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BOOK REVIEWS

Fold and thrust belts—in tribute to Dave Elliott

Mitra, S. and Fisher, G. W. (editors) 1992. *Structural Geology of Fold and Thrust Belts*. The Johns Hopkins Studies in Earth and Space Sciences, The Johns Hopkins University Press, Baltimore, Maryland, U.S.A. 254 pp. (ISBN 0-8018-4350-2) Price $55.00 (hardback).

This volume is a fitting tribute to David Elliott.

Dave Elliott was a driving force behind the renaissance of the late 1970s and the 1980s, in the elucidation of the nature and significance of fold and thrust belts. In the short period between 1976 (when he published *The Motion of Thrust Sheets*) and his death in 1982 he changed the way we think about the geometry and kinematics of fold and thrust belts, about deformation mechanics and mechanisms in fold and thrust belts, and about regional structural styles of fold and thrust belts. Therefore, it is appropriate that these three themes should define the three sections into which the chapters in this volume are grouped. Dave had an uncanny talent for integrating elegant geophysical and geochemical theory with perceptive field and laboratory observations, and accordingly it is fitting that this integration between theory and experiment should be an over-arching motif among the three sections in the book. Dave's profound influence on the elucidation of fold and thrust belts can be associated with the many very capable and enthusiastic research students who came to work with him, and to his numerous lectures and his frequent field and laboratory visits with many colleagues in North America and western Europe, as well as with the several key papers that he published. Most of the chapters in this volume were written by those former students and colleagues who knew him as "an enthusiastic and pioneering student of fold and thrust belt structure".

Part I of the volume, which deals with "Geometry and Mechanics", consists of four Chapters. D. A. Medwedeff has urged extensive borehole data from petroleum exploration, together with data from surface exposures of the Wheeler Ridge anticline, in the Transverse Ranges of California, to document the configuration of an active, laterally propagating, 'blind' thrust wedge; and also to show how the stratigraphy and structure of sediments that were deposited during the folding that is related to the faulting can be used to constrain interpretations of the kinematics of the structure. R. W. H. Butler has developed kinematic models that link variation in concurrent thrusting and folding between and along different structural levels. He has used these models to explain structural relationships at the southwest 'termination' of the Morcles nappe, in the Alps, near the Swiss–French border. D. G. De Paor has used temporal maps (horizontal distance–time projections along structural cross-sections) to illustrate the evolving relationships among thrust faults, folds, erosion and sedimentation in the foreland of the Spanish Pyrenees. S. Mitra has reviewed and critically evaluated techniques for the construction of balanced cross-sections, using examples of sections from the Appalachians, Taurus Mountains, and Papua-New Guinea.

Part II comprises six chapters dealing with "Mechanics and Mechanisms". P. J. Hudleston, following up on an idea developed by David Elliott, has outlined similarities and differences between the motion of glaciers and the evolution of fold and thrust belts. S. Wojtal, also following up on an idea developed by David Elliott, has used an analytical model, derived from analyses of glacier flow, to explain the nature of mesoscopic minor faults and variations in their frequency with distance above the sole fault of the Cumberland Plateau thrust sheet of the southern Appalachians. M. P. Coward, P. A. R. Nell and J. Talbot have extended previous work on deformed worm tubes in the Cambrian Pipe Rock from the Moine thrust zone in the Assynt district by analyzing in detail the bedding-parallel longitudinal and shear strains in four different areas of folding associated with thrusting. G. Mitra has reviewed the microstructures and deformational histories of quartzofeldspathic crystalline basement rocks for a range of environments covering the transition from cataclastic to quasi-plastic deformation, using, as illustrations, examples from the Wind River Mountains of Wyoming, and the Blue Ridge Mountains of the southern Appalachians. J. A. Gilotti has investigated the applicability of the concept of a rheologically critical matrix percentage to the elucidation of the development of the arkosic mylonites along the Särv thrust in the Swedish Caledonides. S. E. Boyer has used geometric relationships between thrusts and deformational fabrics within and around the Grandfather Mountain window in the Blue Ridge thrust sheet to outline a complex and protracted history of development and reactivation of thrust faults in this part of the southern Appalachians.

Part III of the volume deals with "Regional Structural Styles" and consists of four chapters. N. B. Woodward has analyzed variations in structural style of part of the Idaho–Wyoming thrust belt in terms of the concept of structural lithic units, and of the initial stratigraphic controls on the rheological heterogeneity and anisotropy of the rock mass. E. W. Mountjoy has documented the unusual occurrence of numerous back-rotated, southwest overfolds and thrust faults in the southern Canadian Rockies near Jasper, Alberta, and he has shown how these back-rotated structures can be attributed to progressive rotations due to displacements on a sequence of underlying listric thrust faults. R. Deschene and E. W. Mountjoy have outline a new interpretation of the regional structure of the Canadian Rocky Mountain Main Ranges in the Jasper–Yellowhead structural culmination. This involves later, 'out-of-sequence', steep, "post-metamorphic" folds and faults that deform earlier low-angle thrust faults and folds which were active "during the peak of metamorphism". D. Anastasio has used a combination of structural data and the stratigraphic record of synorogenic foreland basin sedimentation to outline the structural evolution of the external Sierra of the southern Pyrenees of Spain, and the relationships between contemporaneous thrusting and transverse, halotectonic folding.

The book is well prepared. The arrangement of the chapters is logical and coherent. The format is attractive, and there are few typographical errors. The reproduction of photographs and photomicrographs is good, and most of them are very informative. Unfortunately, the quality of the figures varies from chapter to chapter, and in a few chapters the scale of the lettering and of the lines has been reduced to the point where they are so small and thin as to be barely legible.

This book is a significant addition to the literature of structural geology. It brings together a diverse body of important information on the structural geology of fold and thrust belts. Some of this information comprises new observations and ideas, but most consists of useful summaries of recent advances in the understanding of fold and thrust belts. Those interested in the structural geology of fold and thrust belt will find this volume well worth reading, and not too expensive to own!

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Bering shelf strike-slip basins

Worrall, D. M. 1991. *Tectonic History of the Bering Sea and the Evolution of Tertiary Strike-slip Basins of the Bering Shelf*. Geological Society of America Special Paper 257. 120 pp. + 3 sheets in a pocket. Price $42.50 (softback).

This beautifully illustrated book (72 pages of figures out of a total of 120 pages; eight full-page figures in color) consists of two parts, each of