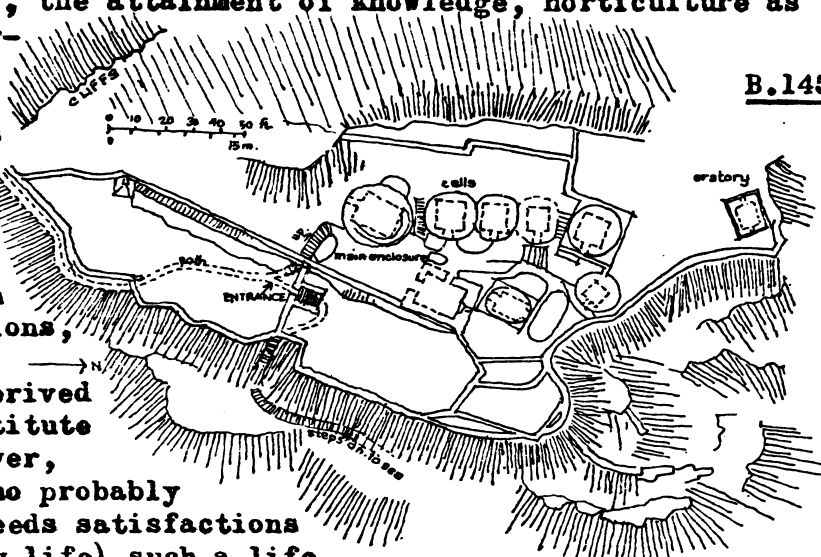
made for recommended re-building of other similar structures). Lines shown dotted are added by the writer from reconstruction model and further details in lighter line also added from ref. (235). NB: This plan is taken from copies of original records. (vide (236) for re-drawn architectural plan).

The various activities constitute a complete social unit:-



Around 500 AD., the monastic church in Britain had formed many isolated communities. These would-be anchorites and christian refugees can be traced to 3rd century in Egyptian desert and the solitary life led in these retreats permitted a focussing of energies upon arts (including gardening), the attainment of knowledge, horticulture as well as spiritual pursuits.

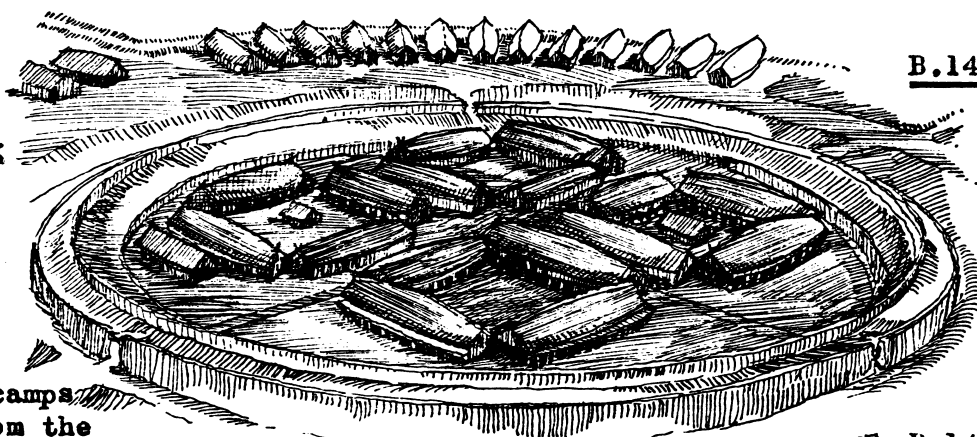
For these new "elite", higher needs satisfactions became attainable, although the bivalency produced by voluntary (partial) deprivation of Needs 1 satisfactions, would have created a variety of unusual derived needs requiring substitute satisfactions. However, for a limited few (who probably had adequate lower needs satisfactions and security in early life) such a life would have produced Needs 5 fruition, according to Maslow's ideas and it is probably these "leaders" who produced the fine works of art of this period, ie. beautiful illuminated manuscripts.



B.145

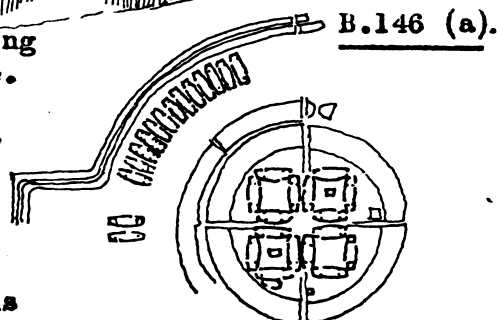
Composite Plan from (252) & (243) of Skellig Michael Celtic monastery (8 mls. of the West Coast of Ireland, surrounded by sheer cliffs on a 700 ft. rock outcrop).

Trelleborg
Military
camp,
(243).



B.146

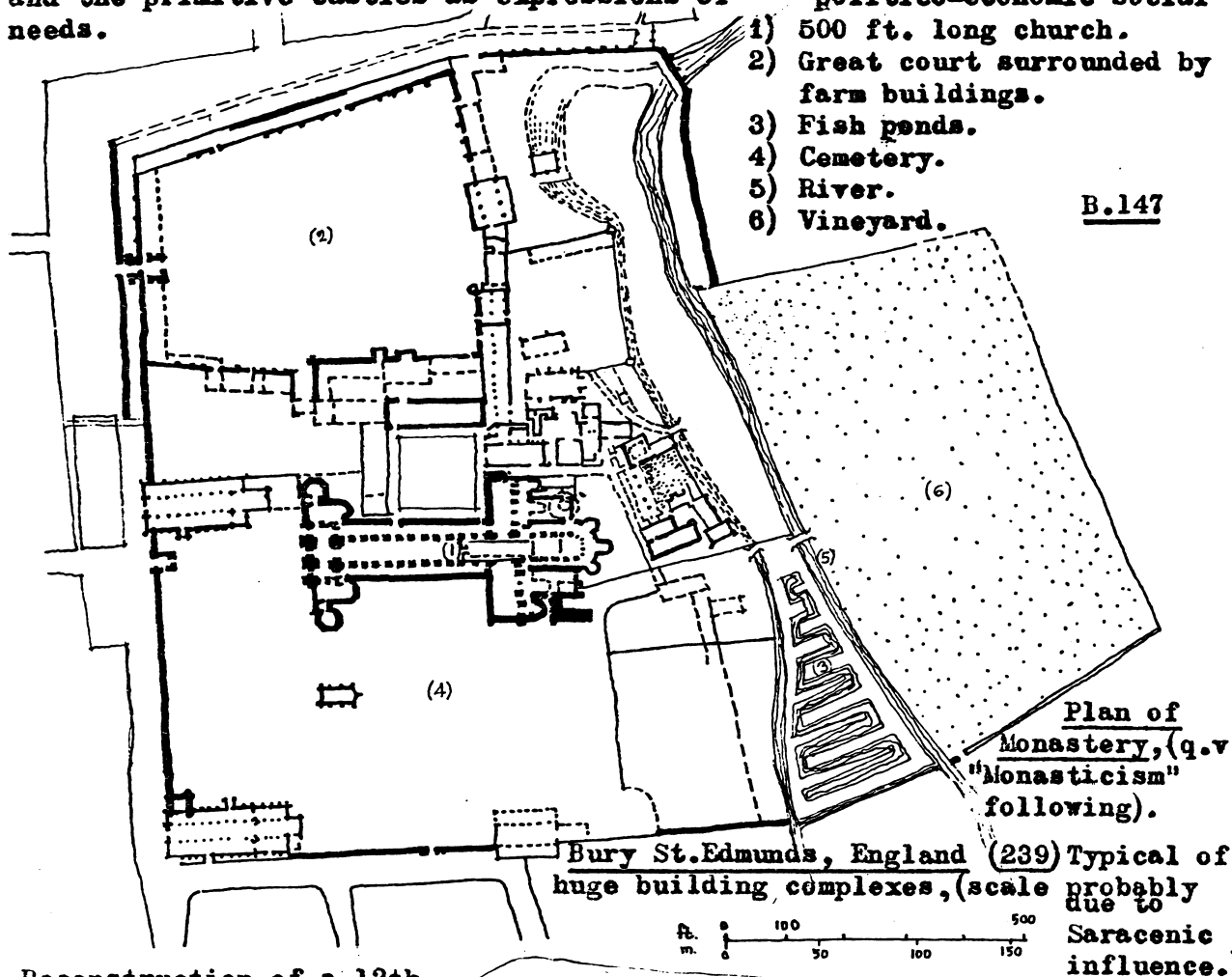
Viking military camps dating from the great age of Viking expansion, tell of growing Scandinavian social cohesion and discipline. It was from these bases, well-defended by topography and geography, that attacks were launched on the isolated and vulnerable communities of Britain. In order to withstand these assaults, the monasteries resorted to the extreme (geographical) sites as in Skellig Michael (above). Scandinavians continuously retarded Britain's evolution, (55).



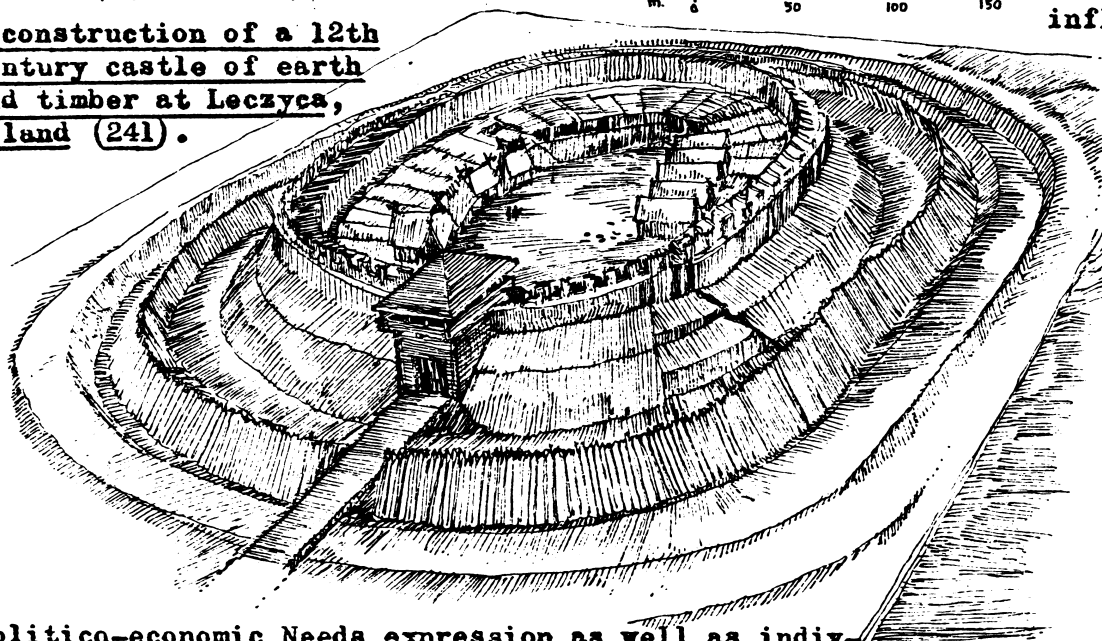
B.146 (a).

Plan of Trelleborg, (256).

A contrast between the vast architectural enterprises following the Norman conquest, as expressions of politico-religious social needs and the primitive castles as expressions of politico-economic social needs.



Reconstruction of a 12th century castle of earth and timber at Leczyca, Poland (241).



B.148

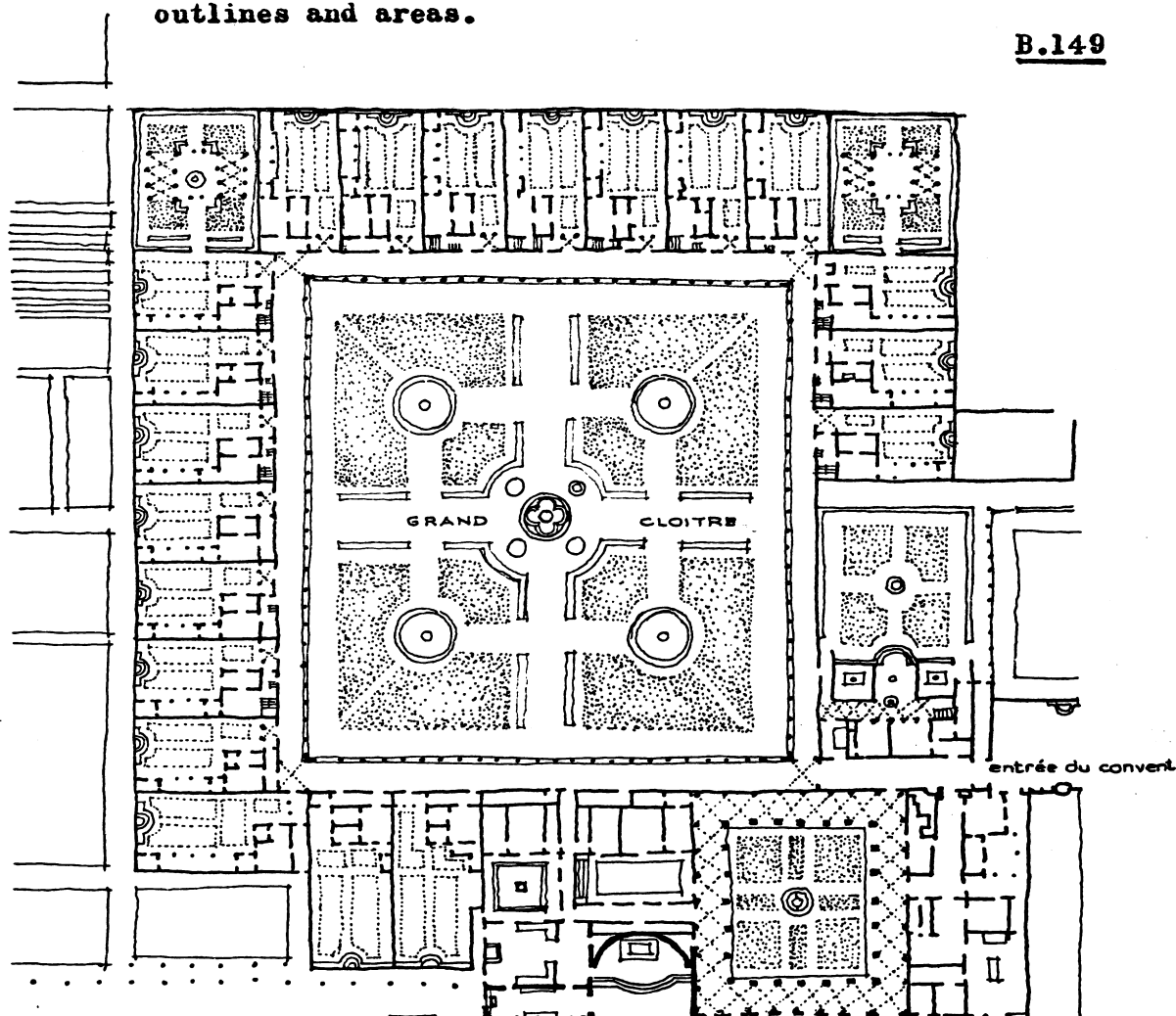
Politico-economic Needs expression as well as individual security (Needs 2).

Maurice de Sausmarez said that "for much of this period (ie. the Dark Ages) the monastic doctrine that what delights the senses is sinful, added to the general mistrust of nature, and the dangers of forest and ocean discouraged interest in realism".

The old Empire symbols of power and wealth were appropriated and adapted to accomodate the new austerity represented in Christianity.

The horticultural, scientific, artistic pursuits were given an impetus by a few people working separately under their own spiritual inspiration and motivation. This is symbolised by the compartmented allocation of plots shown in the plan below by dotted outlines and areas.

B.149



The Thermae Museum at Rome. (Carthusian order of Monasticism).

..with its little concealed cubicle gardens. It is quite clear that, through stirring up the monks to a personal interest, a great impulse was given to the raising of flowers and in consequence to horticulture generally", (223).

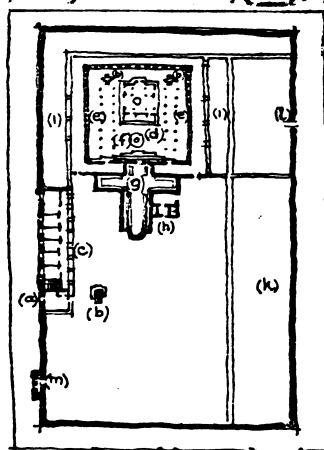
Monasticism:

Not only did the elite comprise princes, nobles, etc., but in the fulfilment of basic needs, the monastic orders contained all that was necessary for the creation of a new elite. These monks probably succeeded in attaining a level of Needs 4 (and possible Needs 5) satisfaction higher than the nobility.

From the austere isolated existence of the coenobia (founded by Pachomius, an Egyptian early 4th century) with its loosely ordered huts, to the strongly fortified Eastern monasteries (see below) to the 15,070 spacious and splendid Benedictine abbeys of Europe and Britain (of which no plans of the early examples exist except St.Gaul are extant, vide B.143), monasticism went through periods of decay during which religious ardour cooled and materialism, wealth, luxury and worldliness prevailed, and periods of revival when new orders were introduced - with consequent changes in systems of spatial enclosure.

The Cluniac is an example of one of the earliest reformed orders (10th century) which, as with many others, achieved popularity, wealth and dignity and hence worldliness (see below). This pattern is probably the familiar one of the "pull" exerted towards lower needs satisfaction when they have not been adequately and intelligently satisfied in early life. Maslow's requirement of a progression through hierarchical succession of needs satisfaction would probably have been disrupted during the earlier life of each aspirant. The higher needs (including religious creativity as an expression of Needs 5) being abandoned as the organism returned to a lower level of needs satisfaction to restore the life balance. This reversion is also seen in the Cistercian order, founded on austere piety by St.Bernard and descending to lavish worldliness of Fountains Abbey (although it was theoretically more democratic than the autocratic Cluniacs and Benedictines). Plan of Abbey of Cluny France, (55), (c.910 AD).

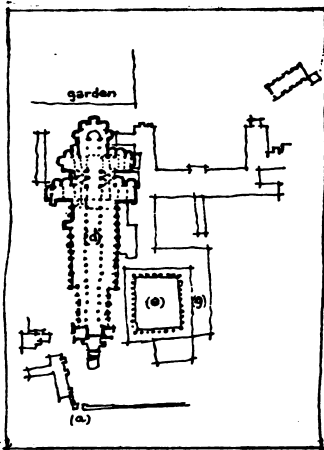
Monastery of Santa Laura, Mt.Athos, (55).



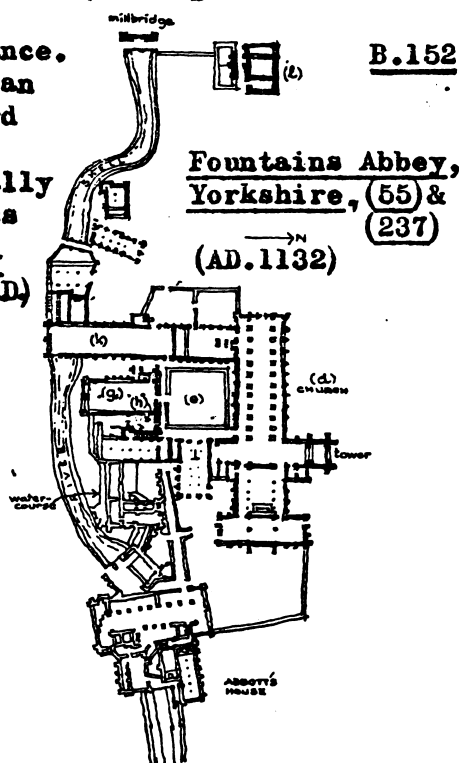
An early abbey designed

for security. (a) Gateway. (b) Chapels, (c) guest house. (d) Church. (e) Cloister. (f) Fountain. (g) Refectory, (h) kitchen. (i) cells. (k) Storehouses. (l) postern gate. (m) tower.

B.150



B.151



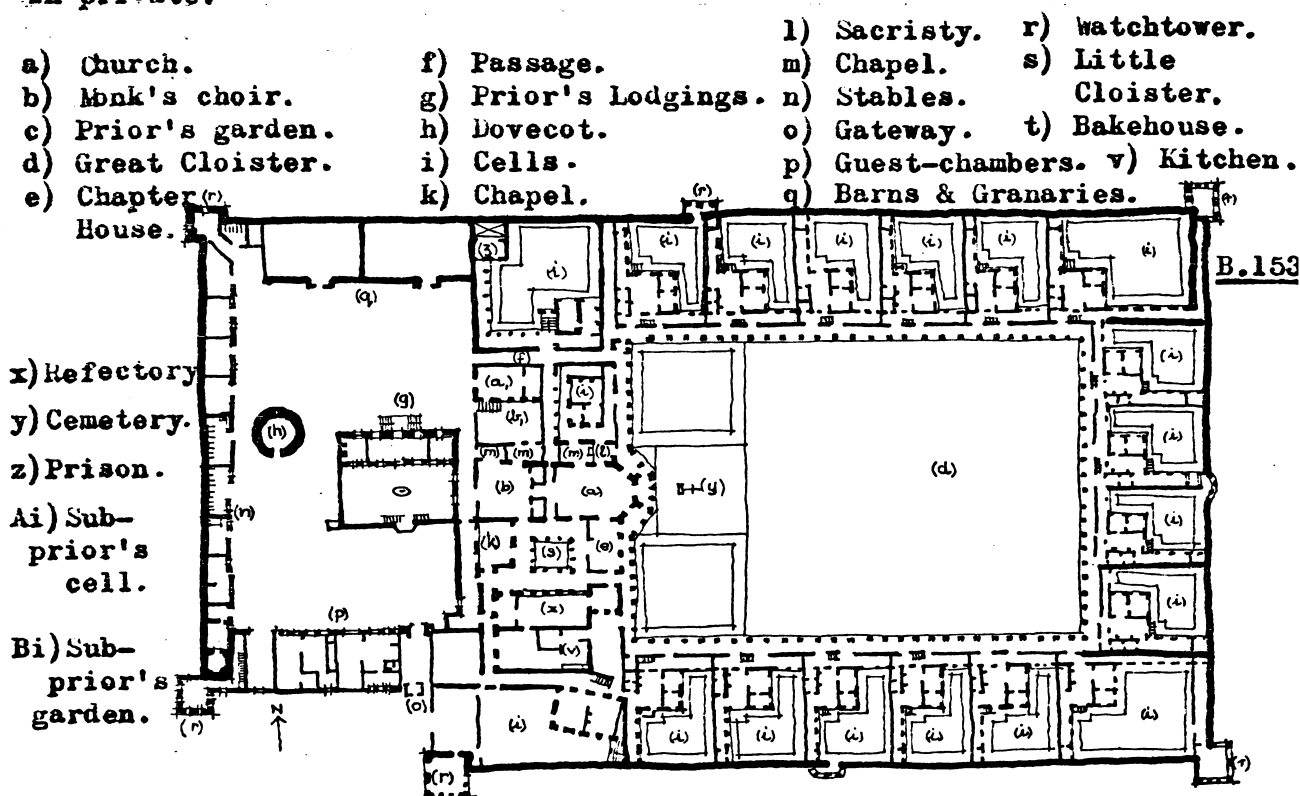
B.152

Fountains Abbey,
Yorkshire, (55) &
(237)

(AD.1132)

Prof. Taylor (pte.comm.) has drawn attention to what could be the anomaly of the life of the (religious) "hermit" when considered in relation to Maslow's hierarchical theory. However, it appears understandable, if one considers that such a life seems to depend for its success upon a period of prior preparation for which sufficient mental balance and lower needs satisfaction are a necessary pre-requisite to the endurance and even enjoyment of such an existence.

The voluntary hermitic life often seems to bring considerable and lasting pleasure and satisfaction to the individual - a significant indicator of higher (Needs 5) fulfilled. An intuition of the value of isolation is seen in the planning of the Carthusian order, founded by St. Bruno, 1084, with its individual cells (vide B.144) - this also resisted reversion to lower needs satisfaction by the order en masse. However, one does not know how much each individual may have "succumbed" in private.



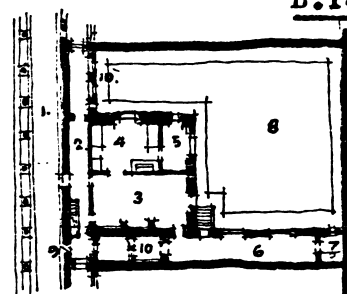
Plan of Carthusian Monastery of Clermont, France (55) - Showing separate cells for solitude and silence.

B.153 (a)

- 1) Cloister gallery.
- 2) Corridor.
- 3) Living-Room.
- 4) Sleeping-room.
- 5) Closet.
- 6) Covered Walk.
- 7) "Necessary"-WC.
- 8) Garden.
- 9) Hatch.
- 10) Wood-store.

(55)

Detail plan of a Carthusian Cell at Clermont.



The Mendicant or Preaching Friars (including the Dominicans, Franciscans, Carmelites and Austin Friars) arose at the beginning of the 13th century. Taken as a whole, the remains of the establishments (which were adapted to circumstances and quite austere) afforded little warrant for the invective of Matthew Paris, benedictine of St. Albans when he says, "these are they who, enlarging day by day their sumptuous edifices and encircling them with lofty walls, lay up in them their incalculable treasures; transgressing the bounds of poverty and violating the fundamental rules of their profession", (55).

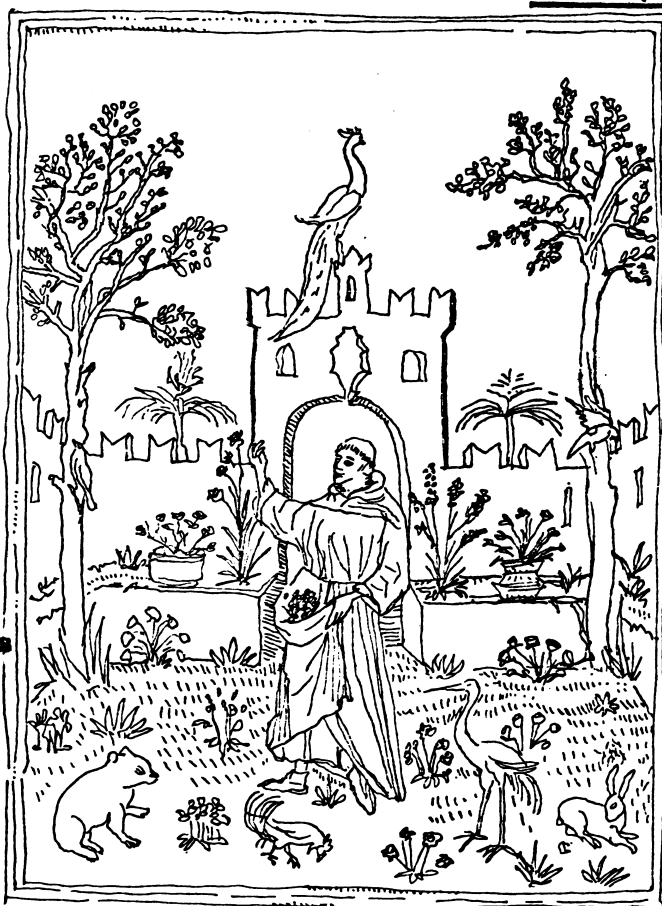
From the ecclesiastical universities of Europe, the Franciscan order furnished a long line of distinguished thinkers, including Roger Bacon and to these sources must be accredited the revival which followed the Dark Ages. The masses were educated and for the first time had access to the means of satisfying Needs 4, including the universality of a common world language, Latin.

B.153 (b)

The stern rationality of the scholastic theologians was gradually modified by warmth of feeling and emotion. St. Bernard, like St. Francis, taught men to approach God not only through the mind but through the emotions. From the influence of these teachings, the material world was seen as "only the transparent veil of God, who was so clearly visible through it, that there was no longer any need to draw it aside. Life was truth, joy, certainty and fulfilment" (277).

Teaching like these are more relevant now than ever. Through the ecological sciences and an empathy with nature, McHarg (274) and others, are re-stating these ideas, having a relevance to man's future.

The organised church suppressed this religious enthusiasm of the people and "so it was that the church by excessive claims, by unrighteous privileges and by an irrational intolerance, destroyed that free faith of the common man which was the final source of all its power. The story of its decline tells....continually of decay from within" (135).

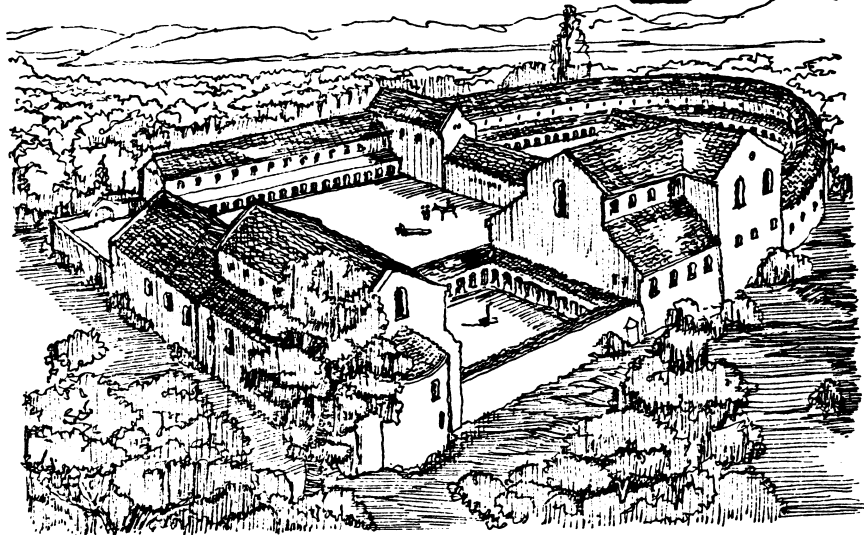


A convent Garden of 1490, (285)

Note: Turfed seat or raised bed with flowers grown in pots.

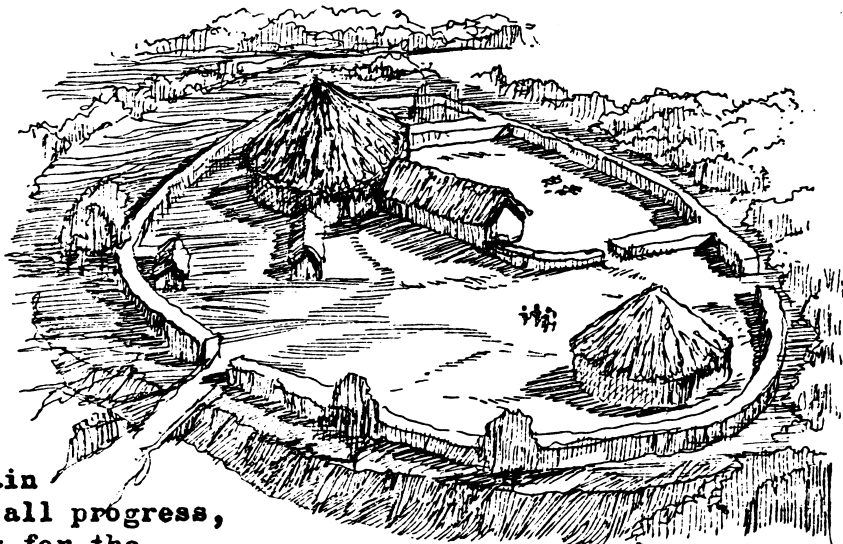
The levels of needs fulfilment of the "elite" and the "masses" was greatly contrasted during the Dark Ages. Europe and Britain were in a continuous state of invasion and insecurity. With the coronation of Charlemagne, the Holy Roman Empire came into existence, combining the church and state, it held the ultimate in potential expression of aggrandisement of the elite.

Charlemagne's palace at Ingelheim (240) was an example of self-aggrandisement (a form of Needs 4 fulfilment) for the elite. (243)



B.154

A Welsh Homestead (240) - Living conditions for the masses remained at a very low standard. Wales was divided into tribal kingdoms continuously at war and only under Viking threat in the ninth century, did any form of unification appear. The average man had little guarantee of any continuity of satisfaction of his physiological (Needs 1), security (Needs 2), or higher needs satisfaction.



B.155

Europe and Britain became inert to all progress, possibly waiting for the millennium and world destruction.

The Norman conquest inaugurated great and far-reaching changes in British history, they were more warlike and cultured than the Saxons and gifted with greater capacities for organisation. They introduced to England strong socio-political needs, as exemplified in the descent of the hill-fort, the Motte-castle. This fortification element as an expression of the new socio-political needs, was repeated throughout England after 1066 as the Normans dominated the English common people.

B.156

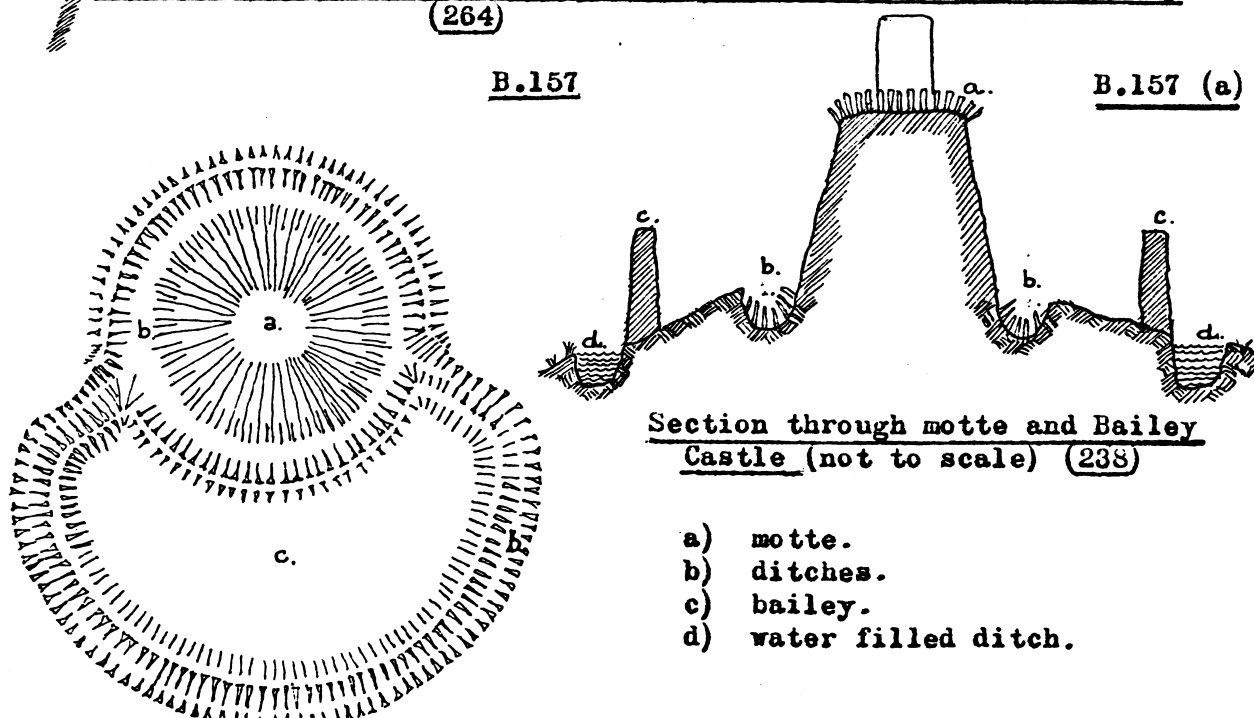


The siege of the Motte-Castle at Dinan from the Bayeux Tapestry.

(264)

B.157

B.157 (a)



Section through motte and Bailey
Castle (not to scale) (238)

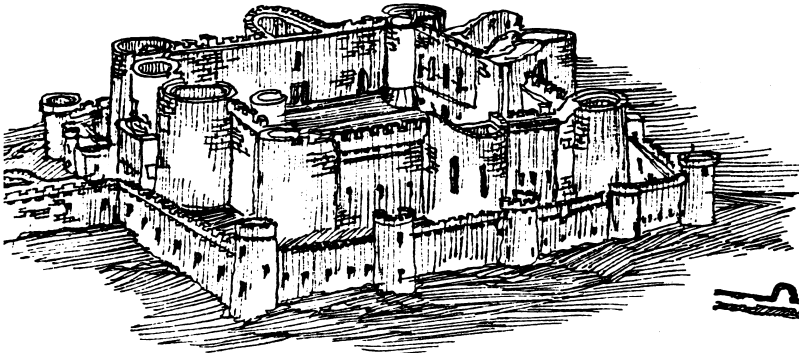
- a) motte.
- b) ditches.
- c) bailey.
- d) water filled ditch.

Plan of a typical motte and Bailey.
(not to scale)

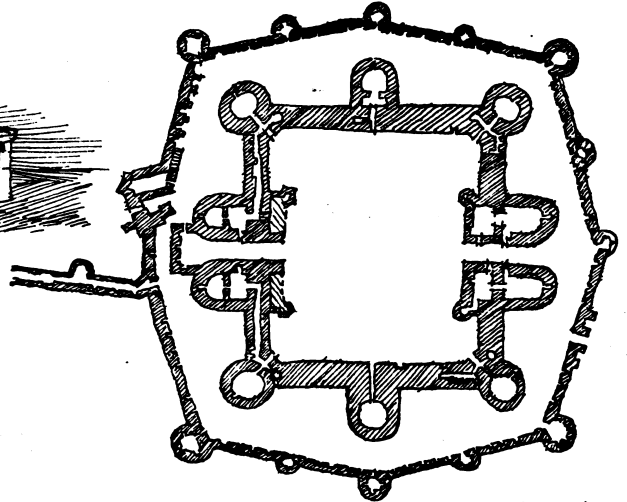
The new Norman socio-political and socio-economic (feudal) systems imposed on the conquered Britain, are exemplified in the form of the Norman castle.

B.158

B.158(a).



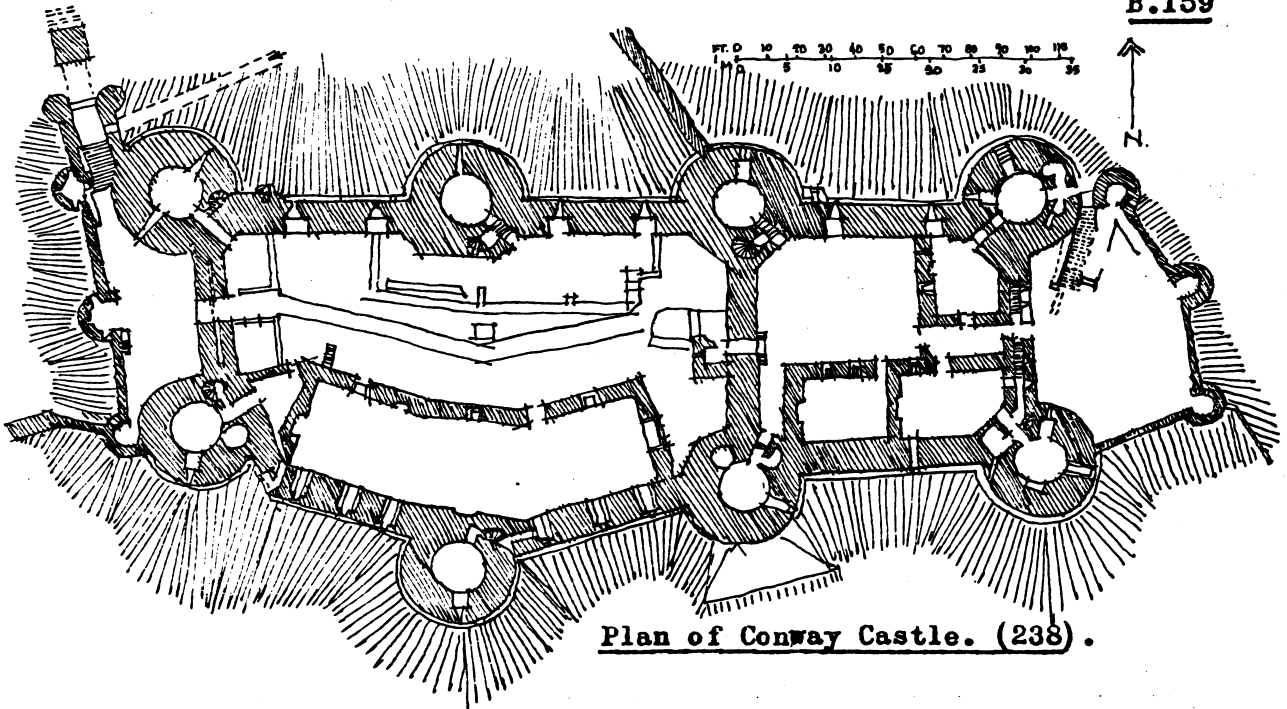
Beaumaris Castle (249).



Beaumaris Castle- Plan (249)

The bulky architectural mass of these castles, dominated the landscape with their presence, expressing the principal of the feudal power of God flowing through the king in a pyramidal gestalt extending down to the serfs from whom service was owed to the castle in return for security (Needs 2). The life of the serf was still impoverished.

B.159

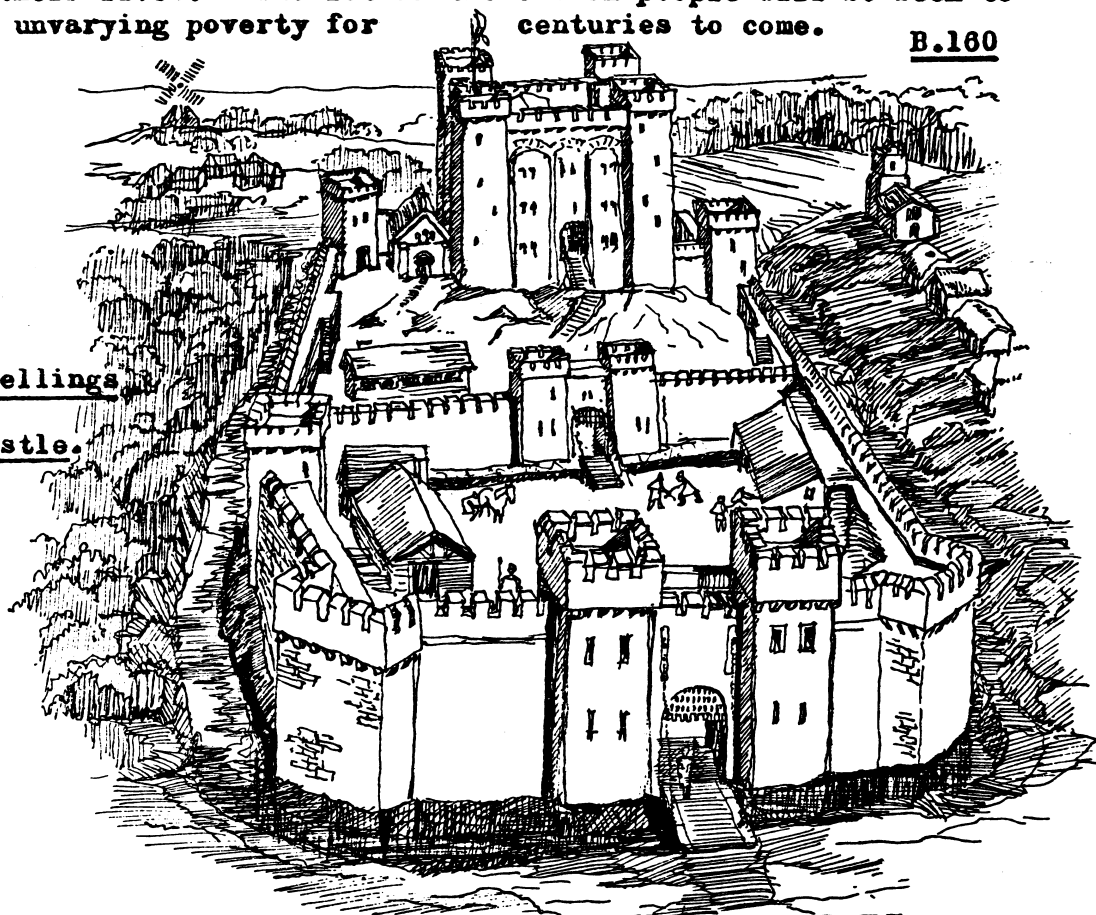


Plan of Conway Castle. (238).

The serfs' dwellings were gathered in close physical proximity, symbolising their security (Needs 2) dependence on the castle as the focus of their lives. The lot of the common people will be seen to be one of unvarying poverty for centuries to come.

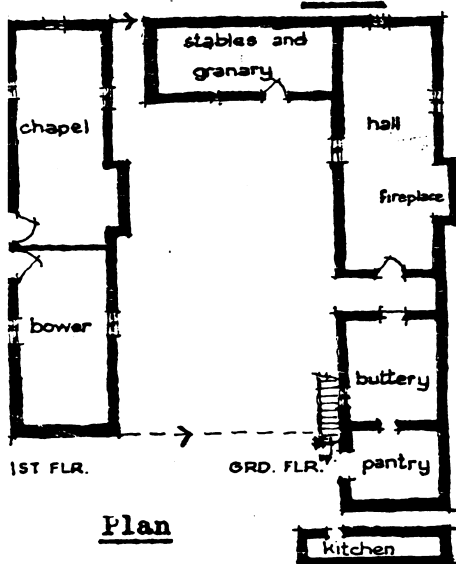
B.160

Serfs' dwellings
around a
Norman Castle.

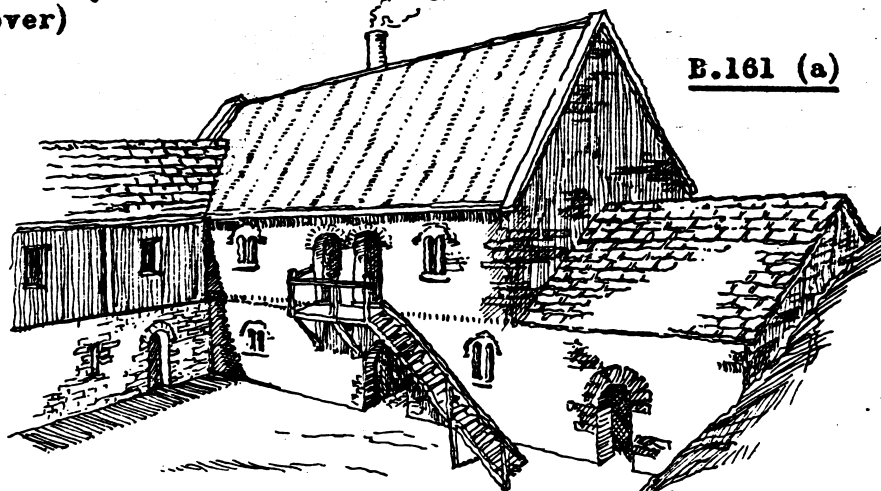


The life of the common people in Britain may be considered as a very slow upward evolution through the physiological and security Needs 1 and 2, with some rudimentary individual social Needs 3 satisfaction. (vide Chart I, back cover)

B.161



B.161 (a)

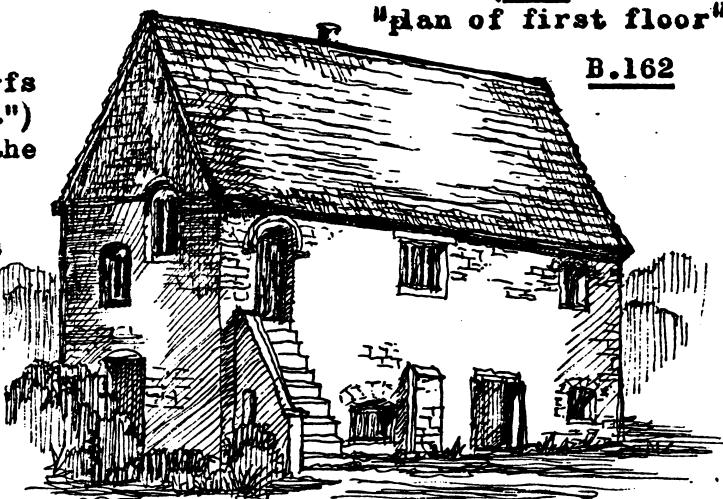


Reconstruction of a 12th Century Norman dwelling.

(23)

Socio-political and socio-economic needs, stimulated the co-operation of Saxon skills and Norman "know how" combining in the architecture of the transitional period and as exemplified in the residences of the slightly more affluent. These were becoming more reasonable micro-environments for developing adequate satisfactions of individual Social Needs 3. This is demonstrated in the advent of the upper floor or solar with a corresponding increase in social privacy requirements as instanced in the incorporation of a bower for the women (vide.B.161 "plan of first floor").

The Normans chose to be separated from the Saxon serfs (who were fed "below the salt") (23) in a large hall where the noble lord and family dined at a refectory table on a raised dais. This hall was either at first floor level, (as in B.162) or extending from ground floor to the roof of first floor level, (as in B.163).



Norman Hall Boothby Pagnell, Lincolnshire (23)



A Norman innovation, with an improving influence on the micro-environment of these relatively primitive dwellings, was the chimney hood (v.B.162(a) above) - heat without much smoke, small windows, thick walls all aided in modifying cold climate effects. Contrast this with Islamic environments (c.f. B.164, B.165, B.166, B.167).

In the ninth century, the Arab Empire in Egypt and Mesopotamia flourished while Europe was still in the throes of war and pillaging. The great Arab empire was far more civilized than Europe; literature, science and the arts thrived and "the mind of man could move without fear and superstition" (135). There was a vigorous intellectual life even in Spain and North Africa where the Saracenic political situation was deteriorating. "Aristotle was read and discussed by these Jews and Arabs, during these centuries of European darkness. They guarded the neglected seeds of science and philosophy" (*ibid*).

B.164

Garden Kiosk, (late 16th Century)
from a miniature in Metropolitan
Museum of Art. (288)

Pavilions and kiosks were sited to take advantage of breezes cooled by the water surrounding them - usually being located at the centre of the crossing of canals.

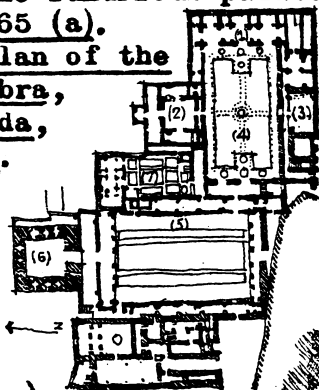
Islamic garden design, particularly in Persia, continued through to the 16th century. The Samanid Gardens of Timurid, (ie. Tamerlane c.15th century) were designed by architects from greater Iran, reflecting the Persian tradition and establishing the "prototypes which were followed... in all later centuries" (288). Sylvia Crowe (267) refers to the source of what she terms the "oasis garden" as being a "search for an earthly paradise serving both sides of man's dual nature". In this sense, she is inferring that all of Maslow's Needs 1-5 inclusive, are satisfied in the best examples of the "oasis gardens", (restricted however, to the elite).



The Dark Ages were a time of threat to all the basic needs, philosophic and artistic thought declined with particular exception of Spain which was occupied by the Moors, from the 8th to the 13th century. Moslem invasion of Europe brought alchemy (which lead to the sciences) mathematics, astronomy and philosophy. Examples of sensitive design and manipulation of micro-environments to provide aesthetic pleasure, are the Alcazars of Seville and Cordoba, and the Generalife and Alhambra of Granada. These buildings formed a link between the fortified castle and the luxurious palace. Arab art here reached its supreme degree of refinement - at a time when the power of Islam in Europe was waning.

B.165 (a).
Key Plan of the
Alhambra,
Granada,
Spain.

(230)

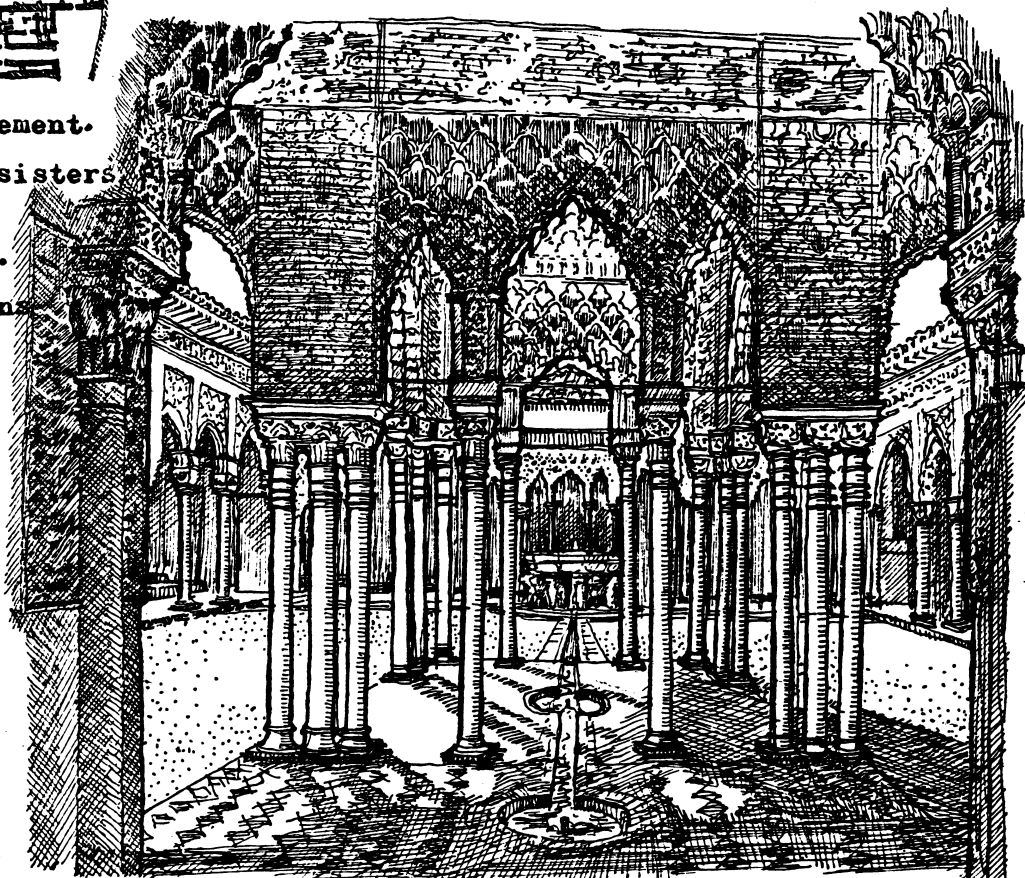


(above)

- 1) Hall of Judgement.
- 2) Hall of two sisters.
- 3) Hall of Abencerrages.
- 4) Court of Lions (B.165).
- 5) Court of Alberca.
- 6) Hall of Ambassadors.
- 7) Baths.

The Moors excelled in the skills of plumbing, and hydraulics, plastering stucco, ceramics, glass blowing, landscaping and horticulture - all exemplifying lower needs satisfactions and a potential for Needs 5 expressions at least for that society's "elite".

B.165



(236 & 277)

The Alhambra, Granada, Spain; Court of the Lions - (1309-1391)

(235)

Stone, stucco and wood, tiles, bricks, gravel and water - an atmosphere of elegant fantasy, cooling, soft sounds of trickling water with reflected light, should be imagined in conjunction with its "original furnishings of brightly coloured rugs and textiles, lamps and other adornments which created....a spectacle". Without doubt, ideal micro-environments for the elite to satisfy all their basic needs.

There are indications that in ancient times, Persia had a flourishing vegetation that gradually dried up, partly because of de-forestation and the loss of fertile soil by erosion. The Persian people responded to potential disaster with an ingenious and far-sighted solution that represented a classic tribute to human resourcefulness.

The climate, coupled with the ingeniously supplied water, the old Zoroastrian emphasis on heaven as a series of great gardens, (142) the Islamic conception of heaven as a garden, (together with the elements listed below) were the formative factors in the creation of such a refined form of micro-environment which is contemporary in concept: Essential elements: (used in micro-climate control)

a) The enclosing wall: The Persian climate being "wind-swept and often barren enjoying only... a few weeks of spring"...

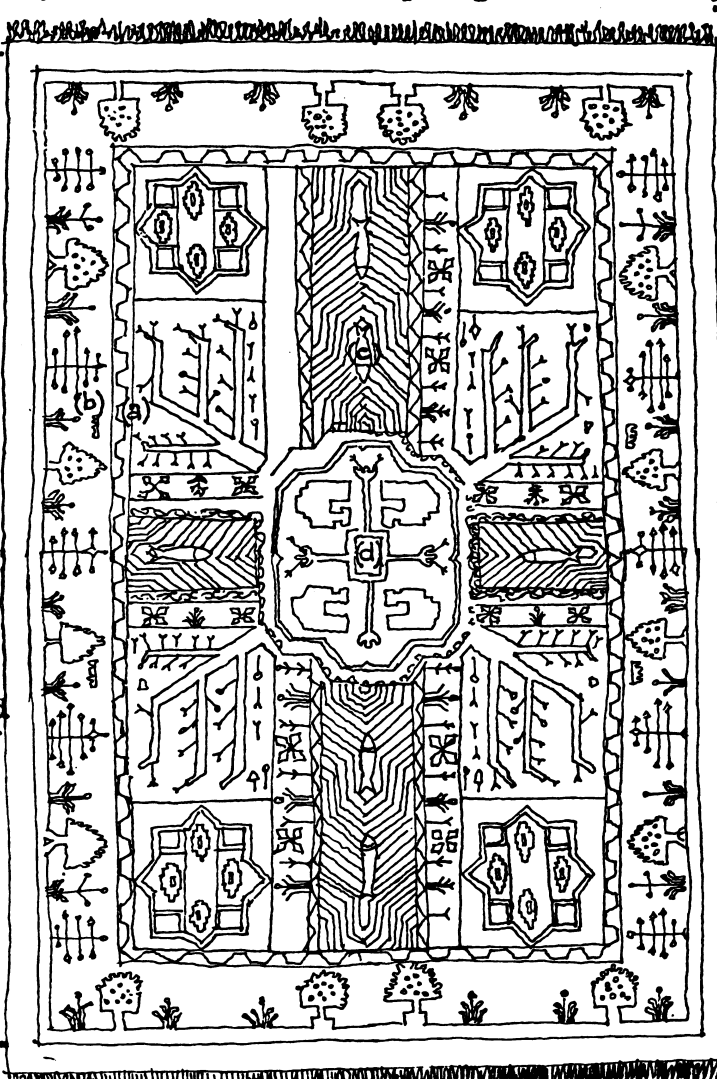
B.166

"before the bitter cold and afterwards heat almost unbearable" (142). together with the necessity of protection from attack in Pre-Sassanian times, coupled with the existence of the harem through the Babylonian, Assyrian, Persian and then the Saracenic periods, necessitated an enclosing wall.

b) Planting: Around the wall was planted an avenue of large trees derived from "the hunting forest" (267). Divisions of the enclosed space into four and eight part divisions, (connected with the religious significance of the divisions of the Koran).

c) Water: Supply was derived from qanats, pools or canals sometimes were stocked with fish and waterfowl.

d) Pavilions: Later kiosks were sometimes enclosed.



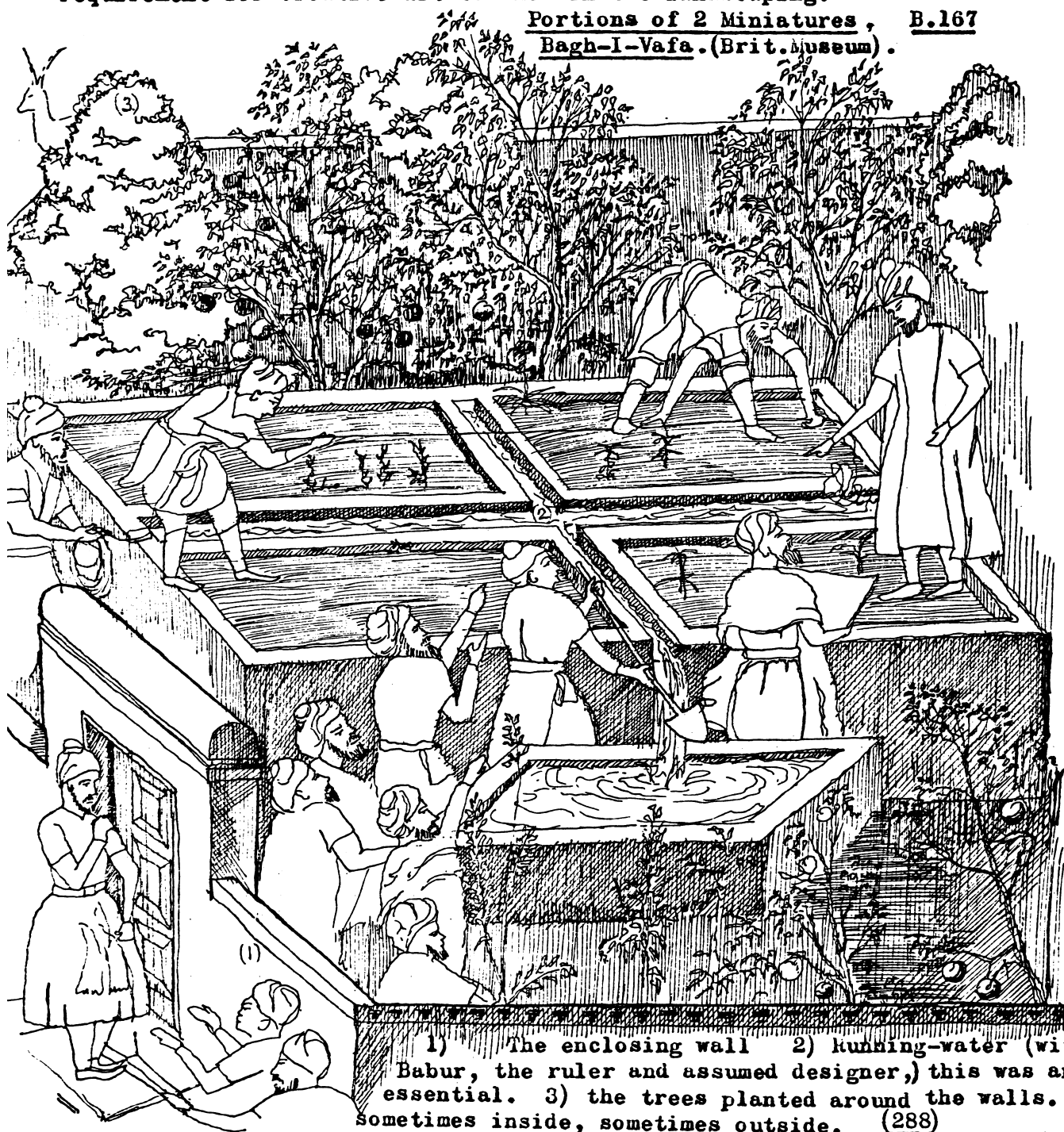
Quoting from the earliest extant account of a Persian carpet (223), "the ground represented a pleasure garden, with streams and paths, trees and beautiful spring flowers."

An example of a Persian Carpet,

-from which most of our knowledge of these earliest gardens is derived, (223).

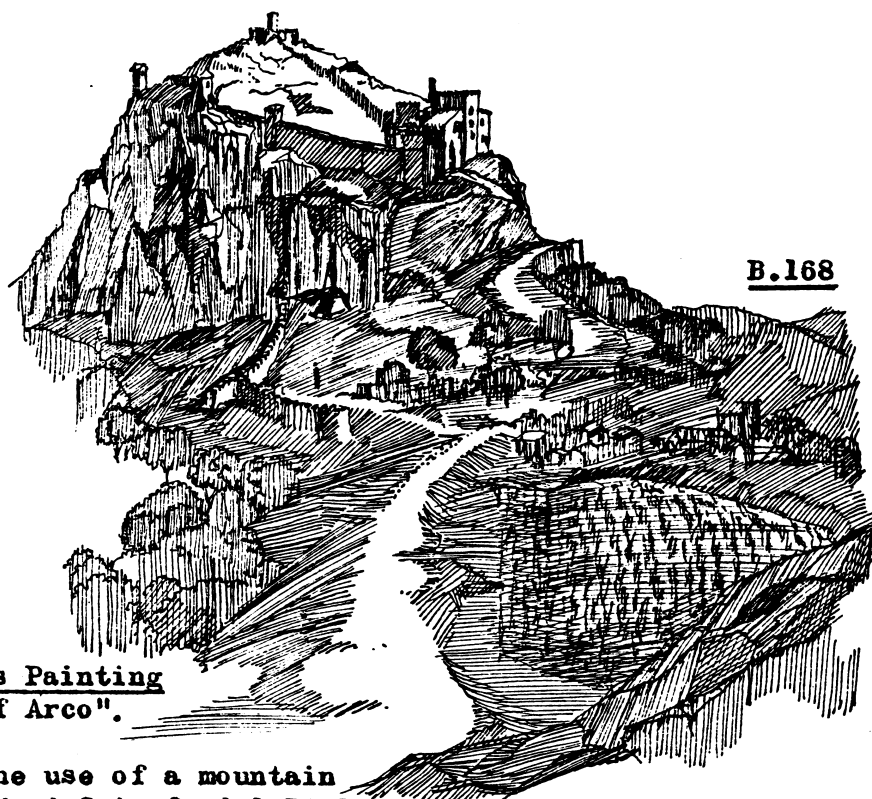
Persian competency in the creation of these superb micro-environments is summarised by Clavijs, a Spaniard, who visited "Samarqand as ambassador of the king of Castile and Leon in 1404,....the air was more fragrant than musk and the water sweeter than sugar as though it were a part of the gardens of paradise" (288). with the Saracenic invasion there followed years of peace (142) and here we have the necessary requirement for creative art to show in the landscaping.

Portions of 2 Miniatures, B.167
Bagh-I-Vafa. (Brit. Museum).



1) The enclosing wall 2) Running-water (with Babur, the ruler and assumed designer,) this was an essential. 3) the trees planted around the walls. sometimes inside, sometimes outside. (288)

In contrast to the freedom of landscape expression represented in the Saracenic culture, Europe was still retarded under a feudal system which was an expression of the need for security Needs 2. Within the restricted confinement of the protective walls, open space and gardens were the residual product of the necessity to keep buildings close together, so that the space became diminutive but carefully ordered. The protective wall eventually enclosed the whole community including the serfs' dwellings and farm areas upon which the castle's subsistence depended.



B.168

Sketch from Durer's Painting
of a town. "View of Arco".

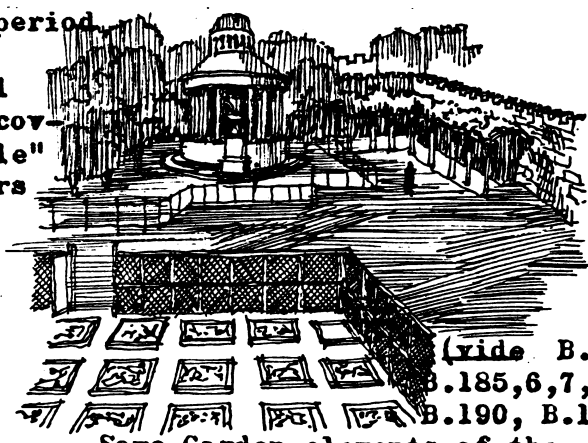
-as an example of the use of a mountain site for security Needs 2 in feudal Italy.
(Albert Durer 1471-1528). (286).

B.169

Climate control elements for the period

- 1) The enclosing wall
- 2) The arbor - this formed a real shelter from the open and was covered with "roses and honeysuckle" -the walk leading to these bowers was also covered. (223)

"A rose tree was often grown, so broad and thick, it can give it's shade to twelve knights together; wound round evenly and bent into a hoop, yet taller than a man; under the same thorny bush, there is golden mullein and lovely grass", (223).



Some Garden elements of the
Middle Ages.

(vide B.184,
B.185,6,7,8,9,
B.190, B.192-3.)

In a time of threat, the dominant need was for protection against sudden attack from invading tribes – the protection which is normally the business of government was not available and the small landowner had to seek protection; the institutions that developed were personal ones – an alliance between the weak and the strong, the former receiving protection and the latter services. The country was split into small units and a new system of government was evolving. In return for the use of the land ("fief") the man became the vassal of his lord.

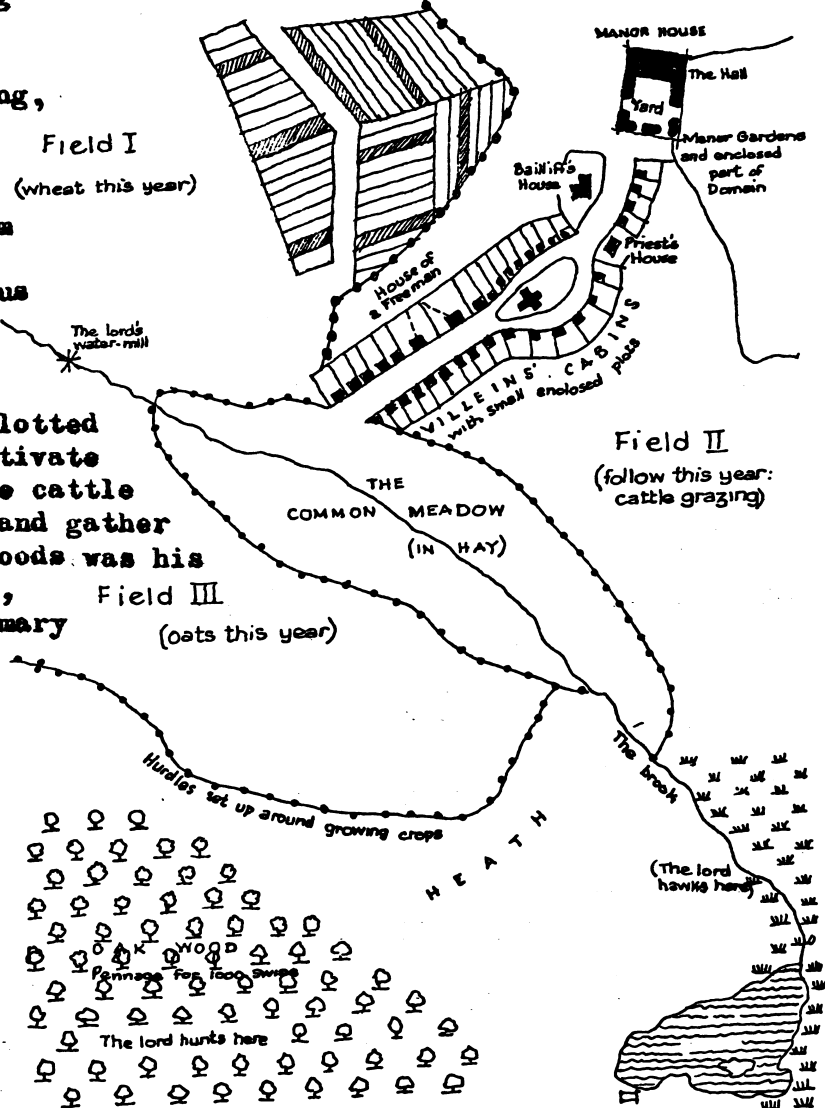
This "feudal" system covered all western Europe with a network of fiefs, rising in graded ranks from serf to knight and ultimately to the king, who held his kingdom from God. Feudalism proved to be the most effective system of government during this period of serious threats to security. Needs 2; the serf, in return for work had a cottage, an allotted strip of land to cultivate for himself; to graze cattle in the common field and gather fuel in his lord's woods was his right. With variations, the system was customary throughout western Europe and worked reasonably well.

Section of field showing stripes – all the three fields would be divided in this way. The dark stripes belong to one holding, as it is evidently a large one it may be the lord's domain.



Norman mound with ruins of unlicensed castle destroyed by order of Henry II.

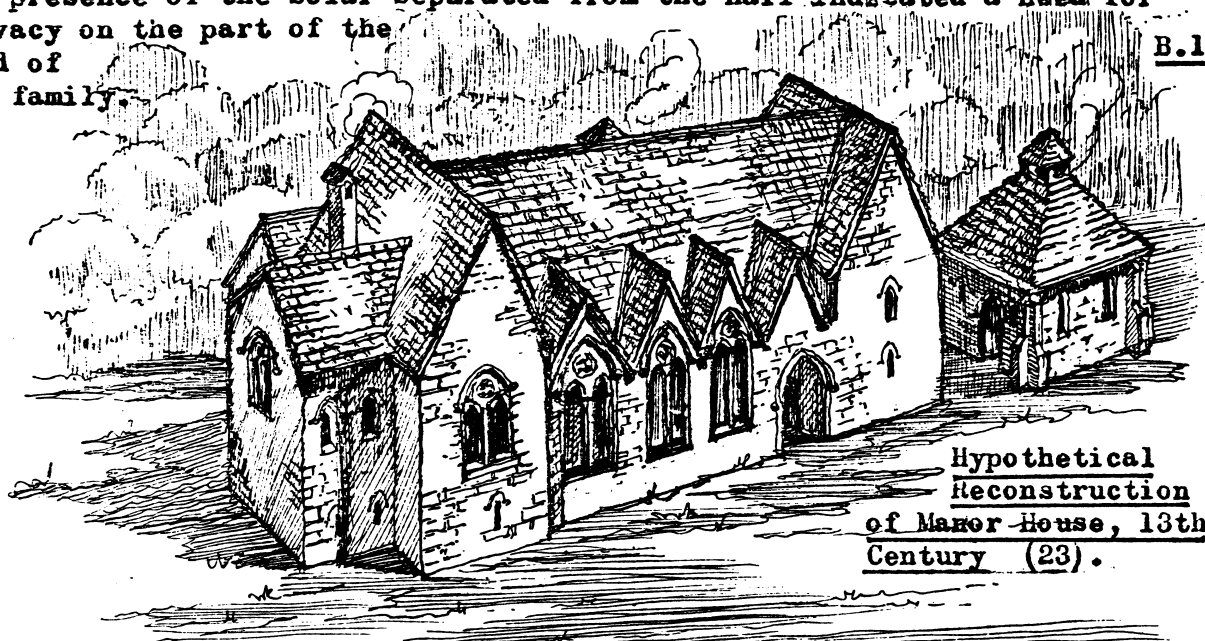
B.170



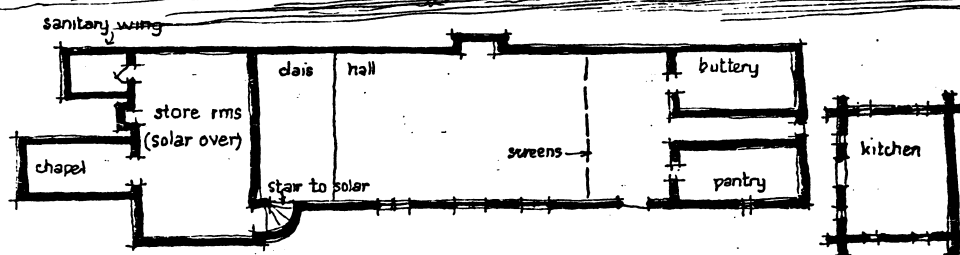
Hypothetical plan of a Norman Village
Showing the pattern of landscape prior
to the Enclosure Acts of the 16th century.

The first period of Gothic architecture was observed in the houses of the more prosperous people, except in the North and on the Welsh ~~marshes~~ where fortified manors were still required (watch towers, thick walls, slit windows). Needs 2 were more satisfactorily gratified and the presence of the solar separated from the hall indicated a need for privacy on the part of the head of the family.

B.171



Hypothetical
Reconstruction
of Manor House, 13th
Century (23).



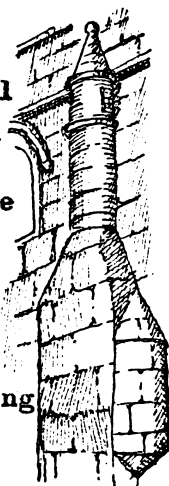
B.171(a)

Plan of Manor House (23).

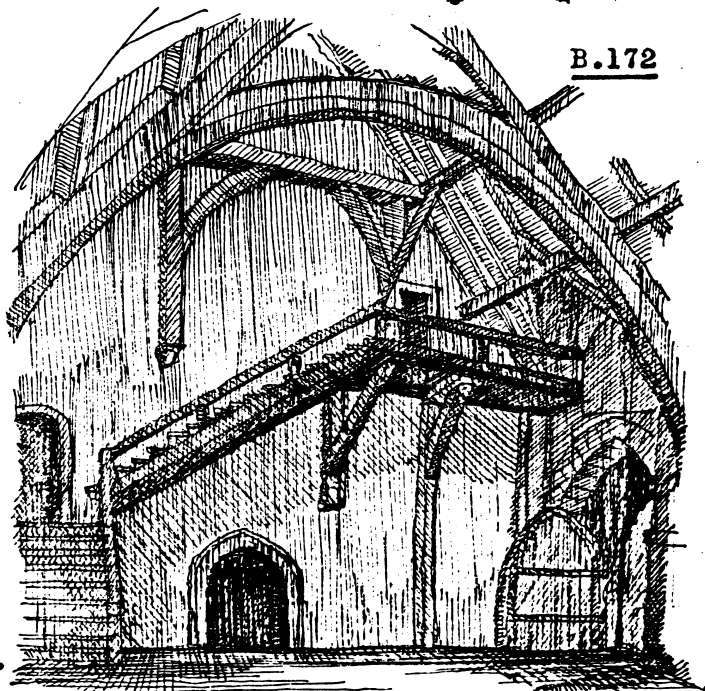
B.171 (b)

Chimney detail
c.1280

This is a buttressed flue which more conservative builders used although tall chimneys were introduced during the previous century.



Medieval Hall, Stokesay, Shrops.
c.1240 (23)

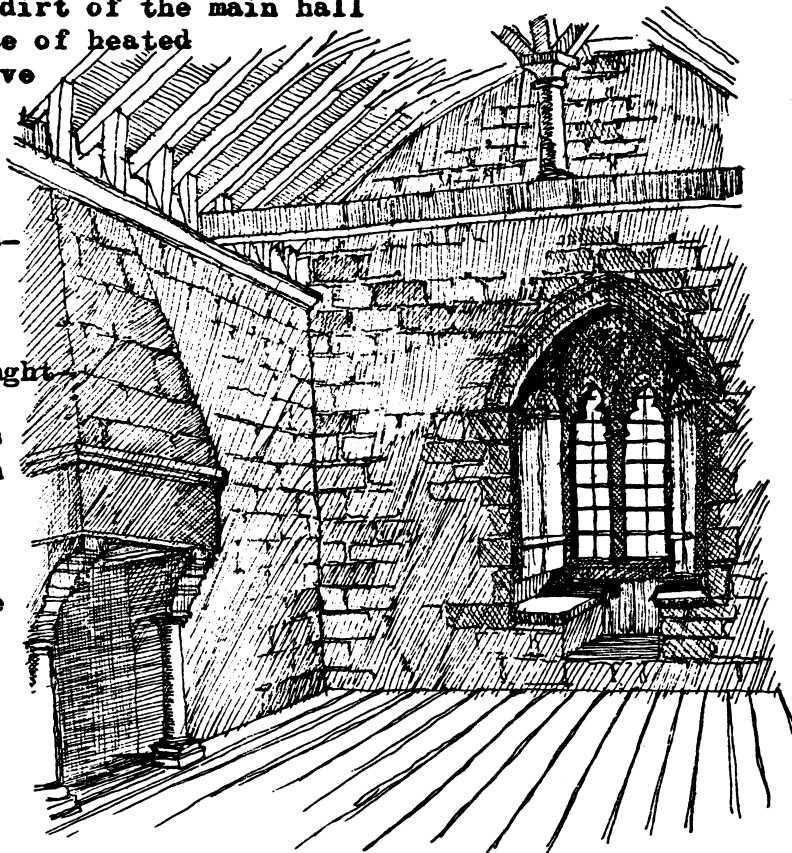


B.172

The solar was also called the withdrawing room (hence "drawing room"). Improvements in living conditions were still confined to the elite or at least to the more wealthy of the masses. Some indication of refinement to social Needs 3 are shown in the use of this withdrawing room, where it was possible to retreat B.173 from the noise and dirt of the main hall

into a micro-climate of heated air without excessive smoke. Thick walls, once heated would withstand cold and small windows limited heat transference.

Tapestries were hung on the walls and woven rugs brought from the East by returning Crusaders were usually strewn on the floor - the beginnings of an aesthetic appreciation of the value of a pleasant environment from which Needs 4 & 5 would evolve (for the elite).



Solar or withdrawing Room c.1290 (23).

Iron bars and wooden shutters protected the windows and held the heat in, panes of glass not being in general use, (although used in churches and noble's castles,) "apparently a medieval householder could not have both light and warmth in cold weather" - (23) (c.f. B.207).

Apart from the absence of glass, the environments of the main mass of people varied little from this period to the 20th century; changes that have subsequently occurred would have modified the insulating effects of the building elements of this period in only a minor degree. The major changes that have brought improvement to the micro-climates that man has inhabited to the present day have been restricted to methods of heating, mainly relevant to the colder climates. It is only in the last decade, that air conditioning and mechanical ventilation together with refinements in building systems have brought a new standard of "improvement" but therein lies a completely new subject related to the removal of environmental stimuli from the organism with what now appears to be the introduction of new threats to physiological health and overtones of threats to mental health.

The Medieval system had become thoroughly established, trade and industry were intensified, finance, law and education were reformed and the characteristic life of the English was regenerated by the influence of Norman ideas. National liberties had been established and an imperial parliament had been founded by de Montfort, 1208.

In consequence, a real English nation had been produced with its own institutions, laws and languages, strong enough to hold its place in the world and enterprising enough to grasp opportunities to expand.

B.174

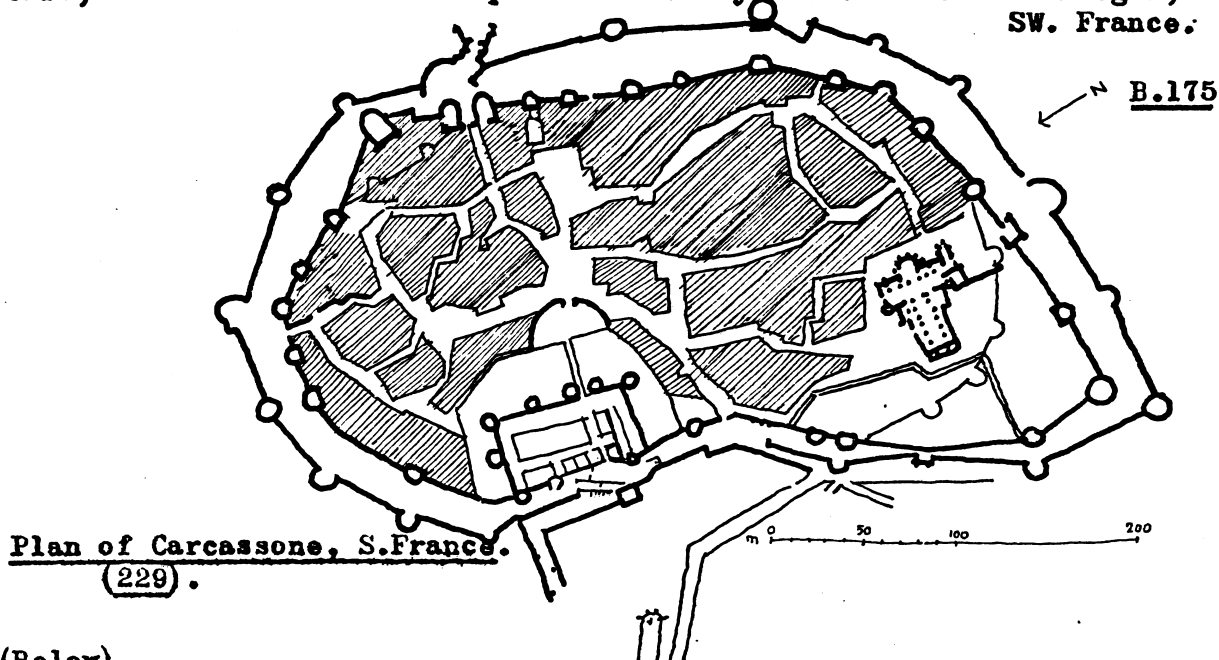


The Manor remained the centre of Medieval life. This Medieval print shows the life of the Manorial village crammed into one artist's work. (185).

A completely organised social unit, with comparative satisfaction of Needs 1, 2 and 3 and a potential of Needs 4 for the elite. Generally, a search for stability resulted in a development of all the social needs in rudimentary form.

During the 11th and 12th centuries, the guilds developed, a new "elite" of craftsmen who began a gradual improvement in the status of the masses and consequently in the degree of individual self-esteem (Needs 4) fulfilment.

Carcassonne, a typical hill-top town of the Middle Ages - in a strategic position and surrounded by an elaborate system of defensive walls. The informal, intimate layout express a pattern primarily intended for pedestrians and conveys a sense of social unity, "intimately pleasing" (229) to the inhabitants. In contrast with this, Edward I in 1298 used planners to lay out towns like Monsegur, SW. France.

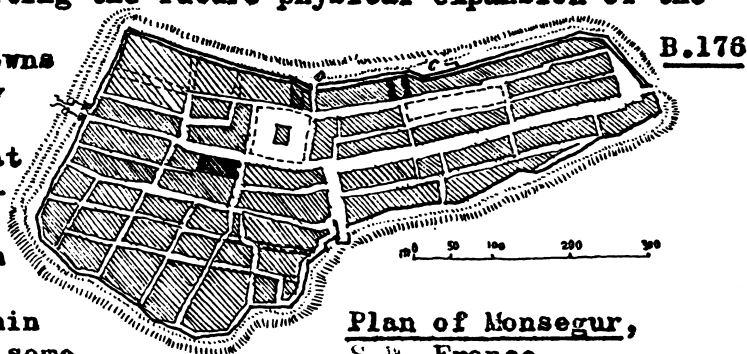


Plan of Carcassonne, S. France.
(229).

(Below)

The comparatively regular layout was the result of prior planning of Monsegur. Medieval towns had adequate open space for private houses and public use (it was only later that congestion and sanitation became a problem.) This was because the advent of gunpowder created a need for stronger walls and a surrounding area of open space for firing at attackers, inhibiting the future physical expansion of the area of the town.

Aesthetically, these towns were more pleasing than any subsequent environment; consequently it appears that the improvement in individual Needs 4 fulfilment for the "masses", together with a limited degree of socio-economic satisfaction, within these limited areas, gave some individuals a definite impetus in the progress of needs fulfilment for the common people.



Plan of Monsegur,
S.W. France.

(c.1298) (229)

In the latter part of the Middle Ages, the decay of feudalism saw the rise of the more law abiding middle classes. Towns and cities grew in importance, industry was extended, trade and commerce were increased and the law was strengthened. With gunpowder, came revolutionised warfare and the elimination of the need for an open space around the walls.

Developing social needs satisfactions, a new aristocracy in the accumulation of wealth by the middle classes, and the consequent improvement of satisfaction of Needs 1,2, 3 & 4, for this newly risen group which divided up to form a new socially identifiable class.

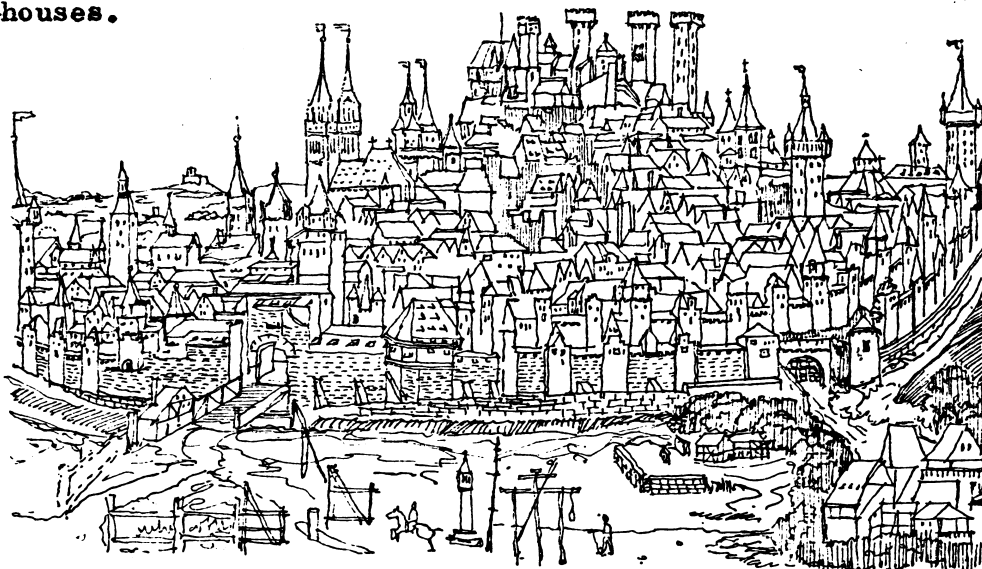


B.177

A walled town from a 1493
German print (273).

The environments of the new merchant middle class echoed those of the nobles - walled gardens complete with the medieval landscape embellishments, were re-produced within the limited confines of town-houses.

B.178



15th century Nuremberg (242).

In the countryside, the welfare of the peasantry and farming communities was far from the equivalent of the Needs satisfaction achieved in the cities. By the 13th and 14th centuries, farming had improved and the villeins or serfs bound to their lords under the feudal system had become freer because it had become customary to pay rent in lieu of labour and produce. In England, with the increase of sheep farming, which needed fewer labourers than agriculture, a villein might purchase his freedom and travel about, hiring himself to farmers. Manor farms were self supporting, this was reasonable for enterprising and active people and those who were not able to lead this type of life fell into dire poverty and misery when they were dispossessed of their small plots of land. The poorest farm labourers still lived in squalor, no better than their Saxon antecedents. The life of the craftsman was better provided with satisfactions of physiological needs in addition to which the other Needs 2 and 3 were

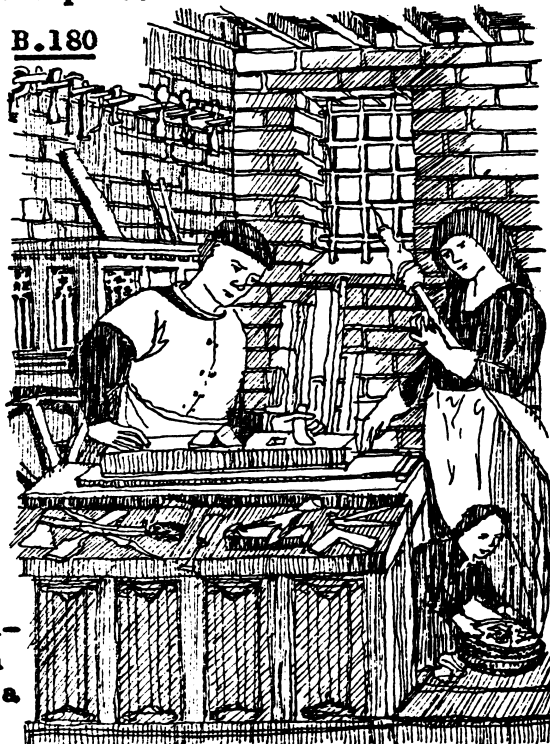
reasonably satisfied and the self esteem of the individual craftsman was given a considerable degree of development through work skill satisfaction and in combination with Needs 3, Needs 4 was expressed through guild membership. This was a thread of individual self esteem development which had begun with the elite providing the architectural skills for temples of the past.

B.179



"The Cottager" 1500 (251)

From the services of the elite in temple building, skilled craftsmanship became the lot of the common man during the Gothic period, giving him a new dignity when combined with the principal of individual worth taught by Christianity, the seeds were sown for a re-birth of the human spirit.



B.180

"The Craftsman" c.1500 (251)

As a result of the merchant class acquiring physical comforts in their town houses, it is probable that the nobles would also have felt impelled to improve their status (Needs 4); whereas until this time emphasis had been upon mobility of the nobility, the nobles' family travelling around the countryside from one castle to another. B.181



Within the walled garden of a Town House. (242)

B.182

The new interest in domestic comfort, included a desire to improve the amenities of surrounding lands. Books on estate management were carefully copied out by hand advising not only on the principles of husbandry but also on the best ways to lay out gardens and pleasure grounds. The extent to which peasantry and the lower classes felt more secure is illustrated by many paintings and miniatures indicating villagers enjoying the rural countryside and working for the manor.

(vide B.183)



"The Noble: c1500". (251)

In times of peace, the areas around the castle were occupied for agriculture and even for other buildings but during times of security needs threat, these "humble dwellings" (242) were liable to be destroyed particularly in areas around city walls.

The open fields were never far away, townsmen rich or poor, could take their sport and a sense of peace and recreation and the quiet satisfaction of agricultural work is conveyed in this sketch taken from a painting in the British Museum depicting peasants working beyond the protection of the walls.

B.183

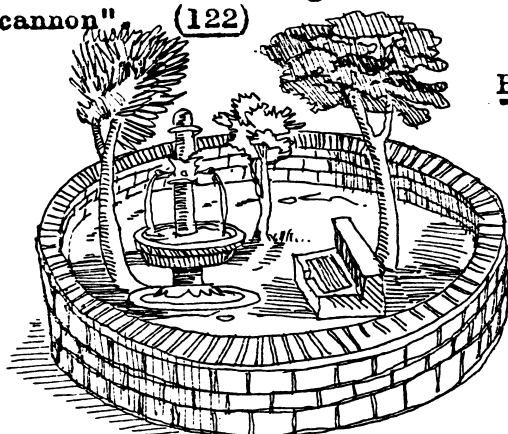


C.15th Flemish Miniature showing villagers gathering harvest (286) .

-security Needs 2, obviously catered for by the protective feudal structure of society.

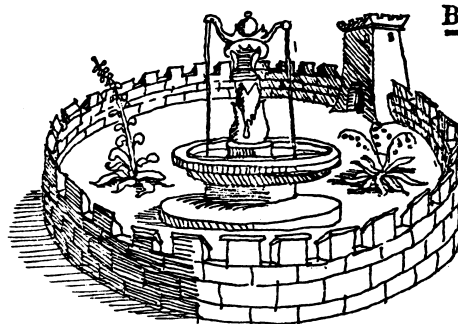
In the walled environment of the Medieval garden, many elements were used for landscaping purposes. These should all be seen in the social context of a need for expression of a very elementary form of self-actualisation of the middle and upper classes. The presence of the wall was also a reflection of the innate sense of insecurity present within the "social character". As yet there was no liberation of thought or feeling from a thousand years of threat and insularity. Micro-environments created within these walls contained the following elements.

- 1) the enclosing wall (masonry, wattle fencing or picket fencing,).
- 2) the arbor (B.186) - covered "with roses and honeysuckle" - "the walk leading to the bower was also covered" (v.B.169) (223).
- 3) Summerhouse (vide B.169).
- 4) Pergolas "To enjoy the garden, one traversed these green tunnels and peeped out upon the open squares between them... such views resembling the views down the barrel of a cannon", (122)
- 5) Fountains (vide B.188-9,90).



B.184

Medieval Gardens often took this circular form (142).



B.185

An early Medieval walled garden (142).



B.186

A Garden Bathing scene of the early 15th century. (142)



B.187

A garden Gate and Fence of 1495 (142).

Continuing the elements used to create micro-climates in the Middle Ages, 6) Ornamental trees and orchards - also called a pleasure contained clipped fruit trees with central fountains, bathing pools or tubs (vide B.186), fountains were designed in different forms with mostly Saracenic influence (although sometimes were fantastic shapes). It is interesting to note that fountains were used to rid the body of "ill-humours" and this has a very interesting relevance to the recently discovered relationship of positive and negative ions to the health of the body, the presence of running water being conducive to the transfer of positive ions, with consequent improvement in body "tone".

B.188

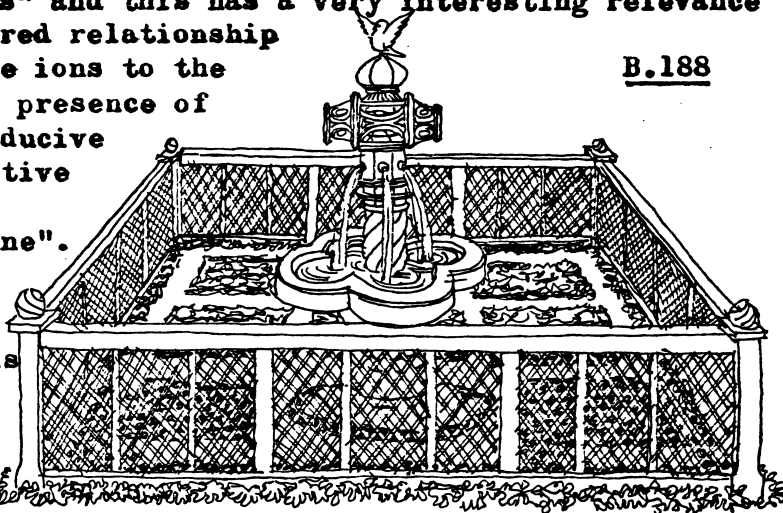
7) Artificial Mounds -

"Many medieval gardens boasted artificial mounds the better to see over the surrounding wall. Both free standing mounds and half cones"

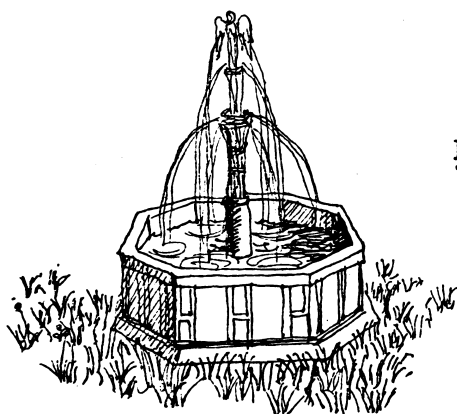
(281).

8) Small mazes and labyrinths.

9) Knot gardens - forerunners of the parterre of the Renaissance.



In castles where space was limited, the garden was often restricted to a little railed area of beds and a fountain (142).

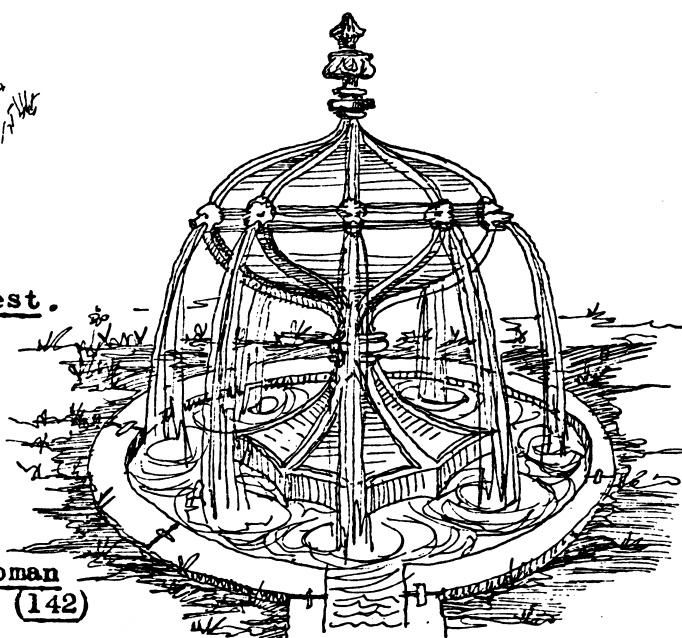


B.189

B.190

In medieval times, the fountain was the centre of garden interest.

(142)



Fountain from the Roman de la Rose of 1470. (142)

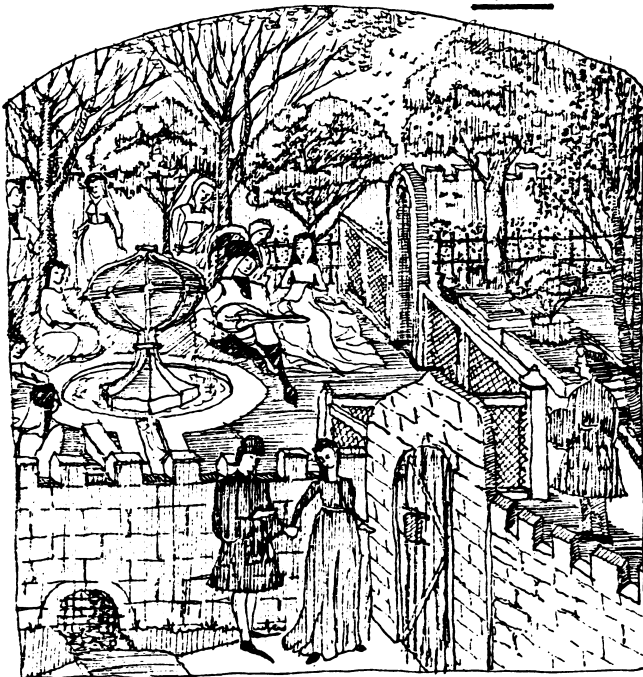
In summary of the medieval period and its transition, the Renaissance, examples are given from art of various periods. Within two centuries (13th-15th centuries), art moved from abstraction to realism and then to materialism. Commencing at a time prior to the spread of the ideas of men like St. Bernard and St. Francis (*vide* B.153(b)), and passing through the 14th century's tentative exploration of emotion to the 15th century's realism and intimacy.



B.191
French Couple conversing. (277).
V. de Honnecourt,
Here they seemed to be engrossed
in reasoning.



B.192
15th Century - German Upper Rhine
engraving. Lovers becoming more
intimate. (277).



B.193
"Lover brought to the Garden of Delight
by Idleness" - The Roman de la Rose. (277).

B.194
Lovers exchanging
sly caresses.



"The Springtime of Life"
Figures from Lyons Cathedral
France. (277).

Increasing realism in the portrayal of pregnant women. The above examples exemplify the transition into the Renaissance with the advent of a new sense of individual uniqueness and worth - the spirit of a new Humanism.

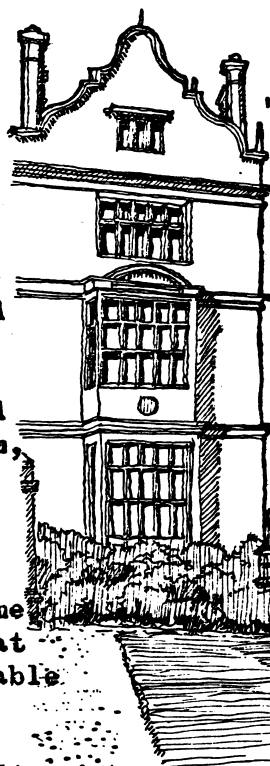
To look for the beginnings of change which culminated in the Renaissance, it is necessary to take into account such factors as the completely new impact which the teachings of Jesus made on society by emphasising the value of the individual, the introduction of paper from China through Saracenic invasions including those that entered Spain, the re-invasion of Spain by the Christian church and its appropriation of the paper-making processes, the life of Roger Bacon who vehemently attacked ignorance and his writings were "like a flash of light in a profound darkness" (135).

He demanded that mankind should "cease to be ruled by dogmas and authorities, look at the world!" He denounced "respect for authority, custom, the sense of the ignorant proud and the vain, proud unteachableness of our dispositions". He contended that if mankind could overcome these, then he prophesied that by experiment, man would be able to use machines, sail in the oceans, move in cars without animals and fly in the air. It was three more centuries before man attempted to explore "these hidden stores of power" (135).

The Saracenic world also gave Christendom its philosophers and alchemists and with printing which followed naturally in the 14th Century "the intellectual life of the world entered upon a new and far more vigorous phase....it became a broad flood in which thousands and presently scores and hundreds of thousands of minds participated" (ibid).

The Mongol conquest also stimulated the geographical imagination of Europe. They had an immense curiosity and desire for learning but were more than anything transmitters of knowledge and the publications of Marco Polo's travels were also instrumental in producing a profound effect on the European imagination.

The printed paper books brought a new realisation of the world beyond the walls of Medieval Europe and caused a "sudden irrigation of the general mind".



B.195
Exemplifying the
"lowering of the walls of the
mind".

Montacute, Somerset, Britain.

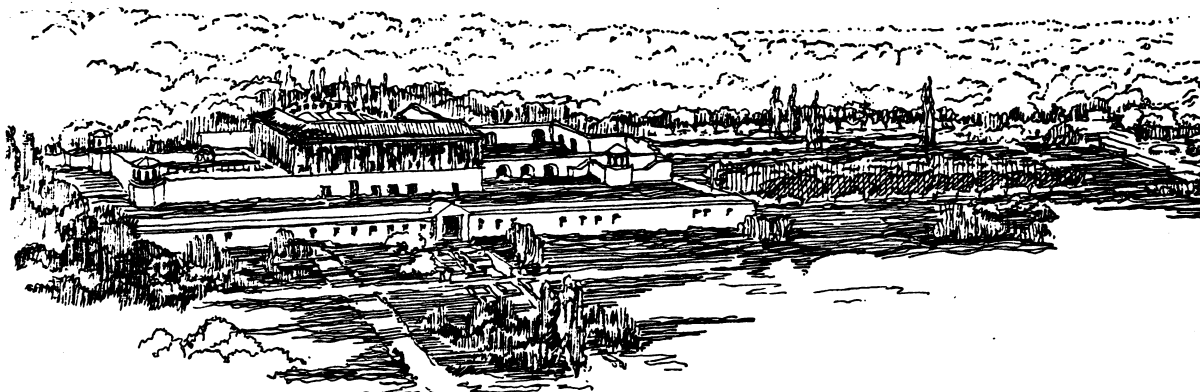
Defensive battlements no longer needed, are transmuted into decorative balustrades and gazebos.

The first change, the natural result of internal peace, was one of expansion and a loosening up of the defensive wall.

"While previously all that men asked of their gardens was peace from a warring world....they now had energy to spare and exercised it in creation" (267) - a potential to realise Needs 5, after a thousand years of threat to security Needs 2.

Landscape as an art became a means of expression of the rebirth of the spirit of inquiry and individual uniqueness - Needs 5 satisfaction at its best. The spirit of the Renaissance was of an increasing sense of individual worth and this released the creative spirit in the designers and architects, patronised by the Papacy and wealthy families. The "lowering of the walls" of the mind was symbolised in a removal of all spatially restricting forms, except where contrast was sought between a small enclosure and a grand vista.

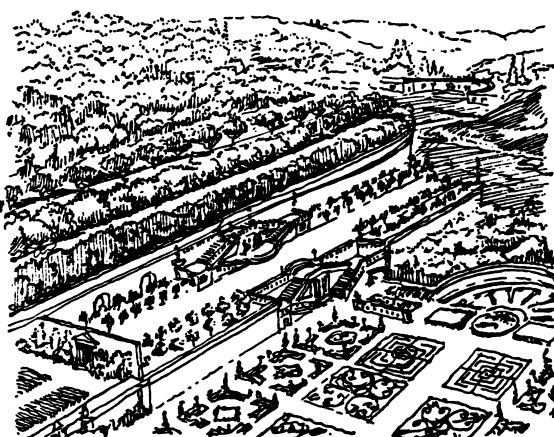
B.196



Villa Madama, Rome (1516-1520) - on the slopes of Monte Maria
 Raphael, Antonio da Sangallo, Giovanni da Udine, Giulio Romano.
"spaces wholly enclosed by buildings in this early phase of the Renaissance....reconstructions...if correct...show that, in its original intention, the house and garden were one interlocking conception as never before. House and garden ran together, forming so closely integrated a whole, that it could scarcely be said where the house ended and the garden began" (279).

Inspiration for the genius of Italian Renaissance gardens was taken from Greece in Roman times and then developed into the terraces of the Renaissance gardens which virtually became a series of open air rooms with the enclosing forest darkness as walls.

The Italian garden is essentially sculptural, towering cypresses, high hedges, terrace walls and steps, ornate fountains, dramatic verticals, deep shadow and later, grottoes, nymphaeums, - alleexpressions of a hot, sunny climate and a steep terrain.

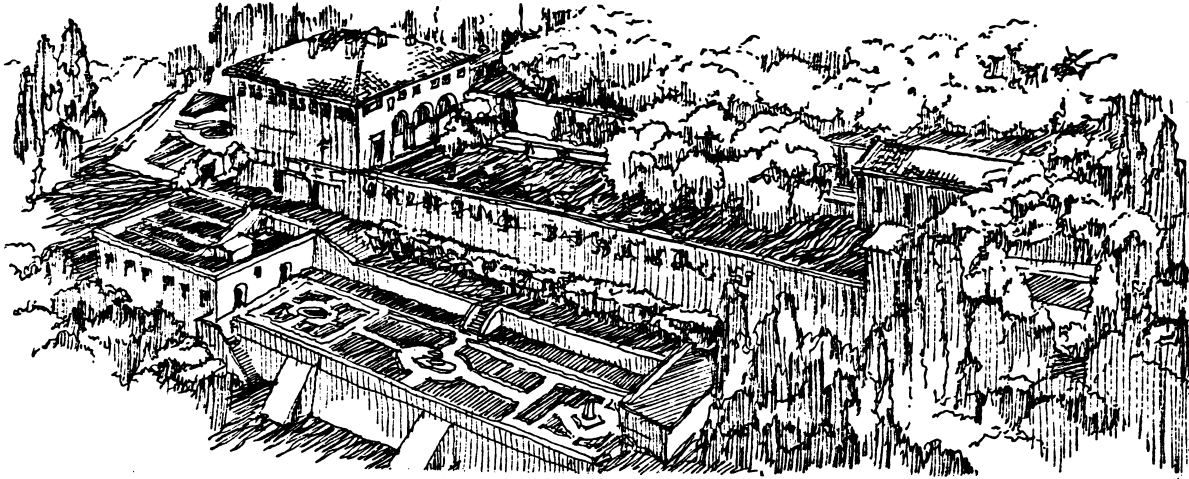


B.197

Reconstruction of part of Terracing
 (142).

Another example of the Early Period (1450-1530) of the Italian Renaissance:

B.198

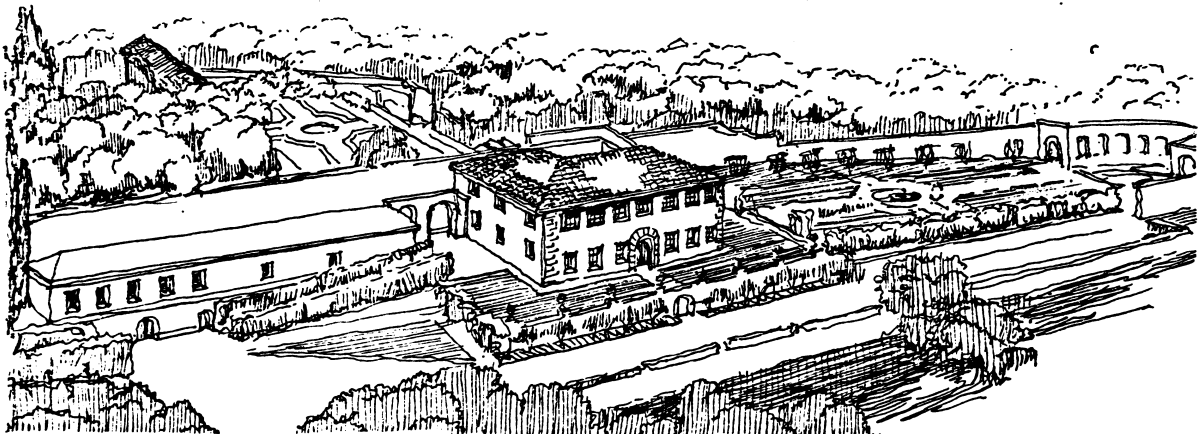


Villa Medici, Fiesole (1548-1561, Michelozzo Michelozzi)

"There is probably as much dignity of learning expressed in the long simple lines of the terraces cut out of the hill below Fiesole, as there ever was in all the cultivated arguments....within....marks the dawn of the Renaissance and in which the newly born love of art and freedom were fostered and spread abroad" (280).

An Example of the Middle Period (1530-1620) of the Renaissance:

B.199

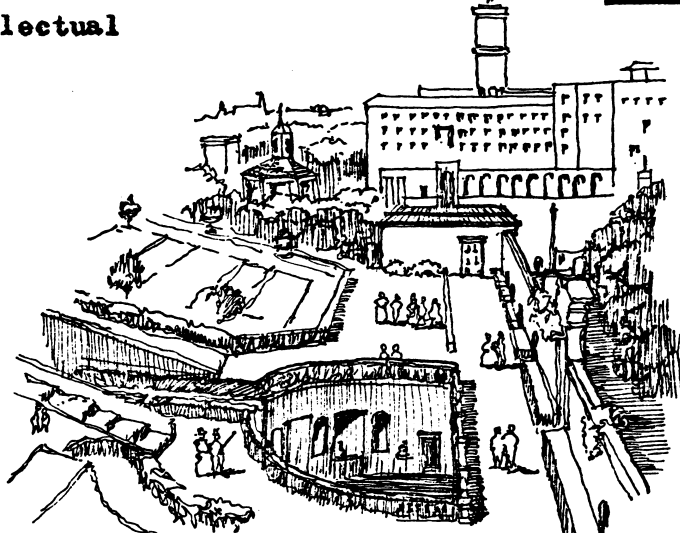


Villa Gamberaia (c.1610, Settignano) - Overlooking Florence. (280).

"In the second half of the 16th century, the triumph of Mannerism was absolute" (287). It found expression in a tremendous motivation of families like the Medici for fulfilling their dreams of self-aggrandisement (the "elite's" expression of Needs 4), through sumptuous decoration of palaces, in landscape gardening and new churches.

Another example of the Middle Period of the Italian Renaissance—the Farnese Gardens, Rome, conceived by Vignola "just to stroll about in" (280) are significant in that the "elite" (in the person of Pope Paul III) motivated by no other obvious reasons than basic Need 5, allowed the masses to use this beautiful environment. B.200

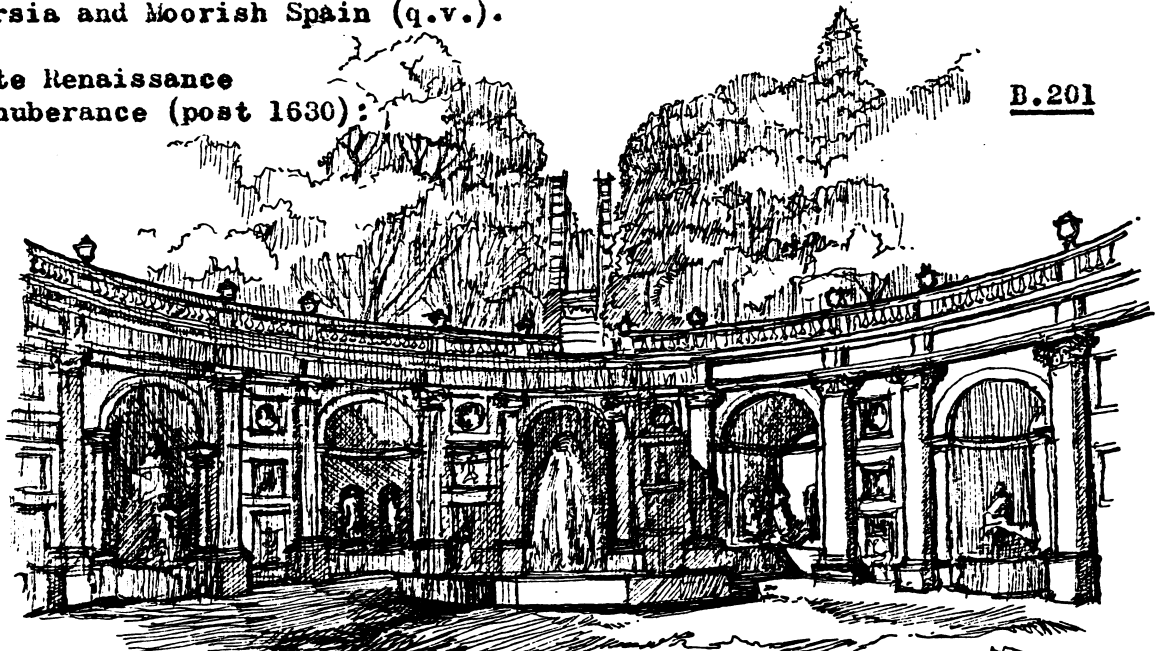
In his grandiose and intellectual approach in matters of design, man still seemed to need links with his simple past as in the form of the "cave-grotto" and this was the one remaining element that persisted. In the grotto and nymphaeum, there seems to have been more than just a link with the Graeco-Roman Art and the search for a suitable micro-environment for relief from the Italian sun. It was a place where refreshment of the spirit could be achieved (mainly by the elite) reminiscent of Persia and Moorish Spain (q.v.).



The Farnese Gardens, Rome, 1506. (280).

Late Renaissance
exuberance (post 1630):

B.201

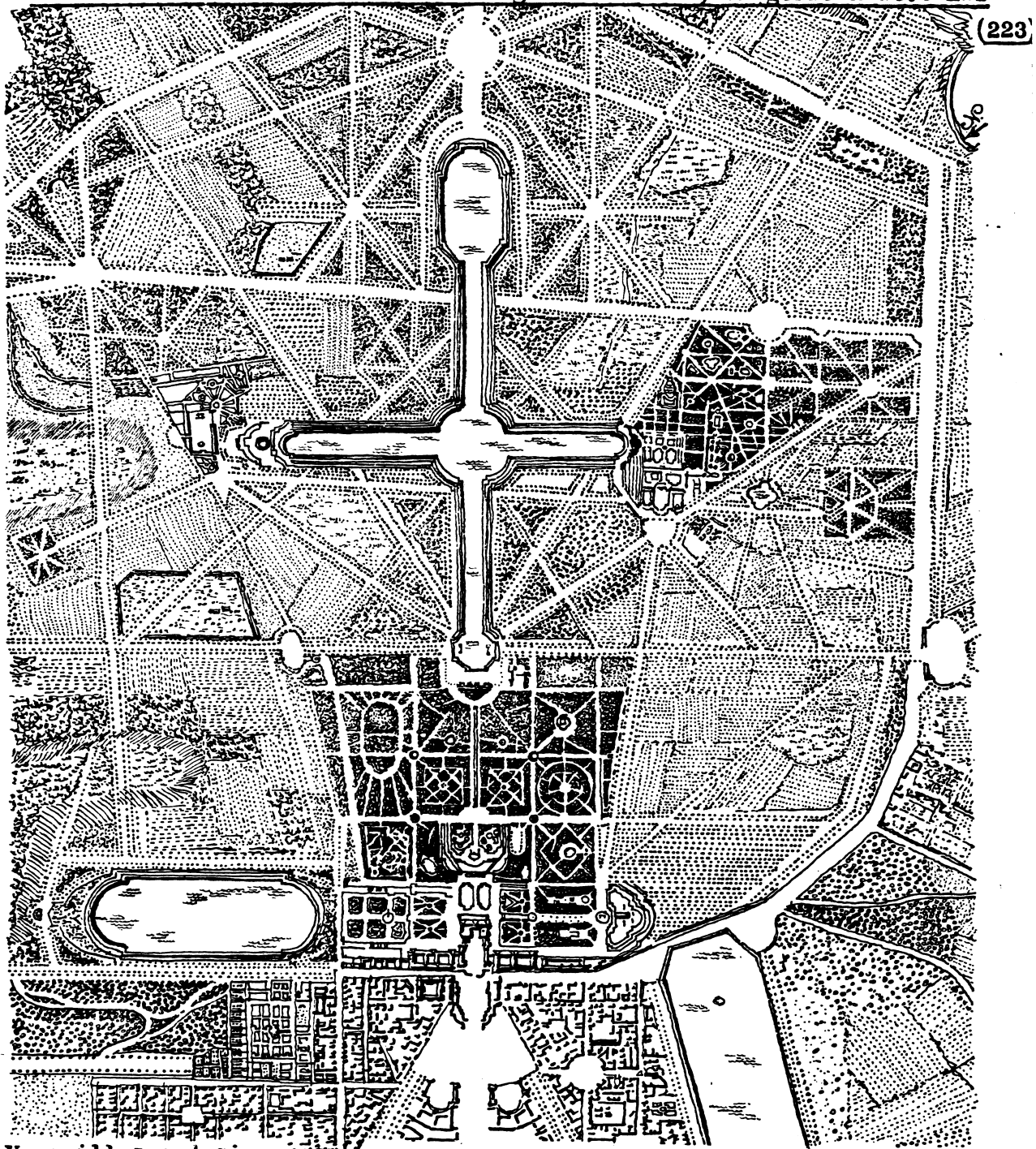


Villa Aldobrandini, Frascati: "a division wall which seems to support the hill, shows a row of pillars and niches and between them, grotto-rooms which are full of the familiar water devices" (280).

"In looking out upon the world from the steep slopes" (281), the Italian Renaissance gardens exemplified the new freedom of intellect and spirit of the elite, which however, the common man was not to enjoy for centuries to come.

"The new gardens of the French tradition were both too big and too rigid to be comfortable to live in. They were rather places for the exercise of the intellect over the forces of nature...."(267). B.202

Versailles - General Plan including the Trianon, Menagerie & Gt. Canal



Versailles and similar examples of French Renaissance over-exuberance were self-aggrandisement of Louis XIV and the elite of France. "Le Roi Soleil depended upon the French common people for the resources to construct such vast schemes. Such profligacy precipitated revolt in the spirit of the people. Deprived physiological needs contrasted with indulgent excesses of elite, culminating finally in the French revolution 100 years later.

English Renaissance - With some degree of peace brought by Henry II the garden emerged from the enclosing wall and was enclosed by fences of thorn or wattle, and in towns, the first town gardens appeared. With the Wars of the Roses, the Security Needs were threatened and progress towards open landscaping was halted. With peace, the next change which occurred was the "loosening of the defensive wall" (242). Italian tradesmen came from abroad and greater wealth was more common.

With the Restoration of Charles II, the French influence came to Britain - the best results being achieved when the Italian and French traditions were not directly copied.

In John Evelyn's diary (1640 -1706), he mentions an aristocracy interested in "new and curious things....resembling the French in knowing no bounds to the human intellect..."

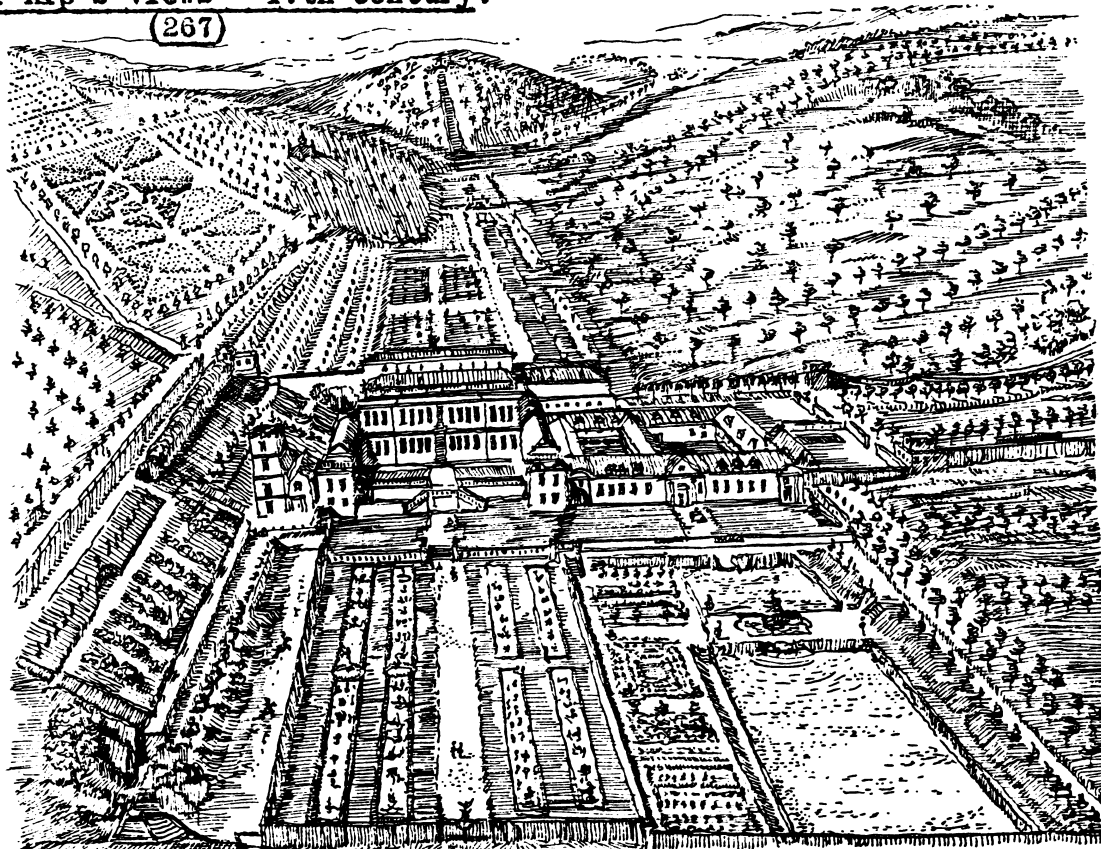
"English men saw no reason to doubt that they could create a better landscape, than nature's original. Doubt came later.

For the moment, man was in the full flush of creation..." (267). The Englishmen too, succumbed to the grand delusions of the self-aggrandisement needs although the Tudors also introduced a period of refinement in architecture and landscape (vide B.195).

B.203

One of Kip's Views - 17th century.

(267)

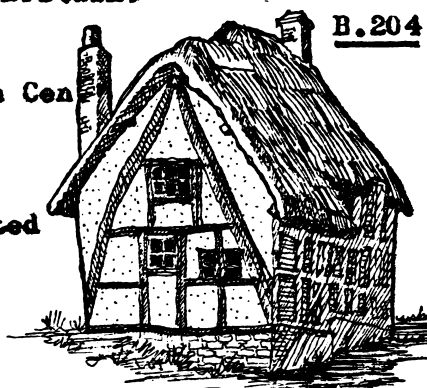


The undulating British countryside with its open agriculture was not suitable for the French patterns, as they distorted when not used on flat terrain.

Centuries elapsed before even some of the common people were able to rise out of the most primitive living conditions and lower levels of needs satisfactions. Below are some typical dwellings of the common people in Britain.

Cruck House, 16th Cen
Gloucestershire

The cruck house tradition persisted after more than 600 years. (23).

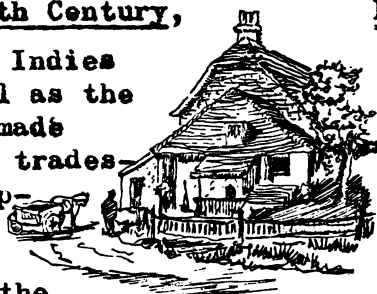


B.204

(Illustration B.205 shows a more durable type that has persisted to the present.)

Farmhouse, 17th Century,

East and West Indies trade, as well as the slave trade, made merchants and tradesmen more prosperous - some of this passed on to the people of the countryside. (283)



B.206

B.207
Small paned windows are a sign of some prosperity - the stable door was a method of letting in light without letting in the farm animals.

HOWEVER, THE COMMON MAN'S DEVELOPMENT OF NEEDS SATISFACTIONS WAS A HISTORY OF DEPRIVATION AND A TEDIOUS ENDURANCE OF POVERTY...

A CONDITION WHICH A LARGE PERCENTAGE OF HUMANITY IS STILL ENDURING TO THE PRESENT DAY.

Devon

B.205

*Cob and thatch cottages, "owing to the extremes of wealth and poverty created by the wool trade in Tudor times, the poorest country folk still lived in flimsy primitive hovels" (23).
17th Century.



* cob =
mixture clay, gravel & straw.



17th Century Farmhouse. (283).

APPENDIX C.

DEFINITIONS &/OR MEANINGS OF SOME TERMS USED.

- 1) **MACROCLIMATE:** .."instruments are at a height of about 2 m. above the level of the ground....at the meteorology station.... the climate thus measured is that experienced by a man walking upright, or human climate, as it is sometimes termed. Values measured at stations 20, 50....kilometres apart characterise the....large-scale climate or macroclimate. This is the kind of climate described in meteorological year books....in works on the science of climatology and in climatological atlases." (p.1 "The Climate Near the Ground," (1).)
- (2) **MICROCLIMATE:** .."the conditions of climate to which young growing plants are exposed cannot be deduced directly from the figures for climate published for the network of official stations....All the meteorological elements are subject to vertical changes because of the nearness of the ground; and in a similar way they also vary horizontally within short distances. These variations are brought about by changes in the nature and the moisture of the soil, even by minute differences in surface slopes and by the type and height of vegetation growing on it. All these climates found within a small space are grouped together under the general description of microclimate, and are thus contrasted with the macroclimate...."
- "the internationally understood meaning of the term microclimate is adhered to....The term kleinklima or Kleinstklima, which might be translated as "climate in a small space", and other frequently used terms such as local climate, position climate, miniature climate, picoclimate, and so forth, are not employed because of their ambiguity...." (ibid, p.2). (In this thesis 'microclimate' ranges in sense between (2) & (3).)
- (3) **TOPOCLIMATE:** "The concept of 'terrain climate' for which C.W. Thornthwaite, Topoclimatology, John Hopkins Univ, Lab.of Climatology,Seabrook (manuscript,1953) has suggested the fitting name of "topoclimate", and therefore taken up an intermediate position between macroclimate and microclimate. This intermediate stage has long been found necessary. H.Scaeta, (Terminologie Climatique, bioclimatique et Micro-climatique, La Met.11, 342-347, 1935) but this term has found as little acceptance as the terminology proposed by R.Geiger and W.Schmidt. W.Weischet, who divided macroclimate into regional and subregional climate, which R.Flohm rightly questioned, called topoclimate in the above sense 'local climate', a term which has been avoided here, since it is used in so many senses in the international literature."

- (4) THERMOPERIODICITY: "The system of thermoperiodicity already provides an answer to the geographical distribution of plants; their genetic constitution determines what temperatures they require and whether these should change daily or seasonally." (p.101, "Botany") (2). "Seasonal thermoperiodicity"....is the reaction of plants to temperatures which change over periods longer than twice a day, usually several weeks or a few months." (ibid).
- (5) CRYPTOCLIMATE: "A term used to describe the climate of completely or partially enclosed spaces, especially spaces of the kind used by man or animal...." Geiger quotes C.E.P. Brooks and G.J. Evans in their "Annotated Bibliography on the climate of Enclosed spaces" - Meteorological Abstracts & Bibliograph, American Met.Soc.Boston, 1950. p.484 of "The Climate Near the Ground" (1).
- (6) ENVIRONMENT: "Environment is seen in a twofold way; as a set of properties of the physical world that act upon an organism; and also as an accumulation of successful solutions to the problem of selecting such conditions in the physical world which are at least survivable." (p.44, "Sign, Image & Symbol" (85).)
- (7) NEED (BASIC): "as a generalization of actual experiential data (rather than by fiat, arbitrarily and prematurely, prior to the accumulation of knowledge rather than subsequent to it simply for the sake of greater objectivity). The long-run deficiency characteristics are then the following. It is a basic or instinctoid need if
1. its absence breeds illness,
 2. its presence prevents illness,
 3. its restoration cures illness,
 4. under certain (very complex) free choice situations, it is preferred by the deprived person over other satisfactions,
 5. it is found to be inactive, at a low ebb, or functionally absent in the healthy person.
- (p.21-2, "Towards of Psychology of Being" (104).)
- (8) BASIC NEEDS: "we can define the concept of basic needs as the environmental and biological conditions which must be fulfilled for the survival of the individual and the group....indeed, the survival of both requires the maintenance of a minimum of health and vital energy necessary for the performance of cultural tasks, and for the minimum numbers

necessary for the prevention of gradual depopulation".(p.75 "A Scientific Theory of Culture" (114).)

"By need, then, I understand the system of conditions in the human organism, in the cultural setting, and in the relation of both to the natural environment, which are sufficient and necessary for the survival of the group and the organism. A need therefore is the limiting set of facts. Habits and their motivations, the learned responses and the foundations of organisation, must be so arranged as to allow the basic needs to be satisfied." (ibid, p.90).

(9) MOTIVATION:

"Many of the problems that have plagued writers in this area, as they attempted to define and delimit motivation, are a consequence of the exclusive demand for behavioural, externally observable criteria. The original criteria of motivation and the one that is still used by all human beings except behavioural psychologists is the subjective one. I am motivated when I feel desire or want or yearning or wish or lack. No objectively observable state has yet been found that correlates decently with these subjective reports, ie. no good behavioural definition of motivation has yet been found. (p.22, "Towards a Psychology of Being" (104).)

(10) SOCIETY:

"any group of people having a common body and system of culture".(p.213).
"The society is the group of people who have a common culture"(p.213, "The Study of Society" (121).)

(11) CULTURE:

"A culture is the set of external manifestations of the common motives and concepts of a society" (ibid).

"If two widely separated and noncommunicating groups of people were to show identical bodies of culture, we would nevertheless not consider them as parts of the same society, since they are not part of the same cultural system. Interaction within the group is thus an indispensable attribute of a society." (ibid).

(12) NORMATIVE SOCIAL PSYCHOLOGY:

"the search for values as one of the essential and feasible tasks of a science or society. It is thus in direct contradiction to that orthodoxy which excludes values from the jurisdiction of science, claiming in effect that values cannot be discovered or uncovered but can only be stated arbitrarily, by fiat, by non-scientists."(p.220 (104).)