PHYSICAL ANTHROPOLOGY AND ARCHAEOLOGY

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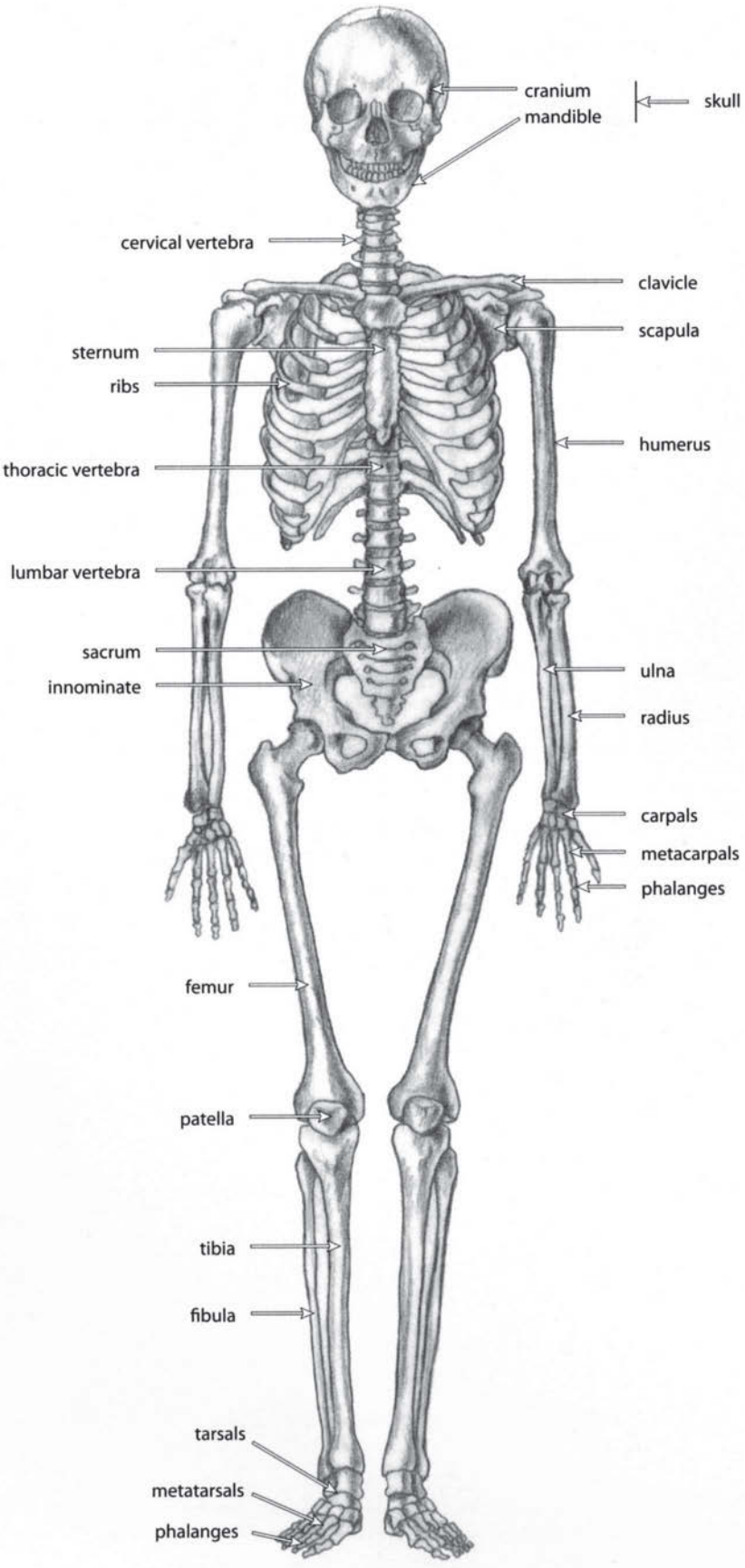
Pearson

FOURTH CANADIAN EDITION

Human
Skeleton



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The Living Primates

The great apes are the chimpanzees, gorillas, and Asian orangutans, while the lesser, smaller apes are the gibbons and siamangs of South and Southeast Asia. Primates are the mammalian order that includes apes, monkeys, and humans. Prosimians, the most primitive of primates, are mainly small, solitary nocturnal creatures. Anthropoids, including apes, monkeys, and ourselves, have larger bodies, and are organized into social groups. All primates have a well-developed visual sense, forward-directed eyes, and larger brains for their body sizes than other mammals.Most live in the tropics, and move around in a variety of different ways.

African Apes

African apes—bonobos, chimpanzees, and gorillas—live in the rain forests and woodlands of Central Africa, from the west coast to areas along the East African rift. Like their Asian relatives, they have long arms, no tails, and broad chests, features that enable them to climb and hang in trees.

Asian Apes

Gibbons and their relatives, the siamangs and orangutans, are confined to South and Southeast Asia. Gibbons are the smallest and most anatomically primitive of all apes, retaining many monkeylike traits. Orangutans are the largest arboreal mammals. Once widespread, they are now confined to forested regions of Borneo and Sumatra.

The Spread of Modern Humans

Fully modern humans evolved in Africa, probably between 200 000 and 100 000 years ago. By 30 000 years ago, they had colonized much of the globe. Rising temperatures at the end of the last Ice Age allowed plants and animals to become more abundant, and new areas were settled. By 8000 B.C., larger populations and

The spread of modern humans

- possible colonization route
- major site 50,000–12,000 BCE
- extent of ice sheet 18,000 BCE
- extent of ice sheet 10,000 BCE
- coastline 18,000 BCE
- ancient river
- ancient lake

intense hunting had contributed to the near extinction of large mammals, such as mastodons and mammoths. In the Near East, groups of hunter gatherers were living in permanent settlements, harvesting wild cereals, and experimenting with the domestication of local animals. The transition to agriculture was under way.

The Spread of Agriculture

The appearance of farming transformed the face of the Earth. It was not merely a change in subsistence, it also transformed the way in which our ancestors lived. Agriculture, and the vastly greater crop yields it produced, enabled larger groups of people to live together, often in permanent villages. After agriculture emerged, craft, religious, and political specialization became more likely, and the first signs of social inequality appeared.

The spread of agriculture

areas of early agriculture, with dates of first domestication of plants and animals

diffusion of agricultural skills

Staple crops under cultivation by c.4000 BCE

- wheat
- barley
- millet
- maize
- rice

Wild ancestors of domesticated animals

- aurochs (wild cattle)
- pig
- sheep
- ass
- dromedary camel
- horse
- bactrian camel
- gaur (wild ox)
- buffalo
- chicken
- goat
- yak
- turkey
- guanaco (llama)
- guinea pig
- alpaca
- banteng

In 5000 B.C., only a limited number of regions were fully dependent on agriculture. In many parts of the globe, small-scale farming began to supplement hunting and gathering, the first steps in the gradual transition to the sedentary agricultural way of life.

Early Farming

c.9000: Einkorn wheat grown in northern Syria: first evidence of true cultivation

c.8500: Rice domesticated in southern China

c.7000: Farming in northern India; barley is main crop

c.7750: Broomcorn and foxtail millets domesticated on North China Plain

c.6500: Farming spreads to Balkans from Southwest Asia

c.6500: Cattle domesticated in Saharan region

c.6000: Farming spreads to Nile Valley from Near East

First evidence of plant and animal domestication in Central America

c.4500: Cultivation of maize in eastern North America

c.4500: Evidence of agriculture in south-central Andes

c.4000: Plants domesticated in sub-Saharan Africa

9000 BC | 8000 | 7000 | 6000 | 5000 | 4000 BC

The First Civilizations

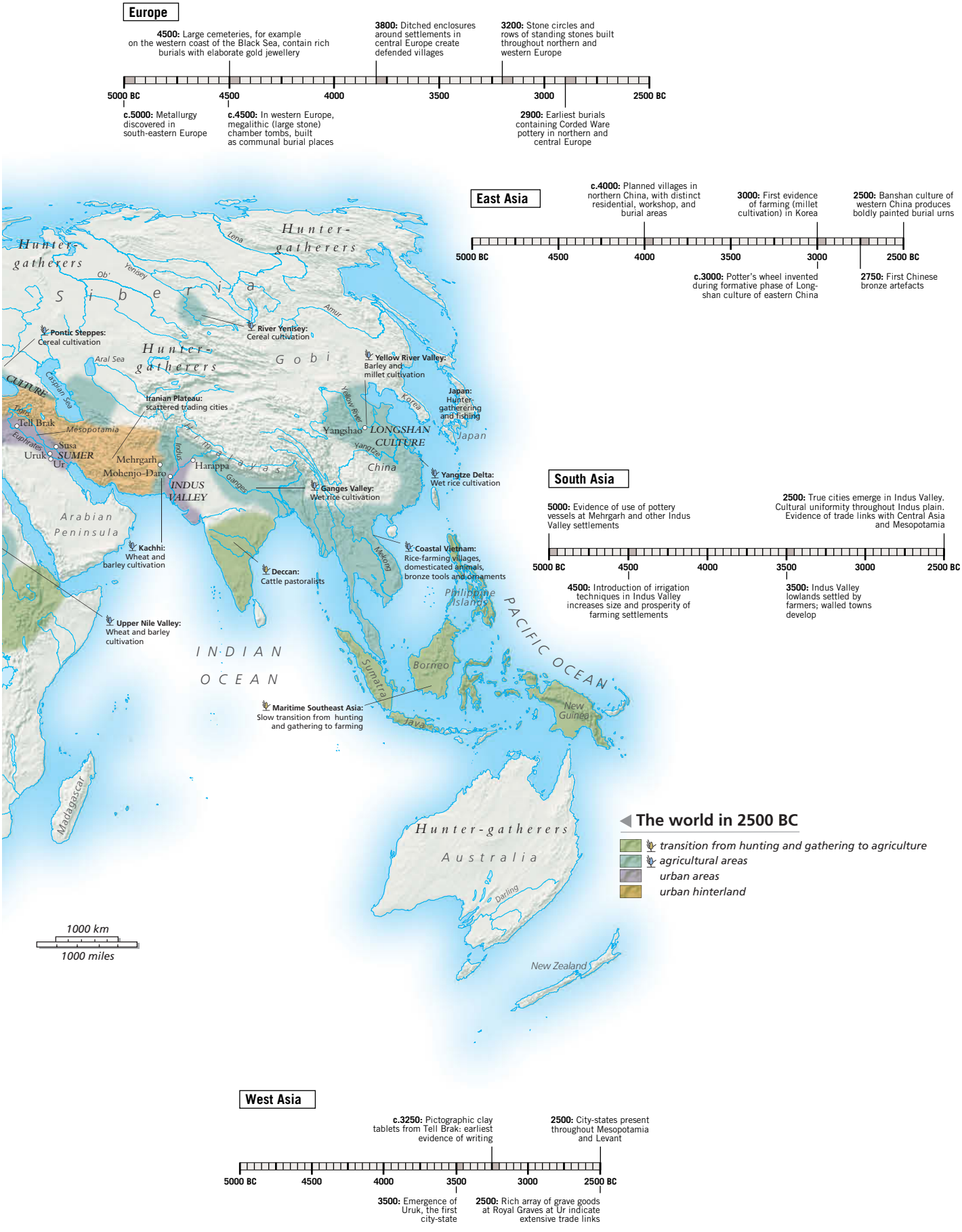
The period between 5000 and 2500 B.C. saw the development of complex urban civilizations in the fertile river valleys of the Nile, Tigris, Euphrates, and Indus. Mesopotamian city states formed small kingdoms, which competed with one another. A literate elite ruled over each civilization, and their artisans experimented with new technologies such as bronze and copper metallurgy. Many village societies developed important ritual centres or buried their dead in communal sepulchres.

The Americas

- **5000 BC**
- **c.4750:** First agriculture in Americas: maize grown in Central America's Tehuacan valley
- **4500**
- **4000:** First pottery in the Americas from Amazon Basin
- **3500:** Cotton cultivated in Central America; used to make fishing nets and textiles
- **3400:** Farming villages established in Tehuacan Valley
- **3000**
- **2600:** Large temple complexes built in villages along the Andean coast
- **2500:** Evidence of long distance trade throughout South America, mainly of valuables
- **2500 BC**

Africa

- **5000 BC**
- **4500**
- **4000**
- **3500**
- **3400:** First walled towns appear in Egypt
- **3100:** King Narmer unifies Upper and Lower Egypt, and becomes first pharaoh. City of Memphis is founded
- **3000:** First evidence of hieroglyphic writing system
- **2650:** The step pyramid of Djoser, the first Egyptian pyramid, is built at Saqqara
- **2530:** Construction of Great Pyramid of Khufu, the largest of the Egyptian pyramids, at Giza
- **2500 BC**


Europe
4500: Large cemeteries, for example on the western coast of the Black Sea, contain rich burials with elaborate gold jewellery
3800: Ditched enclosures around settlements in central Europe create defended villages
3200: Stone circles and rows of standing stones built throughout northern and western Europe
5000 BC
4500
4000
3500
3000
2500 BC
c.5000: Metallurgy discovered in south-eastern Europe
c.4500: In western Europe, megalithic (large stone) chamber tombs, built as communal burial places
2900: Earliest burials containing Corded Ware pottery in northern and central Europe
East Asia
c.4000: Planned villages in northern China, with distinct residential, workshop, and burial areas
3000: First evidence of farming (millet cultivation) in Korea
2500: Banshan culture of western China produces boldly painted burial urns
5000 BC
4500
4000
3500
3000
2500 BC
c.3000: Potter's wheel invented during formative phase of Longshan culture of eastern China
2750: First Chinese bronze artefacts
Hunter-gatherers
Siberia
Lena
Yenisey
Ob'
Amur
Hunter-gatherers
Hunter-gatherers
Gobi
Aral Sea
Caspian Sea
CULTURE
Pontic Steppes: Cereal cultivation
River Yenisey: Cereal cultivation
Yellow River Valley: Barley and millet cultivation
Iranian Plateau: scattered trading cities
Tigris
Tell Brak
Euphrates
Mesopotamia
Susa
Uruk
SUMER
Ur
Mehrgarh
Mohenjo-Daro
Indus
Harappa
Himalayas
Ganges
INDUS VALLEY
Ganges Valley: Wet rice cultivation
Yellow River
Yangshao
LONGSHAN CULTURE
Yangtze
China
Korea
Japan: Hunter-gatherering and fishing
Japan
Yangtze Delta: Wet rice cultivation
Arabian Peninsula
Kachhi: Wheat and barley cultivation
Deccan: Cattle pastoralists
Coastal Vietnam: Rice-farming villages, domesticated animals, bronze tools and ornaments
Mekong
Philippine Islands
PACIFIC OCEAN
Upper Nile Valley: Wheat and barley cultivation
INDIAN OCEAN
Maritime Southeast Asia: Slow transition from hunting and gathering to farming
Sumatra
Borneo
Java
New Guinea
Madagascar
Hunter-gatherers
Australia
Darling
New Zealand
South Asia
5000: Evidence of use of pottery vessels at Mehrgarh and other Indus Valley settlements
2500: True cities emerge in Indus Valley. Cultural uniformity throughout Indus plain. Evidence of trade links with Central Asia and Mesopotamia
5000 BC
4500
4000
3500
3000
2500 BC
4500: Introduction of irrigation techniques in Indus Valley increases size and prosperity of farming settlements
3500: Indus Valley lowlands settled by farmers; walled towns develop
The world in 2500 BC
transition from hunting and gathering to agriculture
agricultural areas
urban areas
urban hinterland
1000 km
1000 miles
West Asia
c.3250: Pictographic clay tablets from Tell Brak: earliest evidence of writing
2500: City-states present throughout Mesopotamia and Levant
5000 BC
4500
4000
3500
3000
2500 BC
3500: Emergence of Uruk, the first city-state
2500: Rich array of grave goods at Royal Graves at Ur indicate extensive trade links

Physical Anthropology and Archaeology

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APPLIED ANTHROPOLOGY

Preface

Physical anthropology explores the intriguing questions that surround the emergence and evolution of humans, what they were like in the past and how they lived, and why they vary biologically. New discoveries, from projects like the Human Genome Project on DNA, are providing evidence that the human past stretches back much further than scientists have predicted, and that humans share a genetic structure similar to other life forms. Archaeology deals with discovering and interpreting that past through remains of long-gone societies. Together, these two disciplines—physical anthropology and archaeology—attempt to reconstruct the past in a way that helps us to understand our roots and to have greater insight into ourselves and some of the problems that concern contemporary societies.

This fourth Canadian edition builds on a strong base. The original edition was designed to highlight the ideas, methods, and discoveries in physical anthropology and archaeology from a Canadian perspective within the framework of Carol R. Ember and Melvin Ember's successful first-year university textbook, *Anthropology*. The intent of this edition remains the same: to provide Canadian students with an introduction to physical anthropology and archaeology that highlights numerous examples of groundbreaking work that Canadian researchers are undertaking. In addition, this edition improves on previous ones by expanding the treatment of the history of anthropology in Canada; providing new sections on how social scientists answer "why" questions using the scientific method; updating the latest advances in archaeological methods and interpretation; and examining how new fossil and archaeological discoveries have changed our understanding of the human past. Many of the interest boxes help to illustrate the fields in which anthropologists toil, from the study of the earliest spoken languages, to how people adapt to and change environments, to the consequences of state formation and why states collapse. They also highlight work that shaped the questions anthropologists ask, new research that addresses them, and how old and new ideas, methods, and discoveries influence the emerging priorities in the discipline.

Foremost, this edition emphasizes to new students of anthropology that physical anthropology and archaeology are contiguous fields. The history of our biology and our cultures cannot be understood in isolation from each other if we are to comprehend our past, present, or future.

Highlights of the Chapters and What Is New in the Fourth Canadian Edition

Chapter 1: What Is Anthropology?

Chapter 1 introduces students to anthropology. We discuss what we think is special and distinctive about anthropology in general, and about each of its sub-fields in particular. We outline how each sub-field is related to other disciplines such as biology, psychology, and sociology. A Perspectives on Gender box highlights the work of a medical anthropologist.

Chapter 2: Uncovering the Past: Tools and Techniques

This chapter introduces the basic concepts behind locating, excavating, and recovering skeletal remains and material culture from the palaeontological and archaeological record. The processes that affect how fossils are formed and where they are found, as well as how archaeological sites form and change over time, are discussed. We also discuss the methods of dating fossils. Chapter 2 explains methods of site surveying and recording, and highlights the importance of provenience, or association, between objects. Finally, we review dating techniques for determining the relative or absolute age of a site and its artifacts.

Chapter 3: Reconstructing the Past: Analysis and Interpretation

Chapter 3 builds on the methods of recovery and analysis outlined in Chapter 2, and discusses a variety of aspects of interpreting archaeological data. The first section of the chapter examines how we reconstruct the past from artifacts, features, and the biological remains of once living peoples. Individual sections show how anthropologists and archaeologists reconstruct past diets, environments, settlement patterns, and social systems. The chapter ends with a discussion of cultural change. Interest boxes discuss interpreting women's roles from artifacts, reconstructing ancient brewing techniques as a means for reconstructing past lifeways, and studying ancient diets through chemical analysis of bones and teeth.

Chapter 4: Historical Development of Evolutionary Theory

This chapter discusses evolutionary theory as it applies to all forms of life, including humans. Following an extensive review of the historical development of the theory of evolution, this chapter ends with a discussion of natural selection and its importance to biological evolution, including how new species might develop. A Current Research and Issues box illustrates the concept of natural selection by examining the current increase in drug-resistant strains of diseases.

Chapter 5: Modern Evolutionary Theory

Chapter 5 introduces the modern theory of evolution, incorporating natural selection and genetics as the processes and basis on which change occurs over time. We also discuss how natural selection may operate on behavioural traits and how cultural evolution differs from biological evolution. We consider the ethical issues posed by the possibility of genetic engineering. A new Applied Anthropology box asks the question, "Who owns your DNA?" A Current Research and Issues box examines the evidence suggesting that evolution proceeds abruptly rather than slowly and steadily.

Chapter 6: Human Variation

Chapter 6, which is moved forward to follow on modern evolutionary theory, deals with biological variation in modern human populations and how biological anthropologists study such variation. In a section on race and racism, we discuss why anthropologists think that the concept of "race" as applied to humans is not scientifically useful. According to this view, human variation is more usefully studied in terms of clinal variation in particular traits. For example, we show how differences between populations—in physical features such as body build, skin colour, height, and susceptibility to disease—can be explained as adaptations to differences in the physical and cultural environment. We discuss the myths of racism and demonstrate that race is largely a social category in humans. We also discuss population variation in susceptibility to diseases and the co-evolution of diseases and humans. A new Applied Anthropology box discusses the use of "race" in forensic anthropology, while another Applied Anthropology box deals with obesity, hypertension, and diabetes in the context of long-term biocultural changes in populations.

Chapter 7: The Living Primates

This chapter describes the living non-human primates and their variable adaptations as background for understanding the evolution of primates in general and humans in particular. After describing the various species, we discuss some possible explanations of how the primates differ—in body and brain size, size of social group, and female sexuality. The chapter ends with a discussion of the distinctive features of humans in comparison with the other primates. A new Perspectives on Gender box explores mother–infant communication and the origin of language, while a new Current Research and Issues box discusses how lemurs and monkeys may have travelled to Madagascar and the New World, respectively, by island hopping.

Chapter 8: Primate Evolution: From Early Primates to Hominoids

Chapter 8 begins with the emergence of the early primates and ends with what we know or suspect about the Miocene apes and their relation to bipedal hominins. We describe the concept of the molecular clock for assessing timing of divergence between species, including hominins from other hominoids. A new Applied Anthropology box discusses the study of biodiversity, and a new Current Research and Issues box focuses on the topic of non-coding DNA. There is also a Current Research and Issues box that presents the work of a Canadian researcher who has studied the remains of a later Miocene ape.

Chapter 9: Early Hominins

Chapter 9 starts with the emergence of the first bipedal hominins. We first discuss trends in, and possible explanations of, the distinctive developments in the hominin line—bipedalism, the expansion of the brain, and the reduction of the face, teeth, and jaws. We then discuss the changing fossil evidence for understanding the evolution of early hominins. This chapter features a new Current Research and Issues box about environmental change and evolutionary consequences in hominins.

Chapter 10: *Homo erectus* and Archaic *Homo sapiens*

Chapter 10 discusses the transition between *Homo erectus* and *Homo sapiens* and the emergence of early modern humans. In keeping with our global orientation, we discuss fossil and archaeological evidence from many areas of the world, not just Europe and the Near East, including evidence indicating that people were hunting big game at least 400 000 years ago. We also explore how the earliest dating of *H. erectus* may affect ideas about when hominins first moved out of Africa. This chapter contains three new boxes: an Applied Anthropology box discussing facial reconstruction, a Current Research and Issues box about the ancestors of *Homo floresiensis*, and another Current Research and Issues box describing the Zhoukoudian cave site in China. A third Current Research and Issues box discusses the first hominins to leave Africa, while a fourth Current Research and Issues box examines growth and development in Neandertals as compared to anatomically modern humans.

Chapter 11: Modern *Homo sapiens*

Chapter 11 discusses the origins of anatomically modern human populations, contrasting the two major competing models—the "single-origin" and multiregional hypotheses. The chapter also covers key changes in cultural practices during the Upper Palaeolithic, including the flourishing of art and new forms of tools. We finish with a discussion of the peopling of the New World and briefly introduce the student to early Arctic cultures. A new Current Research and Issues box discusses the origins of spoken language, and a new Applied Anthropology box asks, "Who were the first North Americans?"

Chapter 12: Origins of Food Production and Settled Life

Chapter 12 deals with the emergence of broad-spectrum collecting and settled life, and the domestication of plants and animals in various parts of the world. Our discussion focuses mainly on the possible causes and consequences of these developments in Southeast Asia, Africa, the Andes, and eastern North America, as well as the Near East and Europe. We discuss puzzles such as why much of Indigenous North America switched to a dependence on corn, even though the earlier agricultural diet was apparently adequate. The chapter includes a new Applied Anthropology box about the archaeology of environmental collapse, and a second Applied Anthropology box discusses the impact of food-getting on the environment.

Chapter 13: Origins of Cities and States

Chapter 13 deals with the rise of civilizations in various areas of the world and the theories that have been offered to explain the development of

state-type political systems. The chapter concludes with a discussion of the decline and collapse of states. Environmental degradation may be due to events in the natural world, but the behaviour of humans may sometimes be responsible. Civilizations may also decline because human behaviour has increased the incidence of disease. A new Applied Anthropology box discusses predicting societal collapse, and a new Current Research and Issues box discusses the question of whether Cahokia, a pre-Columbian city, was a state. A Perspectives on Gender box discusses the consequences for women's status of ancient imperialism in the Andes.

Chapter 14: Applied Anthropology: Physical Anthropology and Archaeology

The first part of Chapter 14 reviews the interaction between basic and applied research, a brief history of applied anthropology in Canada, the ethical issues involved in trying to improve people's lives, the difficulties in evaluating whether a program is beneficial, and ways of implementing planned changes. We point out how applied anthropologists are playing a role more as planners than as peripheral advisers to change programs already in place. The chapter examines several aspects of applied research in biomedical anthropology, environmental anthropology, forensic anthropology, nutritional anthropology, and archaeology as culture history. A new Applied Anthropology box describes raised field agriculture. Another Applied Anthropology box shows how anthropologists were able to explain why a health project in Guatemala did not work, and a Perspectives on Gender box explores the link between eating disorders, biology, and the cultural construction of beauty.

Features

Boxes in Each Chapter

Current Research and Issues. These boxes look at researchers at work or take an in-depth look at new research or a research controversy (for example, the chemical analyses of bones and teeth; interpretation of findings of *Dryopithecus*; Middle Palaeolithic hunting).

Applied Anthropology. These boxes deal with some of the ways anthropologists have studied or applied their knowledge to health and other practical problems (examples include primate conservation; modernization and obesity).

Perspectives on Gender. These boxes involve issues pertaining to sex and gender, both in anthropology and in everyday life (for example, depictions of women in art; changes in women's roles in prehistoric societies).

Readability

We get a lot of pleasure from describing research findings, especially complicated ones, in language that introductory students can understand. Thus, we try to minimize technical jargon, using only the terms students need to know to appreciate the achievements of anthropology and to encourage them to take advanced courses. Readability is important, not only because it enhances the reader's understanding of what we write but also because it makes learning about anthropology more enjoyable! When new terms are introduced, they are set off in boldface type and defined.

NEW! Learning Objectives

Learning objectives are new to this edition. Each chapter begins with learning objectives that indicate what students should know after reading the material. The learning objectives are reinforced with specific questions at the end of each chapter that unite the topics, help students gauge their comprehension, and signal what topics they might have to reread.

Key Terms and Glossary

Important terms and concepts appearing in boldface type within the text are defined at the bottom of each page on which the key term first appears. All key terms and their definitions are repeated in the Glossary at the end of the book.

Summaries

In addition to the learning objectives provided at the beginning of each chapter, each chapter has a detailed summary organized in terms of the learning objectives that will help students review the major concepts and findings discussed, along with review questions to reinforce and to complement the summary.

Think On It Questions

We also provide a series of questions at the end of each chapter to stimulate thinking about the implications of that chapter. The questions do not ask for repetition of what is in the text: we want students to imagine, to go beyond what we know or think we know.

Literature Cited at the End of the Book

The information and conclusions presented in this book are largely based on published research. These sources are cited in the text with full bibliographic references provided at the end of the book.

Supplements

The supplement package for this textbook has been carefully crafted to amplify and illuminate materials in the text itself. These instructor supplements are available for download from a password-protected section of Pearson Canada's online catalogue (www.pearsoncanada.ca/highered). Navigate to your book's catalogue page to view a list of those supplements that are available. Speak to your local Pearson sales representative for details and access.

Instructor's Resource Manual. For each chapter of the text, this manual provides the chapter outline, resources for discussion, discussion questions, paper topics and research projects, and a list of supplementary materials including films and readings.

Computerized Test Bank. Pearson's computerized test banks allow instructors to filter and select questions to create quizzes, tests, or homework. Instructors can revise questions or add their own, and may be able to choose print or online options. These questions are also available in Microsoft Word format.

PowerPoint Presentations. This instructor resource contains key points and figures to accompany each chapter in the text.

Learning Solutions Managers. Pearson's Learning Solutions Managers work with faculty and campus course designers to ensure that Pearson technology products, assessment tools, and online course materials are tailored to meet your specific needs. This highly qualified team is dedicated to helping schools take full advantage of a wide range of educational resources, by assisting in the integration of a variety of instructional materials and media formats. Your local Pearson Canada sales representative can provide you with more details on this service program.

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—Rob Hoppa and Kent Fowler

About the Authors

Carol R. Ember started at Antioch College as a chemistry major. She began taking social science courses because some were required, but she soon found herself intrigued. There were lots of questions without answers, and she became excited about the possibility of a research career in social science. She spent a year in graduate school at Cornell studying sociology before continuing on to Harvard, where she studied anthropology primarily with John and Beatrice Whiting.

For her Ph.D. dissertation she worked among the Luo of Kenya. While there she noticed that many boys were assigned "girls' work," such as babysitting and household chores, because their mothers (who did most of the agriculture) did not have enough girls to help out. She decided to study the possible effects of task assignment on the social behaviour of boys. Using systematic behaviour observations, she compared girls, boys who did a great deal of girls' work, and boys who did little such work. She found that boys assigned girls' work were intermediate in many social behaviours, compared with the other boys and girls. Later, she did cross-cultural research on variation in marriage, family, descent groups, and war and peace, mainly in collaboration with Melvin Ember, whom she married in 1970. All of these cross-cultural studies tested theories on data for worldwide samples of societies.

From 1970 to 1996, she taught at Hunter College of the City University of New York. She has also served as president of the Society of Cross-Cultural Research and is one of the directors of the Summer Institutes in Comparative Anthropological Research, which are funded by the National Science Foundation. She recently served as president of the Society for Anthropological Sciences. Since 1996, she has been at the Human Relations Area Files, Inc., a nonprofit research agency at Yale University, first serving as executive director, then as acting president, and currently as president of that organization.

Melvin Ember majored in anthropology at Columbia College and went to Yale University for his Ph.D. His mentor at Yale was George Peter Murdock, an anthropologist who was instrumental in promoting cross-cultural research and building a full-text database on the cultures of the world to facilitate cross-cultural hypothesis testing. This database came to be known as the Human Relations Area Files (HRAF) because it was originally sponsored by the Institute of Human Relations at Yale. Growing in annual instalments and now distributed in electronic format, the HRAF database currently covers more than 385 cultures, past and present, all over the world.

Melvin Ember did fieldwork for his dissertation in American Samoa, where he conducted a comparison of three villages to study the effects of commercialization on political life. In addition, he did research on descent groups and how they changed with the increase of buying and selling. His cross-cultural studies focused originally on variation in marital residence and descent groups. He has also done cross-cultural research on the relationship between economic and political development, the origin and extension of the incest taboo, the causes of polygyny, and how archaeological correlates of social customs can help us draw inferences about the past.

After four years of research at the National Institute of Mental Health, he taught at Antioch College and then Hunter College of the City University of New York. He served as president of the Society for Cross-Cultural Research. From 1987 until his death in September 2009, he was president of the Human Relations Area Files, Inc.

Peter N. Peregrine came to anthropology after completing an undergraduate degree in English. He found anthropology's social scientific approach to understanding humans more appealing than the humanistic approach he had learned as an English major. He undertook an ethnohistorical study of the relationship between Jesuit missionaries and Native American peoples for his master's degree and realized that he needed to study archaeology to understand the

cultural interactions experienced by Native Americans prior to contact with the Jesuits.

While working on his Ph.D. at Purdue University, Peter Peregrine did research on the prehistoric Mississippian cultures of the eastern United States. He found that interactions between groups were common and had been shaping Native American cultures for centuries. Native Americans approached contact with the Jesuits simply as another in a long string of intercultural exchanges. He also found that relatively little research had been done on Native American interactions and decided that comparative research was a good place to begin examining the topic. In 1990 he participated in the Summer Institute in Comparative Anthropological Research, where he met Carol R. Ember and Melvin Ember.

Peter Peregrine is professor of anthropology at Lawrence University in Appleton, Wisconsin, and external professor at the Santa Fe Institute in Santa Fe, New Mexico. He also serves as research associate for the Human Relations Area Files. He continues to do archaeological research, and to teach anthropology and archaeology to undergraduate students.

Rob Hoppa received a B.Sc. in physical anthropology from the University of Toronto in 1990. Subsequently he pursued graduate work and received a joint M.Sc. in osteology, palaeopathology, and funerary archaeology from the Universities of Bradford and Sheffield (UK) in 1991 and a Ph.D. in physical anthropology from the Department of Anthropology, McMaster University in 1996. His doctoral research focused on issues of sampling for skeletal biology, particularly the impact of bias on palaeodemographic estimates, under the supervision of Shelley Saunders. Following his doctoral research he undertook post-doctoral research in historical demography and epidemiology of a 19th-century subarctic Indigenous community during the decline of the fur trade. In 1998, he joined the Laboratory of Survival and Longevity at the Max Planck Institute for Demographic Research in Rostock, Germany. In July 1999, he joined the Department of Anthropology at the University of Manitoba.

Dr. Hoppa's research has broadly focused on issues of health and well-being in past populations. His research seeks to answer questions regarding the relationship between health and mortality, and changing social, economic, and cultural conditions. His training is strongly anchored in the biocultural tradition that recognizes the complex interaction of biological and social factors related to health and disease in populations.

Dr. Hoppa is currently professor in the Department of Anthropology at the University of Manitoba. His current program of research focuses on the biological anthropology of past populations. He held a Canada Research Chair in Skeletal Biology from 2002 to 2012, and two Canada Foundation for Innovation grants for the establishment of the Bioanthropology Digital Image Analysis Laboratory at the University of Manitoba. There, he and his students are exploring innovative approaches to examining and interpreting data from the past through advanced imaging techniques. Dr. Hoppa served as the president of the Canadian Association for Physical Anthropology from 2005 to 2011.

Kent Fowler received a B.A. and an M.A. in anthropology from the University of Manitoba, where he focused on funerary practices, pottery, and food remains in Early Bronze Age and Neolithic societies in Greece. His Ph.D. research at the University of Alberta shifted to South Africa, where he explored the socio-economic, political, and ritual uses of ceramic technology in early farming communities of the first millennium A.D. Dissatisfied with the kinds, quantity, and detail of ethnographic knowledge about pottery-making in southern Africa cultures, Dr. Fowler initiated the Nguni Ceramics and Society Project (NCSP) in 2002 while a post-doctoral fellow at the University of Calgary under the sponsorship of Dr. Nicholas David. The knowledge gained from this ethnoarchaeological research between 2002 and 2014 added southern Africa to a growing body of evidence concerning the social foundations of technical know-how.

Dr. Fowler's research has focused broadly on the long-term consequences of adopting food production in past societies. Work with colleagues

has seen many kinds of data and approaches brought to bear on questions about the social consequences of food production during research in the eastern Mediterranean, the Near East, Africa, and Canada. His primary research aims to utilize ceramic technology as a means of understanding the organization of farming societies and, in particular, how the manufacture and use of ceramics are linked to routine and special activities people undertake during their lives. His training is deeply rooted in a multi-field approach to anthropology, one that sees a complicated but symbiotic interaction among socio-cultural anthropology, physical anthropology, and archaeology.

Dr. Fowler is currently associate professor in the Department of Anthropology at the University of Manitoba. He is passionate about teaching at both the undergraduate and graduate levels, and is the past recipient of the Faculty of Arts Teaching Excellence Award. For him, teaching and research are different sides of the same coin. His current research program combines ethnoarchaeology, archaeometry, and experimental archaeology to reconstructing ancient technology systems, and applies this research to understanding rural–urban relationships during the 19th-century Zulu kingdom. Research grants have provided the foundation for the Ceramic Technology Laboratory, where Dr. Fowler and his students work on exploring new approaches and methods to examining and interpreting ancient and modern societies through the lens of clay technologies.

1 What Is Anthropology?

Bruno Morandi/Robert Harding World Imagery

LEARNING OBJECTIVES

1.1 Define the purpose of anthropology.

1.2 Describe how anthropology started in Canada.

1.3 Describe the scope of anthropology.

1.4 Explain what the holistic approach means.

1.5 Explain anthropology's distinctive curiosity.

1.6 Describe the fields of anthropology.

1.7 Define *explanation* and discuss its role in anthropology.

1.8 Explain the process of operationalization, the importance of measurement, and the value of statistical evaluation in testing explanations.

1.9 Explain the relevance of anthropology.

What Is Anthropology?

Anthropology by definition is a discipline of infinite curiosity about human beings. The term comes from the Greek *anthropos* for "man, human" and *logos* for "study." Anthropologists seek answers to an enormous variety of questions about humans. They are interested in discovering when, where, and why humans appeared on the earth, how and why they have changed since then, and how and why modern human populations vary in certain physical features. Anthropologists are also interested in how and why societies in the past and present have varied in their customary ideas and practices. There is a practical side to anthropology too. Applied anthropologists solve practical problems using anthropological methods, information, and results.

Yet defining anthropology as the study of human beings is not complete, for such a definition would appear to incorporate a whole catalogue of disciplines: sociology, psychology, political science, economics, history, human biology, and perhaps even the humanistic disciplines of philosophy and literature. Needless to say, practitioners of the many other disciplines concerned with humans would not be happy if these disciplines were regarded as sub-branches of anthropology. After all, most of those disciplines have existed longer than anthropology, and each is somewhat distinctive. There must, then, be something unique about anthropology—a reason for its having developed as a separate discipline and having retained a separate identity over the past 100 years.

A Short History of Anthropology in Canada*

The founders of Canadian ethnology were the missionaries who lived in French Canada in the 1600s. These men, including Fathers LeClercq, Le Jeune and Sagard, were deeply interested in knowing the ways of life and beliefs of the Indigenous people they lived among, and they provided detailed descriptions that were later used by professional anthropologists. Other early Canadian anthropologists included explorer-traders such as Marc Lescarbot, and later teachers at early universities, such as Sir Daniel Wilson at Toronto or Sir John William Dawson at McGill (in the mid-1880s).

Government employees, in particular those with the Geological Survey of Canada, made important records of their travels, including details about Indigenous people they met and observed in the course of their work. The most important of these employees is George Mercer Dawson, who was employed by the Geological Survey from 1875 and rose to be its director in 1895. Dawson helped establish a professional basis for Canadian anthropology, though he died before it was given formal recognition.

In 1910 Prime Minister Wilfrid Laurier established a Division of Anthropology within the Geological Survey, marking the beginning of professional anthropology in Canada. Offices were in the Victoria Memorial Museum in Ottawa, and established anthropologists were recruited from England and the United States. Professor Franz Boas trained Edward Sapir, the first chief ethnologist at the Geological Survey of Canada. Charles Marius Barbeau, a pioneering anthropologist born in rural Québec, was an early contributor to the National Museum (now the Canadian Museum of History). Barbeau's collections of French Canadian material culture, songs, stories and tales provided the foundation for Les Archives de Folklore at Université Laval. Barbeau also recruited to the museum a fellow student from Oxford University, Diamond Jenness.

Like Dawson and Boas, Sapir and Barbeau both studied the Indigenous people of

Anthropology: the study of differences and similarities, both biological and cultural, in human populations. Anthropology is concerned with typical biological and cultural characteristics of human populations in all periods and in all parts of the world.

*Courtesy of The Canadian Encyclopedia, Historica Canada. www.thecanadianencyclopedia.ca.

the Northwest Coast, while Jenness is best known for his research in the Arctic among the Inuinnait. William Wintemberg and Harlan Smith contributed to the collections of prehistoric artifacts.

These men, with a handful of others, had nearly sole responsibility for the development of the profession in Canada from 1910 until 1925, when Sapir left Canada and Thomas McIlwraith took the first academic position in anthropology at a Canadian university. Five years later, McIlwraith was still the sole member of his department at the University of Toronto. The next universities to hire anthropologists, the University of British Columbia and McGill, didn't do so until 1947.

Common trends dominated the development of anthropology in Canada despite differences in language and distances between the various universities and museums. Part of the reason for this uniformity was the widespread influence of the ideas of Franz Boas and his students. Moreover, anthropology in English Canada was built on an interest in Indigenous people living in small, isolated communities. This led to anthropological emphasis on the empirical field-study tradition, with participant observation and interviews with key informants, and resulted in reports that described the technology, economics, social organization, values and world view of each particular community. Research in other areas of Canada and the world gradually increased during the 1960s and 1970s.

In French Canada anthropology was built on rural and small-town studies of the Québec region and its people. The development of anthropology in Québec was based upon the classic studies of French Canadians by early sociologists. The most important figure was Léon Gérin, whose "L'Habitant de St-Justin" illustrated how, in rural Québec, the old European patriarchal system continued to organize the community's lifestyle. This interest in the study of non-Indigenous communities continued to grow throughout the 1960s and 1970s, particularly at the Université de Montréal and Université Laval. Research contributed to the cultural "mapping" of more isolated regions and helped draw attention to socioeconomic disparities. Canadian anthropologists also demonstrated a keen interest in the study of communities beyond Canada, namely in Africa (from the 1970s on), Mexico, Latin America, the Pacific and, later, Asia.

Anthropology first developed within museums and cultural institutions; today, however, it is firmly established at Canadian universities. Fifteen universities offer PhD-track programs in anthropology.

The Scope of Anthropology

Today, the field of anthropology is well established within Canada. Several professional organizations exist in support of the discipline including CASCA, CAA (see Wright 1985, and Mackie 1995 for a history of Canadian archaeology), and CAPA (for a recent history of bioarchaeology in Canada see Cybulski and Katzenberg 2014). Nevertheless, there remain misconceptions of what the discipline represents as it is not often taught in high schools, and is sensationalized in popular culture.

Anthropologists are generally thought of as individuals who travel to little-known corners of the world to study exotic peoples or who dig deep into the earth to uncover the fossil remains or the tools and habitations of people who lived long ago. These views, though clearly stereotyped, do indicate how anthropology differs from other disciplines concerned with humans. Anthropology is broader in scope, both geographically and historically. Anthropologists are concerned explicitly and directly with all people, in all places, and at all times. Beginning with the immediate ancestors of humans, who lived a few million years ago, anthropology traces the development of humans to the present. Every part of the world where a human population has lived is of interest to anthropologists.

Anthropologists have not always been as global and comprehensive in their concerns as they are today. Traditionally, they concentrated on non-Western cultures and left the study of Western

civilization and similarly complex societies, with their recorded histories, to other disciplines. In recent years, however, this division of labour among the disciplines has begun to disappear. Now anthropologists work in a variety of societies, including their own.

What induces anthropologists to choose so broad a subject for study? In part, they are motivated by the belief that any generalization about human beings, any possible explanation of some characteristic of human culture or biology, should be shown to apply to many times and places of human existence. If a generalization or explanation does not prove to apply widely, we are entitled or even obliged to be skeptical about it. The skeptical attitude, in the absence of persuasive evidence, is our best protection against accepting invalid ideas about humans.

For example, when educators in the United States discovered in the 1960s that African-American schoolchildren rarely drank milk, they assumed that lack of money or education was the cause. Evidence from anthropology suggested a different explanation. Anthropologists had known for years that in many parts of the world where milking animals are kept, people do not drink fresh milk; rather, they sour it before they drink it, or they make it into cheese. Why they do so is now clear. Many people lack an enzyme, lactase, which is necessary for breaking down lactose, the sugar in milk. When such people drink regular milk, it actually interferes with digestion. Not only is the lactose in milk not digested, but other nutrients are less likely to be digested as well; in many cases, drinking milk will cause cramps, stomach gas, diarrhea, and nausea. Studies indicate that milk intolerance is found in many parts of the world (Harrison 1975; Durham 1991). The condition is common in adulthood among Asians, southern Europeans, Arabs and Jews, West Africans, Inuit, and North and South American Indigenous peoples, as well as African Americans. As many as 75 percent of all Native Americans are lactose intolerant. It is because anthropologists are acquainted with human life in an enormous variety of geographic and historical settings that they are often able to correct mistaken beliefs about different groups of people.

The Holistic Approach

Another distinguishing feature of anthropology is its **holistic**, or multifaceted, approach to the study of human beings. Anthropologists study not only all varieties of people but many aspects of human experience as well. For example, when describing a group of people, an anthropologist might discuss the history of the area in which the people live, the physical environment, the organization of family life, the general features of their language, the group's settlement patterns, political and economic systems, religion, and styles of art and dress.

In the past, individual anthropologists tried to be holistic and cover all aspects of a subject. Today, as in many other disciplines, so much information has been accumulated that anthropologists tend to specialize in one topic or area. Thus, one anthropologist may investigate the physical characteristics of some of our prehistoric ancestors. Another may study the biological effect of the environment on a human population over time. Still another will concentrate on the customs of a particular group of people. Despite this specialization, however, the discipline of anthropology retains its holistic orientation in that its many different specialties, taken together, describe many aspects of human existence, both past and present.

The Anthropological Curiosity

Thus far we have described anthropology as being broader in scope, both historically and geographically, and more holistic in approach than other disciplines concerned with human beings. This statement again implies that anthropology is the all-inclusive human science. How,

Holistic: refers to an approach that studies many aspects of a multifaceted system.

then, is anthropology really different from those other disciplines? We suggest that anthropology's distinctiveness lies principally in the kind of curiosity it arouses.

Anthropologists are concerned with many types of questions: Where, when, and why did people first begin living in cities? Why do some peoples have darker skin than others? Why do some languages contain more terms for colour than other languages? Why do women have more of a voice in politics in some societies than in others? Why do populations differ in their acceptance of birth control? Although these questions deal with very different aspects of human existence, they have at least one thing in common: they all deal with the *diversity* (both biological and cultural) within and between populations in both the past and present. Such diversity can represent variation in the colour of skin, a language with many colour terms, female participation in politics, or acceptance of birth control. This concern with variation, both biological and cultural, of populations is perhaps the most distinguishing feature of anthropology. For example, whereas economists take a monetary system for granted and study how it operates, anthropologists ask why only some societies during the last few thousand years developed and used money. In short, anthropologists are curious about the typical characteristics of human populations—how and why such populations and their characteristics have varied throughout the ages.

The Fields of Anthropology

Different anthropologists concentrate on different typical characteristics of societies. Some are concerned primarily with physical or biological characteristics of human populations; others are interested principally in what we call cultural characteristics. Thus these two interrelated branches of inquiry in anthropology can be divided into four major sub-fields:

- **Biological or physical anthropology**, which is concerned primarily with the biological diversity of humans, their ancestors, and closely related primates;
- **Archaeology**, which is the study of past human cultures, primarily through their material remains;
- **Socio-cultural anthropology**, which is concerned with the study of recent or contemporary cultures; and
- **Anthropological linguistics**, which is the anthropological study of languages.

Within each sub-field, a variety of research specialties exist, some of which overlap sub-disciplines (see Figure 1–1).

Physical Anthropology

Physical or biological anthropology seeks to answer a variety of questions about the human biological condition in both past and present populations. Some physical anthropologists are interested in the emergence of humans and their evolutionary relationship with other primates (this focus is called **human palaeontology** or **palaeoanthropology**). Others are interested in how and why contemporary human populations vary biologically, and in particular the interactions between biology, environment, and behaviour.

Biological (Physical) Anthropology: the study of humans as biological organisms, dealing with the emergence and evolution of humans and with contemporary biological variations among human populations. Also called *physical anthropology*.
Archaeology: the branch of anthropology that seeks to reconstruct the daily life and customs of peoples who lived in the past and to trace and explain cultural changes. Often lacking written records for study, archaeologists must try to reconstruct history from the material remains of human cultures.
Socio-cultural Anthropology: the study of cultural variation and universals.
Anthropological Linguistics: the anthropological study of languages.
Human Palaeontology: the study of the emergence of humans and their later physical evolution. Also called *palaeoanthropology*.

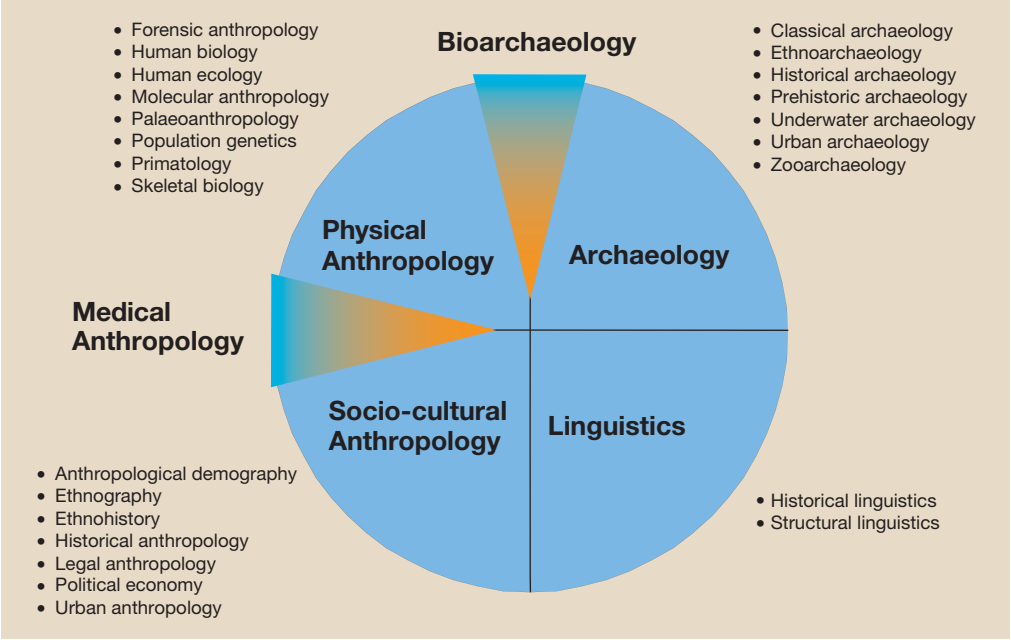

Figure 1–1 The Four Sub-fields of Anthropology

The four major sub-fields of anthropology, as promoted early on by Franz Boas. There are applications of anthropology in all four, and examples of specialties for each sub-field are shown in the lists. Bioarchaeology, drawing from both physical or biological anthropology and archaeology, and medical anthropology, drawing from both physical anthropology and socio-cultural anthropology, are two examples of areas that overlap sub-fields.

In order to reconstruct human evolution, palaeoanthropologists search for and study the buried, hardened remains or impressions, known as **fossils**, of humans, prehumans, and related animals. Palaeoanthropologists working in East Africa, for instance, have excavated the fossil remains of early human ancestors who lived more than 4 million years ago. These findings have suggested the approximate dates when our ancestors began to develop the facility to walk on two legs, very flexible hands, and a larger brain.

In attempting to clarify evolutionary relationships, palaeoanthropologists may use the fossil record and geological information about the succession of climates, environments, and plant and animal populations. Moreover, when reconstructing the past of humans, palaeoanthropologists are also interested in the behaviour and evolution of our closest relatives among the mammals—the prosimians, monkeys, and apes, which, like us, are members of the order of **Primates**. Anthropologists, psychologists, and biologists specializing in the study of primates are called **primatologists**. They observe the various species of primates in the wild and in the laboratory. One especially popular subject of study is the chimpanzee, which bears a close resemblance to humans in behaviour and physical appearance, has a similar blood chemistry, and is susceptible to many of the same diseases. It now appears that chimpanzees share over 95 percent of their genes with humans (Toder et al. 2001; Britten 2002).

Fossils: the hardened remains or impressions of plants and animals that lived in the past.

Primate: a member of the mammalian order Primates, divided into the two suborders of prosimians and anthropoids.
Primatologists: people who study primates.

Spooner/Redmond-Callow/Zuma Press

Biruté Galdikas with two orangutans in Borneo.

From primate studies, physical anthropologists try to discover characteristics that are distinctly human as opposed to those that might be part of the primate heritage. Further, observed behaviours among modern living primates serve as a model for how human ancestors may have behaved under similar environmental conditions. With this information, these anthropologists may be able to infer what our distant ancestors were like. The inferences from primate studies are checked against the fossil record. The evidence from the earth, collected in bits and pieces, is correlated with scientific observations of our closest living relatives. In short, physical anthropologists piece together bits of information obtained from different sources. They construct theories that explain the changes observed in the fossil record and then attempt to evaluate their theories by checking one kind of evidence against another. Palaeoanthropology thus overlaps disciplines such as geology, general vertebrate (and particularly primate) palaeontology, comparative anatomy, and the study of comparative primate behaviour.

Another major focus of physical anthropology investigates how and why contemporary human populations differ in biological or physical characteristics. All living people belong to one species, ***Homo sapiens***, for all can successfully interbreed. Yet there is much that varies among human populations. Investigators of **human variation** ask such questions as, Why are some peoples taller than others? How have human populations adapted physically to their environmental conditions? Are some peoples, such as Inuit, better equipped than other peoples to endure cold? Does darker skin pigmentation offer special protection against the tropical sun?

Physical anthropologists use the principles, concepts, and techniques of at least three other disciplines to further their understanding of human biological diversity: *human genetics* (the study of human traits that are inherited), *population biology* (the study of environmental effects on and

***Homo sapiens*:** all living people belong to one biological species, *Homo sapiens*, which means that all human populations on earth can successfully interbreed. The first *Homo sapiens* may have emerged by 200 000 years ago.
Human Variation: the study of how and why contemporary human populations vary biologically.

interaction with population characteristics), and *epidemiology* (the study of how and why diseases affect different populations in different ways). Research on human variation, therefore, overlaps with research in other fields. Physical anthropologists, however, are concerned most with human populations and how they vary biologically.

Archaeology

The archaeologist seeks not only to reconstruct the daily life and customs of peoples who lived in the past but also to trace cultural changes and offer possible explanations for those changes. This goal is similar to that of the historian, but the archaeologist reaches much farther back in time. The historian deals only with societies that left written records and is therefore limited to the last 5000 years of human history. Human societies, however, have existed for more than a million years, and only a small proportion in the last 5000 years recorded their past in writing. For all those past societies lacking a written record, or where the written record is indecipherable or has disappeared, the archaeologist serves as historian. Lacking written records for study, archaeologists must try to reconstruct history from the remains of human cultures. Some of these remains are as grand as the Mayan temples at Chichén Itzá in Yucatán, Mexico. More often they are as ordinary as bits of broken pottery, stone tools, and garbage heaps.

Most archaeologists deal with the distant past—the time before written records. But there is a specialty within archaeology, called **historical archaeology**, that studies the remains of recent peoples who left written records. This specialty, as its name implies, employs the methods of both archaeologists and historians to study recent societies for which there is both archaeological and historical information.

In trying to understand how and why ways of life have changed through time in different parts of the world, archaeologists collect materials from sites of human occupation. Usually, these sites must be unearthed. On the basis of materials they excavate and otherwise collect, they then ask various questions such as these: Where, when, and why did the distinctive human characteristic of toolmaking first emerge? Where, when, and why did agriculture first develop? Where, when, and why did people first begin to live in cities?

To collect the data they need to find answers to these and other questions, archaeologists rely on techniques and findings borrowed from other disciplines as well as what they can infer from anthropological studies of recent and contemporary cultures. For example, to guess where to dig for evidence of early toolmaking, archaeologists rely on geology and physical geography to tell them where sites of early human occupation are likely to be found near the surface of the earth. To infer when agriculture first developed, archaeologists date relevant excavated materials by a process originally developed by chemists. To understand why cities first emerged, archaeologists may study information from historians, geographers, and others about how recent and contemporary cities are related economically and politically to their hinterlands. If we can discover what recent and contemporary cities have in common, we can speculate on why cities developed originally. Thus, archaeologists gather information from the present and recent past in trying to understand the distant past.

Socio-cultural Anthropology

Cultural anthropologists are interested in how populations or societies vary in their cultural features. But what is culture? To an anthropologist, the term **culture** refers to the customary ways of thinking and behaving of a particular population or society. The culture of a social group includes many things—its language, religious beliefs, food preferences, music, work habits, gender roles, how children are reared, how houses are constructed, and many other learned behaviours and ideas that have come to be widely shared or customary among the group.

Historical Archaeology: a specialty within archaeology that studies the material remains of recent peoples who left written records.

Culture: the set of learned behaviours, beliefs, attitudes, values, and ideals that are characteristic of a particular society or population.

Nancy DeVore/Anthro-Photo

Nadine Peacock, a biological anthropologist, studying reproduction and health among the Efe-Ituri Pygmies of the former Zaire.

Ethnologists seek to understand how and why peoples today and in the recent past differ in their customary ways of thinking and acting. **Ethnology**, then, is concerned with cultural patterns of behaviour, such as marriage customs, kinship organization, political and economic systems, religion, folk art, and music, and with the ways in which these patterns differ in contemporary societies. Ethnologists also study the dynamics of culture, that is, how various cultures develop and change. As well, they are interested in the relationship between beliefs and practices within a culture. Thus, the aim of ethnologists is largely the same as that of archaeologists.

Ethnologists, however, generally use data collected through observation and interviews with people. Archaeologists, on the other hand, must work with fragmentary remains of past cultures on the basis of which they can only make inferences about the customs of **prehistoric** peoples.

One type of ethnologist, the **ethnographer**, usually spends a year or so living with, talking to, and observing the people whose customs he or she is studying. This fieldwork provides the data for a detailed description (an **ethnography**) of many aspects of the cultural behaviours and customs of the group. The ethnographer not only tries to describe the general patterns of their life but also may suggest answers to such questions as these: How are economic and political behaviour related? How may a people adapt their customs to environmental conditions? Is there any relationship between beliefs about the supernatural and beliefs or practices about the natural world? In other words, the ethnographer depicts the way of life of a particular group of people and explains some of the customs observed.

Because so many cultures have undergone extensive change in the recent past, another type of ethnologist, the **ethnohistorian**, studies how

Ethnology: the study of how and why recent cultures differ and are similar.
Prehistoric: in the time before written records.
Ethnographer: a person who spends some time living with, interviewing, and observing a group of people so that he or she can describe their customs.
Ethnography: a detailed description of aspects of cultural behaviours and customs based on observation.
Ethnohistorian: an ethnologist who uses historical documents to study how a particular culture has changed over time.