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Source: *The William and Mary Quarterly*, Apr., 1984, Vol. 41, No. 2 (Apr., 1984), pp. 213-240

Published by: Omohundro Institute of Early American History and Culture

Stable URL: https://www.jstor.org/stable/1919050

Fear of Hot Climates in the Anglo-American Colonial Experience

Karen Ordahl Kupperman

ENGLISH people contemplating transplantation to the southern parts of North America and to the West Indies in the sixteenth and seventeenth centuries expressed profound anxiety over the effect hot climates would have on them. Heat and the environment it engendered were expected to be alien and even hostile to men and women from England's temperate climate. This article is a study of the interaction between perception and reality, particularly of the way in which evidence was interpreted to sustain the preconceptions English colonists brought with them. The settlers' health fared badly in both the southern mainland colonies and the West Indies. This fact confirmed their expectations and contributed important evidence that hardened generalized anxieties into medical dogma by the eighteenth century. The link between weather and disease then became axiomatic. In 1598 George Wateson, drawing on his experience as a merchant in Spain, wrote "the first working textbook of tropical diseases," which warned of the diseases engendered by "intemperate Climats."[1] From that time through the colonial period, excessive heat was seen as the major reason for southern sickliness.[2]

Early modern science taught that human beings and their native physical environment normally existed in a state of ecological harmony. That is, the human constitution was responsive to and shaped by climate, air, and diet. It followed that men and women who had been bred in England were unsuited to environments that were radically different, such as those of the

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[1] David Beers Quinn, *England and the Discovery of America, 1481-1620 . . .* (New York, 1974), 206; George Wateson, *The Cures of the Diseased, in Remote Regions . . .* (London, 1598), sig. B and *passim.*

[2] Gary Puckrein, "Climate, Health and Black Labor in the English Americas," *Journal of American Studies,* XIII (1979), 179-193. For a vivid example of the association of heat and unhealthiness see Sir George Yeardley to Sir Edwin Sandys, June 7, 1620, in Susan Myra Kingsbury, ed., *The Records of the Virginia Company of London,* 4 vols. (Washington, D.C., 1906-1935), III, 298, hereafter cited as *Va. Company Recs.*

southern regions of the New World, with their heats and damps and different dietary regimens. Consequently, those who ventured to such places, stayed there, and ate the indigenous foods risked sickness in the short run and a drastic change in physiology and psychology in the long run as their bodies responded to the new environment.

This line of thought was supported by the medical science of the day based on the Hippocratic theory of the four humors. The four elements, air, fire, earth, and water, were believed to be represented in the human body by the humors blood, yellow bile or choler, phlegm, and black bile or melancholy. Good health resulted from the proper balance of these humors, but each climate created its own characteristic balance. Therefore a move to a radically different climate could cause profound distress while the body tried to adjust. Choler, corresponding to fire, predominated in hot areas: "That Choler abounds between the Tropicks, is but reasonable as well as matter of fact; for the inflaming Sun must needs kindle its like in its neerest Subjects." The body, by its various discharges or excretions, would rid itself of an excess of one or more humors: thus the "bloody flux" that afflicted so many colonists indicated an attempt to achieve the proper amount of blood.[3]

The royalist Richard Ligon fled England in 1647 and spent three years in Barbados where he was a keen and witty observer of the scene. Ligon described his first encounter with the heat of the West Indies, saying that it was hardly to be believed that one from a cold climate could "indure such scorching without being suffocated." He and his companions felt as if they were being "fricased" and experienced "great failing in the vigour, and sprightliness we have in colder Climates." Conversely, Richard Hakluyt marveled that "borne naturalles" of Japan and the Philippines could live in England.[4] Sir William Vaughan, author of several medical

[3] Thomas Trapham, *A Discourse of the State of Health in the Island of Jamaica* (London, 1679), 84; William Vaughan, *Approved Directions for Health, Both Naturall and Artificiall,* 4th ed. (London, 1612), 84, 120; John Hammond, *Leah and Rachel, or, the Two Fruitfull Sisters Virginia and Maryland . . .* (1656), in Peter Force, comp., *Tracts and Other Papers, Relating Principally to the Origin, Settlement, and Progress of the Colonies in North America . . . ,* 4 vols. (Washington, D.C., 1836-1847), III, No. 14, 10; John Lawson, *A New Voyage to Carolina . . .* (London, 1709), 18-19; John Smith, *The Generall Historie of Virginia, New England, and the Summer Isles,* in Edward Arber and A. G. Bradley, eds., *Travels and Works of Captain John Smith . . . ,* 2 vols. (Edinburgh, 1910), II, 565; *Va. Company Recs.,* III, 455; Clarence J. Glacken, *Traces on the Rhodian Shore: Nature and Culture in Western Thought from Ancient Times to the End of the Eighteenth Century* (Berkeley, Calif., 1967), 10-12; Lester S. King, *The Growth of Medical Thought* (Chicago, 1963), 30-31; Richard S. Dunn, *Sugar and Slaves: The Rise of the Planter Class in the English West Indies, 1624-1713* (Chapel Hill, N.C., 1972), 309.

[4] Ligon, *A True and Exact History of the Island of Barbados* (London, 1673 [orig. publ. 1657]), 9-10, 27, 45; Hakluyt, "Epistle Dedicatory" to *The Principall Navigations, Voiages and Discoveries of the English Nation . . .* (1589), in E.G.R. Taylor, ed., *The Original Writings and Correspondence of the Two Richard Hakluyts,* 2 vols. (London, 1935), II, 400.

tracts, expressed the prevailing view: "That which is a mans native soyle, and Countries ayre is best. This by the Philosophers is approved in this principle: Every mans naturall place preserveth him, which is placed in it." Vaughan thought a European could not live near the equator for more than five years.[5]

Change in the balance of the humors may have been what was meant by use of the word *seasoning* to describe the acclimatization of an English person, a process commonly lasting about two years and thought necessary even in southern New England.[6] It was generally believed that the adjustment involved paling and thinning of the blood. William Wood, who was in the vanguard of Massachusetts Bay colonists, said that English traders from Virginia whom he saw in New England were very pale, which he attributed to the drying up of their blood. Since incessant sweating was for many the most remarkable feature of life in a southern climate, the term may have been adopted as an analogy to the seasoning or drying out of wood.[7]

The fear of hot climates was exaggerated in the early years of colonization because Europeans did not realize that the climate of eastern North America was quite different from what their knowledge of climates in comparable latitudes in western Europe led them to expect. Since Newfoundland lies south of London, and Virginia is at the latitude of Spain, promoters expected colonists to face extreme heat in almost all plantations. There was little knowledge of the dynamics of climate and of the effects of the movement of the atmosphere from west to east, which makes the weather on the east coasts of continents so different from that on the west.[8]

People considering or promoting emigration feared effects extending beyond the initial period of adjustment, specifically the possibility that in leaving England they might be leaving their Englishness also, running the risk of becoming more like the Spaniard, whom they perceived as choleric and untrustworthy. The English saw themselves as moderate people living in a moderate climate, and they had firm opinions about the character types produced by the extremes. A late sixteenth-century commentary on colonial plans asserted that a cold climate "brings forth a dull inflexible

[5] Vaughan, *Directions for Health,* 4th ed., 2, 8. By the sixth edition in 1626 he had raised his estimate to 15 years. See also his *The Newlanders Cure* (London, 1630), 6, and John Kirtland Wright, *The Geographical Lore of the Time of the Crusades: A Study in the History of Medieval Science and Tradition in Western Europe* (New York, 1925), 180.

[6] William Hubbard, *A General History of New England from the Discovery to 1680,* 2d ed. (Boston, 1848), 324-325.

[7] William Wood, *New Englands Prospect . . .* (London, 1634), 8; Ligon, *History of Barbados,* 27, 67. David Harris Sacks suggested this possible connection of the two uses of "seasoning" to me in April 1980.

[8] These issues are fully discussed and documented in Karen Ordahl Kupperman, "The Puzzle of the American Climate in the Early Colonial Period," *American Historical Review,* LXXXVII (1982), 1262-1289.

people, obstinately affectinge barbarous liberty & Jelous of all aucthority." Edward Johnson of Massachusetts Bay, on the other hand, believed the perpetual summer of the tropics produced liberty run mad to the point of license. Sir Ferdinando Gorges wrote that people in cold climates were duller than the "sharper wits" of hot countries but had stronger physical constitutions and were capable of having more children. Therefore, though "the invention of Arts hath risen from Southern Nations," those nations had been repeatedly invaded by more hardy and numerous northern peoples.[9]

The conventional wisdom about the effect of hot climates on English constitutions is illustrated by the story of Nicholas Leverton and Hope Sherrard. Leverton had been a minister in the West Indies. Finally he was overcome by "a fit of sickness" and his friends in Bermuda "thought adviseable he should return to England and try his native air." He landed at Sandwich and, as he was preparing to ride to London, the ostler said to him, "Mr. ———, you are somewhat like our minister: I believe you have lived in the hot countries as well as he." In this way Leverton was reunited with Sherrard, who had been his colleague in the Puritan colony at Providence Island. This story is striking because Sherrard had been back in England for several years, yet apparently retained some characteristic look of the tropics. When Leverton settled in England, he named his son Gershom, because he, like Moses, could say: "I have been a stranger in a strange land." For the rest of his life, according to his biographer, "he was subject to warm passions, but they were soon over."[10]

The general agreement that English people would be healthiest in the temperate climates they were used to was frequently offered as a reason to concentrate colonization efforts on New England and Newfoundland. Gorges argued that New England was "more suitable to the nature of our people, who neither finde content in the colder Climates, nor health in the hotter; but (as hearbs and plants) affect their native temperature, and prosper kindly no where else." Edward Hayes and Christopher Carleill, Elizabethan "Projectors," argued that the summer heat of all European places below forty degrees of latitude "is unto our boddies offensyve, Which cannot prosper in dry and scalding heates. more naturall to the Spaniard than us."[11] On the basis of such reasoning Lord Baltimore first

[9] David B. Quinn *et al.*, eds., *New American World: A Documentary History of North America to 1612,* 5 vols. (New York, 1979), III, 173; Edward Johnson, *Wonder-Working Providence of Sions Saviour in New-England* (Andover, Mass., 1867 [orig. publ. London, 1654]), 171; Ferdinando Gorges, *A Briefe Relation of the Discovery and Plantation of New England* (1622), in James Phinney Baxter, ed., *Sir Ferdinando Gorges and His Province of Maine,* 3 vols. (New York, 1967 [orig. publ. 1890]), I, 228-229.

[10] Edmund Calamy, *The Nonconformist's Memorial . . . ,* 2d ed. (London, 1778), I, 290-295. Calamy rendered Sherrard's name as Sherwood.

[11] Gorges, *Briefe Relation,* in Baxter, ed., *Gorges and Province of Maine,* I, 228; [Edward Hayes and Christopher Carleill], "A Discourse concerning a Voyage Intended for the Planting of Chrystyan Religion and People in the North West

decided to found his colony at Ferryland in Newfoundland. After he and his family spent "one intolerable wynter" there, he petitioned the king for land farther south. Baltimore was not prepared to go on with the northern experiment despite Sir William Vaughan's allegation that he had chosen the coldest harbor of the island.[12]

From the 1630s on, propagandists for southern colonies began to stress that the places they promoted lay between the extremes of northern cold and southern heat and therefore would have the riches of hot areas without their evils. Such an argument was made for Maryland.[13] Carolina was also said to experience "a moderate equality of heat and cold between the two violent extreams thereof in *Barbadoes* and *New England.*"[14]

The sun and its heat figured prominently in early English thinking about colonization, and in a profoundly ambivalent way. Fear of hot climates was balanced by the belief that the sun was the source of riches. Despite the widespread conviction that English people would sicken and possibly die in hot climates, the majority of those interested in America went or were sent to the southern regions instead of New England or Newfoundland. Early modern science taught that there was a direct trade off between heat and abundance. The sun had a complex relationship with the earth, not only providing warmth but also drawing substances up out of the earth and water. Its purifying power resulted from its attracting poisonous vapors.

Richard Ligon held that the diseases that raged through the Barbadian settlements were partly caused by colonists' faulty reasoning about the sun's role. For example, a pond in which clothes were washed and slaves

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Regions of America in Places Most Apt for the Constitution of Our Boddies, and the Spedy Advauncement of a State" (1592), in Quinn *et al.*, eds., *New American World,* III, 158-159. Quinn sees "projectors," men who generated speculative schemes of various types, as typical of the Elizabethan period (*Discovery of America,* 232).

[12] George Calvert, Lord Baltimore, to Sir Francis Cottington, Aug. 18, 1629, in Lawrence C. Wroth, "Tobacco or Codfish: Lord Baltimore Makes His Choice," New York Public Library, *Bulletin,* LVIII (1954), 527-534; Baltimore to King Charles I, Aug. 19, 1629, in J. Thomas Scharf, *History of Maryland from the Earliest Period to the Present Day,* 3 vols. (Baltimore, 1879), I, 44-45; Vaughan, *Newlanders Cure,* 68-69.

[13] [Andrew White], "An Account of the Colony of the Lord Baron of Baltamore, 1633," in Clayton Colman Hall, ed., *Narratives of Early Maryland, 1633-1684* (New York, 1910), 7, and "A Briefe Relation of the Voyage unto Maryland, by Father Andrew White, 1634," *ibid.,* 39; Hammond, *Leah and Rachel,* in Force, comp., *Tracts,* III, No. 14, 8, 22; [Beauchamp Plantagenet], *A Description of the Province of New Albion . . .* (1648), *ibid.,* II, No. 7, 6; William Bullock, *Virginia Impartially Examined, and Left to Publick View, to Be Considered by All Judicious and Honest Men* (London, 1649), 4, 32; "Narrative of a Voyage to Maryland, 1705-1706," *AHR,* XII (1907), 329.

[14] E[dward] W[illiams], *Virginia: More Especially the South Part Thereof, Richly and Truly Valued . . .* (1650), in Force, comp., *Tracts,* III, No. 11, 8, 28, 57-58.

bathed after their day's labor was also a source of drinking water. When questioned about the practice, planters explained "that the Sunne with his virtuall heat, drawes up all noysome vapours, and so the waters become rarified, and pure again." Ligon, unconvinced, took his water from a small stream apart. In this case a smattering of scientific knowledge served the colonists badly. Though they had daily and personal experience of the power of the sun, their education caused them to misjudge its efficacy.[15]

The sun's action was also thought to nurture gold, silver, and precious stones within the earth and draw them to the surface: "the influens of the sonne doth norishe and bryng fourth gold, spices, stones and perles." Valuable metals and gems would be found in abundance only in very hot areas.[16] Even where mineral wealth did not materialize, the "Sun with his masculine force" would produce other kinds of riches from the "teeming" feminine earth, for the hottest climate was also the most fruitful.[17] Colonists marveled at how swiftly crops came to fruition, leading to claims of "incredible usurie" in increase as well as multiple harvests every year. From New England to the West Indies, the great heat of the summer was seen as the source of American abundance.[18]

Not only could the plants found in each area be developed, but promoters of early southern colonies argued from fallacious reasoning about the relationship of climate and latitude that plants from many different regions should be introduced and would surely grow in the southern mainland as well as the West Indies. Early Virginia pamphlets promised that the colony would produce oranges and lemons, sugarcane, almonds, rice, and anise, all of which grew in areas where "the sunne is so neerer a neighbour." This reasoning was supported by Caribbean writers such as Ligon who pointed out that sugar was not natural to Barbados but had become, after its introduction, the "soul of Trade" there. Even after

[15] Ligon, *History of Barbados,* 25, 28; Vaughan, *Directions for Health,* 6th ed., 14. More striking is Ligon's report that some people continued to drink the water of a bog into which corpses from an epidemic in Bridgetown had been thrown. Those who did died quickly.

[16] Roger Barlow, *A Brief Summe of Geographie* (1540-1541), ed. E.G.R. Taylor (London, 1932), 179-180; "Commentary on Hayes-Carleill Project," in Quinn *et al.,* eds., *New American World,* III, 174; [Richard] Eden, "To the Reader," *A Treatyse of the Newe India . . . after the Descripcion of Sebastian Munster . . .* (1553), in Edward Arber, ed., *The First Three English Books on America* (Birmingham, Eng., 1885), 7.

[17] *Va. Company Recs.,* III, 220; Ligon, *History of Barbados,* 84; George Best, "Experiences and Reasons of the Sphere, to Proove All Partes of the Worlde Habitable . . ." (1578), in Richard Hakluyt, *The Principal Navigations, Voyages, Traffiques and Discoveries of the English Nation,* 12 vols. (Glasgow, 1903-1905 [orig. publ. London, 1598-1600]), VII, 254-255, 266-267.

[18] [Virginia Company], *A True Declaration of the Estate of the Colonie in Virginia . . .* (1610), in Force, comp., *Tracts,* III, No. 1, 12-13, and *A Declaration of the State of the Colonie and Affaires in Virginia . . .* (1620), *ibid.,* No. 5, 4-5; Hubbard, *History of New England,* 20-21.

such hopes were dashed in Virginia, promoters of Carolina continued to argue that their colony would produce anything grown in the same latitude anywhere in the world.[19] Reports agreed that in the warm colonies both humans and domesticated animals grew larger and experienced more multiple births than in Europe.[20]

There was another side to this picture of superabundance: the sun was so powerful that the planters had to guard their crops and persons against it. Dr. Thomas Trapham, Jamaica physician and member of the General Assembly, wrote that the land in the Jamaican mountains was fertile because it was shaded from the "fierce Rapes of the fiery Phoebus," but that the land around "St. Jago" was poor even for grazing, "the soyle having so long [lain] open to the sterilating Sun." The cacao planters put plantains among their trees to protect them from "the preying sun." Ligon and William Bullock pointed to similar dangers and strategies in Barbados and Virginia.[21] Nor did the sun discriminate in the kind of vegetation it encouraged. Weeds threatened to choke the crops, and thick tangles of vines could appear overnight. Another reservation about the excessive fruitfulness of the south lay in the conviction that the soil would be much more quickly worn out. It was as though any piece of land had only so

[19] [Va. Company], *True Declaration of Estate,* in Force, comp., *Tracts,* III, No. 1, 22; W[illiams], *Virginia Richly and Truly Valued, ibid.,* No. 11, 7-8, 11, 20-29; *A Perfect Description of Virginia* . . . (1649), *ibid.,* II, No. 8, 6, 12; [Plantagenet], *Description of New Albion, ibid.,* No. 7, 32-33; Thomas Hariot, *A Briefe and True Report of the New Found Land of Virginia* . . . (1588), in David Beers Quinn, ed., *The Roanoke Voyages, 1584-1590,* 2 vols. (London, 1955), I, 325; Samuel Purchas, "Virginian Affaires since the Yeere 1620. till This Present 1624," in his *Hakluytus Posthumus or Purchas His Pilgrimes* . . . , 20 vols. (Glasgow, 1906 [orig. publ. London, 1625]), XIX, 147, hereafter cited as Purchas, *Pilgrimes,* and "Virginias Verger . . . ," *ibid.,* 242-243; Hakluyt, "Epistle Dedicatory," to *Principal Navigations,* in Taylor, ed., *Writings and Correspondence,* II, 456; Edward Waterhouse, *A Declaration of the State of the Colony and Affaires in Virginia* . . . (London, 1622), 3-5, 31-32; Daniel Price, *Sauls Prohibition Staide* . . . (London, 1609), sig. F2; "The Discription of the Now Discovered River and Country of Virginia . . ." (1607), in Philip L. Barbour, ed., *The Jamestown Voyages under the First Charter, 1607-1609,* 2 vols. (Cambridge, 1969), I, 100; Patrick Copland, *Virginia's God Be Thanked* . . . (London, 1622), 12-13; Bullock, *Virginia Impartially Examined,* 31-32; Ligon, *History of Barbados,* 84-85; Lawson, *New Voyage to Carolina,* 79; Samuel Wilson, *An Account of the Province of Carolina* (1682), in Alexander S. Salley, Jr., *Narratives of Early Carolina, 1650-1708* (New York, 1911), 175; Robert Horne (?), *A Brief Description of the Province of Carolina* . . . (1666), *ibid.,* 69.

[20] See, for example, John Pory in *Va. Company Recs.,* III, 221; [Va. Company], *State of the Colonie,* in Force, comp., *Tracts,* III, No. 5, 5; Richard Norwood, "The Description of the Sommer Islands, Once Called the Bermudas," in Wesley Frank Craven and Walter B. Hayward, eds., *The Journal of Richard Norwood, Surveyor of Virginia* (New York, 1945), lxxx-lxxxi; and Lawson, *New Voyage to Carolina,* 80-81.

[21] Trapham, *State of Health in Jamaica,* 19, 24, 35; Ligon, *History of Barbados,* 20; Bullock, *Virginia Impartially Examined,* 3.

much allotted fertility, so that if it was particularly abundant, it would sooner become barren.[22] Finally, the generative power of the sun was seen as producing great corruption and putrefaction as well as great abundance; generation and putrefaction inevitably occurred together.[23]

The sun was thought to be especially dangerous for people not used to laboring in its heat. English writers were preoccupied with the question of how a human body changes when introduced into a hot climate. In fact, the body's physiology does change as it becomes acclimatized. The process greatly lessens the strain on the cardiovascular system caused by exposure to a very hot climate because an acclimatized body sheds heat to the environment much more efficiently, partly by dilatation of the blood vessels at the skin's surface, but mainly by the body's "learning" to sweat more quickly and freely. A person new to a very hot environment may sweat 1.5 liters per hour. Within ten days, the rate of sweating will have doubled, and it will reach two-and-one-half times as much within six weeks. Moreover, as the sweat glands become more efficient, the salt content of the sweat is reduced because of the increased secretion of aldosterone. The amount of salt lost in sweat will fall from a peak of 15 to 20 grams per day to 3.5 grams within six weeks of continuous exposure to a hot environment. The acclimatized person has an increased volume of plasma and may have a lower metabolism. Acclimatization is most dramatic in its effects if accompanied by increased physical fitness through moderate exercise. The process reverses itself within three to four weeks after exposure ends, though people who have spent their entire lives in very warm climates have more sweat glands than those from temperate areas, some of whose sweat glands cease to be active in late childhood.[24]

Seventeenth-century observers recognized some of these physiological changes. Ligon may have been pointing to a rise in plasma volume when he said that colonists' blood was paler and thinner in Barbados than it would have been in England. Scientists and settlers knew that the function of the sweating mechanism is to conduct heat from the interior of the body to the outside, but they worried about the result of the process because they

[22] See Philip Bell, governor of Bermuda, to Sir Nathaniel Rich in Arthur Percival Newton, *The Colonising Activities of the English Puritans: The Last Phase of the Elizabethan Struggle with Spain* (New Haven, Conn., 1914), 31-34, and Gov. Samuel Argall to the Virginia Company, Mar. 10, 1617/18, in *Va. Company Recs.*, III, 92. See also Ligon, *History of Barbados,* 69-72, and Dunn, *Sugar and Slaves,* 223.

[23] Best, "Experiences and Reasons of the Sphere," in Hakluyt, *Principal Navigations,* VII, 265. See *Hamlet,* Act II, sc. 2, line 181, for a remark about the sun breeding maggots in a dead dog.

[24] A. R. Lind, "Human Tolerance to Hot Climates," in Douglas H. K. Lee, ed., *Handbook of Physiology,* Section 9, *Reactions to Environmental Agents* (Bethesda, Md., 1977), 93-109; Vernon B. Mountcastle, ed., *Medical Physiology,* 13th ed. (St. Louis, Mo., 1974), II, 1315, 1338-1340; Arthur C. Guyton, *Textbook of Medical Physiology,* 5th ed. (Philadelphia, 1976), 958-960, 967; Robert G. Stone, "Health in Tropical Climates," in *Climate and Man,* Yearbook of Agriculture (Washington, D.C., 1941), 251, 254-255; Jan O. M. Broek, "Climate and Future Settlement," *ibid.,* 231.

believed that "great sweating" left the "inner parts," particularly the stomach, cold and debilitated. They attributed loss of appetite in hot regions to weakness in the stomach: "how can you expect to find heat, or warmth in your stomack, to digest that meat, when the sunne has exhausted your heat and spirits so, to your outer parts, as you are chill'd and numb'd within?"[25] Finally, the whole body became weak and listless. As a remedy, colonists in the tropics, supported by the best science of the time, turned to drinking "strong spirits" and eating hot peppers to warm their insides. Sir Henry Colt, an East Anglian gentleman who emigrated to St. Christopher's in 1630, spent two weeks in Barbados, where he went from drinking "2. dramms of hott water a meale, to 30." He thought he would have gone to 60 drams if he had stayed.[26]

The Spanish physician Nicholas Monardes wrote one of the earliest treatises on New World plants and their properties. His book, which was translated into English in 1577, became a standard work on American diseases and their cure. Monardes endorsed the medicinal use of chili pepper: "It dooeth comforte muche, it dooeth dissolve windes, it is good for the breaste, and for theim that bee colde of complexion: it dooeth heale and comforte, strengthenyng the principall members."[27] To some extent, the taking of chili peppers and alcohol in small amounts was a good adaptive strategy, but not for the reasons the colonists and their medical advisors thought. Though people feel warm after taking them, both promote a degree of hypothermia by increasing the flow of blood to the skin and promoting sweating. Both stimulate gastric secretions, and peppers also increase gastric muscular activity and can, as Monardes indicated, "facilitate the expulsion of gas." In addition, chili peppers are a particularly rich source of vitamins A, B1, and C, and for that reason are important in cultures that live on a high-cereal diet.[28]

Probably no English colonist ate chili peppers to excess, but too many

[25] Ligon, *History of Barbados,* 27, 102; Vaughan, *Directions for Health,* 4th ed., 129; Wood, *New Englands Prospect,* 8.

[26] "The Voyage of Sr Henrye Colt Knight to the Islands of the Antilleas . . ." (1631), in V. T. Harlow, ed., *Colonising Expeditions to the West Indies and Guiana, 1623-1667* (London, 1925), 66. See also John Josselyn, *An Account of Two Voyages to New England* (1675), Massachusetts Historical Society, *Collections,* 3d Ser., III (Boston, 1833), 242-243, and Vaughan, *Directions for Health,* 4th ed., 50. Vaughan thought strong drink was dangerous in the winter when the stomach was "abounding" with heat (*Newlanders Cure,* 70). Dunn gives a particularly vivid picture of social drinking in the 17th-century West Indies (*Sugar and Slaves,* esp. 276-281).

[27] Nicholas Monardes, *Joyfull Newes Out of the Newe Founde Worlde* (1577), trans. John Frampton, ed. Stephen Gaselee (London, 1925), I, 48, hereafter cited as Monardes, *Joyfull Newes.*

[28] Paul Rozin and Deborah Schiller, "The Nature and Acquisition of a Preference for Chili Pepper by Humans," *Motivation and Emotion,* IV (1980), 94; Paul Rozin, "The Use of Characteristic Flavorings in Human Culinary Practice," in Charles M. Apt, ed., *Flavor: Its Chemical, Behavioral, and Commercial Aspects* (Boulder, Colo., 1977), 111-113. See also Vaughan, *Newlanders Cure,* 30-31, and *Directions for Health,* 4th ed., 27.

did not limit themselves to moderate amounts of alcohol. Because the science of the day taught that "strong drink" (spirits) was essential to the digestion in hot weather, it was taken by all, being allotted even to servants and sometimes to slaves. But Caribbean writers agreed that immoderate consumption was a major cause of high disease and mortality rates there. Ligon said that drinking overheated the body, leading to "Costiveness and Tortions in the bowels; which is a disease very frequent there" and the cause of many deaths. He pointed out that ten times more men than women died in one epidemic; since "the men were the greater deboystes," their deaths were directly linked in his mind to overindulgence in spirits. Though Samuel Purchas held that it was the air of the Indies that produced contentiousness in men, most observers linked fighting to drinking and would have agreed with the anonymous *Briefe Discription of Barbados* that the country would be as temperate and wholesome as it was fertile "if the debaucht lives of the people did not prevent nature." As the Virginia Company put it, "well-governed men" live there healthfully.[29]

Robert Beverley, a native-born Virginia gentleman, wrote that the "Gripes is the Distemper of the *Caribbee* Islands." He may have been referring to the dreaded "dry bellyache" that caused "exquisite pain" and could lead to loss of function in the arms and legs. It may have been induced by drinking rum processed in lead pipes. Trapham very shrewdly compared the symptoms to those of cattle in fields around the lead works in Derby, where, he said, the cattle were poisoned by lead fumes. Despite this recognition, however, he thought that the dry bellyache was caused by "sudden contracting cold," which happens in hot areas and is worst when the moon is full. Beverley wrote that the "Gripes" appeared in Virginia only when people drank "filthy and unclean Drinks"; this apparently was occasioned by impatience to drink cider, perry, and beer before they were ready or by using too much lime juice and "foul Sugar in Punch and Flip."[30]

Sudden exposure to a hot climate was seen as particularly dangerous. Reports of all colonies from New England to the West Indies complained of the difficulty of working in the hot summer sun and of the vulnerability

[29] Ligon, *History of Barbados,* 21, 27, 93; Trapham, *State of Health in Jamaica,* 28; Samuel Purchas, *Purchas His Pilgrimage,* 2d ed. (London, 1614), 760; "A Briefe Discription of the Ilande of Barbados," in Harlow, ed., *Colonising Expeditions,* 43; *Va. Company Recs.,* II, 381. See also [Colt], "Voyage," in Harlow, ed., *Colonising Expeditions,* 65-66, 73, 93; *Memoirs of the First Settlement of the Island of Barbados, and Other the Carribbee Islands* (London, 1743), 33; and Antoine Biet, "Father Antoine Biet's Visit to Barbados in 1654," ed. Jerome S. Handler, in *Journal of the Barbados Museum and Historical Society,* XXXII (1966-1968), 62. "Costiveness" and "Tortions" refer to constipation with wringing, twisting intestinal pain.

[30] Beverley, *The History and Present State of Virginia* (1705), ed. Louis B. Wright (Chapel Hill, N.C., 1947), 306-307; Trapham, *State of Health in Jamaica,* 129-139; Hugh Jones, *The Present State of Virginia . . .* (1724), ed. Richard L. Morton (Chapel Hill, N.C., 1956), 85; Dunn, *Sugar and Slaves,* 217, 306.

of unseasoned English people to sickness or even death as a result of the sudden change of climate. John Winthrop recorded that many newcomers died in the hot summer of 1637, and William Bradford believed that the sun's piercing heat made unseasoned people sick. Many accounts of Virginia linked periods of high mortality to "intemperate" heat, a "Torride sommer," or the scorching rays of the sun. On Barbados one man's punishment of standing in the sun all day was "enough to pierce his braine."[31]

Heat stroke may have been the subject of two curious descriptions in which people were said to have been rendered gravely ill by their body's fat melting within them. In one case, described by George Percy in Nevis, the man died. In the other, in New England, the man recovered after about a week. Heat stroke is associated with failure of the sweating mechanism, the reason for which is not known. Symptoms are hot, dry skin and rising body temperature. Victims may be delirious, experience personality changes, and lose consciousness. They may appear to recover but then die of brain damage a few days later. The sinister image of a man's fat melting within him is an index of how threatening and alien hot climates were to early modern English people.[32]

[31] [John Winthrop], *Winthrop's Journal: History of New England, 1630-1649,* ed. James Kendall Hosmer, 2 vols. (New York, 1908), I, 223; William Bradford, *Of Plymouth Plantation, 1620-1647,* ed. Samuel Eliot Morison (New York, 1952), 28; Thomas Dudley to Lady Bridget, Countess of Lincoln, Mar. 12-28, 1631, in Everett Emerson, ed., *Letters from New England: The Massachusetts Bay Colony, 1629-1638* (Amherst, Mass., 1976), 76; Ligon, *History of Barbados,* 110; [Colt], "Voyage," in Harlow, ed., *Colonising Expeditions,* 75n, 98; *Va. Company Recs.,* I, 310, III, 220, 298; H. R. McIlwaine, ed., *Journals of the House of Burgesses of Virginia, 1619-1658/59* (Richmond, Va., 1915), 30; William Strachey, *The Historie of Travell into Virginia Britania,* ed. Louis B. Wright and Virginia Freund (London, 1953), 37-38; [John] Smith, *A Map of Virginia . . .* (1612), in Barbour, ed., *Jamestown Voyages,* II, 334. See also Andrew White, *A Briefe Relation of the Voyage unto Maryland* (1634), in Hall, ed., *Narratives of Early Maryland,* 35; Ferdinando Gorges the Younger, *America Painted to the Life* (London, 1658-1659), sig. A3; and Walter Raleigh, *The Discoverie of the Large and Bewtiful Empire of Guiana* (1598), ed. Vincent T. Harlow (London, 1928), 40. For modern discussion of the issues involved see Dunn, *Sugar and Slaves,* esp. chaps. 8, 9; Darrett B. Rutman and Anita H. Rutman, "Of Agues and Fevers: Malaria in the Early Chesapeake," *William and Mary Quarterly,* 3d Ser., XXXIII (1976), 31-60; Carville V. Earle, "Environment, Disease, and Mortality in Early Virginia," in Thad W. Tate and David L. Ammerman, eds., *The Chesapeake in the Seventeenth Century: Essays on Anglo-American Society* (Chapel Hill, N.C., 1979), 96-125; Thomas P. Hughes, *Medicine in Virginia, 1607-1699* (Williamsburg, Va., 1957); and Karen Ordahl Kupperman, "Apathy and Death in Early Jamestown," *Journal of American History,* LXVI (1979), 24-40.

[32] Percy, *Observations Gathered Out of a Discourse* (1607), in Purchas, *Pilgrimes,* XVIII, 406-407; Josselyn, *Account of Two Voyages,* Mass. Hist. Soc., *Colls.,* 3d Ser., III, 264. For heat exhaustion and heat stroke see Lind, "Human Tolerance to Hot Climates," in Lee, ed., *Handbook of Physiology,* Sect. 9, 102-104; Mountcastle, ed., *Medical Physiology,* II, 1338-1339.

This environment seemed so fundamentally different that English colonists and promoters believed it required an entire body of new medical knowledge. They had no question that hot climates produced diseases different from those of the moderate environment they were used to. "Pestilent Feavours and Calentures," worms, dry bellyache, dysentery, "Frenzies . . . and other hot cholerike sicknesses" were some that disturbed the colonists most. And familiar diseases such as colds were harder to cure; Ligon attributed this to the exhaustion of their bodies from constant sweating.[33] The diseases of hot countries were thought to be bred by the "intemperate and pestilent" air. The air was worst in the tropics, but even in Virginia it had the reputation of being "too hot and aguish."[34] Humidity, combined with heat, was particularly unwholesome. Fogs and dews as well as the moisture-laden night air were considered especially bad, and mariners fled or avoided those places with "infectious *serenas* or dewes."[35]

Only the trade winds made the tropics habitable. William Hubbard reminded his readers that the ancients had not known about these winds when they said that the tropics were unable to sustain life. He thought the heat of the New England summer was sometimes harder to bear than that of the tropics because of the lack of such winds. Only the cold winter saved New Englanders, for "the salubriousness of the air in this country depends much upon the winter's frost."[36]

Some promoters argued that Carolina would be healthier than Virginia because it was closer to the cooling trade winds of the Caribbean or would have more constant weather, less liable to extremes. On the other hand, sharp winter temperatures were thought to protect colonists from the detrimental effects of "continual Summer."[37] And Thomas Trapham

[33] Trapham, *State of Health in Jamaica,* 101-103; Ligon, *History of Barbados,* 45, 67; [Colt], "Voyage," in Harlow, ed., *Colonising Expeditions,* 99; Vaughan, *Directions for Health,* 4th ed., 87-88, 126, and *Newlanders Cure,* 60-62.

[34] Vaughan, *Directions for Health,* 4th ed., 3, 8, 6th ed., 12; [Plantagenet], *Description of New Albion,* in Force, comp., *Tracts,* II, No. 7, 6, 20.

[35] "Robert Dudley's Voyage to the West Indies, 1594-1595," in George F. Warner, ed., *The Voyage of Robert Dudley . . . to the West Indies, 1594-1595* (London, 1899), 69-70.

[36] Hubbard, *History of New England,* 20-21. See also [Colt], "Voyage," in Harlow, ed., *Colonising Expeditions,* 99, and W[illiams], *Virginia Richly and Truly Valued,* in Force, comp., *Tracts,* III, No. 11, 59-60.

[37] William Hilton, *A Relation of a Discovery Lately Made on the Coast of Florida* (1664), in Force, comp., *Tracts,* IV, No. 2, 16, 45; Wilson, *Account of Carolina,* in Salley, ed., *Narratives of Carolina,* 166-169; Horne (?), *Brief Description of Carolina, ibid.,* 66; Thomas Ashe, *Carolina, Or a Description of the Present State of That Country* (1682), *ibid.,* 141; John Archdale, *A New Description of That Fertile and Pleasant Province of Carolina* (1707), *ibid.,* 288; "Francis Yeardley's Narrative of Excursions into Carolina, 1654," *ibid.,* 25; Edward Randolph to the Lords of Trade, Mar. 16, 1698/9, *ibid.,* 208; John Oldmixon, *The History of the British Empire in America* (1708), *ibid.,* 360, 370; Edward Bland *et al., The Discovery of New Brittaine* (London, 1651), 13; Lawson, *New Voyage to Carolina,* 2, 5, 80, 141, 166; John Lederer, *The Discoveries of John Lederer . . . ,* trans. William Talbot (London, 1672), sig. A-Av.

believed that colonists of Jamaica escaped many of the Old World's diseases because the constantly moving air had purifying salts, particularly nitre, dissolved in it. To this, and not to the abundance of fresh fruits and vegetables, he attributed the absence of the scurvy that plagued other colonies in their early years.[38]

Some people believed that the extreme swings typical of America's climate rendered it especially unhealthy. These could be felt in a variety of ways. Newcomers to the West Indies were confronted by the most immediate contrast to their accustomed environment. Mainland settlers were struck by the difference between the great heat of summer and the winter's cold. In all colonies, going to bed sweating with the heat and waking up cold in the night was thought to be the source of many "epidemical distempers."[39]

Trapham believed that all processes of nature were more rapid and brisk in hot climates and that a new set of regimes was therefore necessary. Since the body was struggling to create a new balance of the humors, the traditional approaches of bleeding and purging were still recommended. These had to be used with care, however, especially when natural processes were speeded up. Sir William Vaughan reminded his readers that purging and bleeding worked on the beneficial humors as well as the corrupt and therefore could constitute "treacherous wasting of the Oyle of Life." Sir Henry Colt gave detailed medical advice to his son, who was intending to emigrate to the Caribbean. After warning of the dangers of the tropics, he said that a headache could be eased by bleeding but stressed that it was essential to keep the stomach warm at all times by wearing a stomacher, reflecting the belief that sweating renders the body's interior cold and numb.[40]

Colonists sought cures among the products of their new homes. From colony after colony came pleas for physicians to experiment with the herbs and chemicals the settlers were finding. Such requests had also come from the earlier Spanish colonies. For example, Peter de Osma wrote from Peru to thank Nicholas Monardes, the Seville physician who experimented with New World plants and published a medical treatise about them. He said

[38] Trapham, *State of Health in Jamaica,* 5-7, 14-15, 17, 81.

[39] Hubbard, *History of New England,* 20; Benjamin Church, *Diary of King Philip's War, 1675-76,* ed. Alan and Mary Simpson (Chester, Conn., 1975), 148; Michael G. Kammen, ed., "Maryland in 1699: A Letter from the Reverend Hugh Jones," *Journal of Southern History,* XXIX (1963), 369; "From the Journal of George Fox, 1672, 1673," in Hall, ed., *Narratives of Early Maryland,* 401; George Alsop, *A Character of the Province of Maryland* (1666), *ibid.,* 366; T. H. Breen, "George Donne's 'Virginia Reviewed': A 1638 Plan to Reform Colonial Society," *WMQ,* 3d Ser., XXX (1973), 455; Virginia Company, *A True and Sincere Declaration of the Purpose and End of the Plantation Begun in Virginia* (London, 1610), 13; Beverley, *History of Virginia,* ed. Wright, 305; [Henry] Norwood, "A Voyage to Virginia," in Force, comp., *Tracts,* III, No. 10, 21; Trapham, *State of Health in Jamaica,* 10-11, 19, 47-48; Ligon, *History of Barbados,* 44-45, 93; *Memoirs of First Settlement of Barbados,* 43.

[40] Trapham, *State of Health in Jamaica,* 67; Vaughan, *Newlanders Cure,* 67, 80-81; [Colt], "Voyage," in Harlow, ed., *Colonising Expeditions,* 99-100.

the doctors in Peru were "nothyng curious." William Strachey similarly complained that doctors in Virginia did not understand the ills of the country. Early English colonists on Tobago attributed sickness to lack of knowledge of the medicinal and nutritional qualities of plants native to the island. Hot areas were seen as sharing the same problems and opportunities; Thomas Hariot took a copy of Monardes with him as a guide to the plants of Roanoke, and the Virginia Company sent its colonists Sir Walter Ralegh's work on Guiana.[41] Science taught that the cure for any disease would be found near the disease's source. Richard Ligon put the point well when calling for "able and skilfull Physitians" to come to Barbados, "for certainely every Climate produces Simples more proper to cure the diseases that are bred there, than those that are transported from any other part of the world: such care the great Physitian to mankind takes for our convenience."[42]

Another way of coping was to learn from the Indians and from inhabitants of other hot countries. Colonists acknowledged a large debt to Indian medical practice, emphasizing that to use the products of America without Indian guidance was very risky. As Richard Hakluyt wrote in a marginal note to a story of the Roanoke colonists being poisoned by a fruit in the West Indies, "Circumspection to be used in strange places." Indian remedies were traded from colony to colony. Trapham and Vaughan also suggested looking at the bathing habits of natives of the East Indies and the Near East. Daily bathing in hot weather, of at least parts of the body, would keep the pores open by removing "relicts of obstructing sweat" so that the corrupted humors could be eliminated. Trapham attributed many of the diseases of hot countries to "constipation of the skin."[43]

Progress was made, even in these early years, in understanding the products of the new environments. This came partly through the activities of experimenters such as Monardes, who encouraged the importation of

[41] Monardes, *Joyfull Newes,* 135; Strachey, *Historie of Travell,* 38; [John Scott], "The Discription of Tobago," in Harlow, ed., *Colonising Expeditions,* 114-115; "For *Master* Rauleys Viage," 1584-1585, in Quinn, ed., *Roanoke Voyages,* I, 135; Hariot, *Briefe and True Report, ibid.,* 329, 366; Richard Hakluyt the Elder, *Inducements to the Liking of the Voyage Intended towards Virginia . . .* (1585), in Taylor, ed., *Writings and Correspondence,* II, 337; *Va. Company Recs.,* I, 310, 421, 431, 516, III, 240, 402, 485.

[42] Ligon, *History of Barbados,* 118. On the methods and training of physicians in the colonies see Wyndham B. Blanton, *Medicine in Virginia in the Eighteenth Century* (Richmond, Va., 1931), and Joseph Ioor Waring, *A History of Medicine in South Carolina, 1670-1825* (Columbia, S.C., 1964).

[43] Quinn, ed., *Roanoke Voyages,* II, 518n; Hariot, *Briefe and True Report, ibid.,* I, 328-333; Trapham, *State of Health in Jamaica,* 86-87, 95-96, 125-126, 139-142; Vaughan, *Newlanders Cure,* 77-78, and *Directions for Health,* 4th ed., 131-135. See also Henry Spelman, *Relation of Virginea* (1613), in Arber and Bradley, eds., *Travels and Works of Smith,* I, cix-cx; Samuel Argall, "A Letter of Sir Samuell Argoll Touching His Voyage to Virginia," in Purchas, *Pilgrimes,* XVIII, 92; and *A Relation of Maryland* (1635), ed. Francis L. Hawks (New York, 1865), 21.

American plants. Members of the Tradescant family of England made many voyages to America and other warm climates and brought back "curiosities" native to them for study and display.[44] The colonists themselves also experimented; many asked for or were sent herbals and advice on what to look for and how to proceed, and some believed they had found valuable drugs.[45] They preferred to use indigenous agents even for traditional practices such as purging or vomiting, because they were convinced that each environment produced specific relationships between disease and cure. Robert Beverley reported that the fevers and agues of Virginia could be successfully treated with indigenous roots. John Smith gave a long list of previously unknown plants of Bermuda, noting their qualities as purgatives, costives, and vomits.[46] These had to be used with great care, however, because they were thought to be too powerful and rapid in their action in the exhausted and speeded-up bodies of transplanted Europeans. Ligon reported his experience with the so-called "physick nut," which contained a poison so powerful that cattle even avoided the shade of its tree. If administered in a controlled way, Ligon wrote, the poison paradoxically produced good health. Many of these cures were not exportable. Trapham thought that "coker nut" milk was good for "hectick Heat" but dangerous for a cool stomach, and that China root, used in Jamaica to make the patient sweat, would not work at all in a colder climate.[47]

Ligon hoped that survival in the tropics might be assisted by liberal consumption of sugar, a course he personally followed. He reasoned that as sugar preserves plants "from corruption and putrifaction," why should it not also preserve human life? He quoted Dr. William Butler, "one of the most learned and famous Physitians that this Nation, or the world ever bred: 'If sugar can preserve both Peares and Plumbs,/Why can it not preserve as well our Lungs?' "[48]

Hot climates, then, were perceived as dangerous, especially for people used to England's moderation. Emigrating to the southern parts of America meant taking great risks, in fact gambling one's health against the possibility of amassing riches. This gamble took place on the national as well as the personal level. A high proportion of those who went or were

[44] Monardes, *Joyfull Newes;* Mea Allen, *The Tradescants: Their Plants, Garden, and Museum, 1570-1662* (London, 1964), 163-171.

[45] Hariot, *Briefe and True Report,* in Quinn, ed., *Roanoke Voyages,* I, 328-334; Ralph Lane to Richard Hakluyt the Elder, and Master H—— of the Middle Temple, Sept. 3, 1585, *ibid.,* 207-208; McIlwaine, ed., *Journals of House of Burgesses, 1619-1658/59,* 38; *Va. Company Recs.,* III, 238, 447, 476; Thomas Newe to his father, May 29, 1682, in Salley, ed., *Narratives of Carolina,* 185.

[46] Beverley, *History of Virginia,* ed. Wright, 306; Smith, *Generall Historie,* in Arber and Bradley, eds., *Travels and Works of Smith,* II, 628.

[47] Ligon, *History of Barbados,* 66-68; Trapham, *State of Health in Jamaica,* 49, 92, 122-123.

[48] Ligon, *History of Barbados,* 96; *Dictionary of National Biography,* s.v. "Butler, William."

sent by entrepreneurs lost the wager, but high death rates, because they were seen as a necessary result of transplantation, did not diminish enthusiasm for an English presence in the Caribbean and the southern mainland of North America. We cannot know how many colonists lived for the day when they could return to their own native climate.

Heat and high humidity were seen as necessary concomitants. As Beverley wrote of Virginia, "The Natural Temperature of the Inhabited part of the Country, is hot and moist." This heavy, hot climate was not only dangerous but also unpleasant because the immigrants had to jettison much that was familiar and comfortable in order to accommodate to new ways and new forms of nature. Beyond the fear of death and debility was a distaste for an environment so different from their own—a distaste strongly conveyed by their reports of repellent rodents, reptiles, insects, and uncontrollable strange vegetation. The English saw this alienating milieu as the product of intemperate heat. Prospective colonists were warned to give up their expectations about normal types of food, housing, clothing, and pastimes, and were told not to come if these meant too much to them. Ligon wrote of the "deprest" spirits of the Barbadian planters and the "declining and yielding condition" they had been brought to. What others called "slothfulness or sluggishnesse in them" he attributed to "a decay of their spirits" that led to apathy. Only the hope of one day returning to England kept them going.[49]

Familiar foods and drink had to be foregone in some hot places. The Virginia Company encouraged settlers by affirming that salted meat did not putrefy there as in the West Indies. Ligon told his readers not to bring butter, cheese, or candles in the spring and summer, as they would melt and stink. He wrote that the favorite drink on Barbados was "mobbie," a beverage made from boiled potatoes. It could be kept for only four or five days and tasted like "Rhenish wine in the Must." He thought it an unwholesome drink that produced "Hydropicke humours" because potatoes have a moist quality, and he cited the governor's amazement that people could drink it regularly and live.[50]

Virginia colonists reported difficulty in making beer and wine, the former because barley was too expensive and the climate was too hot to make malt, and the latter because of cost, hot weather, and lack of skill. This was particularly serious because, as they said, people need to drink a

[49] Beverley, *History of Virginia,* ed. Wright, 296; Ligon, *History of Barbados,* 40-41, 117-118. See also Kupperman, "Apathy and Death," *JAH,* LXVI (1979), 24-40. David Galenson has found evidence that, partly because of working conditions there, servants' contracts to the West Indies were for shorter periods than for the mainland (*White Servitude in Colonial America: An Economic Analysis* [Cambridge, 1981], 110).

[50] [Va. Company], *True Declaration of Estate,* in Force, comp., *Tracts,* III, No. 1, 14; Ligon, *History of Barbados,* 30-32; [Colt], "Voyage," in Harlow, ed., *Colonising Expeditions,* 100; "Voyage to Maryland," *AHR,* XII (1907), 328.

lot in hot weather, and they found a sudden switch to water caused alteration in their bodies. As sack and aquavitae were thought to preserve health, so water weakened the body. Later colonists reported success in making beverages from Indian corn and especially in growing orchards for cider, perry, and brandy. These had to be handled with care, however. Cider was thought to be good for those whose blood was hot, because it cut gross humors. Perry, because it was sweeter and was thought more nourishing, was good for those with cold stomachs but had to be mixed with water for those whose stomachs were hot or very humid.[51]

Native foods were deemed unsatisfying or even dangerous. English settlers in the West Indies learned to eat strange foods: iguana, turtle, and even rats. Cassava bread, considered dry and tasteless, replaced more familiar English grains.[52] Virginia colonists also learned to eat "strange beasts," which some liked better than others. The chief corn on the mainland was maize, which Edward Winslow of Plymouth said was especially suited to hot areas. While many were enthusiastic about Indian corn, everyone looked forward to a time when English seeds would grow there, and some agreed with John Gerard's *Herball* that maize was not nourishing.[53] Moreover, there were poisonous plants, some of which aped edible ones in appearance. Hariot wrote of berries like capers that, after being boiled for eight or nine hours, were "very good meat and holesome." If eaten uncooked, "they will make a man for the time franticke or extremely sicke." Differentiating the good from the bad was especially tricky because colonists believed that plants, like human beings, could change their characteristics when moved from one environment to another. Thus Monardes quoted Peter de Osma as saying that while cassava grown on the islands was poisonous, that from the mainland was benign.[54]

[51] *Va. Company Recs.,* III, 365-367, 447, IV, 59; McIlwaine, ed., *Journals of House of Burgesses, 1619-1658/59,* 39; Hariot, *Briefe and True Report,* in Quinn, ed., *Roanoke Voyages,* I, 384; [John] Smith, *A True Relation of Such Occurrences and Accidents of Noate as Hath Hapned in Virginia . . .* (1608), in Barbour, ed., *Jamestown Voyages,* I, 173; Lawson, *New Voyage to Carolina,* 51; Hammond, *Leah and Rachel,* in Force, comp., *Tracts,* III, No. 14, 9-10, 13-14; Newe to his father, in Salley, ed., *Narratives of Carolina,* 181; Beverley, *History of Virginia,* ed. Wright, 314; Kammen, ed., "Maryland in 1699," *Jour. So. Hist.,* XXIX (1963), 370; Vaughan, *Directions for Health,* 4th ed., 31-32.

[52] [Colt], "Voyage," in Harlow, ed., *Colonising Expeditions,* 91, 93; Ligon, *History of Barbados,* 27-28; Trapham, *State of Health in Jamaica,* 61-64.

[53] Winslow, *Good Newes from New-England . . .* (London, 1624), 62-63; McIlwaine, ed., *Journals of House of Burgesses, 1619-1658/59,* 21, 28; Lawson, *New Voyage to Carolina,* 75; "Voyage to Maryland," *AHR,* XII (1907), 335; Gerard, *The Herball; or Generall Historie of Plantes,* enlarged and amended by Thomas Johnson (London, 1636), 82.

[54] Hariot, *Briefe and True Report,* in Quinn, ed., *Roanoke Voyages,* I, 350, 352-353; Monardes, *Joyfull Newes,* I, 143, II, 4, 35.

Though some considered American pork delicious, others believed it acted quite differently on the body in hot climates than in England. Thomas Gage wrote of his many years in Mexico that no matter how much meat he ate at a meal, he was always hungry again in two or three hours, despite the extra rations of chocolate, conserve, and biscuits he was issued. Since the meat seemed "as fat and hearty" as in England, he could not understand why he became hungry so soon until a "Doctor of Physick" explained that though the meat looked good, it lacked "substance and nourishment." The climate had the effect of producing a fair show but "little matter or substance," an impression that reflected English suspicion of the rapid growth engendered by heat. Fruits were fair and beautiful, sweet and luscious, but had not half the nourishment of an "English Kentish Pippin." This nutritional defect indicated something much more serious. Where meat and fruit exhibited such "inward and hidden deceit," the people were the same. Gage remembered a story that Queen Elizabeth, when shown the fruits of America, remarked that "surely where those fruits grew, the women were light, and all the people hollow and false hearted." Whatever the cause, Gage's experience taught him that all the abundance and variety of food offered "little substance and virtue" and that people's stomachs were always "gaping and crying, Feed, feed."[55]

Ligon was concerned to warn off people who might take the deprivation of familiar pleasures too hard. No coursing, hunting, or hawking was possible, nor was horse racing in the heat. One might shoot or bowl, though in imperfect conditions. Indoor sports were all right if not too "laborious." Not only were sports strictly limited in the West Indies, but, Ligon reported, human senses were poorly served there as well. Perfumes and pastilles lost their scent and taste, drawn forth, as he explained, by the heat and moisture of the air. Flowers growing there were less fragrant and varied than in England, and many English flowers could not stand the heat. The sense of touch was also badly served. Everyone recoiled from another's touch: "take it in the highest, and most active way it can be applyed, which is upon the skins of women, and they are so sweaty and clammy, as the hand cannot passe over, without being glued and cemented in the passage or motion; and by that means, little pleasure is given to, or received by the agent or the patient."[56]

Everything brought to the West Indies was subject to corruption and

[55] Thomas Gage, *The English-American, His Travail by Sea and Land . . .* (London, 1648), 43, 200. Gage offered descriptions of some Mexican fruits and their taste (pp. 60-61). See also Ligon, *History of Barbados,* 27; [Colt], "Voyage," in Harlow, ed., *Colonising Expeditions,* 92; and Vaughan, *Newlanders Cure,* 56.

[56] Ligon, *History of Barbados,* 104-107. The satirist Edward Ward wrote of Jamaica that "kissing here grew out of Fashion; there's no joyning of Lips, but your Noses would drop Sweat into your Mouths" (*A Trip to Jamaica: With a True Character of the People and Island,* 7th ed. [London, 1700], 12). On the beauty of native plants see Ligon, *History of Barbados,* 74, 84, and Beverley, *History of Virginia,* ed. Wright, 298-299.

putrefaction. Sir Henry Colt told his son not to bring clothing made of leather because it would rot or mold so quickly. Similarly, Ligon cautioned would-be adventurers that slaves would need a new pair of shoes each month. Everything made of metal rusted. The stones from which Barbadians made their houses sweated moisture that rotted the timbers. They were forced to cover the timber ends with boards soaked in pitch. The living fences Ligon praised on Barbados were especially necessary because all other kinds of fences rotted "by extream moisture, and violent heat."[57]

Other things were vulnerable to the creatures that thrived in the hot, humid environment. Ligon wrote that the hangings in planters' houses were spoiled by ants and eaten by the cockroaches and rats. He described a great variety of insects, lizards, land crabs, and such that inhabited the houses, of which the chiggers (Chegoes) were the worst. The slaves' skins looked, he wrote, as if they had been raked with a currycomb because they were so badly bitten by cockroaches while they slept. No place indoors was safe from the ingenuity of the ants, and the snakes could climb walls six feet high. Trapham attributed the incidence of intestinal worms in Jamaica to the fact that the pond water colonists drank was infested with mosquito eggs. His cure was to eat bitter things or take mercury. Colt wrote that body lice were unknown in the tropics but head lice were unavoidable.[58] Even in New England, John Josselyn noted that the heat brought out many snakes. Sir William Vaughan believed in general that venomous creatures were bred of putrefaction, and John Lawson agreed that vermin were more frequent in warm climates than in those farther from the sun. Robert Beverley said the worst aspects of Virginia were the heat, thunder, and the vermin, in which he included frogs, snakes, and mosquitoes. Mosquitoes and poisonous snakes appear on many such lists.[59] We can sense the intensity of feeling about the alien environment engendered by heat and creatures native to it in a passage in a late work by Capt. John Smith, where he wrote of the "terrible creatures" to be found in Africa, that meet at the watering places and "in regard of the heat of the Country, and their extremities of Nature, make strange copulations, and so ingender those extraordinary monsters."[60]

[57] [Colt], "Voyage," in Harlow, ed., *Colonising Expeditions,* 100-101; Trapham, *State of Health in Jamaica,* 14-15; Ligon, *History of Barbados,* 42, 66-67, 113-115.

[58] Ligon, *History of Barbados,* 42, 61-67; [Colt], "Voyage," in Harlow, ed., *Colonising Expeditions,* 65, 73, 83; Trapham, *State of Health in Jamaica,* 103-110; Gage, *English-American,* 27, 163, 166.

[59] Josselyn, *Account of Two Voyages,* Mass. Hist. Soc., *Colls.,* 3d Ser., III, 227; Vaughan, *Directions for Health,* 6th ed., 7; Lawson, *New Voyage to Carolina,* 16; Beverley, *History of Virginia,* ed. Wright, 299-303; *Virginia Richly Valued, by the Description of the Main Land of Florida, Her Next Neighbour* . . . (1609), in Force, comp., *Tracts,* IV, No. 1, 123.

[60] [John Smith], *The True Travels, Adventures, and Observations* . . . (1630), in Arber and Bradley, eds., *Travels and Works of Smith,* II, 877.

Despite all the dangers and the alien environment, however, English people went to the rich southern mainland of North America and the West Indies in overwhelmingly larger numbers in the seventeenth century than to northern regions that were considered to be more like England. For promoters, planters, and medical men in the colonies, adaptation and survival therefore became major concerns, especially the problem of easing newcomers through the seasoning. Experience demonstrated that the young and strong weathered the traumas of adaptation better than those who were sickly on arrival: some writers blamed high death rates in the southern colonies partly on the poor physical condition of immigrants.[61] Regulation of the rhythm of work and emigration also helped. John Hammond said that servants new to Virginia were not required to work much during their first summer, and he and others claimed that servants never worked during the hottest hours of the summer day. Agricultural work was not distributed evenly throughout the year but was concentrated in the late summer and autumn, the time of highest mortality. Virginia settlers early perceived that if new colonists were to arrive in the fall, they would have several months to become acclimatized before they had to face the heat and disease that prevailed during the summer months of hard work. They repeatedly urged this strategy on the Virginia Company, which turned a deaf ear. When, later in the century, practice did shift to sending ships in the fall, it was because that was when the tobacco crop was ready, according to William Bullock, the English colonial promoter, not because the fall was a better time to send colonists.[62]

Colonists were urged to change their eating habits because orderly diet would make them resistant to the ill effects of extreme weather. Trapham chided colonists in the West Indies for continuing English ways of living instead of "substituting new Indian ones." He complained that "we transport northern chilly propensities and customs thereon depending, into the southern hot Climes, and most improper and destructive to health, at least long life." Trapham suggested that Jamaicans give up the habit of eating large meals in the middle of the day. He wanted them to break their fast with chocolate and dine lightly in mid-morning on fruits and meat in broth. It was important to eat light and easily digested foods, "as all the works of nature here are and ought to be most speedy, to

[61] McIlwaine, ed., *Journals of House of Burgesses, 1619-1658/59,* 23; *Va. Company Recs.,* III, 455.

[62] Hammond, *Leah and Rachel,* in Force, comp., *Tracts,* III, No. 14, 12, 14; W[illiams], *Virginia Richly and Truly Valued, ibid.,* No. 11, 59-61; Alsop, *Character of Maryland,* in Hall, ed., *Narratives of Maryland,* 357; Carville V. Earle, *The Evolution of a Tidewater Settlement: All Hallow's Parish, Maryland, 1650-1783,* University of Chicago Department of Geography Research Paper No. 170 (Chicago, 1975), 161; McIlwaine, ed., *Journals of House of Burgesses, 1619-1658/59,* 23, 30, 36, 38-39; *Va. Company Recs.,* I, 371, III, 298, 301, IV, 582; Bullock, *Virginia Impartially Examined,* 12.

comply with the universal briskness of motions betwixt the Tropics." He urged colonists to remember that flesh is always more "stubborn" than other foods. At four in the afternoon they should take more chocolate. They could drink plenty of water before chocolate but never after. When they took water, they were warned to follow it with candied warm fruits or roots, such as limes, oranges, or ginger, to prevent chilling their stomachs too much. Finally, at seven or eight in the evening they could have a plentiful supper, for which Trapham suggested a huge variety of meats. Even then, Jamaicans should not eat more than to satiety, and ideally chocolate should constitute half of their food. Chocolate was especially good, because it not only cooled and lubricated the body but provided a natural test of health: if your stomach had "too much choler" to stand it, then you needed "evacuation." After sundown, on Trapham's regimen, one could drink wine in moderation, but he felt that only Madeira wines were suited to the West Indies.[63]

Sir Henry Colt advised his son that when he arrived in the tropics, he should eat less meat and increase his consumption of grains and pulses. His meat should be stewed or in broths.[64] Ligon described the diet of servants and slaves as being almost entirely restricted to carbohydrates. They lived on potatoes, loblolly (a thick maize gruel served cold that the slaves hated), some maize, and "Bonavist," a West Indian pulse. During Ligon's time in Barbados the slaves were newly allowed to cut and cook plantains, which they delighted in. He reported the English servants had salt and pickled fish and meats in addition, though advice manuals warned against salt meat in hot weather. Ligon himself loved many of the fruits of his island but thought some of them might be unhealthy. In general, he felt the meat and bread were "not so well relish'd as in England, but flat and insipid."[65]

Though William Hubbard wrote that winter's cold was easier to deal with than extreme heat, southern colonists could do much to control their personal micro-environments through manipulation of housing and clothing. As early as the late sixteenth century, English colonial promoters were aware that house styles could contribute greatly to health and comfort in very hot climates.[66] Ligon observed that mid-seventeenth-century Barbados houses were not built to maximize comfort. Instead of the high-ceilinged, thick-walled houses open to the constant east wind that he expected, he found that dwellings were low and open to the west, which made them resemble stoves. When the late afternoon sun poured in on planters who were full of "kill-devil" (rum) and were smoking tobacco, he wondered why spontaneous combustion did not occur in their oven-like

[63] Trapham, *State of Health in Jamaica,* 50-60, 67. See also Beverley, *History of Virginia,* ed. Wright, 297-298.

[64] [Colt], "Voyage," in Harlow, ed., *Colonising Expeditions,* 99-100.

[65] Ligon, *History of Barbados,* 27-28, 31, 43-44, 80-84, 110, 113.

[66] Hubbard, *History of New England,* 20; "Commentary on Hayes-Carleill Project," in Quinn *et al.,* eds., *New American World,* III, 174.

houses.[67] Mainland colonists learned to choose the highest ground, open to cooling, cleansing breezes, for their residences. Agreeing that high ground was healthier, William Bullock endorsed this practice but warned against placing houses too far from neighbors, "for that's disconsolate."[68]

Eighteenth-century reports make clear that colonists had learned to build their houses to maximize coolness. Beverley said that houses in Virginia were comfortable even in hot weather because they had cool, open, airy rooms. Chesapeake houses were built around a central hall that drew in breezes; sometimes they were raised to allow free movement of air underneath. Kitchens and other rooms devoted to heat-producing functions were separated from the main house in small buildings, and summerhouses made cool retreats. Underground rooms allowed planters to keep butter and other perishables longer. Common planters' houses as well as those of the great landowners were constructed to allow a free flow of air through them. The naturalist Mark Catesby thought that cutting down forests in South Carolina had opened the land up to the winds, making it cooler in summer, though those who could afford to left the coastal area completely during the hottest months. Janet Schaw, a Scottish gentlewoman who traveled to the West Indies in the 1770s, remarked on how cool the houses were on Antigua because they were shaded by tall palmetto trees.[69]

Clothing was the most easily manipulated element of the personal environment. Colonists were quick to adapt the clothing of slaves and lesser servants to warm conditions. Servants' dress on Barbados consisted

[67] Ligon, *History of Barbados,* 25, 40-43, 55-57, 73-75, 78-79, 102-104.

[68] William Strachey, *A True Reportory of the Wracke, and Redemption of Sir Thomas Gates . . .* , in Purchas, *Pilgrimes,* XIX, 58, and *Historie of Travell,* 33-34, 40; Bullock, *Virginia Impartially Examined,* 61; Earle, *Evolution of a Tidewater Settlement,* 140.

[69] Beverley, *History of Virginia,* ed. Wright, 289-290, 299; Jones, *Present State of Virginia,* ed. Morton, 71, 74; Gregory A. Stiverson and Patrick H. Butler, III, "Virginia in 1732: The Travel Journal of William Hugh Grove," *Virginia Magazine of History and Biography,* LXXXV (1977), 22, 24, 28; [Edward Kimber], "Observations in Several Voyages and Travels in America," *WMQ,* 1st Ser., XV (1907), 153; "An Interview with James Freeman, 1712," in Roy H. Merrens, ed., *The Colonial South Carolina Scene: Contemporary Views, 1697-1774* (Columbia, S.C., 1977), 42, 49; Mark Catesby, *The Natural History of Carolina, Florida, and the Bahama Islands* (1731-1743), *ibid.,* 89; Pelatiah Webster, "Journal of a Visit to Charleston, 1765," *ibid.,* 221; "Charleston, S.C., in 1774 as Described by an English Traveller," *ibid.,* 286; Evangeline Walker Andrews and Charles McLean Andrews, eds., *Journal of a Lady of Quality; Being the Narrative of a Journey from Scotland to the West Indies, North Carolina, and Portugal, in the Years 1774 to 1776* (New Haven, Conn., 1923), 83, 95, 101, 103. For general descriptions of adaptation in house styles, clothing, and food in the 18th-century South see Rhys Isaac, *The Transformation of Virginia, 1740-1790* (Chapel Hill, N.C., 1982), 32-36, 43-46; Gloria L. Main, *Tobacco Colony: Life in Early Maryland, 1650-1720* (Princeton, N.J., 1982), 136-137, 143, 148, 167, 192-205; and Hugh T. Lefler and William S. Powell, *Colonial North Carolina: A History* (New York, 1973), 184-186.

of linen shirts and drawers for men and petticoats for women. The linen garments of the slaves were of canvas, and the materials for Europeans were finer depending on status. Carolina promoters said that a major advantage of the climate was that slaves needed few and cheap clothes.[70]

Settlers above the level of servants also adapted, but apparently reluctantly. Robert Beverley complained that newcomers to Virginia refused to dress in accordance with the climate; they went about in thick clothes suitable for northern places and then complained of the heat. At the same time, John Archdale, the Quaker governor, blamed fevers and agues in Carolina partly on carelessness in clothing. Eighteenth-century medical tracts continued to call for intelligent adaptation in styles of dress. Though newcomers were slow to give up heavy northern clothes, long-time residents of the southern colonies learned to dress much more comfortably. They wore light materials in the summer, with fewer layers. Women in Antigua wore masks out of doors to protect their faces from the sun. Men quit wearing wigs in hot weather, except on very special occasions, and replaced them with thin caps. Though they presented an odd, even slovenly, picture to travelers, colonists were clearly adapting to the special conditions of their adopted homeland.[71]

By the eighteenth century, adaptation had made life in the South more comfortable, and the largely native-born composition of the population reduced the role of seasoning as a killer. And yet, inhabitants of the southern mainland and the West Indies continued to think of their regions as less healthy, less apt to produce robust people because of high heat and humidity. The reply of Lt. Gov. John Hart of Maryland to a questionnaire from the Board of Trade in 1720 began: "Maryland is situated in the center of the British Plantations. The climate is unhealthy, especially to strangers, occasion'd by the excessive heat in summer, and extreme cold in winter; the vernal and autumnal quarters are attended with fevers, pleurisies, etc." When Dr. Alexander Hamilton, the Annapolis physician, returned to Maryland from his journey through the northern colonies, he

[70] Ligon, *History of Barbados,* 109, 113-115; [Colt], "Voyage," in Harlow, ed., *Colonising Expeditions,* 100-101; Lawson, *New Voyage to Carolina,* 165; Wilson, *Account of Carolina,* in Salley, ed., *Narratives of Carolina,* 172; Randolph to the Lords of Trade, Mar. 16, 1698/9, *ibid.,* 208; Archdale, *New Description of Carolina, ibid.,* 291.

[71] Beverley, *History of Virginia,* ed. Wright, 297; Stiverson and Butler, eds., "Virginia in 1732," *VMHB,* LXXXV (1977), 29, 32; [Kimber], "Observations in Several Voyages," *WMQ,* 1st. Ser., XV (1907), 158; Andrews and Andrews, eds., *Journal of a Lady of Quality,* 87, 114-115; Devereux Jarratt, *The Life of the Reverend Devereux Jarratt, Rector of Bath Parish, Dinwiddie County, Virginia, Written by Himself, in a Series of Letters Addressed to the Rev. John Coleman . . .* (New York, 1969 [orig. publ. Baltimore, 1806]), 14, 26. See also Dunn, *Sugar and Slaves,* 263-264, 281-286. Mountcastle has tables of the insulation value of different types of clothing (*Medical Physiology,* II, 1315). See also Lind, "Human Tolerance to Hot Climates," in Lee, *Handbook of Physiology,* Sect. 9, 93, 102, and Guyton, *Textbook of Medical Physiology,* 958.

ended his journal with the observation that the governments of the northern colonies were to be preferred to the "poor, sickly, convulsed state" of Maryland. "Their air and living to the northward is likewise much preferable, and the people of a more gygantick size and make."[72]

As Hart indicated, seasoning continued to affect newcomers, and a general impression of unhealthiness hung over the southern colonies. Gov. James Glen of South Carolina found he could not place a value on the 25,000 people there by 1751 because he could not know how "how many thousands must have died before such a number could have been established, so habituated to the climate, accustomed with our seasons, their sudden changes, and the methods of guarding against them, and in short so qualified in every respect to make and denominate them useful planters and inhabitants."[73] Janet Schaw, despite her praise for the ingenuity with which colonists adapted to the environment, complained of the heat in North Carolina as well as the West Indies. She hated the mosquitoes and other insects that increased as the heat grew more oppressive. While she believed that the adoption of bad habits killed more people than the heat alone, she clearly subscribed to the theory of humoral change when she described an elderly Englishman who returned from Antigua to his native land. Though he spent his time in a greenhouse there, he found he had become "so absolute an exotick" that he could not stay.[74]

Natives by no means saw themselves as immune to the dangerous effects of the southern climate in the eighteenth century. Several writers warned that a rash style of life could be very harmful. Excessive indulgence in strong drink was one obvious trap, but less clearly harmful acts could bring disaster. Devereux Jarratt, the common planter's son who became a minister, believed that moving from one environment to another within his own region as a young man had brought a prolonged bout of sickness on him. The Rev. Hugh Jones, mathematics professor at William and Mary, argued that all Virginians could be well as long as they took precautions to protect themselves against the sudden alterations of heat and cold that were so dangerous there. Beverley particularly warned against overheating oneself with exercise and then attempting to cool off

[72] Hart to the Council of Trade and Plantations, Aug. 25, 1720, in *Maryland Historical Magazine,* XXIX (1934), 252; Carl Bridenbaugh, ed., *Gentleman's Progress: The Itinerarium of Dr. Alexander Hamilton, 1744* (Chapel Hill, N.C., 1948), 199.

[73] Glen, "An Attempt towards an Estimate of the Value of South Carolina, 1751," in Merrens, ed., *Colonial South Carolina Scene,* 183; Robert Witherspoon, "Recollections of a Settler, 1780," *ibid.,* 127; James Oglethorpe, *A New and Accurate Account of the Provinces of South-Carolina and Georgia* (1732), in Trevor R. Reese, ed., *The Most Delightful Country of the Universe: Promotional Literature of the Colony of Georgia, 1717-1734* (Savannah, Ga., 1972), 127; Jones, *Present State of Virginia,* ed. Morton, 84-85; Bridenbaugh, ed., *Gentleman's Progress,* xiii.

[74] Andrews and Andrews, eds., *Journal of a Lady of Quality,* 85-86, 93, 105, 116, 122, 153, 182-183.

too rapidly. Finally, a particularly hot summer could upset the delicate balance of the humors that allowed people to live in these climates. When Dr. Alexander Hamilton returned to Maryland, he learned that the summer had been intemperate: "I should have known the time had been unhealthy without his telling me so by only observing the washed countenances of the people standing att their doors and looking out att their windows, for they looked like so many staring ghosts. In short I was sensible I had got into Maryland, for every house was an infirmary, according to ancient custome."[75]

New dangers also appeared in the eighteenth century with the introduction of yellow fever, the great killer of European Americans in the south. Since epidemics of yellow fever, which intensified toward the century's end, always occurred during hot summers, these outbreaks convinced observers, particularly medical practitioners, that heat caused them. The English experience in the southern parts of America was studied by the transatlantic medical establishment, and this study led to the absolute acceptance of medical environmentalism in the eighteenth century. Those who investigated the problem of fevers were in the forefront of the medical thought of their day; they attacked the problem of disease in hot climates empirically, using the most modern equipment available. Additional urgency was imparted to the task by the British government's need to keep its troops alive in the West Indian theater of the great imperial wars where death from disease mowed down the men. What they lacked was the not-yet-developed paradigm of a germ theory of disease; in its absence, their experiments and observation served to reinforce the old beliefs. As long as the humoral paradigm continued to dominate medical thinking, the link between the human body and climate was accepted as dogma.[76]

Eighteenth-century physicians knew that fevers were the leading cause of death in the southern mainland as well as the West Indies, but they saw fevers as the direct product of hot weather, especially when combined with high humidity. Since heat was the source of these diseases, they could appear, in extraordinary circumstances, in Europe. Dr. James Lind, a Scottish naval physician, wrote that tropical fever had appeared in England

[75] Jarratt, *Life,* 29; Jones, *Present State of Virginia,* ed. Morton, 84-85, 93; Beverley, *History of Virginia,* ed. Wright, 305; Bridenbaugh, ed., *Gentleman's Progress,* 198.

[76] On yellow fever in the 18th and 19th centuries see Kenneth F. Kiple and Virginia Himmelsteib King, *Another Dimension to the Black Diaspora: Diet, Disease, and Racism* (Cambridge, 1981), Pts. i, ii. On the end of the humoral paradigm see Charles E. Rosenberg, "The Therapeutic Revolution: Medicine, Meaning, and Social Change in Nineteenth-Century America," *Perspectives in Biology and Medicine,* XX (1977), 485-506. On the "death sentence" that assignment to the West Indies meant for soldiers and sailors see Roger Norman Buckley, *Slaves in Red Coats: The British West India Regiments, 1795-1815* (New Haven, Conn., 1979), 3, and Richard Pares, *War and Trade in the West Indies, 1739-1763* (Oxford, 1936), 259.

during heat waves in 1765 and 1766. Nor did it take much in the way of heat by our standards; the figure mentioned for England was eighty-two degrees.[77] American doctors ordered barometers and the newly accurate Fahrenheit thermometers from Europe and began to take systematic readings of weather variations, which they hoped eventually to correlate with mortality patterns. It was a commonplace that the way to cope with the diseases of any place was first to understand its climate because the link between the two was seen as absolute.[78]

Doctors, like laymen, continued to believe that the human body was drastically changed by moving from a cold to a hot climate. The link between heat and disease for these physicians, as for their seventeenth-century counterparts, was changes in bodily humors produced by exposure to "intemperate climes." Prickly heat and the leg ulcers that afflicted many were seen as attempts by the blood to throw off "fiery" and "acrid" elements, and to excrete them through the skin. Therefore, bathing in cold water or any attempt to control the eruptions was thought to cause more harm to the body by forcing the harmful excretions inward again.[79]

[77] James Lind, *An Essay on Diseases Incidental to Europeans, in Hot Climates, with the Method of Preventing Their Fatal Consequences,* 6th ed. (Philadelphia, 1811). So complete was the identification of hot weather as the cause of fever that West Africa, where death rates from yellow fever and malaria were high among Europeans, was commonly thought to be a place of extreme heat and humidity despite travelers' reports that uniformly described the climate as moderate (P. D. Curtin, " 'The White Man's Grave': Image and Reality, 1780-1850," *Journal of British Studies,* I (1961), 97-100. On the conditions promoting yellow fever and malaria in America see Kiple and King, *Another Dimension to the Black Diaspora,* Pts. i, ii; John Duffy, *Epidemics in Colonial America* (Baton Rouge, La., 1953), chaps. 4, 5; and Rutman and Rutman, "Of Agues and Fevers," *WMQ,* 3d Ser., XXXIII (1976), 31-60.

[78] For such records see Lind, *Diseases Incidental to Europeans in Hot Climates;* William Hillary, *Observations on the Changes of the Air, and the Concomitant Epidemical Diseases in the Island of Barbadoes . . .* (Philadelphia, 1811 [orig. publ. London, 1759]); C. Chisholm, *An Essay on the Malignant Pestilential Fever Introduced into the West Indian Islands from Boullam, on the Coast of Guinea, As It Appeared in 1793 and 1794* (Philadelphia, 1799); and John Lining, "Extracts of Two Letters from Dr. John Lining, Physician at Charles-Town in South Carolina to James Jurin, M.D. F.R.S. Giving an Account of Statical Experiments Made Several Times in a Day upon Himself, for One Whole Year, Accompanied with Meteorological Observations; to Which Are Subjoined Six General Tables, Deduced from the Whole Years Course," *Philosophical Transactions,* XLII (1742-1743), 491-509. For modern discussion of 18th-century theories linking weather and disease see Richard Harrison Shryock, *Medicine and Society in America, 1660-1860* (New York, 1960), 62-63; Owsei Temkin, *The Double Face of Janus and Other Essays in the History of Medicine* (Baltimore, 1977), 459; and James H. Cassedy, "Meteorology and Medicine in Colonial America: Beginnings of the Experimental Approach," *Journal of the History of Medicine and Allied Sciences,* XXIV (1969), 193-204.

[79] Hans Sloane, *A Voyage to the Islands Madera, Barbados, Nieves, S. Christophers, and Jamaica . . . ,* 2 vols. (London, 1707, 1725), I, xciv-xcv; Hillary, *Changes of Air and Concomitant Epidemical Diseases,* iv-vi, 26-27.

Constant perspiration continued to be seen as a major cause of disease. It led to laxity of the muscle fibers and, because of a sympathetic connection between the skin and the stomach, to weakness in digestion. Dr. John Tennent of Virginia believed that excessive sweating stole fluid from the blood and produced "heavy sizy [viscous, glutinous] blood." In extreme cases complete "Stagnation of the Blood" caused death, which "indeed is too often the Case." Tennent recommended routine bleeding for everyone going to the West Indies in order to bring the volume of blood into equilibrium with the laxity of the muscle fibers.[80]

Dr. William Hillary of South Carolina thought that relaxation of the muscle fibers on entering a hot climate caused the blood to become "lax, loose, and attenuated," even in healthy people and that this condition produced fevers and other diseases. Others thought that muscle relaxation led to corruption of the humors. The cold winter months brought relief to mainland residents, but some doctors thought that this did not render these areas healthier than the more constant West Indies, because the body was forced to make drastic adjustments several times each year, an exhausting process for even the most healthy.[81]

Though these theories were more complicated, a seventeenth-century reader would have been comfortable with them, based as they were on the same assumptions about human beings in relation to the environment that had informed earlier thinking. Medical thinking based on experiential data from the colonies transformed the vague and unformed beliefs of the late sixteenth and early seventeenth centuries into the certainties of the eighteenth. Evidence from the colonies, interpreted through the lens of the physicians' assumptions about the human body, allowed medical environmentalism to become dogma. The apparently empirical bond between heat and fever, proven experimentally by the colonists, cemented the role of climate in disease in eighteenth-century thinking.

Fear of hot climates was accommodated by the eighteenth century. Southern colonists accepted the danger and discomfort, much as some late twentieth-century Americans accept the risks of cigarette smoking. Most were uneasy about the risks of living in an intemperately hot place, and scientists sought to understand and mitigate the worst effects of heat, but routines of life went on in the face of the danger. Dr. Hamilton thought of Maryland as inherently unhealthy, yet he gave up the idea of returning to Britain in the 1740s despite his continued bad health. He wrote of the

[80] John Tennent, *Physical Enquiries: Discovering the Mode of Translation in the Constitutions of Northern Inhabitants, on Going to, and for Some Time after Arriving in Southern Climates* (London, 1742), 3-5, 25.

[81] Hillary, *Changes of Air and Concomitant Epidemical Diseases,* vii-viii; John Lining, "A Description of the American Yellow Fever in a Letter from Dr. John Lining, Physician at Charles-Town in South Carolina, to Dr. Robert Whytt, Professor of Medicine in the University of Edinburgh," in Chisholm, *Essay on the Malignant Pestilential Fever,* 303-304; George Milligen-Johnston, *A Short Description of the Province of South-Carolina, with an Account of the Air, Weather, Diseases, at Charles-Town* (London, 1770), 43-46, 65-66.

summer's sickliness with resignation and acceptance.[82] By contrast, seventeenth-century people such as Nicholas Leverton had believed that nothing short of return to their native air could cure them when they were sick.

The southern part of America no longer seemed alien; with the woods diminished and English houses dotting the landscape, it had a comfortable look. The vast majority of the population, especially on the mainland, were native-born and therefore did not see the flora and fauna as exotic. The colonists were not really colonists; they were Americans by birth: hot and unhealthy though the land might be, it was their home. Unlike earlier settlers, most of whom had made a decision to emigrate and who therefore looked around them with an appraising eye, eighteenth-century residents were settled in their American environment. Only travelers' accounts and reports to imperial authorities provide a picture of conditions in the eighteenth century comparable to that frequently painted by settlers in the seventeenth.

Within their commitment to the southern colonies, residents had learned that they could do much to make themselves more comfortable and even safer. They learned to construct cooler houses and to wear lighter, less formal clothes. They learned what foods were safe and how to keep them fresh in hot weather. Some of them learned to avoid excesses that rendered them more vulnerable to illness. Until the germ theory of disease was proposed in the nineteenth century and the role of the mosquito in spreading yellow fever and malaria became understood, they could not effectively combat the fevers that made some summers so dangerous, but eighteenth-century colonists felt in control of and at home in their environment.

[82] Bridenbaugh, ed., *Gentleman's Progress,* xiii.