PART TWO

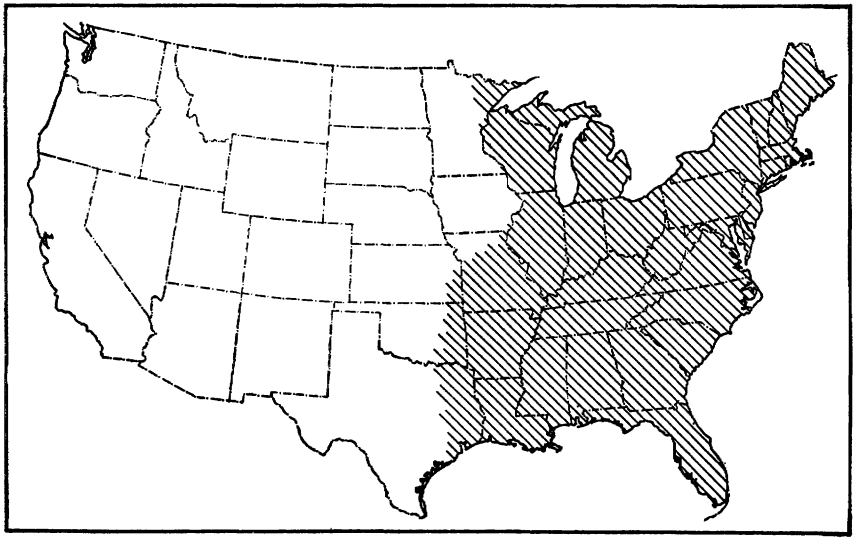
Climate and Agricultural Settlement

The Settlement of the Humid East

By Carl O. Sauer [1]

BY MIGRATIONS and settlement man has spread over the earth and settled it. To each new land he brings the ways of production familiar to him in his old home—ways fundamentally influenced by climate. In the new land some of these ways may suit the climate, some may not. The struggle of adaptation, modification, and discovery then begins. Here is the first of a group of articles dealing with this struggle in the United States and its territories. The settlement of this country represented the greatest mass migration of all time, and the climates, from Alaska to Puerto Rico and Hawaii to New England, cover almost the entire range found on the earth.

[1] Carl O. Sauer is Chairman of the Department of Geography, University of California.



WHEREAS OCEAN AIR FLOWS freely during all seasons over the European shores of the Atlantic, the Atlantic seaboard of the United States is only occasionally and in part influenced by its position on the ocean. Since the weather usually moves from west to east, the usual storm tracks pass from western Canada or the Rockies eastward by way of the Great Lakes and New England. Much of the air that gets to our Atlantic coast has passed over a wide stretch of land beforehand. Such continental air may have been greatly chilled in winter or similarly heated in summer before it reaches the seaboard. Thus our eastern seaboard areas are largely subject to extremes of heating and chilling like those in the interior of the continent, although they have intervening periods of weather that is tempered by air from the ocean. Our Atlantic States have hotter summers and colder winters than the countries of western Europe. Other continental qualities of the climate are a rather abrupt change from winter to summer and the fairly marked development of summer thunderstorms, with rains more intense but of shorter duration than in coastal Europe.

The European colonists became well aware of these differences while recognizing the generally familiar nature of the weather. One of the earliest observations was by Capt. John Smith, who likened the summers of Virginia to those of Spain but its winters to those of England, and who said also, "The like thunder and lightening to purefie the air, I have seldome either seene or heard in Europe."

Peter Kalm, visiting this country from Sweden, wrote under date of September 23, 1748:

> It is true that in Pennsylvania, and even more so in the lands farther to the north, the winters are often as severe as in Sweden, and therefore much colder than in England and the southern countries of Europe. I found, for instance, that in Pennsylvania, which lies by 20 degrees farther south than some provinces of my fatherland, the thermometer of Celsius fell 24 degrees below freezing. And yet I was assured that the winters which I spent there were not of the coldest, but quite ordinary. It is also true, however, that if the winters are at times hard, they do not last usually a great while. One can say properly that in

Pennsylvania ordinarily they do not endure more than 2 months, and sometimes not that long. It is unusual if winter holds for as much as 3 months. Further, the summer heat is very strong and constant. In Pennsylvania, most of April, all of May, and the following months until October are as warm as June and July in Sweden. Cherries are often ripe in Philadelphia on the 25th of May; and, not infrequently, wheat is harvested in Pennsylvania by the middle of June. All of September and half, if not all of October, constitute the pleasantest season in Pennsylvania.

EUROPEAN AND AMERICAN VEGETATION

In most cases, the colonists were at no loss to identify the native plants and animals which they found on the western side of the Atlantic. It would be impossible, indeed, to cross an ocean anywhere else and find as little that is unfamiliar in nature on the opposite side. In all the lands of earliest colonization, from Massachusetts Bay south to Virginia, flora and fauna were closely related to those in the European homeland and indicated to the settlers that they were still under familiar skies and seasons.

Except for some stretches of sand, the east coast was a land abounding in hardwoods. Above all, there were oaks of divers kinds. Ash, elm, beech, birch, maple, poplar, willow, linden, and holly were other familiar trees, even though the American species differed somewhat from those of Europe.

Hardwoods conspicuously different from those of north Europe were the chestnut and walnut; the English had enough experience of the Mediterranean to guess right as to the names of both of these, but they also found hickories and pecans, for which Indian names were adopted, and the noble tulip tree, which they misnamed "yellow poplar." In the north, the colonists found white and red pine mingled with the hardwoods; on the sandy coast, pitch pine; southward from Virginia, forests of yellow pine. Such stands were a new experience to the immigrants, for pines are few in western Europe. Still more novel were the coniferous trees met with in the swamps from Chesapeake Bay south. For want of a better name, the colonists called these trees cypresses, though they are not closely akin to the Old World cypresses. The eastern juniper was similarly mislabeled "red cedar." It was obvious that America possessed a wealth of fine trees far beyond that of the European homelands.

The wild berries were remarkably similar on both sides of the Atlantic and served as an important food supply to the more northerly English colonists. The wild grapes of the New World attracted much attention from the settlers, for in most of northwestern Europe, grapes, either wild or cultivated, did not grow. English, Swedish, and German settlers commented upon the abundance and merits of the American grapes.

This was indeed a lustier land to which the settlers had come, a land of hotter summers and colder winters, of brighter and hotter sun and more tempestuous rain, a land suited to and provided with a greater variety of vegetation than the homelands of Europe. In one important respect only was it strikingly inferior to northwest Europe—the quality of the grasses. There was grass aplenty, both in wet, low meadows and parklike openings or glades in the upland woods, but mostly it furnished rather poor feed. Some, like the broomsedge or broomstraw (eastern *Andropogons*), became coarse and harsh as it

grew. Almost none of the native grasses withstood trampling and grazing. The annual grasses died off if heavily pastured, because they did not get a chance to seed; the perennials had delicate crowns that ill stood the abuse of heavy grazing. In clovers and other herbaceous legumes, a similar inferiority may be noted for the eastern American flora as compared with the European.

INDIAN ECONOMY OF THE EASTERN WOODLANDS

All the native tribes encountered by the early colonists had basically similar ways of making a living. They are usually all classed by anthropologists as Eastern Woodland Indians. Their houses were made of logs or poles set upright; or in some cases strips of heavy bark, as of the chestnut, were tied to a framework of poles. They made dugout canoes by hollowing the trunk of a tulip tree or some other light, strong wood, or used bark canoes, as in the north. The household vessels were largely of wood and bark. The hard maples were carefully tapped for the spring sap, which was boiled down to sugar. From woods borders, berries and edible roots were gathered in quantity. Walnuts, hickory nuts, chestnuts, and the sweeter acorns provided winter foods of importance. Woodland browse and glade and marsh grasses supported game in an amount and variety that greatly impressed the newly come Europeans, who rarely had been given the chance to hunt at home. Many of the Indian uses of forest resources were copied or adapted by the settlers. The products of the woodlands were important to them for many years, as these products had been to the Indians.

From the woodland Indians, the colonists learned ways of farming that greatly helped, if indeed they did not make possible, the successful establishment of settlements in the new country. First of all the whites learned a valuable short cut to land clearing, the deadening of trees by girdling. In Europe, where they were accustomed to open fields of plow land, when additional land was cleared the trees were carefully cut down and the stumps dug out for firewood. In the New World, the clear field, the plow, and the seeds of Old World agriculture all gave way largely to the Indian methods of forest girdling and planting in hills and the use of Indian crops.

The basic Old World crops were field crops, such as small grains, planted in plowed ground, either broadcast or seeded in rows. The Indians used digging stick and hoe for farming, had no regular, rectangular fields, such as plowing requires, and disregarded stumps and dead trees. The planting was usually done in "hills," often by setting several kinds of seed, such as corn, beans, and squash, in each heaped-up mound of earth. By such procedure, the cultivator secured a much greater food supply than would have been possible under European modes of farming, without the labor of getting the soil ready for the plow and without requiring draft animals or equipment other than hoe or mattock.

Not only in the early colonial days of the Atlantic seaboard but for two and a half centuries thereafter the pioneer settler used Indian tillage and Indian crops. He continued to do so until he had ad-

vanced westward to the far interior margin of the lands of humid climate. The best known solution of how to farm in a hardwood country, with a minimum of tools and without the necessity of costly clearing, had been worked out by the aboriginal agriculturists of the New World.

The barking or girdling of trees let the full sunlight onto the forest floor in a few months' time and thus made it ready for planting. The ground commonly was burned over before being planted, to free it of dead branches, dry leaves, and the light herbaceous vegetation that was present. The forest topsoil was dark with leafmold, rich in potash, and congenial to the heavily feeding Indian corn. In a few years wind and weather completed the task of bringing down the dead timber. The deadened hardwood trunks and roots decayed rapidly in the moist, warm summers.

With one or two exceptions the plants cultivated by the Indians had originated far to the south of the United States under tropical or subtropical conditions. The list of native crops includes several kinds of corn, such as dent, flint, and sweet corn, various kidney or navy beans, squashes or pumpkins, the common sunflower, and the Jerusalem-artichoke. Somewhat doubtfully the last two are credited to the eastern United States as the original place of domestication. Excepting the Jerusalem-artichoke, these are all annual plants which, in contrast to most of the crops of northern Europe, require warm weather for starting. A large part of our humid East is as warm in summer as a tropical region. Summer in the middle Mississippi Valley is as warm by day or night as summer in the Tropics, perhaps warmer. Hence, carrying the warmth-loving domesticated American annuals northward from Mexico and Central America to the eastern woodland areas involved no very serious problems for the aboriginal cultivators. It may be assumed, however, that it took many generations for agriculture to spread from Mexico to Chesapeake Bay. As it spread, a gradual selection of plants that would mature in a shorter and shorter growing season took place. These in turn became the parents of our modern commercial corn, beans, and pumpkins.

COLONIAL BEGINNINGS NOT AGRICULTURAL

When the English first began their activities in the New World, they had little concern about places suitable for agricultural settlement. Farming was forced upon the colonists; it was not the object of their coming. The early Englishmen who came to America came to seek a northern way to the Orient, to bar the way of Spanish or French expansion, to seek wealth in furs and in codfish, herring, and mackerel, to find precious metals like those of Mexico and Peru, or at least to secure profitable cargoes of medicines, spices, dyewoods, or naval stores. Stockholders in trading ventures put up the funds on which attempt after attempt at settlement was made and failed—in Newfoundland, in Maine, in North Carolina, and in the Tropics—largely because settlements were started for all reasons but the suitability of climate and soil for farming. The fact that any group of overseas colonists needed above all else to sustain themselves by the products of their agriculture was understood very slowly.

PLANTATION CROPS FROM TROPICAL LANDS

Even the Colony of Virginia, first overseas English settlement that endured, was extremely reluctant to engage in agriculture. In its floundering beginnings, it depended on imported supplies and food traded or taken from the Indians. Four miserable years after the founding of Virginia, the new government of Sir Thomas Dale applied a rigorous regime of enforced agricultural labor, which pulled the Colony through. The Englishmen gave some attention to the growing of Indian crops, and European livestock was turned out to range through the woods. Swine in particular did well on the mast of the hardwoods and increased rapidly. Smith reported as late as 1618 that only 30 or 40 acres of European grain had been sown—in soil prepared with a single plow.

Meanwhile, apparently in 1612, the cultivation of tobacco was begun. This was not the harsh native tobacco (*Nicotiana rustica*) used by the Indians of the eastern woodlands, but the cultivated tobacco (*N. tabacum*) of the American Tropics. During the sixteenth century Spaniards and Portuguese had introduced this Indian ceremonial plant to European trade and its seeds to European gardens. The use of tobacco spread rapidly into France and England. In both countries it was planted to some extent before the founding of Virginia. It is not definitely known how this tropical tobacco came to Virginia. The first plantings probably were of seed that had been brought from England. Fortunately for the success of the Virginia Colony, the experimental introduction of tobacco was made just at the time when the English were acquiring the tobacco habit, before any English colony had been established in the Tropics, and under an economic policy that emphasized production of goods by Englishmen.

It cannot be claimed that Virginia had any peculiar climatic advantage in the growing of tobacco. But Virginia had an advantage in being the only English colony at the time and in the indifferent quality of the leaf tobacco produced in England; and the long and equable summers of Virginia, amply supplied with moisture, free of hot dry winds and sudden sharp drops in temperature, proved sufficiently congenial to the growth of this delicate plant of tropical origin. This was the climatic discovery the Virginians made for New World agriculture.

In later years the major expansion of tobacco was westward in the same latitude as Virginia, continuing to the western edge of the woodland country. A secondary spread took place southwestward, through the Piedmont. After Virginia, Kentucky became the next great tobacco State. Soon Tennessee and the lands north of the Ohio were involved in tobacco planting, and by the middle of the nineteenth century, St. Louis was the greatest tobacco market, with tobacco fields stretching west across Missouri to the Plains.

The next introduction of tropical crops came principally by way of Charleston, S. C. Shortly after Virginia became a tobacco-planting colony, English settlements were established in the smaller West Indian islands, most significantly in Barbados. The rapid growth of settlement and plantations soon crowded this and other islands, and an overflow of population was directed to South Carolina after 1670. Sugarcane, indigo, Barbados, or sea-island, cotton (*Gossypium barba-*

dense), and rice were introduced as plantation crops in the lowlands around Charleston. Similar introductions took place around New Orleans in the eighteenth century by the French, largely influenced from Haiti. Florida entered only slightly into this plantation development, not because of unsuitable climate but because of lack of rich lowlands with deep soil. From the sea-island coast of South Carolina to the Delta of the Mississippi, tropical climatic conditions prevail during most of the year. The principal difference in practice here as compared with that in the West Indies was that whereas such tropical crops as sugarcane and sea-island cotton were treated as perennials in the islands, winter frosts required annual planting in South Carolina and Louisiana.

Last and greatest of the plant introductions in the southern plantations was that of upland cotton (*Gossypium hirsutum*). The manner of its appearance in the South is obscure. A domesticated plant of Mexico, it was, like many New World plants, taken to the Mediterranean by Spaniards in the sixteenth century, and soon it was cultivated to some extent along the entire length of the Mediterranean shores. Its introduction to the English Colonies was perhaps by way of southern Europe. In the eighteenth century upland cotton was rather commonly planted on a small scale in the southern Colonies, chiefly for domestic use. Commercial planting was made possible by the invention of the cotton gin, and the first area of upland, or short-staple, cotton plantations was in South Carolina and Georgia, inland from the old sea-island cotton section.

The climatic background of upland cotton is quite different from that of the sea-island species. The latter needs a large and frequent supply of moisture and a very long, warm growing season, reflecting its fully tropical origin. The upland, or Mexican, cotton was bred in a land with much less moisture and a shorter growing season. The spread of upland cotton was principally westward from South Carolina. Historically, tobacco dominated the upper South and cotton the deep South. This segregation of the Cotton Belt from a tobacco and general-farming belt to the north was not wholly a matter of length of growing season. Two quite different farming systems were in process of spreading westward. Cotton planting pioneered the westward movement through the warmer section of the humid eastern hardwood country. The black prairies of Alabama and Mississippi proved the suitability of the crop to prairie-land cultivation. When settlement reached them, the rich prairies of central Texas were rapidly and most successfully added to the Cotton Belt.

It is somewhat doubtful whether the history of our cotton culture proves the superior climatic adaptability of our South, in particular of the Southeast, for cotton. Perhaps it records only the establishment of a crop in an area with a reasonably suitable climate, the long dominance of the South in world markets resting largely upon its prior development of cotton growing and marketing.

AGRICULTURE IN THE NORTHERN COLONIES

New England was not settled because of agricultural attractions, nor did agriculture become the chief interest of the colonists. Fish and furs, oaken ship timbers, spars and masts of white pine, and iron

made from ore raked from the floors of cool bogs were early products, characteristic of the natural resources of New England. Farming was in many cases a part-time occupation. It appears that New England has scarcely grown enough food for its needs at any time. Lack of sufficient areas of good soil and a climate marked by a brief growing season and little summer heat placed it at a disadvantage with the Colonies farther south.

In the planted fields local kinds of short-season Indian maize, beans, and pumpkins were grown side by side with small grains from England, and it appears that the Indian crops gave the more satisfactory returns.

In the second half of the seventeenth century, English grasses began to make a noticeable improvement in pastures and meadows. The manner of their spread is obscure, but it appears that, sown here and there, they naturalized themselves rapidly and soon displaced the poor native grasses. The cool New England climate was fully congenial to the introduced European grasses and to white clover, in contrast to that in the southern Colonies. In the eighteenth century, one of these European grasses, long established in New England, became perhaps the first important sown hay crop of America, first under the name of "Herd's grass" and then as "Timothy grass." With the improvement of hay and pasture, more attention was given to livestock, especially for meat production. Rhode Island and the Connecticut Valley were especially known in later colonial times for their beef, mutton, and draft horses. These are the chief earlier expressions of the climatic suitability of New England for grass rather than grain and other tilled crops.[2]

DOMINANT QUALITIES OF AMERICAN FARMING DERIVED FROM THE MIDDLE COLONIES

The basic pattern of the American farm is derived chiefly from the middle Colonies, and thus from a continental European as well as from an English background. It was to the middle Colonies that the greatest number of people came who were by birth and training tillers of the soil. Their coming was delayed sufficiently so that they brought with them some of the new agriculture that changed western Europe so greatly in the eighteenth century.

Unlike New England, the middle Colonies were not generally settled as closely knit township communities but as single farmsteads. Unlike the owners of plantations on the southern seaboard, the land operators to the north were themselves the tillers of the soil, occupants of single-family farms.

The contributions of Europeans to the Colonies from the Hudson to the upper Chesapeake were varied. The Swedes and Finns are credited in particular with the introduction of the log cabin, which became the standard house of the frontier until the sod house of the western prairies took its place. The Dutch contributed better

[2] From Jared Eliot's First Essay on Field Husbandry in New England (1747): "English Grass will not subsist without a Winter. In the Southern Colonies the less Winter the less Grass. In Virginia, North and South Carolina, they have no English Grass at all. Where there is no English Grass, it is difficult to make Cattle truly fat; so that Winter brings its good as well as its evil Things." In his Second Essay (1748) he added: "Red Clover is of a quick Growth and will supply our Wants for the present; a few Months brings it forward to an high Head: There are few People yet know the Value of this beneficial Grass." (In Essays Upon Field Husbandry in New England and Other Papers, 1748–1762, Columbia Univ. Studies, 1934.)

breeds of livestock and interest in dairying, and played a role in the introduction of European grasses and clovers. The Scotch-Irish, under which term Irish and Scots are also included, provided a large proportion of the intrepid backwoodsmen who first ventured into the wilderness. It is also probable that they established the culture of the potato.[3]

The German settlers as a group were most preoccupied with becoming permanently established as farmers wherever they settled. They were less mobile than the Scotch-Irish and so are often considered as forming a second wave of settlement behind the latter, who constituted an advance guard in the movement inland. The Germans were general farmers, accustomed to animal husbandry. They practiced manuring and, largely, crop rotation. Notable improvements in grain growing and stock breeding are credited to them. Architecturally they were the creators of the basic American barn, combining barn, stable, granary, and wagon shed under one commodious roof in the so-called Swiss, Mennonite, or bank barn. In contrast to the English colonists, they stabled animals in bad weather and were accustomed to stall feeding. Other items of importance to American farm settlement credited to the colonists from the Rhine are the introduction of the rifle, the Conestoga wagon, and the stove to replace the English fireplace.[4]

From all northwestern Europe, farmers poured into the Colonies during the eighteenth century, settling from the Mohawk Valley to Pennsylvania and in the back country of Maryland. Here lay the largest bodies of rich land, with a familiar climate, convenient to the seaboard. All the accustomed crops and livestock of Europe thrived here. The Old World pattern of general farming, with emphasis on the feeding of livestock, was transferred here to the New World with one major modification—Indian corn was fitted quickly into the agricultural economy and greatly increased the livestock capacity of the farms. Maize was found to be a stock feed superior to anything known then or now in northern Europe. Corn, oats, wheat, rye, clover, and European grains formed a crop combination that provided the means of keeping more livestock and of obtaining sustained high yields. In late colonial and post-colonial times, these general-crop and stock farmers spread this basic American way of farming westward and southwestward. Indeed, when these farmers, reinforced by New Englanders and new arrivals from the north of Europe in the second quarter of the nineteenth century, encountered the prairies in the Old Northwest Territory between the Ohio River and the Great Lakes, they quickly found the technical means of occupying them. The prairies are still a part of the humid East, scarcely differentiated climatically from the woodlands by which they are surrounded on the north, east, and south. The same crops succeed in both areas. The summers of Iowa are as hot as those of Pennsylvania and as much characterized by rains from thunderstorms, and so Indian corn found admirably suited conditions across the whole breadth of the prairie country. Fall, winter, and spring

[3] Earlier introductions of potatoes occurred, but their cultivation did not become common until the eighteenth century. Then they appear in localities with colonists from Ireland, such as New York, and in the back country of New England where Scotch-Irish settlements were made.

[4] A brief account and a good bibliography will be found in: SHRYOCK, RICHARD H. PENNSYLVANIA GERMANS IN AMERICAN HISTORY. Pa. Mag. Hist. and Biog. 63: 261–281. 1939.

weather in the prairie States are equally congenial to the small grains, grasses, and clovers from northern Europe. Hence the middle-colony pattern of farming easily became the famous corn-clover-oats rotation of the prairie States, with hogs as the primary market product.

In the development of the forested Great Lakes States, corn was largely eliminated by reason of the reduced summer warmth. Here the pattern of agriculture became almost identical with that of the climatically very similar Baltic countries. Dairy products, potatoes and other root crops, and some small grains constitute an agricultural complex suited to short, cool summers. New Englanders and Scandinavians were dominant groups that found a continuation of accustomed climatic conditions in the new country.[5]

[5] General references: CARRIER, LYMAN. THE BEGINNINGS OF AGRICULTURE IN AMERICA. 323 pp., illus. New York. 1923. BIDWELL, PERCY WELLS, and FALCONER, JOHN I. HISTORY OF AGRICULTURE IN THE NORTHERN UNITED STATES, 1620–1860. Carnegie Inst. Wash. Pub. 358, 512 pp., illus. 1925.