Chapter 5

Cambial Cell Characteristics

5.1 Cell Shape

The shapes of cambial cells have been a matter of concern from the time they were first recognized. Braun (1854) described cambial cells simply as elongated elements with sloping walls and pointed ends. Nägeli (1858) described them similarly, but added that the pointed ends had a tendency to grow in the direction of the axis. Radlkofer (1858) considered cambial cells to be long rectangles approaching the form of a "whetstone" with oblique end walls. Most dissension among workers concerned configuration of the end wall. Müller (1875-76), for example, argued that cambial cells took the form of a pointed fiber, a view contested by Velten (1875), who claimed that Müller's cambial cells were actually differentiating fibers. Velten suggested that the cambial cells assumed the form of a

![Diagram of cambial cells]

Fig. 5.1a-d. Cambial cells in Raphanus sativus root conforming to the shape of a hexagonal prism. a Transverse. b Radial. c Tangential. d Three-dimensional. (After Kleinmann 1923)
rectangular/prism with slightly canted end walls. In radial sections they displayed square ends whereas in tangential sections the sloping ends were inclined toward the radial plane. Krabbe's (1886) interpretation of Velten's cambial cell is shown in Fig. 6.78B. It is essentially a hexahedron. Although he agreed with Velten, Krabbe questioned whether the wedge-shaped end walls, e.g., A, B, G, and H in Fig. 6.78B, could be maintained without the intervention of sliding growth.

The controversy continued with Mischke (1890) confirming the prismatic, sharply inclined end wall proposed by Velten, and with Raatz (1892) raising objections. Raatz did not necessarily object to the cell shape proposed by Velten, but with the belief that the shape was more or less maintained through the process of