



Photograph of the Month

Buckle folds in the Silurian Mifflintown Formation, Allenwood, PA. Photograph by Mary Beth Gray. © Mary Beth Gray



Buckle folds occur in a limestone-shale sequence of the Mifflintown Formation on the northern limb of the South White Deer Anticline in the central Appalachian fold-thrust belt. The buckled beds are approximately 4 cm thick. Buckle folds at this outcrop were the subjects of landmark research by Richard Groshong (honoree, this issue). Development of the calcite strain gage method (Groshong, 1972) was a major advance in strain analysis in carbonate rocks. Most prior strain analysis methods relied upon shape change in recognizable objects such as ooids, pebbles and fossils with all the inherent limitations of strain contrasts between the objects and the matrix that surrounds them. This new method could be applied to any rock with calcite of sufficient grain size. Once the crystal plastic contribution of strain was determined, Groshong (1975) was able to more fully quantify the relative contributions of deformation mechanisms such as intergranular fracturing and pressure solution. These small folds, studied in great detail, led to the development of strain profiles from which the

mechanism of folding (in this case buckling) was determined. Ultimately, these analyses added valuable new dimensions to ongoing discussions regarding the extent to which competing deformation mechanisms exert controls on overall rock rheology.

#### References

- Groshong Jr., R.H., 1972. Strain calculated from twinning in calcite. *Geological Society of America Bulletin* 83, 2025–2038.
- Groshong Jr., R.H., 1975. Strain, fractures and pressure solution in natural single-layer folds. *Geological Society of America Bulletin* 86, 1363–1376.

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