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Peter V. Minorsky

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On the Cover: To maintain or improve basic stomatal performance criteria such as regulation of water use or rates of CO₂ assimilation while global atmosphere and climate underwent long-term changes, structural and mechanical modifications to the stomatal apparatus were necessary. Pictured are cryo-SEM images of fresh leaves of the fern Nephrolepis exaltata showing a single stoma frozen in its fully open state. The top panel shows a surface view; while in the bottom panel the sample has been cryo-sectioned and etched to reveal detail of the two guard cells in cross section. In this species the guard cells undergo only moderate swelling and little mechanical interaction with adjacent cells to create the stomatal pore. By combining cryo-SEM, cell pressure probe, gas exchange, and modeling techniques, Franks and Farquhar (pp. 78–87) show how increasingly elaborate modes of guard cell swelling and mechanical interaction with adjacent cells during stomatal opening have given rise to a wide range of leaf gas-exchange capacities and sensitivities to environmental fluctuations. Images were created by P.J. Franks, assisted by C.X. Huang.

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