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Grover S. Krantz

Geographical Development of European Languages



PETER LANG

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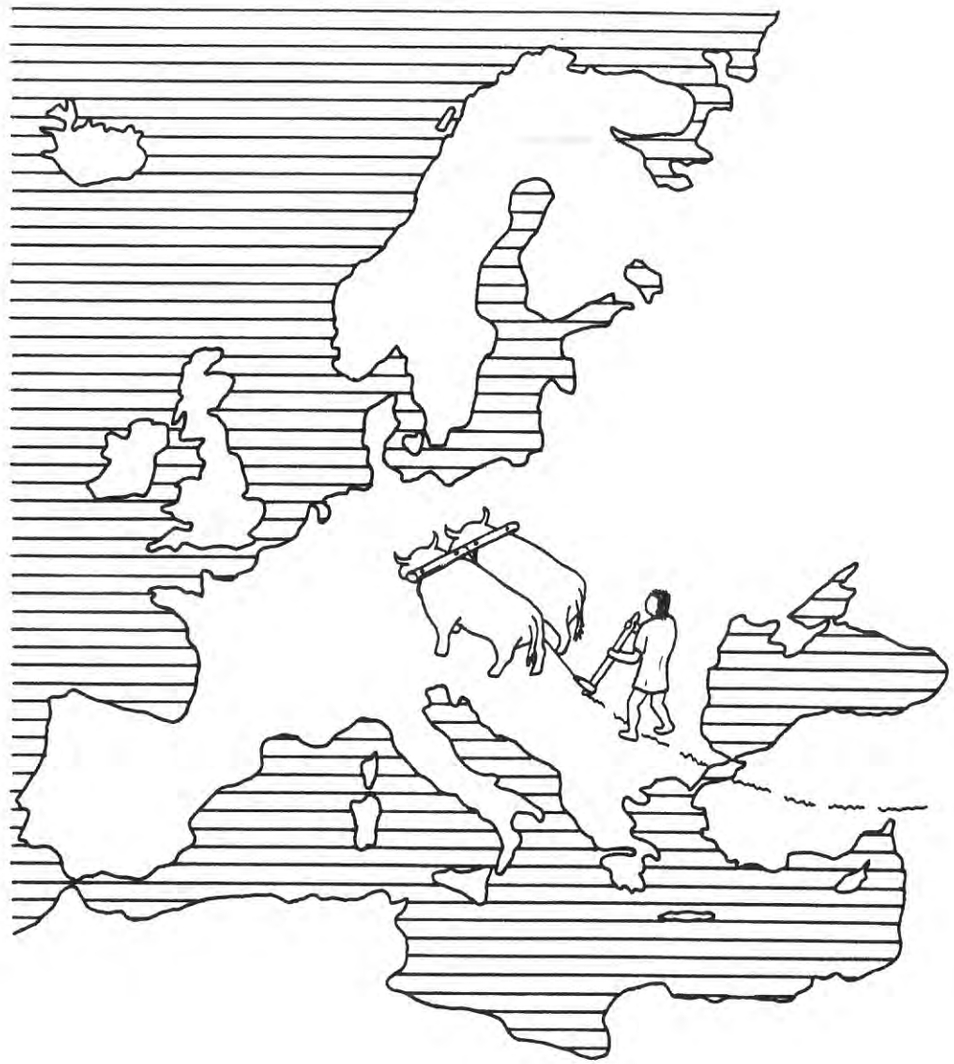
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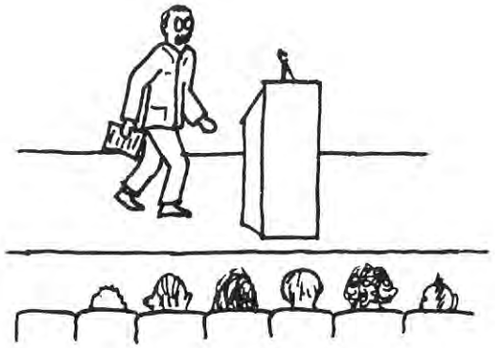
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CHAPTER ONE -- INTRODUCTION

Purpose and Method

This work presents a new approach for reconstructing the geography of prehistoric language differentiations and distributions. It is made explicit in the form of a complete reconstruction of the origin and distribution of all present European languages, and many extinct ones as well. Both the method itself and the results of its application to Europe are offered for critical evaluation by scholars in the appropriate fields.



History has usually concentrated on such things as battles, rulers, and political boundaries. It can also be said that ethnic history, as measured by language groupings, is an equally important aspect that is often ignored or given only perfunctory treatment. Prior to written records, the usual subject material of history is missing, by defintion, and informed speculations are then made about ethnic distributions over time and space. I think that many of these speculations are at least ill-founded, and are

often incorrect. It has proven notoriously difficult to correlate archeology with language history.

What is needed is a rigorous approach to reconstructing linguistic behavior in a geographical setting--one that recognizes the biology and economy of the human carriers of these languages. Such an approach should be founded on principles of human ecology, as well as linguistics, that are applicable to both the prehistoric and historic eras as well. This would take the form of a set of explicit rules of movement that are consistent with known human behavior, and which are universally applied. Such a set of rules would be set in motion at some remote time in the past and then consistently followed through to end up with the actual modern language distribution (Fig. 1). This kind of reconstruction must also show reasonable agreement with the known facts of archeology, history, and linguistics, though it doesn't have to agree with the current speculations in these fields.

A reconstruction of this type is a model that may be tested against other kinds of reconstructions, most of which are not criticized here in any detail. Some archeological and historic data were used to set the times and locations of major events, but otherwise this model was developed to stand on its own merits and internal consistency. This approach is explicitly <u>not</u> a compilation of all available knowledge, from all fields, in order to create such a reconstruction. Instead, it is an essentially independent method whose results should be <u>compared</u> with reconstructions based on other methods.

The first of two principles of human movement to establish here is that people and their languages generally do not move. All peoples will tend to occupy their own territory until some compelling force is brought to bear to make them change their location (or their ethnic identity). When a group expands into new territory, this is normally accomplished by a relocation of only the population surplus. There is no tendency to evacuate most of the residents from their original homeland as long as they can still live there. It is normally in the best short-term

survival interest of all ethnic groups to maintain their locations and languages as tenaciously as possible. Any suggestion of an instance of contrary behavior should be accompanied by a sufficient explanation for it. I first argued this point in print in 1976, it was also stated by Brues (1977:250-51), and it has been elaborated on by others since then.

This means we cannot simply suppose that a group of barbarians was able to spread out and impose its language over large areas of both civilized and noncivilized peoples. Further, great migrations of nonliterate peasants cannot be postulated at will to account for more recent distributions. We cannot just move people all over the map solely to accommodate proposed linguistic connections. Anthropologically speaking, any migration proposal must include answers the following questions:

1. Why did the people <u>move</u> at all rather than simply remain where they were?
2. Why did they move <u>where</u> they did rather than to some other location?
3. Why did they move <u>when</u> they did rather than at some other time?
4. Why was it <u>they</u> who moved, there and then, rather than some other people?
5. <u>How</u> was the move accomplished over the presumed resistance of the people already occupying the location?

If any of these questions are unanswered, by statement or implication, the proposal is correspondingly weak. If none of them are answered, then it is hardly a proposal at all. To postulate a migration without giving answers to these questions is only to restate a linguistic distribution in other terms, as though such a restatement somehow explained something.

In 1977 I applied this principle of stability to a reconstruction of the immigration of the first humans into

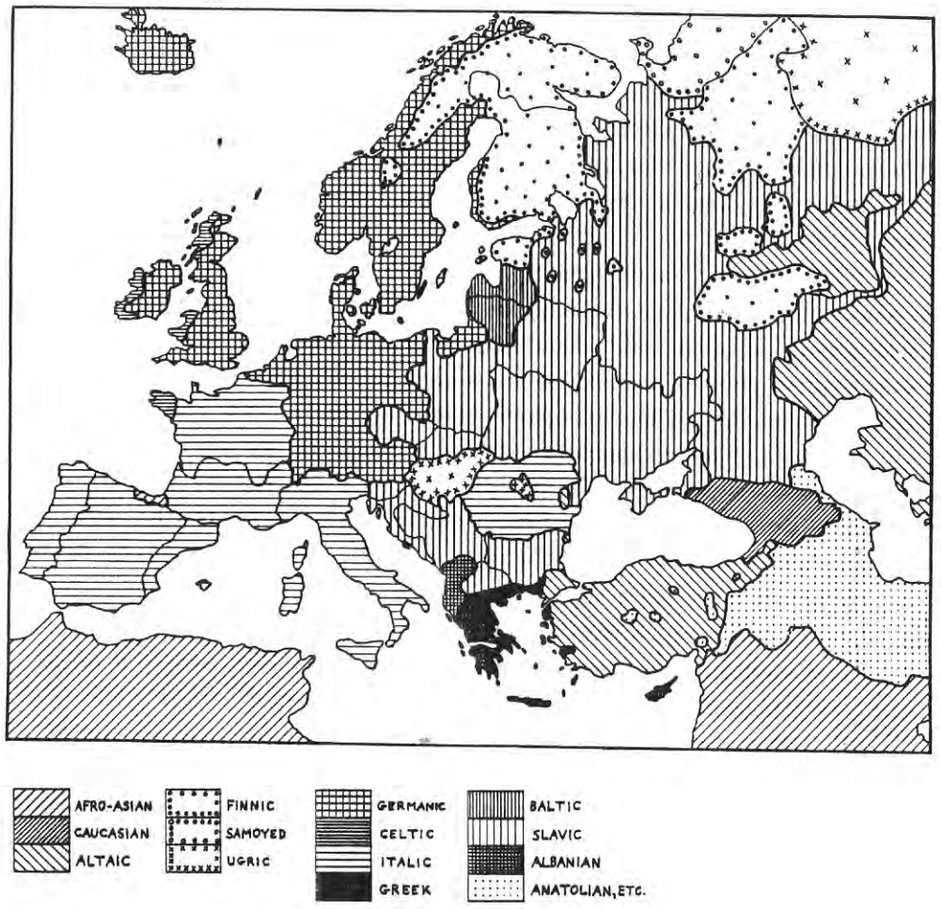


Fig. 1. Language map of recent Europe. All family distributions are shown prior to World War II. Many boundaries are simplified, and some small enclaves are combined and enlarged to make them more visible. Spotty distributions in eastern Russia are so expanded as to approximate the conditions of over a century ago. Major subdivisions are indicated with thin lines within some family areas, while Anatolian and Iranian are not separated. This map represents the goal to be achieved by this and any other reconstruction.

western North America. In that article my typical answers to the above migration questions were:

1. They did not actually move, but instead relocated their surplus population as an expansion of their territory.
2. They expanded where the land was available, where it was either unpopulated or vulnerable to penetration.
3. They expanded when the land was available, or when they acquired the means of penetration.
4. They had better access, or means, than any other people.
5. They prevailed because either the land was empty or they had much greater numbers.

It was thereby shown that at least 95% of the affiliations of the languages and their distributions in western North America could be exactly accounted for by using this, and one other, basic principle of human movements. Most particularly, the concept of a series of "waves" of immigration into the continent had to be ruled out as being inconsistent with the principle of stability. The few discrepancies between my reconstruction and some standard linguistic opinions were emphasized in four comments by Baumhoff, Elsasser, Fleisher, and Leonhardy--all 1978.

The second principle used in the North American reconstruction was that a technological innovation could so increase the numbers, power, and/or prestige of one group that they could overwhelm their neighbors. This provides specific answers to point 5, how they prevailed if the land was inhabited.

Individuals, families, and small groups will cross ethnic borders; this is a normal process at all times. The usual result is that these migrants soon adopt the language of their new neighbors and linguistically disappear. A great differential in population densities will mean there is a correspondingly greater flow in one direction. If this one-way excess in flow is great enough and fast enough for them to maintain regular contact with

other immigrants, then they will keep their language and can instead turn the natives into a minority that is eventually absorbed. As long as the advantage of one group over the other is maintained, the linguistic frontier will continue to move in the direction of lower population density.

With most innovations the neighboring peoples will eventually adopt the new item, increase their own influence, and then resist further encroachment by matching numbers, power, and/or prestige. These people will then press on their neighbors in turn, still farther from the source of the innovation. In this manner a series of linguistic boundary shifts, all in the same direction, were systematically described and explained for western North America.

In reconstructing the linguistic development of Europe one encounters a few innovations that moved ethnic boundaries in this manner. The most outstanding of these was clearly the initial appearance of agriculture, which swept over the continent with such force that the local natives were rarely able to adopt it. This Neolithic revolution would have caused so nearly total an ethnic replacement that this event is taken here as the effective base-line for all subsequent linguistic events. That this also represents the introduction of Indo-European languages into the continent is the most obvious hypothesis to consider first.

My North American reconstruction also included a major episode of depopulation and subsequent repopulation of large areas that resulted in major shifts of some language boundaries. A comparable climatic event is identified in this European reconstruction, but its effect on farmers turns out to be quite different from its effect on hunters.

When a climatic change makes an area uninhabitable to hunters they simply decline in numbers in that place, with no more than stragglers moving elsewhere. When it becomes obvious that the change is not just a minor episode, they might want to shift their tribal territory somewhere else. But all adjacent livable spaces are already occupied by other tribes who may also be suffering, yet who are not so weak as those desiring to move

in. Without large quantities of transportable food supplies, the afflicted population has no recourse but to gradually fade out of existence.

With an agricultural population under similar pressure, there is at least the option of taking in their last crop, gathering together in large numbers, and moving against some small part of their neighbors. Lacking some advantageous technological innovation, such true migrations are normally doomed to eventual linguistic extinction. In the European reconstruction there is one major exception of this kind that survived and flourished because of special geographical circumstances. This is the one I like to call the Germanic Shift.

In many previous studies of European linguistic prehistory the authors have proposed substantial migrations of large bodies of people. These are sometimes pictured as nation-sized populations that shift their locations as units, making and/or breaking linguistic contacts. Individual tribes under stress, even groups of a few thousand people, are able to make this kind of move where the rear echelon is in contact with, and deliberately following, the leading edge. Some reflection shows that a peaceful, settled, farming population, numbering in the hundreds of thousands, cannot possibly move like this as a unit.

Suppose, for example, that a peasant group inhabits an area of 500-km diameter, and is going to shift its location 50 km in one direction. One method would be that all of the included farmers simultaneously load up their possessions and move their homes 50 km in the same direction. (We may ignore how this would be timed to avoid interfering with their farming operations and with each other.) Those at the lead of this move might welcome the new lands, but we must inquire why this should be so, and how they prevailed. Those at the rear might welcome the relief from some natural or human pressure, but we would like to know exactly what this was. For the great mass in the center this would just be a 50-km move from one farming site to another equivalent, but unfamiliar one, and to no apparent gain. Who or what could

compel them all to make this move?

Alternatively, the great mass could be left in place, while those in the rear abandon their lands and move through the others to take up new positions in the front. An extraordinary set of circumstances could facilitate a move like this, but those circumstances must be clearly spelled out.

If one proposes that a large ethnic group shifts its collective location, this should be described in terms of two processes. There must be some force that is physically or ethnically eating them up from behind, while the other front is advancing successfully for some other reason. These factors may or may not operate at the same time, and the main body of people in the center is probably little affected by events at either frontier.

In recent years some detailed archeological investigations and reinterpretations have indicated that many previously supposed migrations might not actually represent ethnic replacements (Dennel 1983). While there may have been major changes in the civilized superstructures, the arts and crafts of the basic producers (workers and peasants) mostly continued unchanged. Even well-known periods of major destruction, as in Greece in the 2nd Millennium B.C., do not necessarily represent ethnic changes (Xirotiris 1980).

The above considerations may appear to put insurmountable restrictions on any attempt to reconstruct linguistic prehistory, and especially to extend such a reconstruction up through historical times. But there are also three considerations that allow for some flexibility that might have been unexpected.

First, there are the time depths usually ascribed to the differentiation of the various European languages. These are extrapolated from more recent, known rates of linguistic change. But there is actually no compelling reason to assume that the languages of preliterate peoples changed at the same rate. In fact, there is evidence that suggests a slower change in earlier times (Pulleyblank 1981). This at least opens the possibility of more time depth in which to encompass the necessary movements,

and a greater range of archeological events that might be included to explain these movements. (I return to this subject in the concluding chapter.)

Second is the question of when these languages began their major divergence. Most current reconstructions of Indo-European languages begin with a dialect mesh in a limited area that began its spread and subdividing as much as 6400 year ago, at about 4400 B.C. (Gimbutas 1977). However, I find compelling reasons to think that Indo-European began to spread more than 3000 years earlier, at 8000 B.C. On the other hand, it may have retained its integrity as a dialect mesh at least as recently as is commonly supposed, though over an enormous area. In fact, I find no clear argument for a break in that diverging mesh until much later--easily up to 2000 B.C., maybe further. (It should be noted that a dialect mesh, as in recent India, can have fully distinct languages in its widely distant parts.)

Third is the proper identification of certain prehistoric languages. Scraps of linguistic evidence like a few monuments, some place names, and personal names of leaders, may in some cases be the products only of an elite group that has taken control of an area. It must be remembered throughout that the linguistic picture being reconstructed here is that of the real people, not just their leaders. A glance through any historical atlas of Europe will show how little relationship there usually has been between the political units and the known linguistic boundaries of the people at those times. Historically impressive movements and conquests have had major impacts on the lives of those who wrote the history, but often without having had any comparable effect on the basic population.

In a preliminary paper on reconstructing the linguistic picture of Europe (1981) I made the case that the original spread of the Indo-European languages could have been accomplished only by the first Neolithic farmers. Quite simply, no other human cultural force since the origin of modern man could have had the power and persistence to cause a language spread of this magnitude. The origin place of these Indo-Europeans accordingly

would be in the area of southern Anatolia.

The currently popular Kurgan hypothesis especially fails for lack of the ability of these marauders to change the languages of entrenched peasantry over so much of the world. There is no possible resource base in the preagricultural Ukraine that could have sustained a dense population, let alone fed them out in such numbers as to linguistically convert almost all the people from Ireland to Bangladesh. That such a conversion was based on conquests with the use of horsedrawn chariots is easily dismissed. Indic and Latin have common terminology for their use, yet they were invented (2000 B.C.) well after the separation of these two languages. Thus "...references to the horsedrawn chariot in IE ritual and mythology are probably later accretions and not derived from a common IE myth." (Mallory 1981: 216, 217.)

Moving on into the detailed distribution of Indo-European subdivisions one finds even further support for the Anatolian source of this family, as well as for the antiquity indicated here. Any attempt to draw Indo-European speech from the Ukraine at 4400 B.C. would make it tend to show natural divisions that in no way resemble the actual distributions, ancient or modern. On the other hand, the substance of this study shows that all of the Indo-European subdivisions, relationships, and locations follow automatically from a Near Eastern origin at the beginning of the Neolithic, some 10,000 years ago. Further, even the non-Indo-European languages of Europe are shown to be distributed in their correct ways as part of this same rigorous reconstruction.

The following picture of linguistic geography does not challenge any conventional classifications of known languages, as my North American reconstruction did in a few instances. The unexpected conclusions here are mainly in the area of increased antiquity ascribed to the original Indo-European dispersion itself, and in the longer residence indicated for some of its subdivisions in their present locations. This would include, for example, developing Greek in its present area since 6500 B.C., and Celtic in Ireland since 3500 B.C. The antiquity of Magyar in

Hungary may be equally surprising; I find it to be a Mesolithic speech that predates the Neolithic entry.

The linguistic affiliations of many prehistoric populations are clearly predicted in this reconstruction, as indicated above, including the non-Indo-Europeans. The most interesting of these are the archeologically famous Kurgans of southern Russia, who turn out necessarily to be Altaic speakers, and specifically of the western, or Turkic branch. Perhaps less surprising is the proposed affiliation of the original Iberian farmers with the Afro-Asian language family.

In at least one major instance the commonly assumed direction of migration of a population is reversed here. It is usually stated that the Uralic Magyars moved <u>into</u> Hungary from an eastern source in the 9th Century A.D. I find instead that all the other Uralic speakers expanded <u>out of</u> Hungary in the opposite direction, and at a much earlier date.

Particular details in this reconstruction, like those mentioned above, may not prove to be a major source of objection. These details are predictive, and many will be tested in the near future. Instead, I expect that the method itself may prove to be the most uncomfortable aspect to some readers. The problem is that so little room is left for "historical" explanations--great leaders, important decisions, ambitions, accidents, apathy, luck, and all the rest of what people believe in. Yet, the absence of this "human element" in the study of ethnic history should be no more disturbing than is its absence in such personal things as disease and heredity.

<u>A Note on Sources</u>



The vast majority of the information given here is common knowledge within the various fields of anthropology, linguistics, history, and geography. The juxtaposition of these well-known facts is what is new. It may be considered

improper, even insulting to the reader, to cite sources for what can be found in basic text books. It is impossible to cite sources for what is original. For these two reasons there are fewer specific references used here than might be expected.

Because many readers will be well-versed in only two or three of the basic fields involved here, mention should be made of my major sources of information. Some of these are drawn upon heavily throughout the text, along with other general works, but are referenced only for particularly unusual, unexpected, or critical points. Many of these are not cited beyond their mention here.

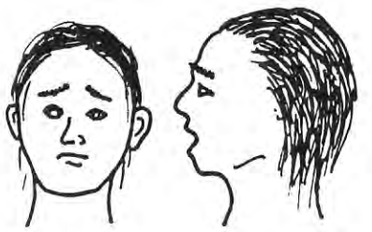
For most of the geographic data I have used the 2nd, 11th, and 15th editions of Goode's Atlas (Goode 1943, Espenshade 1960 and 1978), and the Oxford Regional Economic Atlas of the U.S.S.R. (Economic... 1956). Modern language distributions are drawn from Zaborski (1960), and certain boundaries for my base line of 1939 are drawn from Jastrow (1943). Basic data and comparisons among the Indo-European languages are largely from Lockwood (1969 and 1972).

Conventional theories about the origin of the Indo-European peoples come from a diversity of sources ranging from the works of V.G. Childe (1926) through M. Gimbutas (1973 and 1977). Interesting maps, as well as some speculations on prehistory, are found in Kinder and Hilgemann (1964) and in Barraclough (1978). For early technology and demography I found Forbes (1958), White (1962 and 1967), and Pounds (1973) to be the most useful on a topic that is rarely touched on by others.

Archeological interpretations, especially as relating to migrations, are dealt with by Dennel (1983), but he goes even further than I would in denying them. Human reproductive rates and early population densities are discussed by Hassan (1981). Some ideas on Neolithic migrations and their rates are found in Ammerman (1977). The basic idea that Indo-European languages were spread by food producers was at least suggested by Smith (1976) in a brilliant work on the significance of the Neolithic. Other sources are mentioned as pertinent.

Many of these works also give information with which I am in total disagreement. Such information is all in the form of interpretations and/or speculations that have often unwittingly become elevated to the level of "factual" knowledge. In a few instances I am only offering alternative possibilities to the commonly held presumptions. In all such cases I have attempted to indicate the differences of opinion, as well as the degree of speculation being indulged in here.

Language Differentiation



A dialect mesh is a network of tribal speech communities that are mutually intelligible adjacently, but which become increasingly divergent with distance. Hunting tribes of typically 500 persons, at a density of 0.1 per sq km, would occupy areas averaging 5000 sq km, with diameters of 80 km. At 400 km, five tribal boundaries are crossed and the cumulative effect of five dialects is a different language in a mature dialect mesh. At 800 km, and ten dialects removed, no discernable relationship is likely to be evident from direct comparison without considering the intermediaries.

This description applies to dialect meshes of great antiquity and stability, like the Australian aboriginal languages. Such a mesh will change gradually over time as a unit, with each of its parts maintaining their degree of distinction from every other. A new dialect mesh develops when a language spreads over a new territory of great size. Distinctions between tribal dialects will be small at first, but after thousands of years they increase to the levels of contrast noted above. At 10,000 years ago I would assume that all of Europe and the Near East constituted a single dialect mesh. This may have been continuous with the speech of most of the rest of the inhabited world as well.

With pastoralists, and even more so with farmers, the area occupied by a 500-person tribal unit necessarily decreases as population density increases. This would shorten the geographic distances between unintelligible and unrelatable dialects within a mesh. However, these Neolithic economies are so recent in appearance that there has not been enough time for their dialects to diverge over space even as much as those of hunters. In still more recent times, especially in Europe, ease of communication and transportation has stopped dialect divergence altogether.

Linguistic innovations may appear anywhere in the mesh, and will spread in varying directions at various speeds. At any one time the dialect mesh is thoroughly and almost randomly criss-crossed by hundreds of isoglosses, each of which separates two areas in terms of a single linguistic trait. An innovation that appears at one place is capable of eventually spreading to any and all other places in the mesh. This is analogous to a wide-spread biological species with genetic continuity throughout its range, but with gradually increasing morphological differences over distance.

When a dialect mesh is broken, its parts become free to evolve in their own independent directions. Through the loss of intermediate and mutually intelligible dialects, two or more parts of the original mesh will begin to diverge by what we call linguistic drift. Again, this is analogous to a biological species that loses genetic continuity between two or more extremes that subsequently cannot exchange genes, even indirectly, and thus become separate species. Bringing together two divergent parts of a mesh (or a species) may produce between them a line of unintelligibility (infertility), but as long as they remain connected through some route of intermediate dialects (populations) they are not truly separate languages (species). A freely drifting and separate language requires a full boundary of mutual unintelligibility from all others. Just as in biology, there are indeterminate situations where innovation flow is just badly restricted, and it is not clear whether the division should be labeled as dialect or language (subspecies or species).

Bounded languages are created from a dialect mesh by moving one speech community out of its natural position and into contact with a contrasting linguistic environment, several dialects or more distant. If this is done without leaving a chain of connecting dialects, then a new language has been set free to diverge (drift) from its former mesh mates. It is not necessary that the actual human speakers must make the indicated move, although they often do. A change in the language spoken by one group may similarly put a barrier of unintelligibility between it and some of its neighbors.

It is argued here that human groups do not change their locations, or their languages, as a common practice. Such changes require compelling reasons. Any well-thought-out reconstruction of such events in the past must indicate these reasons.

The basic method of moving a speech community into another location on the dialect continuum is to expand its area at the expense of its neighbors. Those at the source area can eliminate, absorb, or linguistically convert their immediate neighbors, and thus have their speech come to occupy this new area in addition to their original territory. If this process is extended over a sufficient distance, two unlike speech communities will become juxtaposed, and a language barrier comes to exist between them. Such an expansion may be based on a population increase at the source that enables these people to infiltrate and/or conquer their neighbors and thus spread their own ethnic identity. It may also follow from sufficient cultural prestige at the source, that adjacent communities copy their language in ever-widening circles of imitation. These methods may be combined in various proportions in particular instances.

A roll-up of intermediate dialects may progress along a physical or linguistic peninsula, thus assuring that no connections continue around the edges, and such a language then becomes fully bounded. Alternatively, the roll-up may be radial --spreading out in all directions from its source and thus serving to complete its boundary.

An advancing linguistic frontier can also separate additional languages by breaking their continuity with each other. A dialect chain along a coast line, for instance, might have its central part overrun from an inland source, thus splitting it into two independently drifting parts. Or a peninsula could have its base overrun and become separated from its previous contacts with dialects on the main land mass.

When an advancing language frontier encounters a physical barrier of some size, like a mountain chain or a body of water, it should divide and pass around each side of it. The resulting two arms of the frontier may eventually meet one another on the far side of this barrier. If the separation was of long duration an actual language boundary may exist between them at this meeting. As long as a dialect chain trails back from each arm to their point of initial separation neither side will become a fully bounded language. But if any part of this U-shaped dialect chain is removed, by any process, then the two arms become free-drifting languages.

A very different source of dialect contrasts that often leads to language separations occurs when an intruding language overrides a large area that previously contained some linguistic diversity. The original population might not be eliminated, and sometimes not even greatly outnumbered by the overriding ethnic type. Many of the first speakers of the new language here are natives, and actually grew up speaking one of the original languages of the area. They will continue to use various aspects of their own pronunciation, vocabulary, and grammar--and their children will tend to copy these. The dividing lines between these underlying languages often will automatically surface as subdivisions in the new language of the area. Ideally, this phenomenon should be demonstrated in each instance by documenting the particular linguistic phenomena of the preceding language that appear in the same geographic area in the replacing language. Even without such documentation the phenomenon can safely be inferred in many instances. This has been termed "Mischsprachung," and has received less attention than I think it

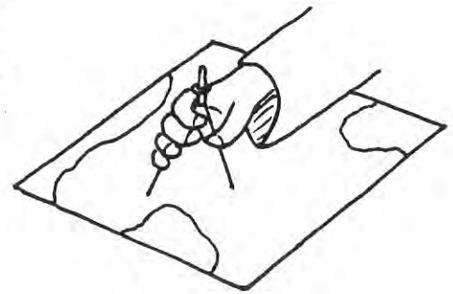
deserves. Several examples appear in this reconstruction.

The history of European languages can be reconstructed in all its essentials by using a surprisingly small number of applications of the principles discussed above:

1. An initial wave of several different immigrant Neolithic populations spread themselves and their languages over a sparse substratum of native hunters throughout Europe and nearby areas. These major groups, in order of significance, are Indo-European, Uralic, Altaic, Afro-Asian, and Caucasian.
2. The Germanic division rolls down from its northern fringe area, breaking the European dialect mesh.
3. From the Latin center in Rome there is a rolling-out.
4. There is a rolling-out from a Slavic center in eastern Europe.
5. Technological advances move the Germanic boundary substantially eastward.

Throughout these developing steps lesser distinctions appeared as a result of breaking dialect chains, from substratum language differences resurfacing, and from the shifting of technological innovations from one advancing group to another.

All of this linguistic history can be shown to be triggered by just a handful of technological and cultural phenomena, and to follow from the uniform application of a set of simple rules of human movement. Detailing this history, as the reader will see, involves lengthy descriptions that relate the above factors to the actual geography of Europe. But throughout, the basic simplicity of the whole process should be evident.



Rules of Movement

The movements of human populations that serve to change the locations of language boundaries must be described in terms of consistently applied rules. Where exceptions are made, these too must follow describable rules of general applicability. These requirements parallel the rules of linguistic changes themselves, and so should come as no surprise. If something as personal as one's own language follows natural laws, then it ought to be expected that the location of one's home might equally follow from natural laws. Individuals are free to vary (within limits) in both speech and location, but human groups are much more predictable under given circumstances.

In order to describe the movements of early European populations I have devised a set of rules that are at least consistent with known human behavior. Within a limited range of possibilities, I have settled on those which generate a pattern of movements that is also consistent with most of the known archeological dates for the spread of Neolithic economies. Variations in these rules of movement have been made to suit different economies and climates. At later times, and within the scope of the historical record, other adjustments are made in these rules to conform with certain changing circumstances.

The basic rule of movement is that a population has the ability to double its numbers in each generation of 25 years. This will be true under the most favorable circumstances and where there is unlimited opportunity to expand its area of occupation. Further, this ability to expand will be applicable only to those small groups on a frontier of advancing occupation. Populations located well behind such a frontier will have neither the opportunity nor the means to expand in that direction, and often would not even be aware that such a frontier existed. Such populations can expand only by finding the means to increase their density of occupation in place.

Since any frontier expansion (in Europe) is always over a territory already occupied by some other population, normally at a much lower density, an additional five years is added to compensate for the losses of personnel in the inevitable minor

conflicts. For all subsequent calculations I simply use the figure of a 30-year generation for the doubling time to allow for this constant factor.

The basic social unit used here is the 500-person tribe that is typical for hunting and gathering peoples, and is applied to all economies initially. Larger units come into play only later. The most probable population densities and their consequent tribal dimensions can be given here:

Economy	Density	Tribal Area	Tribal Diameter
Hunting	0.1/sq km	5000 sq km	80 km
Pastoral	0.25/sq km	2000 sq km	40 km
Farming	1.0/sq km	500 sq km	25 km

The typical pattern for an advancing farming frontier is for the surplus population to move out from filled areas into the most convenient new places to farm. On the frontier this will normally mean moving a short distance ahead into an ideal location rather than continuing to fill less desirable places closer at hand.

It is assumed that on the average only about one-third of the potentially usable land will be occupied, to any significant degree, in the first generation of occupation. Only after the farming frontier has passed on will the less desirable two-thirds of the land be occupied by the expanding population that no longer has access to truly new lands. At such a time the overall density will then reach the typical 1.0 per sq km. (See Fig. 2, upper.)

The gradual filling of the frontier zone can be visualized as a row of squares, 40 km to a side, as shown in Fig. 2, lower. Each of these is occupied by 500 people who farm the best spots, which can be represented by an arbitrary circle in the center with a diameter of 25 km. This circle encloses 500 sq km, and is almost one-third of the area of the whole 40-km square. Over the next generation each of these partially filled squares will generate 500 new people who are looking for new places to farm.

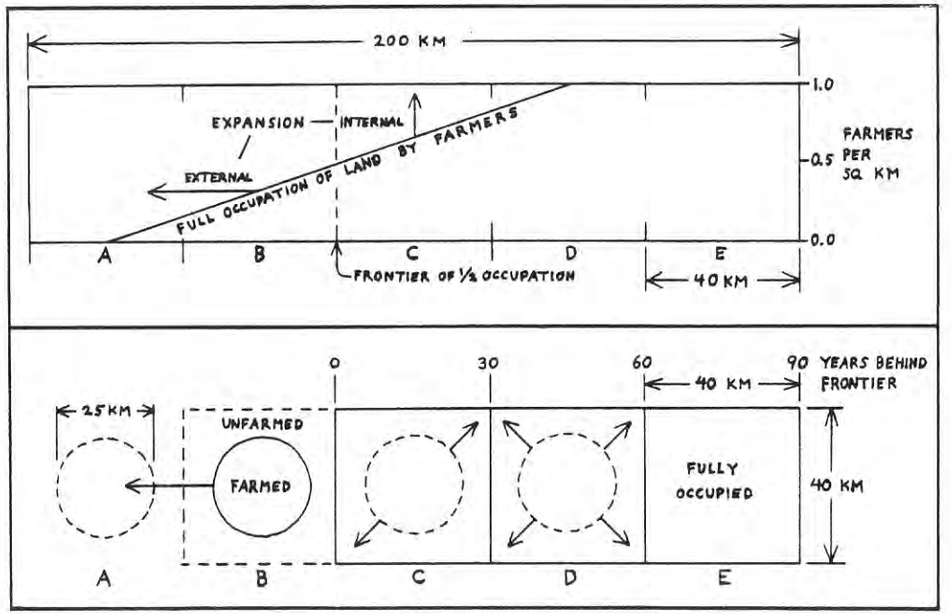


Fig. 2. Pattern of frontier advance. Upper: Farming is shown advancing from right to left (its commonest direction in Europe) in four segments of 40 km each. The rate of land filling is given as a steady increase, and the actual frontier is taken as the line of one-half occupation. This pattern is neither exact nor critical, but it illustrates the process of gradual filling of the land in a frontier zone that may be 120 km deep.

Lower: This idealized pattern shows how farmers fill the same five squares. **A** is being infiltrated by new immigrants, **B** has its prime one-third occupied, in **C** and **D** the remaining two-thirds are filling, and **E** is fully settled. Previous inhabitants of squares **C** and **D** would find it increasingly difficult to move away from the surrounding farmers. A similar pattern would apply to farmers overrunning pastoralists, and with a different scale, to pastoralists overrunning hunters.

These people will mostly move out into the next row of 40-km squares that have not yet been farmed. It would be more practical to move as far as 40 km to an ideal place rather than to move a lesser distance to a poorer place. This amounts to about 17 people per year, or three small families, making a move of this kind in each square.

At the end of a 30-year generation this new 25-km circle should be filled, and the source group will then continue to expand its population by filling in the less desirable lands immediately at hand. For them to continue moving away and into the best lands from this same source area, this would mean a move of 80 km, and this becomes impractical. New advances are now made from the newly filled 25-km circle discussed above. Actual frontier advancement would not have followed exactly this regular pattern of filling circles and squares, but this diagrams the process in the form of an easily visualized process. For purposes of mapping, this advancing rate is given in terms of 200-km units, thus of five generations, and requiring 150 years to accomplish.

Following this same reasoning, a frontier of herdsmen advancing over hunters will add successive tribes of 500 people in the circles of ideal territory, this time with a diameter of 40 km each. These will again constitute almost one-third of the potential area of a typical frontier square now measuring 80 km to a side. Given the same 30-year population doubling rate, these pastoralists should advance their frontier 80 km per generation. They will move the standard unit of 200 km in just 75 years, or twice as fast as the farmers. After their frontier has passed on, further population expansion will be into the less desirable areas immediately at hand, and the overall density then brought up to 0.25 per sq km.

A model for the initial advance of a hunting population would follow a similar pattern, but faster for two reasons. They would cover 120 km in each generation because of their sparser distribution. Also, each generation would be only 25 years because there would be no previous human inhabitants to contend

with. (Hunters cannot overrun territory of other hunters at the same density and technological level.) This process is not detailed here because their occupation of the entire continent is assumed from the outset.

Additional delay factors are introduced when the advancing farming frontier enters areas of low winter temperatures and shortened daylight hours. It is assumed here that a January mean temperature will have no appreciable effect until this reaches below the freezing level. At this point winter problems will lead to enough unusual casualties to increase the time for doubling the population from 30 up to 40 years. It must be noted that this ten-year penalty applies only to the earliest people entering the colder winter zone, and that later adaptations would reduce or even eliminate the problems. But the frontier advance rate applies only to those people initially moving in, and later

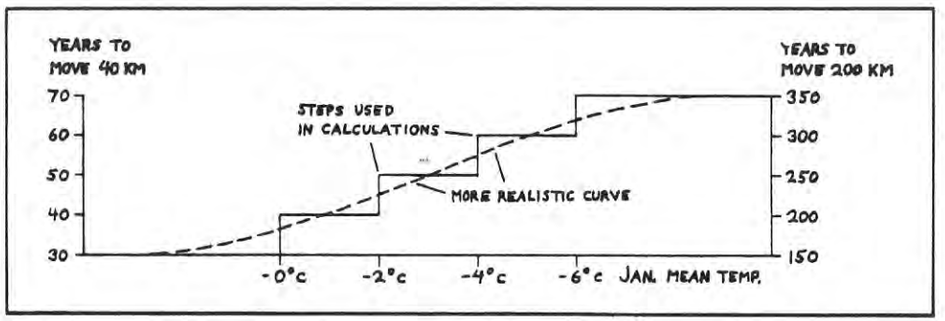


Fig. 3. Penalty increments. Added casualties from colder winters are expressed as additional years to accomplish each 200-km unit of frontier advance. The dashed line approximates the actual increase in this influence. For convenience of calculation this is simplified to four discrete increments of penalty. The figures given here are for the advance rate of farmers; for herders the times would be cut in half. This same graph can be used, with different labels, to illustrate the four increments of delay for progressively shorter winter days of 9, 8, 7, and 6 hours each.

adaptations would have no effect on this.

In terms of the basic 200-km unit of five generations, this winter cold penalty increases the advancement time from 150 up to 200 years. Another 50-year penalty per 200 km is added when the frontier crosses the -2^{o} (Centigrade) January mean temperature line. At -4^{o} another 50 years are added, and again at -6^{o}. It is assumed that by the time this temperature is reached, the frontier peoples will have devised sufficiently good winter adaptations to handle anything more extreme without adding even further penalties. The actual picture of increasing winter cold problems would not follow this neat pattern of steps, but this is at least an approximation (Fig. 3).

In northern latitudes the reduced length of winter daylight time can also be expected to result in added casualties as this begins to become significant. Since temperature and daylight do not decrease together in most places, their effects are calculated separately. When midwinter daylight reduces to less than nine hours the first penalty of ten extra years is added to the 30 years for population doubling. In terms of the basic 200-km unit of advance, this is again an extra 50 years added on to the minimal 150. At eight hours of daylight another 50-year penalty is added, and again at seven and at six hours. After this it is assumed that further daylight lessening need cause no additional penalties, only a continuation of those already assessed. Just as with temperature changes, the actual situation would be a gradually increasing problem, then a leveling off as it is solved. The stepped increments used here only approximate this curve. If one changes temperature to daylight losses, the graph in Fig. 3 should apply equally well to this situation.

With both temperature and daylight variations the penalties may be seen as ten-year increments for each 40-km advance. Since the mapping is all done in 200-km units of five population doublings, these are treated as 50-year penalties. With both factors, there are just four such increments used, so the most extreme case is where 200 years are added to the 200-km advancement time from each cause. Given the basic 150 years,

plus these two delaying factors, the slowest possible advance rate used here is 550 years per 200 km.

It was not exactly ideal to impose these penalties in such large increments at each climate line, but it made calculations of frontier progress much simpler. In following each route of advance I applied the penalty when more than half of the 200-km unit was in the new zone. Occasionally I would balance some nearly equal instances by choosing speed in one case and delay in

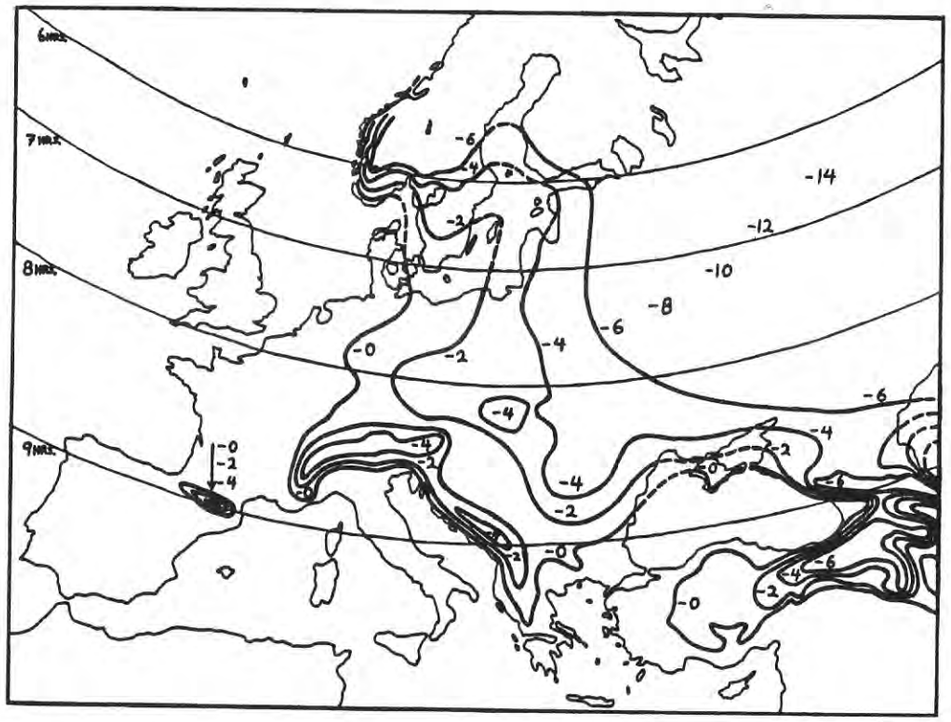


Fig. 4. Climatic factors. Heavy lines are isotherms of four steps of January mean temperatures. It is assumed that any differences in past millennia would at least follow the same pattern. Lighter east-west lines show four steps of reduction in hours of midwinter daylight. Penalties for both factors are applied to the rate of Neolithic immigration.

the other along the same route. Clearly these factors, as applied, are not exact reflections of real conditions, but in the long run they should be at least a close approximation. (See Fig. 4 for the map of temperature and daylight clines used for imposing these delays.)

The basic rates of advance for peoples with other adaptations are calculated using the same kinds of penalties. The same geographic lines of temperature and sunlight are used, the same four increments are assessed and held constant thereafter, and the added increment is always one-third of the basic advance rate under ideal circumstances. Thus with herders, whose basic advance rate is 75 years per 200-km unit, 25 more years are added for each step in each of these two factors, so their slowest advance rate is 275 years per 200 km.

In the following descriptive sections different advance rates for other circumstances are described as they are introduced. They mostly follow this same basic pattern.

No special penalties or delays were introduced for adjustments to new zones of flora and fauna as were used in my North American study. Here it was considered that Neolithic farmers were bringing with them so much of these important items (domesticated) that any changes in the local situation would have had only a trivial effect. Also, no time penalties were assessed for building boats at significant water gaps. As will be seen, there were always other people with shipping available at each such place.

Three more limiting factors of geography may be introduced at this point, as illustrated in Fig. 5. In many places the soil was (and is) too deep and/or heavy to be plowed with the early "scratch plow" that simply cut a furrow. Such soils are mostly randomly distributed, but some major and extensive areas are shown that effectively blocked the entry of large numbers of farmers until new techniques were developed.

A northern farming limit, for most practical purposes, exists along the line of the 120-day growing season. This line would move somewhat during different eras, but it largely marks

the end of the Neolithic advance. Only much later did new species and strains of crops enable farmers to pass this line to some degree.

Mountain barriers would sometimes impede Neolithic progress and significantly retard communications across them. Ethnic boundaries sometimes developed along these, and continued at the meeting lines beyond.

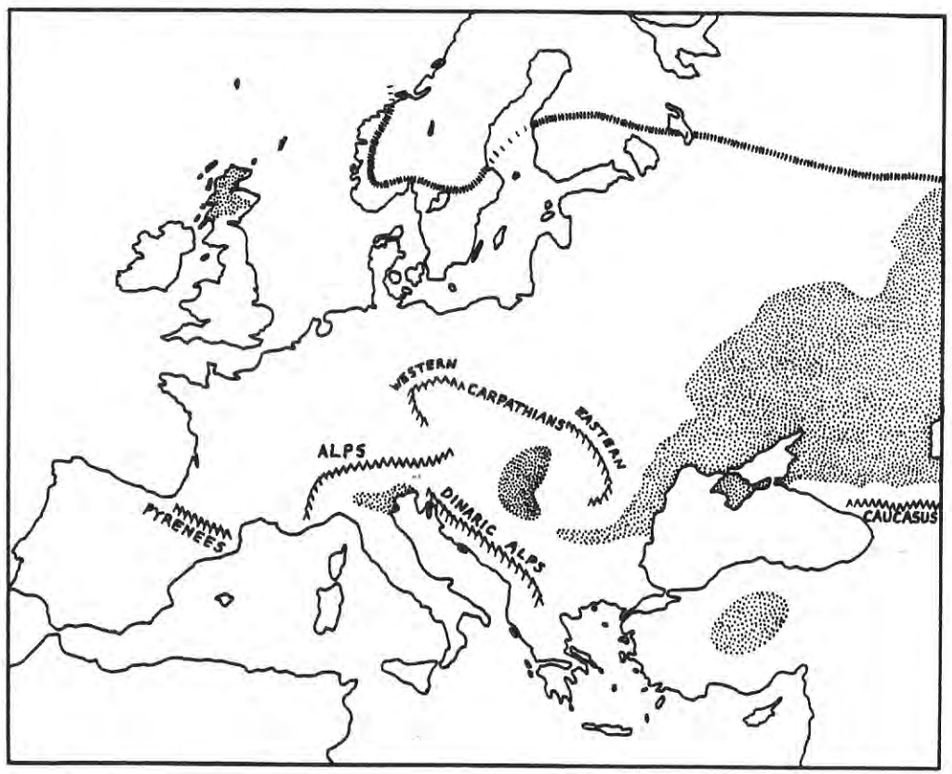
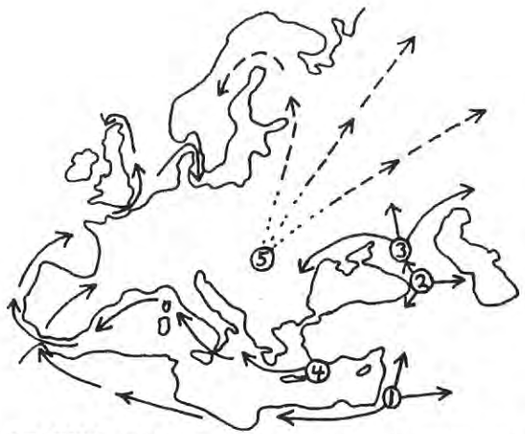


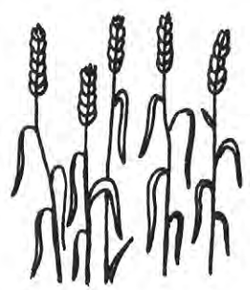
Fig. 5. Geographic factors. Stippled areas in Hungary and Russia are deep soils that could not be plowed by Neolithic farmers. The Moors of Scotland, the Po Valley, and central Anatolia present equivalent situations. To the north is the limit of the 120-day growing season. Some mountains are shown, but only those that affected ethnic movements.



CHAPTER TWO -- PERIPHERAL MOVEMENTS

Neolithic Origins

The exact course of events leading to the development of the Neolithic farming economy is not a critical issue here. It is enough just to set the probable times and places of its beginning in order to chart its subsequent spread with some degree of accuracy, or predictability. Still, a brief summary helps to explain these times and places. This summation is somewhat original, but it is built only from well-known facts.



Farming is simply a logical extension of a way of life that developed in a series of quite natural steps. Within the scope of a hunting-and-gathering economy an extreme specialization on a limited range of food sources is reasonable and practical--if such foods occur in great abundance. One example of this is the Natufian cereal-grain harvesters known from about 11,000 years ago in the Near East (which has popularly come to be known as the "Middle East" in recent years). In dense natural stands of grain a year's food supply can be gathered in just three weeks. The

required technology for harvesting, threshing, storing, and grinding would easily be developed in a short time when their need becomes evident.

More important is the fact that a tribal society of 500 people, more or less, can now find sufficient food in as little as 500 sq km instead of the more usual ten times that area. On the one hand this promotes the ease of sedentary life, and on the other hand it severely restricts wide-ranging hunting practices. Cereals do not provide a satisfactory range of amino acids, so a dependable source of animal protein must be found to make up for diminishing hunting possibilities. Capture and control of some native animals is the obvious solution. Sheep and goats are available in the Near East, and are ideal herd animals for this purpose. Their domestication appears to coincide with intensive cereal harvesting, and logically precedes the earliest actual farming.

This combination provides a way of life that, at first glance, would seem to be ideal and potentially lasting. It has the advantages of little need for movement, allowing permanent living structures with accumulation of property, and a dense population to resist inroads by other people. Actually it is unstable, and a new factor soon appears to upset the equilibrium. The labor requirements for tending animals and for the rapid harvest now make children for the first time an economic asset rather than a liability. Abnormal population pressure is an automatic result.

When the natural stands of grains are fully exploited, any expansion of the population, and extension of this way of life, is possible only by deliberately cultivating these grains in new places. The idea that seeds grew into plants would have been common knowledge to all hunting and gathering peoples. What was needed was a reason to encourage such growth artificially. The development of farming was not something new in itself, but rather it was a method of continuing a familiar way of life (harvesting) in the face of changed circumstances (overpopulation). It is also true that minor climatic changes

may have shifted natural grains out of the territory of a given tribe, thus forcing them to cultivate in order to continue their way of life. Moving with the grains was not an option because other tribes would have occupied the desired territory. Both factors, overpopulation and shifting vegetation zones, would lead people into cultivation simply in order to continue the way they had been living. This is a cultural application of Romer's Rule from paleontology, where an innovation is initially conservative and only later is developed into something truly revolutionary.

The natural distribution of wild emmer wheat can be used for the most reasonable indication of where the commitment to cereal-grain farming began, as shown in Fig. 6 (from Zohary 1969, cited by Dennel 1983). Farming would begin within an area of natural grain where the stands are sparse, or in patches where it is missing. Around the periphery of such stands is the major place where deliberate farming would serve to artificially extend the otherwise natural harvest. Emmer wheat is probably the best food source, and is one of those most consistently found in early Neolithic sites. One might presume it was possession of this grain that tipped the balance between continued foraging and a commitment to farming. This presumption is well supported by the natural distribution of this grain. It occurs in two major locations in the Near East that correspond exactly with my postulated sources for the two major language families that originated in this area. These are thus the original homelands of the Afro-Asian and Indo-European peoples (locations P and A in Fig. 6).

Archeological evidence today shows the earliest Neolithic to be within and around these two locations. The earliest of all appears to be in the southern, or Palestinian, location (Wenke 1980). Exact timing of each small advance in farming technology for the area is not now possible. Still, it would be quite acceptable to postulate the spread of farming from the periphery of the Palestine location at just 150 years before it spread out from the Anatolian location. (This last-named area is actually half inside modern Iraq, but its significance to the present

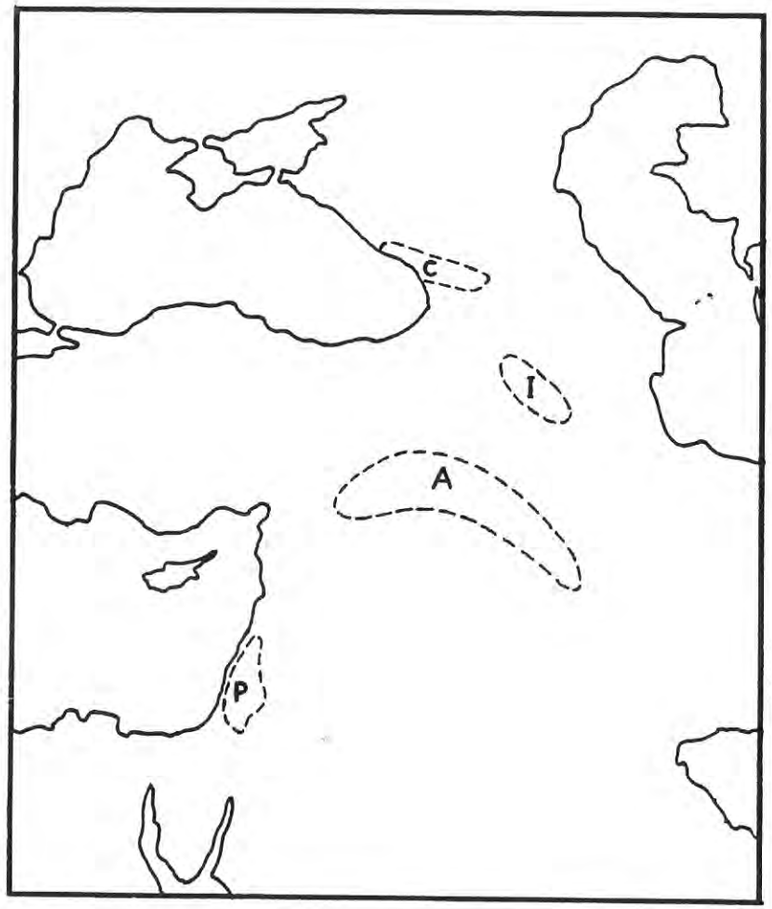


Fig. 6. Neolithic origin locations. Recent areas of wild emmer wheat are shown, with the presumption that they were similarily distributed 10,000 years ago. These are labeled by the initial letters of Palestine, Anatolia, Iran, and Caucasus (uncertain).

study is concentrated more in its Turkish part.)

This timing, if correct, suggests a south-to-north spread of the basic idea by cultural or stimulus diffusion at the rate of 400 km in those 150 years. This is twice as fast as farming itself should have spread. It is also possible that the process developed independently in each place at these slightly different times. It is their close proximity in time and space that suggests a connection.

It is not immediately evident exactly what essential "idea" spread from Palestine to Anatolia. Certainly there was no discovery that seeds grow into plants--if hunters know that copulation leads to babies, then understanding plant reproduction would be child's play. It is not likely that any equipment was critical, as most of this should have been available, or at least easy to develop. The required herd animals were abundant in both areas some time earlier. Possibly the essential discovery was the calendar--knowledge of how to determine the exact time of year that the seeds should be planted in order to achieve the maximum harvest. (I wish to thank Diane Horton for this thought.)

The scenario postulated here is that the correct sowing times, procedures, and equipment were developed first in the Palestinian emmer wheat location. The timing would be that farming began its spread from here at 8150 B.C. This is not to be taken as a definite date--it could have varied by a few centuries either way. It is chosen in part for its consistency with all other dates used in this reconstruction. If this date of 8150 B.C. is changed, then all other dates for the initial Neolithic spread must be correspondingly shifted.

By the date of 8000 B.C. the farmers out of the Palestine location should have spread their settlements 200 km in all directions beyond the core area of emmer wheat. Also at 8000 B.C. the knowledge of when to plant (or some other critical item) is presumed to have reached the western edge of the Anatolian emmer wheat location. At this time the people on this edge would likewise begin their own expansion at the same basic rate of 200

km every 150 years. The calendrical knowledge probably spread out from the Palestine location faster than the expansion of the people themselves--perhaps at twice their rate. Alternatively, this knowledge may have reached the edge of the Anatolian location directly ahead of the spreading farmers--always 200 km ahead of the actual settlement frontier. This knowledge of the planting calendar would be of use only to those harvesters inhabiting the edge of a natural emmer wheat stand who are in a position to expand outward under population pressure. In other circumstances foragers normally show little interest in copying the way of life of neighboring farmers.

Selecting 150 years as the lead time for Palestinian farming was not just based on archeological suggestions. This difference is just the amount of time that automatically results in the formation of a subsequent boundary between Palestinian and Anatolian farmers that corresponds to the later language line between Afro-Asians and Indo-Europeans. It also turns out that this same lead time ultimately results in a much later meeting between North African and European farmers at the other end of the Mediterranean, in the Pyrenees Mountains, which is also linguistically critical. The archeological data are not precise enough to say that this gap was just 150 years, but it could not have been much different. This may eventually be determined exactly.

Palestinian Farmers

The spread of farming out of the Palestine location, beginning at 8150 B.C., is followed here only in those details that are of significance to the development of European languages (Fig. 7). It is assumed from the outset that this expansion was by the original Afro-Asian speakers. This assignment was not arbitrarily made, but it became evident from observing the



automatic distribution of farmers from this source, and how this distribution compares with that of the recent Afro-Asian language family.

The northern edge of the Palestine location is just 400 km from the western tip of the Anatolian emmer wheat location. At 8000 B.C. Afro-Asian farmers would have covered half this distance, just at the time the presumed Indo-Europeans would have begun their spread from here. In 75 more years they would meet--Afro-Asians at 300 km from their source and Indo-Europeans at 100 km from their source. This meeting line would then trend to the north-west and reach the Mediterranean in 7800 B.C. at its northeastern corner. This effectively ends the spread of Afro-Asian farmers at this point, and gives farmers from the Anatolian location free access through the rest of Anatolia. This leads ultimately to their unimpeded entry into Europe, hence the first specific reason to think these are the original Indo-Europeans.

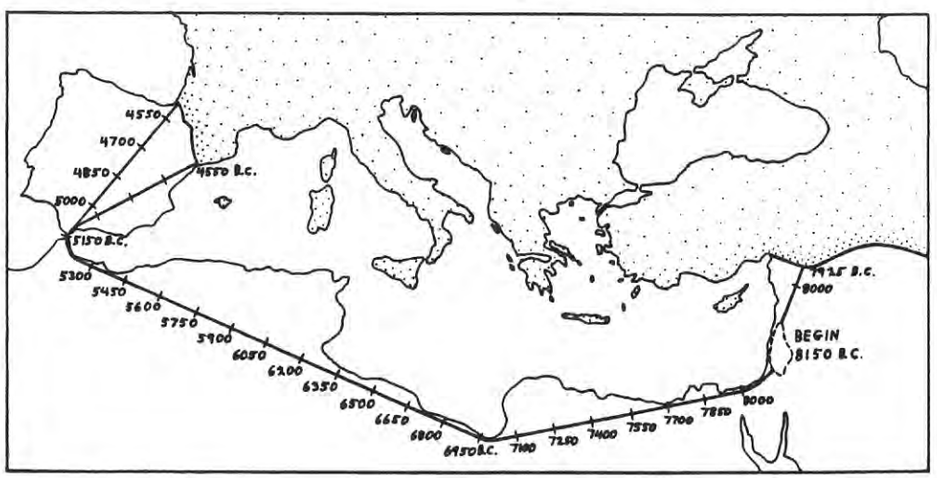


Fig. 7. Neolithic expansion from Palestine. Heavy lines trace the two routes of Afro-Asian spread that are stopped where they meet expanding Indo-Europeans--in Syria and the Pyrenees. Dates are given at each 200-km unit of progress. Afro-Asian territory is left blank, while other speech areas are stippled.

Moving to the east, it may be expected that farming would have extended progressively outward from along the southern edge of the Anatolian location. The calendrical knowledge would not have spread so easily over the Syrian Desert where native cereals were not common. In that case the Afro-Asian frontier would soon move close to the southern edge of the Anatolian emmer wheat location and continue to the head of the Persian Gulf. This automatically results in a language line that runs very nearly along the present Afro-Asian boundary. There is no obvious reason why this language line should have moved greatly in the last 10,000 years. (Compare the line as shown in Figs. 1 and 7.)

Afro-Asian Spread



Further expansion of the Afro-Asian farmers would be into all accessible places to the south and west of their initial area of occupation. Their move into Arabia and the main body of Africa has no relevance to the present study. To the west, in the most direct line across northern Africa, these farmers would have advanced to Gibraltar and beyond (Fig. 7). At a steady rate of 200 km in every 150 years they would cover the 4000 km to Gibraltar in 3000 years, arriving there at 5150 B.C.

The practice of pastoralism with sheep and goats, but without farming, is viable by itself. It should also have spread out from the Palestinian location into the drier areas that could not be tilled. It is quite likely that a different language group was involved in this economy, but it doesn't matter here. These shepherds should have spread just twice as fast as the farmers, possibly reaching Gibraltar 1500 years earlier, at 6650 B.C. There is no reason to suppose they ever developed seaworthy craft, and so did not transport themselves or their stock into Europe. These people would ethnically disappear, at least in

northern Africa, when the tide of farmers eventually rolled over and incorporated them.

A similar group of shepherds would also be at Gibraltar when the farmers arrived from northern Africa. These are the Sea Shepherds or Boat People who developed in Europe and who spread along the northern Mediterranean and Atlantic coasts. (These are not to be confused with the "Sea People" of 1200 B.C. in the eastern Mediterranean, who do not appear in this reconstruction.) Unlike their African counterparts, these European pastoralists had seaworthy craft. While the African shepherds could not enter Europe for lack of boats, the European shepherds could not enter Africa because all the suitable environments would already be occupied. The Sea Shepherds are described in a later chapter; their importance at this point is that they were in a position, since 5915 B.C., to transport the African farmers and their equipment into Iberia.

These Afro-Asians would be the first serious agriculturalists in Iberia--the Sea Shepherds appear not to have engaged in any significant farming. The farmers' expansion over Iberia would be an extension of their spread across northern Africa, and which continued at the same rate. Here they no doubt overran and absorbed the Sea Shepherds in their coastal locations.

Across Iberia to the north-east the farmers would progress four units of 200 km each in the next 600 years. In 4550 B.C. they would reach the lower Ebro River and meet an incoming wave of farmers from the opposite direction. These new farmers ultimately stemmed from the Anatolian location, and are here identified as Indo-Europeans. The two groups would have had essentially the same economic base of crops, domestic animals, and technology. Their methods of land utilization and consequent population density would have been the same. Neither group would have any significant advantage over the other, and each was living on familiar home territory. Their meeting line becomes the second place where people of Palestinian and Anatolian origins encountered one another. This time it was 4800 km from

the Afro-Asian starting point. A stable language boundary would exist here until some other factor forces a change.

Over the next 50 years this meeting line between two farming peoples would arc around to the north-west and end against the Pyrenees. This leaves a triangular area in northeastern Iberia in Indo-European hands. This site ultimately correlates with the origin place of Catalan, the recent language of Catalonia.

Along a different path through Iberia, somewhat to the west of the one just described, the Afro-Asian farmers would advance to the western end of the Pyrenees. The Indo-Europeans reach this area measurably later, so the farmers from Iberia cross the mountains. Their predictable meeting line is about 50 km up the modern French coast, and arcs inland about 100 km to where it reaches the northern flank of the Pyrenees. This meeting line of 4450 B.C. so accurately follows the recent Basque language boundary that its identification appears unavoidable. It has been suggested that Basques once occupied much more territory in the past--the Gaulic province of Aquitaine. It is also possible that this larger area was only controlled by Basque speakers long enough to establish some place names.

This identification of Basque with Afro-Asian is based on geography rather than on any good linguistic evidence. Tovar (1970) and others would distantly associate Basque with Hamitic, and most authorities tentatively include Hamitic in Afro-Asian. These tenuous connections conform well with this reconstruction. Basques are known to have been in their present location since at least 3000 B.C. according to Wilbur (1980); there is no evidence against extending this back another 1500 years.

A short segment of the Afro-Asian frontier would also follow the mountain divide in its west-central part. By 4500 B.C. all of Iberia (except for its northeastern corner) would be occupied by these farmers of presumed Afro-Asian affiliation. They would naturally subdivide into a dialect mesh over the next few thousand years. They would also have included large areas that had been thinly populated by the much earlier Sea Shepherds. More recently their incorporation into the Empire of Carthage

would likely introduce Phoenician in many places. Finally, an influx of Celtic settlers in the last few centuries B.C. would be added to help create a very complex linguistic picture for the peninsula. Almost all of this becomes irrelevant somewhat later when Latin became the nearly universal language of the area. These and still later events are discussed in other parts of this study. The major point established here is the exact course of the first meeting line between Afro-Asian and Indo-European farmers in Europe. Any other accounting for this language line seems to involve far more speculation than is offered here.

Caucasian Farmers



It is calculated here that farming began to spread out from the western edge of the Anatolian location at 8000 B.C., just 150 years after it began from the Palestinian location. From the Anatolian source the Neolithic spread would have been mainly to the west and east, and only to a lesser degree to the north and south. Before detailing the major Indo-European expansion it is necessary to deal with the northern flank. Here there appears to have been a third source for the Neolithic that must be pinned down.

To the north-east of the Anatolian location there is another known stand of wild emmer wheat. It is in a large valley that surrounds the northwestern corner of modern Iran (Fig. 6, location I). An obvious idea would be to associate this location with the origin of the Caucasian language family. While this might be true, there are some good reasons to doubt this, and instead to place the Caucasian origin well to the north, at location C in Fig. 6. (The reader is reminded not to confuse Caucasian languages with Caucasoid race.)

The Iranian location, marked I in Fig. 6, is entirely occupied by an Indo-European speech (Armenian) today, rather than

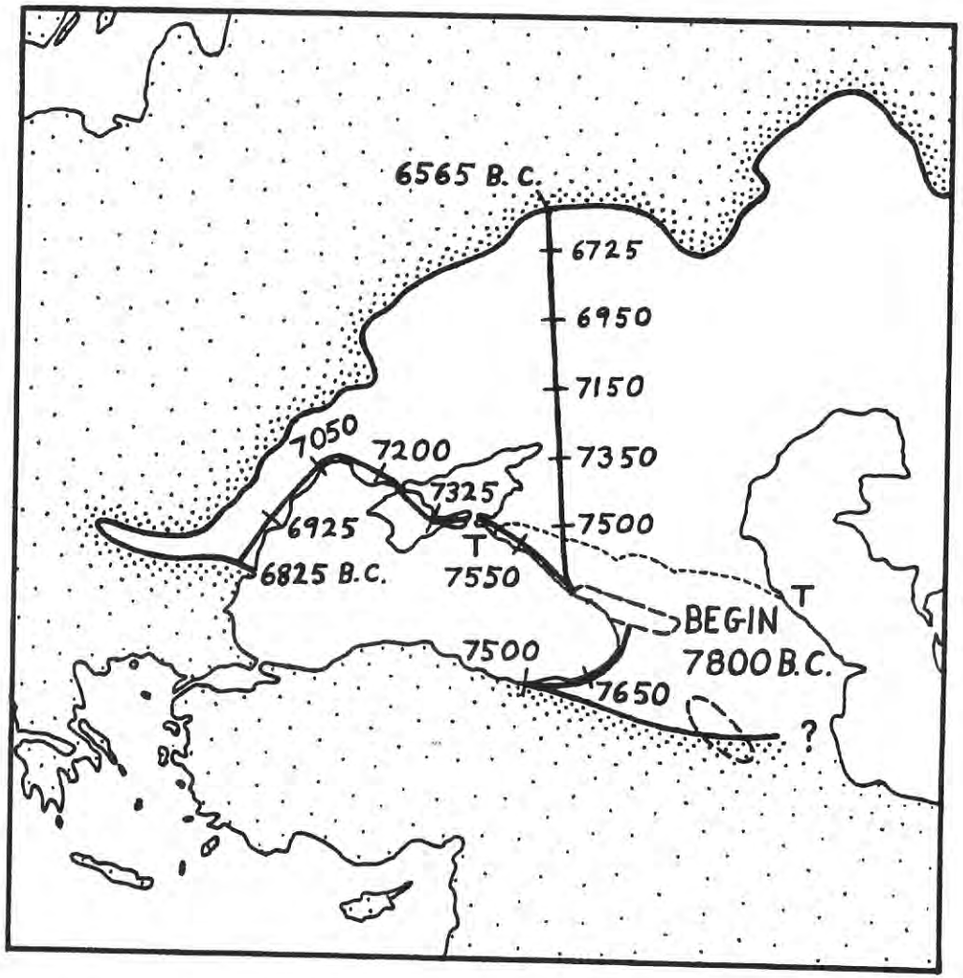


Fig. 8. Neolithic expansion from the Caucasus. Heavy lines trace the routes of Caucasian and Altaic spread from their proposed sources. The transfer of pastoralism to Altaic speakers is indicated by the letter T at the end of the dashed line where deep soils begin. Dates are given at each 200-km unit of progress. Caucasian and Altaic territory is left blank, while other speech areas are stippled.

Caucasian--a difficult though not impossible problem to get around. A language that spread from this location would also tend to put its speakers much more to the east than is the present Caucasian distribution. More likely, the expanding Neolithic wave from the Anatolian location simply overran most of this area before its occupants had time to build up a significant farming population. Also, it is a closed valley that would be entered by the presumed Indo-Europeans from its open end, thus making egress difficult.

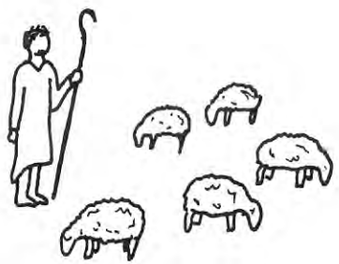
The present Caucasian languages are found on the north and south sides of the Caucasus Mountains throughout all but the eastern end of the range. The simplest accounting for this would be to postulate yet another stand of wild emmer wheat, or its functional equivalent, to be found on the south side of the mountains, toward their western end (location C in Fig. 6). Except for heavier rainfall, ecological conditions here are similar to those at the other wheat locations. According to Chard (1975:224) there is wild emmer wheat within this general area of the Soviet Union, but he gave no map. If deliberate cultivation appeared and spread out from here just 200 years later than from the presumed Anatolian source, then all of the major language distributions work out correctly. This delay of 200 years is otherwise unsupported by any direct data that I am aware of. It also appears to imply an independent development of the planting calendar because the distance involved is too great for the transmission speed suggested above.

Given this presumed starting time of 7800 B.C., Caucasian-speaking farmers would have spread out in all directions until they encountered barriers of geography or other farmers. They would expand their frontier to the south and then west along the southern shore of the Black Sea for a distance of 400 km in 300 years. Farmers from the Anatolian location presumably started 200 years earlier and expanded their holdings directly north (among other directions). With the standard delays imposed for cold winters here, they would reach the same point on the Black Sea coast in 500 years. They meet at 7500 B.C., with the

presumed Indo-Europeans being in the process of occupying most of Anatolia, and covering all access to the west. The Caucasians would occupy just the northeastern corner of modern Turkey along the Black Sea, much as they do today (Fig. 8).

The timing difference of just 200 years is critical here, and might someday be directly determined. If the Indo-European lead time were any less, the Caucasian farmers would have had access to western Anatolia and eventually into Europe proper. Clearly this did not happen. If the Indo-European lead time were any greater, then the next-described result of the Caucasian spread would not have been completed. In the following section it is shown that this result did occur.

Altaic Shepherds



The only other direction of Caucasian expansion that is of any concern here is that to the north-west along the eastern shore of the Black Sea. After advancing some 280 km along this route, and using 350 years, they would enter the deep steppe soils that could not be farmed with the simple plow in use at that time. (This area would remain largely unfarmed for another 8000 years.) At 7450 B.C. these farmers must halt their advance, but their practice of animal husbandry would automatically be picked up by the local Mesolithic peoples. These would be the natives of the Kuban region, just to the east of the Sea of Azov (Fig. 8).

This is the first part of the Eurasian Steppe land that would be reached by people with domestic sheep and goats. From here, people with sheep herding and other Neolithic traits, except for serious farming, were able to spread over the entire grassland and semidesert area from the Ukraine to Manchuria. Almost the whole area is today inhabited by speakers of the Altaic language family, so-named from the Altai Mountains located

near its center. It is usually assumed that their languages originated here, on the border between the Turkic (western) and Mongolic (eastern) branches of the family. There is no obvious mechanism whereby the original language type of this entire area could have been replaced by another single type at any time after the introduction of this pastoral economy. The obvious conclusion is that the Altaic family actually originated with the Mesolithic inhabitants of the Kuban.

Altaic expansion to the east is of no concern here. To the north and west the sheep-herding economy would be very successful throughout the relatively open country. Their progress would halt at the fully forested lands where sheep are not suited. Sheep occur in most of Europe today only in association with farmers; previously there were no wild forms in these forests.

Altaic expansion within Europe would be at the rate of 75 years, plus temperature and daylight penalties, for every 200 km. At this speed they reach the fully forested zone in modern Russia long before any Neolithic farmers enter these forests. Traveling due north out of the Caucasian source, these shepherds would reach the border of the forest zone at 6565 B.C.; this is some 2500 years before the European farmers reach that point, coming from the west with their own sheep.

If these Altaics had long ago abandoned all serious farming, which is most likely, they would be unable to penetrate these forests. They did not even have the option of reverting to a hunting and gathering economy because this niche was already filled here by the native inhabitants. If there had been any significant spread of Altaic speech into these forests there should be clear indication of this in recent linguistic distributions, but there is none.

The most important route of Altaic expansion is that which follows the most direct line around the Black Sea, through the Crimea, and into the eastern Balkans, on to where the grasslands and deep soils end. At pastoralist advance rates, these shepherds would reach the border of this zone, just inside the northeastern corner of modern Bulgaria, at 6825 B.C. Indo-

European farmers, following standard calculations, should arrive at this same line from the opposite direction (from the south) at 6830 B.C. The two meetings with Indo-Europeans, first by the Caucasians in northeastern Turkey, then by the Altaics in Bulgaria, are exactly timed and serve to determine the gap of 200 years between their beginnings. (See Fig. 8.)

The precise timing of the Indo-European and Caucasian meeting in Anatolia has already been described, and this allows for no significant leeway in either direction. The same is true for the Altaic encounter in the Balkans. If the pastoralists had arrived earlier in northeastern Bulgaria, the less-than-dense forest there would have allowed some further advance of an archaic Turkic language. Just such a language, Gagauz, is found today in two Balkan enclaves--in eastern Romania and just inside northeastern Bulgaria, but not beyond. They probably date from this time. (Gagauz is usually assumed to be a recent import from Turkey, but its deviant nature and location fit much better with the interpretation given here.)

If the Altaic shepherds had arrived in Bulgaria much later, then the Indo-European farmers would have transferred their pastoralism to the local Mesolithics. These would necessarily expand northward to meet the incoming Altaics at some point. This would then create an unknown ethnic group of which no trace remains. It would also make the Gagauz difficult to explain. (In my earlier study in 1981 I did not consider the possibility of a Caucasian origin of the Neolithic at all, and assumed that the Altaics arose from this Balkan source. This was clearly incorrect even though the results are largely the same.)

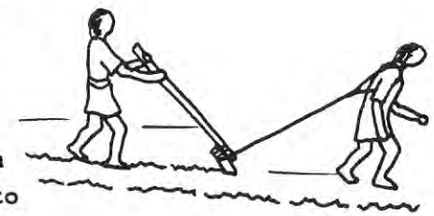
The importance of this part of the geographic reconstruction lies in determining the ethnic identity of the early inhabitants of the Pontic Steppes. From the earliest Neolithic, until the area was largely overrun by Slavic farmers in the Christian Era, these nomads were necessarily Altaics. From Kurgans through Scythians to Sarmatians the great bulk of the population would have spoken Altaic (Turkic) languages. The fact that Iranian personal names have been identified among Scythian leaders

(Crossland 1967) is no proof of what the popular speech may have been. (If personal names were used as our only guide, we would conclude that much of Europe today is Hebrew speaking.)

This reasoning effectively removes the archeologically well-known Kurgans of southern Russia from being a possible source of Indo-European speech. Leaving aside the problems of how the Kurgans could have spread their language, and the fact that the initial spread of farming is the only reasonable mechanism for a change of this magnitude, we would still have the problem of explaining what happened to the Kurgans themselves. If they had been the source of Indo-European speech they would doubtless have spread it over the entire Eurasian grasslands as well. (The existence of Tocharian might be used to argue in favor of this.) Then some natural mechanism must be found to replace this supposed Kurgan speech with Altaic throughout its range. Nothing of the kind seems to be available, especially after the development of horse-based military procedures in this area.

Indo-Europeans in Asia

The next major non-Indo-European language group to deal with is the one I call Aegean. This is the speech that was apparently spread by the Sea Shepherds that have already been mentioned. (Again I apologize to the reader for using a name similar to the later "Sea People," with whom there is no connection.) Before these Sea Shepherds can be described it is necessary to review their background and origin. This stems from the Neolithic farmers who first advanced their frontier toward Europe from a Near Eastern source. These would be the early Indo-Europeans who transferred their sheep-raising technology to some local natives in the Aegean area, much like the Caucasian farmers did to their Altaic neighbors.



Three sources for the origin of Neolithic farming have been tentatively located in the Near East. The starting times for their expansions and their initial contacts with one another have also been laid out in the geographically most probable pattern. The spreads from two of these sources, Palestine and the Caucasus, have already been followed through as far as they should have affected the languages of Europe.

From the perspective of the overall Neolithic invasion of Europe, the Palestinian source of presumed Afro-Asians produced something like a left flank of this invasion. The Sea Shepherds may almost be viewed as an adjunct to this left flank. The Caucasus source, with its Altaic off-shoot, forms something of a right flank of this invasion. Still another group, the yet-to-be-described Uralics, are an adjunct to this right flank. These two flanks almost surround the core of Europe. The main weight of the central invasion, by direct reasoning and by elimination, must have been the Indo-Europeans themselves.

The spread of farmers from the Anatolian location has been reconstructed in terms of its meeting lines with those farmers stemming from Palestine to the south and from the Caucasus to the north. These lines are in reasonable agreement with the recent distributions of the language families that are involved. The central group of presumed Indo-Europeans would have access to all areas both east and west of its source, and between the areas occupied by people from the other two sources on the north and south. This Indo-European spread may now be followed through its initial stages to just short of the actual invasion of Europe.

Indo-Europeans would have unimpeded access to the east over all of modern Iran and into the Indian subcontinent. Their identification with the first farmers in that area would appear to be unavoidable. The writings of the Harappan civilization accordingly would have to be an early form of Indo-European; their decipherment could be an important test of my ideas. The supposed introduction of this speech into India from invasions around 1800 B.C. is unsupported by any direct evidence. Most indirect evidence, including the present study, argues against

the likelihood of a total language replacement being effected by a relatively small number of primitive invaders at this time. (The brief appearance of Indic writings in Mesopotamia in 1800 B.C. may represent a late military incursion, rather than a record of these people on their way to India.)

The Indo-European spread that is of more concern here is the west through Anatolia, where they also had unimpeded access. The most direct route to Europe would first be straight west in order to skirt the central highlands where winter temperatures would cause delays. Then in western Anatolia a northwesterly course would bring these farmers into Europe just short of 7100 B.C. Within that time frame most of the rest of Anatolia would also be settled.

One important result of this proposed initial occupation by Indo-European farmers is that we need not look elsewhere for the origin of the old Anatolian languages. Hittite, Palaic, and Luwian were all based here since the arrival of the first Neolithic farmers. Later Anatolian languages like Lycian, Phrygian, and Armenian are probably also equally native to the region. The ultimate fate of the Anatolian languages with the introduction of Turkish is covered in a later chapter.

A large area of grassland in central Anatolia was probably not easily plowed, and local Mesolithic people here should have adopted sheep herding. Indo-European farmers then would have spread around both sides of this area, meeting each other again to the north-west of it. The ethnic identity in this grassland area is almost certainly Hattic. A short digression into some later historic events is necessary at this point.

Singer (1981) has established the Hattic homeland to be exactly here in the Halys River basin (now Kizil Irmak), which in turn happens to be the core area of the ancient Hittite Empire. This odd contrast of an Indo-European empire based on a non-Indo-European homeland has been neatly solved. Steiner (1981) showed that the Hittite Empire was in fact Hattic-speaking in terms of its rulers, religion, and core population. The Indo-European Hittite (more properly "Nesite") was merely the diplomatic and

commercial language of central Anatolia from earlier times that continued to be used by the Hattic rulers. Once horses came into use in Asia Minor, this pastureland of central Anatolia would automatically become the basis of a major military power. It would be of non-Indo-European speech only if the Indo-Europeans were the farmers who could not have settled this particular area.

Sea Shepherds

The next event of importance is the presumed transfer of some Neolithic traits from the Indo-Europeans to some of the local Mesolithic inhabitants off the southwestern coast of Anatolia. This is the most reasonable starting place for the Sea Shepherds or Boat People, as I variously call them. This is an archeologically well-known group who spread early Neolithic traits around much of the European coastal areas.



The development of seaworthy craft may be expected among any Mesolithic peoples living where there are numerous islands within sight of the coast and of each other. These invite exploration and exploitation, and the boats themselves can also support fishing. Boats could have been devised anywhere that bodies of water occur, but any degree of sophistication depends on their usefulness. The Aegean is one of the most ideal locations for such a development, and there is archeological information that supports this as far back as 6500 B.C., and possibly farther (Dennell 1983:116). This is the first such maritime zone that would be encountered by early Neolithic farmers.

The advancing front of Indo-Europeans along the Mediterranean coast of Anatolia would reach the first significant Aegean island, Rhodes, in 7300 B.C. Most of these islands are not well suited to cereal-grain farming on a large scale, but would be excellent for sheep herding. It would appear natural

that the farmers would be delayed here, and that the Mesolithic natives would adopt their domestic sheep keeping. This would involve a transfer of mainly the pastoral aspect of the Neolithic economy, just as in the Caucasian-Altaic transfer and the others that are indicated here.

These new Sea Shepherds would have the opportunity to spread around the coasts and all accessible islands, which means the entire Aegean Sea, ahead of the advance of Neolithic farming. They would occupy any and all places along the coasts that offered good sheep pasturage. They would not tend to move far inland because of the forests, and also so as not to lose the other major aspect of their economy--fishing.

The ethnic identity of the Sea Shepherds is not that of any recognized linguistic group of today. It would most likely relate to the Pelasgian language of Greece which is known from geographic place names that are not Greek. It may well be recorded in the Minoan hieroglyphs, and just possibly in Linear A. This Aegean language would be carried by the Sea Shepherds in the course of their expansion, changing over time, and be distributed sporadically around the seacoasts of much of Europe. The fishing aspect of their economy would be lost whenever they spread inland. Their sheep herding, without farming, was only sporadically viable in mostly forested Europe. Eventually they would be met by the Indo-European and Afro-Asian farmers, and were overrun and easily incorporated. They would probably have no more than minor linguistic impact except for one location near the end of their range. (See Fig. 9 for their distribution.)

The starting time for the Sea Shepherd economy would be at 7300 B.C. when Indo-European farmers first reached this area of developed boats. I would allow 200 years for the integration of this way of life and for its spread throughout the Aegean. This interval is arbitrary, and its actual length would have no critical bearing on subsequent events.

Indo-European farmers should be at the Dardanelles about 7050 B.C., presumably just 50 years before the Sea Shepherds reached that point. They can cross into Europe with the aid of

other Mesolithic boat people who would have lived there. With this timing, a new group of Sea Shepherds might have spread briefly over part of the northern Aegean.

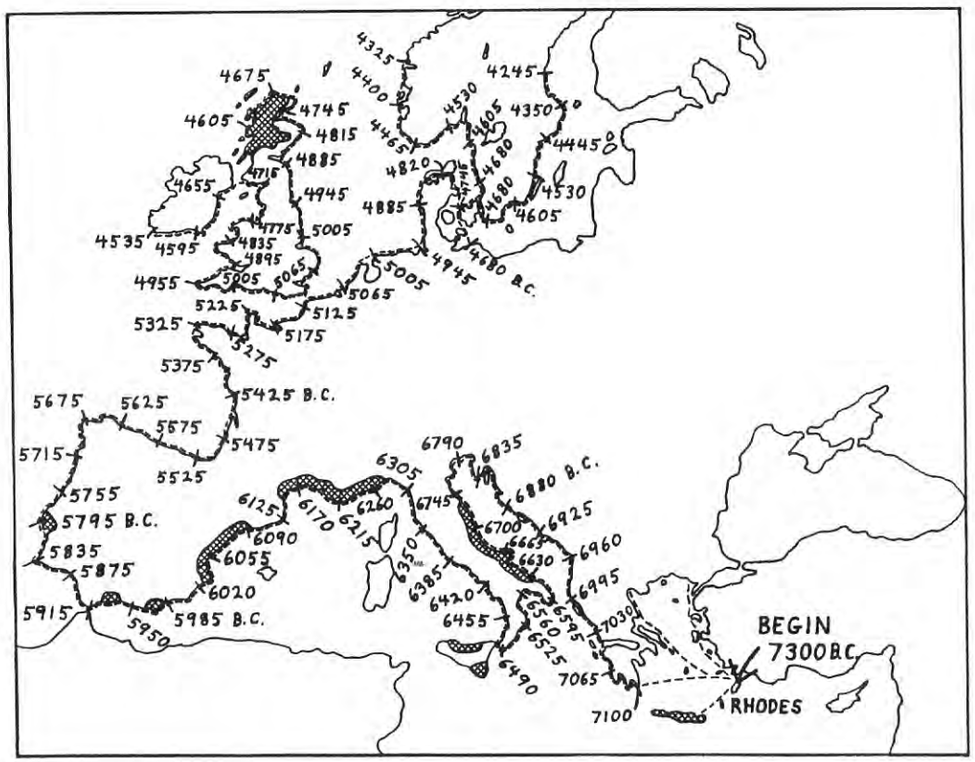


Fig. 9. Spread of the Sea Shepherds. The dashed line traces the progress of Aegean Boat People, from the Island of Rhodes around the Mediterranean and Atlantic coasts of Europe, and ending in the Baltic. Suggested dates are given at each 200-km unit of advance. Cross-hatching indicates areas that were occupied well after the initial wave had passed through.

With slightly different timing, the developed Sea Shepherds could have been at the Dardanelles first and helped transport the Indo-European farmers across that water barrier. In this case they would have had access into the Black Sea, finding sufficient grazing lands up to this point. Within this sea they could make no further progress as sheep herders. All of its coasts already would be occupied either by farmers or by land-based shepherds. Their ethnic identity would not persist long with their economy reduced to just fishing and commerce. Similarly, any spread of Boat People clockwise around the Mediterranean would be confined to the maritime aspect because the sheep-herding niche was also filled long before.

From the southern tip of Greece the Sea Shepherds had an open ecological niche in just one direction--to the west along the northern Mediterranean shore, and ultimately up the Atlantic coast of Europe as well. Their starting time is here set at 7100 B.C., just 200 years after their origin across the Aegean. Their arrival at the English Channel at or before the time of the inland farmers is archeologically known; they would be available to assist in this crossing too. Still farther along the coast it would be convenient if these Boat People had reached the Danish Islands in time to assist farmers in crossing into Sweden. Local Mesolithics should have had boats, but they probably could not easily handle cargoes that by then included cattle as well as sheep.

It is a safe presumption that the earliest advancing wave of Boat People would have hugged the coasts and made no attempts at sea crossings beyond visual contact. Later developments improved their range, but this would have had no effect on the initial wave of shore settlers. Given this limitation, their entire route of 11,000 km from the Adriatic to Denmark can be laid out in 55 units of 200 km each. Between their starting date of 7100 B.C. and their arrival in Denmark by 4650 B.C. (the same time as for farmers), there are 2450 years available. This gives an average of just under 45 years for each 200-km unit of advance. Considering that these Sea Shepherds were very mobile and

initially could settle only small coastal areas, this rate of spread appears to be at least reasonable.

A more exact schedule for their progress can be constructed by following the model used elsewhere in this study. A basic rate of one generation per 200 km can be assumed, and it would take the same 30 years as in other cases. The same penalty of one-third of this is added for each hour of reduced winter sunlight. (No freezing temperatures occur along this route.) Another penalty of five years is arbitrarily added to each 30-year generation for expected losses at sea, and this is doubled to ten years for all travel along Atlantic coasts. These factors give an internally consistent set of variations that should at least approximate the real situation. For a 200 km unit the fastest advance would have them make it in 35 years, and at their slowest along this route it would take them 65 years.

The first significant point reached by the Sea Shepherds is Gibraltar at 5915 B.C. North African land-based shepherds may have been there as early as 6650 B.C., but would not likely have crossed this water gap. The Sea Shepherds would find no available pasturage remaining on the African coasts, so there would be a standoff between them. When Afro-Asian farmers arrive at 5150 B.C. their crossing into Iberia, along with their new economy, would be facilitated. Without this transportation these farmers might have been substantially delayed here while developing their own craft, if they ever would. The 765-year difference in arrival times would allow for considerable improvement in the shipping that was available here. The frontier of the Sea Shepherds by this time had already progressed to the English Channel.

The next significant item is the arrival of the first Sea Shepherds at Dover in 5095 B.C. Indo-European farmers from the continent would not reach Calais for almost another 600 years, at 4500 B.C. Again, well-developed water craft thus should be available to transport the farmers and their stock into a new location with no expected delay. This amount of lead time of boats over farmers was not essential, but the presence of some

kind of good water craft was. Here, though not at Gibraltar, the boats had to be large and strong enough to carry cattle. The crossing into Ireland would follow the same pattern somewhat later.

The third meeting of Sea Shepherds with the advancing front of farmers on the continent would be at the area of the Danish Islands. The schedule used here puts the Aegean Boat People in the proper place at 4700 B.C., and the first farmers at 4625 B.C. (This is actually more than a century earlier than the crossing at Calais-Dover, but these events are here given in the order of arrival of the boats, not the farmers.) In this case the calculated lead time is only three generations, but the probable availability of local water craft makes this close timing less critical. In any case, their overall timing was calculated just so that this meeting would take place.

Following out this schedule, the Sea Shepherds would reach the coast of modern East Germany at 4700 B.C., and the Indo-European farmers would arrive there at the same time. All possible areas to the east would have been occupied by farmers even earlier. Thus the center point of the East German Baltic coast should mark the Sea Shepherds' maximum advance around the continent. They would have had access to all of Scandinavia just before this, and may well have settled parts of Denmark and southern Sweden. It is not likely that they went much farther to the north--even today few sheep are raised in Scandinavia.

The Scandinavian farmers probably incorporated a disproportionate amount of ship building as a regular part of their culture. This would follow from their abundance of coasts, lakes, islands, and rivers where shipping would have continuing use. The Sea Shepherds' ethnic component in this may already have faded out before the next major water gap was reached in this area. This was the crossing of the Baltic Sea from eastern Sweden, through Aaland, to the southwestern coast of Finland. This crossing would occur at 3300 B.C.

The Sea Shepherds may have first rounded the northern-most corner of Scotland at 4675 B.C., and been in the middle of its

western islands 70 years later. They would complete their coverage of the Irish coast at 4505 B.C. Given the dense forests over most of the British Isles, shepherd penetration would have been minor. Only in the Moors of western Scotland would they find a large area to occupy that was at all comparable to the places they held in the Mediterranean.

The crossing from Scotland to Ireland by the earliest farmers would have occurred at 3725 B.C. Again, the Sea Shepherds had long been there (since 4685 B.C.) and would have provided the shipping facilities at whatever cost may have been appropriate at the time and place.

Since there are no recent European languages that have been identified, even in part, with these Sea Shepherds, the reasons for this lengthy account should be reviewed. In terms of the mechanics of the rest of this reconstruction, their significance lies in their predictable availability for transporting the advancing frontier of farmers across all significant water barriers. Without the Boat People it might have been reasonable to impose a long time penalty for the development of such shipping by the farmers themselves, at least at some key locations like Gibraltar and Dover. It is not obvious how long this would have taken, and thus it might have had a major effect on the timing of some farmers' advances. Fortunately for this reconstruction, no such considerations were necessary.

These Sea Shepherds are well known archeologically, especially along the Mediterranean coast. They are often credited with being a major factor in the initial spread of the Neolithic in southern Europe. Considering their ethnic fate this importance could well be questioned. Yet the fact of their existence must be recognized. Actual farming might have reached as far as Italy along their established coastal routes, though well behind the Sea Shepherds' initial frontier. Such a farming intrusion from the coasts must have been minimal, considering the absence of clear linguistic evidence to this effect. The known diversity and complex relationships of early Italic languages may argue for some influence from this source.

The parts of western Europe that are noted for the megalithic monuments correspond somewhat with the Sea Shepherds' distribution. This is especially true for the abrupt stopping of both at the same place just inside the Baltic area. It is tempting to look for some connection. However, these monuments occur much farther inland than we have any reason to believe these people could ever have reached. Also, the dating of the megaliths is only after the farmers arrive, and not during the time of the Sea Shepherds only. Finally, many of these monuments were for astronomical calculations--an art that only the farmers really needed. Descendants of the Sea Shepherds, with their maritime orientation, may have figured prominently in spreading some cultural items like these, but that is about as far as one can go on this line of speculation.

Linguistic influences may not be entirely out of the picture, so I offer the following speculations. The pre-Helenic, or Pelasgian, place names in Greece must be pre-Neolithic, as figured here. They would then be from the exact time and general area from which the Sea Shepherds originated, and thus could represent a related language. Similar traces may occur elsewhere. A well-known section of northwestern Germany and the Low Countries, and running as far west as the Somme River has many place names that are neither Celtic or Germanic. These may trace back either to the local Mesolithics or to the Sea Shepherds. The Etruscan language is still unsettled, and these Boat People are the only viable candidates other than the Indo-European farmers themselves. Ligurian remains problematical, and a Sea Shepherd element may well be involved. Probably the best case can be made for the extinct Pictish language of Scotland that occurred in just the area where they most likely would have survived in some numbers. Beyond this, they were ephemeral and they do not appear on the last maps.

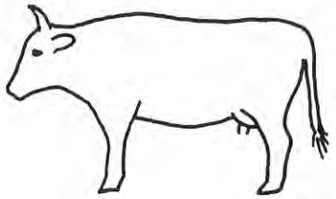


CHAPTER THREE -- NEOLITHIC SPREAD IN EUROPE

The major thrust of the Neolithic entry into the main body of Europe can now be described. Four simultaneous flanking movements of other language groups have already been dealt with: Afro-Asian sweeping across North Africa and into Iberia, Caucasian into the southeastern corner, Altaic throughout the Pontic Steppes, and Aegean along the southern and western coasts of Europe. A fifth flanking movement of Uralics in the north does not get underway until after the Indo-European entry, so its full description is postponed to the end of this chapter.

The overwhelming source of Neolithic farming in Europe is clearly the initial wave of immigrants from Anatolia who first entered the Balkan Peninsula about 7100 B.C. Their identification as Indo-European speakers has already been discussed. Within a century of this entry the first-occupied lands would have been filled to carrying capacity with settlers, and further immigration was quickly phased out. This is the same pattern as with all frontier advances. It is mentioned here only to remind the reader that there was no need for the existence of a great population reservoir in Anatolia to feed into Europe. The initial wave of immigrant farmers is sufficient, and is all that could have entered anyway.

Balkans



Expanding overland at a regular rate the Indo-European farmers would have fanned out uniformly over the southern Balkans. To the north they reached the deep-soil region in northern Bulgaria at 6830 B.C., where they met the Altaic sheep herders who arrived there at about the same time from the opposite direction. Details of this encounter are given in the preceding chapter. The immediate significance is that the entire Pontic Steppe region was then closed to entry by any other ethnic group. The boundary of deep soils and grasslands, along with its inhabitants, forms a right flank bordering the original Indo-European speech area on this continent.

To the west and south the farmers spread over and occupied the major parts of modern Greece, reaching its southern tip at 6500 B.C. Differentiation of the Greek language must have had its ultimate beginning at this time. There is no subsequent event that affords anywhere near this degree of population replacement.

Further expansion in the Balkans would then begin to encounter factors of winter cold and shortened daylight hours, as described in the Rules of Movement. These would seriously affect the intruding farmers in the form of personnel losses from the new climatic factors, local carnivores, and the Mesolithic natives, among other things. The influence of these penalties may be noted on the map of progress along the major routes where dates are given at each 200-km interval (Fig. 10). This becomes even more evident on the map where the advance of the Neolithic frontier is shown in 500-year intervals (Fig. 11).

The advancing wave of farmers would first encounter the Hungarian Plain, roughly the eastern half of modern Hungary, at 6400 B.C. The deep soils here cannot be plowed except for some

choice locations mainly along the rivers. The Neolithic wave became divided into two fronts that passed around each side of this area. Natives of the Hungarian Plain would now have the opportunity to adopt domestic animals, among other things, from their new neighbors. At this time cattle were included among these animals; they apparently were domesticated in the southern

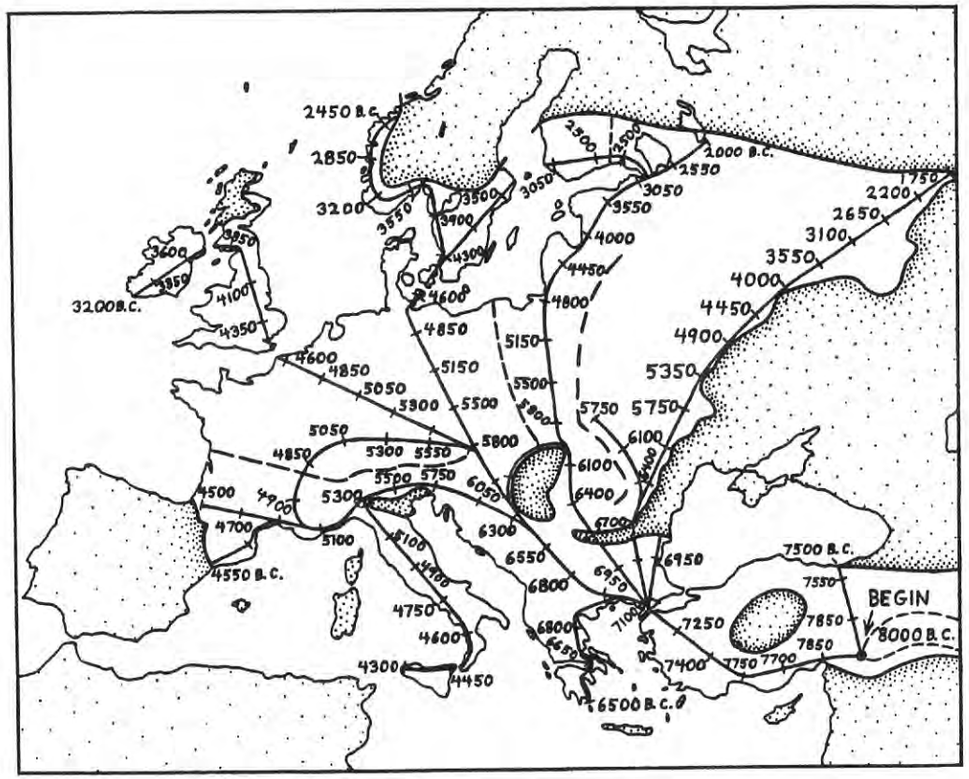


Fig. 10. Neolithic expansion from Anatolia. Heavy lines trace the main routes of Indo-European spread through Asia Minor and over the central part of Europe. Dates are given at each 200-km unit of progress. Indo-European territory, along with that of the Uralic farmers, is left blank; all other speech areas are stippled. Heavy dashed lines show linguistic divisions where incoming peoples were partially separated by natural barriers.

Balkans just a century or so previously (Wenke 1980). Cattle would have gained rapid popularity because they could be used to pull plows, as well as provide meat, milk, and tough hides.

Cattle are well adapted to the European forest zone, and wild forms lived there as part of the natural fauna. Sheep, on the other hand, are not well adapted to forest conditions and had no wild representatives in this area. Farmers can continue keeping sheep in Europe by clearing pasturage and otherwise caring for and protecting them. Pastoralists would often find cattle to be the more useful animal to keep under domestication here. The only advantage of sheep is to use their hair and skins for clothing. It would be automatic for the Hungarian natives to adopt the pastoral aspect of the Neolithic economy, with an emphasis on cattle, along with pottery and whatever else may have seemed useful. They would have taken up little or no farming, and no doubt put less emphasis on permanent dwellings and large amounts of personal property.

As cattle herders these eastern Hungarian natives would then spread out automatically into all available areas that were not already blocked by the advancing farmers. Their rate of advance would be twice that of farmers, just as with the sheep herders of the Eurasian grasslands. By 5800 B.C. the farming frontier would have passed completely around the Hungarian Plain with the two arms of this advance meeting on its northern side. This then cut off the inhabitants of the plain from further contact with their ethnic relatives who had spread out from there to the north and north-east. These cattle herders on the outside, expanding faster than the farmers, would continually outdistance them and come to occupy ever larger territories. The detailed history (with maps) of this advance of herders out of the Hungarian Plain is given in a later section.

The domestication of cattle had been so recent in the Balkans that it probably would not have spread far when the Hungarian natives picked up the practice. Cattle raising should have reached the deep soils of eastern Romania at a similar time. Here they would be adopted by the local pastoralists where they

largely replaced sheep in this economy. This new domesticate would then spread eastward over the Eurasian grasslands. In areas of taller grass, cattle would predominate; in areas of less rainfall and shorter grass, sheep would continue to be the major domestic animal.

A two-part wave of cattle domestication then automatically spread eastward out of the Balkan area. South of the forest zone, cattle were largely substituted for sheep by the existing pastoralists, in place. Within the forest zone, cattle were introduced as the major domestic animal by the influx of the first pastoralists out of Hungary. It may be assumed that cattle replacement in the steppes progressed at about the same rate as the new pastoralists advanced in the forests. Evidently neither got far enough ahead of the other to cross the forest line and make a major ethnic intrusion into the other's area.

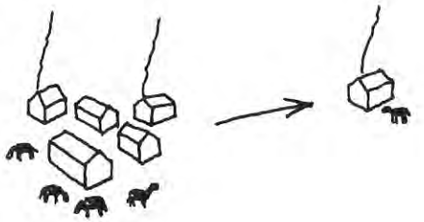
Continuing to follow the full Neolithic advance we may note that the meeting point north of the Hungarian Plain represents a 600-year separation of these two waves of farmers. This is not enough time for their speech to become separate languages, but a strong dialect contrast would probably exist by that time. As people advance at known rates from both sides, this meeting point would be extended into a meeting line that can be plotted with some accuracy. It runs to the north-west, curves gradually toward the north because those on the west move faster, and reaches the Baltic about 100 km west of the mouth of the Vistula (Fig. 10).

The continuity of the spreading dialect mesh of Indo-European was broken by this line, especially to the north. It would not have been a major linguistic barrier initially, but as speech innovations emerged on each side some might cross and others might not, and it would have strengthened over time. The continuity from one side of this line to the other would still exist through contacts around the southern side of the Hungarian Plain. This would tend to limit the amount of divergence between the two sides in the north. From its location and early occurrence, this may be taken as the dividing line between the

original Balto-Slavic on the east and Celtic on the west.

Eastern Europe

The spread of Neolithic farming in eastern Europe involves the entire area between the Celtic meeting line on the west and the Altaic pastoralists on the southeastern border. Within this area of expansion there are two crosscutting divisions--earlier and later phases, and separate paths of advance. The two are described here in that order.



The early phase is that of the Indo-European farmers who can be followed across the entire eastern front, disregarding the separate paths. At their beginning these eastern farmers crossed from Bulgaria to Romania over a band of steppe land along the lower Danube, most of which could not be farmed by simple techniques. It was a narrow strip that was just then being infiltrated by the first Altaic sheep herders, and should have been passed over with little difficulty or delay.

Farther to the north the farmers' advance rate gradually slows down with increasing penalties from colder winters with shorter days. This eventually results in a halt of the ethnic advance well within Russia, and a transfer of the full range of Neolithic technology to the local residents.

Normally, if the native Mesolithic population begins to adopt farming practices, the oncoming wave of established farmers will roll over and incorporate them before they can substantially increase in numbers. At some point the rate of agricultural advance may become so slow that the native inhabitants are able to increase in numbers enough to hold their ground. When the natives are pastoralists instead of hunters, as in this case, the farmer's population advantage is only four to one, instead of ten to one. It can also be assumed that pastoralists will find less

difficulty than would hunters in accepting the full Neolithic way of life. They would need just two full generations of unimpeded (doubling) population increase, with the new technology, in order to match numbers with the incoming people.

Roughly speaking, a slowdown to 450 years per 200 km can be used to mark this transfer of Neolithic technology to the local pastoralists. After this it would be just the technology that spread, not the people, so there would be no further ethnic moves while the Neolithic frontier itself continues to advance. It is assumed here that the advance of Neolithic technology within a resident population would continue at the same rate as it would if it had continued to overrun the natives.

The 450-year transfer rule generates an arc passing through the middle of Latvia and roughly enclosing Belorussia (White Russia). Various parts of this line are reached between 5000 and 4000 B.C. This is reasonably close to the line that is known to have enclosed the early distribution of Baltic dialects, leaving the Uralic language family beyond it to the north and east. This marks the halt of the Indo-European language distribution for over 4000 years. Actually the transfer of farming from Indo-Europeans to Uralics must have taken place on the Lithuanian border, some 100 km to the south of where the above rule would put it. Most likely a denser population of cattle herders near the Baltic coast allowed for a faster matching of numbers with the intruding farmers, thus causing the transfer to happen somewhat earlier along this part of the arc.

Beyond the Indo-European stopping line Neolithic farming technology should continue to spread most likely at its standard rates, becoming still slower in some places. Here it spread among Uralic-speaking herdsmen who had moved out from the Hungarian Plain somewhat earlier. With the farming advance continuing so slowly, it would be adopted by adjacent populations without any significant movements of people on this frontier. This farming frontier continued to advance until it reached the line of the 120-day growing season. Beyond that, pastoralism continued to be the basic economy--one that had switched from

cattle to reindeer in this area.

The advance of Neolithic farming may now be followed along the two major paths in eastern Europe. As the original farmers spread north through Romania there would be a noticeable delay in the colder central part of the country. The crest of the eastern Carpathians can be used to mark this division, as it also served somewhat as a barrier of its own. The western and eastern arms of this advance meet to the north after a separation of 600 years. This separation was probably less than total, so it is not clear how strong a linguistic dividing line was generated beyond here. In any case, this meeting line progresses almost exactly along the recent Polish-Russian division, and then turns automatically to the north-east to continue nearly along the Lithuanian and Latvian borders against Russian. This coincidence is so close as to suggest that it resurfaced when more recent languages spread over the area. (See dashed line in Fig. 10.)

The earlier spread of Uralic pastoralists is described in the next section, but one aspect of it must be anticipated here. They begin in Hungary, and appear automatically to have divided themselves into three major paths as they spread north and east over much of eastern Europe. The dividing line between their left path (Finnics) and their center path (Samoyeds) largely follows the meeting line just described (Fig. 12). This old Uralic division began 200 km to the west of the Polish-Russian line, but it joins that line in northern Poland and they run together to the end of the Indo-European farmer limit. A substratum of Uralic contrasts can be added to the Indo-European contrasts that are here indicated on each side of this line. This comes to mark the division between what might be called Coastal and Interior Baltic (terms invented here), and in recent times is the dividing line between Baltic and Slavic.

The left path of Neolithic advance in eastern Europe runs generally northward between the Baltic coast and this persistent ethnic dividing line paralleling that coast, some 200 km inland. Farming practices transfer to Uralic natives at the Latvian border and continue along this path to the north and north-east.

Farming then curves eastward around the head of the Gulf of Finland and finally moves into Finland itself, crossing the modern border at 2500 B.C. A short distance west of here the advance would be stopped, at about 2300 B.C., when it meets a similar advance of local Neolithic coming from the opposite direction--out of Sweden. (See Fig. 10 for the dashed line paralleling the Baltic coast, and Fig. 12 for the Indo-European stopping line.)

Finland should not show any ethnic break at this meeting line between eastern and western influences. On both sides it was native Finnic peoples who were adopting the full Neolithic practices on their own territory. There should, however, be some kind of a technological contrast here. The two paths that met in southern Finland carried technologies that last parted company in 6500 B.C. in the Balkans. Over 4000 years of separate development, even on the conservative frontier zone all the way, should have led to recognizable differences in art and style.

Further Neolithic advance to the north would end roughly along the line of the 120-day growing season. That would include about one-third of modern Finland. The rest of the country would stay in the hands of reindeer pastoralists for a long time.

The remainder of the Neolithic advance in eastern Europe, its right path, would come out of eastern Romania and run generally to the north-east into most of Russia. This is bounded on the west by the Baltic path of Neolithic immigration, and on the east by the Eurasian grasslands where cattle were just being adopted by the resident Altaic sheep herders. This is a broad front, almost 500 km wide near its beginning and increasing to over 800 km at its widest part.

The post-Romanian part of this path consists of the western Ukraine (the forested part), and then passes over the Pripet marshes to encompass Belorussia. These marshes probably did not slow the Neolithic advance, but were enough of a linguistic barrier to later form part of the dividing line between Slavic to the south and Baltic to the north.

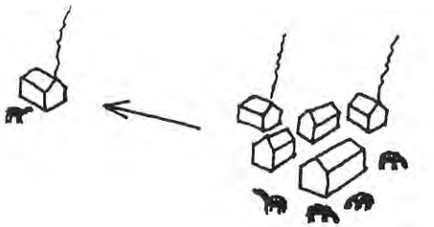
The farming front at first should have advanced directly

northward through Romania and fanned out equally to the north-west and north-east within the Ukraine. After that it automatically turned more to the north-east as its western part advanced more rapidly, and it was pressed in by the even faster advance of farmers along the Baltic path. The line of technology transfer was then reached along the northeastern boundary of modern Belorussia. (See Figs. 10 and 12.)

The continuing Neolithic advance was then of technology only, and passed through the Uralic pastoralists who were native to the area. This should be archeologically testable where early farming passes through the area, and it should be marked by a style line where ethnic identity changed from intruders to residents. From here on, the Uralic substratum is presumed to be divided into two paths of about equal width. Closer to the Baltic is the central Uralic group, here equated with the ancestral Samoyeds. Adjacent to the Pontic Steppes is the right branch of the Uralics, presumed to be the original Vogul/Ostiaks (Ugric speakers). Both of these pastoral groups would have adopted Neolithic farming techniques and passed them on even deeper inland, with no expectation of significant internal population movement. Increasingly severe winter conditions along these paths would suggest that local population densities did not rise as much as in the milder climates to the west. There is no indication that the internal dividing line between these two Uralic language groups ever surfaced here in later populations.

The frontier of the full Neolithic economy continued to move eastward and eventually pinched out between the converging lines of the 120-day growing season on the north and the edge of deep soils on the south. These meet on the western slopes of the Ural Mountains, and this point should have been reached about 1750 B.C. Beyond the 120-day season, both north and east, there would be the reindeer-based Uralic pastoralists. To the south, in the deep soils, would be the cattle-based Altaic pastoralists. Reindeer and cattle zones meet at the Urals, and the dividing line between them continues to the east into Asia.

Western Europe



The Neolithic frontier advancement around the western side of the Hungarian Plain constitutes the rest of the Indo-European source for Europe. This advance subdivides into many different routes, of which two can be considered major. These were separated from each other by the Eastern Alps into northern and southern branches. The northern branch leads to the largest area and is described first.

A direct course can be plotted from western Hungary to Denmark, then across the islands into Sweden. From this path people filled in the western, or Celtic, side of the dividing line running from Hungary to the Baltic. The rate of advance generally slows down along this route because of colder winters and shorter days. There is one minor exception at the base of the Danish peninsula where winters are warmer than before or later.

It has been calculated that the Aegean Boat People reached the Danish islands just ahead of the overland farmers. If so, they would provide the means of transportation between these islands and into Sweden. If this calculation is in error we may assume that the local Mesolithic water craft were capable of moving some of these farmers and their livestock.

This northern European path can be followed directly to the coast of eastern Sweden to where it meets the 120-day growing season line at 3050 B.C. A branch of this path would turn off to the north-east and cross the lower end of the Gulf of Bothnia to reach Finland. I am assuming that shipping would continue to be available throughout Sweden, even in the absence of the Sea Shepherds, because of the area's extensive network of waterways and offshore islands. There should have been no delay gaining transportation to the Aaland Islands and on to southwestern Finland. By counting only land distances in this last 200-km

unit the Neolithic people and their economy should have been able to enter Finland over a long stretch of its southern and western coasts. Shipping contact between this coastal strip and Sweden would have been maintained thereafter. Swedish speech along this strip thus may date back to 3050 B.C.

The rate of Neolithic advance slows dramatically as Finland is entered, and its transfer to native Finnic speakers would be automatic just inland from the coastal strip. In this new manner the economy alone would progress across Finland at the rate of 550 years (the maximum) for the next 200 km. With just a small additional advance, the Neolithic way of life should meet its counterpart entering Finland from the south-east at 2300 B.C. Not surprisingly, the archeological contrast between these two sides of the country has long been noted, while the only linguistic contrast is the one far to the south-west where Swedes and Finns meet (Kivikoski 1967).

The Neolithic advance can be followed up the interior of Norway with interesting results. At the latitude of Oslo the 120-day line is met, at 3500 B.C., and farming necessarily stops. Cattle herding and other traits would then transfer to the native Mesolithic Scandinavians of the interior. This pastoralism then should have advanced through and over other Mesolithic hunters at the rate of 75 years, plus penalties, per 200 km. After an advance of about 270 km they would meet the southward moving Uralic (Lappish) reindeer herders in 3130 B.C. This encounter is calculated to have occurred on Lake Femund, which in recent years just happens to mark the southernmost extent of the Lapps. The remainder of the meeting line between Lapps and Scandinavian herdsmen, and the full boundary of the latter may be seen in Fig. 13.

The mountainous interior of the southern part of the Scandinavian Peninsula thus contained a presently unknown ethnic group. These were local Mesolithic Caucasoids (racially), unrelated to either the Indo-European farmers intruding from the south nor to the Finnic-speaking Lapps from the north. I shall call them "Nordics."

Their approximate area of 145,000 sq km could have supported about 36,000 cattle herders at 0.25 per sq km. Their relatives in the rest of lower Scandinavia were early overrun and absorbed by the Neolithic farmers. This part of lower Scandinavia amounted to some 186,000 sq km. With a 2% incorporation of hunters into the farmer's population in this area, this amounts to 4000 people. Native Scandinavians thus totaled about 40,000 people, as compared with 186,000 Indo-European farmers (assuming 1.0 per sq km initially). When they later all mixed, these Nordics would constitute 17.6% of the total Scandinavian population, not counting the Lapps. This is by far the largest increment of native incorporation into the Indo-European speaking population for any major area. This could go a long way toward explaining the 30% non-Indo-European vocabulary that Lockwood (1969) says is found in basic Germanic.

For all practical purposes the narrow base of the Danish peninsula may be taken as the division between the Germanic of the northlands and the Celtic speech of the continent. That Germanic initially differentiated in just such a compact area is linguistically indicated by the uniformity of its sound shifts (Lehman 1970:2).

Indo-European farmers moving more nearly westward may now be followed along the path leading to the British Isles. Their progress would be more rapid than it was to the north--250 years for each 200 km for most of the way. They should reach the Straits of Dover at 4500 B.C., and cross into England with the aid of the Aegean Boat People who got there 600 years earlier. At 3700 B.C. they again make use of these Sea Shepherds to get into Ireland. At 3200 B.C. their frontier reaches land's end at the southwestern corner of Ireland.

Farming progress necessarily came to a halt after only a minor penetration of Scotland. The Moor land is good pasturage, especially for sheep, but most of it cannot be farmed even today. Most likely the Sea Shepherds settled this area and have biologically survived to this day. Their original language is now lost, although Pictish is probably its last survival, which

died out by 1000 A.D.

Some form of sea navigation was most likely a local Mesolithic development in western Scotland, a tradition which later merged with its Aegean counterpart. Such a cluster of habitable islands just offshore should have stimulated the natives to devise shipping wherever they occur. Just as with the Danish island cluster, local boats might have been able to transport the farmers even if the Aegean Boat People had not been there--but we may never know for sure.

The Indo-European progress across Germany and France would be unremarkable, though the Low Countries may have been settled only sparsely at this time. It should have gone roughly according to the schedule given here. The spread to the south through France would halt along an east-west line about even with the southern border of Switzerland. This line is where they would meet the southern branch of the western Indo-European farmers--those who passed to the south of the Alps. This meeting first occurs just to the south-west of Geneva at 4800 B.C., and extends due west to the Atlantic where it finally closes up at 4350 B.C.

The area allocated here to the proto-Celtic speech community is very large, especially in its breadth from central Poland all the way to Ireland. Throughout most of this area there were no dividing lines at natural obstacles that might have created separations. The only constrictions are those which separate Ireland from Great Britain, and it from the continent. The presence of considerable coastal navigation, where the Boat People presumably merged with the local farmers, would have reduced the impact of these constrictions. There were few major enclaves within the area to set one part off in contrast to another, as with Scandinavia. The only obvious enclave was that of the Sea Shepherds in Scotland. The region in and around the Low Countries, with its unusual place names, remains an enigma.

I see no good reason why this entire Celtic area should not have maintained a high degree of linguistic unity for several millenia. Given the geographical circumstances this should have

been no problem. Still, it is contrary to the usual view to say that Britain and Ireland have been of Celtic speech since the earliest Neolithic. Historical evidence of certain Celtic movements into Britain does not mean that the original inhabitants were not also Celtic. The archeological record was formerly interpreted as showing repeated mass immigrations into Britain, but these are now discounted by many authorities.

If evidence could be produced for a population replacement, or even a conquest by a higher civilization prior to the Roman Empire, then we would have to allow for at least the possibility of a pre-Celtic Indo-European speech in Britain. It might even turn out that the Aegean sheep herders had managed a significant and lasting area of occupation elsewhere than in Scotland. But on present evidence neither of these seems likely.

The southern branch of the western flow of Indo-European farmers passed from Yugoslavia into Italy with little delay. They would be forced to by-pass the deep soils and marshes of the Po River valley before progressing down the length of Italy and into Sicily. The sea crossing through Elba to Corsica and Sardinia was probably accomplished at a slightly later date.

The other route of advance of this southern branch continued along the Mediterranean coast and spread over southern France with no appreciable delay. These farmers expanded northward and would meet the proto-Celtics at the latitude of southern Switzerland. The term Ligurian was applied in early historic times to the language community that stretched across northern Italy and southern France. Its continuity would be natural at the time of first settlement by Neolithic farmers. A pronounced constriction because of the mountains on the present French-Italian border should have led to an early differentiation into eastern and western parts. Curiously, there is little historical evidence that this happened, and the same term was used for both areas into Roman times.

The division between Ligurian and Celtic stemmed from their split at the eastern Alps in Austria. This separation was 1200 years old when they first encountered one another again in

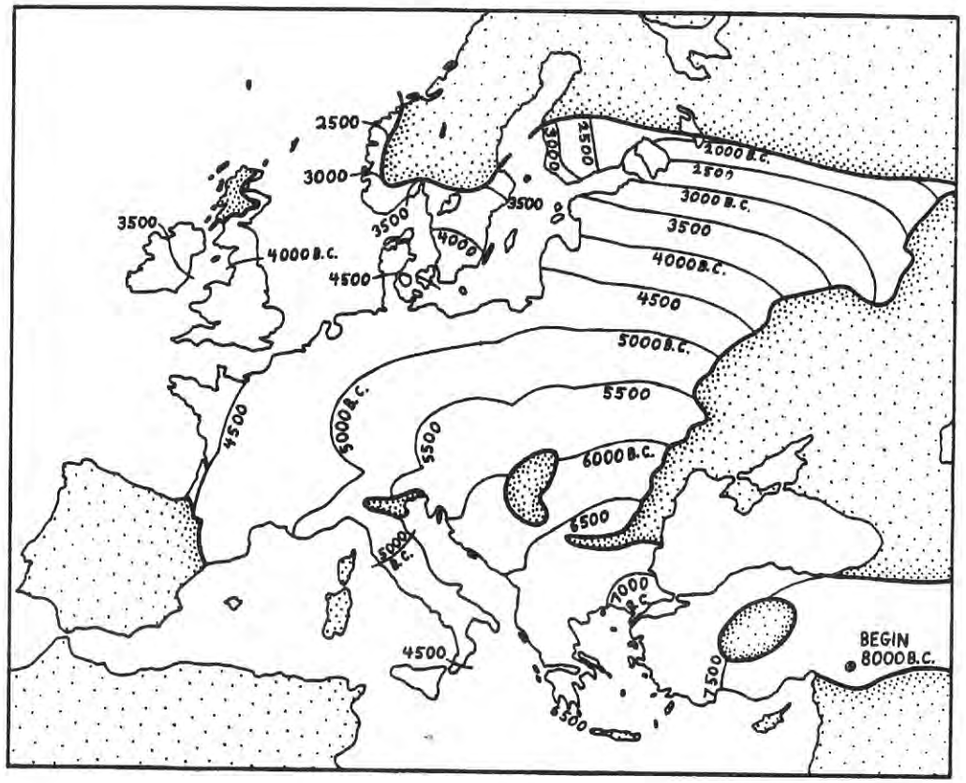


Fig. 11. Rate of Neolithic expansion. The farming frontier in Europe is shown at 500-year intervals from its inception in Anatolia at 8000 B.C. The contours are drawn from data given in Fig. 10 and from many more routes of spread that were also calculated. This map compares favorably with calibrated dates of the earliest farming sites, but this is because the advance rates were chosen partly with this goal in mind. The map omits the Neolithic of the Mediterranean that was spread by the Aegean Boat People only after their initial wave.

France. This is twice as long as the proposed initial separation between Celtic and Baltic, and it should have created a significant linguistic barrier. By the time the two sides reached the Atlantic their separation was 1650 years in the past. The division was known in early historic times and it survived the Latinization of Gaul. It was later reinforced by Germanic influences in northern France that did not extend to the southern part. Today the distinction between French and Provencal is approximately on this line. A sufficiently deep analysis of Provencal should show an ultimately Italic connection long prior to Latinization.

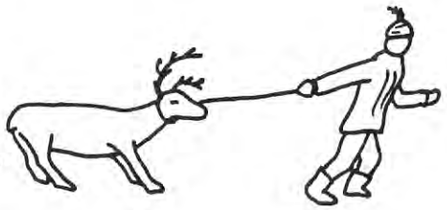
To the south-west the Indo-European farmers crossed the eastern end of the Pyrenees and would have progressed about 200 km into the northeastern corner of Iberia. Here they met the Afro-Asian farmers who had spread over northern Africa and moved up through the rest of Iberia. These Iberians had essentially the same Neolithic economy, although probably without domestic cattle at that time.

Toward the western end of the Pyrenees it was the Afro-Asians who reached the mountains earliest. They crossed over to meet the Indo-Europeans on the French side at 4550 B.C. At this end the transgression was much less, only about 50 km to the north and 100 km inland.

At this point the initial distribution of Indo-European speech throughout Europe is complete. A discussion of this long-lasting, stable condition must await a description of the geographical spread of the Uralic language family.

Uralic Spread

The Uralic language family is unrelated to Indo-European, and makes up a minor part of the European linguistic picture of today. It is of interest in this study partly because of its



present distribution, but also because it included much more of Europe in the past. In addition, a detailed study of the Uralic subdivisions further illustrates some of the geographic principles that are presented here.

Uralic languages today are spoken across much of northern Europe and Asia, and in Hungary. Within the U.S.S.R. the Uralic and Altaic national minorities are now distributed with the former mostly in the forest zone and the latter in the steppes. (See the eastern part of Fig. 1.) According to most authorities the original Uralic homeland was in the Ural Mountain area, hence the name. From this central location these people supposedly spread out in all directions to reach their present distribution, and entered Hungary in 896 A.D.

I find all of this highly improbable for various reasons. A geographically central location is no evidence that this is the original site of a language group. The reason for its spread must be demonstrated--it cannot be assumed to have expanded automatically, and equally, in all directions. The penetration of central Europe in the 9th Century by a northern Asian tribe is possible. But a population replacement, or even a language change, by such a tribe within a well-populated agricultural region like Hungary at that time is clearly impossible. Any such claim should be accompanied by an explanation of the mechanism whereby this change might have been accomplished.

Given these objections the actual Uralic-speaking distributions would allow only one alternative explanation--that the family originated in Hungary and spread out in the opposite direction. This poses no serious problem if the time for this origin and dispersion is put at the earliest Neolithic. If this is true it means that Hungarian (Magyar) is actually the oldest in-place language in all of Europe. To test this idea it must be shown here that the present Uralic distributions can follow automatically from a Hungarian source, and this must be done through the consistent application of logical rules of population movements. It must also be shown that the subdivisions of Uralic are distributed in reasonable conformity with these rules.

The following is a detailed description of events that result automatically in the correct distribution of this family. In a later chapter some additional movements are described that lead to the modern distributions of each of its subdivisions. I can find no other approach that even remotely fits both the known facts and simple consistency.

The Neolithic frontier first reached the Hungarian Plain at 6400 B.C., as noted earlier, according to the schedule used here. The deep soil in this area precluded farming in all but a few choice locations. At least 60,000 sq km would remain in the hands of Mesolithic hunters. With a density of 0.1 per sq km, there should have been about 6000 people here, expectably divided into 12 tribes of 500 each. The most parsimonious arrangement of this number of tribes would be a row of four across the northern border, four more just below these, then a row of three, and finally one at the southern tip (Fig. 12 A). The actual number and arrangement might well have differed from this, but the row of four dialect tribes across the northern edge is the only item of significance here. Just as with other hunters, these dialects should have been mutually intelligible, but with clear distinctions from each other.

From their new neighbors to the south these hunters would adopt cattle herding and many other Neolithic traits, but little or no farming. Within 200 years (almost seven generations) this new economy should have been integrated and spread throughout the area. This is the same amount of time it would take to advance a herding frontier through the plain if it started immediately upon contact with the farmers. This is also the same time delay that was allowed for the adoption and spread of sheep herding among the Boat People throughout the Aegean Sea.

It is assumed here that all the natives of the Hungarian Plain would have seen themselves as something of a related unit in contrast to the inhabitants of the surrounding forested hill country. The innovation of cattle-based pastoralism ought to have spread freely and easily among these tribes with little transgression onto each other's territories. The eventual spread

of this economy out of the plain would begin mainly with an expansion of the edge tribes overrunning their immediate hunting-gathering neighbors.

When this expansion gets underway at 6200 B.C. the farmers will have advanced one-third of the way around each side of the plain. Those cattle herders moving out to the east and west from the central section would soon be overrun by the more numerous farmers with their own cattle. Only those herders who spread out from the row of four tribal areas across the northern edge have unimpeded and unlimited space to expand into. These people would spread out and away from the oncoming farming frontier, and at about twice the rate of speed of these farmers. Eventually the farmers closed in around the northern side of the Hungarian Plain and isolated the original body of cattle herders, but many of their descendants would already have moved out and were able to continue their expansion into new areas. We now have two Neolithic frontiers in eastern Europe--fast-moving pastoralists overrunning hunters, followed by slower moving farmers who are gradually incorporating the pastoralists from behind. (See Fig. 12 for a sequence of seven maps showing this action.)

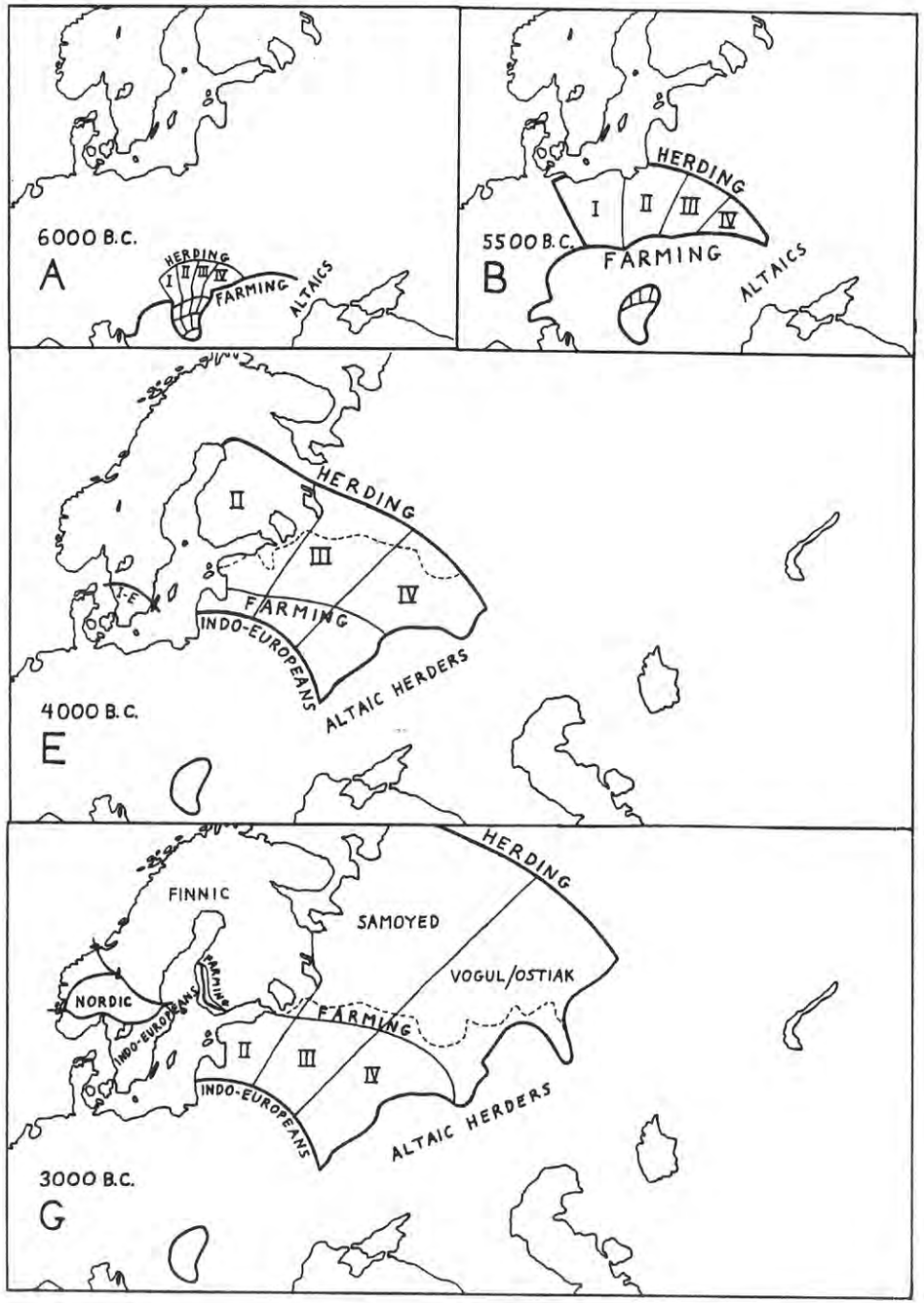
Of the four original hunting tribal areas on the northern fringe, the ultimate disposition of three of these is the major theme of what follows. As cattle herding developed, and population increased by maybe 2 1/2 times, these four tribes should have begun to subdivide into smaller areas with comparable populations. As each subdivides into two or three social groups within its original hunting territory they would also be sending surplus population outward into new areas. The linguistic differences that separated the original four hunting tribes would be perpetuated in the rapid spread of people from each of them. Linguistically speaking, four distinct dialects from the Hungarian Plain would radiate outward with these expanding populations. One can assume that each of these four groups started out with equal numbers and reproductive potential, and came to occupy comparable tracts of land. These are referred to as groups I through IV, which may be followed along paths of the

same numbers.

A new irregularity must be introduced at this point concerning the directions of spread of the four groups. At first glance it would seem they should spread over a full range from north-west through north-east--at least 50° both west and east of due north. In fact they would spread to the west by no more than 30° from north. This consideration was based initially on examination of subsequent linguistic distributions. If Group I on the left had spread as much as 45° west of north, then its people would have gained access to Denmark. From there they should have had little difficulty crossing into Sweden (using local Mesolithic boats) and spreading over the main part of Scandinavia. These should then be the ancestors of the Lapps who switched from cattle to reindeer herding along the way.

The first problem with this scenario is that Lapps have a Finnic-related language, clearly a part of Group II that can be traced up the east side of the Baltic. A Group I origin for the Lapps would have made their language one of the major branches of Uralic, instead of just a subdivision of Finnic. The second problem relates to the 30% of non-Indo-European vocabulary that is found in the Germanic languages. The only obvious source of this vocabulary is the native population of Scandinavia. If these had been herders out of the Hungarian Plain, then the outside component in Germanic should have been of a Uralic type. Evidently it is not, as this is the first possibility that would have been looked at.

In this reconstruction we are compelled to block the westward spread of these cattle herders at about 30° west of north, and thus have them fail to reach Denmark. The only apparent reason for this would be the density of the Mesolithic hunter population in the western part of Europe where winter survival was easier. Native hunters would take a toll of domestic animals and of the herders themselves. At some level these hunters would be so numerous as to delay, and perhaps even stop, the progress of these pastoralists. Rather than try to develop a new delaying factor for this one case I simply limited



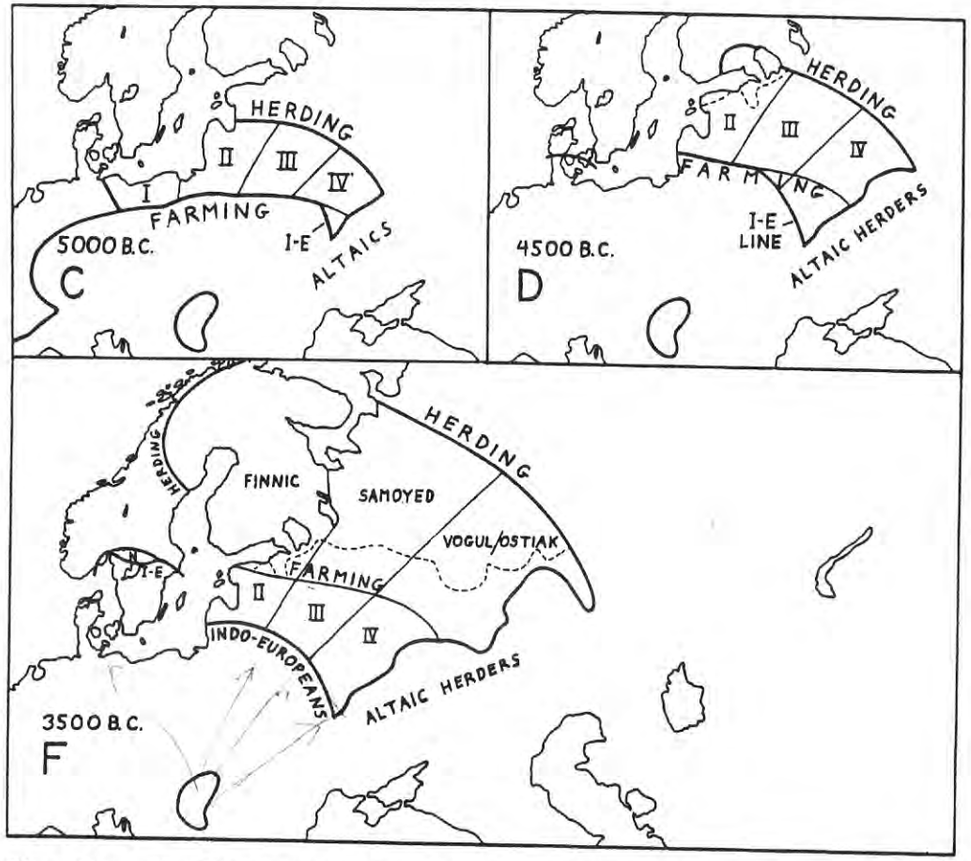


Fig. 12. Uralic expansion. The spread of Uralics is given at 500-year intervals. Cattle herding reaches the Hungarian Plain at 6400 B.C. and the expansion begins at 6200 B.C. Map **A** shows dialect tribes, the numbered four in the North showing 200 years' worth of expansion. In map **B** they reach the Baltic, while Indo-European farmers have closed around and isolated their source. The herding frontier advances in **C** through **G**, and the farming frontier moves slowly behind. Map **E** shows a full separation of the Indo-European speech line from the still-advancing farming frontier, well within the Uralic area. Heavy lines mark language families while lighter lines show some subdivisions and economic contrasts. The dashed line marks the reindeer boundary.

the westward spread of cattle herders to the radius at 30° west of north.

Each of these four dialects then would fan out of Hungary over an arc of about 20° by Mercator projection. Group I centers on 20° west of north, Group II starts out due north, Group III centers on 20° east of north, and Group IV has a heading of 40°. Group I would fan out over most of western Poland, reaching the Baltic Sea in less than 500 years. Within the next 700 years they would be ignominiously overrun by farmers and terminated without linguistic issue.

Group II moved due north at first, then automatically curved to the east. This curve results in part from the differential advance rate between themselves and the slower Group III on their right. It may also follow from the pressure of their own members edging to the east to avoid dead-ending along the Baltic coast. Group II continues northeastward and around the Gulf of Finland, presumably crossing at the narrow part (20 km) just west of Leningrad. They should also pass around to the east of Lake Ladoga. This arm would have been nearly pinched off at this lake by Group III. Some of them should have advanced on up the west side of Lake Onega, but Group III would take its east side.

Somewhere along this course it may be assumed that there was a transfer from cattle to reindeer herding. I have put this at the recent boundary between mixed forest and the fully coniferous forest. (This boundary is given in many atlases with minor variations, so I used the one from Goode's World Atlas, 15th edition, simply because it had the fewest irregularities.) Along the path of Group II this event would center on the modern border of Estonia and Russia (Fig. 12 D). After the change to this new major domesticate it is assumed that their population density would go down somewhat, and the area occupied by a 500-person tribe would correspondingly increase. It is also assumed that the density of local hunters would also be declining, so as to permit this. From here on, their rate of advance has been somewhat arbitrarily increased to a basic 60 years per 200 km--the time reduced from the 75 years that was used for them as

cattle herders. The same rules continue to be applied for the delay factors from reduced winter temperature and daylight. Each increment of these two factors adds 20 years (again one-third of the basic rate) to the time required to advance the frontier by 200 km. The maximum application of these penalties is still held to the same four increments for each factor. The slowest rate of progress for this set of conditions now becomes 220 years per 200 km, vs the 275 years for the cattle-based economy.

With this new rate of advance, the herders of Group II, the presumed Finnic branch of Uralics, would have spread over all of modern Karelia and Finland. Their progress would continue around the head of the Gulf of Bothnia and then down the Scandinavian Peninsula. On the shore of this gulf, about 180 km north of Stockholm, they would encounter the Indo-European farmers who had been advancing to the north. Both groups should reach this meeting point sometime between 3200 and 3100 B.C. The exact timing is not very critical here because this is also the stopping line for farmers--the 120-day growing season. The Neolithic farmers with their boats, cattle, and greater numbers should have extended their occupation some distance beyond this meeting, but only along a thin strip of the Baltic coast.

In the interior of Scandinavia the southward progression of Group II Uralics would be stopped at Lake Femund at about 3130 B.C. Here they should have met the local Nordic pastoralists who had adopted cattle herding from the incoming Indo-European farmers. Shortly thereafter, the meeting line would automatically extend almost due west from here to the Norwegian coast. The southern farmers can also be expected to have extended their control of the Atlantic coastal strip substantially to the north.

The area inhabited by Group II Uralics was also being overrun from behind by the advancing Indo-European farmers who had surrounded and then passed beyond the source area. The progress of these farmers would have gradually slowed and finally stopped on the Lithuania-Latvia border at 4400 B.C. Farming then would have automatically transferred to these Finnic speakers who

added it to their economy and passed it on through their fellows as far north as the 120-day growing-season line. This would eventually mark the division between Finnish and Lappish. The distribution of Finnic languages, from Latvia through Lappland, would remain little changed until the advent of deep-soil plowing that entered their area around 700 A.D. Even then, what territory they lost in the south was more than made up by gains in the east. This is described later. The total area occupied by this linguistic unit included an impressive part of Europe, both then and now, but their numbers have never been very great.

The progress of Group III Uralic herders was fairly simple. They expanded out of the Hungarian Plain at 20° east of due north, and gradually curved more to the east because of the advance-rate differential with Group IV on their right. Eventually they progress almost due east, but this is largely a simple consequence of their great-circle route being plotted on a Mercator projection.

Group III Uralics should have adopted reindeer herding at the same line of full coniferous forest--about 400 km east of Leningrad. They soon reached the Arctic coast and progressed along it as far as the Taymyr Peninsula. This automatic distribution coincides almost exactly with the modern Samoyed speech area after some of its European part is subtracted later by other peoples. Their indentification with this branch of the Uralic family would appear to be unavoidable.

Group IV Uralics left the Hungarian Plain from its northeastern corner--a seemingly minor fact that proves to have great significance much later. Their progress centered on 40° to the east of due north, and this also follows a great-circle route that eventually heads due east into central Siberia. Their path was bounded by Group III on their left, and by the forest edge on their right. Here they should have been almost keeping pace with the spread of cattle keeping that was being adopted by the previous sheep-herding Altaics in the Steppes. Deep into Russia most of them would be expected to adopt reindeer herding upon entering the purely coniferous forest. The automatic

distribution of peoples along this path, with appropriate later subtractions nearer their source, coincides almost exactly with the Vogul/Ostiak branch of the Uralic family. This linguistic identification is assumed to be the case.

Groups III and IV were being overrun from behind by Neolithic farmers just as Group II was. These Indo-European farmers were able to advance over what is now Belorusia, then bogged down and transferred their farming to these Uralic cattle herders. With all three Uralic groups, Finnic, Samoyed, and Vogul/Ostiak, the farming technology moves through them at the rate of 450 or more years per 200 km. While this would increase their population it would likely be too little and too slow to cause any significant movements of people. The linguistic boundaries should have stayed constant after this farming transfer.

Most linguistic classifications of the Uralic family first separate Samoyed from the rest, and then subdivide these into Finnic and Ugric (Magyar plus Vogul/Ostiak). This is not in accord with the three co-equal groups described above. However, other detailed analyses of Uralic do give the three groups as used here. Hajdu (1976) shows that these three are almost exactly equally distinct from one another.

The lengthy description given above is of regular and geographically predictable events. These would have led automatically to a distribution along the three major migration paths directly into the areas that the three Uralic branches occupy in more recent times. This has involved no unexplained migrations or expansions of a "historical" nature to put these people in their correct locations. This appears to be much more than mere coincidence. Finer dating of the pertinent archeological remains should show the direction of movements.

It remains to be shown why it is Vogul/Ostiak, and not one of the other two, that should be the most closely related to the recent language of Hungary--Magyar. There is also a major shift to the east by many Finnic speakers that must be accounted for. Both of these are neatly explained in a later chapter as

automatic consequences of a technological change a few thousand years after this initial dispersal.

Language Map



After the Neolithic economy spread to its natural limits in all possible directions, the linguistic map of Europe achieved a long-lasting stable condition. For the southeastern corner this time of stability dates back as far as 6500 B.C. For most of Europe stability was reached by around 4000 B.C., while in Ireland and Scandinavia a few minor ethnic movements continued through the next millennium. Fig. 13 shows the distribution of languages that automatically results from the processes that have been described up to this point.

From this time of settlement, all the way up 500 B.C., there is no indication of any significant factors that would have made changes in the linguistic geography of Europe. For most of the continent this first period of stability lasted 4000 years; for some parts it was over 6000 years. This is much longer than all the time that has passed since then. The remaining linguistic movements and differentiations occurred mostly in just a 2000 year period from 500 B.C. to 1500 A.D. These consisted of four major events that grade into one another, and which can be separately mapped only with some arbitrariness. The only other period of relative stability is the last 500 years of European history.

The map of Europe during this first stabilization shows a number of very different languages that largely surround the continuous dialect mesh of Indo-European intruders. In the southwestern corner Iberia is occupied by presumed speakers of the Afro-Asian family that also stretches across northern Africa back to their source area in the Near East. In a smaller northwestern corner is the Pictish speech of Scotland that may

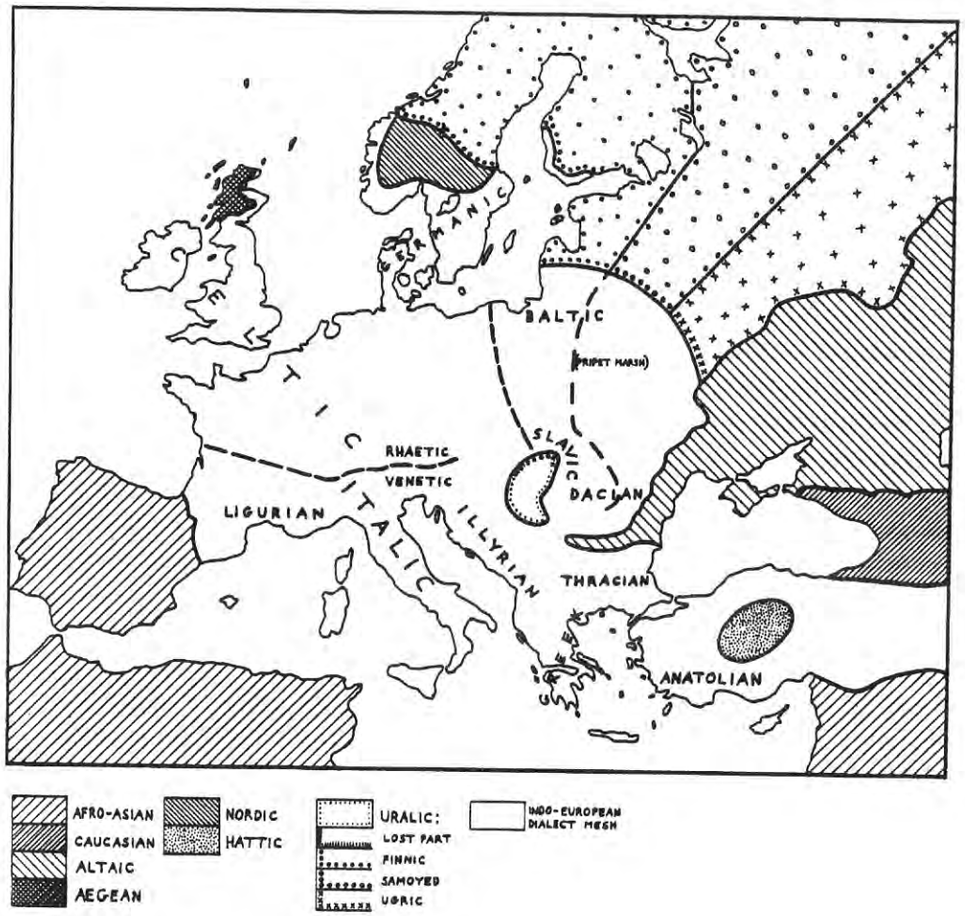


Fig. 13. Language map at first stabilization. Shortly after 3000 B.C. Europe had seven language families with the distributions shown here. In the south-east this stability was reached as much as 4000 years earlier. Areas of developing Indo-European dialects are indicated, along with some linguistic barriers. Aegean languages might have survived in other places, especially in Italy and the Ligurian area. Mesolithic languages should also have survived in the Low Countries, and in the Po Valley.

ultimately derive from the Mesolithic Boat People of the Aegean. To the north we find part of the wide-spread Uralic language family that continues through most of Finland, Estonia, Latvia, and Great Russia, as well as their surrounded source land in the Hungarian Plain. The Altaics stretch from eastern Romania, through the Ukraine, and on into central Asia. Caucasian occupies northeastern Anatolia and the Caucasus Mountain area. Brief Mesolithic survivals no doubt occurred in many places, the Scandinavian cattle herders being the most conspicuous of these, and the only one shown in Europe. The Hattics are a major survival in Asia Minor. Others would have lasted for some time in such places as the Po River valley and the Low Countries, but they were of no ultimate significance and eventually disappeared. The Aegean Sea Shepherds left settlements along much of the Mediterranean and Atlantic coast, but these too were rapidly absorbed when the full Neolithic economy arrived in each area from the landward side.

The central core of Europe is occupied by Indo-European speakers at this time. Their boundaries with all the other languages mentioned here are sharp and total. Only through Anatolia, and from there on into Iran and India, do they have linguistic continuity outside of Europe. The otherwise simple picture of a dialect mesh of gradual differentiation is broken in only a few distinct places, and none of these is fully bounded.

A major dividing line developed when the immigrant farmers were separated by the full length of the Alps and Eastern Alps, and this line was then extended to the Atlantic coast from their meeting point beyond that barrier. This separated Celtic from the Ligurian-Italic speech areas, but their linguistic continuity was maintained around the eastern end of the mountains. A similar separation occurred when the farmers passed around the Hungarian Plain, met again on its northern side, and continued this dividing line to the Baltic shore. This was the initial basis for a division between Celtic on the west, and Balto-Slavic on the east. A mountain and temperature barrier in the eastern Carpathians led to yet another separation whose repercussions

become evident only later. The Pripet Marshes provide a partial barrier between Baltic and Slavic. Germanic tends to pinch off from Celtic at the constriction of southern Denmark. Reduced communication tending to separate both Ireland and Great Britain ought to have caused some divisions, but apparently these were not significant. Indo-Iranian is not distinguished here from Anatolian because this separation nowhere affects the reconstruction of European language distributions.

The Indo-European dialect mesh in Europe at this time would show some divisive tendencies, but none need be called separate languages. Those at the prominent meeting lines maintained continuity back through their places of initial separation, no matter how distinct the linguistic barrier at the far end might have become. Constrictions should still have maintained continuity even if the changes were rather abrupt through the corridors. Sheer distance, combined with minor geographical barriers, would have tended to emphasize regional contrasts. The map of Europe at this time can be labeled with many Indo-European "languages," but it must be noted that these are probably only dialects in a complex network, and none would necessarily be truly distinct or bounded from any other. Linguistic innovations that appeared at any point within the mesh would still tend to spread eventually over the entire system. In other words, this dialect mesh continued to evolve, or change over time, as a single unit, regardless of its slowly increasing internal diversity.

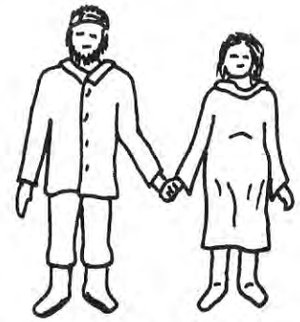
These Indo-European dialects would not separate into independently evolving lines until something happened to create separate groups that were fully bounded from each other.



CHAPTER FOUR -- RACIAL PROPORTIONS

Population Mixing

It is assumed here that the introduction of Neolithic farming and herding practices into Europe was accomplished primarily by an incoming wave of immigrants from the Near East. To assume otherwise would require postulating and supporting some unique circumstance for this area of the world. It is also assumed that a small proportion of the native peoples was genetically incorporated into this intruding population at a regular and cumulative rate. This section summarizes my efforts to quantify this incorporation on a geographical basis.



There are two basic aspects to this population mixing. One is the introduction of Anatolian genes into the European pool by the farmers. (Primitively, the genetic barrier between the Balkan Penninsula and Anatolia would have led to a considerable contrast in the gene pools of the two areas.) The results of this intrusion can be perceived in modern populations in terms of a few classical traits like hair and eye color, and some

measurements, but the contrasts are not great. Blood-type frequency distributions seem to offer a somewhat better record of this event.

The other aspect of mixing is the expansion of Caucasoid populations (whether European or Anatolian) over Mongoloid peoples in the northeastern part of Europe. The results of this mixture are much more evident in terms of visible anatomical traits, and can also be traced in the frequencies of blood types.

These two aspects overlapped in time, but they are discussed mostly in the order given above. The focus here is on the geographic and demographic factors that would have determined these mixtures, and not the results in terms of distribution of the characteristics themselves. Beyond a superficial check for consistency, I leave it to others to compare these results with detailed racial data.

Anatolian-European Mixture



Recently it has been suggested that agricultural practices spread into Europe by diffusion (imitation) as opposed to being carried in by a wave of immigrants (Dennel 1983). If true, this would be the only known instance of a hunting people who eagerly adopted the farming way of life. The documented history of hunter-farmer contacts around the world in recent centuries has always shown a great reluctance on the part of nomads to shift to a sedentary existence. In all known cases the spread of agriculture has been accomplished primarily by the spread of the actual farmers themselves (Smith 1976).

It does not follow from this that all, or even most, of Europe's present population is descended from the Near Eastern immigrant farmers. A native admixture of only 2% for each 40 km of frontier advance would cumulatively reduce the Anatolian gene

pool to only 20% of its original component at the far end of Europe. This decline would be gradual, but not linear. At each step the rate of retention of Anatolian genes would be .98, so one multiplies .98 times .98 times .98, and so on, for as many 40-km steps as are being measured. This leads to a rate of decline that is necessarily rapid at first, and becoming more gradual as it progresses.

At this rate the incoming genes would be reduced to half their frequency just to the west of Vienna, and their remainder halved again at the border of Scotland and by lands' end in most other directions. In all, the collective gene pool of Europe would end up about half native and half intruder, with a strong cline from the entry point to the far west and north. The known distribution of genetic traits in Europe conforms quite well to this description (Mennozi, Piazza, and Cavalli-Sforza 1978). There is no reasonable way to explain this genetic distribution without postulating just such an immigration, whether by farmers or by some others. And there is no known force, other than farming, that would accomplish this degree of population replacement in its initial advance.

A similar intrusion can be postulated for the first appearance of agriculture in northern India, and the distribution of genetic traits again conforms with this pattern. Agriculturalists also overran most of sub-Saharan Africa from a Negroid source just north of the Equator. In this case the percentage of native incorporation (of Pygmies, Bushmen, and Hottentots) was apparently much less, judging from their gene frequencies (Krantz 1980). Distributions of external traits also tend to follow the same trends in Europe, India, and southern Africa. Anatomical features characteristic of the source areas gradually decline in each subcontinent as one moves away from those sources.

One objection to the immigration scenario is that there was not a great population reservoir in western Anatolia at an early date to supply this influx (Dennel 1983). This objection apparently is based on an analogy with modern migrations, where

the migrants are drawn from a vast area by sophisticated means of mass transportation. By contrast, the earliest Neolithic expansion was strictly a frontier phonemenon. Each increment of population expansion that needs land to farm will simply move to the nearest suitable place that is known and accessible. At or near the frontier there are new lands available for occupation. A hundred km behind that frontier these new lands become inaccessible and probably unknown, so expansion moves into the less desirable local places immediately at hand. No great reservoir of population was needed for this kind of expansion--just an open frontier with some ordinary people who are overreproducing themselves.

In the following discussion I draw the line between the European and Anatolian (Asian) gene pools at the Dardanelles and along the Caucasus Mountain divide. A similar line between North Africa and Europe is put at Gibraltar. This may seem to be a rather arbitrary geographical boundary, but it is probably the best available for present purposes because these would be the original major barriers to gene flow.

The model of frontier expansion makes some reasonable, though undemonstrable, assumptions that have already been described. The farmers' initial occupation of some 500 sq km out of each block of 1600 should probably involve little or no mixing with the local inhabitants. It is their subsequent expansion into the other two-thirds of each block that leads to the absorption of some of the natives. As this would begin in earnest only after the initial colonizing activity had passed on by more than 40 km, the local foragers would find it increasingly difficult to survive or even to escape envelopment.

As the farmers eventually fill out a 40-km square to a density of one person per sq km they reach a population of about 1600. If they incorporate 2% of their own numbers in each such block, this means taking in 32 out of an original hunter population of 160. The other 128 hunters can be accounted for by a mixture of killing and dispersing some, and absorbing others without allowing them the opportunity to reproduce. Actually,

the hunter population in this square would have been reduced to more like 110 when the farmers took the best one-third of the area; the missing 50 could have moved elsewhere as stragglers. Then taking in 32 people out of a trapped 110 constitutes a 30% absorption rate of the natives. This of factor 30% is used throughout this reconstruction.

Where adverse climatic conditions significantly delay the frontier advance, this model should still hold for each 40-km geographical unit, on the average. The added time allows for more casual interbreeding between invaders and natives. Extra native genes would enter the farmers' gene pool. Extra farmer genes would also enter the natives' gene pool. These displaced farmer genes will be recovered as the frontier advances, thus negating the extra incorporation of native genes. Presumably, those natives who most resemble the farmers are those most likely to be added to the frontier population.

This incorporation model may be followed over most of Europe, from Greece all the way to Sweden, Ireland, and Spain. At a .98 retention rate for each 40-km movement, these results are mapped at 10% intervals in Fig. 14. This shows the percentage of western Anatolian genes that ought to have survived in each area. With a few changes discussed later, this should also be a close approximation of the present condition.

A major exception to the above model occurs in eastern Europe outside of the Balkans. Within this area it already has been proposed that a pastoralist economy had spread out from a source in the Hungarian Plain, and this was composed entirely of native Europeans. Their population would have been 0.25 per sq km, or two and a half times that of native foragers. Thus, when farmers overran this area (excluding the plain itself) they would outnumber these herdsmen by only four to one, instead of the usual ten to one as elsewhere.

The same model for farmers overrunning hunters is followed here, with just one basic change being required. In the original model 30% of the natives who were trapped behind the frontier were incorporated into the farming population. The same factor

of 30% can be used here, but now applied to a larger base number of natives. In a given 40-km square the herder population would ideally be 400, at .25 per sq km. Upon losing the prime one-third of the area to the farmers they are reduced to 275 people. When the farmers fill the rest of the square and absorb 30% of these, it means 82 people are taken in and the remainder are neutralized in other ways. These 82 people will then constitute 5% of the population of 1600 farmers. In other words, the genetic retention rate will shift from .98 down to .95 when farmers overrun each 40 km of herders.

In those parts of eastern Europe where Uralic pastoralists preceded the Indo-European farmers, a .95 retention rate for Anatolian genes has been used in the map (Fig. 14). In the Hungarian Plain itself the farmers were mostly excluded, but they heavily penetrated some parts of it, so the retention figure for European genes was arbitrarily put at 60 to 70%, thus matching the adjacent peoples. The population of the lower Danube is similarly assigned the same gene frequency as its neighboring farmers. Beyond Lithuania and Belorussia the advance of the Indo-Europeans was halted for a long time, so the farmers beyond here would be 100% European.

The Indo-European frontier also halted part way up the Scandinavian Peninsula at the 120-day growing-season line. Part of the Neolithic technology, primarily cattle pastoralism, would have been transferred to the native Nordics who were completely European in their genetic make-up.

Still one other halt in the Indo-European advance apparently occurred in the highlands of Scotland. Here farming is almost impossible, but sheep herding and fishing do well. The Sea Shepherds out of the Aegean are almost certainly the source of the pastoral population here.

Sea Shepherds would have been fully Anatolian in genetic make-up at their source point in Rhodes. There is no obvious logical structure to calculate their rate of incorporation of native peoples following the model of other population movements. The major difference is that these Boat People spread inland from

the coasts, generally only short distances at first, so native hunters would not tend to become trapped by an engulfing frontier of new peoples. Also, their postulated advance rate of 200 km per generation is the fastest of any in this reconstruction.

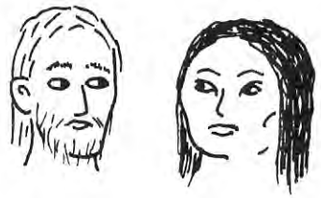
The normal rate of genetic retention for herders overrunning hunters is shown below to be .92 per generation, or .815 per 200-km advance. This low rate should not apply to the Sea Shepherds for the reasons noted in the last paragraph. The rate should be higher than the .92 per generation, and I have arbitrarily put it at .95 simply as an educated guess.

Allowing two units of mixing in crossing the Aegean, and 54 more 200-km units to reach Scotland, the Anatolian component would have been reduced to just 6%. Thus they were 94% European in their genetic make-up at the end. In contrast, the farmers who reached that point somewhat later in time were reduced in 70 steps of 40 km, but with only a 2% admixture in each, so they should have arrived in Scotland with 23.8% Anatolian genes.

If the native foragers had continued to survive in Scotland, a transfer of sheep to their care would leave the Highlands 100% European in genetics. But if the Boat People had prevailed and occupied the area, as is most probable, they might have been about 6% Anatolian. If they mixed significantly with natives the result would have been somewhere between zero and 6% European, but closer to the latter. In any case the cline of Anatolian genes would drop from 23.8% near the Scottish border, down to about one-fourth of that amount.

Caucasoid-Mongoloid Mixture

The spread of pastoral people to the north and east out of the Hungarian Plain, in a wave that was followed for a short distance by farmers, is the major one that had racial implications of the visible type. These herders were of pure Caucasoid



race (not to be confused with Caucasian languages) in terms of such classical traits as skin, hair, and eye color; hair form and distribution; and nose form and body type. In their advance to the north-east these herders encountered and overran hunters of the Mongoloid racial type (Fig. 15). The mostly invisible genetic contrasts between Europeans and Anatolians, as discussed above, are here combined into the commonly understood racial type of the West.

The Caucasoid-Mongoloid racial line used here is based on the most likely areas of development of their specialized traits during the last glacial epoch, and on their expectable northward expansions as the ice melted. I have allocated all of subglacial Europe to the Caucasoids, also the area around the Black Sea, the Caucasus Mountains, and Iran. Mongoloids are assumed to have lived east of the Caspian Sea and throughout central Asia; they were the more cold-adapted people.

With climatic amelioration both racial types would expand northward, but the Mongoloids had the distinct adaptational advantage and would have spread well to the west of their original area. The ultimate racial line can be drawn from the north shore of the Caspian Sea to Leningrad and extending it through Scandinavia, but leaving all of Finland on the Mongoloid side because of the early Baltic Sea barrier. This line in Scandinavia also fits well with the last melting away of the local ice sheet, where early hunters would meet after entering the peninsula from opposite ends at the same time. This dividing line might appear to be highly speculative, but any attempt to place it as much as 200 km in either direction would raise serious geographical problems, if not impossibilities. Obviously there would have been considerable racial mixture along this line, with a dilution of both types for some distance to either side. But for purposes of counting gene frequencies at greater distances, a sharp line or a mixed zone would both produce the same results.

The same general model for genetic mixture can be followed here, just as in the previous cases, where farmers were the

overrunning population. The herding intruders here move in 80-km squares, first occupying the prime area of a 50-km circle that is arbitrarily placed in its center. The 6400 sq km of the square originally should be inhabited by some 640 native hunters. A tribal unit of 500 herders then moves in to occupy the 2000 sq km of ideal territory, displacing 200 of the hunters and leaving 440 of them behind. The herders then expand into the entire square with a final population of 1600. If they also incorporate the usual 30% of the 440 remaining hunters, these constitute 132 of the new herder population. These 132 are now 8% of the 1600 herders in this 80-km square. This means a genetic retention rate of .92 for each step of 80 km, and is the equivalent of a rate of .96 for a 40-km farmer-sized move. For purposes of long-range mapping, the three cases may be compared.

Replacement	Retention Rate	Per 100 km	Per 200 km
Farmers over Hunters	.98 per 40 km	.951	.904
Farmers over Herders	.95 per 40 km	.876	.774
Herders over Hunters	.92 per 80 km	.900	.815

A new complication enters the picture when the pastoralists change their emphasis from cattle to reindeer at the line of pure coniferous forests (Figs. 12 and 15). This was postulated to have reduced their density of occupation, and increased the size of their tribal areas and made their rate of advance faster. It may be assumed that hunters in this environment were similarly reduced in density, so no correction need be made for this aspect. The only significant difference would be the increased distance these herders now advance in each generation. Previously this was expressed in the reduced basic time for them to advance each 200-km unit, from 75 down to 60 years, plus penalties.

In this context the movement of reindeer herders should first be thought of as an increase from 80 to 100 km for their advance per basic generation. With the same genetic retention rate per generation of .92, this is now their rate per 100 km.

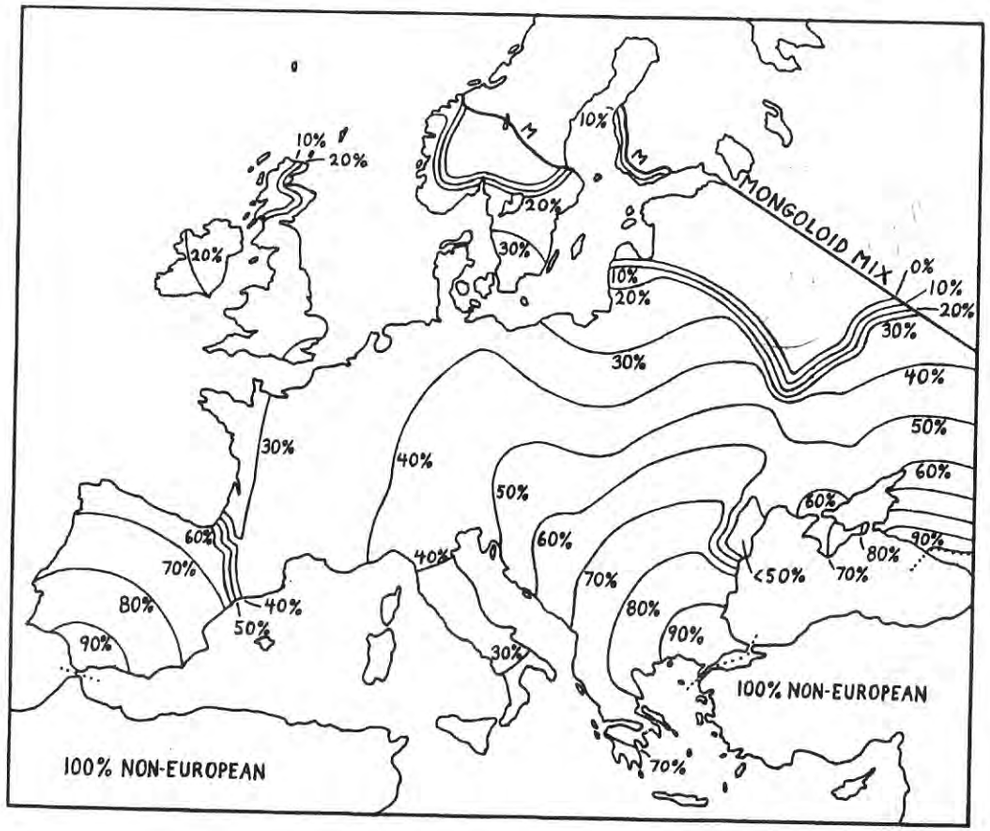


Fig. 14. Non-European genes. Approximate levels of Anatolian and African genetic contributions are shown at 10% intervals over the continent. Additonal genes from the Aegean source are not figured in here--this should somewhat raise the Anatolian component along the Mediterranean coast. Large areas of pure European genetics may be noted in Scandinavia and Russia. These isogenes are cut-off at the heavy line marking Mongoloid mixture.

Their rate per 200-km unit is then the square of this, or a .8464 retention.

The reindeer boundary on the main Finnic path is crossed 200 km before they enter Mongoloid territory. On the Samoyed path it is crossed 200 km after passing this racial line. The Vogul/Ostiaks cross it 400 km into the Mongoloid area. The expected retentions of Caucasoid racial genes may now be mapped with careful attention paid to the rates according to which type of animal is presumed to be the major domesticate. The results of this are shown on the Eurasian map in Fig. 15.

The move of the Finnic branch through Finland and into the Scandinavian Peninsula enters Mongoloid territory already with the reindeer adaptation. They overrun and incorporate these natives with a retention rate for their Caucasoid traits of almost .85 per 200-km unit. Their component of Caucasoid genes begins with 100% at Leningrad, declines to 51% at the head of the Gulf of Bothnia, and reaches a low of 37% when they cross back over the racial border in mid-Scandinavia. After that point they are incorporating more Caucasoid genes from the early hunters who entered Scandinavia from the other direction. Their Caucasoid proportion then rises to about 53% when they finally meet the Indo-European farmers and Nordic herders.

Within the total area of greater Lappland, including two-thirds of modern Finland above the farming line, the overall average of Caucasoid genetic background works out to 50%. This would have been the condition as of 3130 B.C. when the herders met in Scandinavia and closed out the last of the pure hunters.

During the 5000 years since then, these Lapps have been in contact with northern Europeans in and around much of their territory, but with almost no contact with Mongoloid populations. The expectable gene exchange with their more numerous neighbors would have somewhat increased their proportion of Caucasoid genes. It is also likely that social selection, especially in more recent centuries, would have favored the European physical appearance beyond their total genetic composition, thus further increasing the Lapps' resemblance to their fully Caucasoid

neighbors.

The Samoyed path to the north-east passed over Mongoloid territory for 200 km with presumed cattle breeding. The retention rate of Caucasoid genes would be .815 for this segment. After this the reindeer herding rate of .8464 applies to the rest of their expansion. At this rate their Caucasoid component is reduced to 50% in 800 km, and halved again to 25% in just over

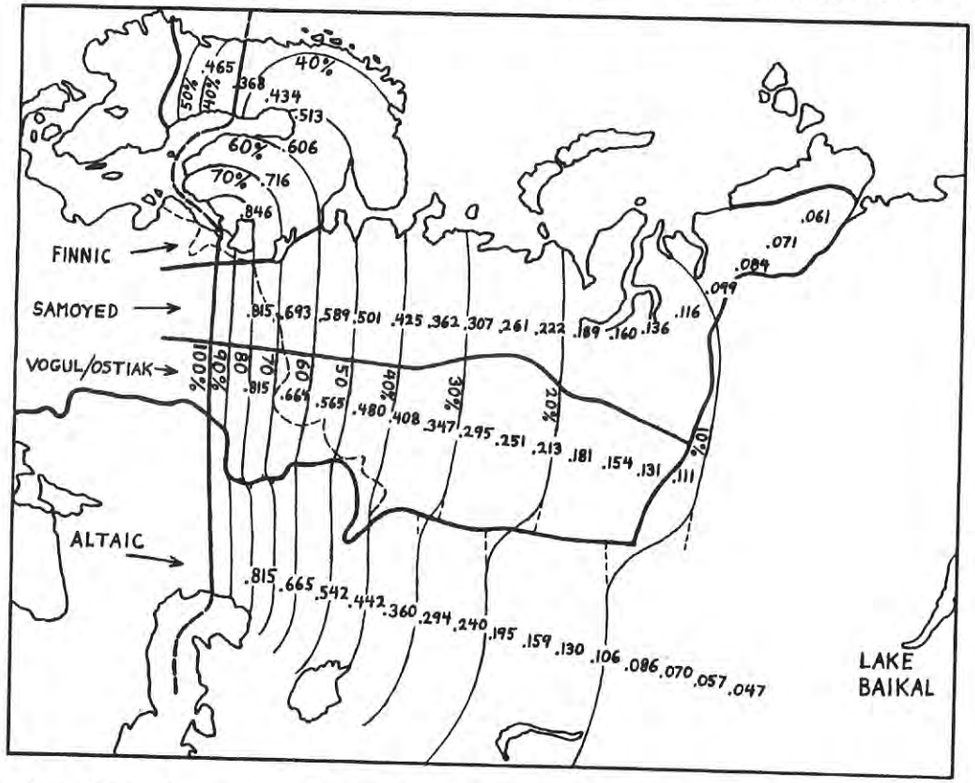


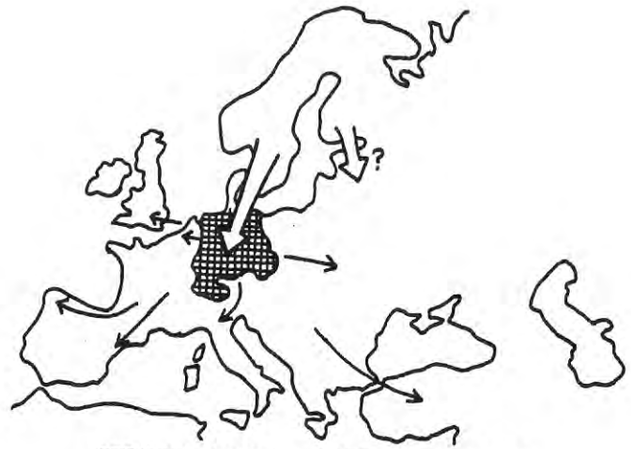
Fig. 15. Caucasoid genes in Asia. The nearly vertical, heavy line on the left shows the original Caucasoid-Mongoloid racial boundary. Economic movements to the north and east spread the Caucasoid component in these directions. Each 200-km figure is given, and fine lines mark the 10% intervals. A Mongoloid component was interjected into the Caucasoid side in central Scandinavia. A dashed line marks the reindeer boundary.

800 more km. At the eastern limit of Samoyed distribution in the Taymyr Peninsula it reaches a low of only 7%.

The recent Samoyed distribution runs from 1000 km beyond the old Mongoloid line all the way to the Taymyr Peninsula. The Caucasoid component for the area ranges from 42.5% down to 7.1% across this distance in the initial spread. This gives an average of just under one-fourth Caucasoid genes, and three-fourths Mongoloid. This conforms reasonably well with their observed physical traits. They would have reached their eastern limit at 880 B.C. according to the present schedule. The subsequent almost 3000 years of internal mixing should have evened out the east-to-west discrepancy to a considerable degree. Further selection for Arctic-adapted Mongoloid traits should also have occurred in place, thus increasing their Monogloid appearance.

The Vogul/Ostiak history is similar to that of the Samoyeds. The distance traveled and timing involved is close enough to theirs, so that similar Caucasoid-Mongoloid proportions should have been strung out over roughly the same west-to-east distribution. Both this group and the above Samoyeds are spread over such large areas that significant genetic contributions from outside were unlikely. Only with the recent Russian penetration and control of the entire region has there been much mixture, especially along the southern fringe.

The racial make-up of Europe presented here remained constant until the ethnic movements began in 500 B.C. The subsequent changes are mostly minor because population increase, in place, was the general rule. Some estimates of these later changes are summarized in the later chapter on the Final Adjustment, and are shown in Figs. 29 and 30.



CHAPTER FIVE -- GERMANIC SHIFT

The first major break in the Indo-European dialect mesh, at least in Europe, resulted from the Germanic expansion out of Scandinavia. This, and a few other events, inaugurated a series of changes that totally broke up and redistributed the European language picture over the following two thousand years.

Farming peoples have the ability to evacuate their homelands under adverse circumstances, while hunters cannot. This is possible because they can take in their last crop and move, taking this food-and-seed with them. They also may have better information about where a more suitable environment might be found. More important is their ability to concentrate in large numbers for a move through a narrow space. This concentration can give them immediate military superiority over almost any resistance. Of course, upon settling in a new area they must necessarily disperse themselves to about the same degree as the local residents, and then their temporary advantage is lost.

Simple migrations of farmers, into already farmed areas, are usually absorbed by the previous residents within just a few centuries. If the intruders and residents share similar technologies, economies, and cultural prestige, then it is just a matter of time and mate exchange until the more numerous residents linguistically absorb the newcomers. Ordinarily, such

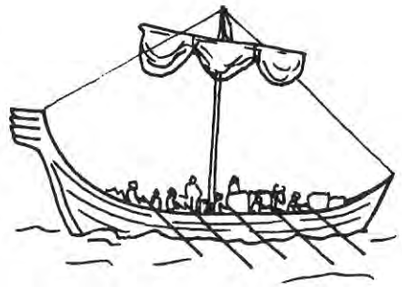
intrusions number no more than a few thousand, or maybe tens of thousands, of people moving into a region that is many times more populous. Migrations of much larger numbers would be decimated by problems of sanitation and disease if they were similarly concentrated. A very large migration might avoid such problems by subdividing into many separate units. But these would usually be distributed in various directions, each of which would ultimately meet the same fate of all other such smaller migrations.

There are some special circumstances under which migrating peoples can and clearly have maintained their ethnic identity indefinitely. If the group occupies an insular or peninsular location in which it becomes the sole or major population, then it might persist. The physical absence or small number of immediate neighbors might serve to insulate them against linguistic absorption.

The other circumstance is where the separate elements of a very large migration maintain communication and close proximity to one another. In this manner they might divide the resident population into relatively small groups between their own immigrant elements. Under ideal circumstances it could be the divided groups of residents who become linguistically absorbed on a large scale. It was apparently a massive migration of just this kind out of Scandinavia that moved into and created what eventually became Germany.

Exodus from Sweden

The Sub-Atlantic phase of climatic deterioration in Europe was a relatively mild episode that affected farming only along its northern fringe of greatest vulnerability. It probably was not even noticed on most of the continent. Its major effect of cooler and damper climate



devastated the Scandinavian Peninsula; the East Baltic region apparently was not much bothered, but this is disputed (Fodor 1976 vs Kivikoski 1967). The Sub-Atlantic spans the last five centuries B.C. During its most intense part, from 400 to 50 B.C., Sweden almost disappears from the archeological record (Pounds 1973:14, Scott 1977:9, and Stenberger 1962:109).

During the late Bronze Age, just before this episode, about one-third of present Sweden had been occupied by farmers--with much of it very densely populated. The coast was occupied half-way up the Gulf of Bothnia. The Norwegian coast was then held by Europeans as far north as Narvik. By 400 B.C. Swedish occupation was reduced to just a thin coastal strip in the south, and the offshore islands. Norway was almost emptied, and its coastal occupation drew back to near Bergen, at about the latitude of Stockholm. Denmark does not appear to have been affected. (See Fig. 16 for the emptied areas.)

The obvious conclusion is that nearly the entire population of Sweden, and most of Norway as well, simply went away somewhere. These areas began to be repopulated after about 50 B.C., presumably by recovery from the fringe settlements and by new immigration, mainly from Denmark.

Other explanations have been offered for this lack of an archeological record for nearly four centuries. The developing Iron Age on the continent at this time has been credited by some authorities with cutting off the affected area from trade and communication, hence the scarcity of datable remains (Stenberger 1962). I fail to understand why such a unique event as this cut-off should have occurred here.

More seriously, some Swedish scholars I have talked to (but failed to note their names) think that there are enough undated Bronze Age graves to fill the gap if they are mostly assigned to this time period. This strikes me as dubious for two reasons. The percentage of undatable graves ought to be roughly constant for all centuries, but we are to suppose that they concentrate on just the afflicted time period. This is so odd as to require some special explanation that is not forthcoming. Also, we do in

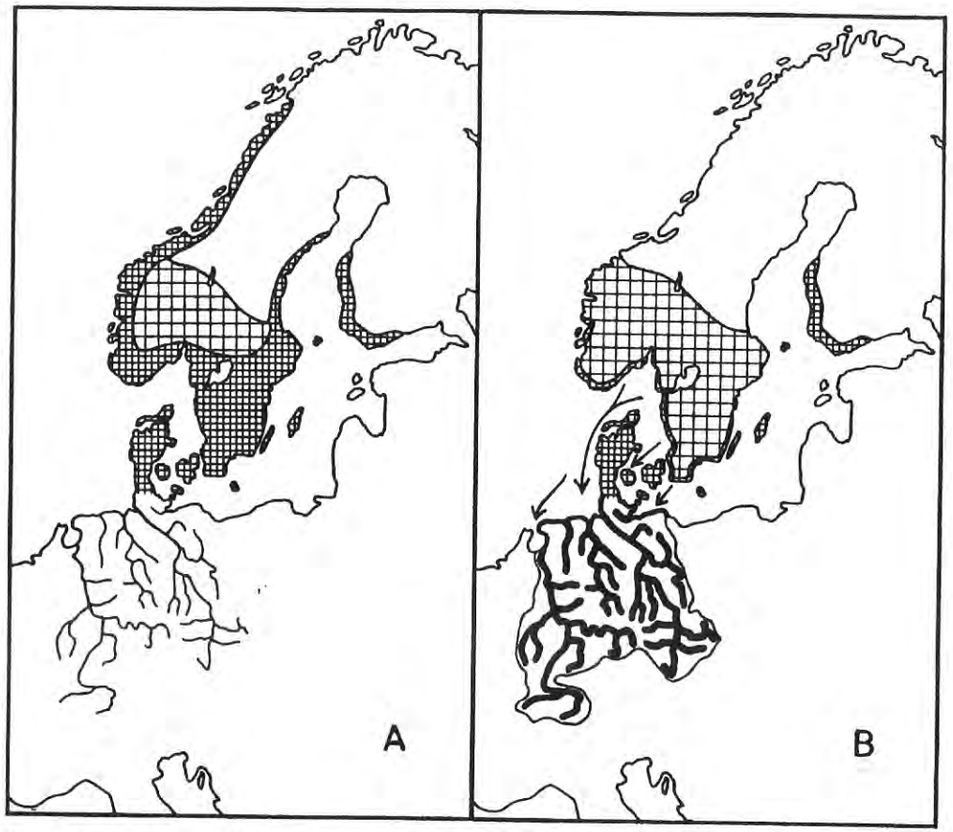


Fig. 16. Germanic shift. Map **A** (left) shows the original distribution of Germanic in Scandinavia. Open hatching shows the old area of Nordic speech--the sparse pastoralists who should have been assimilated by 500 B.C. To the south are the major German rivers beyond Denmark that would be the goal of emigration from Scandinavia during colder, wetter times.

Map **B** (right) shows the result of the Sub-Atlantic phase, where continuing coastal occupation and Denmark are given in tight hatching. Open hatching shows the area evacuated by farmers, and which presumably remained only sparsely occupied. The German rivers are drawn as solid bars 20 km wide--the presumed strips of earliest Scandinavian intrusion. A fine line is drawn around the drainage area of these rivers.

fact have a continuous record on the coast and islands where the material is clearly datable to the otherwise empty period.

We can safely proceed on the assumption that the major part of the Bronze Age population of Sweden simply moved out. Being farmers rather than hunters, they had this option. It is also evident from the record that they left rather abruptly--the entire exodus must have taken place in less than a century. The only logical direction for them to go was south. It is tempting to see this event as the origin of the German-speaking population on the continent. Before we can draw this conclusion it is necessary to show that such a move is consistent with the rigorous approach used in the rest of this reconstruction.

The recent German area, and especially the rough mapping of the earliest Germanic occupation here, conforms closely with the combined drainage of the Rhine and Elbe Rivers, and the lesser rivers between them. I will go further and postulate that this was exactly their initial area of intrusion. The Oder drainage to the east, and the Vistula basin still farther east, may also have been invaded. Judging from the following calculations, and also from the later pattern of linguistic events, it would appear that these eastern rivers received no more than minimal Germanic immigration, which did not long persist.

As Swedish Bronze Age agriculture was failing in the 5th Century B.C., the affected people would naturally be looking for more suitable lands to the south. They would have had enough geographical knowledge at that time to know that warmer climates lay in this direction. They would also know that the land in this direction was already occupied by settled farmers. There was enough time for explorers to discover (if they didn't already know) that beyond the Danish area there were river valleys that were not well populated. Most of the Celtics in the area of modern Germany farmed the better-drained, lighter, upland soils away from the rivers (Pounds 1973), and some of the Scandinavians would certainly know this. A major ecological opening was available at that time for a population that was already oriented to exploit it.

For transportation, Scandinavia was well supplied with large boats. These are well known, indirectly, from two sources. Rock engravings and other art work of the Bronze Age show unmistakable boats, often shown containing numerous men with oars. Of similar age are burial places or monuments--patches of ground outlined with many upright stones in the shape of a ship. It is not presumed that a ship was actually buried at such sites, but the size and shape of one is clearly represented in each case. Most of these range from 6 m to 20 m in length, with a few measuring much more (Stenberger 1962).

There has been much discussion as to the construction of these ships, whether they were skin-covered frames, or were solidly planked. The rock engravings have been interpreted by many authorities to represent the wooden ribs of a ship showing through an ox-hide covering. A simple consideration of their absolute size rules this out. Ever-larger ship frames can be made from timbers of increasing sizes, but ox hides have a fixed thickness and strength. Beyond a few meters length, such a ship would be so heavy that even a gentle scrape against shore gravel would tear through any hide. Multiple layers of tanned animal skins only postpones the inevitable failure. While we do not yet have actual remains of ships from exactly this time, there is one dated to the early 3rd Century B.C. from Denmark. This specimen is 10 m long and is built of planks (Clark 1977:203).

Planked craft, much like the later Viking ships, would be capable of transporting large numbers of people to new locations. Let us suppose a million such people are to be moved out of the southern one-third of Sweden into the middle of the western German area in half a century.

The people would weigh an average of 60 kg (including infants and children) and may have had baggage, equipment, and livestock of 240 kg each, for an estimated total of 300 kg per person. (Modern refugees often move with only a small fraction of this weight.) A fair-sized Bronze Age ship of 15 m could carry 15 to 20 metric tons of cargo, thus about 50 people with their possessions, and a crew of perhaps ten.

At just walking speed, and moving by day only, such a ship could travel from central Sweden to half-way up one of the German rivers and return in less than three months. (Some trips would be longer, most shorter.) Two trips each summer and, allowing for bad weather days, just one winter trip could easily be made by each ship. One fair-sized ship could then transport 150 people per year to their new homes at a leisurely pace. In 50 years a million people could be transported this distance by 133 such ships. If a thousand ships were available (a low estimate) this entire population could have been moved in less than seven years.

Obviously, most of the existing ships would continue to be used for ordinary commercial purposes, fishing, and war during this time. But then, Danish sources would probably have had at least an equal number of ships that would have been available for this move, giving a total of maybe 2000 craft. In a 50-year period, the mass migration of a million heavily supplied people could have been accomplished with the diversion of only about seven percent of the available sea transport.

The Swedish immigration into Germany need not be viewed as a military invasion. Rather, it would have been more like a massive infiltration of settlers into the lightly occupied river valleys. Of course if resistance were encountered, the intruders would have had overwhelming numbers of armed men available at each of their limited paths of entry. These rivers would have been familiar to many commercial shippers from the Denmark area, and no doubt to a few from Sweden and Norway as well. They may also have been regularly visited and fished, with occasional settlers being introduced even before this great migration.

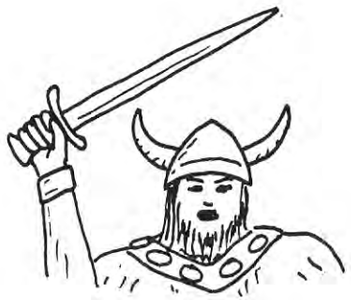
The geographic pattern of the move is both simple and regular. Emigrants from Sweden might naturally assume that a warmer climate was the general necessity, although it was only warmer summers that were actually needed. They would accordingly have felt compelled to concentrate their intrusion into those rivers located to the west of Denmark--to the east winters were just as cold as in southern Sweden.

We can presume a limit to their adventurousness and the distances they were willing to travel, which would also be based on their area of prior familiarity. This limit could be put at 200 km to either side of the base of the Danish peninsula. To the east, in the least favored direction, this gives them access to the coast and lesser streams, but stops short of the Oder river. To the west they would enter the Elbe, the lesser rivers Weser and Ems, and reach into the Zuider Zee. Within this sea they would have access to the Isel River (also Ysel or Ejssel) which is one of the mouths of the Rhine. Progressing up the Isel they enter the main part of the Rhine upriver from its joining with the Maas (Meuse) River. If they were consistent in moving only upriver, then the drainage of the Maas would be omitted from their area of occupation. From this entry pattern we simply follow their advance up every branch of each of these rivers to the limits of their drainage basins and stop there.

During the Roman conquest of Gaul, and over the next few centuries, note was made of the Celtic-Germanic boundary in much of this region. A few tribal assignments in Roman sources may be incorrect, but generally the Germanic area reported at that time corresponds closely with the line based on these drainage basins. My exclusion of the major mouths of the Rhine as well as the Maas tributary was in fact originally suggested by this early mapping of the Germanic tribes. Only later did I find this made perfect geographical sense.

Occupation of Germany

At first glance it might seem that an exodus from just one-third of a small country like Sweden could not possibly have overwhelmed the entire Celtic population of such a large area as modern Germany. However, more careful examination of the details shows it to be quite



feasible, even inevitable.

The land area of Sweden that was seriously farmed in the late Bronze Age, and then evacuated, amounts to some 98,600 sq km by my measurements. In the 2nd Century A.D. it is estimated that the northern part of this, called "central" Sweden, supported a population of at least half a million people, at a density of something like ten per sq km. (Here and elsewhere I have used population estimates from Pounds 1973.) This would involve half of the farmed part of Sweden. For the remainder of settled Scandinavia, as well as for Germany, a density as low as five per sq km is indicated. Seven centuries earlier, Bronze-Age Sweden would have supported at least as many people. Their settlement actually extended somewhat farther to the north at that time, as compared to the early Iron Age, and there were no significant improvements in agriculture during this interval. Assuming the same densities in 500 B.C. as for 700 years later, the other parts of Sweden and evacuated Norway would have held another 472,500 people. Adding these to the population of central Sweden, this gives us the potential for an exodus of 972,500 people. (I have not figured in the native Scandinavian cattle herders of the interior, nor the coastal people to the north. Some of them may have been involved, but this is not certain. Probably they spread into the evacuated areas.)

At six persons to each sq km in the defined basins of the Rhine and Elbe, a high estimate of the target population in western Germany would be about 2,472,000 people in an area of 412,000 sq km. (Duby, 1973, estimates a population less than half this great, but he no doubt would also have reduced the Swedish numbers correspondingly if he had dealt with that area.) The residents should then outnumber the intruders by well over two to one; the invaders having just 28.2% of the combined populations.

Casual examination of rivers and tributaries in the German area shows 6,275 km of total length of significant streams that would be easily navigable for even the largest ships of the time. There is also a northern coastline of 750 km that is of easy and

immediate access. The likely scenario would be for these infiltrating-invading Scandinavians first to occupy the coast and both banks of all these rivers to an average depth of ten km in all directions. (The actual occupation zone would vary greatly from place to place, but this may be used as an average for purposes of computation.) The area of these shoreline strips adds up to a surprising 133,000 sq km, or 32.3% of the total. (See Fig. 16 for a map of this initial area of occupation.) If the intruding population were spread evenly over all this area, to the exclusion of the resident natives, their density would be 7.42 per sq km. This is about the average for the entire source area, and is well under that estimated for central Sweden.

This riverine zone of the German area was originally the least populated part; as noted above, the higher lands were the most favored for their easy farming. If the density of native riverine residents is taken as two per sq km, then some 266,000 people would be living in these strips. This would be only 10.76% of the total Celtic population of the Rine-Elbe basins, who were occupying 32.3% of the total land area.

It may be assumed that the infiltrating Scandinavians would absorb these people into their own groups. Some residents might move away from the shores, while others would be attracted to the newcomers, and these should about balance. The intruders' 972,500 would be augmented by the assimilation of these 266,000, for an immediate total of 1,238,500. In this first action in a limited area the intruders outnumbered the affected residents by almost 4 to 1, so these could have been incorporated with no difficulty. This augmenting raises the population density along these river strips to 9.3 per sq km--almost the same as back in central Sweden, and a workable figure as will be seen.

After the subtraction of these 266,000 people, the remaining Celtics between the riverine zones would number 2,206,000. They would be occupying a badly subdivided area of 279,000 sq km, with a density of 7.9. At this point the remaining Celtics will still outnumber the intruding Germanics, but the ratio is reduced to less than 2 to 1. Now the intruders have 32.3% of the land and

35% of the population within the whole river drainage area.

The number of rivers and their combined lengths that are used here is somewhat arbitrary. During the first century of intrusion the riverine occupation may have been somewhat less than the total; given time, the occupation could well exceed that calculated here. The rivers figured here are simply those that are shown most regularly on various European maps. The 10-km distance from each bank is based on an easy day's walk to the limit and back. The density of Celtic population along these rivers was arbitrarily set at just one-third of the average reported for the entire country. This riverine population density would then be one-fourth of the density in the remaining higher lands where most of the farming was concentrated. It just happened to work out that when the resident Celtics of the rivers are added to the Scandinavian intruders, their total would fill these strips to almost the ten per sq km, just as in the best Swedish lands.

The ecological basis for this newly achieved, high density of riverine settlement must also be considered. Some explanation is needed for the Swedish population here being about four times greater than it was for the natives before they arrived. The two obvious means are fishing and short-term crops.

Fishing skills were increasingly developed as Indo-European farmers expanded to the north. Dietarily essential vitamin D for winter consumption was obtained from sun-dried fish. Water craft and other appropriate fishing technology were devised and adopted from resident hunters, as well as from the Aegean Boat People who were encountered there. Most of the ships from the affected Swedish and Norwegian areas would ultimately end up in Germany, along with the skills to build more. The German river system offered an underutilized ecological opportunity to exploit this large aquatic food supply. This developmental gap eventually would have been closed by a slow filtering to the south of the appropriate skills, and this was no doubt underway. But the process was fortuitously accelerated by the climatic adjustment that drove large numbers of skilled fishermen into the area

during one short time period.

Scandinavian farmers had long been situated up against the limit of the 120-day growing season. This limit is somewhat arbitrary because it depends on the crop, and fluctuates from year to year. Still, it marks the approximate limit of farming that was reached by the first settlers around 3000 B.C.

Yearly variations in the length of the growing season would have adversely affected crop yields on many occasions. This problem would be most frequent near this upper limiting line, but at times it would have affected the greater part of inhabited Sweden and Norway. In bad seasons often only part of the grain crop would mature. This would cause a strong natural selection favoring those variations that matured slightly early; conscious selection by the farmers is not required. The automatic result of short-season varieties may also be at the cost of losing some other desirable qualities.

Seed from these fast-growing strains would have been brought by the settlers into the German area and would be sown in the river valleys. The German rivers, especially the Rhine, have a spring flooding as they drain meltwater from the snowfall in higher altitude areas to the south. Accordingly, their bottomlands cannot be tilled and sown until much later in the season than the surrounding uplands. This results in a growing season that was too short for the Celtic farmers to use. However, selected northern seed was better able to mature in the available time. Scandinavians were able to take large yields from this unusually fertile soil. Again, the techniques and seed might eventually have filtered down to this area, but it was a climatic shift that brought them in abruptly at this time.

Celtic and Germanic peoples would find their respective territories interfingered in a complex pattern, with each group of one ethnic type partially surrounded by groups of the other. With total population figures for the entire region still running almost 2 to 1 in favor of the Celtics, they eventually would have assimilated the Germanics if all other factors were equal. Several additional factors tipped the balance in favor of the

Germanics. (Throughout this discussion I often use "Germanics" for Germanic-speaking people, "Celtics" for Celtic speakers, and so on, for easy flow in the narative. I am sorry if this short-hand form bothers some readers.)

The scenario of intrusion given here is somewhat artificial for the sake of simple presentation. I have described how the river zones were occupied as a first stage, which was followed by the taking of the intervening higher lands. Actually, many of these between-river spaces in the north would have been taken early in the movement, and long before the river zones were filled in their more distant southern parts. The actual process of filling in between the rivers was probably progressing as a "second front" a few hundred km behind the advance wave up the rivers themselves. The time taken to evacuate Sweden also imposes some constraints on this model.

If the evacuation was accomplished in 50 years, there had to be enough land available at the end of this time to support all these people. If the riverine settlements had progressed just half of the 600 km straight-line distance through Germany in these 50 years, they would have acquired 66,500 sq km of river zone territory. The invaders' full 972,500 people, plus 133,000 from half of the Celtic riverine population that would be incorporated at this point, add up to 1,105,500 Germanics. At the previously calculated density of 9.3 per sq km, only 609,150 of these could be settled in the partially occupied river zones. The other 496,350 must be settled in other places. At the assumed upland density of 7.9 per sq km (as with the Celtic farmers), another 62,800 sq km are needed to locate the rest of the Germanics. In order to take this much territory the full Germanic advance over the land area must have moved almost 150 km, or one-fourth of the total distance. Out of a total linear distance of 600 km, if the riverine advance had reached 300 km in 50 years, the total occupation must have gone half of that, or 150 km.

A new aspect to the intrusion now appears in the above version of upland occupation following shortly behind the

riverine expansion. No provision was made for the Celtic population that had been living on these uplands. Many Germanics would have been lost in the inevitable wars, and others lost through temporarily strained refugee living conditions. Their places would have been filled by many thousands of Germanized Celts. I cannot imagine that any more than half of these upland Celtics would have been incorporated into the Germanic ranks. That still leaves the other half with nowhere to go but out. The exodus of these Celtics is discussed in the next section.

Something like this double pattern of advance is probably close to what actually happened. The advance wave of riverine occupation would eventually absorb and Germanize all of the 266,000 Celtics who lived there. The second wave of upland occupation that followed behind would Germanize about half of the Celtic inhabitants (ultimately 1,103,000 people) over a protracted period of time, and force the departure of the other half.

The numbers involved can now be reviewed in terms of the originally described two-stage occupation of Germany. The initial riverine occupation by 972,500 Scandinavians would absorb 266,000 natives and become a population of 1,238,500. These would then assault the upland Celtics in a piecemeal fashion and eventually absorb 1,103,000 of them in modest increments. This leaves 2,341,500 Germanic people in a previously Celtic land, while another 1,103,000 of these Celtics have gone elsewhere under pressure. It still remains to be explained why the invaders should have prevailed over the residents so often that such an impressive Celtic withdrawal would have occurred.

River shipping of large volumes of produce gives a significant economic advantage to those with the equipment and locations to accomplish it. They can also transport large populations both up and down the rivers as circumstances call for. Military reversals in local conflicts need not be total for those who have ships. The simple expedient of crossing a river can often provide a safe retreat--an opportunity that is denied to land-based foes under comparable circumstances.

It can safely be presumed that the recent mass migration out of Scandinavia and the continuing upriver settling would mean these people had a degree of cooperation and coordination far greater than that found on the Celtic side. Finally, there is the simple fact that these northerners were bigger and stronger, on the average, than their Celtic adversaries. In combat with hand weapons this gives a substantial advantage to one side, all else being equal. The effects of a similar body-size discrepancy between Celtics and the still smaller Mediterraneans were often noted by classical writers among the latter. Absolute body size in this part of the world varies with latitude in a regular geographic manner.

It must be stressed that the details given here of exact land areas, populations, and densities are actually only approximate. The succession of events is also not necessarily exact. This picture is built up from the most probable parts known, and the result is not only inevitable, but it accords well with historical facts that were recorded by civilized people around the edges. Details might well have varied, but the general picture is probably true as given here. The most precise, and hopefully testable, prediction here is that German ultimately relates more closely to ancient Swedish than it does to Danish.

The numbers and distributions of ethnic forces given here would have been just barely sufficient to ensure ultimate Germanic dominance of the Elbe-Rhine drainage basins. Another factor that probably contributed to their success was the sparse population of the region surrounding the Low Countries. The presense of non-Germanic and non-Celtic place names here indicates that it must have been ill-filled in the first wave of Neolithic settlement. Barraclough (1978:85) maps this area as including the coastal 30.3% of the drainage basins under consideration here. If we assume this place held just half the number of people as in other Celtic areas, then an across-the-board reduction of 15.2% can be made. Applying this correction factor throughout all the previous calculations would mean that

the initial riverine zone of Scandinavian occupation would have contained 39% of the total drainage basin population. If the previously calculated 35% was sufficient, then this likely 39% makes their success even more understandable.

A large ethnic group of native Mesolithic people continued to exist as cattle herders for some time in the interior of the southern part of the Scandinavian peninsula. We do not know exactly when these Nordics were assimilated into the Germanic agricultural population. If they still existed as a separate entity at the time of the evacuation of Swedish farmers, they could have expanded to fill some of that void. (Remaining Swedes, reverting to a Mesolithic economy with some pastoralism, could have filled it just as easily. Lappish reindeer herders may also have temporarily extended their area.)

It is much more likely that these Nordic natives were absorbed into the Germanic speech community well before this time of exodus. These people are the only obvious source of the non-Indo-European vocabulary found in the Germanic languages. Since this includes German itself, the absorption must have occurred before the southward move began in 500 B.C.

Celtic Diaspora

According to many prehistoric reconstructions a great expansion of Celtic peoples began about 800 B.C. This was supposedly because of their military and commercial power that was based on the ironworking in their central European homeland. Archeological evidence of the spread of Hallstatt iron work was probably just that--and no human movement need be supposed. Only after 500 B.C. is there clear indication of human migrations, and their explanation given here turns out to be quite different from the usual image of a conquering ethnic group. An ethnic expansion of the Celtics is



no more logical than the supposed ethnic spread of the Kurgans out of the Pontic Steppes.

During the intrusion of Scandinavian immigrants into central Europe large numbers of the Celtic natives evidently left this area. The entire Rhine through Elbe drainage basins has an area of 412,000 sq km, and was then the home of about 2,472,000 people. The considerations developed above indicate that nearly half of this population, an estimated 1,103,000 people, departed under pressure within the period of 450 to 50 B.C. Massive movements of Celtics were noted by Roman and other historians during this same time. These migrations clearly stemmed from a source generally in the German area, just as postulated here. While some authorities assume they are refugees fleeing from advancing Germanics, many others see this as part of an overall Celtic expansion on its own merits. There are no natural factors that would appear to support this latter interpretation.

A "domino" effect is described here where Scandinavians make one shift, and this causes Celtics to make the second. The lasting effects of these two moves, however, are totally different. A presumed 972,500 Scandinavians made a concentrated move in one direction into a clearly deliminated territory. The circumstances were such that the ethnic composition of these intruders would be preserved and was automatically imposed on those of the fragmented resident populations that remained. The exodus of 1,103,000 Celtics was dispersed to the west, south, and east, in at least six identifiable groups. They were locally successful in conquering pieces of territory and maintaining their ethnic identity for some time. In the long run, however, their dispersion was too wide-spread for any of them to have preserved their languages longer than about four centuries.

If we assume these Celtics left in only the six groups identified here (an unlikely assumption), they each could have numbered 184,000 people. More likely, these six groups were only about half this large, while the remainder was distributed in many smaller movements. A wide dispersal of so many groups, some of them very large and others small, could easily create the

impression of an expanding ethnic type. This is especially true if they were militarily powerful, and if their spread was accompanied by the diffusion of advanced ironworking techniques. The actual cause of this movement has been obscured by the fact that historical sources were often so situated as to observe the Celtics, but largely missed the driving force behind them.

The Belgae of northernmost Gaul were noted by Caesar in the middle of the First Century B.C., and he was told that they had recently come from the region of Germany. These were Celtic people, in large numbers, who had also entered Britain by that time. The area in question of northern Gaul should have supported a minimum population of 450,000 at six per sq km.

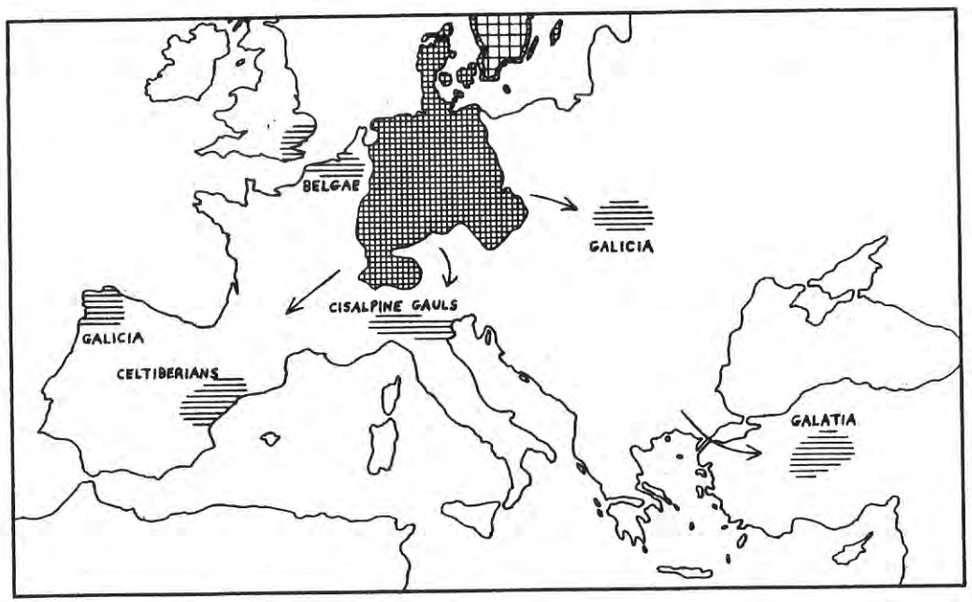


Fig. 17. Celtic Diaspora. The German river basins, from Rhine to Elbe, are included in the Germanic hatched pattern. Major groups of historically known Celts are named and marked with close horizontal lines. These are interpreted here more as refugees than as a conquering expansion.

Obviously, even a full one-sixth part of the Celtic dispersal (184,000 people) would have constituted no more than a rather influential, and possibly a conquering, force. They apparently did not have the benefit of any major new technology, nor any unique geographical circumstances, that would have enabled them to make an ethnic replacement in settled agricultural regions. But is is possible that they were the first Indo-European farmers to occupy some parts of the Low Countries that up to then had remained in Mesolithic hands. In most of both Gaul and Britain they should have made little difference because the previous residents were also Celtics.

Similar intrusions are known to have occurred in Iberia in the 5th Century B.C. These would therefore have been among the earliest Celtic groups leaving the German area. They are known from place names to have settled in various locations over half of the peninsula. The resultant ethnic mix is sometimes called Celto-Iberians or Celtiberians. Only in the northwestern corner did their language apparently persist until Roman times where it formed a distinct dialect after Latinization. This corner, still known as Galicia, was semi-protected from linguistic assimilation by the fact that there were no neighbors along half of its boundary. Assuming the Celtics entered Iberia around both ends of the Pyrenees, we could count these as two of the six major groups that exited from Germany.

Also in the 5th Century B.C. a massive Celtic intrusion occurred in the Po valley of northern Italy. This was previously a thinly settled area, and these "Cisalpine Gauls" were a powerful force. They were suppressed by the Romans some 400 years later, and ultimately assimilated. Part of southern Poland is still known as Galicia from the ancient Gauls, or Celtic settlers from the same diaspora. The Galatians of central Anatolia were well known to Christian missionaries of the First Century A.D. They supposedly arrived early in the 3rd Century B.C., and eventually disappeared as a linguistic entity. The movements into Italy, Poland, and Anatolia may be considered as three of the six major Celtic migrations. (See Fig. 17 for a map

of all six.) If this reconstruction of events is correct, the absense of many more migrating Celtic groups should become increasingly conspiuous.

While this Celtic dispersal apparently involved a slightly larger population than the initial Scandinavian intrusion that ultimately forced them out, they left no more than indirect linguistic evidence of their fate. They do not appear on my language maps that summarize each time period. The predictable geographical and technological circumstances that assured Scandinavian success on the continent were equally definitive in leading to the ultimate disappearance of these migrating Celtics.

Language Map



Linguistic distributions in Europe at the end of this phase of Germanic migration overlap somewhat with the changes that are introduced by the next major event, the Roman Empire. These two events can be separated arbitrarily at the year One (Fig. 18). This assumes the Germanic move was complete, and that Sweden and Norway were repopulated--these were not quite true at that time. It also assumes that Latin had not yet supplanted any of the languages that it later did, though this was actually beginning to happen.

The map differs in just a few particulars from that of a few thousand years earlier. These can be mentioned in their logical, and somewhat temporal, order of priority.

The separate ethnic group of cattle herders in Scandinavia is gone. These Nordics almost certainly had merged with the northernmost Indo-Europeans before the Germanic move began in 500 B.C. This would represent the beginning of the Germanic separation which Lockwood (1969) argues must have occurred in a small area in relative isolation from the rest of Indo-European.

The Germanic expansion onto the continent changed their

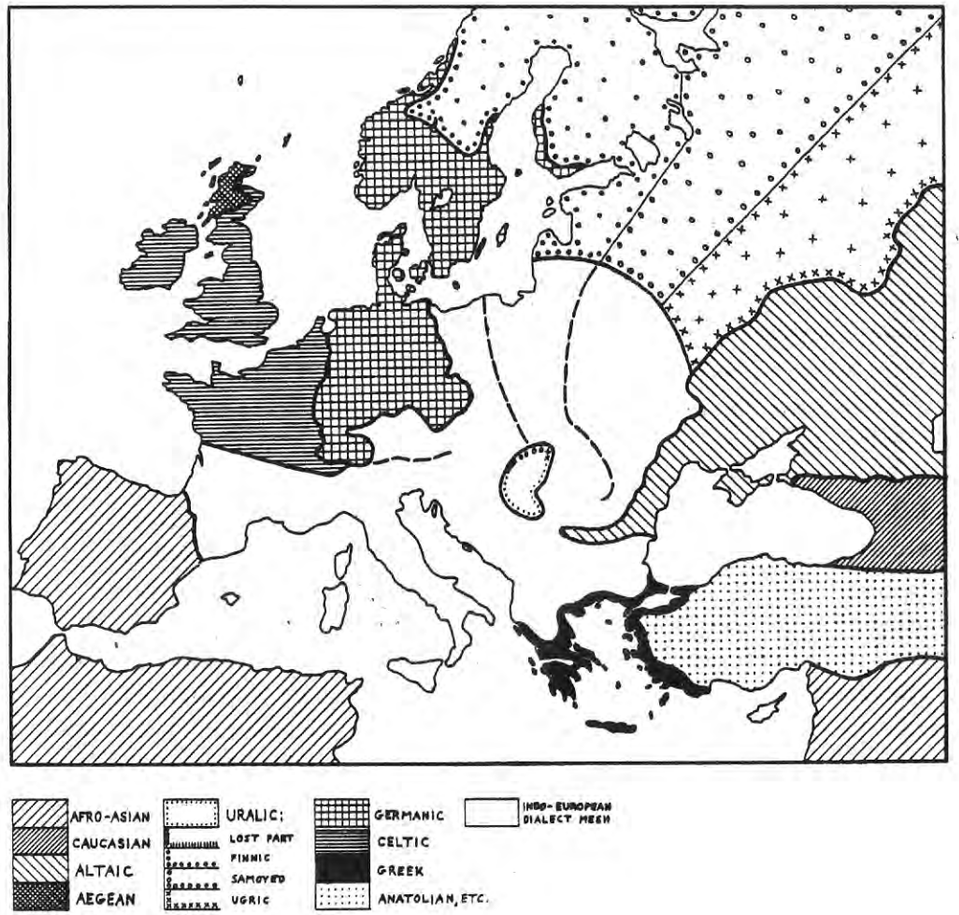


Fig. 18. Language map in the year one. The Germanic expansion onto the continent has created a strong boundary against other Indo-European dialects, thus allowing them free linguistic drift. The Germanic move also cut-off western Celtics from their dialect chain and initiated their free drift. Greek expansion followed a similar pattern, cutting off the Anatolians and themselves to drift. All other areas remain constant.

boundary from what may have been only a dialect transition into that of a fully bounded language. From this time on, its own dialect mesh drifts independently of the rest of the Indo-Europeans. This may have been the first break in the dialect mesh of the original Indo-European spread.

When the Germanic expansion reached the Alps it cut off the western Celtics from all contact with the rest of the Indo-European mesh. This continuity had previously been maintained by a chain of dialects around the eastern Alps. The language line across southern France could no longer be circumvented, and Celtic also becomes free to drift on its own course.

For some three centuries Greek had been the socially dominant language of the eastern Mediterranean and was being adopted by various peoples around the Aegean and up the Balkan Peninsula. This amounts to a folding back of one language over several dialects, though by adoption rather than by human replacement. It is clear that Greek had acquired linguistic independence from the rest of Indo-European by this time. Of course the Greek of Linear B was distinct from written Hittite a thousand years before, but the possibility of a chain of connecting dialects of nonliterate peoples between them at this time cannot easily be dismissed. Greek expansion also served to separate the original Indo-European mesh into its Asian and European halves and set them free to drift independently of one another. While little attention is called to this Greek phenomenon, it is actually a small version of the next major event that centers on Rome. Greek certainly had a much wider distribution in the cities of the eastern Mediterranean than is shown here, but it is primarily the rural speech that is estimated in this map.

The category "Anatolian" continues to be used for all the Indo-European languages of Asia without distinguishing the Iranian area.

Other language breaks might have been created in the Balkans by the repeated incursions of Kurgan horsemen out of the Ukraine. These are known from archeological records going back to well

over 4000 B.C., and are here assumed to have been made by Altaic speakers. Domestication of the horse enhanced the military capacity of these people, but it would not have increased their population, nor in any other way enable them to make ethnic conversions. I am now inclined to think that the Indo-European dialect mesh survived their activities in good order.



CHAPTER SIX -- PATTERN OF LATINIZING

A highly civilized society has the potential of spreading its language over the less civilized people under its influence. The most significant and lasting example of this process in European history was the spread of Latin during and after the dominance of the Roman Empire. This was well underway before 100 B.C., and was only slowing down by 500 A.D.

High civilizations had begun as early as 3000 B.C. in and around southwestern Asia. Small areas of conquest were soon built out from some of these. Great empires that actually incorporated many diverse nationalities did not appear until much later. The first major example in this sense was the Achaemenid Empire of Persia, dating from 550 B.C. One might suspect that the pertinent administrative procedures were only being slowly developed up to this time. The potentiality of great empire building spread westward, and there soon appeared the likelihood of a sea-based power of this sort in the Mediterranean.

Early Greek colonies had spread widely through much of the Mediterranean and Black Seas, but they showed little tendency toward political unity. By 330 B.C. much of the eastern Mediterranean was included in the Macedonian Empire that was in this area based largely on sea connections. The Macedonian and later Greek empires extended their rule over peoples who were

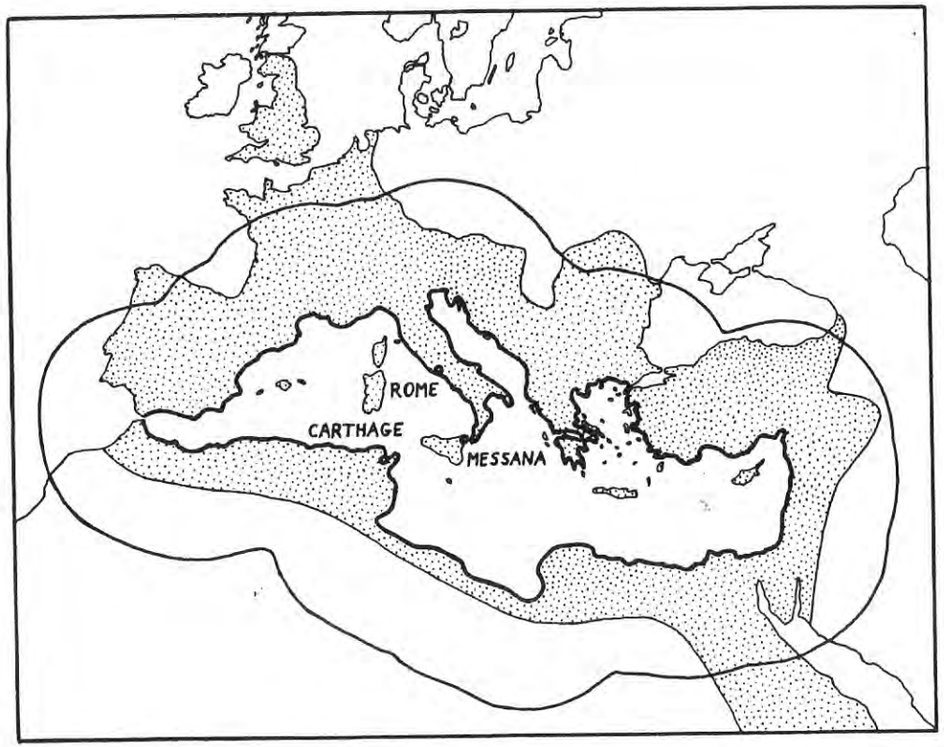


Fig. 19. Mediterranean Empire. A heavy line is drawn around the entire Mediterranean coast, and a medium line is drawn 600 km beyond it. This may be compared with the actual outline of the Roman Empire--stippled and bounded by the fine line. The Empire falls short of the 600-km line in deserts, deep soils, and some areas of cold winters. The Empire extends well beyond the 600-km line only in Britain and Egypt where there is ethnic continuity and easy access. Rome, Carthage, and Messana are potential centers, any one of which would have built essentially the same empire.

mostly of an equal or higher level of civilization than Greece itself. Accordingly, while Greek became the major language of high-level government, commerce, and culture, it had much less effect on the speech of the majority of real people in the area.

It was only a matter of time before this political trend would spread to the west and an all-encompassing Mediterranean empire would appear. Greek, Phoenician, Etruscan, and other sources were soon competing to become the focus of this obvious development. One of these "other" sources was Rome.

The Empire



The geographical extent of the Roman Empire can be described, perhaps even predicted, by a single rule with a handful of logical qualifications. The location of Rome is almost central to the Mediterranean Sea (the Greek city of Messana in northeastern Sicily would be even closer to the center). Roman influence, especially in the form of their control of communication and commerce, was based on sea travel throughout the Mediterranean. Its military power was based on its armies that moved mainly on roads that circumscribed this sea, but they maintained contact with the political center by water-borne communication.

To delineate the Empire a line should first be drawn around the entire margin of the Mediterranean Sea. A second line can then be drawn at a constant 600 km away from this shoreline. This second line is close to the actual border, with just a few exceptions (Fig. 19). Roman power was limited, and their economic interest was low, in the deserts of northern Africa and Arabia. The Empire also did not extend to the 600 km line in the colder climates well beyond the Alps, nor in the higher mountains of eastern Anatolia. The deep soils of the Hungarian Plain were still unusable to farmers, and this grassland area remained in

the hands of its native horse and cattle breeders.

In areas of ethnic continuity and relative ease of access the Empire stretched beyond the 600-km line. Egypt came under their domination as a single unit. Northern Gaul, Belgium, and Britain were inhabited by much the same Celtic peoples as were in central Gaul. There were no great barriers in this area, and Rome just happened to be located more than 500 km in this direction from the most central location that would have been in Sicily. (A comparable extension into the western German area met with less success because of an even more war-like people with a great hinterland of kinsmen behind them.) The northwestern corner of Iberia was included to round-out the area by just a 200-km extension of the frontier to the Atlantic. A small strip at the eastern end of the Black Sea consisted of fertile lowlands of easy access through this watercourse. Other places around the coast of the Black Sea were at least associated with the Empire.

Language Effects



The subject peoples within this Empire may be divided, for present purposes, into two categories (Fig. 20). Most of the eastern part had a level of civilization equal to or above that of Rome itself. In these areas Roman conquest was mainly a matter of decapitating the state, but leaving its commercial, legal, and other institutions largely intact and managed by local personnel. The Latin language made little headway there beyond the higher social levels.

Some parts of the east, and most of the west, were of a lower level of socioeconomic integration. Here the Roman authorities introduced a unified system of economic, legal, commercial, military, and governmental institutions. These peoples were also connected by a network of transportation and communication facilities. This entire civilized superstructure

was created and managed by Romans down to the local level. This was quite unlike the practice in most of the east where such institutions already existed.

The Latin language was the medium of communication in all of these new organizations throughout half of the territory of the Empire. It became in the best interest of all individuals there to learn to speak Latin for economic gain and social security. This linguistic transformation was certainly not completed by the

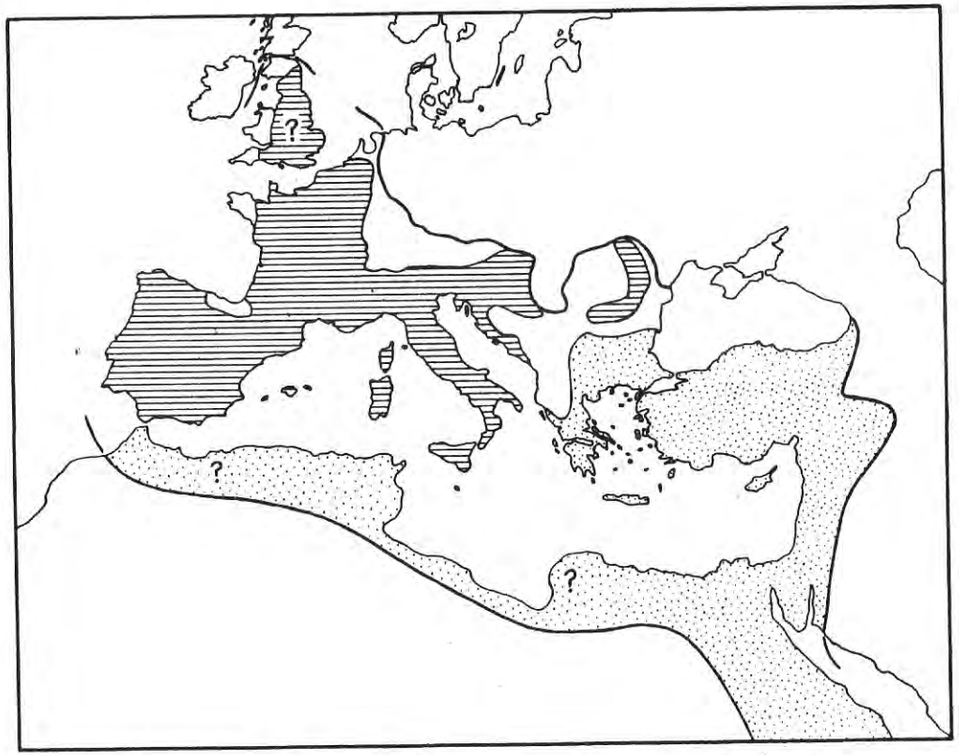


Fig. 20. Levels of Latin influence. Stippled areas show where civilized infrastructures existed, local Roman control was minimal, and native languages continued. Horizontal lines mark the areas where Romans developed the full infrastructure, for which Latin was the official and lasting language. Blank areas within the Empire remained un-Latinized for various reasons.

fall of Rome, but it had progressed so far that the remaining native speakers eventually conformed to the most influential language. Some parts of the western Empire resisted Latinizing. It is well known, for example, that the north-central coast of Spain remained Basque speaking.

The Breton peninsula of France remained Celtic speaking, and most closely related to Cornish which was its nearest British neighbor. Celtic is divided into two groups, P-Celtic of Ireland and Scotland, and Q-Celtic of the rest of Britain and Gaul (Lockwood 1969, Baldi 1983). That Breton is closer to Cornish than Cornish is to Goidelic (Ireland) is to be expected; that was the situation in Caesar's time as well. The claim of a more recent intrusion of Breton from Great Britain is too improbable to consider seriously--the historical move between the 5th and 9th Centuries could have been little more than a refugee group of British nobility. Even Lockwood (1972) doubted that a Saxon invasion in the south-east of Britain would have caused an emigration from the south-west corner. He suggested the possibility of at least a small Celtic survival in Brittany throughout Roman times that might have attracted refugees from an Irish intrusion into Britain.

In Britain itself, Wales and Cornwall remained Celtic in spite of some degree of Roman control. Like Brittany, these hilly and infertile areas are not amenable to maintaining Roman villas, and thus were under less social pressure to conform to the "universal" tongue.

Whether the area of England itself was Latinized is largely irrelevant because the later Anglo-Saxon conquest overran whatever speech was most common there at the time. The Rhineland Germans, although part of the Empire, were not well assimilated. Unlike the Gauls, these Germans had a large hinterland of unoccupied peoples of their language group. Beyond the Alps the provinces of Rhaetia and Noricum (roughly Bavaria and Austria) seem to have preserved their language for some time. This was known as Rhaetic, a part of the Indo-European continuum that was geographically and linguistically intermediate between Celtic and

Illyrian. These two provinces, plus Pannonia (western Hungary), may have become strongly Latinized in later years, but this was all overridden by other peoples soon thereafter.

Within the Balkans, excepting Greece, there apparently was a three-part division. Thracian in Bulgaria may have held out as a "civilized" area, but it soon disappeared from a later cause. Illyrian-turned-Albanian (an approximate relationship) held out for lack of significant penetration of their mountain core by Romans or anybody else. Much of the remainder was Latinized, and even settled, by Romans.

The Adriatic coast (Dalmatia) was thoroughly Romanized. The area of present Croatia was more accessible and clearly more settled by Romans than was Serbia, hence the foundation of their present division. Slovenia is likely explained by its being part of the Venetic speaking area. This old Venetic area is probably also represented today by the Friulian language immediately to the west within Italy.

Dacia (modern Romania) was somewhat Latinized, and its southern and eastern Transcarpathian foothills were also settled by Romans. This latter area survived the Slavic expansion, and eventually recovered its original territory and more.

The fringe of northern of Africa, outside Egypt, and much of interior Anatolia were no doubt largely Latinized, but these were overrun later by Arabic and Turkish expansions. The Latinization of North African cities is well known, but the language of the rural population at that time is mostly unknown.

The linguistic result of the phenomenon of Rome was the spread of a single language over vast areas of that Empire. Unlike most of the events described here, this was not based on a movement of people, but of cultural prestige that led to voluntary language change. This survives today in the form of modified descendant languages in most of Spain, Portugal, France, Italy, Romania, and half of Belgium.

This vast out-flow of one language from a single city may seem to be one of those unique phenomena of the "historical" type. Actually it was a very predictable phenomenon of the time.

During the last few centuries B.C. there were several rising city powers in the west-central Mediterranean, and one of them was bound to succeed in forming the inevitable circum-Mediterranean Empire. That it was Rome, and not Carthage, Greek Messana, or an Etruscan city is largely irrelevant. The result would have been roughly the same with any of them, except that a different language would have played the role that Latin did. All told, there is relatively little in this section on Latinizing that is controversial other than its proposed regularity and/or predictability.

Language Map



The linguistic picture of Europe after Latinizing cannot be fully separated from the next phenomenon of the Slavic expansion. An arbitrary division can be made at about 300 A.D. by presupposing the Latinizing that was actually completed only much later in some places. This date also just precedes any visible movements of the Slavs and Magyars who were already beginning to expand out of their core areas. (See Fig. 21.)

Western Europe at this time has lost the original Indo-European dialect mesh, and most of the Afro-Asian as well. The greater part is now overlain by Latin and is already beginning to form its own dialect mesh. It is also subdividing according to the distributions of the underlying languages. Germanic covers another large area to the north, from Germany through much of Scandinavia. Germanic and Italic now share a long common boundary, from the Alps to the North Sea, along which other languages are in the process of being digested by these two. Celtic survives in Brittany and the British Isles, with perhaps some Latin in England itself.

In eastern Europe the original Indo-European dialect mesh

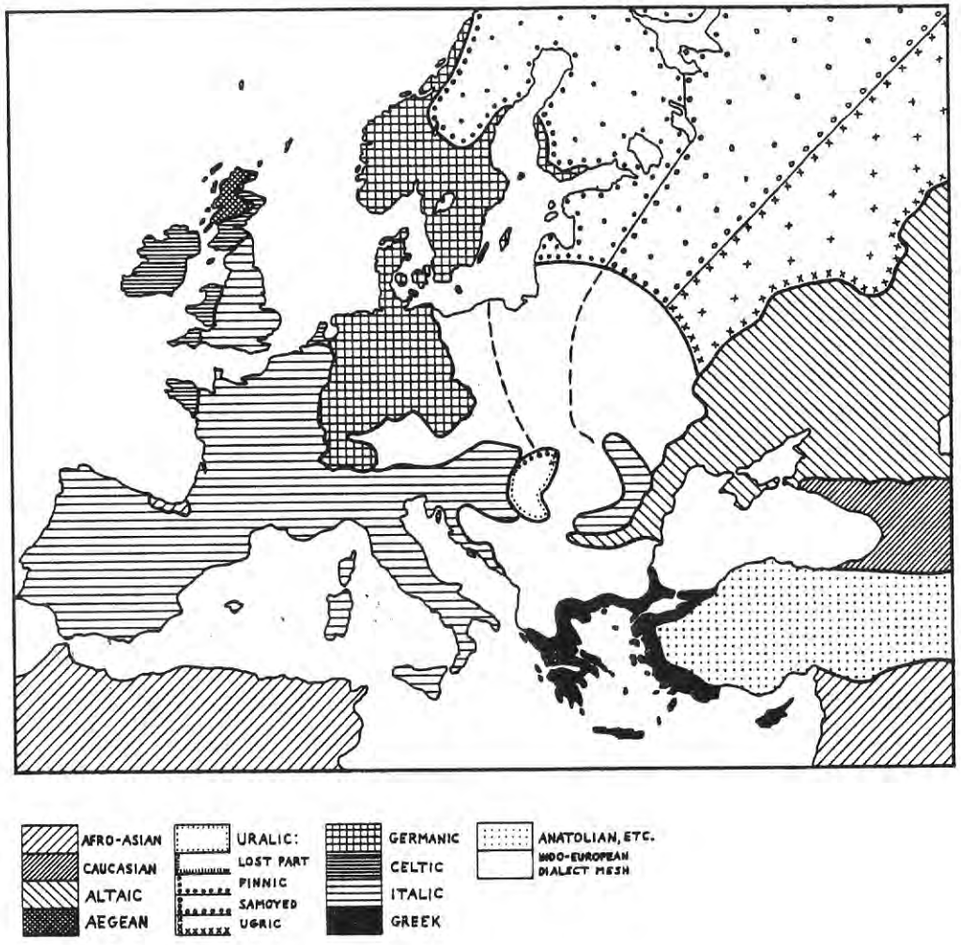
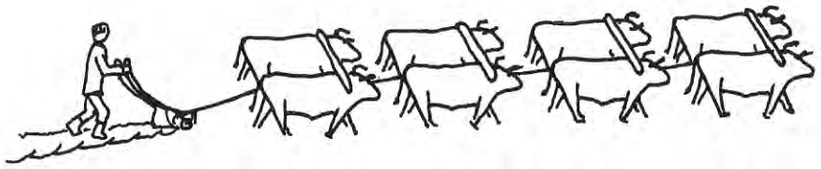


Fig. 21. Language map in 300 A.D. Italic languages, almost all derived from Latin, have spread over much of Europe, especially in the west. They replace large areas of Celtic, Afro-Asian, and much of the Indo-European dialect mesh in the south-central part. Other changes are minimal.

still covers a large area, but it has also lost ground here. Greek no doubt progressed farther up the Balkan Peninsula and formed a distinct language line against Illyrian on the west and Thracian on the east. This fold-back phenomenon had long since engulfed those dialects that formerly were intermediates between Greek and its northern neighbors. Latin was injected into the northern Balkans--as the leading language in Dalmatia-Croatia, and as a lasting phenomenon only along a curving strip around the eastern Carpathians in Romania. Magyar continued as an island of alien speech in the Hungarian Plain. The name "Anatolian" is still used here for all of the Indo-European languages in Asia.

The rest of eastern Europe constituted the remains of the original Indo-European language spread, as yet unaffected by linguistic events elsewhere. Very strong contrasts would have distinguished the speech of different parts of this mesh because of distances and time for dialect development. An eastern version of what still might be called Celtic existed in the Oder River basin and nearby. (Some Germanic may also have penetrated this area.) This was locally separated from Baltic by the ancient dividing line that dates from the initial occupation by farmers. Baltic itself would have coastal and interior halves divided by a similar, but no doubt weaker line. Proto-Slavic is not geographically set apart except for the modest barrier of the Pripet Marshes against interior Baltic. Slavic would grade imperceptably into the other parts of the remaining Indo-European dialect mesh in all directions from its central location. This continuity would be broken by the next cultural event that goes so far as to replace almost this entire remaining mesh, and more territory as well, with an expansion from that small Slavic area within its center.



CHAPTER SEVEN -- SLAVIC EXPANSION

Background

At about the same time that Roman power was beginning to wane, a new ethnic movement was getting underway in eastern Europe. This was the expansion of Slavic-speaking peoples that has been back-tracked in time and space, by most authorities, to about 200 A.D. somewhere in the middle Carpathian region. Unlike the influence of Rome, this event was not based on higher level of civilization, nor on any particular military capacity. Sheer numbers are all that can be found to explain this movement that constituted an irresistable flood for many centuries.



Estimates of population density for most of eastern Europe at 200 A.D. center on around two per sq km, a figure far lower than in all regions to the south and west. This is largely a consequence of the smaller fraction of the land that is suitable for plowing. This density must be multiplied by about four times in order to create the kind of population pressure that would have enabled the Slavs to overrun most of their neighbors, many

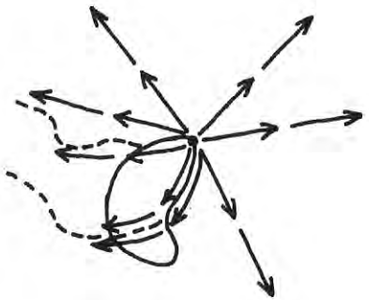
of whom had equal or higher levels of civilization. Great increases in population are made possible only by corresponding increases in food production. In the 6000 years that farmers had occupied this area, population density had only doubled from the presuned initial figure of one per sq km. A major change in the agricultural base at this time and place could easily have been postulated even if we did not have any direct knowledge to that effect. In this case we do know. Before this time the simple scratch plow, or aratum, was the only type in use. This plow was pulled by a pair of oxen and just cut a furrow in the ground. It could not be used in deep turf or heavy clay soils. The mold-board plow, also called the caruca or simply the heavy plow, was a much more complicated machine. It begins with a vertical knife supported at the front to cut the turf. This is followed by a horizontal plowshare, set well below the ground surface, to which is attached a curved board that lifts the topsoil and turns it over. It has wheels to support its weight and to set the depth at which it plows. This whole apparatus is then pulled through heavy soil by a team of usually eight oxen. Fields mostly changed in shape from squares to long rectangles so that fewer turns had to be made with this cumbersome affair. (See White 1962.)

An obvious place for such a plow to be developed would be near the edge of the Hungarian Plain where the soil could not be tilled with the light plow. In this area there was a meeting of Roman technology with that of immigrant Celtics, as well as that of local forest and steppe peoples. If this innovation was developed along the northeastern margin of Magyar territory, then the subsequent ethnic movements would automatically follow just as recorded.

Most of the soil of Europe, outside of the Mediterranean area, was too heavy for the light plow and remained untilled up to this time. Lighter soils in the upland forests, as well as alluvial river valleys, were abundant enough that farmers were previously able to effectively occupy the whole area, but only at a low population density. When the heavy plow became generally

available far more of the land could be tilled--possibly four times as much in most places. This provided the basis for a population explosion that radiated from the source.

Beginning Expansion



The rate of expansion of plow agriculture through the Hungarian Plain itself is a bit difficult to calculate. For the most part, this territory was now being farmed for the first time. Most of the plain was cattle and horse country, but it included some river-valley agriculture, and was surrounded by farmers no more than 100 km from any point within. General farming skills, hired hands, seed, and a planting calendar were easily obtainable, so the advance was probably much faster than the original expansion of simple farming. My suggestion is that a double speed, equal to that of expanding pastoralists, would be applicable here. At this rate 150 years would see this deep-soil farming spread from its source point through about half of the Hungarian Plain. Another 150 years would take it through the rest of the plain to the south-west, and well out into the surrounding forested lands. Magyar expansion in all other directions would be quite different. (See Figs. 22, 23, and 24 for maps of ethnic spreads caused by the mold-board plow.)

Modern Hungarian speech extends about 40 km beyond the plain to the north and north-east (Fig. 23). This suggests that the heavy plow was developed inside Magyar territory, and that the new farmers expanded in these directions as well. Given the novelty of serious farming, and the proximity of the Slavic frontier, the Magyars would not have built up any significant population pressure in this direction. Adoption of the plow by Slavic farmers would have been rapid--they may have devised much of it already.

The fact that almost all of the terminology relating to the mold-board plow and its parts is of Slavic origin forcibly suggests they are its inventors (White 1962:49). This would seem to place the development on the edge of Slavic territory against the Hungarian Plain. But in this case we are hard-pressed to explain the 40-km advance of the Magyar frontier against the Slavs to the north and north-east. Perhaps this represents a later move that is related to the Magyar penetration to the east into Transylvania. One solution, to which I am inclined, would be that a colony of Slavic farmers just inside the Hungarian Plain were the first to assemble this plow. In this way we can account for the Slavic terminology, along with the Magyars being among the first majors users.

Slavic farmers living around the origin place of the heavy plow would have become involved with its use and spread at almost the same time as would the Magyars, no matter what was the exact spot where the invention actually occurred. Their subsequent rate of expansion can be estimated from historical sources to have been about 200 km per century, with no penalties for winter conditions. It was by extrapolation backward from this information that the time and place of the source was pinpointed. This rapid Slavic expansion was mainly over areas that were already under at least some degree of cultivation with the light plow.

The expectable difference between the advance rates inside eastern Hungary and outside it, would automatically lead to some interesting border adjustments. (The Magyar basic advance rate is assumed to be 75 years, plus 25 for 9-hour days, and 50 for -2° winters, for a total of 150 years per 200 km.) Along the northern edge of the plain, the Magyar and Slavic advances to the west may be compared first. After a slight starting delay of about 30 years, the heavy plow in Slavic hands would move 200 km in the same time as would its use by the Magyars. At this point the deep soil along the Magyar path ends, and they too should now expand at 200 km per century. At equal advance rates from here on, Magyars would move westward up the Danube River while Slavs

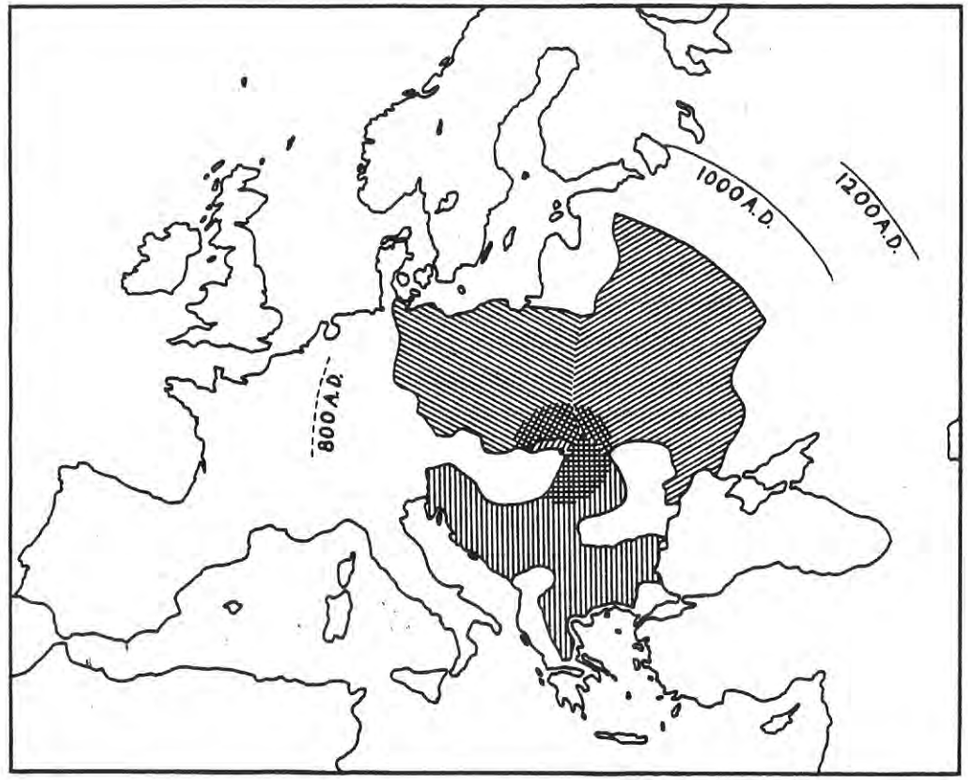


Fig. 22. Slavic expansion. This is the first of four maps showing ethnic shifts that followed from the development of the mold-board plow. The original Slavic area is the unbordered circle of cross-hatching around the dark spot that marks the plow's origin. Slavic expansion is shown by groups of parallel lines radiating in three directions for the western, southern, and eastern branches. A small area near the center was lost to expanding Magyars. The date is 800 A.D. when the western and southern advances have halted, but the eastern is still progressing. Eastern limits at 1000 and 1200 A.D. are also indicated. The 800 A.D. line in the west marks the probable position of heavy plow technology among the local, non-Slavic peoples.

continued through Czechoslovakia.

Along the eastern border of the plain both ethnic groups would likewise be advancing the use of the heavy plow in a southward direction (Figs. 22 and 23). Allowing the same 30-year delay in the Slavic start, Slavs are actually slightly ahead at 200 km. At this point the Magyars are still in their own deep-soil area as novice farmers, while the Slavs are moving the plow faster outside of it. The Slavic lead would be increasing as they turn more westward, paralleling the curved border of the main part of the plain. About 50 years after the 200-km mark, the Slavs would enter the southern extension of the deep-soil area, automatically heading due west by that time, and comfortably ahead of the Magyars. From here on, equal progress by both groups would result in the Slavs taking over this southern part of the plain, and continuing their advance directly to the west. This again conforms to the recent boundary of Magyar vs Slavic speech areas.

A general picture now emerges for the initial stages of the advance of the users of the mold-board plow. At a 300-km radius, a circle can be drawn around the probable point of origin of the plow just inside the northeastern corner of the Hungarian Plain. At this point the Magyars hold 20% of the circumference and almost 30% of the enclosed area, but are open for further expansion only directly to the west. The Slavs hold 80% of the circumference and are open to further expansion in all other directions. In spite of their probable slight delay in starting, the Slavs are so positioned as to be the overwhelmingly dominant force in all subsequent developments (Fig. 22).

The further advance of the heavy plow and its users can now be detailed along a series of paths, beginning with due north and progressing counterclockwise. Maps of its effect on various ethnic groups other than Slavic are found in Figs. 23 and 24. In order to separate the movements of various groups from their neighbors, each map shows just half of them, spaced alternately around the "clock."

Western Slavs

Slavic expansion to the north (Figs. 22 and 23), as in all other directions, would involve overrunning and incorporating other farming populations whose speech only gradually diverges from core Slavic as the distance from there increases. The right flank of this northern move may well be the old meeting boundary that dates from the time when the first incoming farmers were divided by the eastern Carpathians. (If so, this line still exists after some 8000 years and today separates the western from the eastern branch of modern Slavic.) The advance to the north would continue and eventually overrun the southern part of what was by then differentiated as Baltic speech. The remaining Baltics would adopt the heavy plow and thereby increase their own population density to the point where the Slavic expansion loses its advantage and stops at 550 A.D. The exact location of this line of transfer cannot be predicted, but it could not be beyond the southern border of modern Lithuania, which is the core area of Baltic speech today. The present border of Poland with the U.S.S.R. is the most probable line.



These Baltics, in turn, would naturally continue this advance to the north and overrun some of their Finnic neighbors in the same manner. Thus Latvia was added as a new area where Baltic speech was overlain on a Finnic base--a linguistic description that is well known. The Baltic advance was similarly stopped at the border of Estonia near 800 A.D. when these Finnic peoples adopted the plow. They increased their population, took the new technology around through the Leningrad area and into Finland, and eventually up to the northern limit of farming. Just how much movement this caused among the Finnic-speaking populations is not clear. This two-time transfer of the mold-board plow along the east coast of the Baltic Sea suggests that

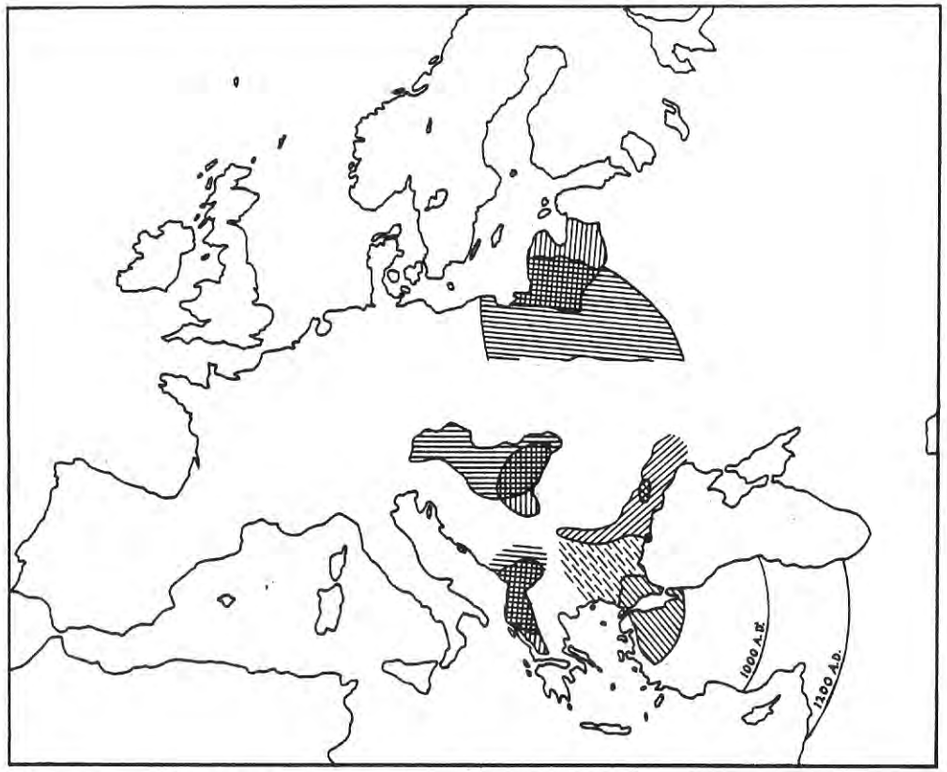


Fig. 23. Non-Slavic expansions, Group I. These four languages show changes that resulted from use of the mold-board plow. Their positions alternate with others (Figs. 22 and 24) to separate their overlapping movements. For each language, lost territory is marked with "defensive" lines perpendicular to the direction of plow advance, retained area is cross-hatched, and gains are lined parallel to the direction of advance. In the north, Baltics lose ground to Slavics, hold Lithuania, and gain Latvia before passing the plow on to the next people. Magyars lose their southern tip and gain much to the west. Albanians lose and gain modest amounts. Turkic loses most of its Balkan holdings (the northeastern border is left vague here) and expands into Anatolia. These Turks first gain, and then lose, the dashed area of Bulgaria. The map is dated at 800 A.D., and shows lines of 1000 A.D. and 1200 A.D. for the Turks in Anatolia.

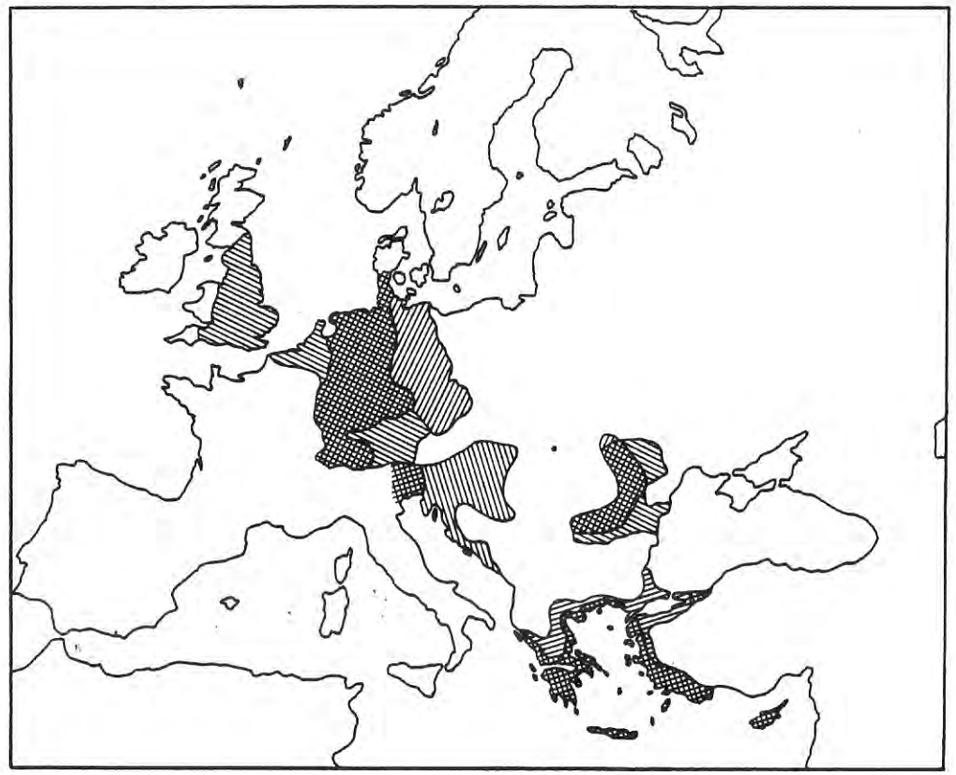


Fig. 24. Non-Slavic expansions, Group II. These four languages show changes that resulted from use of the mold-board plow. Their positions are alternated with others (Figs. 22 and 23) to separate their overlapping movements. Use of the plow spreads in four directions from the origin spot. For each language, lost territory is marked with "defensive" lines perpendicular to the direction of plow advance, retained area is cross-hatched, and gains are lined parallel to the direction of advance. In the west, Germanics lose a wide strip on their east and gain greatly in Bavaria, the Low Countries, and England. Romans lose old Pannonia, Croatia, and Dalmatia, but hold in Italy proper. Greeks lose most of their inland area. Romans in Dacia spread considerably to the east. The map is drawn at maximum expansion of the peoples involved, about 800 A.D.

the area had been well populated before this event. At a lower initial density the natives might not have been able to increase their numbers fast enough ever to be able to oppose the intruding plow users.

More to the north-west (Figs. 22 and 24) the Slavic advance passed over the North European Plain, unimpeded, to the shore of the Baltic Sea all the way west to the base of the Danish peninsula. They stopped by 700 A.D. just short of cutting Denmark off from Germany. The eastern part of this new Slavic territory was the old Celtic-related area, and the western part was Germanic.

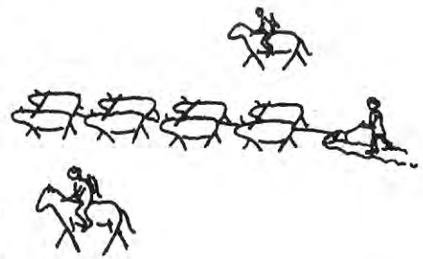
North German tribes were in motion toward the west during, and no doubt because of, this advance of the Slavic frontier. Saxon colonies that had been settled on poor lands in Britain in 450 A.D. (or earlier) would have received many over-seas refugees from the east. This led to their rapid conquest of much of Britain in just 50 years between about 550 and 600 A.D. Eventually these Germanics also brought in the heavy plow that was ideally suited to just those areas in which they had been initially settled. Their inevitable local population increase, plus continuing immigration, led to the final Anglo-Saxon take-over, and the ethnic assimilation of the Britons, by 800 A.D. Not surprisingly this Germanic tide also stopped at Cornwall, Wales, and Scotland, just as the Romans had before them. The mold-board plow was no better suited to effective use of these lands than was the Roman villa system.

At about this same time, Germanic expansion on the continent engulfed western Netherlands, northern Belgium, and a piece of northern France. Again, these were the low areas of heavy soil to which their new plow was so well suited. Interestingly, this is the western half of the area already noted for its non-Celtic and non-Germanic place names. Apparently neither the original farmers nor the Celtic refugees from Germany were able to settle here very densely until this time. The rest of France was too well populated and civilized to become Germanized, though most of it was overrun and controlled by German-speaking minorities for

many years to come. The Franks are the best known of these invading tribes.

More directly to the west from the source point, Slavic penetration ran through the length of modern Czechoslovakia, stopping finally at the western Carpathian mountain barrier (Fig. 22). Early along this path the natives of the Slovak area were near-relatives of the Slavs. In Bohemia they encountered the recently arrived Germans, whom they surely outnumbered. These early "Bohemians" who evacuated their homeland are the obvious source of the German intrusion into Bavaria at about 500 A.D. (Fig. 24). This was the old Rhaetic province of the upper Danube, whose native speech (whether Rhaetic or Latin) was replaced at this time. The Slavic advance expectably halted here from a combination of the transfer of the heavy plow, denser populations resisting them, and a low mountain barrier.

Magyar Moves



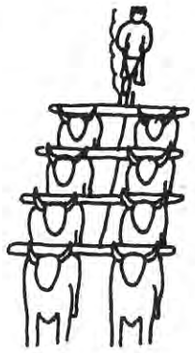
The Magyar advance should have been affected by the fact that most of these people had only recently become serious farmers. Previously their emphasis had been on cattle herding and horse riding. Their later history suggests that they did not ever settle very densely outside of the Hungarian Plain. What ultimately proved to be their firm boundary to the west was only 200 km removed from their original homeland. They apparently did progress another 300 km to occupy the main body of Austria, but gave it up readily to the German reflux a few centuries later (Fig. 23).

Given their equestrian skills and newly augmented population, Magyar armies periodically raised havoc, especially to the west of their extended homeland. Atilla the "Hun" was merely their current leader when the factors for expansion first developed.

The many supposed ethnic changes within Hungary during this and later times could have been no more than changes in the political control of the nation. The historic waves of conquest out of Asia are without any ecological foundation. A few tens of thousands (at most) of invaders will not change the ethnic composition of half a million entrenched peasants without some mechanism that has yet to be specified.

There is one case that can be made for a degree of ethnic change within Hungary. The original development of the mold-board plow would have increased the population in the northeastern corner by a factor of ten times or more, prior to its spread over the rest of the country. An explosion of numbers, power, and prestige would engulf the rest of the country spreading from this spot. Predictably, the dialect of this northeastern corner would have overrun all other dialects. The significance of this is that the Vogul/Ostiak migration must have started out from this very same corner more than 6000 years earlier. This then explains why modern Magyar resembles (only vocab) Vogul/Ostiak more than either of them resembles the other two branches of Uralic. If a different dialect within Hungary had prevailed over the others, then the relation between Hungarian speech and the three outliers would have been different.

This reconstruction presupposes that the differences between the Uralic dialects of 6000 B.C. were in some ways greater than the amount of contrast that has accumulated since then between Vogul/Ostiak and Magyar. This suggests a slow rate of change in recent millennia, and a two or three times longer period of differentiation among the original dialects in Mesolithic Hungary. These contentions are presently neither supported nor disproven by other data that might pertain to these languages.



Southern Slavs

To the south, Slavic farmers spread over nearly the entire Balkan Peninsula (Fig. 22). A western branch of them overran the southern part of the Hungarian Plain, and advanced to the Adriatic coast and into the Eastern Alps. In this direction the only human population that was numerous enough to resist this tide was just within Italy itself.

Subdivisions of Slavic in this area probably relate to underlying language differences in the previous population. Slovene in the far northwest, as well as the adjacent Friulian language in Italy, may owe their distinctions from their respective neighbors in both directions to the previous Venetic language. Friulian has also been associated with the old Rhaetic of Bavaria and Austria, which may have been Latinized during Roman times. If Venetic was also Latinized, then it was just a distinct dialect that underlay the area of both Friulian and Slovene. (See Fig. 24.)

Croatian on the inland side of Yugoslavia, as well as Dalmatian on the Adriatic coast, are differentiated from their neighbors by their presumed incorporation of preceding Latin speech. Bosnian Slavic exists on what should still have been Illyrian territory at that time.

A central branch of southern Slavs overran most of the Illyrians, leaving only remnants in the mountains of Albania (Fig. 23). They also pressed on into Greece and overwhelmed most of that country except for some coastal areas and cities (Fig. 24). Limited Slavic penetration of Anatolia is also reported. Displaced (or expanding) Albanians participated in the invasion of Greece (Fig. 23). Both Greeks and Albanians also moved in large numbers by sea to settle in small patches of Sicily and southern Italy, adding to earlier Greek inhabitants, where they remain today. This whole southern flood had reached high tide by the year 800 A.D., and then the Helenizing reflux began immediately to work its way back up the peninsula.

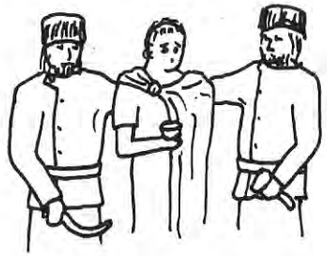
An eastern branch of the southern Slavs swept down the Danube basin to the Black Sea, occupying modern Bulgaria in the process (Fig. 22). This move almost coincided with the Turkic

move that is proposed here, also based on the plow, out of steppeland extension along the lower Danube (Fig. 23). These were the Bulgars of history who were the dominant ethnic group there, given their equestrian military force. They would necessarily be numerically inferior to the Slavs who eventually prevailed. The Turkic Bulgars were no doubt in the area first, and they are the ones who introduced the mold-board plow into Anatolia. One need look no further than northern Bulgaria to find the Bulgar homeland that is usually placed far to the north-east in the Pontic Steppes. Their detailed history is discussed shortly.

This eastern branch of the southern Slavs also constituted the right wing of the two-pronged Slavic sweep around the old Roman province of Dacia. They absorbed the remaining Bulgars and moved slightly north along the Black Sea coast.

Romania

Most of Dacia, now Romania, was probably in the process of being Latinized for the same reasons as in western Europe. The major part, in the west, was overrun by Slavs by 400 A.D. The barrier ring of the eastern Carpathian Mountains would have retarded this advance long enough for the Romans and Turkics on the other side to adopt the heavy plow and begin their own expansions.



The Roman colonies in the foothills extended their arc of occupation from south through east, and naturally overran most of the Turkic people who had bordered them here in the grasslands (Fig. 24). Two small remnant groups of this Turkic population still remain in the area (Fig. 23). The Slavic tide then automatically spread to these Roman colonists from around both sides of the mountains, blocking any further Latin expansion, and absorbing most of the remaining Turkics (Fig. 22). The Slavs had

begun their expansion long before; by comparison, these Latins had built up only a small population impetus for their own move. The Latins occupied the mouth of the Danube, but the Slavs closed in from both directions along the Black Sea and almost cut them off from it.

After the Slavic advance ended, the Latins soon re-asserted their ethnic dominance over the original province of Dacia, much like the Greeks did in their own area. A large Slavic component was merged into this new linguistic entity. The only item that remains unexplained here is the Magyar population in Transylvania, near the center of Romania, and some more small colonies between there and Hungary itself. ?

Turks

After the mold-board plow was adopted by the Latins of Transcarpathia they would, in turn, pass it on to their immediate neighbors along the Black Sea coast and lower Danube valley. The breadth of Latin occupation was so little that they could not have augmented their level of population enough to immediately overrun all of these neighbors. These were the Turkic inhabitants of the steppe region of grass and deep soils that extends to here from the Ukraine. This is the westernmost end of the Eurasian grasslands that must have been inhabited by Altaic herdsmen since the earliest Neolithic. Just like the Magyars, these horse-using pastoralists were in close contact with agriculturalists, and had immediate access to their technology and experienced personnel. As with the Magyars, we would expect them also to adopt the heavy plow and increase their population, but not at first with the same intensity as the more agriculturally oriented Slavs.



This strip of grassland runs for about 500 km along the Black Sea coast, extending inland about 150 km in most places.

On the lower Danube it runs over 400 km inland, but this projection is less than 100 km wide. In terms of subsequent events this Balkan grassland strip can be subdivided into three major parts--the northern part bordering on the Ukraine, a middle section surrounding the Danube delta, and the southern projection running up the lower Danube.

In the northern part, Latins would expand into the deep soils and make the plow available to the local Turkic natives. Most likely the Turkics failed to adopt it here in northeastern Romania. These people were in only partial contact with farmers, and were contiguous with a large area and population of other pastoralists in the Ukraine. If they ever did begin any deep plowing they were probably soon overrun by the Slavic farmers from the north. The Turkics of this area were absorbed by Latins and Slavs.

From the middle section there was no available space into which Turkic horsemen-turned-plowmen could expand. While they would take up farming, they were trapped against the Black Sea by expanding Latins who had most of the advantages. The present Gagauz enclave in eastern Romania is best explained as remnant of this Turkic population.

Along the southern strip these Turkics would naturally adopt the plow from the oncoming Latins. (See Fig. 23 to follow this whole Turkic move.) In this case there was open territory to the south into which they could expand over the local Thracian farmers who did not yet have the heavy plow. These Turkic peoples would have the same combination of horse-based mobility and a new-found farming technique that characterized the Magyars to the north-west. Their rapid, but still relatively sparse, expansion over all of modern Bulgaria and beyond would be the automatic result.

Very shortly behind this Bulgar expansion a dense population of Slavic farmers would naturally spread over the same area, entering from the north-west. They would have the same plow and with more experience in its use, but would be without the use of horses. Given the greater mobility of the Turkics, and the

greater numbers of the Slavs, they would more easily mingle than form a boundary between each other. The more horse-oriented group would be militarily, and hence politically, dominant over the other. This, then, is the quite natural origin of the Bulgarian state.

Greek coastal strips and cities (including Constantinople) mostly held their ground against the wave of Albanian, Slavic, and Turkic intruders. As far as the Balkans are concerned, this was about the limit of these movements. But across the straits in Anatolia there occurred an important extension of this historical process.

Turkic horsemen/plowmen would have had first access to cross into Anatolia, and to expand there with the new agricultural techniques. Their major crossing can be put at the Dardanelles, rather than at the Bosporus where Constantinople is located. By this time the Turks (as they may now be correctly called) had advanced 400 km with the use of the mold-board plow, taking maybe 200 years to accomplish this move. With even half this much experience, it might be expected that their agricultural abilities should have improved considerably. If their density of settlement had increased enough they would be able to form an ethnic frontier that could resist further infiltration and incorporation by the advancing Slavs. A stable Turkish frontier ought to form in the southeastern corner of the Balkans. The present Turkish ethnic border is at this appropriate location. This frontier does not pass across southern Bulgaria at a constant 200 km from the Turkic starting line, but includes only the eastern end of that potential zone. This may result from the fact that the Turkic source area on the eastern end was much larger than its projecting western tip. If their migration was primarily southward (as would be natural), the eastern end would have included the greatest numbers of them.

Within Anatolia these Turkish farmers would spread automatically over the entire central area, engulfing the mostly sparse local inhabitants. They would leave only the coastal strips and cities in the hands of the Greeks and other Indo-

European nationalities. Except for the strong hold of Greek on the western fringes against the Aegean, these non-Turkish enclaves were eventually absorbed by the new dominant ethnic group.

Farther to the east in Anatolia the major part of the Turkish-speaking frontier today ends along an arc that centers on the Dardanelles, and that would mark their advance line at 1170 A.D. by the schedule used for this movement. On the south, Turkish stops short of this arc, roughly on the old Semitic frontier at the Syrian border. On the north it extends another 350 km for no obvious reason into what should have been Caucasian territory.

The intrusion of the Seljuk Turks from the east in the 11th Century brought Islam and a higher degree of political organization. This would have been a significant factor in later absorbing the coastal enclaves, but it could hardly account for the major spread of Turkish in the main part of Anatolia. I suspect that extant records of the Seljuks might indicate whether they found linguistic relatives already occupying the area.

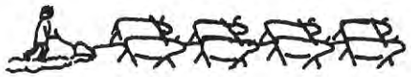
The total Turkish advance indicated here is 1300 km from their source area, and it should have taken them almost 700 years to accomplish. Eventually the heavy-plow technology would have passed on to other peoples in eastern Anatolia--Kurds, Armenians, and Caucasians. As long as the plow continued to be useful these people would have made their own geographical adjustments. Such further movements go too far afield to be dealt with here.

A major significance of this Turkish expansion, other than explaining it for its own sake, is that it marks the first physical separation of the Indo-European languages into European and Asian geographical divisions. The dialect mesh had been broken much earlier, allowing the two halves to drift freely from one another. By 500 B.C. Greek probably had spread far enough to effect a language break between the Balkan and Anatolian dialects. It is even possible that the Hittite Empire or other events had created such a break even earlier. But until this Turkish intrusion, the Indo-European family of languages had

occupied a contiguous territory.

Eastern Slavs

The eastern Slavs constitute what ultimately became the largest division of this language group. Their expansion was generally to the north-east, and it nowhere encountered any major groups of densely settled or highly civilized peoples who could seriously impede their progress. (See Figs. 22 and 25.) Their farming was effectively blocked by the 120-day growing season on the north and by the semidesert region on the south. This long eastern advance, overrunning previously farming peoples, appears to have progressed at a regular rate of 200 km per century all the way to its natural limits.



The dividing line between eastern and western Slavs (now Russia vs Poland) lies approximatley at the meeting of the original farmers who had first passed around the two sides of the eastern Carpathians. To the east of this line the Slavs overran remnants of the original Indo-European dialect mesh. These were first the Slavic-related people who lived south of the Pripet Marshes, and who extended considerably to the east. Their area of incorporation is within the modern Ukraine, as is their subsequent area of further extension into the steppes. The basic language for the source of the eastern Slavic expansion is thus identified as proto-Ukranian.

North of these marshes the native people who were being incorporated by the Slavic expansion were the interior Baltics. By 650 A.D. their original area would have been overrun, and they do not exist today. Its boundaries coincide so nearly with Belorussia that the source of the distinction of this modern language seems to be clearly identified.

The remainder of the eastern Slavic advance was over the

Uralic tribes that are here divided into Samoyed and Vogul/Ostiak sections. Some Finnics soon got into this area as well. Those Slavs who overran a base of Uralic peoples are known today as Great Russians.

During the first half of its advance to the north-east, the Slavic left flank continued to parallel the Baltic coast at about 200-250 km inland. This flank ran along the ancient dividing line between the paths of the original Finnic and Samoyed pastoralists (Uralic groups II and III). The coastal zone received its heavy plow from the western Slavs and was probably well populated even before this. The inland area was more thinly populated, and the native Uralics here evidently were not able to adopt the plow readily enough to hold their ground at any point.

After the eastern Slavic advance passed the original Indo-European occupation area, a new geographic situation arose that caused two major advancing fronts to intermingle. When the eastern Slavs pass the Gulf of Riga, their left flank turns from north-east to due north as it continues to parallel the coast. In other words, the Great Russian advance fans out somehat to their own left. This then comes into conflict with the advance along the Finnic path near the coast. (See Fig. 25 for this and further Finnic moves in Russia.)

As heavy-plow agriculturalists advance into deep-soil locations, some of the local farmers can be expected to retreat in order to avoid being surrounded and incorporated. This kind of retreat is possible only into lands that are not already densely settled. Interior Baltics probaly did just this and moved their frontier 60 km beyond the Dvina River before they were finally overwhelmed. The denser population of Finnic farmers in modern Latvia faced a different situation and had the numbers to do something about it. The western half of this country (Courland) was a cul-de-sac in the north, and its people were probably well aware of this. Accordingly, large numbers of farmers, especially from western Latvia, would be expected to gather all their belongings and shift to the east to avoid being engulfed by Lithuanian plow farmers. This move puts these Finnic

farmers directly into the path of advance of the eastern Slavic plow farmers instead.

In the region immediately to the east of Latvia, Slavic farmers were fanning out to their left (due north), and Finnics were spreading directly into them with their own turn to the right (due east). The original natives here were so sparse that the intruding Finnics would be second only to the Slavs in numbers. This is just the condition that is known to have occurred in the Novgorod area in 850 A.D. at the founding of the first Russian state. The Slavs had the better equipment and would soon have the numbers to dominate the society. The original Finnic farmers who remained would occupy islands of lighter soils, or they would adopt the heavy plow. Many such enclaves exist in this area today. Other Finnic farmers would have moved on to the east, eventually to become the Mordovinians. More on them later.

A similar shift to the east by Finnic farmers would again occur at the Gulf of Finland. This time the refugees pressed into a narrow corridor through the Leningrad area, while some continued to the east to become the Komi. The adoption of the heavy plow by Finnics at the Estonian border would relieve at least the ethnic basis for further pressure, and the spread of the plow would assure Finnic identity in this corridor up to modern times. (The later Russification of Leningrad itself follows automatically from geographical considerations of modern state policy.)

Finns and Slavs would have passed around their respective sides of Lake Ladoga and met again on its northern side. The advance of both groups was halted here by 1100 A.D. along the 120-day growing season line until more recent times.

The Finnic farmers out of Latvia and Estonia evidently had a continuing history of some interest. Large numbers of them could have avoided being engulfed by the Slavs simply by continuing their move to the east. Even without the heavy plow, their farming skills plus their numbers should have been sufficient for them to pass through the sparsely settled interior of Russia--

given sufficient motivation. By moving just 1.6 times as fast as the Slavic frontier, these Finnics could slip to the east and avoid encirclement. This means taking a crop or two, then moving, and repeating this many times without leaving significant numbers behind. This was an actual migration, not a frontier extension which is unable to advance at that speed anyway.

There are still many Finnic enclaves just to the east of Latvia where the first intermingling with Slavs occurred. Beyond this there ia a long gap with none of them for the next 500 km across central Russia. Then Mordovinians are encountered in great numbers. Evidently these Finnic farmers out of Latvia reached and filled-in the last corner of arable land in the east, where it tapered down and pinched out between the growing season to the north and the deep soil to the south. The oncoming Russian advance would have reached them at 950 A.D., to judge from the location of the westernmost surviving examples.

The Mordovinians (and related peoples) now occupy only about one-tenth of their "natural" area in this corner. Displacement by Russians would have been abrupt in this first contact with people using the heavy plow, but Finnic speakers have lost ground in recent times as well. It can be seen that the Mordovinians also managed to adopt the mold-board plow, because their area extends about 300 km into the deep-soil region at their eastern extreme. Here they are again dissected by Russian speech, which demonstrates recent absorptions.

Mordovinian distribution shows yet another peculiarity at its extreme eastern end. They do not occupy the very last piece of the cul-de-sac between short seasons and desert; this spot is held by Turkic pastoralists with ethnic connections still farther to the east. Mordovinian occupation ends some 250 km south of the present 120-day growing-season line, while cattlemen occupy much of the potential farmland north of the Mordovinians and up to the crop-growing line. This seeming malpositioning of the two is almost the reverse of what might be expected at first glance. (See Figs. 1 and 25.)

Actually, if one assumes the growing-season line was shifted

250 km to the south after the year 1050 A.D., then the Mordovinians would have exactly filled the last existing farming space at the eastern tip. (This suggested lowering of the farming limit may correspond to the deteriorating climate in the North Atlantic at a slightly later date, which terminated the Norse colonies in Greenland.) If the original use of cattle spread across the steppes slightly faster than it did in the forests, then a considerable area of tillable eastern forests could have been held by Altaic cattlemen. This area would later be lost to the Finnic, and then to the Slavic farmers, but only up to the limit of the growing season that was displaced southward at that time.

Another part of the Finnic retreat was out of Estonia and across Russia to the Komi area. This is mostly to the north of the normal limit of farming, but where oats, barley, and rye are grown today. Here they are pressed up against and between the Samoyeds and Vogul/Ostiaks, where they overran some of these peoples and even spilled over the Ural Mountains. They had to abandon much of their usual farming and crops to inhabit this area. The area of occupation follows no obvious pattern except as another effort to avoid Slavic encroachment. Since many Russians have made similar moves into the north, it is best left unexplained except to say that it is a recent, civilized phenomena. (See the north-east corner of Figs. 26, 28, and 25, in that order.)

While the eastern Slavs advanced rapidly across Russia, they also moved into the deep soils of the southern steppe region with the essential aid of the mold-board plow. These Pontic Steppes were then occupied by Turkic pastoralists, with little or no agriculture, who would have harassed the intruding farmers. On the other hand, improved communication and transportation of the time would have meant a much deeper frontier-feeding zone that could provide large numbers of pioneers. To the local ruling nomads, whether Sarmatians, Mongols, or Turks at various times, the ethnic identity of these farmers would make little difference so long as they could tax the wealth that was being created.

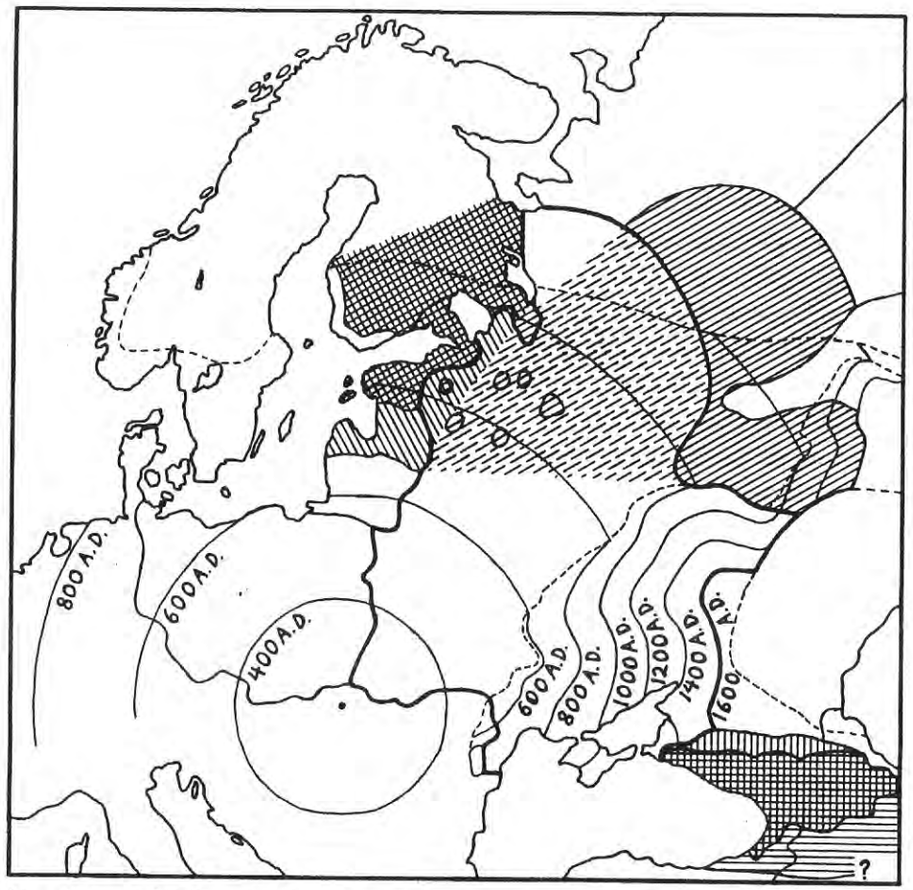


Fig. 25. Finnic expansion. Changes are shown for Finnics, Caucasians, and Slavics far from the origin of the heavy plow. Finnics lose Latvia and part of western Russia. They moved east ahead of the advancing Slavics, lost much of this new land, but held some enclaves and a large area in the east. They also joined in the plow-based penetration of the Steppes. Caucasians lost ground in the south and advanced a bit northward. Eastern Slavics are shown in heavy outline as of 1600 A.D. They are the major source of immigrants into the Pontic Steppes, with dates indicated. In the north a dashed line marks the 120-day growing season; dashes in the center-east show the deep-soil margin; and dashes farther to the south-east mark the desert edge.

I have found that political maps of southern Russia do not reflect linguistic groupings of the real people any more than similar maps do in the rest of Europe at that time.

The advance of eastern Slavs into the steppes was certainly faster than the rates used for the first Neolithic farmers in other areas. After mapping the area with several different rates, I found that a base rate of 120 years (four generations instead of five) per 200 km, plus the usual penalties, seemed to fit best with both logical expectations and historical data.

The early advance of the heavy plow out of its source area was at least retarded, and probably stopped, by the barrier of the eastern Carpathians. It had reached the Latins of Dacia on the far side of these mountains by passing around both ends at nearly the same time. From these two ends, the use of the plow would move through Latin territory toward the mouth of the Danube. As already noted, the Latins then spread out into the grasslands where the Turkics were also picking up this new agricultural technology. At the same time Slavic farmers were making parallel sweeps around these mountains, but farther out to each side, well to the south and to the north-east of the Latin speakers.

The Slavs had both temporal priority over, and a deeper frontier-feeding zone than the Latins. At about 500 A.D. both Latins and Slavs entered the steppes to the south and the north-east of Romania, but the Slavs expectably blocked the slower Latin advance. Both arms of the Slavic advance curved around the Romanian effort, reached the coast of the Black Sea, and came just short of cutting them off at the mouth of the Danube.

The left arm of this sweep, the one to the north-east of Romania, represents the first entry of the Slavs into the great Eurasian grasslands. At their presumed rate of advance, these farmers reached the Black Sea at 700 A.D., and Rostov-on-the-Don at 1400 (Fig. 25). Continuing this schedule to the year 1900 would have them only partway into the Kuban and first contacting the Caucasians, and not yet on the far side of the Urals. Since these last events are in fact badly misdated, it is clear that

recent centuries have seen a great increase in their rate of advance. Political unification and railroads have made the entire country a feeding zone for the frontier.

Within the steppes a contrast between Ukrainian and Great Russian speech persists. Ukrainian coincides with those pioneers whose last forest contacts were with Slavic-related Indo-Europeans. Russian coincides with those pioneers whose last forest contacts were with Uralics. Until the year 650 A.D. the only Slavs in the steppes were of the Ukrainian type. After that time all new immigrants, passing from forest to steppe, were Russian. By extending from this division at their point of entry, a line is generated that runs close to the present language frontier. If the Ukrainians are granted a slightly deeper frontier-feeding zone this would serve to spread their advance 15° to their left at the expense of the Russians; then the dividing line is on the actual frontier. Sometime after 1500 A.D. the political control by Russians mostly blocked the Ukrainian advance at their current line.

Language Map



The year 1100 A.D. is chosen from a range of possible dates to represent the stable condition as far as most of Europe is concerned (Fig. 26). It is selected mainly because it immediately precedes the German reflux to the east, which is the major item in the next event. It also catches the Slavic move to the east well short of its maximum extent, but that connot be helped--this move was not completed until even well after the following German action had run its course. In fact, it is continuing even today.

Distributions in southeastern Europe at 1100 A.D. reflect a rolling back of the Slavic frontier from its maximum extent of about 800 A.D. (Compare Figs. 22 and 26.) Exactly where some of

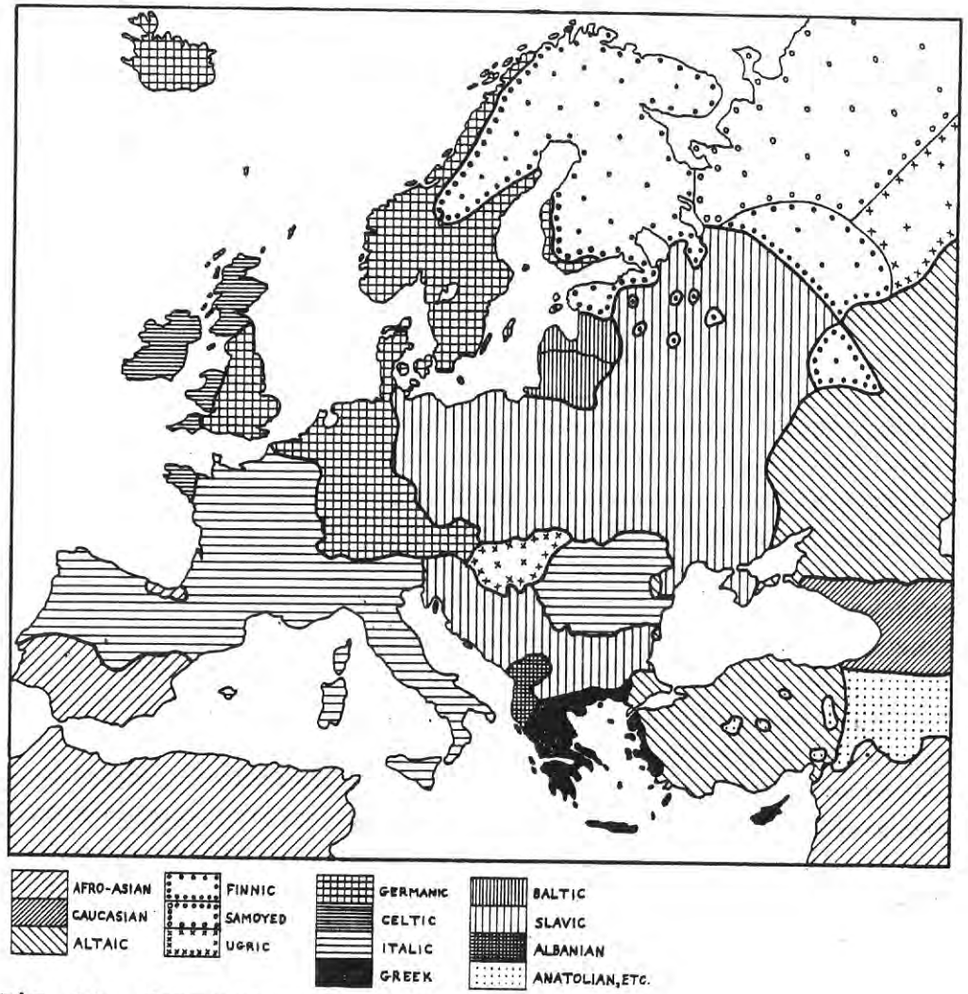


Fig. 26. Language map in 1100 A.D. The Slavic explosion to the west, south, and east is the major feature. Other languages had considerable areas lost and gained from the use of the heavy plow. Pictish is lost (according to historical sources), and Afro-Asian has reinvaded Iberia. Some "civilized" refluxes occur in Greece, Romania, and the German occupation of Austria. Uralic is the biggest loser of ground. The Caucasian shift is not shown because it happened after 1100 A.D. The Anatolian-Semitic boundary is now arbitrarily adjusted to its modern position.

these frontiers had moved by this time had to be estimated. The Magyars of Transylvania, in the middle of Romania, are not indicated because I don't know how or when that move occurred. Turkish is stopped on its presumed line of 1170 A.D. without showing its penetration of Cucasian territory that should have occurred later.

It was the Uralic family that had lost the most ground to the Slavic explosion as of this date, and these losses would continue over the next few centuries. The eastward shift of much of its Finnic part somewhat moderated this loss to the family as a whole. The Altaic family similarly lost much ground to the eastern Slavs, and has continued to do so until modern times. Again, one of its subdivisions made progress elsewhere--here in the form of the Turkish spread over Anatolia.

Many language groups went through a two-step process of losing ground to the Slavs on one side, then after acquiring the mold-board plow, gaining new territory in the other direction. (These are shown in the before and after maps of Figs. 23 and 24.) Clear examples of this process are seen in Germanic, Baltic, Romanian, and Albanian. If one ignores the fact that Magyars participated in the origin of this move, they can also can be seen in terms of lost, held, and gained territory. Some groups lost ground to the Slavs and gained nothing, like Samoyed, Vogul/Ostiak, Greek, and Latin in the west. In other cases ground was lost to non-Slavics who had acquired the heavy plow.

Two special cases of plow-induced shifts show losses and gains, but without a full middle ground that was held throughout the process. A large gap exists in the Turkic distribution where they had gained new territory with the plow to the south of their homeland, then later lost some of this (Bulgaria) to expansions by denser Slavic populations. The Finnic distributions show an even larger gap between their homeland in the Baltic area and their penetration of the steppes in eastern Russia. Again, it was Slavic farmers who were able to overrun the territory that was occupied only temporarily by the eastern Finnics.

Perhaps the most significant aspect of this whole episode

was the loss of the last remnant of the original Indo-European dialect mesh that had persisted in eastern Europe. At this point all of it is subdivided into new dialect meshes, within recently formed boundaries, that are evolving independently of each other. The previous contact between the European and Asian halves of this family are also now irrevocably separated by the deep interjection of the Turks.

Latin-derived speech remains dominant in the west, though they now should more properly be referred to as Italic (or Romance) because of the many subdivisions that have become separate languages. Italic lost ground directly to Slavic in the western Balkans, and indirectly in northernmost Gaul where Germanics overran that area with the aid of the Slavic plow. The Rhaetic area of Bavaria and Austria, as well as all of England, were Germanized by this time. But it is not clear whether either area should have been classed as truly Latinized before this. I labeled Rhaetic as original and England as Latin in an earlier map (Fig. 21), but this was arbitrary and might even have been correct the other way around.

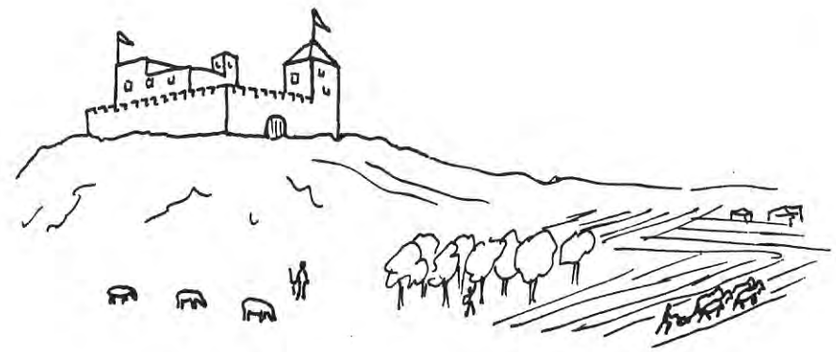
Latin also lost whatever it may have held in North Africa to the Semites after 675 A.D., in an action totally unrelated to the mold-board plow phenomenon. This returned the area to the Afro-Asian language family that had evidently occupied it in the initial Neolithic spread. Semitic Arabs also gained control of most of Iberia and were in the process of Arabicizing the population. Their limit is drawn rather arbitrarily near the middle to include the area that was under their domination for the longest time. They do not appear to have made significant or long-lasting contact with the Basque hold-over from the earlier Afro-Asian incursion.

Western Celtic continued in Brittany, Ireland, Cornwall, Wales, and Scotland. The last three of these are at this time separated from each other by the Anglo-Saxon intrusion, but they had already been separated by the Roman occupation of just the same area.

Pictish has disappeared from Scotland by this time, having

been replaced by the Celtic speech of Ireland. One can visualize the Picts as a small ethnic group, under pressure from the Anglo-Saxons and Vikings, voluntarily merging their cultural identity with the only significant rivals to these Germanic threats.

The Lapps would have lost significant ground to northward-expanding Scandinavians, but the line drawn here is no more than an educated guess.



CHAPTER EIGHT -- FINAL ADJUSTMENT

The last significant step in the development of the linguistic geography of Europe consisted of a number of changes in locations of language boundaries. This did not involve the separating out, or elimination of, any major language. The greater part of this adjustment resulted from the development of a new pattern of farming that stemmed from a particular source area, and which again increased the peasant population base. Another part of this adjustment was the continuing Slavic advance to the east that has not yet run its course. There should be few surprises here, though the economic basis of these movements is rarely noted in most history books.







3-Field System

By 800 A.D. the Germanic advance to the west on the continent had ended, and language boundaries there had begun to stabilize. The area between the

Rhine and Seine Rivers was still in a state of flux, with German dominant in the eastern part and French dominant in the west. Within this area the first indications of a new agricultural revolution were then beginning to appear. This new development is known to Western scholars as the Feudal system.

In practical terms this new procedure was an integration of several important items. Mold-board plows had reached this Frankish area by 800 A.D. and were part of the complex. The change to the 3-field system of crop rotation is first reported from here at about 800 A.D. (Gille 1969, Pounds 1973, White 1962). This involves the sequence of fallow, winter crop, spring crop, etc. At any one time there would be a roughly equal division of the fields into these three uses. Compared with the previous 2-field system, grain production increased by 50% on a given area. It also has the advantage of dividing the plowing into two halves at different times of the year, thus distributing the seasonal work load on draft animals.

The horse collar replaced the neck yoke also at about 800 A.D. This enabled horses to pull four or five times harder without choking, and thus equalling the pulling power of oxen. Since horses can plow half-again faster, and for a few more hours per day, they now become the major draft animal. Much of the increased grain crop was normally in the form of oats, and horses become more economical even when counting their feed requirements.

A new form of tree-felling axe was introduced in the following century (Duby 1954:363, cited by White 1962:41). This is correlated with a major episode of deforestation throughout Europe that lasted until 1300 A.D. By that time virtually all usable agricultural land had been cleared in western Europe, but the process was much slower to the east. These new farm lands alone would have led to at least a doubling of food production.

Beans became a significant part of the food crop at this time (White 1962:76). These are a major source of protein in the human diet and are an effective substitute for much, though not all, of the need for animal protein.

With all of the above factors, overall food production in western Europe increased by at least four times between 800 and 1100 A.D. The corresponding increase in human population would also tend to create outward pressure from the major source area of these innovations. The Feudal system of social organization developed during this time and is credited with being a major factor in subsequent human movements. Increased use of horses in agriculture also made them more available to the military. The stirrup, which allows the soldier to swing a sword from horseback without falling off, was introduced to the West in the 8th Century. Thus western Europe greatly augmented its military power, as well as its population, at this general time.

German Reflux

The core of these new developments was mostly in the Frankish area that straddled the French-German language line. Its major weight appears to have been slightly to the French side, as indicated by a modest rolling back of the German-speaking frontier. This ranged from no change at all around Switzerland to as much as 100 km in some places to the north of there. The upper Moselle valley was the largest area lost by the Germans from their earlier holdings (Fig. 27).



For three centuries the Medieval economy was developing at its source and spreading to the east through the German-speaking area. Then between 1100 and 1300 A.D. the German frontier rolled eastward about 300 km, from the Elbe to well east of the Oder-Nisse line. In central Germany the western Carpathian Mountains were a significant barrier, and they were passed by an average of only 50 km.

After 1300 A.D. (1330 according to some writers) the eastward move continued in an altered form for at least another

century. During this time the German settlers were mainly townspeople--workers in variouus skilled trades who set up colonies, or added to them, ever farther to the east. Some farmers continued to move, but the advance of the language frontier was mainly in the form of Germanizing the resident

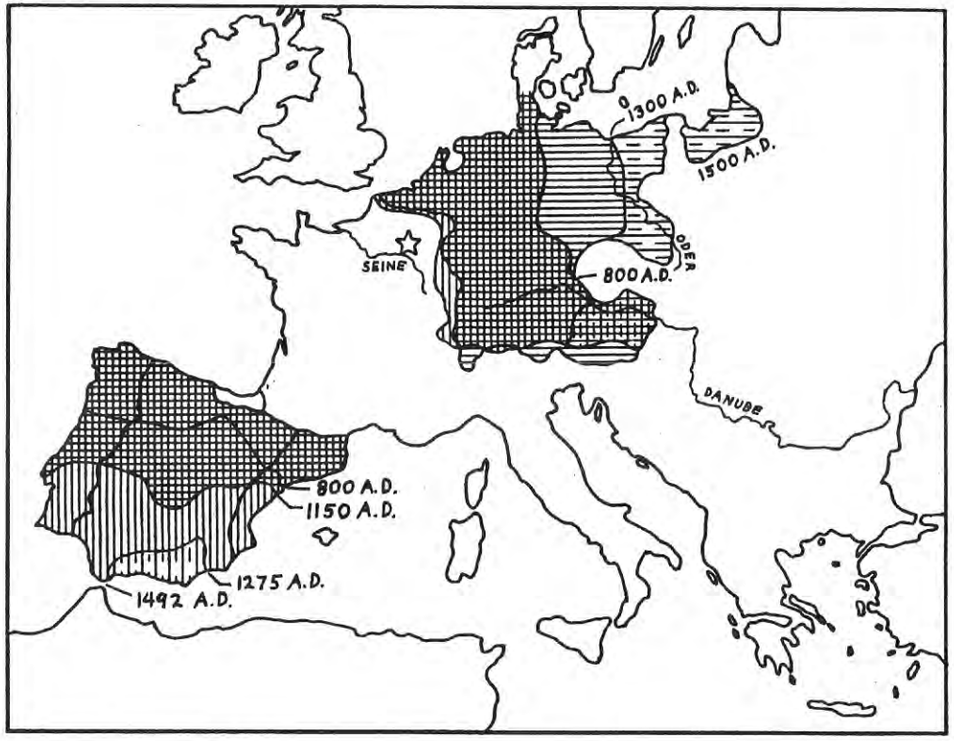


Fig. 27. Effects of the Feudal system. The impact of this new economy was most conspicuous in Germany and Iberia. The star marks its general source in "Frankish" lands. German lost some ground to French (lines perpendicular to the Feudal advance) and gained considerably in two stages to the east (lines parallel to the advance). Mixed markings in Austria illustrate the uncertainty about when Germans fully occupied it. Re-Latinizing of Iberia probably began without the Feudal system, but its rapid advance after 1150 A.D. certainly reflects this influence.

Slavic peoples. This second form of eastward Germanic movement automatically followed the easiest channels of transportation and communication, and these emphasized water travel. During the next century the Germanizing wave progressed another 400 km along the Baltic coast into East Prussia, and 200 km up the Oder River into Silesia.

It should be noted that the 200 km German advance downstream along the Danube exactly fits this pattern and distance. History says it was accomplished by 1100 A.D., but I suspect this was little more than a military occupation. The real Germanization of Austria was probably accomplished after the year 1100.

The geographical pattern of this last German advance can be described as consisting of three thrusts, one along each of the three major waterways (Fig. 27). A 200-km move was made along each river course, and 400 km along the more easily navigated coast. The intervening areas of Bohemia and Polish Posen were only marginally intruded upon.

More advanced outposts also existed, but soon after 1400 A.D. they failed to continue Germanizing the countryside. Instead, the local people were increasingly adopting enough of the Feudal system and its technology to increase their own productivity and population, and thus to hold their ground against further encroachment.

The first advance of German settlers moved the frontier 300 km in 200 years, or 1.5 km per year. The Germanization process then moved it another 200 to 400 km in 100 years, or an average of 3 km per year--twice as fast. Improvements in the means of transportation and communication would then allow further eastward movement of these agricultural skills at an accelerating rate. The 3-field system is reported in Russia at 1500 A.D. This requires another advance of 600 km in that century to reach even the closest Russian frontier by this date. Thus the advance rate was doubled again to become 6 km per year. With no further acceleration these new farming techniques could easily spread over the rest of European Russia in the next three centuries.

Iberia



The process of Latinizing had earlier overlain a substratum of many languages in Iberia. Three of these in the north are of particular interest here. Celtics had occupied a 200-km square in the north-west, Basques held the 500-km strip across the top center, and Ligurian was in a triangle of just over 200 km to a side in the north-east. Three distinct dialects of Latin emerged--Galician (or Gallegan), Castilian, and Catalonian, in that order. These eventually became distinct languages.

Early in the 8th Century most of Iberia was conquered by Arabs out of North Africa. Their hold was longest (700 years) and strongest toward the south, and was no more than transitory on any part of the 200-km-deep northern fringe.

Christian reconquest from the Moors progressed slowly until about 1150 A.D., at which time half the peninsula was under their control (Fig. 27). During the next three and a half centuries their expansion rate was twice as fast. There is no obvious ecological basis for the early part of this Christian expansion, but the later and major part coincides with the German expansion to the east. An obvious presumption would be that the 3-field system, horse collars, stirrups, and the rest of the Feudal economy had taken hold in northern Iberia at this time. This then added greatly to the population and military strength of this northern faction.

The reconquest was completed in 1492. It unrolled from the three northern language areas in a generally southward direction. Although the rest of Iberia had been largely Arabized, the more numerous northerners should have easily imposed their languages as they moved to the south. Political boundaries between the variouus Christian kingdoms varied almost randomly during this conquest, giving no indication of the linguistic divisions.

It is a natural presumption that military manpower, political administrators, and the many new settlers would all tend to move generally southward from their three northern sources.

The Galician corner would naturally progress straight to the south, paralleling the Atlantic coast, and maintaining an average breadth of 200 km. This advance runs out abruptly at the mouth of the Guadiana River in southern Iberia. Except for its originating corner, this strip becomes modern Portugal.

The central and largest section of Castilian is the basis for modern Spanish. Only in this area do we still have a living survival of the original pre-Roman language--Basque. The southward advance of Castilian covered the major part of the peninsula.

The Catalonian corner would unroll down the eastern side of Iberia, but this coast angles strongly to the south-west. Moving straight south they would pinch out against the coast with almost no progress; paralleling the coast at 200 km they would cut unnaturally into the Castilian area. The obvious compromise is a gradually narrowing coastal strip that reaches slightly more than halfway down the peninsula.

These three languages automatically come to occupy their exact modern portions of Iberia. No historical events need be called upon to account for these distributions.

Other Places



The Feudal farming complex would have enterred England as it was being developed, and only shortly after the mold-board plow arrived. The Germanic language frontier in the British Isles should have made some advances corresponding to those on the continent. English did gradually prevail over the local Celtic languages, but for no obvious reason this was both slower and later than the German advance to

the east. Celtic resistance may have been stronger than Slavic, and the English pool of resources was smaller than the German. By the year 1500 A.D. only modest progress had been made. With the rise of the modern industrial age Celtic has faded rapidly.

Scandinavians progressed up their major peninsula with the increasing population pressure from the southern areas. The Feudal farming complex probably was not so much a factor in opening up new lands as was the use of new crops and strains that could tolerate the climate. Again, progress was slow to 1500 A.D., but faster with industrialization.

In southeastern Europe the modern language boundaries look like they were reached, for the most part, by the end of the previous stage at 1100 A.D. The southern Slavs, Turks, and Romanians had consolidated most of their gains, and the Greeks had pushed their ethnic frontier back up the Balkan Peninsula. Still, there were a few changes of uncertain date that could be postulated for the period of 1100 to 1500 A.D.

The Turkish penetration of Caucasian territory is first shown for this time. Also shown is a Caucasian bulge to the north, as well as an Iranian intrusion.

In eastern Europe the Slavic expansion was continuing throughout this period. Details of this advance up to 1500 A.D. and beyond appear in the previous section. This Slavic move was basically a continuation of the mold-board plow phenomenon, and the Feudal farming system merely added a new impetus.

Language Map

At this date of 1500 A.D. the linguistic map of Europe has reached its modern condition in almost all respects. (See Fig. 28 and compare with Fig. 1.) The central area was already modern by the date of 1330 A.D., just before the "Black Death" struck. Only around the periphery have



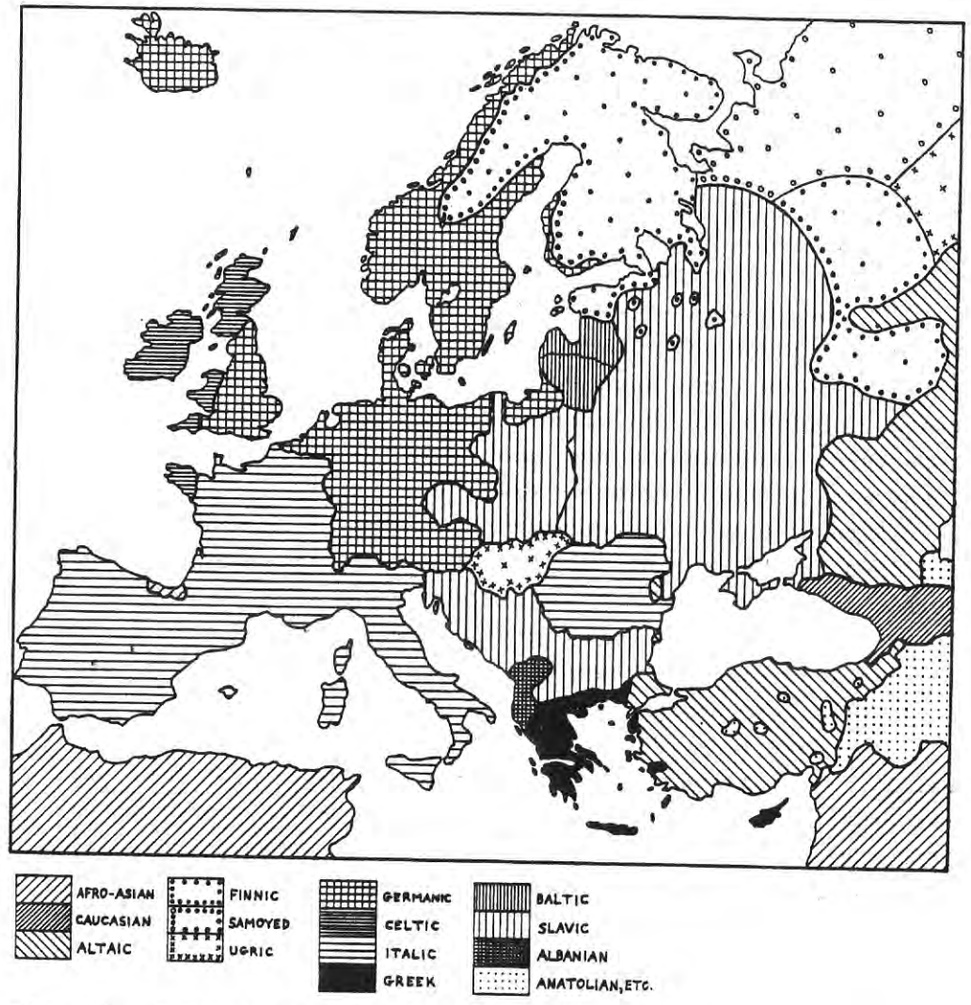


Fig. 28. Language map in 1500 A.D. The major changes are re-Latinizing of Iberia, eastward advance of the Germans, and continuing eastward movement of the Slavic frontier in Russia. The last Turkish progress is shown, along with a presumed Caucasian shift to the north. A recent Persian intrusion in the east is not distinguished here from the Anatolian language group. Scandinavian penetration to the north has been increased gradually and arbitrarily in this and other maps.

there been any further changes in the last four centuries. And these changes are merely continuations of trends that had already been in operation for some time.

Germanic, Italic, and Slavic languages dominated Europe. The only other Indo-European language groups were Greek, Albanian, Baltic, and Celtic. These last four all occupied relatively small areas in 1500 A.D., and Celtic was rapidly retreating. "Anatolian" is used for all Indo-Europeans in Asia.

Of the non-Indo-European families, Uralic was and still is the most impressive in terms of numbers and area. Hungarians, Estonians, and Finns were distinct nationalities, if not modern states. Farther to the north and east, other Uralic speakers were thinly distributed over mostly nonagricultural lands. These were in the process of being Russianized.

Altaics were the next most impressive, with modest Turkic holdings in the Balkans that expand greatly into Anatolia. Turkic terrritory in the Pontic Steppes was still considerable in 1500 A.D., but was being gradually overrun by Slavic farmers. The final Turkic line there would soon stabilize as good farming land faded into semideserts.

The territory of Caucasian speakers has always been rather small. Turkish and other groups were encroaching on them from the Asian side. On the European side the Caucasians probably held their maximum area as of 1500 A.D. In later centuries the Russian advance would reduce them somewhat.

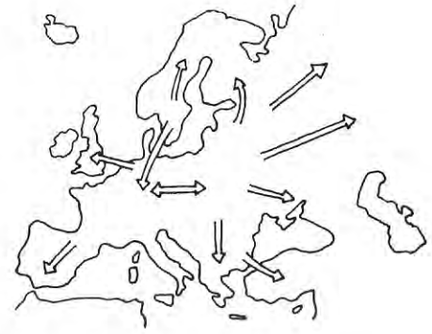
Basque is the only other non-Indo-European language. Its area of use has probablly not been significantly reduced since 1500 A.D., but most of its speakers are now also bilingual in either Spanish or French. They are the only members of the presumed Afro-Asian family on the continent.

The changes that occur after this time are restricted to the Germanic and Slavic areas. English had not yet replaced Celtic in Cornwall, Scotland, and most of Ireland and Wales. Scandinavians were expanding to the north at the expense of the Lapps, and this has continued up to the present time.

The eastern Slavs--Ukranians and Russians--were still

expanding their agricultural holdings with the mold-board plow, and this would continue for some time. Uralics to the north and Altaics to the south were losing ground to this advance. Still further Russian incursions would continue into northern Russia and Siberia in modern times. These incursions, like those by the English and Scandinavians, gained impetus from modern industrial developments.

Recent Racial Changes



The maps of racial distribution that were developed in an earlier chapter represent the situation after the initial Neolithic occupation and up through as late as 500 B.C. Since that time only a few significant changes are indicated. These are summarized as a small item in this chapter, and with the maps in Figs. 29 and 30. These agree well with known distributions of "genetic" and "classical" traits in modern populations.

The first notable racial movement since the Neolithic should have been the expansion of militant horsemen out of the Pontic Steppes in the 5th to 3rd Millennia B.C. This action has been recognized in a few metric changes in some skeletal remains from eastern Europe. This "Kurganization" tapers off swiftly to the west and does not reach central Germany at all (Schwidetzky 1980). Skeletal remains from Greece have been studied in detail for evidence of this same phenomenon. Xirotiris (1980) finds there has been no significant immigration into the Aegean area since the early Neolithic. Present evidence suggests there were no population movements in this time and place that seriously affected gene frequencies over large areas.

Scandinavians, with their presumed 27% Anatolian genes, shifted to the south and entered the German river basins where the residents were an average of 42% Anatolian. My calculations

suggest that the intruders ultimately constitute 41.5% of the resultant mix, so the shift in Anatolian gene frequency in Germany would be about two-fifths of the way from the local Celtic percentages toward the Swedish. This change is introduced into Germany while maintaining a comparable south-north cline as before. (Compare this area in Figs. 14 and 29.)

The Celtic diaspora probably had too little effect on their locations of settlement in most cases to call for changes in the map. The Slavic intrusion from the east into German lands was probably about matched by the German reflux in the opposite direction shortly thereafter. The Germanic (Saxon) intrusion into Great Britain would not have greatly affected the map, because the frequencies in both locations were so similar at that time.

Most of Iberia was initially Asiatic/African except for a small mixture with Mesolithic Europeans. Its northeastern corner was strongly European from the beginning, and there was some Celtic intrusion into the north-west and elsewhere. The Feudal spread would add many more Europeans to the northern fringe, but they were still a small minority. The Christian conquest from the north would raise the European genetic component somewhat higher throughout the peninsula.

The slavic expansion increased local populations at the source area, then these moved radially from there to some degree. Beyond a radius of 400 km there should be some significant shifts in Anatolian isogenes. Among settled agriculturalists about half of the people, and their genes, should have been derived from populations about 400 km closer to the source. This means shifting all isogenes at least 200 km radially outward for as far as the mold-board plow spread. Where native populations were thinner, the shift would be greater. I suggest an isogene shift of 400 km for the Baltic-Finnic area, and one of 600 km for the other Uralics. For the Pontic Steppes the farmers' advance over the herders should have carried their genes at a retention rate of about .81 per 200 km to be consistent with their advance rate. This is all shown in Fig. 29.

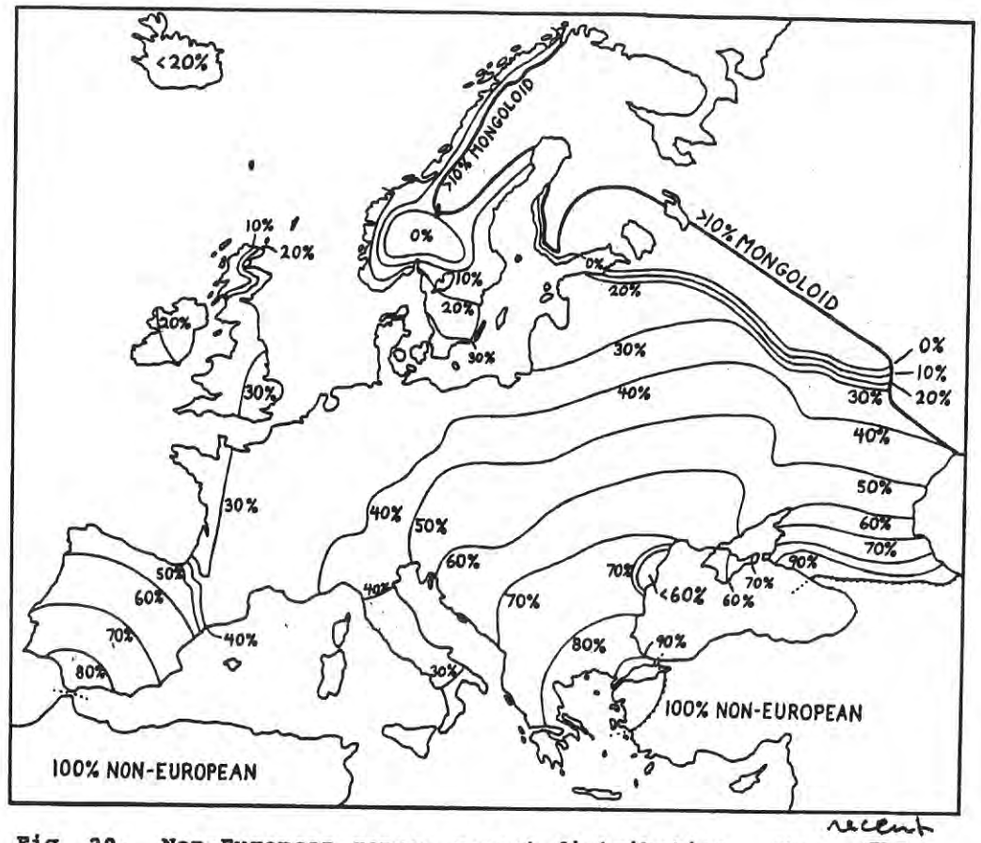


Fig. 29. Non-European genes, recent distribution. The approximate contributions of Anatolian and African genes in Europe are shown at 10% intervals. This map may be compared with Fig. 14, which gives the distribution at the time of the original Neolithic settlement. These changes are the logical expectations that follow from the population movements indicated throughout this reconstruction. The greatest shift is of Anatolian genes to the north and north-east with the Slavic expansion. Non-European genes back-off in Anatolia and Iberia, and there are also some adjustments in the Germanic area. As with Fig. 14, there is no attempt to include extra Anatolian genes along the Mediterranean that were brought in by later Boat People. The Caucasoid-Mongoloid line is also shifted to the north and east.

The racial map of Caucasoids vs Mongoloids, as far as Europe is concerned, is also plotted for recent times by these same procedures. This is figured only for the year 1500 A.D. to avoid recent Russian expansions which have drastically reduced the Mongoloid element. The problem here is that urban and rural contrasts become great, and cannot effectively be combined in a single map. (Compare Figs. 15 and 30.) Again, this agrees well with modern racial distributions, but this is not entirely surprising because the rates of mixture were at least partly calculated to achieve this result. That the geographic pattern fits is perhaps more significant.

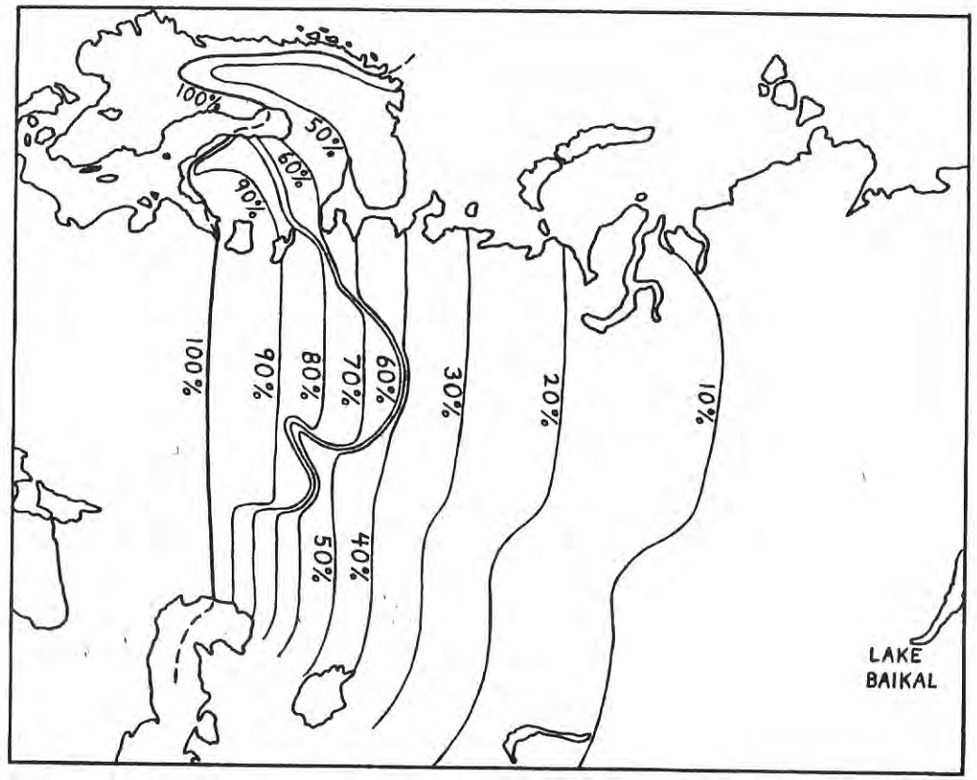
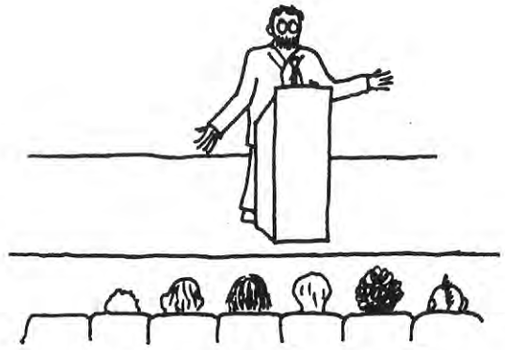


Fig. 30. Caucasoid genes in Asia, recent distribution. The Caucasoid component is given in 10% intervals, beginning with the heavy line of 100% in the west. This map may be compared with Fig. 15, which gives the distribution at the time of original Neolithic settlement. The major contrasts result from Caucasoid intrusions with farming in northern Russia and Scandinavia. These changes, like the earlier map, are based on reconstructed ethnic movements, and are not compared here with actual racial data in detail.



CHAPTER NINE -- CONCLUSIONS

The entire story of the development of European language geography, as just reviewed, turns out to be rather simple in its broad outline. It consists of just five major steps--the initial Neolithic occupation, the Germanic move, the Roman Empire, the Slavic expansion, and the Feudal adjustment. Three of these are based primarily on technological changes, one on a climatic fluctuation, and one on a spread of social factors. There may well have been other important events, but no more need to be added to account for the known linguistic distributions, past and present. The rates of movement of the human populations involved are brought down to just one basic pattern with a few regular quantitative variations. This is also certainly oversimplified, but again no significant differences from this are needed to account for the present language map. (The Slavic shift to the west after World War II is so well known that its inclusion seemed superfluous.)

All of the changes recounted here are rational, natural, and regular--in a word, predictable. To some readers this may also appear to be mechanical, and thus neglecting the "human element." It is true that a consistent theme of this reconstruction is that it does not take into account any conscious decisions of the people involved, nor any chance events--no "historical" factors

at all. Quite simply, it was not found necessary to introduce any such explanations to account for the big picture. In terms of finer details not covered here, these historical factors no doubt would come increasingly into play. That level of detail was not encountered in this study.

An interesting aspect of this investigation is the close parallel between its basic philosophy and that used in purely linguistic reconstructions. In both cases a set of universally applicable rules is devised to describe the known phenomena, and all variations on these are also formulated into rules which admit of no exceptions. There is no inherent reason to connect these two very different kinds of linguistic reconstructions; the rigorous application of rules is part of science in general.

The amount of speculation that has been indulged in here is actually remarkably small, especially as compared with other reconstructions of the same subject. After settling on the basic principles involved, the task here became one of finding where, when, and how people would have moved, but not of discussing where they could have moved. Each of these moves had to be shown to follow directly from the geographical situation. None of them could be postulated just to fit with the reported historical, linguistic, or archeological data. In many cases definitive evidence is lacking for what has been claimed here. The future studies and discoveries that might test these claims are mentioned throughout the text, where pertinent.

Major Innovations

A number of conclusions are reached in this study that contrast sharply with present commonly held opinions about the prehistory of European languages. There are ten such contrasts that are worth recounting here in some detail. The first four of these should prove to be the more



important and surprising to most students of this subject.

1. That the Indo-European languages originated in the Near East and were spread by the first farmers at an early date. There is ample evidence that Neolithic farming spread over most of Europe since 7000 B.C. from a Near Eastern source by way of Anatolia. It is equally clear that this economy was brought by an incoming wave of settlers who greatly outnumbered the native foragers at all points of contact. It necessarily follows that the language of these immigrants prevailed over that of the previous residents in all cases. There was a limited entry area, at the Dardanelles, for those whose descendants eventually overran the majority of the continent. This means that most of early Neolithic Europe must have constituted a single linguistic unit. At no time in subseqeunt European history is there any evidence of another human wave of advance that had anywhere near such overwhelming numbers, or that spread itself over so great a territory. Even with no information beyond this, the most obvious conclusion would be to relate this Neolithic invasion to the major language family of Europe today. That all of the geographical details and subdivisions fit with this picture, as well as the distributions of other nearby families, only serves to strengthen this interpretation.

The timing of this event, as compared with the supposed time of origin of the Indo-European languages, is the major point of contention. If the Indo-European dispersal could be put back substantially in time, then the source and the mechanism for its spread would follow automatically. The speed of linguistic change has been roughly estimated in some Indo-European languages where documentation extends back to well over 2000 years ago. (Linear B to modern Greek has the longest, though poorly known, history of 3400 years.) By assuming a constant rate of change, and extrapolating back beyond these documents, a beginning time for Indo-European divergence has generally been put at about 3500 B.C. Many Indo-Europeanists now push this back another 900 years to make an archeological connection with the Kurgans as the

presumed source. The fact that the Neolithic spread began much earlier, at 8000 B.C., may pose no problem for several reasons.

First, the dialect mesh was most likely intact up to about 2000 BC and maybe even much later, while full-speed drift would commence only after it broke up. Differentiation among its connected dialects until then may have been considerable, but was probably much less than what occurs in freely drifting languages.

Second, it is quite possible that language change was a much slower phenomenon in early times than it has been more recently. Most known cultural changes follow this pattern. I see no inherent reason why language diversification should also have followed an accelerating growth curve, but perhaps it has.

The third reason is that increased communication between different languages tends to provide innovations for further changes. Such contacts certainly increased in later times with the development of civilizations. This is mainly a supporting argument for the acceleration idea given above.

Finally there is my own observation that small speech communities appear to drift more slowly than large ones, all else being equal. This is easily shown with the languages at hand--Baltic is most like proto-Indo-European, Icelandic is the most conservative Scandinavian language, Rhaeto-Romanche is the most like Latin, and even Quebecan resembles an early form of French. Slavic is also close to the original Indo-European, while its population explosion is a very recent phenomenon. Similar examples are found in other language families, including some California Indians (Krantz 1977). The general rule is that among sister languages, these with the larger populations change the fastest. This is not generally recognized, I suspect, simply because most linguists have not arranged their data to look at this possibility.

A combination of some or all of these factors could easily put the Indo-European origin time back to 10,000 years ago, rather than the 5500 (or 6400) that has been commonly supposed.

Another major problem with this thesis is that proto-Indo-European vocabulary indicates a mainly pastoral economy

(Goodenough 1970). Common words for "plow" and "to plow" as well as words for the major cereal grains are found in the European language branches, but cannot be matched with corresponding words in Anatolian or Indo-Iranian (Cowgill 1970). At first glance this would indicate that the original Indo-European speakers were pastoralists, but not farmers. A second look, however, suggests that this common European terminology may be significant. It shows that the original Indo-European speakers who spread over Europe must have been both farmers and herdsmen--exactly the basic Neolithic economy as postulated for them here. If they were herders only, then one is at a loss to account for their common farming terminology. On the other hand, my reconstruction is at a loss to explain why this same farming terminology is not found in the Asian branches. Clearly this is an impasse, with basic vocabulary capable of being used to argue both ways.

The regular occurrence of horse and cattle words in all Indo-European branches could be explained by their being broadly intruded into the pastoral terminology before the language break-up had progressed very far. On the other hand, the idea of a similarly late intrusion of farming terminology into the European half of the family would presuppose they were not farmers up to that time.

Benveniste (1969) shows that Indo-European societies all include a division between priests, warriors, and farmers, but that the etymology for these classes does not correspond in the various branches. This also suggests a broadly intrusive social structure at some later date. Likewise, words for kingship, slaves, sacred, sacrifice, and legal terminology do not go back to common roots; whereas terms for order, moderation, and control are comparable. Again, this all seems to point more to peasants than to warriors at the beginning.

In addition, Goodenough (1970:262) pointed out that if one follows the Indo-European connection with Caucasian (Lehman 1952:112) to its logical conclusion, this implies that its spread "...could go back to the Neolithic colonization of Europe."

2. That Anatolia was mostly Indo-European speaking as far back as 7000 B.C. This conclusion greatly simplifies all of our prehistoric reconstructions for that area by removing the need to look elsewhere for the origins of some known peoples of early history. The supposed migration of Hittites through Caucasian territory (however that might have been accomplished) is not needed in order to explain their remote similarities; they actually had been neighbors since 7500 B.C. in their present locations. Even the Mitanni, of presumed Indo-European affiliation, are first located exactly where this language family is shown to bulge down into the Afro-Asian area in the initial dispersal.

It is often assumed that southern Anatolia could not be the Indo-European homeland because its natural flora and fauna does not correspond well with the terminology of the protolanguage, as derived from its most widely distributed words. This does not necessarily follow if such words were distributed only as widely as are the natural items they refer to. Thus the original Indo-European would not be expected to include words for things that did not exist in its homeland, but such words would develop where and when the items were encountered and spread from there. While Indo-European natural vocabulary does not support an Anatolian source, I fail to see that it clearly excludes this source either.

3. That the Altatic language family spread from the Kuban rather than the Altai Mountain area. The only available impetus that would account for Altaic expansion would be their animal husbandry, initially based on sheep and goats. The most obvious source of this economy is the Near East. Putting the exact location of proto-Altaic just east of the Sea of Azov is not well substantiated, but it could not have been far from there. The timing of this origin at 7500 B.C. ought not to generate much controversy, especially if a long-persisting dialect mesh is allowed for in the early stages.

There will be disagreement with my identification of

Kurgans, and especially Scythians, with the Altaic family of languages. Ecology and geography argue for a single ethnic group having spread pastoralism over the entire Eurasian Steppes, and there is no evident opening for even a partial replacement until the time of the Slavic heavy-plow farmers.

No mechanism has ever been suggested whereby Indo-European speech could have entered the steppe area at some early date, let alone spread out over most of its neighbors, and then be replaced by Altaic. Some Iranian names among the later Scythian rulers are no indication that this was the language of the population. A conquest from the outside, or even imitation of names from a higher civilization nearby, could easily account for this meager linguistic evidence. The fact that the Mongol conquest in the 13th Centry A.D. left only a few small language enclaves would certainly argue for ethnic stability of even this region.

4. That the Uralic language family stemmed from the Mesolithic inhabitants of the Hungarian Plain. According to most authorities Uralic originated in the Ural Mountain area and spread out from there, including a final intrusion into Hungary in the 9th Century A.D. This is most improbable because there is no accounting for how such a pastoral adaptation could have arisen in this starting location. Yet if the adaptation moved into the area from outside, it should have been brought by people whose linguistic affiliations lay elsewhere. On the other hand, it is certainly possible that some relatively primitive nomads from the Urals could have intruded themselves into the heart of Eastern Europe, but no good reason for such a move has been offered. It is especially difficult to explain how they could have ethnically replaced an entrenched peasasntry that probably outnumbered them by more than ten to one.

The only resolution to these problems is to postulate Hungary as the origin place for the Uralics, and having them spread to the north and east from there. As reconstructed here, they would automatically have separated themselves into the three major subdivisons that are now located in the northern regions.

It also follows here that the easternmost of these subdivisions would automatically have the closest affinity with the Hungarian source.

Archeological evidence of a presumed early Uralic population in the Ural Mountain area fits just as well with the new interpretation offered here as it does with the traditional view. It is a simple consideration of who had the capacity to move in which direction, at what time, and against which population, that should decide the issue. The only problem that remains is the linguistic time depth that is apparently involved. Since this appears to be a common problem throughout this reconstruction, and the only one of note, the principle of Occam's Razor would argue that we should make a general correction in just this one aspect.

5. That the Basques are a remnant of an early Afro-Asian occupation of Iberia. This view should raise little objection except from those few who want to make Basque the oldest language in Europe. The only realistic alternative to the farmers out of northern Africa would be to make them descendants of the Aegean Sea Shepherds. In recent times the Basques have been mainly farmers. Their fame as sheep herders could arise from a farming base just as easily as their farming could have been added to pastoralism. It is their geographic situation, rather than any strong evidence of linguistic affiliation, that points to Afro-Asian connections. The Sea Shepherds ethnically disappeared from their coastal occupations, and there is nothing to indicate why they might have continued just here to become Basques. On the other hand, the Afro-Asian expansion should have stopped exactly along the present Basque boundary in France.

6. That the Germanic-speaking fringe of southwestern Finland dates back to the arrival of the first Neolithic farmers out of Sweden. Traditionally, this intrusion is put sometime in the Middle Ages during the period of Swedish military expansion. One problem with this view is that nowhere else along the trans-

Baltic coast did other Swedish speech communities survive where they should equally be expected. A more positive argument is that this is the exact strip of coast, with the correct depth of penetration, that would have been occupied from a Swedish source at 3050 B.C. according to the present reconstruction. Its linguistic unity with Sweden could have been maintained since then by regular shipping contacts.

7. That Breton has been the local Celtic language of Brittany since the earliest Neolithic. History would have this as an intrusion from western Britain during the 5th to 9th Centuries. The improbability of such a linguistic replacement, without a known mechanism, should be evident. The difficult terrain of Brittany is physically similar to those areas of Celtic hold-outs in western Britain. A similar continuity of speech is only to be expected. The especially close relation between Breton and Cornish is a problem that does not fit well with my reconstruction.

8. Deriving the German language directly from Sweden is not an original suggestion. That they initially occupied exactly the drainage basins of the two major western German rivers is highly specific here. It was not just the historical estimates of their early boundaries that suggested this mapping. The Germanic move out of Scandinavia was the only major population shift that had neither overwhelming numbers nor higher civilization to account for its success. It was therefore necessary to examine the exact geographical circumstances to see if there might be some kind of satisfactory explanation. These turned out to be unique, at least on this scale, and a river-basin pattern of occupation showed how this move was accomplished.

9. That the pattern and timing of the Roman Empire was inevitable, at least in rough outline. This should raise little objection, but it will be insisted by many that it was a historical circumstance that Rome was its center. I'm inclined

to think that if all the details were known, the triumph of that one Italic town might well prove to have been inevitable as well. It was, after all, located right on the meeting line of Etruscan and Greek civilizations, and it could profit maximally from both.

Lacking such knowledge, we can speculate on the results if a competing site had been successful. It is my contention that if Carthage had won the Punic wars it would have formed the same empire for all practical purposes. This would no doubt have had essentially the same linguistic result, except that it would have been Phoenician instead of Latin that dominated the western Mediterranean.

10. That the modern Turks entered Anatolia from Europe rather than from a central Asian source. The interjection of the Turks, which broke the geographic continuity of the Indo-European languages, may not be a proper part of this study because it occurred outside of Europe. Still, the people who apparently made this move, and the evident mechanism that was used, both originated in eastern Europe. Anatolia also has figured quite prominently in European linguistic affairs ever since the major entry of the Neolithic economy from there 9000 years ago, so its recent fate may be of legitimate interest.

Historical sources give no indication of how this Turkish interjection was accomplished--military conquest being no explanation. An ethnic replacement of this magnitude requires an ecological reason comparable to that which caused the great Slavic expansion. These Turks did not bring in a higher order of civilization, nor were they a massive exodus from some natural disaster. In fact, the mold-board plow did enter an area of Turkic speech on the lower Danube, as reconstructed here, giving these people sole and direct geographical access to Anatolia.

The ten innovative concepts summarized above are only a small fraction of those presented in this study; the list could have been prolonged almost indefinitely. These are selected as being the conclusions that are most at variance with the usual

historic and prehistoric reconstructions. It was never my intention to deliberately seek to disagree with previously held views, but neither did I hesitate to do so when the evidence warranted this.

It might be supposed that the major common theme of these new conclusions is the assigning of greater antiquity to many events than has usually been assumed. I would rather describe the common theme as saying that most people have tended to inhabit their homelands since their differentiation. Only incidentally has this come to indicate longer residence in a number of instances.

Many other reconstructions of Indo-European prehistory have had the various peoples moving rapidly and widely around the map for some time, then somehow arriving at their first recorded locations just before their written history begins. After this they move very little except for a few who's languages did not persist. This contrast between high mobility before history begins, and then relative stability after this, seems much too extreme for people who were agriculturally based throughout. By my interpretation these migrations are substantially reduced in number, and those moves that are retained are spaced out somewhat in their timing. In each instance an ecological reason is given that would appear to make the move inevitable.

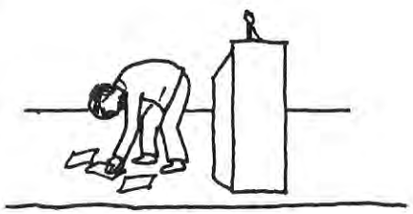
A notable aspect of this reconstruction is that the same procedures and rules of movement are applied throughout its development. Prehistoric peasants are assumed to have been just as tied to the land as their historic descendants. If early boundaries are to be moved from place to place, then these must be described in the same terms as for the more recent movements.

It will be noticed that many historically famous migrations are either specifically denied here, or are simply ignored. The waves of ethnic conquest that repeatedly swept over the Eurasian Steppes were, at most, replacements of the ruling groups. Any major change in the Altaic languages of this area would require some mechanism that has yet to be proposed. Likewise, the series of invasions of Hungary had no known method by which they might

have changed the ethnic identity of the masses of people living there. A whole series of others, like Goths, Vandals, Vikings, etc., are left out entirely because they caused no permanent linguistic changes of significance. If the German army has not affected the French-German speech boundary with three crossings in one recent century, then it is not surprising that earlier and far smaller armies had no lasting linguistic effects either.

Problems Remaining

There are also a few aspects to this reconstruction that are not fully satisfactory to me. Some of these are worth recounting briefly.



1. The Caucasian language origin proposed here is very hypothetical and could use some confirmation or correction. I am particularly uncomfortable about postulating another center of origin for Neolithic farming in the Caucasus Mountain region, and passing over the known stand of natural emmer wheat in northwestern Iran for the source. Yet all considerations of timing and geography argue for this more northerly location.

2. The Aegean Sea Shepherds are treated here mainly in their frontier capacity as Boat People, but they later would facilitate the spread of full Neolithic farming techniques and people along the northern Mediterranean coast. Linguistically, this could mean that Aegean speech was a factor in Ligurian, Etruscan, and various Italian languages. Racially, this means a greater Anatolian component in Italy and southern France than my maps indicate. I have largely ignored this racial factor simply because there was no obvious way to quantify its effects. A correction of some kind is desirable here.

3. What caused the Magyar extension into Transylvania? There is a substantial population of modern Hungarians in the center of Romania for which I find no ecological explanation that is suitably rigorous.

4. If the mold-board plow originated inside Magyar territory, why is all its terminology Slavic in origin? Vocabulary argues for an origin in Slavic lands; ecology would place it on the Slavic-Magyar border; but subsequent geographical considerations fit best with the spread beginning just inside the Hungarian Plain. This reconstruction is based mainly on the geographical interpretation, although it would make relatively little difference which one had been used.

5. The historical impact and repercussions of the Slavic expansion to the west appear to have been somewhat earlier than they were in the south, although their timing ought to have been about the same. Some adjustment might be made to explain this, but it would also affect the solutions to problems 3 and 4 above. Every variation I've tried so far seems to affect these three problems in a slightly contradictory manner.

6. The proposed exodus of Finnic farmers out of Latvia and Estonia, and then across Russia, is an uncomfortably unique phonomenon. There is nothing logically wrong with this aspect of the reconstruction for its time and place, but it would be much better if there were other examples of this kind of move.

7. It is not clear why the Turks should have spread so far with the mold-board plow while the Magyars used it to advance their frontier less than half that distance. It is true that there were some major grasslands for the Turks to move through while the Magyars faced only forested lands to the west of Hungary. Other factors of ecololgy and demography may have been involved.

This list of remaining problems could also be prolonged, but not very far. In general, the procedures used here have handled all but some relatively trivial discrepancies. I would welcome any new attempts at this kind of reconstruction. Perhaps some of the problems noted above might be handled with new factors or new interpretations. More empirical data relating to some of my assumptions about human movements might strengthen or alter them. Perhaps the entire problem could be redone with some wholly new or greatly altered assumptions.

The overall picture of European linguistic geography is perfectly described and accounted for by the procedure used here. The conclusions reached are given in the form of clear laws, discrete events, and exact mapping--all of which may have been a bit overstated and oversimplified for the sake of clarity. In effect, the stage was set as of 10,000 years ago, the rules were given, and some reasonable innovations were tagged for their introduction at specified times and places. The whole thing was then put in motion and the results were observed through time. While much of the resulting story is not presently testable, some of it is. The fact that this process does fit well with most of known history and archeology, and that it ends up with the modern distributions and relationships--all this argues strongly that it represents the actual series of events.

It would seem unreasonable to discredit the method itself because of disagreement with some of its results. If this were done for the sake of a few details, then the explanation for the major part is lost as well. Either the method works or it does not. It would be peculiar indeed if 90% of European linguistic history followed natural laws, and the remainder were under no such constraint.

This is not to say that the reader must accept every detail of this reconstruction as given, or else reject it all. The method still has room for correction and change. Since the entire reconstruction follows automatically from the facts of geography and my basic assumptions, any error in its conclusions should be found to stem from an error among these assumptions.

In developing this picture I tried out many different sets of assumptions about human movement that were within the range of possible choices. All of the dates given at the 200-km intervals on the migration paths were calculasted at least ten separate times. Many other paths were also figured out, several times over, that are not shown on the maps. There is also some leeway in the application of geographical barriers, climates, soils, and vegetation zones; the atlases do not always agree on these. I do not claim to have tried out every possible set of assumptions, but after finding some impossible situations at various extremes it was usually easy to close in on the most likely ones.

Hopefully, the spirit of this approach will be appreciated by critics and supporters alike. Ideally it will be used by those who would alter or redo this reconstruction, or who would attempt a similar reconstruction of another area. The spirit might be restated simply as: There is a reason for everything, it's just a matter of finding it.



BIBLIOGRAPHY

Ammerman, A.J. and L. Cavalli-Sforza. 1977. The wave of advance model for the spread of agriculture in Europe. In Transformations: mathematical approaches to cultural change, ed. by K. Cooke and C. Renfrew. London: Academic Press.

Baldi, P. 1983. An Introduction to the Indo-European Languages. Carbondale: Southern Illinois University Press.

Barraclough, G. (Editor). 1978. The Times Atlas of World History. Maplewood, New Jersey: Hammond.

Baumhoff, M. 1978. Comment on G. Krantz's "The Populating of western North America." Method and Theory in California Archaeology 2:57-59.

Benveniste, E. 1969. Indo-European Language and Society (Translated by E. Palmer 1973). University of Miami (Florida) Press.

Brues, A.M. 1977. People and Races. New York: McMillan.

Chard, C.S. 1975. Man in Prehistory, 2nd Ed. New York: McGraw-Hill.

Childe, V.G. 1926. The Aryans (Reissued 1970). Port Washington, New York: Kennikat Press.

Clark, G. 1977. World Prehistory, 3rd Ed. London: Cambridge University Press.

Cowgill, W. 1970. Comment on "The Origins of Settled Farming in Temperate Europe," by B. Wailes. In Indo-European and Indo-Europeans, ed. by G. Cardona, H.M. Hoenigswald, and A. Senn, pp. 279-305. Philadelphia: University of Pennsylvania Press.

Crossland, R.A. 1967. Immigrants from the North. London: Cambridge University Press.

Dennel, R. 1983. European Economic Prehistory: a new approach. London: Academic Press.

Duby, G. 1954. La Revolution agricole medievale. Revue de geographie de Lyon, XXIX.

Duby, G. 1973. The Early Growth of the European Economy (English translation 1974). New York: Cornell University Press.

Economic Intelligence Unit, and Cartographic Department of the Clarendon Press. 1956. Oxford Regional Economic Atlas: The U.S.S.R. and Eastern Europe. New York: Oxford University Press.

Elsasser, A. 1978. Comment on G. Krantz's "The Populating of western North America." Method and Theory in California Archaeology 2:59-60.

Espenshade, E.B. (Editor). 1960. Goode's World Atlas, 11th Edition. Chicago: Rand McNally.

Espenshade, E.B. (Editor). 1978. Goode's World Atlas, 15th Edition. Chicago: Rand McNally.

Fleisher, M. 1978. Comment on G. Krantz's "The Populating of western North America." Method and Theory in California Archaeology 2:61-62.

Fodor, I. 1976. The main issues of Finno-Ugrian archaeology. In Ancient Cultures of the Uralic Peoples, ed. by P. Hajdu, pp. 49-78. Budapest: Corvina.

Forbes, R.J. 1958. Man the Maker. London: Abelard-Schuman Ltd.

Gille, B. 1962. The Medieval Age of the West (Fifth Century to 1350). In A History of Technology and Invention, vol. I, ed. by M. Daumas, pp. 422-574, (English translation 1969). New York: Crown.

Gimbutas, M. 1973. The beginning of the Bronze Age in Europe and the Indo-Europeans: 3500-2500 B.C. Journal of Indo-European Studies 1(2):163-214.

Gimbutas, M. 1977. The First Wave of Eurasian Steppe Pastoralists into Copper Age Europe. Journal of Indo-European Studies 5:277-337.

Goode, J.P. (Editor). 1943. Goode's School Atlas, revised. New York: Rand McNally.

Goodenough, W.H. 1970. The Evolution of Pastoralism and Indo-European Origins. In Indo-European and Indo-Europeans, ed. by G. Cardona, H.M. Hoenigswald, and A. Senn, pp. 253-265. Philadelphia: University of Pennsylvania Press.

Hajdu, P. 1976. Linguistic background of general relationships. In Ancient Cultures of the Uralian Peoples, ed. by P. Hajdu, pp. 11-46. Budapest: Corvina.

Hassan, F. 1981. Demographic Archaeology. London: Academic Press.

Jastrow, M. 1943. Europe - Languages. In Goode's School Atlas, revised, pp. 106-107. New York: Rand McNally.

Kinder, H. and W. Hilgemann. 1964. The Anchor Atlas of World History, Volume I (English translation 1974). Garden City, New York: Anchor Press.

Kivikoski, E. 1967. Finland. New York: Praeger.

Krantz, G.S. 1976. On the nonmigration of hunting peoples. Northwest Anthropological Research Notes 10(2):209-216.

Krantz, G.S. 1977. The populating of western North America. Method and Theory in California Archaeology 1:1-63.

Krantz, G.S. 1980. Climatic Races and Descent Groups. West Hannover, Mass.: Christopher.

Krantz, G.S. 1981. The Indo-European homeland in Anatolia. Abhandlungen, Volkerkundliche Arbeitsgemeinschaft, Heft 29:1-15.

Lehman, W.P. 1952. Proto-Indo-European Phonology. Austin: University of Texas Press.

Lehman, W.P. 1970. Linguistic Structure as Diacritic Evidence on Proto-Culture. In Indo-European and Indo-Europeans, ed. by G. Cardona, H.M. Hoenigswald, and A. Senn, pp. 1-10. Philadelphia: University of Pennsylvania Press.

Leonhardy, F. 1978. Comment on G. Krantz's "The Populating of western North America." Method and Theory in California Archaeology 2:60.

Lockwood, W.B. 1969. Indo-European Philology. London: Hutchinson University Library.

Lockwood, W.B. 1972. A Panorama of Indo-European Languages. London: Hutchinson University Library.

Menozzi, P., A. Piazza, and L. Cavalli-Sforza. 1978. Synthetic maps of human gene frequencies in Europeans. Science 201:786-792.

Mallory, J.P. 1981. The Ritual Treatment of the Horse in the Early Kurgan Tradition. Journal of Indo-European Studies 9:205-226.

Pounds, N.J.G. 1973. An Historical Atlas of Europe 450 B.C.--A.D. 1330. London: Cambridge University Press.

Pulleyblank, E.G. 1981, personal communication. Department of Asian Studies, University of British Columbia.

Schwidetzky, I. 1980. The Influence of the Steppe People Based on the Physical Anthropological Data in Special Consideration to the Corded-Battle Axe Culture. Journal of Indo-European Studies 8:345-360.

Scott, F.D. 1977. Sweden: The Nation's History. Minneapolis: University of Minnesota Press.

Singer, I. 1981. Hittites and Hattians in Anatolia at the beginning of the Second Millennium B.C. Journal of Indo-European Studies 9:119-134.

Smith, P.E. 1976. Food Production and Its Consequences, 2nd edition. Menlo Park, Calif.: Cummings Publishing Co.

Steiner, G. 1981. The Role of the Hittites in Ancient Anatolia. Journal of Indo-European Studies 9:150-173.

Stenberger, M. 1962. Sweden. New York: Praeger.

Tovar, A. 1970. The Basque Language and the Indo-European Spread to the West. In Indo-European and Indo-Europeans, ed. by G. Cardona, H.M. Hoenigswald, and A. Senn, pp. 267-278. Philadelphia: University of Pennsylvania Press.

Wenke, R.J. 1980. Patterns in Prehistory. New York: Oxford University Press.

White, L. Jr. 1962. Medieval Technology and Social Change. Oxford: Clarendon Press.

White, L. Jr. 1967. Technology in the Middle Ages. In Technology in Western Civilization, Volume I, ed. by M. Kranzberg and C.W. Pursell, pp. 66-79. New York: Oxford University Press.

Wilbur, T.H. 1980. The Earliest Stages of the Successful Resistance to Indo-Europeanization of the Western Pyrenees. Journal of Indo-European Studies 8:3-15.

Xirotiris, N.I. 1980. The Indo-Europeans in Greece: an anthropological approach to the population of Bronze Age Greece. Journal of Indo-European Studies 8:201-210.

Zaborski, B. 1960. Europe - Languages. In Goode's World Atlas, 11th edition, pp. 108-109. Chicago: Rand McNally.

Zohary, D. 1969. The progenitors of wheat and barley in relation to domestication and dispersal in the Old World. In The Domestication and Exploitation of Plants and Animals, ed. by P.J. Ucko and G.W. Dimbleby, pp. 47-66. London: Duckworth.

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