Disease as a Eugenic Force

By NATHANIEL WEYL

Each disease has its own differential impact, but the thrust of disease as a whole is unambiguous. Diseases strike down preferentially the poor, the ignorant, the superstitious, the hungry, those low in vitality, those who live in filth and squalor, the people who drink polluted water, who are lousy and flea-ridden, who live and sleep in huddled masses in which infection is almost inevitable. Thus, the ravages of disease are generally not aristocidal, but the opposite.

Disease tends to be more urban than rural because populations of minimum density and size may be needed to feed it and because congestion creates major health problems of its own.

Comparing one civilization with another, all are exposed to the potential catastrophe of new illnesses to which they have not developed immunity, but the blow is most calamitous and lethal when the exposed population has enjoyed isolation from other human groups and when it has achieved maximum genetic homogenity. Therefore, primitive peoples and independent civilizations, isolated by marine, forest or mountain barriers, have been almost exterminated by new diseases in epidemic form. On the other hand, peoples who live on or near great trade and migration routes have tended to acquire comparative immunity.

Over the centuries, epidemics have killed more people than armies and germs have won more battles than generals.

The expansion of white settlement to cover the entire habitable globe, following the fifteenth century voyages of discovery, brought new diseases to heretofore isolated and unexposed populations. Native peoples were decimated and non-European civilizations annihilated.

The brilliant indigenous civilizations of the Americas — Mayan, Aztec, Mixtec, Zapotec, Quechua and Chibcha — were destroyed, and the class or classes that created them vanished, leaving behind a mere peasant mass. The élite were eliminated by execution and battle losses against the Spaniards, by intermarriage and by the newly introduced diseases. The native populations as a whole were reduced to a fraction of their size by the combined assault of smallpox, syphilis and other virulent epidemics introduced by the Conquistadores.

In North America, smallpox reduced the Massachusetts and

Narragansett Indians in the seventeenth century from 39,000 to a few hundred. There were an estimated 700,000 Indians in North America when the Europeans arrived. By 1850, only a quarter of a million remained.

When the white men discovered Polynesia, they found a happy, healthy and vigorous people excellently adapted to the illnesses of their island habitat. The Europeans introduced scarlet fever, syphilis and measles which in two generations almost annihiliated the population. The 300,000 inhabitants of Polynesia when Cook made his first landfall there in 1778 had shrunk to 37,000 by 1860. The epidemics were so deadly that not a single Polynesian child born in the year 1848 survived.[1]

Eskimos and Maoris were similarly decimated by newly introduced diseases. European contacts with Japan, China and India, by contrast, did not create major new medical hazards for these Oriental peoples. Those who inhabited continental land masses and had been in contact with Europe either directly or indirectly had already acquired partial immunity. The isolated populations, particularly the island ones, lacked the advantage of this earlier exposure and consequently perished.

When new diseases first strike a non-immune population, they tend to be virulent and lethal. In time through mutation and evolution, the pathogens and their victims evolve tolerable symbiotic relationships. The great killers of past centuries often survive as comparatively mild children's diseases. The once dreaded afflictions of scarlet fever and measles are good examples.

The human agencies which carry diseases from the regions where they are endemic to virgin territory include armies, navies, merchants, explorers, missionaries and uprooted peoples on the march. Historically, armies have probably been the pre-eminent agencies of infection. They moved large distances; they lived under appallingly unhygienic conditions which weakened their resistance; they were large enough bodies of men to keep diseases infectious even where the latter rapidly reached a fatal course; finally, the institutions of rape, looting and murder provided excellent means for infection of civilian populations.

SYPHILIS

The belief that Columbus's sailors were infected in the West Indies and returned to spread syphilis through Europe was fairly

[1] Réné J. Dubois, M. D., *Bacterial and Mycotic Infections of Man*, Lippincott, Philadelphia, pp. 16-17.

generally accepted until recently. However, the esteem in which mercury was held as a treatment for "lepra" among the Crusaders argues that syphilis or some related disease was present in Europe or the Near East centuries earlier. For, while mercury is useless against true leprosy, it is a specific for such *treponemal* infections as syphilis and yaws. In 1303, Bernardus de Gordonio wrote that four characteristics of "lepra" were that it was highly contagious, incubated quickly, was acquired through coitus, and that children were sometimes born with it. All of these traits apply to syphilis, none to leprosy.[2]

The African disease of yaws, which does not require venereal contact for infection, is caused by a *treponema* virtually undistinguishable from that causing syphilis. One theory is that syphilis in a mild, non-venereal form spread from Africa to Europe centuries or millennia before Columbus. Then a mutant *treponema* arose towards the close of the fifteenth century and the disease assumed virulent epidemic form.[3]

Before the Renaissance, European urban populations were isolated from each other in walled towns. In these small, isolated populations, infections would tend to become endemic; immunity would develop in the human hosts and both parasite and host would achieve some sort of equilibrium.

Treponemal infection probably occurred in the Middle Ages anywhere on the skin surface. Europeans were not ashamed of nakedness and whole families would walk nude to the bath houses. Beds were shared even in noble houses. As late as the mid-sixteenth century, the Earls of Northumberland required that chaplains sleep two and choir boys three to a bed. Since Europeans slept naked, abundant opportunities existed for the spread of *treponemal* infection by skin contact.[4]

Revolutionary changes occurred during the Renaissance and Reformation. Artillery made city walls obsolete and helped destroy the isolation of the towns. The latter grew rapidly, the newcomers building outside the walls.

The Reformation brought a new campaign against nudity and public baths, which was started by the Protestants and echoed by the Counter-Reformation Catholics. As puritanical attitudes

[2] Calvin Wells, *Bones, Bodies and Diseases,* Praeger, New York, 1964, p. 102.

[3] Ronald Hare, "The Antiquity of Diseases Caused by Bacteria and Viruses. A Review of the Problem from a Bacteriologist's Point of View," Don Brothwell and A. T. Sandison (Editors), *Diseases in Antiquity,* Charles C. Thomas, Springfield, Illinois, 1964, p. 125.

[4] Aidan Cockburn, M.D., *The Evolution and Eradication of Infectious Diseases,* John Hopkins, Baltimore, 1963, p. 158.

towards nakedness spread, the *treponema* presumably met the challenge by becoming venereal. Those bacteria which attempted to pass from skin surface to skin surface would be blocked by clothing and would die. Those that spread *via* the sexual organs would survive and reproduce to the exclusion of the others. Thus both bacteria and the form of the disease would be genetically changed.

In the sixteenth century, Cockburn suggests, syphilis may have been in transition between general and venereal infection. The common method of greeting in Tudor England was the kiss on the mouth. Syphilis was not generally supposed to be transmitted solely by sexual intercourse and Henry VIII accused Cardinal Wolsey of giving him the disease by breathing on him.[5]

During the early sixteenth century, syphilis seems to have been almost ubiquitous in urban Europe. Sir Thomas More wrote that five times as many syphilitic patients attended monastic hospitals in 1529 as had done so in 1499. A third of the population of Paris was said to be infected. Fifteen out of 20 patients admitted to St Bartholomew's Hospital in London were syphilis cases. And Erasmus declared that nobles who had not had the disease were "*ignobilis et rusticans.*"

For centuries, the connection between syphilis and paresis, or general paralysis of the insane (GPI), remained obscure. Tabes was first described in 1799, but it remained for the great Japanese bacteriologist, Hideyo Noguchi (1876-1928), to discover *Treponema pallidum* in the central nervous systems of patients dying of paresis and thus to prove that the latter was a tertiary form of syphilis.[6]

Salvarsan, the cure of syphilis discovered by Paul Ehrlich (1854-1915), does not affect the *treponema* once it enters the nervous system. The tertiary stage may or may not develop. It appears usually three to ten years after the primary infection and following a latent period of several years in which the patient, before modern laboratory tests were devised, could enjoy the illusion that he was cured. Paresis can lead to death by rupture of the aorta or by cerebral haemorrhage; it can enter the nervous system causing paralysis; it can enter the brain, causing insanity and anguished death often preceded by periods of grandiose hallucinations approximating to megalomania.

Patients suffering from general paralysis of the insane could expect death in about five years. Syphilis affects survival both by killing those it drives insane and by interfering with reproduction.

[5] Frederick F. Cartwright, *Disease and History*, p. 64.

[6] Arturo Castiglioni, *A History of Medicine*, Alfred A. Knopf, New York, 1958, p. 801.

It may cause sterility or the production of weak, diseased and congenitally syphilitic children.[7]

Since we have no way of knowing how many of the poor were sterilized or killed by syphilis, it would be arbitrary to dogmatize on whether the disease was on balance aristocidal. On general grounds, however, there are two reasons for believing that it was. Then as now, the intellectuals and the upper classes had greater opportunities for promiscuity and sexual experimentation than the masses and were less restrained by conventional, religious and legal tabus. Since they lived healthier lives and came of sturdier stock than average, their sexual drives were probably above average.

In any event, the list of historical figures who suffered from syphilis, or were alleged to have done so, is long and impressive.

Cartwright lists as syphilis victims such rulers as Charles VIII and Francis I of France, Henry VIII of England and Czar Ivan the Terrible; among the high clergy, Pope Alexander Borgia, his nephew, Peter Borgia, and the Cardinal-Bishop of Segovia; among artists, Benvenuto Cellini and Toulouse-Lautrec; among writers, Heinrich Heine, Jules de Goncourt, Alphonese Daudet and Guy de Maupassant.[8]

To this list, Emperor Franz Josef of Austria-Hungary should be added and his bride, Empress Elizabeth, whom he infected when she was 16. Before she was assassinated by an anarchist 20 years later, Empress Elizabeth showed such signs of eccentricity or madness as living exclusively on a diet of blood and milk and receiving her Greek teacher upside down on a trapeze.[9] Their son, Crown Prince Rudolf, whose suicide with his young mistress at Mayerling has been the subject of several romantic movies, was a congenital syphilitic. Winston Churchill's father, Lord Randolph Churchill, contracted the disease from a prostitute and died in agony of paresis, thus cutting short one

[7] Perhaps the most famous example is Henry VIII of England. His eldest daughter, Mary, was partially deaf, had a "rather low and wide" nose, perhaps approximating the flattened nose bridge of some syphilitics, and exuded a foul smell of which her husband, Philip II of Spain, complained. Henry's son and heir, Edward VI, was a fat, sickly boy whose "unheathful humors" caused his death at 15. Henry's known illegitimate son, Henry Fitzroy, Earl of Richmond, died at the age of 17. All may have been congenital syphilitics. Elizabeth I lived to a ripe old age by the standards of her day, but called herself "but a barren stock."

As for Henry himself, he was married to six women for a total of 36 years. There is no record that he was able to impregnate either of his two last wives in six years of marriage. The probability that he became impotent at 49, Cartwright concludes, "is probably the strongest evidence of syphilis in his marital history." Frederick F. Cartwright, *op. cit.*, pp. 70-73.

[8] Frederick F. Cartwright, *op. cit.*, p. 65.

[9] Ralph G. Martin, *Jennie: The Life of Lady Randolph Churchill: The Romantic Years 1854-1895*, Signet, New York, 1969, pp. 134-135.

of the most brilliant careers in nineteenth century British politics.[10]

From several medical histories, Ralph G. Martin has culled the names of such other supposed eminent syphilitics as Frederick the Great, Ludwig van Beethoven and Franz Schubert. The researcher at the Wellcome British Medical Library adds to the list Rabelais, Goya, Edouard Manet, Oscar Wilde, Woodrow Wilson and V. I. Lenin.[11]

Oddly enough, these authorities all omit Benito Mussolini. The fact that he had syphilis is attested by such biographers as Laura Fermi. When I was a young student in London, Angelica Balabanova, who claimed to have picked Mussolini up out of the gutter and groomed him for leadership of the Italian Socialist Party, told me that she had to coax and nag him to go to his doctor regularly for his syphilis treatments. The future Duce of Italy objected that the medication was unbearably painful and would whine and lie and even throw scenes to avoid it.

Another case that is hardly ever mentioned is Abraham Lincoln. In his recollections of Lincoln, published a quarter of a century after the latter's death, Billy Herndon claimed that his great associate had once confided in him that he had picked up a case of syphilis.[12] According to Herndon, Lincoln was greatly disturbed, underwent regular treatment and was presumably cured.[13] Since effective prophylaxis was not generally available

[10] Ralph G. Martin, *op. cit.*, pp. 63-64, 304-318.

[11] I have no means of judging the accuracy of this list. The charge that Woodrow Wilson had syphilis is emphatically denied by his admirers and is not, to my knowledge, taken seriously by his biographers. Lenin asked his physician whether he had paresis, but this does not prove that he suffered from it. Lenin's parents produced six children, five of whom lived to maturity, and of these five, four produced no issue. However, this could be a case, as C. D. Darlington suggests (*The Evolution of Man and Society,* p. 557) of hybrid sterility.

[12] William Henry Herndon and Jesse Weik, *Herndon's Lincoln: the True Story of a Great Life,* 1889. Herndon was Lincoln's law partner in Springfield, Illinois. When he was elected President, Lincoln left Herndon behind to manage his law business because he thought he drank too much to hold down a responsible post in Washington. Herndon's book refutes some of the pious nonsense that was being written about Lincoln at the time, but it treats its central figure with respect amounting almost to veneration.

[13] Treatment usually was based on mercury injections. Paresis, which Lincoln did not have, was deemed incurable. In 1927, Julius Wagner-Jauregg won the Nobel Prize for his discovery that neural syphilis could sometimes be cured by infecting patients with malaria. This raised body temperature to a point which generally killed off most of the *treponemata.* A story I was told about this was that, when Wagner-Jauregg's award was announced he noticed a pained expression on the face of a Viennese colleague. "Cheer up, Dr Freud," he reputedly remarked, "they haven't announced the Nobel Prize for fiction yet."

at the time, any normal man ran the risk of contracting the disease. Nevertheless, the thought that Abraham Lincoln may have been a syphilitic is so abhorrent to many Americans that Herndon's story is seldom mentioned by biographers.

LEPROSY

The affliction which medieval man regarded with undiluted horror was known as leprosy. The extent to which it corresponded with a sickness known today as Hansen's Disease is a matter of some dispute and much conjecture.

In a funeral sermon delivered in 379 A.D., St Gregory Nazianzus describes lepers as " men already dead except to sin; often dumb, with festering bodies whose insensible limbs rotted off them; heartbreaking and horrifying spectacles of human ruin; objects of repugnance and terror; driven from the house, the marketplace, the village, and the fountain; persecuted even by their parents; disfigured, unrecognizable, identified only by their names; avoided, shrunk from, detested, despised by relatives, fathers, mothers, spouses, children; wandering night and day, naked, destitute, exposing their loathsomeness to the gaze of passers-by to move them and obtain alms."[14]

The sequestration of lepers was a solemn ceremony. Kneeling behind the altar and hidden by a black cloth (or, as in Amiens, standing in an open grave), the leper heard mass, and then had cemetery earth thrown on his head three times to symbolize his death to the world.

The priest then formally prohibited him from ever entering church, monastery, fair, mill, marketplace or the company of persons. He must never leave his house without his leper's costume and never go barefoot. He might not drink from any fountain or use any cup but his own. He could not touch any object until he had bought it. Nor could he enter a tavern. He could not have relations with any woman except his own. If an acquaintance met him on the road and spoke to him, he could not reply unless he was down wind from the other person. Nor could he ever enter a narrow lane.

> I forbid you, if you go along any thoroughfare, to ever touch a well or the cord unless you have put on your gloves. I forbid you to ever touch children or give them anything. I forbid you to eat or drink from any dishes other than your own. I forbid you drinking or eating in company, unless with lepers.[15]

[14] Quoted in Saul Nathaniel Brody, *The Disease of the Soul: Leprosy in Medieval Literature*, Cornell University Press, Ithaca, p. 79.

[15] Saul Nathaniel Brody, *op. cit.*, pp. 66-67.

The leper warned the healthy of his approach with a rattle or castanet or perhaps a bell worn on his shoes. Or he could carry a small horn, as at Lille, or sing *De Profundis,* as at Arles.

Monarchs such as Henry II of England and Philip V of France were impatient of these elaborate arrangements. Philip simply had lepers strapped to a post and set on fire. Henry permitted them a Christian funeral: they were led to their graves and buried alive.

However, as Brody points out, there were many exceptions to this harsh treatment for persons of wealth and rank.[16]

> A privileged leper could obtain permission to remain outside the leprosarium, either secluded in his own home or in a house or small farm in the countryside. And even were he made to enter a leper house, the situation could be made bearable for a person of position. The leper asylum frequently granted such individuals the right to construct (at their own expense) a building on the leprosarium's land, and certain leprosariums were reserved exclusively for stipulated classes. In Dauphine, there was one leper house for the commons, another for the nobles, and a third for the ladies of the court. The hospital at Walsingham was for lepers who were rich and of good family and that of St Lawrence of Canterbury for the clergy.

Generally incarceration was for life. But the physician's diagnosis could be appealed against and, when the patient's symptoms disappeared, he might be released.

This suggests that there were some differential survival and reproductive advantages for the social élite in the treatment of leprosy. Death would probably come slower and the possibilities of bearing children would be better for the highborn who received special privileges, who lived in comparative comfort, and who had a greater chance of being discharged as cured.

The fact that special leprosariums for court ladies and for the clergy were created shows that the disease was by no means peculiarily an affliction of the poor. Richard I of England may have been a leper and it has been suggested that his sobriquet of "*coeur de lion*" referred, not only to his courage, but to his having the characteristic leonine visage of the leper. A monarch who was indubitably a leper and who died of the disease was Baldwin IV (1161-1185), of the Crusader Kingdom of Jerusalem. This admirable and brave young ruler led his troops into battle when he was already so racked by leprosy that he found it painful in the extreme to raise his lance or ride in armor. An appealing story told about Baldwin is that a courtier once remarked

[16] Saul Nathaniel Brody, *op. cit.*, pp. 69-71.

that it was sad that he should be the only king in Christendom who was a leper. On the contrary, Baldwin replied, he was fortunate to be the only leper in Christendom to be a king!

PLAGUES AND WARS

The plague of Athens, which killed Pericles, lost the Peloponesian War and mortally wounded the most brilliant civilization man has ever known, may have been smallpox or a lethal form of scarlet fever.

A series of plagues of unknown nature during the first centuries of the Christian era may have done more to destroy Rome than the sociological and philosophical causes advanced by such historians as Gibbon, Spengler and Toynbee. The epidemic of 79 A.D. was perhaps fulminating malaria; that of Orosius (125 A.D.) is an enigma; the plague of Galen (164-189) may have also been smallpox.[17] After that came Cyprian's plague and the great outbreak of bubonic plague in the reign of Justinian (540-592) which prevented the re-establishment of the Roman Empire in the West.

One reason the Crusades failed was that the Christian armies were exposed to diseases endemic to the Near East but for which they lacked immunity. In the First Crusade, 300,000 Christian soldiers besieged Antioch in 1098. Three years later, epidemics, scurvy and battle had reduced that force to 20,000. The Second Crusade melted away in similar fashion. The Fourth was laid low by bubonic plague and dysentery.

"The Thirty Years War was in all its phases dominated by deadly epidemics," Zinsser wrote.[18] When Gustavus Adolphus and Wallenstein besieged Nuremberg in 1632, typhus and scurvy killed 18,000 soldiers, forcing both generals to withdraw.

Typhus is a group of related diseases caused by different species of *rickettsiae,* transmitted by arthropods, generally lice and fleas. Its first unambiguous appearance in Europe was in 1489 during the struggle between Spaniards and Moors for Cyprus. Two years later a typhus epidemic struck the Spanish army engaged in the conquest of Granada, killing 17,000 soldiers as against only 3000 slaughtered by the Moors.

The most dramatic achievement of typhus was the destruction of Napoleon's armies during the 1812 invasion of Russia, thus preventing the political unification of Europe. The victory

[17] One theory is that the Huns were infected by smallpox which was raging in Mongolia. When they started their great military westward migration, they gave the disease to the Germanic tribes who resisted them, who in turn introduced it into the Roman Empire.

[18] Hans Zinsser, *Rats, Lice and History*, Little, Brown, Boston, 1935, p. 159.

usually attributed to General Winter was won by General Typhus. The sagacity which Tolstoy attributes to the Russian supreme commander, Kutuzov, in *War and Peace* seems misplaced since microbes had already won the decisive battles.

Napoleon's armies were not destroyed in the retreat from Moscow; they were shattered before they got there. The central invading force, which had crossed the Russian frontier 265,000 strong, had already been reduced to 90,000 effectives when it reached Moscow.[19]

The basic problem was that Slavic Europe was a vast region of filth and poverty in which typhus had for centuries been endemic. The Polish peasants were unwashed and verminous. Their habitations were hovels of the most miserable sort. When the Grand Army proceeded into Russia proper, the squalor and vermin became even more ubiquitous.

Polluted water caused massive outbreaks of dysentery and enteric fevers which weakened Napoleon's forces and overcrowded his field hospitals. Despite the fact that his military medical service was the best the world had seen, once typhus attacked this debilitated force, the slaughter was decisive.

In the First World War, typhus caused havoc on the Eastern Front, but was virtually absent in the trenches of France despite crowding and unsanitary conditions. It is estimated that 25 million cases of typhus occurred in Russia during the First World War and the bloody civil war that followed it.[20]

Hopefully, the last appearance of epidemic typhus on the European Continent was towards the close of the Second World War. With the German transportation system shattered by Allied bombing and food and medical supplies in a shambles, typhus ravaged the concentration and extermination camps, slaughtering tens and perhaps hundreds of thousands of those victims of Nazi genocide who had managed thus far to survive. It may well have caused considerable deaths in the German and Russian POW camps in Poland and the U.S.S.R.

ST ANTHONY'S FIRE

An interesting medieval affliction was known as *ignis sacer* or St Anthony's Fire. First referred to in the annals of the Convent of Zanten (approximately 857 A.D.), the disease struck in epidemic form at least six times between that year and 1129.

Its cause was that the poor ate bread baked from rye, or

[19] Frederick F. Cartwright, *op. cit.*, p. 90. When the last stragglers reached German soil, they numbered 40,000 men, of whom, it was said, only 1000 were ever again fit for duty.

[20] Stanley R. Robbins and Jonathan H. Robbins, "Disease: Human," *Encyclopaedia Britannica, Macropaedia*, Vol. 5, p. 857.

sometimes other grains, infected with ergot, a fungus (*sclerotium*) that develops on grasses. The fungal spores are carried to the rye flowers where they germinate, destroy the ovaries of the rye plant and displace them with ergot — compacted microscopic threads similar in appearance to the rye kernel, but larger and darker.[21] The miraculous cures attributed to St Anthony were due to the fact that the afflicted were cared for in convents and monasteries where they were given ergot-free bread.

Ergot contains about 20 poisonous alkalis, of which one of the most important is lysergic acid (LSD). The infected ears of grain, each containing from one to several ergotized kernels, would be harvested and, if the ergot was not removed, baked into bread.

The symptoms of the disease included colic and vomiting, followed by headaches, vertigo, cramps of the limbs and itching of the skin, paraesthesia and convulsive seizures. It was excruciatingly painful and patients complained of feeling they were being burned alive. When the blood vessels were constricted, gangrene would often set in. Arms and legs would turn black and patients would complain that they were " being eaten up by the holy fire and blackened like charcoal."[22] The fingers and toes of sufferers would sometimes fall off as in leprosy. The convulsive form of ergotism was most prevalent in Russia, the gangrenous form more common in France. It is evident that the symptoms do not resemble LSD intoxication and hence other alkaloids must have been the main pathogenic factor.

In 1934, Sir Edward Mellanby discovered that outbreaks of ergotism generally occurred in periods of food shortage or famine, possibly due to lack of Vitamin A and other protective foods which may give partial immunity.[23]

The affliction was borne primarily by the peasantry, by the poorer classes, and by countries with a cold to temperate climate where agriculture was largely on a small-peasant-holding and subsistence basis.

Rye does best in colder climates and, while ergot can infect wheat and other grains, it is primarily a rye parasite. The peasants who worked in the fields and baked their own bread were more exposed to ergotism than the city dwellers who bought ergot-free bread from bakers.

In medieval Europe, the bread of the poor was baked from a variety of whole grains and other substances, including rye,

[21] Article on " Mycota " in *Encyclopaedia Britannica, Macropaedia,* Vol. 12, p. 756.

[22] Austin Smith, M.D., *Encyclopedia Americana*, Vol. 10, p. 473.

[23] Sir Stanley Davidson and R. Passmore, *Human Nutrition and Dietetics*, Livingstone, London, p. 351.

barley, millet, oats, buckwheat, vetch, beans, peas, lupines, lentils and the bark of trees. In parts of France, the chestnut was "the only resource of the rural poor" and was eaten as bread or after having been boiled in water or milk.[24]

English dietary standards during the Middle Ages were probably considerably better than those of Europe. Since British agriculture was based on large holdings, rather than subsistence plots, a greater proportion of the arable land was under wheat than in France, Germany or Sweden. Probably for this reason, ergotism was common in France, but is hardly mentioned in the English chronicles. A popular derivation of the word *baragouin* indicates the astonishment of Breton soldiers when they first saw white bread in England as contrasted with the rye and other dark bread to which they were accustomed.[25]

MALARIA

Throughout history, malaria has been one of the greatest of all lethal and debilitating agencies. Where it does not kill, it enfeebles. Malaria has played an often decisive, but almost invariably underrated, role in the rise and fall of civilizations.

From the beginning of the fifth century B.C., there is overwhelming evidence—supported by the writings of Plato, Aristotle, Hippocrates and Galen—that Greece was gripped by an insidious and debilitating disease, one that in all probability was malaria.[26] There is no evidence that malaria was prevalent in the age of Homer. It developed only with the cutting down of forests to provide firewood, timber for ships, and more crop and pasture land. This led to erosion and to the formation of stagnant pools and marshes in which malarial mosquitos bred. Wars and civil wars had a similar effect. Irrigation and drainage works would be abandoned in the general disorder or else destroyed by the contending armies.

The decline in the Greek intellect after about B.C. 400 has been attributed to malaria. The disease crossed the Ionian Sea to scourge the Hellenic colonies of Magna Graecia and bring about their decline.[27] Hectic shipbuilding, partly to meet the

[24] Marc Bloch, "Les aliments de l'ancienne France" in Jean-Jacques Hémardinguer (Editor), *Pour une histoire de l'alimentation,* Libraire Armand Colin, Paris, 1970, p. 233.

[25] E. Paramalee Prentice, *Hunger and History,* Caxton, Caldwell, Idaho, 1951, p. 62. *Baragouin* means outlandish or unintelligible speech. Its component parts are the Breton words *bara* for bread and *gwenn* meaning white.

[26] W. H. S. Jones, "The Prevalence of Malaria in Ancient Greece," in Don Brothwell and A. T. Sandison, *op. cit.*, p. 175.

[27] C. F. Craig and E. C. Faust, *Clinical Parasitology,* Kimpton, London, 1945.

military needs of the Punic Wars, deforested the central Italian plains and created swamps and marshes. The African mercenary armies of Carthage brought malarial parasites with them and these found lodgement in the swamp lands. The centuries of Rome's decline may have been associated with a significant increase in the incidence of malaria.[28]

The disease has also been known in ancient China. It has been credited with forcing abandonment of the great Khmer city of Angor Wat in Cambodia and with playing a rôle in the decline of Mayan civilization.[29]

In his great work on the Mediterranean, Braudel points out that "there is not a plain in the Mediterranean today, from Portugal to Lebanon, that is not threatened by the danger of flood waters. Even Mecca disappears under torrential rains in some winters."[30]

As these waters recede, they often leave stagnant ponds, marshes or swamps of reeds because of the flatness of the plain, the slow efflux of the water, the fact that sand dunes bar the way to the sea as in the case of the Pontine Marshes, or for some other reason. Here water becomes synonymous with death.

Malaria in ancient times was often fatal and, when not fatal, it wore men out. Anemic communities, infected by mental and physical lassitude, would lack the energy either to solve their problems or to defend their frontiers.

In the sixteenth century, Braudel writes, "plague, carried from India and China by long-distance travellers, although greatly to be feared, is only a passing visitor to the Mediterranean. Malaria is permanently installed there."[31]

Before the discovery of quinine or its successor synthetic drugs, the cure for malaria was to drain the marshes, put the plains under the plow, create irrigation and drainage systems, and never neglect them. Endemic malaria would sap the will of the people to do these things. If famine, epidemic or war destroyed the hydraulic system, malaria would return. Or else the forests were cut down: in the Roman case, to build ships and to supply firewood for the great public baths.

The virulence of malaria has varied from one historic epoch to another. A significant increase is believed to have occurred towards the close of the Roman Empire in the West, and again toward the end of the fifteenth century.[32] New pathogenes may

[28] C. D. Darlington, *op. cit.*, p. 252.

[29] A. A. Sandosham, M.D., *Malariology with Special Reference to Malaya*, University of Malaya Press, Singapore, 1965, p. 10.

[30] Braudel, Vol. I, p. 63.

[31] Braudel, *op. cit.*, Vol. I, p. 64.

[32] P. Hildebrandt, *Der Kamp ums Mittelmeer*, 1940; Braudel, *op. cit.*, p. 65.

have been introduced in the latter period from the Americas and perhaps from Africa. Braudel points out that Baiae in the Bay of Naples, a resort for high society in Roman times and described as charming in a letter Petrarch wrote in 1343, was deserted in the sixteenth century because its population had fled the fevers. Cyprus had such a bad reputation for malaria that captains, transporting pilgrims to the Holy Land in the sixteenth century, had to agree not to put in to the island for more than three days. The evidence points to a major increase in the degree to which malaria affected the Mediterranean in the century after Columbus.

Malaria is a disease of the plains. The mountain folk are normally not affected. There are other climatic limitations. If a mosquito carries it at temperatures below 68 degrees Fahrenheit, the malarial parasite will not mature during the lifetime of its host and cannot therefore infect man. Nor can the *Anopheles* mosquito breed at temperatures below 61 degrees or if humidity is lower than 63 per cent.[33] These limitations grant comparative immunity to the colder regions of the earth and to most of the temperate zones.

In regions of endemic malaria, the native population often buys partial immunity at a terrible cost. Defective types of haemoglobin develop through mutation. While there are several dozen of them and hence sweeping generalizations permit exceptions, they generally cause fatal anemia in the pure (homozygous) state and severe anemia in the mixed (heterozygous) condition. Sufferers from these genetic anomalies, the best known of which is sickle-cell anemia, escape severe and chronic malaria because the parasite finds the mutant blood pigment indigestible. Darlington calculates that, if a third of the relevant genes in a population exposed to malaria are mutants of this sort, one-ninth of the people will die of the homozygous mutation, probably in childhood, but nearly a third will survive, without severe malaria, but with greatly reduced vigor.[34]

Like most other diseases, malaria has an impact that is the reverse of aristocidal. Areas subject to malaria are avoided by all those who can afford to do so. Only the poorest, the least skilled, the least capable, the people who are driven to marginal and insalubrious lands by the fear of starvation remain in heavily malarial areas. Disease in general strikes at the poorest and most ignorant classes, peoples and races. Malaria is no exception.

[33] H. H. Lamb, "Climate" in *Encyclopaedia Britannica, Macropaedia*, Vol. 4, p. 728.

[34] C. D. Darlington, *op. cit.*, pp. 39-40.

The Distribution of Anthropological Traits in Europe

By BERTIL LUNDMAN*

INTRODUCTION

Geography and history are critical factors in the ethnogenesis of the living peoples of Europe. Some of these groups consist of hypotheses, which would lead too far afield to substantiate more precisely at this time. This article will above all deal with the anthropological relations in Europe at the time of the beginning of industrial civilization. This is the only somewhat static epoch about which we possess extensive knowledge. From this point we shall go back to the time of the first expansion of the Indo-European peoples. However, it is hardly possible to go back further in time.

In terms of natural geography Europe forms an appendage of the Eurasian continent. However, we can still not deny the great independence which our part of the world possesses when viewed from a purely anthropological standpoint. For Europe was and is up to our time the dwelling place of the bulk of the White or Europid race and for most of its pronounced subraces. To the south the region of the predominantly Europid race extends approximately to the northern border of the Sudan savannah. East of the Nile river, however, the racial boundary is very indistinct. In Asia Europid races fill up all of southwest Asia and predominate also in the north of western India—becoming rarer about the northern Deccan region and around the lower Ganges region.

East and north of these areas begins the predominance of the Mongolid races. The Mongolids dominate also in the steppes of southernmost Russia to the lower reaches of the Volga River and up toward the Ural mountains. From here on the racial boundary is likely to pass between the still predominantly Europid Volga Finns and the predominantly Mongolid Voguls, Ostiaks, and Samoyeds. It then reaches the European Arctic Ocean somewhat south of the mouth of the Pechora River.

Herewith we have delineated the predominant Europid region in the Old World. Within this region are found only a few small non-Europid enclaves. One of these is the tiny predominantly Mongolid Pussta region of Hungary—and also the region north of the Azov Sea in the Ukraine. There are in addition a few no less interesting smaller predominantly Negrid regions in the Sahara—and now also in the Atlas mountain region of Morocco.

* Translated from the German by Donald A. Swan.