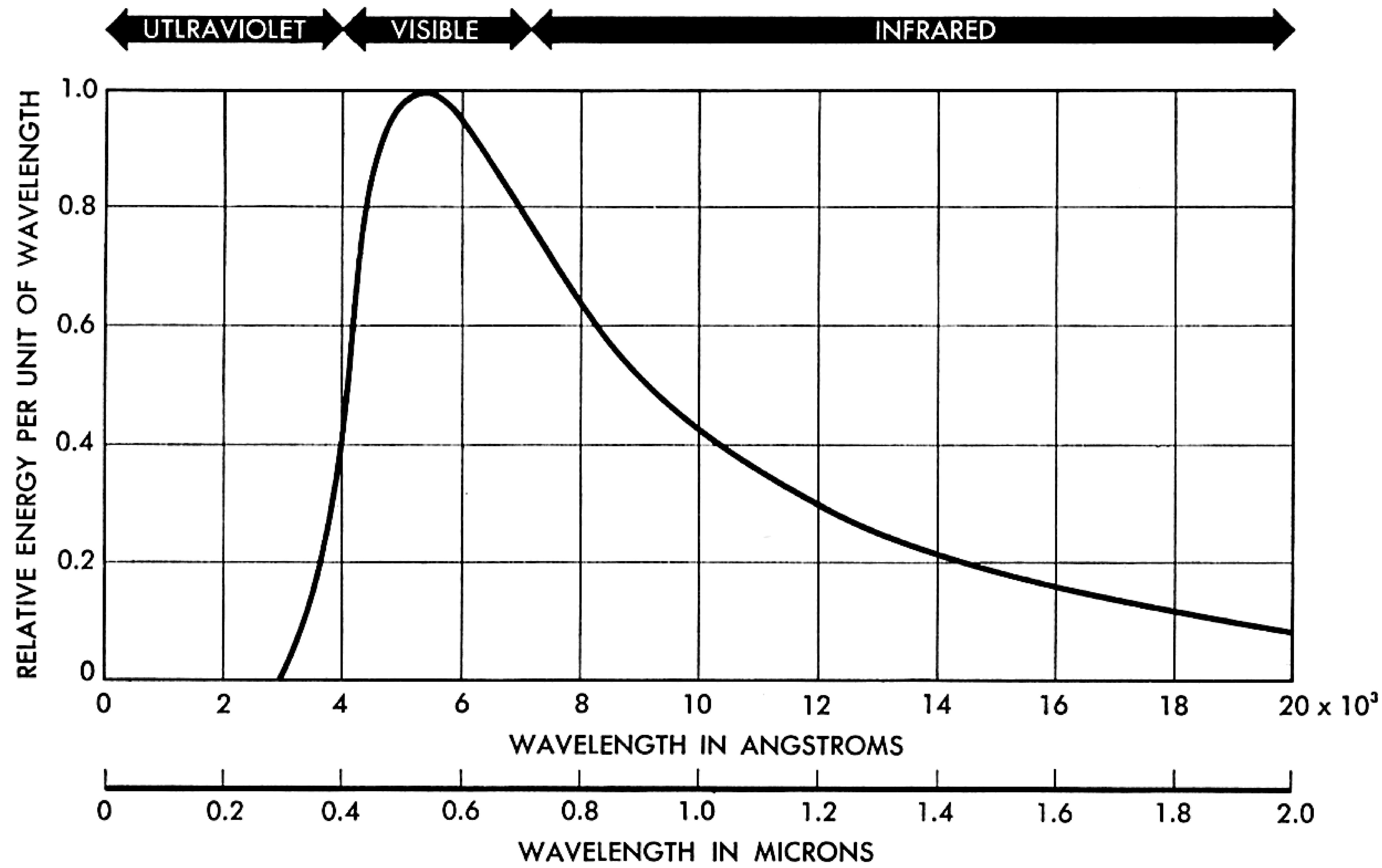

Figure 3-2. *Distribution of solar energy as a function of wavelength.*

The energy of a *photon*, Planck found, was related to the frequency of the radiation by the formula,

$$E = h\nu,$$

where E is the energy in ergs, ν is the frequency in cycles per second, and h is Planck's constant of proportionality, which turns out to be 6.62×10^{-27} erg-second.

The energy of a photon is the smallest division of radiated energy. Thus, it is impossible to have half a photon, and radiated energy must always equal some whole number of photons times the energy of a photon. But you can readily see from the previous equation that all photons will not carry the same minimum unit of energy.

With Planck's simple formula, we can compute the energy per photon of any color. For the frequency, ν, we can use its equivalent, $\nu = c/\lambda$, where c is the velocity of light and λ is its wavelength. Consider, for example, the photon energy for 6000Å in the red:

$$E = h\nu = h \times c/\lambda = \frac{6.62 \times 10^{-27} \times 3 \times 10^{10}}{6000 \times 10^{-8}}$$

$$= 3.31 \times 10^{-12} \text{ erg}$$

Because we will be dealing soon with electrons absorbing photons, it will be helpful to change ergs to electron-volts. This rather descriptive unit is the energy gained, or lost, by an electron moving through