Ph.D. THESIS AWARD

MICHAEL C. RYGEL

The 2006 recipient of the award for the Ph.D. that made the most outstanding contribution to Canadian sedimentary and petroleum geology is Dr. Michael C. Rygel. His thesis, entitled “Alluvial sedimentology and basin analysis of Carboniferous strata near Joggins, Nova Scotia, Canada,” was supervised by Dr. Martin Gibling at Dalhousie University in Halifax, Nova Scotia. Michael received financial assistance from the Geological Society of America (GSA), the American Association of Petroleum Geologists, the Coal Geology Division of GSA, and a Nova Scotia Museum Research Grant. Additional financial support was provided to Martin Gibling by Imperial Oil and the Natural Sciences and Engineering Research Council of Canada (NSERC). An important part of Michael’s research included working with Dr. John Waldron at the University of Alberta on a project sponsored by Devon Canada.

Michael graduated with a B.S. from the University of Pittsburgh at Johnstown in 2000 and completed his Ph.D. in Earth Sciences at Dalhousie University in 2005. While at Dalhousie University, Michael was awarded the President’s Graduate Teaching Assistant Award (2002–2003), was a Killam Pre-Doctoral Scholar (2003–2005), and won the Doctoral Thesis Award for the best Ph.D. in the Sciences and Engineering (2006). Additionally, Michael received the Cameron Award from the Canadian Society of Coal Science and Organic Petrology (2001), the A.L. Medlin Award from the Coal Geology Division of GSA (2004), and the GSA History of Geology Division Student Award (2004).

During the summer of 2004, Michael worked as a Geoscience Intern for ChevronTexaco’s Energy Technology Company in San Ramon, California and used forward stratigraphic modeling to improve understanding of the subsurface geology in the Caspian Sea region. Following completion of his Ph.D., he worked as a Post-Doctoral Research Associate at the University of Nebraska-Lincoln on a project sponsored by Drs. Chris Fielding and Tracy Frank that helped to refine understanding of the spatial and temporal record of late Paleozoic glaciation in eastern Australia. In August 2006, Michael accepted a position as an Assistant Professor in the Geology Department at the State University of New York, College at Potsdam and plans to continue working on Paleozoic strata in eastern North America.

Michael’s doctoral research focused on Carboniferous rocks in the Cumberland Basin of Nova Scotia (Rygel, 2005). The majority of this research involved the coastal exposures of the Joggins Formation, a candidate UNESCO World Heritage Site. The initial phase of his research involved working as part of a research team that measured the Joggins section for the first time since it was originally described by Sir William Logan in 1842 (Calder et al., 2005; Davies et al., 2005). In order to reconcile the new measurements with the original work of Logan, Michael revisited Logan’s original field notes. Rygel and Shipley (2005) documented new information about the search for coal in Canada and the interactions between William Logan, John William Dawson, and Charles Lyell during what would become one of the most important early geologic studies in Nova Scotia.

With a modern stratigraphic framework in place, Michael went on to describe a suite of “vegetation-induced sedimentary structures” that provide physical evidence of the fundamental role that vegetation played in mediating sediment erosion and accumulation in the Carboniferous fossil forests of Nova Scotia (Rygel et al., 2004). Similar structures in the Mississippian Horton Group of Atlantic Canada provided new insight into the dynamics and distribution of poorly preserved Lepidodendropsis forests (Rygel et al., 2006). Recognition of these vegetation-induced sedimentary structures in the rock record may allow an improved understanding of the distribution of early land plants, particularly in dryland settings.

The Joggins Formation provided a unique opportunity to examine the internal architecture and geometry of the 82 fluvial channel bodies that crop out in the coastal exposure (Rygel and Gibling, 2006). Detailed sedimentological examination revealed...
that these channel bodies represent fixed, meandering, and multistorey types that occur in both coastal wetland and well-drained floodplain facies associations (Figure 2). Despite markedly different styles of preservation, analysis of channel body geometry and form revealed that the bodies were part of an integrated drainage network and collectively represent most of the natural geomorphic variability of the system. These channel bodies were deposited during a time of rapid subsidence and sedimentation, and preserve a great deal of information about the dynamics of the rivers that formed them. This situation contrasts with low-subsidence cratonic and foreland basins where sea-level change and other forcing factors tend to rework the landscape and create a complex mosaic of channel body architectures.

Michael worked with Dr. John Waldron at the University of Alberta on interpreting new, high-quality seismic lines from the Cumberland Basin (provided by Devon Canada). Waldron and Rygel (2005) demonstrated that halokinesis was active during deposition of the Joggins Formation and was largely responsible for the rapid subsidence that facilitated preservation of the Joggins fossil forests. The marked thickness and lithological changes that occur in the Cumberland Basin appear be a consequence of syndepositional salt withdrawal.


**References**


Fig. 2. Diagram showing the internal architecture and relative size of channel bodies in the Joggins Formation (from Rygel and Gibling, 2006).