RENAISSANCE EUROPE AND THE POPULATION OF AMERICA.

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The Renaissance has aptly been characterized as the "Age of Reconnaissance", for behind the revival of interest in classical learning which has given its name to the age was the outpouring of energy in Western Europe that came from the creation of a new technology and new forms of organization. Improvements in ship design and navigation together with application of men and capital enabled Europe to explore deep into the oceans and to reach the shores of the greater part of the inhabited lands on the globe. For most of Asia and Africa it was a charting of coasts and exploration inland, the establishment of factories or posts on shores as foci of trade, with little conquest of the interior. Only in the Western Hemisphere did the Europeans of the Renaissance establish relatively permanent dominion far inland, subject to their rule great native states, and embark upon settlement with relatively substantial numbers. To the middle of the seventeenth century that was the effort of the Portuguese and most of all of the Spanish (1).

One can exaggerate the extent of Hispanic occupation of America in this statement of contrast, true though it is. If one looks at a map of the Americas, it is clear that the Spanish and Portuguese left untouched vast areas: the continental expanses of what was to become Anglo--America, the tropical interior of South America from the southern and eastern slopes of the Andes to the thin coastal fringe of settlement that was Brazil, the almost unending plains of the Chaco and the Pampas merging into Chilean and Argentine Patagonia, where the Araucanians presented an heroic and special resistance. In a century and a half the Europeans did occupy most of the West Indies and in a series

(1). — See the fine book by J. H. Parry, *The Age of Reconnaissance. Discovery, Exploration and Settlement 1450 to 1650,* London, 1963.

of forays and occupations seized control of the zones of dense aboriginal settlement, most notably those in Meso-America and in the Andes. These were the zones of so-called high native civilization, with native populations already organized for the delivery of surplus to clergy and nobility. The European vision basically aimed at superimposition of a European upper class and substitution of another clergy upon a productive base of docile Indian labor and a mediating native upper class to the extent that it remained obedient and useful.

The European intrusion which began conversion of the New World into that extension of Europe called America either annihilated the native cultures or profoundly altered them. In the regions of high native cultures, the innovating and culture-bearing classes were destroyed or neutralized, effectively decapitating the native cultures and preventing recovery from the European conquest through reinvigoration of native elements. The native cultures were aggregated to Europe and became in the end part of European culture through substitution of Christianity and its clergy for the native religious cults and priesthoods, through substantial replacement of the native tongues by Spanish or Portuguese and the relegation of the native tongues to peasant status, through the implantation of European technology and administration, European modes of thought, superstitions, value systems, and very concepts of self (2). The Europeans through initial conquest, *mise-en-valuer* often without intention of destroying the golden cow, and a series of utterly unforeseen concomitants of their navigational unification of the globe brought with them massive and prolonged destruction of the natives as well as their culture and in the end a thorough rebuilding that has left vastly changed populations and cultures. Despite sweeping change major elements of the Europe of 1492 are still recognizable in the Europe of today; that is far less true of the America of today when one searches for major elements of aboriginal culture

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(2). — See, in these regards, Charles Gibson, *The Aztecs under Spanish Ruel. A History of the Indians of the Valley of Mexico, 1519-1810* (Stanford, 1964); George Kubler, "The Quechua in the Colonial World", in *Handbook of South American Indians,* II, 331-410 (Washington, D. C., 1946); Robert Ricard, *The Spiritual Conquest of Mexico. Translated by Lesley Byrd Simpson* (Berkeley, 1966); Fernando de Armas Medina, *Cristianización del Perú (1532-1600)* (Sevilla, 1953); Pierre Duviols, *La lutte contre les religions autochtones dans le Pérou colonial; "l'Extirpation de l'idolâtrie" entre 1532 et 1660* (Institut Français d'Études Andines, Lima, 1971); George Foster, "Report on an Ethnological Reconnaissance of Spain", in *American Anthropologist,* LIII, 311-325 (1951); and "Aspectos antropológicos de la conquesta española de América", in *Estudios americanos,* Sevilla, VIII, No's 35-36, pp. 155-171 (agosto-septembre 1954); Woodrow Borah, "Race and Class in Mexico", in *The Pacific Historical Review,* XXIII, 331-342 (1954).

and technology. Even the term and concepts of America are European creations (3).

Of the many fundamental changes that Renaissance Europe brought to the New World in the creation of America, we shall concentrate here upon one — changes in numbers of inhabitants and in racial composition. In the year 1500 Europe from the Atlantic to the Urals had a population estimated at perhaps sixty to eighty million souls (4). Today that same extension of land supports over six hundred million human beings. By contrast America today has a human population of approximately five hundred millions, perhaps a fifth less than that of present-day Europe (5). Clearly these proportions are not static, for by the end of this century America will surpass Europe in numbers since Latin and Caribbean America (but not Anglo--America) with their low death rates of recent achievement and the high birth rates traditionally theirs (6) show a relentless vital energy that makes them vast nurseries where more than half of the national populations are children and adolescents. Racially the people of America today are a huge potpourri of genetic strains and skin colors; in few countries is there racial homogeneity, and where there is, as in Haiti, it has been achieved by such drastic measures as massacre. Equally clearly the racial heterogeneity and upsurge in numbers characteristic of present American populations have been present for some centuries, for if we look at a mid-point at the beginning of the nineteenth century, marked by Alexander von Humboldt's famous visit to Spanish America (1799-1803), we find the same human potpourri

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(3). — Whether one agrees or not with Edmundo O'Gorman, there is no doubt that he has a point. See his books *La invencion de America, el universalismo de la cultura de Occidente* (Mexico City, 1958) and *La idea del descubrimiento de America. Historia de esa interpretacion y critica de sus fundamentos* (Mexico City, 1951). See also Antonello Gerbi, *La disputa del Nuevo Mundo* (Mexico City, 1960).

(4). — Marcel R. Reinhard and André Armengaud, *Histoire générale de la population mondiale* (Paris, 1961) avoid any global estimate. I arrive at one by adjusting the estimate of Julius Beloch for 1600 (100 millions) in terms of the movement of population Reinhard and Armengaud describe for the fourteenth, fifteenth, and sixteenth centuries. Pp. 72-95; for the estimate of Beloch, see A. M. Carr-Saunders, *World Population. Past Growth and Present Trends* (Oxford, 1936), pp. 30-32. See also Fernand Braudel, *La Mediterranée et le monde mediterranéen à l'époque de Philippe II* (rev. ed., 2 vols., Paris, 1966), I, 361-364.

(5). — The estimates are derived by totalling the figures for the individual countries in the *World Almanac for 1970*.

(6). — See O. Andrew Collver, *Birth Rates in Latin America: New Estimates of Historical Trends and Fluctuations* (Berkeley, 1965) and Eduardo E. Arriaga, *Mortality Decline and Its Demographic Effects in Latin America* (Berkeley, 1970).

and a population of perhaps twenty-five millions as against a European population of nearly two hundred millions (7).

But any such process must have a start and before that start there may be other processes or configurations of behavior. We know that before Renaissance man set foot on the Caribbean shores the Western Hemisphere was racially homogenous: it had only Indians except for a small number of Eskimos in the Arctic fringe. But in 1490 how many Indians were there in the two continents stretching from Cape Horn to the Arctic Ocean? That is a difficult and much debated question. In our own day estimates ranges from lows of 8.4 and 13.4 (9) million to middle ranges of 40 to 70 (10) million and maxima of perhaps 100 million and upwards (11). Differences of these kinds cannot easily be reconciled, nor can scholarship rest easy with the Solomonic device of dividing the child, useful though that is in legend and politics. Let us therefore look into the estimates a bit further.

The bases for the estimates have been as varied as the results. Kroeber, who gives us the lowest estimate of 8.4 millions, based his calculations upon examination of technology and carrying capacity of land tribe by tribe and region by region. He was best acquainted with the Indians of temperate North America. Rosenblat, to whom we owe the estimate of 13.4 millions, resorted in the end, after a massive review of available literature, to application of a concept of credibility and comfort — acceptance of figures with which he could feel at ease — that led him to discard as exaggerated virtually all of the recorded data prior to the compilation of López de Velasco for Spanish America, made in the 1570's. Of the middle-range estimates, that of Karl Sapper (40-60 millions) was derived from a careful examination of technology and carrying capacity zone by zone, but in his case with exceptionally thorough knowledge of Meso-America and the Andes, much of which he had explored on foot and horseback. One is struck by his comment

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(7). — Carr-Saunders, 30 and 42; Reinhard and Armengaud, pp. 225-226.

(8). — Alfred L. Kroeber, *Cultural and Natural Areas of Native North America* (Berkeley, 1939), pp. 131-181, esp. 166.

(9). — Angel Rosenblat, *La población indígena y el mestizaje en América* (3d ed., 2 vols., Buenos Aires, 1954), I, 13.

(10). — Karl Sapper, "Die Zahl und die Volksdichte der indianischen Bevölkerung in Amerika vor der Conquista und in der Gegenwart", in International Congress of Americanists, XXI, The Hague, 1924, *Proceedings*, pp. 95-104; Henry F. Dobyns, "Estimating Aboriginal American Population. 1. An Appraisal of Techniques with a New Hemispheric Estimate", in *Current Anthropology*, VII, 396-398 (1966), citing the estimates of Rivet and Spinden.

(11). — Dobyns, p. 415; Woodrow Borah, "America as Model: The Demographic Impact of European Expansion upon the Non-European World", in International Congress of Americanists, XXXV, Mexico City, 1962, *Actas y memorias*, II, 381.

that he could not accept for the Andes of the Incas a population inferior to that of the Andes in perhaps 1900 when his own wanderings demonstrated that the cultivated area had shrunk substantially (12). Of the perhaps maximal estimates of our day, one by Henry Dobyns (90 to 102 millions), applies an original concept of decline under factors unleashed by the Europeans to an average survival of four percent and hence multiplies by twenty-five the population zone by zone at low point when recorded data more often are available; the other is my admittedly casual comment made upon the basis of study of Meso-America, that we might in the end find that the aboriginal population of the New World in 1490 was "upwards of a hundred million". That is a cautiously incautious statement upon which I prefer to rest until we have more regional studies. It relied, when made, upon application of an average factor of decline throughout the Hemisphere of ninety percent, or an average survival of ten percent.

Hemispheric estimates like these, and there are no other kind, rest in the end upon a decidedly fragile base: conceptions of technology and the carrying capacity of land, credibility applied in somewhat bizarre ways, comfort, and factors of attrition. The last have in their favor that they are derived from recent regional studies but must assume a uniform functioning of some kind in all of the regions of the Western Hemisphere. That, of course, remains to be established.

The one hope of finding evidence and of escaping from an endless round of arguments characterized frequently by faith but distinctly less frequently by charity lies in regional studies. In recent decades we have become aware that for Spanish America there do exist large masses of counts taken at various times during the colonial period for fiscal purposes, essentially collection of tribute from Indians, and for church purposes, and that many of them give evidence for the last years of aboriginal rule as well as for the centuries of European domination. For the Incan Empire there is preserved a good deal of testimony on the results of the last Incan tribute counts since the Spanish in their earlier investigations into ability to pay usually asked about the last Inca tribute count (13); for the realm of the Triple Alliance in Meso-America we have the more difficult testimony of the ideographs in the Matrícula de Tributos and the Codex Men-

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(12). — Karl Sapper, as cited above, and additionally his discussion of his estimates in the light of work by James Mooney and Kroeber, "Beitrage sur Frage der Volkszahl und Volksdichte der vorkolumbischen Indiane bevoelkerung", in International Congress of Americanists, XXVI, Sevilla, 1935, *Trabajos científicos*, I, 456-478, esp. 459-462.

(13). — *Visita hecha a la provincia de Chucuito por Garci Diez de San Miguel en el año de 1567* (Lima, 1964) and *Visita de la provincia de León de Huánuco en 1562, Iñigo Ortíz de Zúñiga, visitador* (Huánuco, 1967).

doza (14). For all of the regions of high aboriginal civilization (15) and for Hispaniola (16), we have numerous counts starting soon after the appearance of the Europeans and taken at relatively frequent though irregular intervals. These counts present problems parallel to those found in counts taken in medieval or Renaissance Europe in that they cover only part of the population and respond either to church or fiscal rather than vital specifications; yet as is the case with the church and fiscal counts of Europe, they can be brought to total numbers of people and to similar territorial coverage (17). The adjustments, however, require complicated calculations and extensive piecing out of data that are apt to leave people unused to demography or to demographic history with a sense of witnessing feats of legerdemain. Yet the methods and theory are those in standard use among bureaus of census and statistical departments around the globe. The results like those of present-day statistical offices equally have margins of error, obviously larger in general but not always more so if one looks at present-day statistics of the so-called Third World (18).

The most detailed and extensive work to date on a region of America has been that Professor Sherbburne F. Cook and myself on central Mexico (19). We were able to build upon the interest of a

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(14). — Sherburne F. Cook and Wood ow Borah, *Essays in Population History: Mexico and the Caribbean,* I (Berkeley and Los Angeles, 1971), 1-72 and especially 5-7.

(15). — *Ibid.,* pp. 411-429; Juan Friede, *Los quimbayas bajo la dominación española. Estudio documental (1539-1810)* (Bogotá, 1963) and "Algunas consideraciones sobre la evolución demográfica en la provincia de Tunja", in *Anuario colombiano de historia social y de la cultura,* Nº 3 (1965), pp. 5-19; Germán Colmenares, *Encomienda y población en la provincia de Pamplona (1549-1650)* (Bogotá, 1969); Darío Fajardo M., *El regimen de la encomienda en la provincia de Velez* (Bogotá, 1969). Clearly wherever the Indians were subjected to encomienda or tribute, there were counts.

(16). — Cook and Borah, *Essays,* I, 376-410.

(17). — See the fine introduction by T. H. Hollingsworth, *Historical Demography,* Ithaca, 1969.

(18). — See, for example, Collver, cited above; see also such studies as Eduardo Cordero, "La subestimación de la mortalidad infantil en México", in *Demografía y economía,* II (1968), 44-62; and United Nations, *Manual IV: Methods of Estimating Basic Demographic Measures from Incomplete Data* ST/SOA/Series A/42.

(19). — Our research, a cumulative series of analyses, has been published in the following: "The Rate of Population Change in Central Mexico, 1550-1570", in *Hispanic American Historical Review,* XXXVII (1957), 463-470; *Price Trends of Some Basic Commodities in Central Mexico* (Ibero-Americana: 40,Berkeley and Los Angeles, 1958); *The Population of Central Mexico in 1548: An Analysis of the* Suma de visitas de pueblos (Ibero-Americana: 43, Berkeley and Los Angeles, 1960); *The Indian Population of Central Mexico, 1531-1610* (Ibero-Americana: 44, Berkeley and Los Angeles, 1960); "Quelle fut la stratification sociale au Centre du Mexique durant la première moitié du XVIe siècle?", in *Annales. Économies, Sociétés, Civilisations, 18e année*

previous generation at the University of California in Berkeley which had accumulated substantial masses of tribute and confessional data for colonial Mexico. Over a number of decades we were able very extensively to increase the mass through searches in Mexico and in Spain and were helped very greatly by the recent publication of additional bodies of data that had come to light. In the end we found ourselves with the initially baffling ideographs of Montezuma's tribute roll in the Matrícula de Tributos and the Codex Mendoza and with masses of data of varying coverage for the early 1530's, 1548-1551, the 1560's, 1769-1786, the 1790's, and 1605-1610. For the 1560's, which became our base period we found that we had usually at least one and often two counts for almost all the two thousand odd Indian towns in central Mexico — in all a ninety percent sample. For the early 1530's, we had a ten percent sample; for 1548-1551, a fifty percent one; for 1579-1586, a sample of approximately fifteen percent; for the 1590's, again a fifty percent sample; and for 1605-1610, a sample of approximately five percent. The years after 1610 until almost the end of the seventeenth century constituted a long gap with only scattered data, but the eighteenth century we found by contrast a virtual Garden of Eden with frequent tribute counts, the earlier ones preserved in a characteristically Spanish fashion through inclusion in a prolonged suit over fees, and with rudimentary state censuses taken in 1742-1746, 1777, and 1789-1794. In the data we found enough evidence on numbers of person per household and per family, widows, widowers, unmarried men and women, infants, children, unmarried adults of both sexes, children undergoing doctrinal training, and communicants that we could establish equivalents and so bring statements in one or more categories to total numbers of persons. Our other major set of calculations has been bringing data to uniform territorial coverage, and for this purpose we have been able to establish the 1560's as a base period and to locate the towns missing in other samples so that we could adjust by use of proportion.

Our perhaps intricate calculations have given us the following estimates for the Indian population of central Mexico at various dates in the sixteenth century:

(1963), pp. 226-258; *The Aboriginal Population of Central Mexico on the Eve of the Spanish Conquest* (Ibero-Americana: 45, Berkeley and Los Angeles, 1963); "On the Credibility of Contemporary Testimony on the Population of Mexico in the Sixteenth Century", in *Summa anthropologica en homenage a Robert J. Weitlaner* (Mexico City, 1966), pp. 234-239; and the *Essays* already cited.

1518	25.2 millions
1532	16.8
1548	6.3
1568	2.65
1585	1.9
1955	1.375
1605	1.075

In the same period the non-Indian and part-Indian population, which was O in 1518 rose to perhaps 200,000 in 1605. Our results emphatically indicate that there was a dense aboriginal population in central Mexico when the first Spaniards landed on its shores and that that population shrank by roughly 96 percent within less than a century.

Another way of analyzing the data at our disposal has been to test for differential operation of destructive factors by climatic zones. For this purpose we sorted all data by the location of the towns within three zones: the coasts or *tierra caliente,* or from sea level to 1000 meters, the *tierra templada,* or an intermediate zone from 1000 to 1500 meters, and *tierra fría,* or the plateau, anything above 1500 meters. We expressed our results in terms of the population of each zone in 1568, which is taken as 1.00, the population in 1518 being expressed as multiples of that base figure:

Tierra caliente	47.80
Tierra templada	9.55
Tierra fría	6.60

Clearly the lethal factors unleashed by the Europeans operated with startling difference according to climatic zone.

Enough research has already been carried out in other regions of Latin America to indicate that central Mexico was not unique. Studies of a number of provinces in Colombia indicate the same massive loss of native population and the same kind of differential action of lethal factors according to climatic zones (20). For Peru even more fragmentary studies indicate also heavy loss of population upon the coming of the white man but further give data for a climatic zone higher in altitude and colder than can be found in Mexico, that is, settlements from 3000 to nearly 5000 meters. In this fourth climatic zone, the

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(20). — See citations in note 15.

native population suffered even less loss (21). Yet another study carried out by Professor Cook and myself has studied the evidence on the native population of the island of Hispaniola, the first major area of European settlement in the Western Hemisphere. Everyone has agreed that the natives died out in a few decades, but the question has been how many were there to die? Professor Cook and I applied to the surviving testimony on numbers the textual analysis common for the study of ancient or medieval European history, determining who was copying whom, what was the probable source of the data, and to which year each statement should be assigned. The last category is critical, for population changes, and if it is assailed by massively lethal factors changes very rapidly. We found for Hispaniola in 1492 a population of approximately eight millions. This huge reservoir of humanity shrank in ten years to less than a tenth and in three decades virtually died out (22) — a remarkable parallel to the experience of the central Veracruz coast with its similarly humid climate and high temperatures.

As far as one can generalize from these studies — admittedly few and derived from too few regions of the Western Hemisphere — the maxima among the hemispheric estimates I have indicated would appear to have the highest probability of being right. When the Europeans first came to the Western Hemisphere, they found dense native populations and whatever the causes these populations melted away upon contact with the Europeans, especially if the contact was one of domination. Destruction of population was most rapid and nearly complete in low-lying humid, tropical areas and least in the coldest areas at highest altitudes.

At this point we must stop briefly to consider an issue that always intrudes, namely, the *Leyenda Negra* and its mirror opposite, the *Leyenda Rosada,* for the generalizations I have just made arouse furious opposition on the essentially emotional ground that such havoc in native populations would constitute blots upon the Spanish honor and, therefore, must be held to be untrue. National honor is a difficult and nebulous subject at best, but let me say merely that if it is held that the Spaniards were worse than other nations of an expanding Europe in their treatment of native peoples, the statement is almost certainly false; on the other hand, if it is held that the Spaniards were substantially better, that is almost certainly false as well. Equally the Spaniards did unto others what most of the others would have done

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(21). — See citations in note 13; C. T. Smith, "Depopulation of the Central Andes in the 16th Century", in *Current Anthropology,* XI (1970), 453-464; and David Noble Cook, "La poblacion indigena en el Perú colonial", in Universidad Nacional del Litoral, Instituto de Investigaciones Históricas, *Anuario,* VIII (1965), 73-110.

(22). — Cook and Borah, *Essays,* I, 377-410.

unto them if they had had the chance; that certainly applies to Montezuma the Younger and Atahualpa if not to the Arawaks. Let us go where the data take us, therefore, and not strain to find an anachronistic morality in the sixteenth century.

The matter of the *Leyenda Negra* of the *Leyenda Rosada* does bring up the problem of the causes for massive loss of native population; presumably those who oppose high estimates as fomenting a Black Legend fear that the Spaniards or Europeans in general will be held responsible for the deliberate massacre of millions of human beings. Now, conquest is hardly an occasion for mass displays of charity and good will. Indeed, we have too many accounts of the bloodshed that did take place in the new-found lands to suppose that conquest in America has been different. But a simple comparison of the small numbers of Spaniards involved and the huge numbers of Indians indicates at once that deliberate slaughter could not have destroked such multitudes. During the decade in which perhaps seven million Arawaks died on Hispaniola, there were from a thousand to five thousand Spaniards on that island, themselves wasted by disease and subject to the high death rate of the tropics (23).

A clue to the major cause of population loss comes from an examination of demographic experience elsewhere on the planet during European expansion. In Farther Asia the advent of the Europeans either had little effect upon numbers or actually led to substantial increases in population. The Philippine Islands, parts of which were conquered, certainly suffered no massive losses such as occurred in the New World. China, which received new American crops that made possible profitable cultivation of its uplands, doubled its population as a result. India also doubled its population under the new peace imposed by British rule in the eighteenth and nineteenth centuries, and in the earlier centuries between the appearance of Vasco da Gama and the triumphs of Clive suffered no observable demographic damage that could be traced to European contact. Indonesia, where the Dutch brought peace and a unified rule, embarked upon an expansion of numbers that increased its population several-fold. For Africa, the Africa south of the Sahara that the Europeans penetrated both earlier and later than the New World called America, the story is considerably more mixed, perhaps because we have much less evidence. What evidence we have suggests that East Africa, which had been long in contact with the non-African countries around the Indian Ocean, showed no disturbance of population and that West Africa, which had not had that kind of continuing contact, showed some damage to population. For West Africa, however, the history is deeply complicated by

(23). — *Ibid.*, 409-410.

the slave trade with its steady export of human beings to the Western Hemisphere. Nevertheless, available evidence to date indicates no depopulation of humid, tropical areas, and abandonment only of some rather small exposed savannah areas near the Sahara too open to slaving raids. The general effect even of the slave trade and its withdrawal of millions of human beings over a period of four centuries may have amounted to little more than an annual cropping which only in rare instances affected the size and potential of the reservoir. The region which shows greatest similarity in experience to America is that of the Pacific Islands. There the coming of the white man in the eighteenth and nineteenth centuries brought rapid death and massive depopulation. The Hawaiian Islands, to give but one example, were estimated by members of the Cook expedition in 1778 to have had around 400,000 inhabitants. Later estimates, mostly by missionaries, show a steadily shrinking population; in 1853, the year of the first census, it was only 71,019. The native population reached its lowest point in the 1890's with about 40,000. The rapid increase of population in recent decades has largely been brought about by immigrants and their progeny (24).

The varied experience of these areas upon the advent of Europeans and their shipping clearly indicates that those regions which were isolated from previous contact suffered most severely. Farther Asia and Africa, which had long been linked with each other and with Europe through long distance trade routes whether by caravan or ship, took little or no damage. The Western Hemisphere and the Pacific Islands, which had long lived in isolation, suffered demographic disaster upon the advent of the Europeans and their shipping. The fundamental cause of destruction must, then, have been disease. The regions of the Old World long linked with each other by complicated systems of shipping and caravan exchanged lethal elements but with a spacing over millennia so that there could be recovery from each assault. Perhaps the best known instance is the havoc wrought by bubonic plague in fourteenth century Europe and the successful recovery of European population in the next two centuries (25). The New World and the Pacific Islands received the accumulated heritage of the Old World, given planetary effect by European shipping, in a few decades and with little or no spacing between epidemics so that whole populations could die out or sink to phenomenally low levels. The Renaissance and the Enlightenment, which brought about navigational

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(24). — See the discussion in Borah, "America as Model". See also Philip Curtin, "Epidemiology and the Slave Trade", in *Political Science Quarterly*, LXXXIII (1968), 190-216, and *The Atlantic Slave Trade. A Census* (Madison, 1969); Andrew W. Lind, *Hawaii's People* (Honolulu, 1955), pp. 15-18 and 25.

(25). — Reinhard and Armengaud, pp. 72-82.

unification of the globe, brought thereby unwittingly the inevitable spread of bacteria, and parasites. So the debate over the *Leyenda Negra* becomes in many ways a debate whether the Spaniards should have anticipated the discoveries of Pasteur.

Until a few decades ago our discussion would have had to halt at the interesting point of deciding that the most important cause of the destruction of the American Indian population could be detected as disease, but in recent years scholars have steadily been probing into such further questions as what was the epidemiological status of the New World before the advent of the Europeans, just what did the Europeans bring, where did it come from, and did European ships carry any return cargoes of lethal elements? The evidence ranges from historical reports, legend, depictions of illness on pottery figures, skeletons unearthed in excavation, coprolites, the presence or absence of disease transmitting vectors, and the patterns of disease in non-human primates in the Old World and the New. What emerges is an interesting story (26). The palaeolithic men who were ancestors of the

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(26). — The discussion which follows is largely based upon a lecture by Dr. Frederick L. Dunn, of the University of California, San Francisco, to a geography seminar in April 1970, material prepared by him for that lecture, and a long personal discussion in which he very generously made his knowledge and reading available to me. In addition, I have consulted *inter alia*, and the reader will find useful the following: R. Hoeppli, *Parasitic Diseases in Africa and the Western Hemisphere. Early Documentation and Transmission by the Slave Trade*. (Acta Tropica, supplementum 10, Basel, 1969), which covers considerably more than its announces, and is the latest summary of research to date; P. M. Ashburn, *The Ranks of Death. A Medical History of the Conquest ofAmerica* (New York, 1947); Werner Kollath, *Die Epidemien in der Geschichte der Menschheit* (Wiesbaden, 1951); E. Wagner Stearn and Allen E. Stearn, *The Effect of Smallpox on the Destiny of the Amerindian* (Boston, 1945); Miguel E. Bustamante, *La fiebre amarilla en Mexico y su origen en America* (Mexico City, 1958), stressing a view hold now but with an excellent discussion of yellow fever epidemics in Mexico and with a fine bibliography; Alfred W. Crosby, Jr., "The Eearly History of Syphilis: A Reappraisal", in *American Anthropologist*, LXXI (1969), 218-227: Philip Curtin, "Epidemiology and the Slave Trade", cited in note 24 has a good discussion of the meaning of isolation and of contact. His *The Atlantic Slave Trade*, cited also in note 24, stresses the meaning of disease death rates among slaves and whites in the tropical and temperate regions of America. For some of the kinds of research into origins and spread of disease, see Frederick L. Dunn, "On the Antiquity of Malaria in the Western Hemisphere", in *Human Biology, XXXVII* (1965), 385-393; "Epidemiological Factors: Health and Disease in Hunter-Gatherers", in Richard B. Lee and Irven DeVore, eds., *Man the Hunter* (Chicago, 1968), pp. 221-228; "Cultural Evolution in the Late Pleistocene and Holocene of Southeast Asia", in *American Anthropologist*, LXXII (1970), 1041-1054; and Dunn and R. Watkins, "Parasitological Examinations of Prehistoric Human Coprolites from Lovelock Cave, Nevada", in *Contributions of the University of California Archaeological Research Facility*, Number 10 (July 1970), pp. 176-185.

American Indians brought with them some diseases from the general pool of the Old World, but they were essentially from the temperate portions of that hemisphere, came in relatively small numbers, and spent millennia in cold and temperate climates. They therefore had lost all tropical diseases except those that could survive in populations of temperate and even arctic habitat. Diseases characteristic of temperate and arctic climates, they could easily have carried with them although in small and scattered bands many infections would have burned themselves out. It seems likely that of the diseases of viral origin the American Indians had infectious hepatitis, arthropod-borne encephalitis, and poliomyelitis, the latter operating as a relatively widespread infection among children of little serious effect. Of rickettsial-borne diseases, the American Indians had mite and tick-borne infections. Of diseases of bacterial origin, they had pneumonia and tuberculosis, two important killers that have no difficulty surviving among populations of temperate and arctic habitat and today remain prominent in the uplands of Middle America. The big question concerns syphilis, which appeared suddenly in southern Italy in 1493 in a fulminating form, spread rapidly over Europe, and within half a century became, if not exactly a companionable disease, at least a less virulent one. One theory is that syphilis is of American origin, was brought to southern Spain on the return voyage of Columbus, and appeared first in Naples because some of the sailors shipped to southern Italy. There is, however, insufficient evidence to establish this theory even though examinations of skeletons in the Caribbean and nearby areas have uncovered clear evidence that veneral syphilis was present in Pre-Columbian times. Another theory, preferred by Heoppli, holds that endemic and veneral syphilis were present in both the Old World and the New, but that more virulent strains to which the populations of neither had immunity may well have developed shortly after the return of Columbus from his first voyage. These strains were transmitted to the Indians by the Europeans (27). Where there is such dispute among experts, the amateur does well to keep his peace. So we must list syphilis as possibly an export to the New World in the form of new and more virulent strains or equally possible a contribution of the New World to the Old. Except for the possible and disputed American origin of syphilis, the list of diseases present in the Western Hemisphere before men of the European Renaissance set foot in it contains almost none of the mass killers in the sixteenth and seventeenth century New World epidemics that have been recorded.

Introductions by the Europeans did not come merely from Europe. The new, greatly improved European ships linked Africa to the New World, especially through the slave trade, and with their shorter voyages

(27). — Hoepli, pp. 94-110, esp. pp. 102-105.

and frequent movement transmitted diseases before they could die out among the confined population of a vessel or a fleet. Not merely diseases of temperate zones were thus brought to America but also those of the tropics. The combined list is long. Of diseases of viral origin, those introduced by the Europeans or their African slaves included smallpox, which desolated central Mexico in 1522 and has been a major killer among American Indians ever since; measles, among the American Indians a dread and lethal infection; rubeola; chicken pox, both of these again dread infections among hitherto unexposed population; influenza; and yellow fever. This last may have become an important cause of death in epidemics only relatively late, for the first recorded epidemic is of the middle of the seventeenth century. Presumably the carrying vector, Aedes Aegypti, itself of Old World origin, had to build up in the new habitat before yellow fever could reach epidemic proportions. Of diseases of rickettsial origin, louse-borne typhus is almost certainly of Old World origin, but one not completely unresolved question concerns the nature of *matlazáhuatl,* an epidemic that devastated Mexico in 1575-1579 and at various times until the 1760's. The symptoms indicate exanthematic typhus, and the epidemic was entirely confined to Indians, but the native name (net of spots) may suggest previous native familiarity. So let us leave a small question mark here. Of diseases of bacterial origin, the Europeans introduced bacillary dysentery, diptheria, typhoid fever, and pertussis, this last (whooping cough) also a dangerous disease in hitherto unexposed populations. Of diseases of protozoal origin, the introductions by Europeans are malaria, long present in the Mediterranean basin, and amoebiasis, commonly known as amoebic dysentery. Among possible imports that did not take root we should mention the dreaded African trypanosomiasis, which failed because its insect vector, the tsetse fly, could not usually survive the ocean voyage on slave ships nor take firm hold in the American tropics. Finally, we should mention the wide range of helminthic infections, such as hookworms, trichuriasis, filariasis, tapeworms, and onchoceriasis, all of Old World origin. These, however, rank as debilitating infections rather than as epidemic killers.

The lenght of this list should be enough to reinforce the point that the Europeans brought many new diseases among which were most of the epidemic ones responsible for the major disasters that destroyed so much of the American Indian population in the sixteenth and seventeeth centuries, and indeed later. Previous isolation meant that the new diseases encountered populations devoid of resistance so that all epidemics reached exceptionally lethal effect and infections such as measles and whooping cough that are benign among groups accustomed to them, became major killers.

Diseases, of course, were not the sole cause. Conquest is and was a bloody business; in the conquest of America the Europeans caused

much destruction of human life. Their handling of the natives showed the same brutality that they used to each other and perhaps even more. There is too much testimony for serious doubt on this score. The remaking of Indian economies and societies for European *mise-en-valeur* and to suit European ideas of civilized society meant permanent disruption of traditional ways of production and distribution, all the costs of sweeping change without measures to cushion the impact, and the almost immeasurable but firmly present psychological despair and loss of vital élan that accompany conquest and prolonged disaster. The epidemics in themselves would have serious compounding factors since they reached such proportions that there were too few remaining healthy to care for the ill and the enfeebled survivors could not make adequate provision for the future. Accordingly, the horrors of famine followed any severe epidemic. Some of the Spanish measures to care better for the diminished population by bringing the remants together in consolidated towns (the policy of *congregación*), we know now exposed the survivors to new contagion and to the spread of helminthic infections.

So, much of the demographic disaster that Renaissance Europe brought upon the New World must be ascribed to lack of vision, or to inadequate vision. It was again the operation of a characteristically human pattern, to embark upon innovation and discover later the costs of disturbance in traditional balance. Human understanding comes often at heavy price; in our own day we face wider crises brought on by our own headlong course and lack of knowledge.