The Palynology and Micropalaeontology of Boundaries

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The Palynology and Micropalaeontology of Boundaries

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Caption for cover

This is one of the most spectacular and well-known views in the Canadian Rockies: Cirrus Mountain and the Weeping Wall seen from the Big Bend viewpoint in northern Banff National Park, Alberta.

Several important boundaries, both geological and ecological, are evident in this image. The distinct break in slope across the centre, edged by trees, marks the boundary between the Upper Devonian and Lower Mississippian. The steep lower slopes of Cirrus Mountain are formed in grey limestone of the Upper Devonian Palliser Formation. These cliffs are known as the Weeping Wall, so called for the number of waterfalls that cascade down the face. The more gently sloping mid-slopes of Cirrus Mountain are formed by shales of the Banff Formation. The upper slopes are formed from the more resistant dark grey cliff-forming rocks of the Rundle Group. Cirrus Mountain rises to 3215 masl, giving almost 1600 m of relief in this view. To the left of the main peak, in the notch, lies the Mount Coleman normal fault, with the lower peak at the far left capped by rocks of the Palliser Formation. This three-part geological sequence (Palliser–Banff–Rundle) occurs widely in the Front Ranges and in places, as here, the Main Ranges of the Canadian Rockies.

The treeline, an important modern ecological boundary, is also well marked along the slopes of Cirrus Mountain. In this area, the upper subalpine forest is dominated by Engelmann spruce (*Picea engelmannii*) with some Rocky Mountain Sub-alpine Fir (*Abies bifolia*). Whitebark pine (*Pinus albicaulis*) is often a component of the treeline zone. In this view southward, down the North Saskatchewan River valley, the valley floor lies at about 1600 masl. The Icefields Parkway (Hwy 93), a major tourist route, parallels the river.

Photo credits: David Gummer, Provincial Museum of Alberta, June 2002.

Preface

This book arose from a special session sponsored by the Canadian Association of Palynologists, which was held at the Geological Association of Canada–Mineralogical Association of Canada Joint Annual Meeting in Saskatoon in 2002. The session featured seven papers and a poster. It was an interesting and well-attended session, providing a fine opportunity to explore some imaginative and thought-provoking research. The presentations illustrated many approaches to the study of boundaries, and the participants were enthusiastic about the prospects for publication. It was clear from our research that no similarly focused book was available. Given the variety of approaches and applications of boundary problems and the centrality of boundary issues in many geoscience projects, a compilation volume seemed particularly timely. As conveners of the special session, we undertook to steer the project through the publication process.

We also solicited papers from people who were not able to attend the conference, and received a tremendous response. The 16 papers in this volume provide a revealing and extensive survey of the ways in which identification and characterization of boundaries are approached in the many different branches of palynology and micropalaeontology. The papers span geological intervals from the Cambrian to the Miocene, and feature most major micropalaeontological indicators, including conodonts, pollen, spores, diatoms, dinoflagellates, foraminifera and ostracodes. Although the original session had a strong Canadian and North American focus, the papers included here have a much broader geographical range, and include contributions from Poland, Egypt, Belgium, Argentina and the United Kingdom. Boundary problems are evidently not constrained by political boundaries!

The sponsoring organization, the Canadian Association of Palynologists or Association Canadienne des Palynologues (CAP), was founded in 1979. CAP is primarily a newsletter organization, producing two issues a year. The CAP website (*http://www.scirpus.ca/cap/cap.shtml*) also promotes communication among the widely scattered membership and serves as an archive for palynology-related articles and items from the Newsletter. CAP fosters interest in palynology through many activities, including participation in geoscience meetings and encouraging publications, such as this volume.

Although numbers fluctuate, CAP has a core of around 50 members. Participants are drawn from all branches of palynology and work in all geological eras. CAP counts among its members many distinguished Canadian geoscientists. Recently, the Association has also attracted members from other micropalaeontological fields. In common with all science in Canada, CAP has been affected by recent economic downturns. Nevertheless, CAP remains a vibrant and active geoscience association, as the successful compilation of this volume illustrates.

The production of this book has involved many people from different organizations. The Provincial Museum of Alberta supported the assembly of the volume by covering mailing and courier costs. We thank the authors for their patience and co-operation during the assembly process, and the many reviewers for their insightful and authoritative comments on the manuscripts. We are most grateful to the Geological Society for its support and encouragement throughout this project, and in particular John Gregory and Angharad Hills, for their advice and patience.

On a personal level, ABB thanks Yves Beaudoin for tolerating semi-permanent piles of manuscripts on the dining-room table and for cheerfully 'ticking off' reference lists during winter evenings. MJH is indebted, as ever, to his family for their support.

Finally, we hope this volume will promote discussion and stimulate additional research on the fascinating practical problems and theoretical issues posed by boundary identification and characterization. If, 10 years hence, we can contemplate convening another session with new research built on the solid foundation of the work described here, we and the authors will have done our jobs.