FIGURE 1.5 ***Valeriana officinalis.*** **The fine botanical detail of eighteenth and nineteenth century medical botany texts surpassed all previous efforts in providing accurate descriptions of the primary plants used in medicine. (From Woodville, W. 1810. *Medical Botany*.)**

Pharmacognosy—The Child of the Microscope

In 1667, Robert Hooke (1635–1703), credited with the invention of the two-lens microscope (Figure 1.6a), published his primary work, *Micrographia,* in which he described various cells and units of cells as "tissue cells" and further explained that the stinging of nettles (*Urtica* spp.) was due to the flow of a caustic sap from the bristles of the plant (Figure 1.6b). This was among the earliest observations of plant anatomy and physiology at the microscopic level.

In 1838, a German botanist and professor of natural sciences (Jena), Mathias Jacob Schleiden (1804–1881; Figure 1.7), announced that the cell was the fundamental unit in plants and that all tissues were made up of a combination of cells (Youngken 1930). Though the microscope had been used to examine plant tissues as early as the seventeenth century, through use of a compound microscope, Schleiden introduced botanical microscopy as a key technique for distinguishing between the structural characteristics of different medicinal plants. Schleiden's original work showed that various species of sarsaparilla (*Smilax*) could be distinguished from each other due to the characteristic pattern of cellular structures that each possessed (Kraemer 1920).

Schleiden further recognized that specialized training was needed to evaluate the quality of herbal ingredients appropriately, paying particular attention to the need for the pharmacognosist to keep in mind the relationship between the plant part or fragments being examined and the living plant—a relationship almost completely ignored in pharmacognosy today. Schleiden criticized what he viewed as the inexactness of grosser morphological evaluation and, due to what he perceived as the exacting character of botanical microscopy, referred to pharmacognosy as "the mother of all disciplines of the natural sciences."