

epigenetic mark is called *DNA methylation*. Methylation chemically modifies a portion of the DNA molecule in a way that reduces the level of gene product produced by a particular gene, “and its influence is dependent on the genetic context within which the methylation occurs” (2015, 723). Unlike DNA itself, methylation and other epigenetic marks “are sensitive to environmental exposures throughout growth and development, [and] they represent a prime candidate mechanism underlying developmental plasticity” (2015, 728). It is important to emphasize, however, that epigenetic modifications are fully compatible with the Darwinian foundations of contemporary evolutionary theory. This is because epigenetic marks “can only occur in interaction with the underlying genetic variation that is available” (2015, 725).

Skin Color Skin color is a highly visible, complex, continuous phenotypic trait in human populations. Variation in skin color seems to be the product of a few genes of major effect, additional polygenes of intermediate or minor effect, and input from the environment. As Nina Jablonski (2004) writes, “determination of the relative roles of variant genes and varying environments has proven extremely challenging” (613), and it is not clear how many alleles are involved or whether identical genes are responsible for the dark skin of apparently unrelated human populations (Marks 1995, 167–68). Biological anthropologists agree that skin color is adaptive and related to the degree of ultraviolet radiation (UVR) that human populations have experienced in particular regions of the globe.

It is important to emphasize that “similar skin colors have evolved independently in human populations inhabiting similar environments,” making skin color “useless as a marker for membership in a unique group or ‘race’” (Jablonski 2004, 615). Indeed, some of the most striking features of human skin are clearly consequences of developmental and phenotypic plasticity: variations in skin thickness are a function of age and history of sun exposure; the outer layers of the skin in darkly pigmented or heavily tanned people have more, and more compact, cell layers, making the skin more effective as a barrier to sun damage. The overall intensity of skin color is thus determined by a combination of morphological, physiological, environmental, and developmental factors. When the intricate articulation of these factors is destabilized, the outcome can be anomalous skin conditions such as *albinism* (an absence of pigmentation), abnormally intense pigmentation, or a patchy spotting of light and dark skin (Jablonski 2004, 590).

Human skin color exhibits clinal variation, with average pigmentation growing gradually lighter in populations that live closer to the poles (Figure 5.4). The pigments in human skin (melanins) protect the skin against sunburn by absorbing and scattering UVR and by protecting DNA from damage that can lead to cancer (Jablonski 2004, 590). Of course, as humans we risk sun damage to the skin because we do not grow fur coats, like our closest primate relatives. Dark fur coats can actually protect primates from tropical heat by absorbing short-wave radiation (UVA) near the surface of the coat and reflecting much long-wave radiation (UVB) away before it reaches

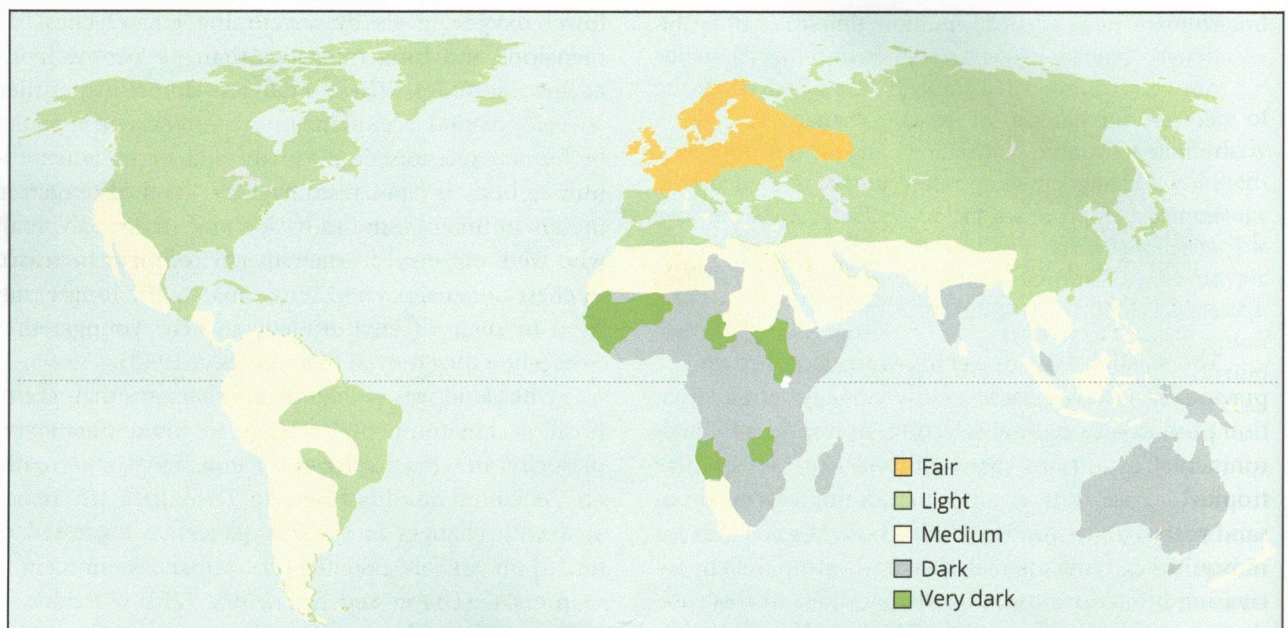


FIGURE 5.4 When the unexposed skin of indigenous peoples is measured and mapped according to the degree of pigmentation, skin shades tend to grow progressively lighter the farther one moves from the equator.