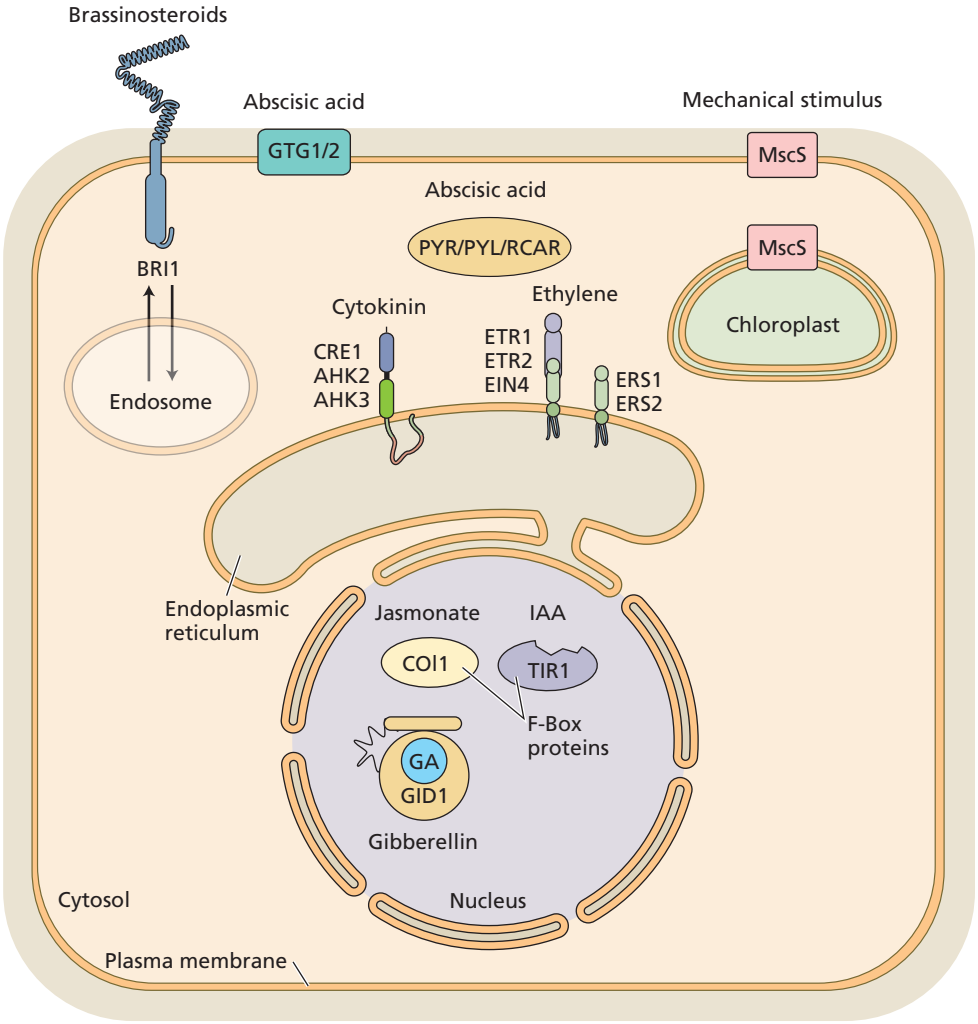

Figure 15.3 Primary locations of plant hormone receptors and mechanosensitive receptors (MscS) in the cell. The individual receptors are discussed later in the chapter. (After Santer and Estelle 2009.)

ponent" systems. Several plant photoreceptors diverged from similar proteins in bacteria and have taken on new functions. For example, bacterial members of the cryptochrome/photolyase superfamily are flavoproteins that repair pyrimidine dimers produced in DNA by UV light. In plants, cryptochromes lack the critical residues required for DNA repair, and instead mediate light control of stem elongation, leaf expansion, photoperiodic flowering, and the circadian clock (see Chapter 16).

Other plant receptors are more similar to those found in animals and fungi, but often have additional or modified components. Examples are found in plant F-box receptor/ubiquitin ligase systems that are integral to several plant hormone receptor complexes (see Figure 15.3). Eukaryotic E3 ubiquitin ligase complexes, which are present in both the cytosol and nucleus, covalently attach ubiquitin to substrate proteins, tagging them for degradation by the 26S proteasome. In the SCF (*S*kp, *C*ullin, and *F*-box protein) subfamily of E3 ligases, substrate recognition is mediated by **F-box proteins**. The plant F-box gene family has greatly expanded in plants to accommodate this expansion in function.

A **kinase** is an enzyme that catalyzes phosphorylation—that is, the addition of a phosphate group from ATP to a substrate, such as a protein, thus modifying its properties. When a protein functions as a receptor and transduces that signal by phosphorylating another molecule, it is called a **receptor kinase**. Depending on the type of receptor kinase, a target protein can be phosphorylated at various amino acid residues (serine, threonine, tyrosine, or histidine) to alter its biological activity. Receptor kinases, which function in diverse animal signaling mechanisms, have a limited, but important, role in plants. Most notable of these is the receptor system for brassinosteroid hormones, wherein the BRI1 receptor kinase plays a central role in development (see Figure 15.3). There are also a large number of **receptor-like serine/threonine kinases** (**RLKs**) in plants compared to other kingdoms, and RLKs play a prominent role in plant–pathogen interactions (see Chapter 23). However, although components of some receptor systems found in animals are found in plants, they may not participate in analogous functions. For example, animals systems contain a large number of plasma membrane G protein–coupled receptors (GPCRs)