

## NEWSLETTER OF THE STRUCTURAL GEOLOGY AND TECTONICS DIVISION GEOLOGICAL ASSOCIATION OF CANADA

**December 1994**

Season's greetings. Much has been going on these days, including a very successful meeting of the Canadian Tectonics Group, and the awarding of the Best Paper and Best Thesis prizes. And in case you have not had a chance to vote lately, we also have a ballot for all the SGTD members to fill out. So here is a bit of reading to go with the Xmas cheer.

### **CTG MEETING '94**

The 14th Annual Workshop of the Canadian Tectonics Group was held on the week-end of the 14-16 October, in Belleville, Ontario. The meeting was very well organized (thanks to Simon Hanmer and Pierre-Yves Robin) and also very well attended, with a total participation of sixty. Saturday proved to be a densely-packed day of oral and poster presentations that covered a wide range of topics including strain theory, geodynamic modelling, Appalachian tectonics, Core Complexes, Digital Terrane Modelling, Syntectonic Plutonism, and Petrofabric Analysis. The field trip on Sunday was led by Pierre-Yves Robin, with the participation of Paul Williams. Participants were introduced to complex folding, fabric development and granite dyke intrusion in the Clare River Structure, near Tweed. The field trip was very interesting and a great success, thanks in part to the beautiful autumn weather.

### **BEST PAPER AWARD**

The SGTD award for Best Paper of the year was awarded at the CTG workshop. The prize of \$100. is given for the best paper of the year by Canadian authors, or dealing with Canadian structural geology and tectonics. The winning paper is chosen by the Division Executive from short lists of papers submitted by the Division Councilors. This year, the awardees were Pierre-Yves Robin and Sandy Cruden, for their paper Strain and vorticity patterns in ideally ductile transpression zones, which appeared in the Journal of Structural Geology. Hearty congratulations to P.-Y. and Sandy! A list of all the papers considered this year, as submitted by the councilors, appears at the end of this newsletter.

Our Councilors select papers eligible for the Best Paper prize that appear in eight journals: CJES, Tectonophysics, Tectonics, GSA Bulletin, Geology, CSPG Bulletin, JGR, and the Journal of Structural Geology. For the coming year, if anyone becomes aware of a good paper that appears in another journal, or in conference proceedings, please send a copy to the executive with a note pointing out the particular strengths of the work.

### **BEST THESIS AWARD**

Normally, the Executive also announces the award for the Best Thesis of the year at the CTG workshop. This year, the choice of the winning thesis was put off for a few weeks. We are pleased to say that the delay in choosing the winner was due to the large number of submissions (nine). The task of choosing a winner was also complicated by the high quality of all the theses we read. The Best Thesis prize has since been awarded to Dr. Robert J. Scammell, for his thesis Mid-Cretaceous to Tertiary thermotectonic history of former mid-crustal rocks, southern Omineca Belt, Canadian Cordillera (PhD, Queens University). Bravo to Rob and also to all the other candidates whose theses were considered. A list of all the submitted theses can be found at the end of this newsletter.

### **NAMING THE DIVISION MEDAL**

As all faithful readers of this newsletter are aware, the SGTD will soon be endowed with a medal to be awarded annually to the authors of the Best Paper.

At the 1994 Annual Business Meeting in Waterloo, Andrew Hynes proposed that the medal be named for F.D. Adams (1859 - 1942), a native of Montreal and an eminent Canadian geologist. A summary of F.D. Adams' professional career and his remarkable accomplishments was given in the last Main Thrust. Since then, Willem Langenberg, Phil Simony and Philippe Erdmer have proposed that the medal be named after the late David Elliott. Both proposals were discussed at the CTG workshop, where it was decided to hold a mail-in vote in order to make the difficult choice between the two proposals. Following are summaries and appreciations of the careers and achievements of F.D. Adams (reproduced from the last Main Thrust) and of David Elliott. At the end of the newsletter, you will find a ballot with both names listed. Please take the time to cast a vote for one or the other of the two proposals, or, if you prefer, write in the name of another person for whom you think the medal should be named. Mail or fax the ballot to the Division Secretary (address and fax number below). The results of the vote will be announced at Victoria '95.

### **F. D. ADAMS 1859 - 1942**

- 1878 - At age 19, he was the first graduate of the Department of Chemistry and Mineralogy, McGill University. Following graduation he joined the Geological Survey of Canada.

- 1881 - Travelled to Heidelberg on a leave of absence to study the new technique of thin section petrography using the polarizing microscope. This led to pioneering work on the geology of the Grenville presented in numerous publications.

- 1889 - Joined McGill University as lecturer.

- 1893 - Became Logan Professor in the Department of Geology, McGill University. Spent the following eight years studying metamorphic processes and the metamorphic history of the Grenville in eastern Ontario. While a professor at McGill, Adams was also a pioneer in the discipline of experimental plastic deformation of rocks. He designed and built an experimental rig, and carried out experiments aimed at understanding the structural and microstructural features he observed in Grenvillian rocks. Adams' experimental work was highly original and at the forefront of geological research.
- 1908 - Was appointed Dean of the Faculty of Applied Science at McGill.
- 1910 - Published a milestone paper, entitled On The Flow of Marble
- 1913 - Was elected president of the 12th International Geological Conference.
- 1924 - Retired from McGill after serving as lecturer, professor, Chairman, Dean, Vice-Principal and Acting-Principal.
- 1929 - After three field seasons in Ceylon, he published a complete treatise and the first geological map of the island.
- 1938 - Published a book based on his research into the early history of Earth Science, entitled The Birth and Development of the Geological Sciences.

### **DAVID ELLIOTT 1938-1982**

David Elliott was an enthusiastic and pioneering student of fold and thrust belt structure whose central contribution was an approach combining good field work with insightful physical analysis. His ability to pose geologically meaningful questions in terms of simple physical principles emerges clearly from the notes he prepared for a C.S.P.G. short course on the geometry and mechanics of thrust belts when he was on sabbatical in Calgary in 1977. These notes account in no small part for Dave's impact. They are a gold mine of good ideas; a few were followed up in his later publications, but many were left for others to develop after his death in 1982.

Dave was born and raised in Montreal and received his B.Sc. from McGill in 1960. His summer field jobs in northern Quebec and graduate work in Scotland (Ph.D. Glasgow, 1964) gave him a profound respect for the value of field work and a well-honed ability to unravel complex structures. His postdoctoral work with John Ramsay (Imperial College 1964-65) nurtured an innate mathematical ability and convinced him that physical analysis carefully tied to field data could produce geologically meaningful results. During his academic career at the Johns Hopkins University he took his students on numerous field trips in Canada, Britain, France, Switzerland and the U.S. He retained his Canadian citizenship and served as an enthusiastic ambassador for Canadian geologists. Dave's field trips typically included a mix of international participants and there was never any question that he was a Canadian first. These memorable trips offered him the chance to astound people with his unique form of 'Frenghish' (eg. le bras = l'arme) and instigate camp cooking competitions despite the fact that his "Canadian team" never won (unless Brits were the only competition). Although Dave lived half of his life outside of Canada, his impact was felt worldwide; in the U.S. his solid background and passion for field work are still held up as an example fostered by the "great Canadian system".

submitted by Deborah A. Spratt

### **DAVID ELLIOTT - AN APPRECIATION**

From the Journal of Structural Geology, 1983, v. 5, p. 99.

David Elliott was a graduate of McGill University and like most Canadian undergraduate geologists he worked in summer field camps in the Canadian Arctic. These trips were the source of many of his amusing stories, usually accompanied by a certain sense of Elliott hyperbole, loved and appreciated by his friends. He then carried out post-graduate studies at Glasgow University where he pioneered the use of isogons in structural analysis. Dave continued his career with post-doctoral studies at Imperial College where he began investigating processes of geological deformation, especially finite strain and strain paths. He then took up the post of Associate Professor, later Professor, of Structural Geology at Johns Hopkins University where he began field work in the Appalachians which led him to investigate the geometry of thrust belts. He widened his investigations into the thrust belts of the Canadian Rockies, the Moine thrust zone, the Alps and, much later, the Scandinavian Caledonides. This work led him to pioneer and popularize many new geometrical techniques which help the study of the nature and development of thrusts. Dave introduced the concept of the balanced section to a wider audience and developed the technique so that it could be applied to cleaved and similarly folded rocks. He unstintingly shared his unpublished manuscripts with colleagues in Europe, and largely as a result of his lectures at the Geological Society of America and the Tectonic Studies Group of the Geological Society of London, and the distribution of notes for courses given in Calgary and Lausanne, he influenced and encouraged a large number of workers to look at thrusts and thrust belts in a new way. Dave also continued, along with his students, investigations into the processes and mechanics of natural deformation and produced an elegant, simple model, analogous to glacier behaviour, which helped to explain the origin of thrust belts. He also ran a series of informal field trips to the Appalachians and the Canadian Rockies for his students and colleagues which were great eye-openers and tremendous fun for those geologists lucky enough to attend. Dave became an advisor to the editors of the Journal of Structural Geology because he had very strong views on the way that the geological literature ought to be published.

Dave was en route to the August 1982 'Fabrics Conference' in Zurich, before intending to visit the Pyrenees to investigate a thrust belt new to him, when he tragically died. He once described the death of a U.S.G.S. geologist in the field as a proper and fitting end for a geologist to 'die with his boots on' and, sad to say, Dave achieved this. He will be remembered by his many friends and colleagues as a tall, boyish figure full of amazing fun and wit who could tolerate unbelievers gladly with a slight knowing smile on his lips. He

was incredibly widely read in many branches of the geological, physical and mathematical sciences and seemed to have an infinite capacity for work and research. He obviously influenced very many structural geologists and his written work is likely to rank with the best. Fortunately, the Department of Geology at Johns Hopkins has plans to bring out his unpublished work and that of his research students. His loss will be felt by all the geological profession but mostly by his wife Lois and his daughters Kate and Jenny who have suffered a tragic bereavement.

J.R. Hossack

### GAC-MAC SPECIAL SESSIONS

Two special sessions to be sponsored or co-sponsored by the SGTD were proposed to the organizers of Victoria '95. Unfortunately, our tardiness in submitting the proposals resulted in their not being included in the program. A proposal for an SGTD-sponsored Special Session has been submitted (on time) to the organizers of Winnipeg '96 by Colleen Elliott of Concordia University. The Special Session would deal with reactivation of basement faults in shield areas, evidence for reactivation, and consequences. If you are interested in participating, get in touch with Colleen as soon as possible.

### MEMBERSHIP TRENDS

In the last Main Thrust, it was mentioned that 1) membership in the SGTD has been declining, and 2) many of those on the Main Thrust mailing list are not paid members of the Division. A quick comparison of the membership list of the SGTD and the mailing list for the Main Thrust turned up the following food for thought.

1) We currently have 168 paid members of the SGTD. Comparison with membership lists for the last two years shows that this number seems to be stable (plus or minus ten or so), which is good news.

2) There are seventy-seven names on the Main Thrust mailing list who are not paid members. A statistically invalid evaluation of the names and addresses of those who are not SGTD members reveals that people from academia, industry, government agencies, and elsewhere, are all about equally represented.

There does not appear to be a financial crisis in the near future for the Division. If you have any thoughts concerning this situation, please let the executive know.

### FINANCES

Here is our financial situation up to December, 1994.

#### INCOME

Balance from spring 1994	\$ 5821.12
GAC income via F. Fueten	\$ 545.00
Income from GAC	\$ 155.00
Interest	\$ 815.10
<b>TOTAL</b>	<b>\$ 7336.12</b>

#### EXPENDITURES

Best paper prize	\$ 100.00
Best abstract prize	\$ 150.00
Best thesis prize	\$ 100.00
Students subsidies (CTG)	\$ 250.00
Waterloo '94	\$ 427.24
Subsidy to Precambrian Division for EMPOB '95	\$1000.00
Banking charges	\$ 16.00
<b>TOTAL</b>	<b>\$2043.24</b>

**BALANCE \$ 5292.88**

### UPDATES

This section was introduced to the Main Thrust to keep everyone up to date on news of importance to the Canadian Structural Geology and Tectonics community. Please do not hesitate to let us know of any news from your department, field, province, ...

### CLOSING REMARKS

As you have noticed, the Main Thrust currently serves to keep the SGTD membership (and 77 other interested parties) informed of meetings, finances, prizes awarded, and thesis / post-doc opportunities. Do not hesitate to also use it as a forum for your ideas. If you have something to say to colleagues across the country, send us an email and request that it be included in the Main Thrust.

To finish up, another reminder about the Division's very own link to the information superhighway. By sending an email message to CTG@spartan.ac.brocku.ca, it will be redistributed to all those who are on the SGTD emailing list set up at Brock University. If you wish to be included on this list, send your name and email address to the Division Secretary (see email address below) or to Frank Fueten

(ffueten@spartan.ac.brocku.ca).

Of course, any comments, suggestions or questions for the Executive are, as always, welcome.

## THE CLASSIFIEDS

MSc thesis. Structural and magnetic fabric study of a granite pluton and its wall rocks in the Quebec Appalachians. Demonstrate the timing of emplacement relative to Acadian tectonics. Results important for regional interpretations. Stipend, t.a. and logistics. Contact Keith Benn (see address below).

MSc thesis on a structural/geochronological problem related to the Grenville Front in the Temiscamingue area, near the Ontario/Quebec border. Simply stated, the question is: "Where is the Grenville Front here?". Contact Simon Hanmer (see address below).

PhD thesis research on deep-crustal (granulite to upper amphibolite facies) shear zones in the Early Proterozoic Nagssugtoquidian orogen in SW Greenland. Unique opportunity to examine the question: "How do large shear zones initiate in the deep crust", in conditions of superb exposure, access and logistical support. Contact Simon Hanmer (see address below).

## SGTD Executive

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**LIST OF PAPERS ON STRUCTURAL GEOLOGY / TECTONICS 1993 - 1994** This list includes all the titles submitted to the Executive by the Councilors. Papers are by Canadian geologists or concern Canadian geology.

## TECTONOPHYSICS

Hirt, A.M., W. Lowrie, W.S. Clendenen and R. Kligfield, Correlation of strain and the anisotropy of magnetic susceptibility in the Onaping Formation: evidence for a near-circular origin of the Sudbury Basin, 225, 231-254.

Vilotte, J.P., J. Melosh, W. Sassi and G. Ranalli, Lithosphere rheology and sedimentary basins, 226, 89-95.

Quinlan, G., J. Walsh, J. Skogseid, W., Sassi, S. Cloetingh, L., Lobkovsky, C. Bois, H. Stel and E. Banda, Relationship between deeper lithospheric processes and near-surface tectonics of sedimentary basins, 226, 217-225.

Xu, Y-G., J.V. Ross and J-C C. Mercier, The upper mantle beneath the continental rift of Tanlu, Eastern China: evidence for the intra- lithospheric shear zones, 225, 337-360.

Huang, Z., and M.A. Williamson, The thermal conductivity and heat flow density of the Jeanne d'Arc Basin, offshore eastern Canada, 233, 177-192.

Borradaile, G.J., R.A. Stewart and T. Werner, Archean uplift of a subprovince boundary in the Canadian Shield, revealed by magnetic fabrics, 227, 1-15.

Morgan, J., Three-dimensional strain analysis in physical models of geological structures, 230, 181-198.

Girard, R., Orogen-scale strain partitioning and an analogy to shear-bands in the Torngat Orogen, northeastern Canadian Shield, 224, 363-370.

Lafrance, B., J.C. White and P.F. Williams, Natural calcite c-axis fabrics: an alternate interpretation, 229, 1-18.

Benn, K., Overprinting of magnetic fabrics in granites by small strains: numerical modelling, 233, 153-162.

## JOURNAL OF STRUCTURAL GEOLOGY

Suhr, G., Evaluation of upper mantle microstructures in the Table Mountain massif (Bay of Islands ophiolite), 15, 1273-1292.

Sawyer, E.W. and Benn, K., Structure of the high-grade Opatoca belt and adjacent Abitibi subprovince, Canada: an Archean mountain front, 15, 1443-1458.

Robin, P.-Y.F. and Cruden, A.R., Strain and vorticity patterns in ideally ductile transpression zones, 16, 447-466.

Cruden, A.R. and Launeau, P., Structure, magnetic fabric and emplacement of the Archean Lebel stock, SW Abitibi greenstone belt, 16, 677-692.

Ji, S. and Martignole, J., Ductility of garnet as an indication of extremely high temperature deformation, 16, 985-996.

## **GEOLOGY**

Erdmer, P. and Mortensen, J. K., A 1200-Km-long Eocene metamorphic-plutonic belt in the northwestern Cordillera: Evidence from southwest Yukon, 21, 1039-1042.

Van Gool, J. A. M. and Cawood P. A., Frontal vs. basal and contrasting particle paths of metamorphic thrust belts, 22, 51-54.

van der Velden, A.J., and Cook, F.A., Displacement of the Lewis thrust sheet in southwestern Canada: New evidence from seismic reflection data, 22, 819-822.

Percival, J.A., Stern, R.A., Skulski, T., Card, K.D., Mortensen, J.K., Babin, N.J., Minto Block, Superior province: Missing link in deciphering assembly of the craton at 2.7 Ga, 22, 839-842.

Brown, R. L., Beaumont, C., and Willett, S. D. 1993(11). Comparison of the Selkirk Fan structure with mechanical models: Implications for interpretation of the southern Canadian Cordillera. *Geology*, v. 21, pp. 1015-1018.

Jones, A. G., Craven, J.A., McNeice, G.W., Ferguson, I.J., Boyce, T., Farquarson, C. and Ellis, R.G., North American Central Plains conductivity anomaly within the Trans-Hudson orogen in northern Saskatchewan, Canada, 21, 1027-1030.

Rivers, T., van Gool, J.A.M., and Connely, J.M. 1993(12). Contrasting tectonic styles in the northern Grenville Province: Implications for the dynamics of orogenic fronts. *Geology*, v. 21, pp. 1127-1130.

Monger J. W. H., van der Heyden, P., Journeay, J.M., Evenchick, C.A., Mahoney, J.B., Jurassic-Cretaceous basins along the Canadian Coast belt: Their bearing on pre-mid-Cretaceous sinistral displacements, 22, 175-178.

Cawood, P.A., Dunning, G.R., Lux, D., and van Gool, J.A.M., Timing of peak metamorphism and deformation along the Appalachian margin of Laurentia in Newfoundland: Silurian not Ordovician, 22, 399-402.

Lawton, D.C., Spratt, D.A., and Hopkins, J.C., Tectonic wedging beneath the Rocky Mountain foreland basin, Alberta, Canada, 22, 519-522.

Nance, R.D., and Murphy, J.B., Contrasting basement isotopic signatures and the palinspastic restoration of peripheral orogens: example from the Neoproterozoic Avalonian-Cadomian belt, 22, 617-620.

Gower, C.F., and Tucker, R.D., Distribution of pre-1400 Ma crust in the Grenville Province: Implications for rifting in Laurentia-Baltica during geon 14, 22, 827-830.

## **TECTONICS**

van Staal, C.R., Brunswick subduction complex in the Canadian Appalachians, 13, 946-962.

Mahalynuk, M.G., Nelson, J. and Diakow, L.J., Cache Creek terrane entrapment: oroclinal paradox within the Canadian Cordillera, 13, 575-595.

Stephenson, R.A., Coflin, K.C., Lane, L.S., and Dietrich, J.R., Crustal structure and tectonics of the southeastern Beaufort Sea continental margin, 13, 389-400.

Bouteiller, R.R. and Keen, C.E., Geodynamic model of fault-controlled extension, 13, 439-454.

## **CANADIAN JOURNAL OF EARTH SCIENCES**

Roberts, W. and Williams, P.F., Evidence for early Mesozoic extensional faulting in Carboniferous rocks, southern New Brunswick, Canada, 30, 1324-1331.

Stauffer, M.R. and Lewry, J.F., Regional setting and kinematic features of the Needle Falls shear zone, Trans-Hudson orogen, 30, 1338-1354.

Starkey, J., The analysis of three-dimensional orientation data, 30, 1355-1362.

Kirkwood, D. and Malo, M., Across-strike geometry of the Grand Pabos fault zone: evidence for Devonian dextral transpression in the Quebec Appalachians, 30, 1363-1373.

Waldron, J.W.F., Stockmal, G.S., Corney, R.E., Stenzel, S.R., Basin development and inversion at the Appalachian structural front, Port au Port peninsula, western Newfoundland Appalachians, 30, 1759-1772.

Lin, S., Relationship between the Aspy and Bras d'Or "terrane" in the northeastern Cape Breton Highlands, Nova Scotia, 30, 1773-1781.

Williams, H., Currie, K.L. and Piasecki, M.A.J., The Dog Bay line, a major Silurian tectonic boundary in northeast Newfoundland, 30, 2481-2494.

Culshaw, N.G., Ketchum, J.W.F., Wodicka, N. and Wallace, P., Deep crustal ductile extension following overthrusting in the south-western Grenville Province, Ontario, 31, 160-175.

Benn, K., Miles, W., Ghassemi, M.R., Gillett, J., Crustal structure and kinematic framework of the north-western Pontiac subprovince, Quebec: an integrated structural and geophysical study, 31, 271-281.

Daigneault, R. and Allard, G.O., Transformation of Archean structural inheritance at the Grenvillian Foreland Parautochthon Transition Zone, Chinougamau, Quebec, 31, 470-488.

Hynes, A., Gravity, flexure, and the deep structure of the Grenville Front, eastern Quebec and Labrador, 31, 1002-1011.

#### **THESES 1993 - 1994**

Robert J. Scammell, 1993.

Mid-Cretaceous to Tertiary thermotectonic history of former mid-crustal rocks, southern Omineca Belt, Canadian Cordillera, PhD, Queens University, Kingston.

Peter C. Jahans, 1993.

Computer-based procedures for constructing geological maps: an example from the Rocky Mountain Foothills in British Columbia, MSc, University of Alberta, Edmonton.

Stephen T. Johnston, 1993.

The geologic evolution of Nisling Assemblage and Stikina Terrane in the Aishihik Lake area, SW Yukon, PhD, University of Alberta, Edmonton.

Desmond E. Moser, 1993.

A geological, structural, and geochronological study of the central Wawa gneiss domain: implications for the development of different crustal levels of the Archean Abitibi-Wawa orogen of the southern Superior Province, Canadian Shield, PhD, Queens University, Kingston.

Abani K. Samantary, 1993.

Computer-assisted petrographic image analysis and quantization of rock texture, PhD, University of Western Ontario, London.

Robert A. Stevens, 1994.

Structural and tectonic evolution of the Teslin tectonic zone, Yukon: a doubly-vergent transpressive shear zone, PhD, University of Alberta, Edmonton.

Byron Veilleux, 1993.

Structural geology of the Triangle Zone at Langford Creek, MSc, University of Alberta, Edmonton.

Kathryn Margaret Bethune, 1993

Evolution of the Grenville Front in the Tyson Lake area, southwest of Sudbury, Ontario, with emphasis on the tectonic significance of the Sudbury diabase dykes, PhD, Queens University, Kingston.

Guowei Zhang, 1994

Strike-slip faulting and block rotations in the McConnell Creek area, north-central British Columbia: structural implications for the interpretation of paleomagnetic observations, PhD, McGill University, Montreal.

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BALLOT \*

Please indicate your choice of the two proposals (or write in your own proposal) for naming the new SGTG medal which will be awarded for the Best Paper.

F. D. Adams \_\_\_\_\_

D. Elliott \_\_\_\_\_

Other \_\_\_\_\_

\* please mail or fax to the Division Secretary

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