Fig. 2-1. Mercator's projection and its huge size distortions in the higher latitudes. Greenland looks to be larger than South America and on a par with Africa, when in fact South America is eight times larger.

Fig. 2-2. The United States Geological Survey (USGS) map of Mount Rainier, a sample of the superb hand-drawn cartography in this series. It's worth looking at this with a magnifying glass.

Fig. 2-3. The global grid in lines of latitude (left) from 0 (the Equator) to 90 (Poles North and South) and longitude (right) from 0 at Greenwich, England to 180 across the Pacific Ocean.

Fig. 2-4. The Robinson Projection, like many others before it, keeps the latitude lines equidistant but bends the meridians, greatly reducing the size and shape distortion of the Mercator Projection

Fig. 2-5. Dr. Snow's now-famous map of a part of London's Soho District, recording the location of new cholera cases as well as deaths resulting from earlier infections. Note the concentration of dots around the water pump at Broad and Lexington.

Fig. 2-6. The continents where they were, relative to each other, before Pangaea broke apart and their "drift" began. This map represents the Land Hemisphere about 100 million years ago.

Fig. 3-1. World population growth by region, 2011. For data, see Table 3-1.

TABLE 3-1. RATES OF ANNUAL POPULATION CHANGE BY GEOGRAPHIC REALM (2012) (WORLD AVERAGE = 1.2)

Subsaharan Africa	2.6
Pacific	2.0
North Africa/Southwest Asia	1.9
South Asia	1.7
Middle America	1.6
Southeast Asia	1.3
South America	1.2
Australia/New Zealand	0.8
North America	0.6
East Asia	0.5
Europe	0.0
Russia	–0.2

WORLD POPULATION DISTRIBUTION
One dot represents 100,000 people

0 1000 2000 3000 Kilometers
0 500 1000 1500 Miles

Fig. 3-2. World population distribution via dot map shows the three greatest concentrations, all in Eurasia, a historic pattern that endures although Africa's growth rate exceeds all others today.

Fig. 3-3. Global core and periphery. This is only one possible representation of this phenomenon; as depicted here, the core contains about 15 percent of the world's population and earns 75 percent annually of all the money made.

WEGENER'S CONTINENTAL DRIFT HYPOTHESIS

Fig. 4-1. A modified version of Wegener's original map. He had the dates wrong and the mechanism he proposed to account for the "drift" of continents was a failure, but his hypothesized supercontinent, Pangaea, did exist as he postulated it.

Fig. 4-2. The Pacific "Ring of Fire"—an ocean-fringing belt of active volcanoes and earthquake epicenters—marks the planet's most unstable crustal zone. Note the traces of the Mid-Atlantic Ridge and other midoceanic ridges in the Indian and South Pacific oceans, where new crust is formed.

TABLE 4-1. THE GEOLOGIC TIME SCALE

Fig. 4-3. Some details of Pangaea, the ancient supercontinent, and its southern sector, called Gondwana. The circular area in the south is the glaciated part of Gondwana; the South Pole lay between present-day Antarctica and South Africa.

**GLOBAL TEMPERATURE CHANGE,
LATE CRETACEOUS TO PRESENT**

Fig. 4-4. Inferred planetary temperature trends after the K/T impact. The Late Cenozoic Ice Age, still in progress, began about 36 million years ago. Hominins had to survive ever-colder temperatures and sharp climatic fluctuations during the Pliocene.

Fig. 4-5. Early primate dispersals from Eurasia into Africa and Indonesia. Late Miocene cold drove these primates southward, giving rise to the lineages of the gorilla and the chimpanzee in Africa and the orangutan in Southeast Asia. From a drawing in D. R. Begun (2003), "Planet of the Apes," Scientific American, 289:2.

Fig. 4-6. The Northern Hemisphere as it was during a Pleistocene glaciation. Ice covered North America as far south as the Ohio River and Eurasia from Britain to Russia.

Fig. 4-7. The timing and route(s) of early human migration from Africa into Eurasia and beyond are still being reconstructed: this is one possible version.

Fig. 5-1. Temperatures in the Northern Hemisphere over the past 18,000 years. Rapid warming and fast melting of the Wisconsinan glaciers is followed by a sudden return to bitterly cold temperatures (the Younger Dryas) but just as quickly the warming trend resumes and has continued, with some fluctuations, until the present day. Today, after a cooling period from about 1940 to 1970, global warming is augmented by human pollution of the atmosphere.

Fig. 5-2. Glaciations and interglacials during the past 400,000 years of the Pleistocene. Note that glaciations are not uniformly cold and interglacials are not consistently warm. Humans settled Europe during some of the Wisconsinan's coldest times. Modified from J. Hansen (2004), "Defusing the Global Warming Time Bomb," Scientific American, 290:1.

Fig. 5-3. Aggregate evidence of global average temperature change, 1860–2010. A composite of many such calculations, this record suggests a rise in temperature in excess of 1° centigrade. Note the average decline, 1940s to 1960s, and the accelerated rate of warming after 1970.

A: Equatorial, Tropical, Moist

B: Desert, Dry

C: Midlatitude, Mild

D: Continental, Harsh

E: Polar, Frigid

H: Highland

WORLD CLIMATES
After Köppen–Geiger

A HUMID EQUATORIAL CLIMATE

- Af — No dry season
- Am — Short dry season
- Aw — Dry winter

B DRY CLIMATE

- BS — Semiarid
- BW — Arid

h=hot
k=cold

C HUMID TEMPERATE CLIMATE

- Cf — No dry season
- Cw — Dry winter
- Cs — Dry summer

D HUMID COLD CLIMATE

- Df — No dry season
- Dw — Dry winter

a= hot summer
b=cool summer
c= short, cool summer
d=very cold winter

E COLD POLAR CLIMATE

- E — Tundra and ice

H HIGHLAND CLIMATE

- H — Unclassified highlands

0 1000 2000 3000 Kilometers
0 1000 2000 Miles

Fig. 5-4. The Koppen-Geiger map of world climates. Note the vast expanses of desert and steppe, rainforest and polar climates; it is interesting to compare this map to Figure 3-2, World Population Distribution. Our planet is small; most of its surface is water and ice; only a comparatively small part of the land is habitable with adequate water and moderate temperatures—and yet 7 billion of us are aboard.

ing the rate of pollution of the atmosphere should have priority as a public health as well as an environmental matter. But ice ages will continue to come and go. Glaciers will wax and wane. Sea levels will fall and rise. Species, cultures, and civilizations will flourish and fail. Nature's power will prevail.

Fig. 6-1. The world divided into geographic realms. Not shown here is the division of each realm into component regions, for example West Africa, East Africa, Equatorial/Central Africa, and Southern Africa.

Fig. 6-2. The domain where Muslims ruled has expanded and contracted over time (for example, Muslim rule was ended in Iberia and later in Eastern and Mediterranean Europe). But many Muslims believe that any area once under Islam must be recovered. This map approximates what this would require.

Fig. 6-3. Afghanistan, graveyard of empires. Where the Vakhan Corridor reaches eastward, Afghanistan touches China.

Fig. 6-4. Iraq generalized. The notion of partitioning the country during the American intervention, perhaps temporarily, was mooted, then abandoned. It may yet come about.

Fig. 6-5. Ethnic components in Afghanistan's population. Note the Pushtun domination in the east and south, with outliers in the north, giving rise to the geographic name "Pushtunistan" as a player in the competition among interests here.

Fig. 7-1. The Triple Frontier in southern South America, apparent staging area for the first major Islamic terrorist strike in the Western Hemisphere.

Fig. 7-2. The African Transition Zone and the Islamic Front in Africa. Strife between Muslims and non-Muslims occurs intermittently along this cultural "fault line"; al-Qaeda affiliates operate from the Somali sector to Nigeria and Niger.

Fig. 8-1. China and the United States in their respective latitudinal positions, showing not only comparative size and distance but also latitudinal extent. China extends both farther north and farther south than the contiguous United States, but the east-west dimensions are almost identical.

Fig. 8-2. Evolution and growth of the Chinese Empire. Versions of this map, which shows the maximum extent of Qing-Dynasty China, often accompany comments by Chinese readers of my books to justify Beijing's control over Tibet (Xizang), Mongolia, and even parts of Kazakhstan and Russia.

Fig. 8-3. China's four-hierarchy, complex political-administrative map. The so-called Autonomous Regions are undergoing Hanification; they are autonomous in name only although minorities are exempt from certain regulations that apply to Han Chinese. The province of Qinghai contains a substantial Tibetan-Buddhist minority.

Fig. 9-1. The Industrial Revolution spread eastward from the British Midlands in the 1840s to the Donbas Region on the border of Ukraine and Russia nearly a half century later. It transformed Europe's—and the world's—economic geography.

Fig. 9-2. The European Union: the Ins and the Outs, the past and the future.

Fig. 9-3. Europe's historic fractiousness makes the European Union a remarkable achievement, but devolutionary pressures continue to simmer and sometimes boil. From Scottish independence (still contemplated as a goal by a significant minority) to Kosovo's turbulent secession from Serbia, European minorities push in one direction even as national governments move toward the other: still-stronger unification.

TABLE 9-1. EUROPE'S POLITICAL ENTITIES

ENTITY	WHO THEY ARE	OTHERS
European Union	The 25	
Leaders (Core)	France, Germany	U.K., Spain
Followers (Periphery)	Poland, Slovenia, Hungary, Czech Republic	Baltics, Malta, Cyprus
Outsiders	Norway, Switzerland, Iceland	Ukraine, Serbia
Regions	Baden-Württemberg, Lombardy, Rhône-Alpes	Andalusia, Bretagne, Saxony, Tuscany
Devolutionary Pressures	Catalunia, Basque Country, Corsica, Kosovo	Scotland, Flanders, Montenegro
Fragments of History	Gibraltar, Kaliningrad	Andorra, San Marino, Liechtenstein, Monaco, Ceuta and Melilla

Fig. 10-1. Russia is the world's largest territorial state by far, but settlement is strongly concentrated in its western, Moscow-centered core and Russian leaders worry that the depopulating east is on the verge of becoming ungovernable.

Fig. 10-2. Southern Russia's cauldron of conflict is a mosaic of ethnic republics where Muslim extremists continue to resist Moscow's incorporation and where cultural differences involving other customs and beliefs cause never-ending strife. Across Russia's southern border lie three former Soviet Socialist Republics among which Georgia has seen Russian armed forces invade on behalf of pro-Russian minority Ossetians. Abkhazia, a Georgian province on the Black Sea coast, has been wrested from Georgia by Russia, which recognized it as an independent state.

Fig. 10-3. Simplifying Russia's vast and diverse physiography: the Ural Mountains divide west from east, where Siberia dominates and settlement forms a discontinuous ribbon along the mountainous south.

Fig. 10-4. The mouse that roared: Chechnya on the northern flank of the Caucasus Mountains.

Fig. 10-5. Russia's Eight Federal Districts, proclaimed by President Putin and superimposed on the administrative map of Russia's more than 80 historic regions. Two decades of population loss are recorded in the numbers.

Fig. 11-1. The Transatlantic slave trade's impact can be measured in numbers, but never in terms of its lasting demographic and cultural impact on Subsaharan Africa.

Fig. 11-2. This painstakingly constructed map known worldwide as the "Murdock Map" after its researcher and cartographer James Murdock, attempts to reconstruct what the ethnic mosaic of Africa looked like before the European colonial invasion began. As Murdock emphasized, the thin lines between ethnic domains often were transition zones, not sharp divides. And African views of land ownership and territorial boundaries differed markedly from those of the European colonists.

Fig. 11-3. Nigeria astride the Islamic Front. Twelve northern States in Nigeria's federation have adopted Sharia law; friction between Muslims and non-Muslims along the divisive cultural border continues to take a significant toll.