

# The Evolution and Genetics of Latin American Populations

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and

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**CAMBRIDGE**  
UNIVERSITY PRESS

PUBLISHED BY THE PRESS SYNDICATE OF THE UNIVERSITY OF CAMBRIDGE  
The Pitt Building, Trumpington Street, Cambridge, United Kingdom

CAMBRIDGE UNIVERSITY PRESS  
The Edinburgh Building, Cambridge CB2 2RU, UK  
40 West 20th Street, New York NY 10011-4211, USA  
477 Williamstown Road, Port Melbourne, VIC 3207, Australia  
Ruiz de Alarcón 13, 28014 Madrid, Spain  
Dock House, The Waterfront, Cape Town 8001, South Africa  
<http://www.cambridge.org>

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First published 2002

Printed in the United Kingdom at the University Press, Cambridge

*Typeface* Times 10/12.5pt *System* Poltype® [vN]

*A catalogue record for this book is available from the British Library*

*Library of Congress Cataloguing in Publication data*

Salzano, Francisco M.

The genetics and evolution of Latin American populations/Francisco M.  
Salzano and Maria Cátira Bortolini.

p. cm.

Includes bibliographical references and index.

ISBN 0 521 65275 8 (hbk.)

1. Human population genetics – Latin America. 2. Physical anthropology –  
Latin America. I. Bortolini, Maria Cátira, 1961– II. Title.

QH455.S35 2001

599.93'5'098–dc21 2001025508

ISBN 0 521 65275 8 hardback

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# 1 *Origins*

... but the real reason why we study it [evolutionary biology] is that we are interested in origins. We want to know where we came from

*John Maynard Smith and Eörs Szathmáry*

## **A diversity of sources**

To understand the present biology of Latin American populations it is important at the outset to emphasize the large diversity of their founding stocks. The earliest migrants to the continent were those now called Amerindians. The end of the fifteenth century witnessed the so-called European discoveries, which set in motion a mass movement of people not only from that continent, but also from Africa and Asia. In this chapter we will present some background material for the characterization of these migrants, needed for the evaluation of what occurred in the past 500 years.

## **Amerindians**

### *Confusion at the first encounter*

The denomination of ‘Indian’ to the people Christopher Columbus found when he landed in America was due to a mistake, since he and his companions imagined that they had arrived in India. This did not preclude the quick dissemination of this generic designation, although some restrictions have been raised in relation to it (Maestri-Filho, 1994; Field, 1994). America was named to honour Americus Vesputius, the Florentine navigator, who, differently from Columbus, conceived the new lands as a New World (Vesputio, 1951).

### *Controversies*

There is much discussion about almost all aspects related to the arrival of the earliest Americans. (Table 1.1 summarizes some of the questions, and the evidence used to answer them.) In relation to their previous homeland



several options could be considered, but there is an almost unanimous consensus that they probably entered the American continent from Asia through the Bering Strait. A recent proposal to resurrect traces of Polynesian ancestry among these early Americans was shown to be unwarranted by Bonatto *et al.* (1996).

However, establishing an Asian origin is not enough. From where in Asia did they come from? A previous idea that they derived from groups inhabiting eastern Siberia was contradicted by evidence from mitochondrial DNA (mtDNA), since these groups lack a mtDNA haplogroup (B) that is well represented in Amerindians. The T cell lymphotropic virus type II, present in a large number of Amerindian groups, is absent in eastern Siberia. Both the virus and the mtDNA haplogroup B, however, do occur in the indigenous population of Mongolia, suggesting common ancestry between the present Amerindians and Mongolians (Neel *et al.*, 1994).

There is also much controversy about the date of arrival of these migrants, and the number of main waves of migration. The options are indicated in Table 1.1. There is increasing evidence that this date of entry is much earlier than has been supposed, but there are no undisputed indications about this from the archaeological and paleoanthropological material. Based on mtDNA data Bonatto and Salzano (1997*a,b*) suggested a model for the peopling of the Americas in which Beringia played a central role. This region would have been colonized by the Amerindian ancestors, and sometime after this colonization, they would have crossed the Alberta ice-free corridor and peopled the rest of the American continent. The collapse of this ice-free corridor during a few thousand years (about 14 000 to 20 000 years ago) isolated the people south of the ice sheets, giving rise to the bulk of North, Middle and South American Indians. The Na-Dene, Eskimo, and probably the Siberian Chukchi, would have originated from those who had stayed in Beringia, through a process of independent diversification.

This view, however, is not accepted by many scholars, who use other sources of evidence to question it. Here is not the place to examine all arguments in detail, and the reader is directed to the references given at the bottom of Table 1.1 for an appraisal of the most important aspects of these controversies. In relation to the number of migration waves, it would be wise to remember Brandon's (1961) assertion: 'There is no reason whatever to suppose that men of such times were consciously migrating, they were only living'.

***Prehistoric development***

Independently of what happened before, the fact is that a substantial number of people were present in what is now Latin America at the time of European arrival, by the end of the fifteenth century. But again there is much discussion about their precise numbers. The estimates generally relied on are: (a) prehistoric remains, (b) historical accounts, and (c) depopulation rates that occurred due to war, epidemics or other causes; and inferences from these factors are then made about the size of the putative original groups. All of these estimates are subject to errors, due to incomplete conservation of the prehistoric material, exaggerated or wrong testimonies, and local variation of the factors responsible for population decreases and eventual recoveries.

Selected estimates for the number of persons present in several areas, and in the total of Latin America, at the time of the European arrival are given in Table 1.2. For the whole region the number of people varies between 28 and 88 million, with a reasonable value, in our view, being 43 million. Their distribution through the continent, however, was uneven and related to the degree of socioeconomic development the different groups reached through time.

What are the main characteristics of these socioeconomic developments? The groups that first colonized the area were small, assembled as bands which relied mainly on hunting and gathering for their subsistence. They are generally classified under the generic name of Paleoindians, and archeological evidence of them is found all over the area, from Middle America to Tierra del Fuego. Some of the most important sites and cultures related to them are given at the bottom of Table 1.3.

Environmental changes and the extinction of the Pleistocene megafauna conditioned the development, initially in Middle America and the Andes, of agriculture. This occurred around 5000 BP, and led to a real revolution. By this time, the bands started to merge into larger groups or tribes. They could assemble in villages or stay dispersed in neighborhoods, but rarely exceeding, a few thousands of members. Fishing and the collection of mollusks was still an important means of subsistence in the coastal areas, and this strategy would continue together with the incipient agriculture.

The next stage in structural development was reached through the chiefdoms, with the integration of communities and the beginnings of stratification and hierarchies. This began around 2300 BP in different regions, including Middle America, the Intermediary Area (part of Central America, Ecuador and Colombia), as well as Caribbean, Andean and Amazonian territories. Two of the most sophisticated cultures of this

period were the Middle American Olmec tradition, present in the La Venta site, and the Andean Chavín de Huántar (Table 1.3.).

Finally, in Middle America and the Andes, this type of social organization led to the development of states with incipient (Maya) or more developed urban centers (Toltec, Aztec, Inca). At the arrival of the Spaniards in Peru in 1532, the Inca Empire extended from Colombia to central Chile, from the Pacific Ocean to the eastern jungles – the largest political system created in the New World up to that time. Its capital, Cuzco, was as the Inca proclaimed ‘the world’s navel’, and the Empire’s total population is estimated to have been 12–14 million (Bethell, 1984).

This linear scheme of development is just an abstraction. Actually, the process was different in diverse regions, involved reversals, adaptation to local conditions, and in many places (as in the Amazon) the persistence of many groups with essentially the same way of life as they had at the time of colonization of the continent.

We can only guess about the conditions of life that these groups enjoyed under these varied circumstances. There is a long way from the basic egalitarian relationships prevailing in the hunter-gatherer bands to the Inca’s complex hierarchy. The relationships between the center of the Empire and its periphery are also important. Neves and Costa (1998) considered this question with regard to the prehistoric people who inhabited the Atacama Desert of northern Chile and their association with the Tiwanaku empire. They used femur length as an indication of stature, and the latter as an assessment of standard of living. Femur length *per se*, and sexual dimorphism were evaluated (it is known that nutritional stresses affect males and females differentially, reducing sexual differences). Comparisons were made for three periods: before the Tiwanaku influence, during the period of the Empire’s control, and post-Tiwanaku. Both indicators suggested a positive impact (better life conditions) during the associated Tiwanaku/Atacama period. Since the measures do not show any increase in variation in the people of this period, the authors concluded that the data do not support the hypothesis of a concentration of health in a few individuals during Tiwanaku times, but rather a generalized improvement of living conditions.

## **Europeans**

### ***Small but important***

The small size of the European continent (it could be visualized as just a peninsula of the larger Asian continent) contrasts with its historical,

cultural, political, and economic importance. Its history, in many respects, constitutes the essence of humankind's achievements. It was the birthplace of all occidental civilization, both in its material and spiritual aspects. The diversity of its peoples is only matched by their cultural variability. It was from there that, in the sixteenth century, the great adventure of the maritime expansion took place, considerably enlarging our view of ourselves.

### ***Prehistory***

Members of the genus *Homo* (*Homo erectus* and archaic *Homo sapiens*) were present in the region as early as 700 000 years ago. By the late Middle and early Upper Pleistocene (between 200 and 35 thousand years ago) the area was inhabited by a peculiar type of creature, the neanderthals. The appearance of modern humans (*Homo sapiens sapiens*) is documented only much more recently, that is, about 45 000 years ago. A heated debate has been going on for a long time now whether *Homo sapiens neanderthalensis* would have been completely substituted by *sapiens sapiens* without admixture, or whether such admixture did actually occur. Morphologic and genetic data were assembled and variously assessed (reviews in Stringer and Gamble, 1993; Trinkaus and Shipman, 1993). The direct examination of mitochondrial DNA sequences of the neanderthal-type specimen (Krings *et al.*, 1997), determined that they fall outside the variation of modern humans, suggesting that at least in relation to this organelle there was no overlap. These results, however, do not rule out the possibility that neanderthals contributed other genes to modern humans.

### ***Cultural development***

The cultural developments that took place in Europe from the time of *H. sapiens sapiens*' arrival up to around AD 900 are summarized in Table 1.4. It is a long history of achievements, from the simple stone artifacts of the Paleolithic to the Iron Age, reflected in its demographic structure which varied from single bands of hunter-gatherers to sophisticated empires. The interpretation of these facts is also subject to much discussion, which can be exemplified by the models advanced for the spread of agriculture.

Three models have been advanced for the spread of farming, a cultural development which started in the Near East. They are: (a) *demic diffusion*: a slow expansion of people from the Neolithic source population into

Europe who, due to their better suitability, either displaced or absorbed the less numerous Mesolithic hunter-gatherer populations (Ammerman and Cavalli-Sforza, 1984); (b) *cultural diffusion*: which did not involve intrusion of peoples, only of ideas, as well as the trade of crops (Dennell, 1983); and (c) *pioneer colonization*: migration of persons did occur, but was on a small scale, with much less influence in the genetic make-up of the populations involved (Zvelebil, 1986).

These models can be tested, considering the present genetic variability of European groups and that expected under the different alternatives proposed. Three selected examples will be presented here. Barbujani *et al.* (1995) developed five models of microevolution in European populations, considering also their relationships with Indo-European speakers. These were then compared with data from 26 nuclear protein genetic systems. The best correlations between observed and simulated data were obtained for two models in which dispersal depended basically on population growth, thus favoring the demic diffusion hypothesis. But diametrically different conclusions were reached by Richards *et al.* (1996), after an analysis of the mtDNA of 821 individuals from Europe and the Middle East. These authors found that the major extant European mtDNA lineages should have predated the Neolithic expansion, the conclusion being that the spread of agriculture was a substantially indigenous development. Fix (1996), on the other hand, using the HLA system as a model, made a computer simulation that indicated that clinal patterns similar to those observed in European populations could be due to temporal gradients in natural selection. These clines could have been influenced by domestication (specifically to animal husbandry) but not necessarily to the mechanism of demic diffusion. More recently Barbujani *et al.* (1998) and Chikhi *et al.* (1998) reexamined the problem both conceptually and using nuclear DNA markers, clearly favoring the demic diffusion model.

### *Factors responsible for the Maritime Epopée*

More specific information about the events which shaped the lives of people living in the six European countries mainly involved with the Great Navigations of the sixteenth century is given in Table 1.5. They are characterized, in the period considered (AD 1000–1600) by an intense flux of peoples of different ethnic affiliations, wars, and the formation and dissolution of political units. The question that can be asked is: What factors were influential for the development of this great enterprise?

Undoubtedly, significant improvement in the art of navigation is the

first point to be considered. In this connection, Portugal's Prince Dom Henrique (1394–1460) should be mentioned. He founded the School of Sagres, responsible for the training of a series of important Portuguese navigators, who successively, during one century, explored almost all regions of the world.

The structure of the European societies of that time should also be considered (reviews in Wehling and Wehling, 1994; Wasserman, 1996a; Wasserman and Guazzelli, 1996). With a density of 40–60 inhabitants per square kilometer, there was more physical contact among individuals, wider circulation of goods and ideas, and a more intensive exchange of experiences. The societies were structured in a rigid way, which generally involved the monarchy, the Church, the nobility, and the common people – bourgeois, artisans, and peasants. But this does not mean that regional differences did not exist. An important aspect in Portugal's and Spain's initial development must have been the Arab influence, with its characteristic absence of private property and of a pluralistic society in which there were opportunities irrespective of ethnic or religious affiliations. In Europe as a whole, however, the transition between feudalism and capitalism was actively under way. Within this context, the strengthening of the monarchies, the development of trade, the need for a stable monetary system, the crusading ideal that 'the others' should receive the word of Christ, and the Renaissance during the fourteenth to sixteenth centuries, were all important for the developments that took place at that time.

## Africans

### *The cradle of mankind*

There is consensus that the first species of our genus, *Homo habilis*, originated in Africa from an earlier genus *Australopithecus*, now extinct. It is thought that *H. habilis* first appeared some 2.5 million years ago (mya), and was replaced by *H. erectus* at about 1.5 mya. The latter spread to Asia and Europe. The next taxon in this phyletic line was *H. sapiens*, who appeared around 500 thousand years ago (kya) in Africa, and later dispersed to Europe and west Asia. Modern humans (*H. sapiens sapiens*) are first found in East and South Africa around 100 kya (Table 1.6).

### ***Cultural development***

Later developments in Africa are summarized in Table 1.6. People from three basic stocks are recognized as the ancestors of all African populations: Khoisanids, Negroids and Caucasoids. Descendants from the first today inhabit almost exclusively southern Africa, but were once found over a wider area. Present-day representatives are the Khoi and San, notable for characteristics such as steatopygia and languages with characteristic clicks.

Negroids would have given rise to the groups who live today in the tropical forest and in much of eastern and southern Africa, the pygmies probably representing a long-term adaptation to tropical forest. These would include Nilo-Saharan speakers, West Africans and Bantus.

Groups related to modern Caucasoid populations lived in North Africa. In the Maghreb a specific Paleolithic culture developed from 22 000 to 7500 BC, named Iberomarusian, typically of the Cro-Magnon type. At the end of the Pleistocene – early Holocene they coexisted with a pre-Neolithic culture, the Capsian. People from this culture were hunter-gatherers and fishermen who consumed large amounts of mollusks. Later they acquired pottery and sheep, but always retained Paleolithic characteristics.

Neolithic developments involved the appearance of agriculture, cattle domestication, and more efficient fishing economies. Written documents appear in Egypt about 3000 BC. The advent of the Metal Age furnished conditions for the organization of early states and empires (more details in Table 1.6).

### ***State formation***

Starting with the Egyptian and Ethiopian empires, a series of states originated in many parts of the African continent. Some of these are listed in Table 1.7, with the approximate epoch of their existence and location. However, no consensus has been formed for why they originated in so many parts of the African continent. Partial explanations could be: (a) the superiority of iron weaponry which, monopolized by a few, would lead to this development; (b) the increment of long-distance trade, determining the formation of centralized urban groups; (c) the production of economic surplus, bringing about specialization of labor and a restricted group of ‘power’ goods that could be kept in the hands of a few; (d) the need for social management of larger and larger groups, determined by demographic growth; and (e) conquest, or imitation of neighboring states

(Curtin *et al.*, 1978). It is probable that a combination of these factors may have been important, and that they differed in diverse circumstances.

### *The tragic commerce*

Enslavement is part of the history of all ancient populations, but it never before or after reached the levels of the sixteenth to nineteenth centuries, with its tragic impact on African societies. As was emphasized by Curtin *et al.* (1978), it is ironic that maritime contact, which ended Africa's long isolation, should have led to a situation in which its own peoples became Africa's main export product. To understand clearly all aspects of the phenomenon it should be understood that: (a) the trade was uneven along the continent; areas such as the present Republic of South Africa and East Africa, from Tanzania to Ethiopia, were not involved in it; and (b) the Africans themselves were active agents in the process. For instance, there was a convention in West Africa (though not in Central Africa or Mozambique) that the European slave traders should stop at the waterside. Africans themselves would act as middlemen in the trade to the interior.

Details about the main regions where the slave trade was active, ports of exportation, African dealers, and the relative importance of these regions are presented in Table 1.8. The traffic occurred mainly along the West Coast and Mozambique, through several ports, and distinct states acted as dealers. The flow varied among regions during the four centuries of the trade. For instance, in Senegal and Gambia the peak of the traffic in absolute numbers occurred in the eighteenth century, while for Mozambique this happened a century later. The net result, however (e.g. the intercontinental transportation of about 80 000 people per year in the 1780s) was only matched by the intentional overseas European migration that took place in the nineteenth and twentieth centuries. Reader (1998) estimated as 9 million the number of slaves who were shipped across the Atlantic between 1451 and 1870.

What was the impact of the slave trade on the African populations? Some small ethnic groups were completely wiped out. Others suffered heavily for a time (Yoruba, Wolof), some were lightly involved (Benin), while still others (such as the Dahomey) may have profited at the expense of their neighbors. The sheer physical destructiveness of the trade was not high enough to produce differences in social health and progress between aggressors and victims. Its most serious damage to African society was the negative social imprinting that was established upon all the unfortunate victims, and their descendants, who suffered this unethical process (Curtin *et al.*, 1978).



**Other contributors*****The Asian connection***

Migrants to Latin America came from almost everywhere. But in historical times and numerically, besides the groups already mentioned, some of the most important contributors (especially for Middle America, the northern part of South America, and southern Brazil) were people from East Asia (mainly Chinese and Japanese), as well as East Indians and Pakistani.

Asia is presently the most populous continent on earth, 1997 estimates indicating a population of 3.5 billion. More than half are concentrated in China (1.2 billion) and India (0.9 billion). The continent also has a rich prehistoric and historic past. Aspects related to the Mongolian and Siberian contributions to the formation of Latin American Amerindians were discussed earlier in this chapter. Here we shall concentrate on the main events that in the past shaped East Asian (Table 1.9) and East Indian (Table 1.10) populations.

***A millenarian civilization***

Pre-sapiens fossils and artifacts have been found in several places in the present Chinese territory, as well as early *Homo sapiens*, but no neanderthals. In what is now Japan evidence for human occupation near Tokyo 30 kya (the Sanrizuka site), and the oldest pottery in the world (12.7 kya) has been found.

Some of the main events and cultures identifiable in the prehistory or history of East Asia are listed in Table 1.9. The first written documents and urban life can be dated to the epoch of the Shang dynasty, 3.7 kya. The ensuing history is complicated because we are considering a very large territory, high population numbers, and tremendous fragmentation of these populations, with frequent migration from one region to another. However, few points deserve mention. Technical improvements in agriculture were mainly responsible for the population growth. With the end of the feudal system, farmers owned their land, while merchants and artisans became independent of the lords. A new elite also emerged, composed of administrators, teachers and philosophers. During the following years, a complex civilization was developed, which succeeded in developing a closely knit social and political structure that benefited from trade with its neighbors. Assimilation of other people (Turkic, Mongol, Tungusic) was also active, resulting in a closer approximation of northern Chinese to

these populations and to Koreans rather than to the Chinese of the southern provinces.

### ***Kaleidoscopic people and social structures***

The Indian subcontinent provides us with a tremendous amount of social, cultural and ethnic diversity. Main aspects of its development are indicated in Table 1.10. The Indus valley was the scene of urban developments that were not as early as those of Mesopotamia, but which flourished giving rise to important structures such as the Harappan civilization, with its most important city, Moenjodaro, which, at its peak, may have had 40 000 inhabitants or more.

Migration from a wide set of peoples (Indo-Aryans, Greeks, Sakas, Kushanas, Huns, Arabs) and their admixture with the autochthonous populations led to a myriad biological and ethnic diversity. Superimposed on this a complex social structure was developed, including tribal clusters, castes, varnas, caste clusters, jatis, religious communities and sect clusters. Since marriage is regulated by the boundaries of these structures, they should be considered, together with geographic location and language, in any attempt at a delineation of an East Indian group.

### **The 'discovery'**

#### ***Starting with one mistake***

'During all night we heard the sounds of birds' wrote Cristopher Columbus in his diary on 9 October 1492 (Colombo, 1984). Three days afterwards and a little more than 2 months after they left the port of Palos (Spain), the three ships commanded by the Genoese admiral reached a small island called by the surprised and curious natives Guanahani, which was immediately rebaptized as San Salvador. Columbus experienced, in this first contact, a feeling of wonder. In his own words, 'and when I arrived here a perfume so good and gentle came from the flowers and trees that was the sweetest thing in earth'.

The ambitious and devout Columbus believed that he had reached the rich and unknown regions of the Far East, since he had the idea that traveling eastward inevitably would lead him to Asia and the Indies. Contouring the island of Cuba he even identified geographic details described by Marco Polo in his circumnavigation of the Indochina peninsula

(O’Gorman, 1986). In 1506, after being charged by the Inquisition, and poor and forgotten due to the fact that he had not discovered the riches that had stimulated his four expeditions, Christopher Columbus died refusing to accept the evidence that he had not reached the periphery of Kublai Khan’s empire.

To a certain extent it is absurd to speak of the ‘discovery’ of a continent, which at the time of Columbus’s arrival would have held more than 43 million people, magnificent civilizations, and cities larger than Madrid. In addition, it is possible that the continent had been visited by Vikings 500 years previously (Cavalli-Sforza *et al.*, 1994). But the fact is that America would never be the same after this event, its history frequently being divided into pre- and post-Columbian times.

### *Ideology and prejudices*

The Europeans arrived in the New World at a climax of their cultural, military and religious force. This generated a strong Eurocentric feeling of superiority (Herrero, 1996). This imperative was rooted in the fact that the Christian culture and the written tradition were considered as superior. Consequently classified as inferior, or even excluded from the concept of culture altogether, were practices based mainly on oral, popular, and non-Christian traditions, such as those of the Indians and of the Africans brought to the Americas as slaves (Todorov, 1983; Bern, 1995). In addition, important scientific and technological developments gave such a material strength to the Europeans that they became persuaded of the superiority of their civilization.

These facts, and their ignorance of indigenous and African achievements, contributed to the colonizers conceiving of the New World as a place of degradation and exclusion; this as well as mercantile and other views on the possibilities for exploitation. This led to one of the greatest genocides in the history of mankind, with the relegation to the periphery a system of cultures that would not be in keeping with the European tradition. The resulting exploitation system contributed to the welfare of the economy and the wealth of the Iberian and Anglo-Saxon empires for centuries. But the strength of this hegemony was not enough to avoid biological admixture, cultural exchanges, and the blending of colonizers and colonized in a new synthesis. Concomitantly, independent nations were formed. The Latin American world emerged out of turbulence.

Table 1.1. *Controversies related to the arrival of the first Americans, and the types of evidence considered*

<i>Questions</i>	<i>Sources of evidence</i>
1. From where did they come?	1. Geologic
1.1. Siberia	2. Archeologic
1.2. Mongolia	3. Paleoanthropologic and morphologic
1.3. Somewhere else in Asia	4. Linguistic
1.4. Polynesia	5. Medical
1.5. Other places	6. Protein polymorphisms
2. When did they arrive?	7. DNA polymorphisms
2.1. Not earlier than 15 000 years ago	
2.2. Earlier (30 000–40 000 years ago)	
3. How many main waves of migration?	
3.1. Just one	
3.2. Three	
3.3. Four	

*Selected references:* 1. Geologic: Lemmen *et al.* (1994). 2. Archeologic: Hoffecker *et al.* (1993); Prous (1995); Roosevelt *et al.* (1996); Meltzer (1997). 3. Paleoanthropologic: Steele and Powell (1992); Munford *et al.* (1995); Lahr (1995); Neves *et al.* (1996). 4. Linguistic: Greenberg *et al.* (1986); Greenberg (1987); Diamond (1990). 5. Medical: Confalonieri *et al.* (1991); Neel *et al.* (1994). 6. Protein polymorphisms: Schanfield (1992); Cavalli-Sforza *et al.* (1994). 7. DNA polymorphisms: Horai *et al.* (1993); Torroni *et al.* (1994); Wallace (1995); Merriwether and Ferrell (1996); Forster *et al.* (1996); Bonatto *et al.* (1996); Bonatto and Salzano (1997a,b).

Table 1.2. *Estimated numbers for the population present in selected areas and the total for Latin America at the time of the European discovery*

Area	Estimated population (millions)		
	Minimum <sup>a</sup>	Maximum <sup>b</sup>	Most probable
Central México	11	25	14
Central America	0.9	6	5
Caribbean (including Venezuela)	1	10	4
Colombia	—	—	3
Central Andes	12	32	13
Araucanian territory	—	—	1
Brazil	1	7	2
Other	—	—	1
Total	28	88	43

<sup>a</sup>Adding 2 million to account for the missing estimates.

<sup>b</sup>Adding 8 million to account for the missing estimates.

Source: Bethell (1984); Verano and Ubelaker (1992).

Table 1.3. *Chronology of prehistoric and historic sites and cultures in Middle and South America*

Chronology	Middle America		Intermediary area	Carib	Amazon	Andes		Patagonia and Tierra del Fuego
	Highlands	Lowlands				Coast	Highlands	
10 000 BC S			Taima Taima			Monte Verde	Pikimachay	Los Toldos
C	<i>Clovis</i>							
9000 BC S			La Sueva				El Inga	Cueva Fell
			Turrialba					
C	<i>Ajuereado</i>							<i>Magallanes I</i>
8000 BC S			Las Vegas			Quereo	Guitarrero	<i>Magallanes II</i>
C								
7000 BC S	Guila Naquitz		El Abra				Pachamachay	
6000 BC C	<i>El Riego</i>							
5000 BC S	Zohapilco			Banwari Trace		Paloma		
4000 BC S			Cerro Mangote			Quiani		Englefield Island
								<i>Magallanes III</i>
C	<i>Coxcatlán</i>							
3000 BC S			Puerto Hormiga					
C	<i>Abejas</i>							
2500 BC S						Pampa		
C			<i>Valdivia</i>					<i>Magallanes IV</i>
2000 BC S			Pastaza		Tutishcainyo	Huaca Prieta	Kotosh	
			Real Alto			Aspero		
C	<i>Purrón</i>							
1500 BC S						El Paraiso		
						La Florida		
1000 BC S	Tlatilco	San Lorenzo				Cerro Sechín	Wankarani	
						Moxeke		
C		<i>Olmec</i>	<i>Barrancoïd</i>		<i>Ananatuba</i>			
			<i>Malambo</i>					

500 BC	S	Cuicuilco	Nakbe La Venta						
	C								
AD/BC	S	Monte Albán	Tikal El Mirador	La Tolita		Hupa-Iya		<i>Chavín</i> Pukara	
	C								
AD 500	S	<i>Izapa</i> Teotihuacán		<i>Saladoid</i> Manta San Agustín	<i>Saladoid</i>		Sipán		
	C		<i>Classic Maya</i>		<i>Ostionoid</i>	<i>Marajoara</i>	<i>Mochica</i> <i>Nazca</i>		
AD 1000	S	Tula Cholula	Chichén Itza Palenque	Sitio Conte		Mojos Manacapurú		Tiwanaku Huari	
	C			<i>Quimbaya</i> <i>Calima</i> <i>Milagro</i>				<i>Magallanes V</i>	
AD 1500	P	Aztec	Maya	Chibcha	Taino	Several Santarém	Inca Chan Chan	Inca	Ohna, Yaghan
	S	Tenochtitlán	Mayapán						
	C	<i>Toltec</i>			<i>Chicoid</i>	<i>Aruã</i>	<i>Chimú</i>		

P, People (ethnic groups); S, Sites; C, Cultures.

Source: Fiedel (1996).

Table 1.4. *Chronology of prehistoric and historic European development*

Chronology	Stages of development	Cultures	Places
700–500 kya	<i>H. erectus/H. antecessor</i>	Oldowan	Atapuerca, Ceprano
500–200 kya	'Archaic' <i>Homo sapiens</i>	Acheulean	Many sites
200–35 kya	Neanderthals	Mousterian	Almost everywhere at its peak of population development
40 kya	<i>Homo sapiens sapiens</i> Paleolithic	Aurignacian, Gravettian	
18 kya		Lascaux	France, northern Spain
10 kya	Mesolithic	Microliths	Several places
8 kya	Neolithic	Cordial ware, Linear pottery	From Greece to all over Europe
4 kya	Middle Neolithic Copper mining		Began in the Balkans
		Megalithic monuments	
		Stonehenge	England
3 kya		Bell beaker	Western and central Europe
		Globular amphora	Central, northern and eastern Europe
		Corded ware	
		Battleaxe	
	Pastoral nomadism		Ukraine and north of Caucasus mountains
2 kya	Bronze age	Minoan civilization	Crete
		Mycenean civilization	Greece
		'Urnfeld'	Southern Germany, Czech Republic, Slovakia, Austria
1 kya	Iron age	Hallstatt	Western Austria
		La Tène	Northwestern Switzerland
		Etruscan	Italy
		Phoenician influence	Italy, Spain
		Greek empire	Eastern Mediterranean area
		Roman empire	Mediterranean, Balkans, France, England
AD 500	Middle Ages	'Barbarian' influence	All over Europe
AD 900		Magyar influence	Hungary
		Arabian influence	Italy, Spain
		Turkish influence	Balkans

kya: thousand years ago.

Source: Cavalli-Sforza *et al.* (1994).

Table 1.5. *Some key events during the first sixteen centuries of the Christian Era in the five countries mainly involved with the Great Navigations of the sixteenth century*

Chronology	Countries				
	France	Netherlands	Portugal	Spain	British Isles
Around AD 1	Celtic domination	Celtic domination	Roman empire	Roman Empire	Celtic domination
500	Frankish invasion	Frankish invasion	Visigoth invasion	Visigoth invasion	Anglo-saxon invasion
700			Arab invasion	Arab invasion	
800	Holy Roman– German empire	Holy Roman– German empire			Viking invasion
1000–1100			Christian conquest of Coimbra and Lisbon	Kingdoms of Navarra, León Castela and Aragón	Norman invasion
1200–1300			End of Arab occupation	End of Arab occupation	Magna Carta
1301–1500	One-hundred-years war	Burgundy domination	Avis dynasty		One-hundred-years war Wars of the Roses
1501–1600	Religious conflicts and peace	Spanish domination and independence in 1579	Spanish domination	Carlos I and the largest kingdom in Europe	Tudor dynasty and foundation of the Anglican Church

Source: Camargo (1998).



Table 1.6. *Chronology of prehistoric and historic African development*

Chronology	Stages of development	Peoples/cultures/events	Places
2.5 mya	<i>Homo habilis</i>		
1.7 mya	<i>Homo erectus</i>		
100 kya	<i>Homo sapiens sapiens</i>		Omo, Border caves, Klasies river mouth
10 kya	Paleolithic	Khoisanids	East and southern Africa
		Negroids	West Africa
		Caucasoids	North Africa
		Iberomarusian	Maghreb
		Capsian	Libya
7.5–5 kya	Neolithic		Egypt
7.0 kya	Fishing economy	Ishango	Lakes Mobutu and Turkana
4 kya	Agriculture		Sudan, Ethiopia
3 kya	Written documents	Egyptian civilization	Egypt
		Bubalis	Southern Algeria, Libya, northern Chad
		Round head	
2.3 kya		Incorporation of Egypt into the Hellenic World	Egypt
2.3 kya		Gwisho	Zambia
1.5 kya	Cattle domestication	Bovidian	
1 kya		Equidian	
		Bantu expansion	Central and southern Africa
0.6 kya	Metal Age	Kush kingdom	Meroe, Nubia
0.5 kya		Nigerians	Nok
		Lake Victorians	Urewe
AD 100		Roman influence	Northern Africa
700		Arab expansion	Egypt, East Africa
800		Phoenician influence	North Africa

mya: million years ago.

Source: Curtin *et al.* (1978); Cavalli-Sforza *et al.* (1994).

Table 1.7. *A list of some of the African states or empires which were formed in a period of 3.4 thousand years*

Chronology	African states or empires	Places
1500 BC	Egypt	Nile valley
600 BC	Ethiopia	Ethiopia
AD 100	Takrur	Senegal river
400	Ghana	Sahel
400	Aksum	Tigre plateau
800	Gao (a Songrai state)	Niger bend
800	Kanem and Borno	Lake Chad
900	Fatimid	Maghreb
1000	Masudi	Central Mozambique
1100	Almoravid	Maghreb
1100	Mwene Mutapa	Zambezi-Limpopo region
1200	Darfur	Chad
1200	Almohad	Maghreb
1200	Borno	Lake Chad
1300	Mali	Sahel
1500	Malawi	East African interior
1500	Hausa	Central Sudan
1500	Luba	Central Africa
1500	Lunda	Central Africa
1500	Kongo	South of the Zaire river
1600	Songrai	Mali, Senegal
1630	Kuba	South of Sankuru river
1700	Mossi	West of the Niger river
1700	Tio kingdom of Makoko	North of the Stanley Pool
1800	Merina	Madagascar
1850	Futaanke	Between the Niger and Senegal rivers
1890	Samori Ture	Northern Ivory Coast and Ghana

Source: Curtin *et al.* (1978).

Table 1.8. *The African slave traffic*

Region	Ports of exportation	Main dealers	Importance
Senegal/Gambia	St Louis, Rufisque, Joal, Cape Verde islands	Jahanke, Wolof, Bambara, Fuuta Tooro	Furnished about one-third of all the slaves exported from Africa before 1600. Peak in absolute numbers in the eighteenth century
Upper Guinea and Sierra Leone	Cacheu, Cape Verde islands, Conakry	Mane, Fube, Fuuta Jalo	One-third of the slaves exported in the sixteenth century. Total contribution less than 5% of the total
Windward Coast	Fragmented, Grand Lahou	Kuranko, Bambara, Juula, Asante	Never very important, spurts in the sixteenth and eighteenth centuries
Gold Coast	25 major stone forts	Akwamu, Asante, Accra	Up to 1660 small, main export product was gold. Afterwards, increase in the slave trade which reached 75% of total export value by 1680.
Bight of Benin	Whydah, Ajashe, Lagos	Dahomey, Yoruba, Oyo, Edo, Allada, Ouidah	The Benin state generally restricted or prohibited the export of male slaves, in contrast to the other states
Niger Delta and Cameroons	Bonny, Brass, Kalabari	Igo, Efik, Awka, Aro	Supply less numerous but steady
Mozambique	Mozambique, Kilwa, Zanzibar		Major source of slaves to Brazil in the nineteenth century

Source: Curtin *et al.* (1978).

Table 1.9. *Chronology of prehistoric and historic East Asian development*

Chronology	Stages of development	Peoples/cultures/events	Places
230–500 kya	<i>Homo erectus</i>		Lower caves of Zhoukoudian, near Beijing
300 kya	<i>Homo sapiens</i>	Earliest specimens	Dali, Jinniushan and Maba
67 kya		Oldest modern specimens	Liujiang
30 kya		Human occupation	Near Tokyo
12.7 kya	Neolithic	First pottery (oldest in the world)	Japan
10 kya		Jomon culture	Several places in Japan
8.5 kya		Pre-Yang-Shao culture	Several places, China
7.8 kya		Classical Yang-Shao	Shaanxi, Hebei, Hunan
7.0 kya	Agriculture		Shandong province, China
6.0 kya		Ta-Pen-Keng cultures	South coastal region
4.8 kya		Lung-Shan period	China
		Xia dynasty	China
3.7 kya	Writing documents, urban life	Shang dynasty	Center in Honan, northern China
3.1 kya	Feudal system	Chou dynasty	Capital: Shensi
2.5 kya		Division in several warring states	Northern China
		Qin dynasty	
2.4 kya		Yayoi period	Japan
2.2 kya		Han dynasty	China
AD 222		'Six dynasties' period	China
400	Beginning of history	Kofun period	Japan
500		Sui dynasty	China
900		Sung dynasty	China
1200		Mongol conquest	China
1300		Ming dynasty	China
1600		Ching dynasty	China

Source: Bowles (1984); Cavalli-Sforza *et al.* (1994).

Table 1.10. *Chronology of prehistoric and historic East Indian development*

Chronology	Stages of development	Peoples/cultures/events	Places
5.6 kya	Neolithic	Pre-Harappan cultures	Amri, Kot-Diji
5.0 kya		Burzahom	Kashmir valley
4.0 kya	Urban life	Harappan civilization	Moenjodaro, Harappa
3.5 kya	Iron Age	Painted Gray Ware	Gangetic region
2.5 kya		At least 15 kingdoms	Several places
2.0 kya	Entrance into history	Indo-Aryan arrival	Migration from Central Asia through the Iranian plateau
2.4 kya		Greek and Saka migrations	Several places
1.5 kya		Mauryan empire	All India except the extreme south
AD 100–200		Kushana and Hun invasions	Several places
400		Gupta dynasty	Northern India
800		Arab invasion	Northern India
1000		Turk invasion	Northern India
1526		Moghal empire	Almost all India

Source: Cavalli-Sforza *et al.* (1994); Papiha (1996).