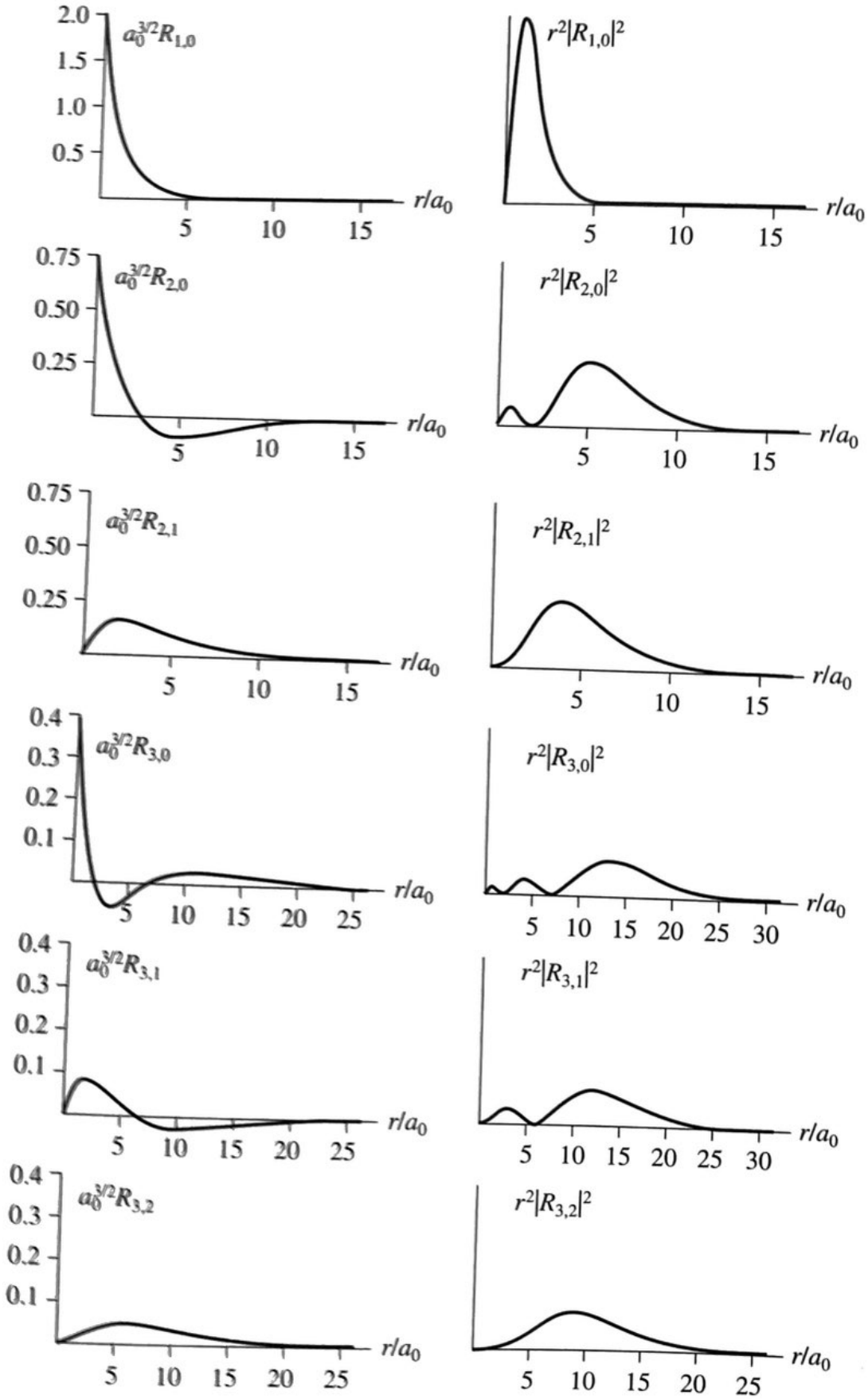

Figure 6.8 Plots of the radial wave function $R_{n,l}(r)$ and the radial probability densities $r^2 \left|R_{n,l}(r)\right|^2$ for the wave functions with $n = 1, 2, 3$.

These radial functions as well as the radial probability densities $r^2 \left|R_{n,l}(r)\right|^2$ are plotted in Fig. 6.8. Notice how the probability of finding the electron at increasing r varies with the quantum numbers n and l. This is why it is often said that the electron resides in different shells ... principal quantum number n. So ...

...ained in (4-18) is presented as an energy-level dia... Figure 4-11. The energy of each level, as evaluated from (4-18), is shown on... in terms of joules and electron volts, and the quantum number of the level i... on the right. The diagram is so constructed that the distance from any lev... level of zero energy is proportional to the energy of that level. Note that th... (most negative) allowed value of total energy occurs for the smallest quantum... $n = 1$. As n increases, the total energy of the quantum state becomes less... with E approaching zero as n approaches infinity. Since the state of lov... energy is, of course, the most stable state for the electron, we see that th... state of the electron in a one-electron atom is the state for which $n = 1$.

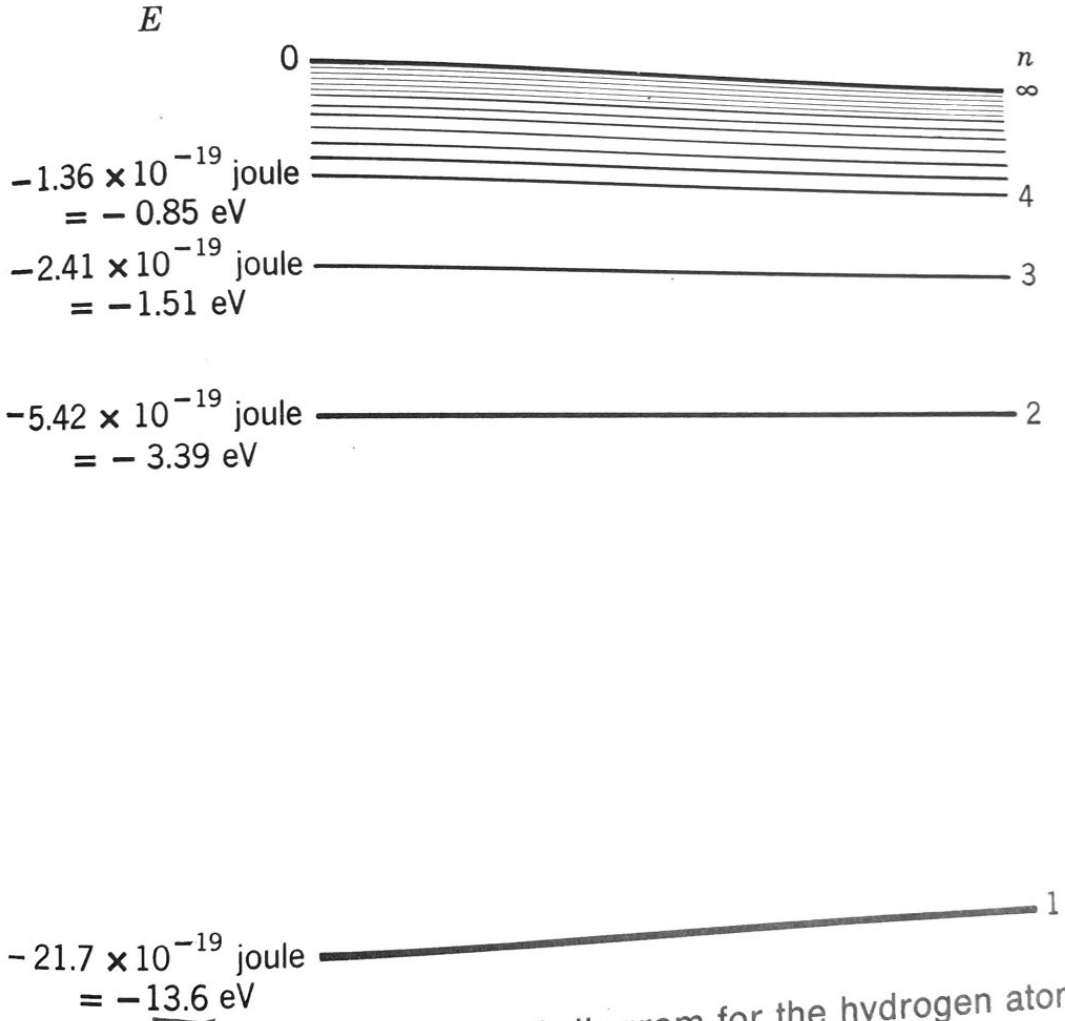

Figure 4-11 An energy-level diagram for the hydrogen atom.

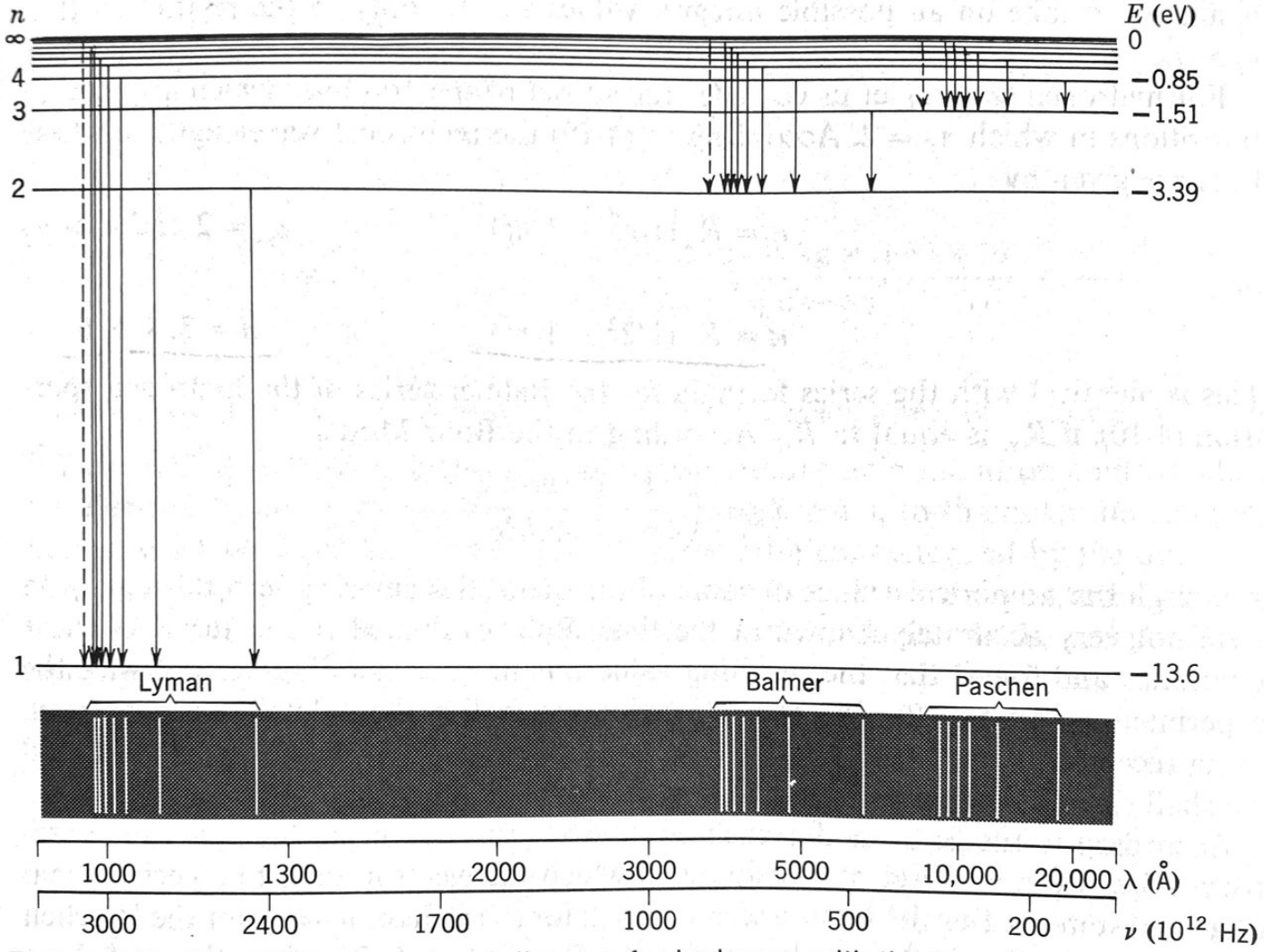

Figure 4-12 *Top:* The energy-level diagram for hydrogen with the quantum number n for each level and some of the transitions that appear in the spectrum. An infinite number of levels is crowded in between the levels marked $n = 4$ and $n = \infty$. *Bottom:* The corresponding spectral lines for the three series indicated. Within each series the spectral lines follow a regular pattern, approaching the series limit at the shortwave end of the series. As drawn here, neither the wavelength nor frequency scale is linear, being chosen as they are merely for clarity of illustration. A linear wavelength scale would more nearly represent the actual appearance of the photographic plate obtained from a spectroscope. The Brackett and Pfund series, which are not shown, lie in the far infared part of the spectrum.