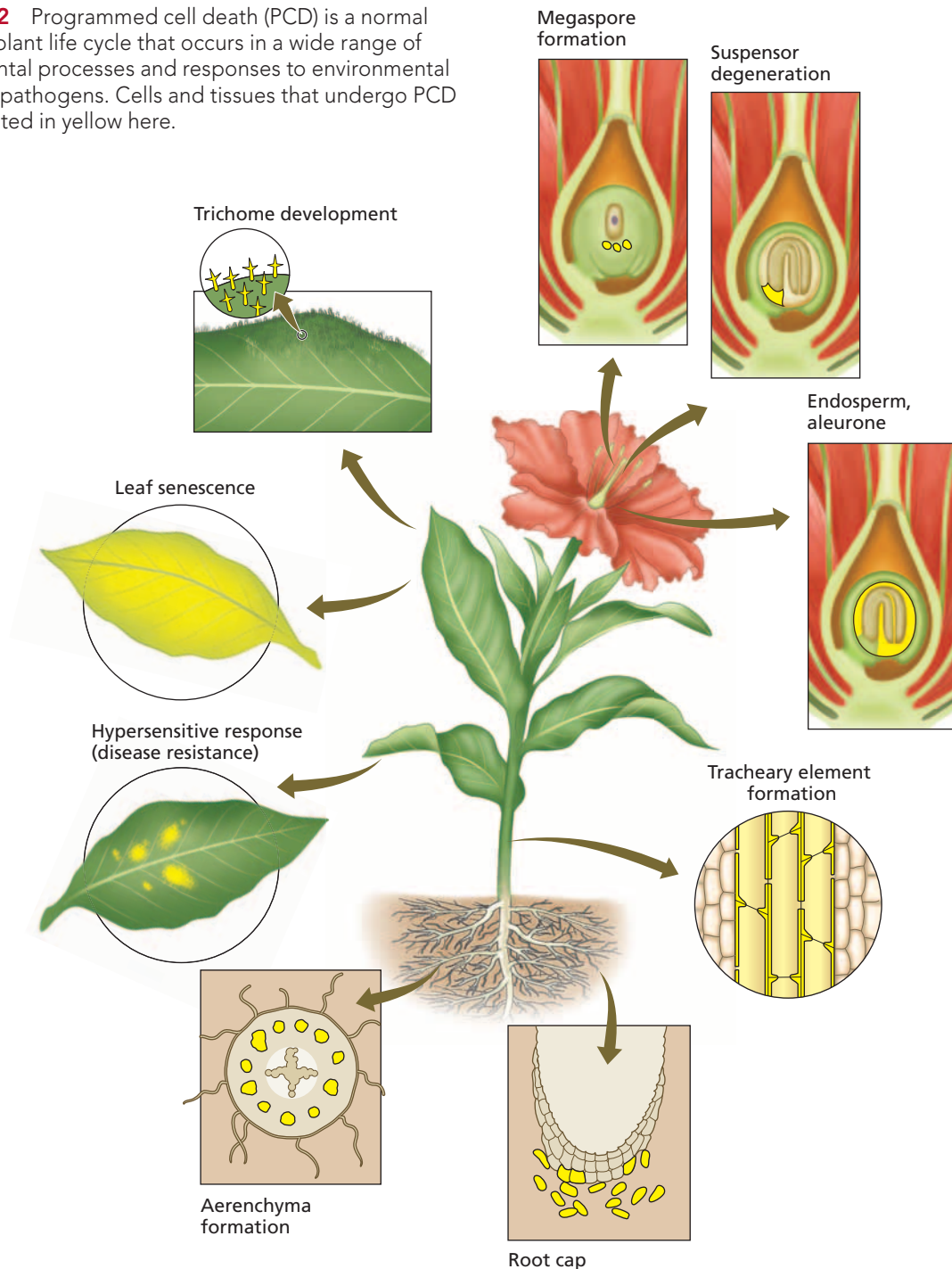


Figure 22.2 Programmed cell death (PCD) is a normal part of the plant life cycle that occurs in a wide range of developmental processes and responses to environmental signals and pathogens. Cells and tissues that undergo PCD are highlighted in yellow here.



the expression of a characteristic set of genes that orchestrate the dismantling of cellular components, ultimately causing cell death.

PCD in animals is usually associated with a distinct set of morphological and biochemical changes called **apoptosis** (Greek for “falling off,” as in autumn leaves). During apoptosis the cell nucleus condenses, and the chromosomes fragment as a result of endonuclease digestion of the DNA between specific nucleosomes; this process

produces an ordered oligonucleotide “ladder” when the DNA is size-separated by gel electrophoresis. In addition to nucleases, *caspases* (cysteine-dependent *aspartate*-specific proteases) target particular proteins by introducing single breaks after specific aspartate residues. Directed digestion of target proteins by caspases leads to the controlled death of the cell. During this process the plasma membrane forms irregular bulges, or blebs, and the cell fragments into numerous vesicles called *apoptotic bodies*,