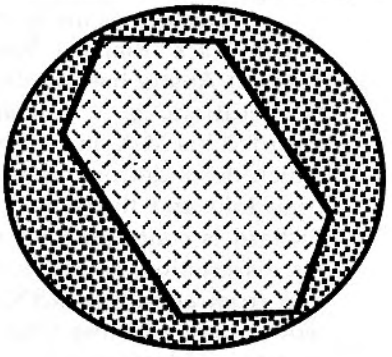


On Track

The Newsletter of the International Fission-Track Community

Volume 4, Number 1/Issue 8

Edited by *Dennis C. Arne*
Dalhousie University

(A Special Pre-ICOG-8 Edition)

One copy per lab; please copy and distribute

Editor's Notes

Featured in the present issue are the responses to the questionnaire printed in the November 93 *On Track*. Sixteen replies had arrived by "press time" and while the sample size is small compared to the number of issues mailed out (120), the results overwhelming indicate satisfaction with the status quo among those that took the time to respond. Many thanks to them by the way.

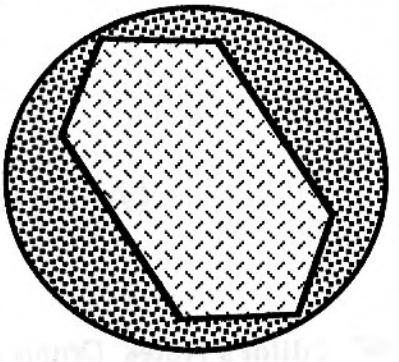
Of the sixteen respondents, not one suggested that *On Track* should evolve into a formal journal. The consensus seems to be that we, as a community, would best serve the technique by publishing within existing journals. More specialized contributions can always be submitted to Nuclear Tracks and Radiation Measurements. Not surprisingly, most respondents would not pay for an enhanced *On Track*, presumably because they would consider such a publication to be largely irrelevant.

Perhaps the most controversial question regarded the acceptance of original material for *On Track*. The majority of respondents considered such contributions acceptable, provided authors recognize that an article in *On Track* is not a formal publication. I can only repeat my earlier suggestion that articles in *On Track* be referred to as personal communications if credit is to be given in another venue. Several respondents suggested that original contributions be restricted to technique development, the facilitation of which was one of the stated aims in the creation of this venue. Most people felt that the Editor was adequate for "review" purposes, although I must admit I've had a pretty slack time of it this issue!

Finally, the vast majority of respondents preferred the present system of rotating editorships every year or so. The advantage of this is that each rotation should bring a new perspective to *On Track* and provides different labs an opportunity to blow their own horn a bit. I make no secret of the fact that I've taken this opportunity as Editor to try and raise the profile of the Dalhousie Fission Track Research Laboratory, and would encourage other would-be editors to bear this advantage in mind when considering the time commitment involved in preparing and mailing each issue. I would especially appeal to fission track laboratories in Europe and Asia to consider taking on the task in the future.

This brings me to the question of the next editor of *On Track*. Richard Weiland of the University of Texas at Austin has kindly offered to produce the next two editions of *On Track*. Richard was recently awarded his M.A. in Geology during the completion of which he undertook apatite fission track work in the Irian fold and thrust belt, Indonesia. At the moment Richard is continuing his research in New Guinea for his dissertation, a task that will unfortunately prevent him from attending ICOG-8 in June. On his behalf, I would urge all those sitting on short articles, research updates, address changes, or fission track publications in the more obscure literature to send their contributions. *On Track* will certainly fade away without them.

Dennis C. Arne



On Track is a biannual newsletter of the international fission-track community. It is printed in the months of May and November. The views expressed in *On Track* are those of the authors and do not necessarily reflect those of the fission track community or the editor of *On Track*.

Previous editors:

Dave Coyle (1990-91), La Trobe University
Trevor Dumitru (1991-92), Stanford University
Rasoul B. Sorkhabi (1992-93)Arizona State University
Dennis Arne (1993-94) Dalhousie University

CALL FOR CONTRIBUTIONS FOR *On Track* issue 8 (November 1994)

Dear Fellow Fission Tracker:

The next issue will come out in May 1994 and **we're looking for contributions.**

We welcome contributions of virtually any kind, including descriptions of new lab techniques, reviews of useful products, news and gossip, raving editorials about what all the other labs are doing wrong, meeting announcements, job openings, cartoons, and descriptions of what you are doing in your research. If you want to contribute, send me the final text to arrive by the **NOVEMBER 1, 1994 DEADLINE** at the latest (if it's a substantial article, let me know the title and length ASAP).

If possible, please send both one paper copy of your contribution and a **Macintosh DISC** (3.5 inch size) with the text saved in Microsoft Word. If you can't send a Mac disc, send an IBM compatible disc (3.5 inch size) in Word, or WordPerfect. Contributions can also be sent electronically, but please check with the editor before you send anything.

On Track includes a **LIST OF RECENT AND FORTHCOMING FISSION TRACK PAPERS**. If you know of a paper that was published recently or that is in press and should appear in the near future, please send it in. Just send your contributions on paper or send a copy of the first page of the paper. Full reprints are always welcome.

Also, if you move or know of someone who has moved, please inform us.

On Track is also happy to run **ADVERTISEMENTS**. There's no charge for line ads by non-commercial entities (e.g., universities). Please contact the editor for advertising rates for commercial ads (e.g., by equipment dealers).

On Track will remain free, at least for the near future. However, to save costs we generally mail only one copy per lab so please be sure to pass *On Track* around your lab.

Send contributions to:

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Acknowledgments

I would like to thank all those that contributed to the present issue of *On Track* ; Bob Walter, John Murphy and Dave Coyle, and particularly Casey Ravenhurst and Bob Mackay for putting together an article based on their very recent microprobe results. Mike Collins provided invaluable assistance in putting the final copy together in a hectic push to get this issue out early in time for ICOG-8.

The editor

INTS

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*** Please note the new dates**

The following questionnaire appeared in the November 1993 issue of *On Track* to accompany a guest editorial by Dave Coyle. Approximately 120 copies were mailed out, but these included single copies to laboratories used by more than one fission tracker. I estimate our circulation to be somewhere between 150 and 200 individuals. Only sixteen responses were returned, giving a response rate of somewhere near 10%. In spite of the small number of responses, the results are pretty clear and call for a retention of *On Track* in its present format.

On Track Questionnaire

1: Should *On Track* aim to evolve towards becoming a scientific journal? (ISSN number, peer review, only original research published)

Yes 0 No 16

2: Would you be willing to pay for an enhanced *On Track* ?

Yes 4 No 12

If so, how much ? _____

3: If you answered NO to 1), should contributions which present original work be accepted for distribution in *On Track*?

Yes 10 No 6

If so, should they be reviewed by:

- the editor 9 - a review board 2

4: Should *On Track* have:

- a permanent home _____

- rotate editorships as is 14

- rotate editorships every 2/3 year(s)?

Room for comment was provided and , almost without exception, the respondents provided additional thoughts on what they consider *On Track* to be. Most appreciated the informal nature of the present format and felt that "yet another" new journal was unnecessary. The presentation of original results was considered acceptable by the majority of respondents, provided that contributors are aware that an article in *On Track* does not constitute a formal publication.

Recent Fission-Track Papers

Arne, D.C., (1994), The Phanerozoic exhumation history of the northern Prince Charles Mountains (East Antarctica). *Antarctic Science*, **6**, 69-84.

Arne, D.C. and Zentilli, M. (in press) Apatite fission track thermochronology integrated with vitrinite reflectance - a review; Reevaluation of Vitrinite Reflectance as a Maturity Parameter: Petrologic, Kinetics and Geochemical Factors, P.K. Mukhopadhyay and W.G. Dow (eds.), *American Chemical Society* .

Cheng-Hong Chen, Li-Ping Tan, Rong-Li Tien, San-Hsiung Chung and Tsung-Kwei Liu, (1993), Fission track age dating of igneous rocks and silicified sandstones from Chilung volcano group, northern Taiwan: implications of mineralization events of the Chinkuashih gold-copper deposits. *Journal of the Geological Society of China*, **36**, 157-?.

Dumitru, T.A., I.R. Duddy, and P.F. Green, (in press), Mesozoic-Cenozoic burial, uplift, and erosion history of the west-central Colorado Plateau. *Geology*.

Hendrix, M.S., Dumitru, T.A. and Graham, S.A. (in press), Late Oligocene-Early Miocene unroofing in the Chinese Tian Shan: an early effect of the India-Asia collision. *Geology*.

Burgmann, R., Arrowsmith, R., Dumitru, T. and McLaughlin, R., (in press), Rise and fall of the southern Santa Cruz Mountains, California, deduced from fission track dating, geomorphic analysis, and geodetic data. *Journal of Geophysical Research*, **99**.

Gallagher, K., Dumitru, T. and Gleadow, A.J.W. (in press), Constraints on the vertical motions of the eastern Australian platform during the Mesozoic. *Basin Research*.

Garver, J.I., Archibald, D.A., and Van Order, W.F., Jr., (1994), Late Cretaceous to Paleogene cooling adjacent to strike-slip faults in the Bridge River area, southern British Columbia, based on fission-track and ^{40}Ar-^{39}Ar analyses. *Geological Survey of Canada, Current Research*, **1994-A**, 177-183.

Foster, D.A. and Gleadow, A.J.W., (1993), Episodic denudation in East Africa: a legacy of intracontinental tectonsim. *Geophysical Research Letters*, **20**, 2395-2398.

Foster, D.A., Gleadow, A.J.W. and Mortimer, G., (1994), Rapid Pliocene exhumation in the Karakoram (Pakistan) revealed by fission-track thermochronology of the K2 gneiss. *Geology*, **22**, 19-22.

Foster, D.A., Murphy, J.M. and Gleadow, A.J.W., (1994), Middle Tertiary hydrothermal activity and uplift of the northern Flinders Ranges, South Australia: insights from apatite fission-track thermochronology. *Australian Journal of Earth Sciences*, **41**, 11-18.

Garver, J.I. and Brandon, M.T., (in press), Fission-track ages of detrital zircons from Cretaceous strata, southern British Columbia: implications for the Baja BC hypothesis. *Tectonics*.

Omar, G.I., Lutz, T.M. and Giegengack, R., (1994), Apatite fission-track evidence for Laramide and post-Laramide uplift and anomalous thermal regime at Beartooth overthrust, Montanna-Wyoming. *Geological Society of America Bulletin*, **106**, 74-85.

Thomson, S.N., (in press), Fission track analysis and provenance studies in the Calabrian Arc sedimentary rocks, southern Italy. *Journal of the Geological Society of London*.

Thomson, S.N., (in press), Fission track analysis of the crystalline basement rocks of the Calabrian Arc, southern Italy: evidence of Oligo-Miocene late-orogenic extension and erosion. *Tectonophysics*.

van der Beek, P., Cloetingh, S. and Andriessen, P., (1994), Mechanisms of extensional basin formation and vertical motions at rift flanks: constraints from tectonic modelling and fission-track thermochronology. *Earth and Planetary Science Letters*, **121**, 417-433.

Short Tracks

* *Charles and Nancy Naeser* of the U.S. Geological Survey have left Denver and are now based at Reston, Virginia. Charles has accepted an administrative posting and Nancy is establishing a new fission-track lab.

* *Stuart Thomson* completed his Ph.D. last year with the London Fission Track Research Group and has recently taken up a two year post at Ruhr-Universität, Bochum, Germany.

* *Mark Tippet* has moved from Hamilton, New Zealand to Salford, England, where he is a lecturer in Physical Geography at the University of Salford.

A Fission Track On-Ramp to the Infobahn

Dave Coyle
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In a recent flurry of e-mail between several FT labs scattered about the globe, the idea of creating a sort of electronic FT news system over the Internet was mooted. The option of a usernet-style newsgroup was quickly rejected (by me) in favor of a moderated mailing list. The idea of having a moderated mailing list instead of open news is appealing, because it would

eliminate the "flame wars" common to usernet news, and it would allow a certain degree of focusing: topics on related subjects could be grouped together, and inappropriate nonsense could be weeded out (if you have read netnews, you know that the spelling mistakes are particularly viciously pounced upon: this is childish and a waste of everyone's time). The idea is that the mailings will only contain topics of genuine interest to all. Another good reason is that news for small groups tends to be sparse, and we would quickly get out of the habit of reading a conventional news group, if the last ten times we looked there had been nothing new. Plus , the news is delivered to your doorstep like the daily news paper, (and it won't get all soggy either).

And *On Track* ?

Well that you asked. *On Track* is by now a firmly entrenched FTD institution and nothing should ever replace it. The advantage that *On Track* has over e-mail is scope: the articles can be more in-depth, formatted text, figures and graphics are allowed, and a greater variety of material is published (jokes, poems, cartoons included). The electronic service (ElTrack, for short) will be quite different, reflecting it's own unique strengths, which are timeliness and transience (i.e.: things that are important now but not worth killing a tree for). Thus ElTrack will concentrate on facts that you may want to know now: important addresses, conference news, upcoming articles, tips and tricks in the lab, the next *On Track* deadline, and anything else that can be expressed in a handful of ASCII text. (like: "Help! My fellowship expires in December, and I need a new job", or "Who ants to be a beta tester for TrackMan (a cool App)?"). But also *On Track* itself can be distributed electronically, in a device-independent format that will allow you to print it out yourself, saving production costs. In addition, *On Track* could include a summary of important news items, for those who can't (or just don't want to) cruise the Infobahn. So *On Track* and ElTrack would exist symbiotically.

How does it work?

That's the easy part. You mail your submissions to the moderator (that's me: dcoyle@eu10.mpi-hd.mpg.de), and I will do one of three things to it:

1) Forward it to the whole world immediately, because it's so important.
2) Hold it to include with a mailing of related items.
3) Expire it because it does not parallel the ElTrack idiom (you will be informed, but no correspondence will be entered into!)

To subscribe, just send an e-mail to me stating exactly that. Mailings will be restricted to one per site, with some person there responsible for local distribution.

But I don't have e-mail!

Don't panic. You can access internet just about everywhere, although some institutions balk at the initial hook-up cost and ongoing expense. Do not despair: there are a number of commercial service providers who will give you individual access for a low monthly fee*. All you need is the appropriate hardware (computer and modem, the faster the better, and, of course, a phone line) and communications software (minimally UUCP and it's emulants on various PC platforms). The cost of your connection is going to be proportional to the degree of connectivity you desire, so a dialup-only UUCP-like connection for just mail and news will be much cheaper than a two-way SLIP or ISDN link. I will actually be managing the list though a commercial passive/aggressive UUCP link, so you see, it's not that hard to do. The hardest part is finding a host to connect to. This is a classic catch-22: the best way to find them is through a posting on a net, but of course you do not have access to the net yet, do you? The answer is to phone/fax a nearby friend who does have access, and ask them to make the posting for you.

Archives

There are certain lists of things that it is too much bother for each of us to create or keep up-to-date by ourselves. Addresses of important suppliers, peoples e-mail addresses and fax numbers, and such like. It would be great to have a central repository were each can contribute their special knowledge, and reap the benefits of others doing the same. I know where to buy good pre-cut micas, for example. These lists could be compiled centrally and stored in an on-line archive, so that anyone can get the most up-to-date information whenever they want it. I imagine that it would consist of at least these elements: Important addresses, Frequently asked questions, Back issues of *On Track*, a list of fission track articles and, hopefully, the Abstracts of those articles. Unlike ElTrack, we are not yet sure how we should go about establishing the archive, or where. I have my opinions on this matter, but I think we should all get together at ICOG to discuss it.

I hope that you will all endorse this project through your enthusiastic participation.

* in North America there are lots: Compuserve, American Online Tymenet, and many others (this is not

an endorsement!). Most have toll-free 1-800 numbers, and bill you by the minute, usually with cheaper rates at night. There is also an Internet surcharge on some commercial networks.

Attention: Fission Trackers for CN Glass Standards

John Murphy
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E-mail "geojm@plains.uwyo.edu."

Dr. Jan Schreurs of Corning Inc., who designed, produced and distributed the "CN" Standard Glass Series for over two decades will retire August 1, 1994. The reason for telling you this is two fold:

1) Depending on our need for additional CN standards, Dr. Schreurs and Corning Inc. are providing us with a one-time opportunity to produce new CN-equivalent glass standards.

2) Corning is looking for laboratories to purchase, and distribute in the future, the existing CN Glasses (Table 1). At this point Barry Kohn, at La Trobe University, has inquired about CN-1 and CN-5, but homes are needed for the remaining standards. Purchasing and curating the standards will be a large commitment of money and time, without any assurance of recovering costs over the long term.

Table 1 Details of what CN-Glasses currently exist and the price per wafer

CN-1[1] 40 ppm U: 117 X 56 X 26 mm block, will yield ~60 wafers of 2 X 27 X 26mm. Fifteen 1 mm-thick wafers now exist.
CN-2[1] 40 ppm U: 130 X 55 X 26 mm block, will yield ~65 wafers of 2 X 27 X 26 mm. Twenty six 1 mm-thick wafers now exist.
CN-3[2] 40 ppm U: 110 X 150 X 14.5 mm block, will yield ~29 wafers of 2 X 23 X 14.5 mm. Twenty-nine 1 mm-thick wafers now exist.
CN-4[2] 32ppm Th, 8ppm U: 135 X 80 X 25 mm block, will yield ~225 wafers of 2 X 25 X 25 mm. Fifteen 1 mm -thick wafers now exist.
CN-5[2] 10ppm U: 150 X 38 X 15 mm block, will yield ~75 wafers of 2 X 18 X 15 mm. Fifty 1 mm-thick wafers now exist.
CN-6[2]1ppm U: 154 X 64 X 16 mm block, will yield ~60 wafers of 2 X 20 X 16 mm. Thirtyish 1 mm-thick wafers now exist.

Notes: Underlined numbers are popular fission track glasses to be purchased and distributed by La Trobe University. Price is a function of the number cut and polished, not on the thickness of the wafer.

1- Price is $15 per wafer
2- price is $12-14 per wafer

Concerning new standards: Important questions to consider are:

1) Do we want new CN standards ?

2) What CN glasses do we want duplicated and/or do we want other geometries, glass-types, etc. ?

3) Who will curate and distribute the new glasses ?

4) When to order ?

5) How will funds be generated to pay for them ?

Some thoughts are summarized below.

Need: Results of the attached survey and of discussions at ICOG-8 will be used to decide whether we need new CN glasses.

What We Want: Which glasses to duplicate, how many wafers of each, how thick, and what type of glass should be used.

Host/Curator: This would be a substantial commitment and would necessarily require a laboratory with stable funding (if that's possible). If you or your institution are interested please speak up at ICOG (Barry Kohn will be there to lead discussions) or contact me, perhaps when you submit your questionnaire.

When: Dr. Schreurs is retiring August 1,1994, but will be available as a consultant for about one year. As this is uncertain, I recommend that we move quickly to determine whether we need new glasses and then proceed as necessary.

Cost: Corning estimates the cost to be US$12-15 per wafer (Table 1) to produce melts with enough glass for 300-500 1mm thick wafers (remember 4-6 glasses can be cut from each wafer). If we were to order 2 batches, for example one each of CN1 and CN5, then the funds necessary for 300 1-mm wafers at $15 would be about US$9,000. Because of past breakage (at 1 mm, the wafers are brittle), should we consider increasing the wafer thickness (Barry's idea)? This is a simple task but it would reduce the total wafer yield by half while reducing cost somewhat less (perhaps only some should

be thicker). To lower Na-induced problems, as in existing CN and NBS standards, should we consider using quartz glass (Trevor's idea). Unfortunately, this procedure requires melting temperatures exceeding 1900°C which, along with unbroken SiO_4 tetrahedra that inhibit homogenization (Na, K, and B are normally added to break them), this process would cost 3-5 times more to use. Another possibility is a K-glass: does neutron irradiation produce radioactive nasties in such a glass ?

Funding/Payment: This would likely be tough. Suggestions have included:

1) Writing as joint NSF-type proposals as a cohesive group (imagine that).

2) Asking for donations from petroleum and mining companies who frequently use fission track thermochronology.

If the international FT community agrees on a need for additional standards, perhaps all of us should contribute something. **Regardless of the support you would offer please respond to the questionnaire below; PRONTO!** Give them to Barry at ICOG or mail them to me.

For the sake of our nebulous futures please think back, if you where there, to past needs for standards, and forward, to future needs and about the words written above. Unfortunately I will not be at ICOG-8, however that meeting is ideally timed for the situation. **I urge interested people to meet in Berkeley and discuss the matter.**

Dr. Schreurs is currently very busy so I suggest you respond to either me or Barry (Fax 613 479 1272; e-mail bkohn@mojave.latrobe.edu.au) about matters concerning standard glasses (the *On Track* Editor has enough to do). If you are sincere about purchasing and curating any or all of CN-3, CN-4, CN-6 please contact Elton Harris, manager of experimental melting, Corning Inc., Corning NY 14831. As a favor to Corning Inc., if anyone knows other isotopists who might purchase and curate these glass standards please pass this letter on to them.

Please tick the appropriate space in the adjacent questionnaire, comment as you see fit, and forward your response to John Murphy. Because we need to act promptly, only final decisions will be summarized in the next *On Track*.

I would urge everyone who has an interest in glass dosimetry to please return the questionnaire to John as soon as possible. Both he and Dr. Schreurs are going out of their way to ensure a future supply of CN glasses and, as we all well know, they don't last forever !

Ed.

Questionnaire: CN-GLASSES

Should new glasses be made? Yes ___ No ___; Why?

_____

_____

_____

Should we duplicate existing glasses or try something new that is particularly suited to our needs ?

Duplicates ? CN1 ___ CN2 ___ CN5 ___

Others ? ___ Specify ____ ppm U

How many ? 300 ____ 500 ____

How thick (mm) ? 1___ 1.5 ___ 2 ___ Assorted ___

Comments:_____

_____

_____

_____

What glass-type ?

Na ____ (Duplicate existing standards if possible)

Si ____ (Justify cost, inhomogeneity, etc.)

_____

K ____ (List known irradiation products)

_____

B ____ (Nasty byproducts known to occur so not recommended)

Comments:_____

_____

_____

Host/Curator ?

Is your laboratory considering hosting the new standards ? Yes ___ No ___ Maybe ___

Comments:_____

_____

_____

Funding ?

I suggest that a proposal be to NSF ___ Industry ___ both ___ others _____

Suggestions:_____

_____

_____

Timing ?

I think we should ignore this unique opportunity ____ or act promptly then place an order ___.

I will help by seeking funding ___ serving on a proposal writing committee ___ other _____.

Name _____

Contact Fax/Tel number _____

Directory of the International Fission-Track Community

Editor's Note: This directory was originally prepared by Rasoul Sorkahbi, past editor of *On Track* (1992-93). I have attempted to update the directory to the best of my ability, but this can only be achieved if individuals contact the current editor with address changes. It is published solely for the information of fission-track researchers; this is neither a comprehensive directory including all fission-track researchers nor an official document endorsing the scientific stand of individuals by the fission-track community.

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ICOG-8 UPDATE
Berkeley, California
June 5-11, 1994

ICOG-8 is rapidly approaching and most people will already have made plans to attend. However, for those of you who may be hovering on the precipice of indecision, Bob Walter of the Organizing Committee has kindly provided me with a listing of accepted papers that will be of interest to the fission track community. With one exception, all the papers listed contain a reference to fission tracks in their title, which is how they were plucked from the conference data base. So if you don't see your paper listed, don't panic, it just means Bob couldn't find it easily. Fortunately, I remembered the title of my own paper!

Andriessen, Paul Antonius Session 11b Poster

High Cooling Rates and Tectonic Unroofing in the Internal Zone of the Alpine belt of the Betic Cordillera, S. Spain, During the Early Miocene: Constraints From Fission Track Analyses.

Arne, Dennis Session 11b Poster

Absolute timing of thrust faulting: a thermochronological approach.

Dunkl, Istvan Session 11b Poster

Fission Track Evidence on the Pliocene-Quaternary Uplift of the Margin of the Pannonian Basin, Hungary.

Feinstein, Dr. Shimon Session 11b Oral

Apatite Fission Track (ATF) and Organic Maturity (OM) Paleothermometry of the Eastern Margin of the Gulf of Suez.

Gallagher, Kerry Session 11b Oral

Genetic Algorithms: A Powerful New Method for Modelling Fission Track Data and Thermal Histories.

Gleadow, Andrew J.W. Session 11b Oral

Towards a Apatite Fission Track Morphotectonic Image of the Snowy Mountains, SE Australia.

Hansen, Kirsten Symposia 2a Oral, Poster

Cooling and Uplift in a Tertiary Plume Area: Fission Track Evidence from the Kangerlussuaq Area, East Greenland.

Hsin-Yi, Tseng Session 3e Oral

Relating Hydrothermal Fluid Flow to Thermal Maturity for a Triassic Basin: Results from Fluid Inclusions and Fission Track length Data.

Iwano, Hideki Session 1a Oral

One-To-One Correlation of Fission Tracks Between Sphene and Mica Detectors.

Johnson, Kit Symposia 2a Oral

Differentiating the Tectonic and Erosive Components of Denudation Using Fission Track Analysis: A Case Study from S.E. Spain.

Khai, Nghiem Vu Session 3d Oral

Natural Etching and Annealing of Fission Tracks in Zircons during Hydrothermal Alteration

Kohn, Dr. Barry P. Session 11b Oral

Thermotectonic History of the Cajon Pass Deep Drillhole, Southern Califoria: An Apatite Fission Track Study.

Lee, Jeffrey Symposia 2a Oral

Rapid Uplift and Rotation of Mylonitic Rocks, Northern Snake Range, Nevada: Insights from K-Feldspar $^{40}Ar/^{39}Ar$ and Apatite Fission Tracks.

Mitchell, Melinda M. Session 11b Poster

Thermal Variations in a Passive Margin, from Apatite Fission Track Analysis in the Western Otway Basin, Australia.

Noble, Wayne P. Session 11b Oral

Extentional Tectonic Evolution of the Eastern Tanzania from Apatite Fission Track Thermochronology.

O'Brien, Alun F. Session 11a Oral

Annealing Characteristics of Spontaneous and Induced Fission Tracks in the Fish Canyon Tuff Zircon

O'Sullivan, Andrea J. Session 11b Poster

Apatite Fission Track Study of a Vertical Profile Through the Bogong High Plains.

Ravenhurst, Casey E. Session 11a Oral

Effects of "Bulk" Etch Rate as Recorded in Etch Pit Dimensions on Measured Fission Track Length Anisotropy in Durango Apatite.

Rasa, Asaf Session 11b Poster

Apatite Fission Track Thermochronology of Selected Wells from the Bowden/Surat Basins, Eastern Australia.

Rohrman, Max Session 11b Oral

Large Scale Doming and Associated Basin Evolution in South Norway: Evidence from Apatite Thermochronology.

Sanders, Carlos A. E. Session 11b Poster

The First Fission Track Results of the Transylvanian Basin-Carpathian Mountain Belt System in Romainia

Seward, Diane Session 11 Poster

Neogene Extention in the Western Alps-Evidence from Fission Track Dating.

Siddall, Ruth Session 11b Oral

The Post-Varsican Evolution of Continental MArgins of the Bay of Biscay: A Study using Apatite Fission Track Analysis.

Thomson, Stuart N. Session 11b Oral

Evaluation of the Late Orogenic Exhumation History of the Calabrian Arc, Southern Italy Using Fission Track Analysis.

Yamata, R. Symposia 2a Poster

Fission-Track Annealing in Zircon; Confined Track Length Analysis and Arrenius Plot

Yelland, Andrew J. Session 11b Oral

Exxhumation of the Red Sea and Gulf of Aden Rift-Flanks: Fission Track Contrasts within Volcanic and Non-Volcanic Margins of the Yemen Republic.

Special Announcement for ICOG-8 !

Bob Walter of the ICOG-8 Organizing Committee has kindly offered to arrange a venue for the fission track community to get together at ICOG-8 to discuss a variety of issues. The "workshop" is tentatively scheduled for Tuesday, June 7th between 5:30 and 6:30 PM. An announcement of the venue location will be made at the meeting, but you may have to look for it. The proposed topics for discussion include:

1) The future of *On Track* (see the results of the questionnaire on page 4) and on the initiation of an moderated mailing list (see Dave Coyle's article on page 5).

2) Future availability of standard dosimeter glasses (see John Murphy's article on page 7).

3) The future editor for *On Track* in 95/96, after Richard Weiland's sentence (sorry, term).

4) Anything else that people would like to discuss, hopefully with suitable refreshments at hand!

5) An informal meeting of NAFTA (North Atlantic Fission Track Alliance) is proposed to discuss plans for a series of transects across different North Atlantic rifted margins. Anyone interested in this proposal should speak to Casey Ravenhurst at ICOG.

If interested please contact Bob Walter and let him know that you're planning to attend. In return, you may get an early notification of where the workshop will be held.

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Keeping Track

Editor's Note: The purpose of this section is to allow fission track researchers to "keep track" of what research is currently being undertaken, as opposed to the earlier section in which the movements of individuals is "tracked". Contributions can either be brief or detailed and are intended to make other labs aware of what research is currently in progress.

News from the Wild West

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The fission track laboratory at the University of Wyoming, established by Dr. James Steidtmann in about 1987, has recently acquired an automated stage system which has improved productivity substantially. Dr. Steidtmann is working with Pete George (a former post-doc, now at UT-Austin) on a project in the Hanna Basin of Southeast Wyoming. A Ph.D. student, Uwe Strecker, is working on a study of the Black Hills, but there is no other student activity.

John Murphy, after moving from La Trobe last June, has set up the new stage system and has phased out the use of toxic heavy liquids for routine separations. He continues to work on Alaskan projects, mainly in association with the various government agencies in central and northern Alaska. He continues to consult much of the time, both in Alaska and South America with petroleum research groups and mining companies. Steidtmann, Cerveny (now ARCO) and Murphy are working-up data from the deepest well in the Mid-Continental Rift (>17,000ft.) which is yielding results that require the addition of substantial amounts of Late Paleozoic-Mesozoic section or, less likely, a recent lowering of the local geothermal gradient. Unfortunately little information on thermal maturation is available due the old age of the bulk of the section, however the fission track parameters by themselves are very useful. Steidtmann and Murphy are planning to write some proposals soon and a new post-doc may show up within the year.

A Word from Bochum

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Stuart Thomson recently arrived in Bochum to join Manfred Brix and to evaluate the low-temperature thermal history of various tectonic units in Crete, Greece. Other areas of interest to researchers at Bochum include the Harz Mountains, eastern Germany various parts of the western Alps, and the Rheinish Massif of western Germany and Belgium (in collaboration with Tony Hurford, London). Future projects also include work on mainland Greece and various aspects of zircon and sphene annealing.

Microprobe Analyses of Oxygen in Apatite

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Chemical compositions can strongly affect the fission track annealing behaviour in apatite (Green et al., 1986, 1988). Fission tracks in F-apatites anneal completely at temperatures as much as 30°C lower than tracks in Cl-apatites (Ravenhurst et al., 1992). But, what about OH- and CO_2-apatites? Improved technology now makes electron microprobe analysis of Oxygen in apatite not only possible, but practical (Nash, 1992). Carbon, though, is still a difficult problem. Where previously the OH composition of apatites had to be inferred from low totals and calculated using stoichiometry, we can now actually determine the amount of Oxygen bound up in OH and/or CO_2.

Large crystals of apatite from Durango, Mexico; Otter Lake, Quebec; and Bamle, Norway (Smithsonian No.B13064) were microprobed with a JEOL 733 superprobe using operating parameters similar to those recommended by Stormer et al. (1993; 10 μm beam size, 15 KV acceleration voltage and 15 nA current). Oxygen and Fluorine were analyzed using a wavelength spectrometer equipped with an Ovonyx (LDE1) crystal. All other elements were analyzed using the energy-dispersive system. Fluorine was counted first for 20 seconds and Oxygen for 40 seconds. The raw data was corrected using the Link ZAF matrix-correction program. Instrument calibration was performed on cobalt metal (± 0.5%). Durango apatite was used as a standard for O, F, Ca and P, tugtupite for Cl, sanidine for Si, garnet for Fe, MnO_2 for Mn, jadeite for Na, kaersutite for Mg, chalcopyrite for S, celestite for Sr and monazite for La, Ce, and Nd. Two tables of data are presented (Tables 1 and 2).

Table 1 contains some of our early analyses which do not include Oxygen. Data are presented as oxides and reduced in the normal manner assuming the presence of 26 anions and 16 cations (e.g. Deer, Howie, Zussman, 1966). The troubling thing about this type of analysis is the assumption that F and Cl always substitute for O in the lattice; 1/2 of the atomic proportions of F and Cl are always subtracted before scaling the proportions for 26 anions of O+F+Cl. This despite the fact that F and Cl seem to have a unique position in the apatite crystal lattice. Is there some part of the logic that we do not understand?

Table 2 contains analyses of the same large crystals, but include direct analyses of Oxygen. These data are reduced assuming 21 atoms in the unit cell; P+Si+C should add to 3.0 (2.89-2.95), F+Cl+OH should add to 1.0 (0.94-1.01), total O should equal 12 (12.09-12.18), and all the remainder (including Ca) should add to 5.0 (4.90-4.96). Twelve repeat analyses on Durango (not shown) provided the range of sums in brackets. A similar range around the ideal sums would likely be acceptable for other apatites. The Otter Lake apatite does appear to contain excessive F, well beyond that allowed by stoichiometry. Does this F actually substitute for O in this case thereby freeing up some of the O for use in CO_2? The CO_2 estimation in Table 2 is a guess at likely CO_2 content such that the O sum drops below 12 by an amount that 1/2 the excess F can substitute. Interestingly the CO_2 guess is close to that found for Otter Lake by Bergman et al., (pers. comm.).

We are interested in communicating with others who have wrestled with similar problems. We have done this work using the ZAF matrix correction program. Is the PHI RHO Z matrix correction program a better option? We noticed a significant change in O analyses in a section after it was rotate 180° in the holder and re-analyzed. The sample had been polished by hand, but after machine polishing and re-analysis, the effect was much less. A final request; we would very much like to know about any apatites for which an independent (not microprobe) analysis of O exists.

References

Deer, Howie and Zussman, (1966), An Introduction to the Rock Forming Minerals. Longman, London, 528 p.

Green, P.F., Duddy, I.R., Gleadow, A.J.W. and Lovering, J.F., (1988), Apatite fission track analysis as a paleoemperature indicator for hydrocarbon exploration. In Naeser and McCulloh (Eds.), *Thermal History of Sedimentary Basins*. Springer-Verlag New York Inc., New York, USA.

Green, P.F., Duddy, I.R., Gleadow, A.J.W., Tingate, P.R. and Laslett, G.M., (1986), Thermal annealing of fission tracks in apatite, 1. A quantitative description. *Chemical Geology (Isotope Geocsience Section)*, **59**, 237-253.

Nash, W.P., (1992). Analysis of oxygen with the electron microprobe: Applications to hydrated glass and minerals. *Am. Mineralogist*, **77**, 453-457.

Ravenhurst, C.E., Roden, M.K. and Miller, D.S. (1992), Dependence of fission track annealing on crystal chemistry (abstract). 7th International Workshop on Fission-Track Thermochronometry, July 13-17, U. Penn., Philadelphia, PA.

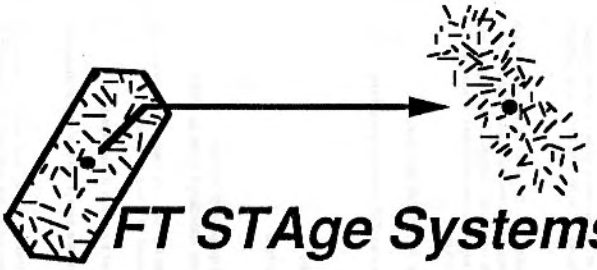
Stormer, J.C., Pierson, M.L. and Tacker, R.C., (1993), Variation of F and Cl X-ray intensity due to anisotropic diffusion in apatite during electron microprobe analysis. *Am. Mineralogist*, **78**, 641-648.

TABLE 1. APATITE ANALYSES WITHOUT OXYGEN

Sample Name	P2O5	CO2	SiO2	SO3	Ce2O3	Nd2O3	La2O3	FeO	MnO	MgO	CaO	Na2O	SrO	F	Cl	OH	O=F,Cl	Totals
Durango	40.91		0.28	0.00	0.47					0.00	54.35	0.27		3.56	0.40	0	1.59	98.65
(oxide prop.)	0.2882	0.0000	0.0046	0.0000	0.0014	0.0000	0.0000	0.0000	0.0000	0.0000	0.9691	0.0044	0.0000	0.1876	0.0112	0.0000		
(atomic prop.)	1.441	0.0000	0.0093	0.0000	0.0043	0.0000	0.0000	0.0000	0.0000	0.0000	0.9691	0.0044	0.0000	0.1876	0.0112	0.0000	0.099	2.5274
(stoichiometry)	5.9295	0.0000	0.0478	0.0000	0.0297	0.0000	0.0000	0.0000	0.0000	0.0000	9.9688	0.0903	0.0000	1.9296	0.1149	0.0000		
(sums)	5.9772										10.0888			2.0445				
Otter Lake	38.40		1.04	0.00	0.56					0.00	54.17			4.33		0	1.82	96.67
	0.270532	0.0000	0.0173	0.0000	0.0017	0.0000	0.0000	0.0000	0.0000	0.0000	0.9659	0.0000	0.0000	0.2279	0.0000	0.0000		
	1.352659	0.0000	0.0345	0.0000	0.0051	0.0000	0.0000	0.0000	0.0000	0.0000	0.9659	0.0000	0.0000	0.2279	0.0000	0.0000	0.114	2.4722
	5.6904	0.0000	0.1817	0.0000	0.0356	0.0000	0.0000	0.0000	0.0000	0.0000	10.1588	0.0000	0.0000	2.3968	0.0000	0.0000		
	5.8721										10.1945			2.3968				
Bamle,	41.22									0.21	53.08	0.32		0.37	3.10	0	0.86	97.44
Smithsonian	0.290384	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0052	0.9464	0.0052	0.0000	0.0197	0.0874	0.0000		
	1.45192	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0052	0.9464	0.0052	0.0000	0.0197	0.0874	0.0000	0.054	2.4623
	6.1325	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0547	9.9936	0.1097	0.0000	0.2079	0.9233	0.0000		
	6.1325										10.1581			1.1311				
After OH calculations																		
Bamle	41.22									0.21	53.08	0.32		0.37	3.10	1.6	0.86	99.04
Smithsonian	0.290384	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0052	0.9464	0.0052	0.0000	0.0197	0.0874	0.0888		
	1.45192	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0052	0.9464	0.0052	0.0000	0.0197	0.0874	0.0888	0.054	2.5511
	5.9190	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0528	9.6457	0.1059	0.0000	0.2006	0.8912	0.9051		
	5.9190										9.8045			1.9969				

TABLE 2. APATITE ANALYSES INCLUDING OXYGEN

Sample Name	P	C	Si	S	Ce	Nd	La	Fe	Mn	Mg	Ca	Na	Sr	F	Cl	OH	O	Totals
Durango	17.77		0.12		0.51	0.13	0.28				38.71	0.25		3.57	0.44		38.51	100.29
(atomic prop.)	0.5737	0.0000	0.0043	0.0000	0.0036	0.0009	0.0020	0.0000	0.0000	0.0000	0.9658	0.0109	0.0000	0.1879	0.0124	0.0000	2.4069	4.1684
(formula = 21 atom:	2.8903	0.0000	0.0215	0.0000	0.0183	0.0045	0.0102	0.0000	0.0000	0.0000	4.8657	0.0548	0.0000	0.9466	0.0625	0.0000	12.1256	
(sums)	2.9118										4.9535			1.0091			12.1256	
Otter Lake	16.80		0.48		0.75	0.25	0.26				38.70			4.26			38.00	99.5
	0.5424	0.0000	0.0171	0.0000	0.0054	0.0017	0.0019	0.0000	0.0000	0.0000	0.9656	0.0000	0.0000	0.2242	0.0000	0.0000	2.3750	4.1332
	2.7558	0.0000	0.0868	0.0000	0.0272	0.0088	0.0095	0.0000	0.0000	0.0000	4.9058	0.0000	0.0000	1.1392	0.0000	0.0000	12.0669	
	2.8426										4.9514			1.1392			12.0669	
Bamle	18.00				0.25						37.90	0.24		0.28	3.30		39.15	99.12
Smithsonian	0.5811	0.0000	0.0000	0.0000	0.0018	0.0000	0.0000	0.0000	0.0000	0.0000	0.9456	0.0104	0.0000	0.0147	0.0931	0.0000	2.4469	4.0937
	2.9812	0.0000	0.0000	0.0000	0.0092	0.0000	0.0000	0.0000	0.0000	0.0000	4.8509	0.0536	0.0000	0.0756	0.4775	0.0000	12.5522	
	2.9812										4.9136			0.5531			12.5522	
After OH calculations																		
Bamle	18.00				0.25						37.90	0.24		0.28	3.30	1.5	37.65	99.12
Smithsonian	0.5811	0.0000	0.0000	0.0000	0.0018	0.0000	0.0000	0.0000	0.0000	0.0000	0.9456	0.0104	0.0000	0.0147	0.0931	0.0882	2.3531	4.0881
	2.9852	0.0000	0.0000	0.0000	0.0092	0.0000	0.0000	0.0000	0.0000	0.0000	4.8574	0.0536	0.0000	0.0757	0.4781	0.4532	12.0875	
	2.9852										4.9202			1.0071			12.0875	
With CO2 estimation																		
Otter Lake	16.80	0.65	0.48		0.75	0.25	0.26				38.70			4.26			38.00	100.15
	0.5424	0.0541	0.0171	0.0000	0.0054	0.0017	0.0019	0.0000	0.0000	0.0000	0.9656	0.0000	0.0000	0.2242	0.0000	0.0000	2.3750	4.1873
	2.7202	0.2714	0.0857	0.0000	0.0268	0.0087	0.0094	0.0000	0.0000	0.0000	4.8424	0.0000	0.0000	1.1244	0.0000	0.0000	11.9109	
	3.0773										4.8874			1.1244			11.9109	



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- ARCO Exploration and Production Technology, Plano, Texas, installed in 1992
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- E.T.H., Zürich, Switzerland, installed in 1993 using a preexisting Lang stage
- Kent State University, Kent, Ohio, installed in 1993
- University of Wyoming, Laramie, Wyoming, installed in 1993
- University of Arizona, Tucson, Arizona, installed in 1993
- Max-Planck-Institut, Heidelberg, Germany, installed in 1993 using a preexisting Zeiss stage
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- La Trobe University, Melbourne, Australia, installed in 1994 using new Zeiss Axiotron stages

Not On Display at ICOG, But Available Nearby:

The system will ***not*** be on display at the June 1994 ICOG meeting in Berkeley, California, but will be available in Palo Alto, 45 miles away. If you would like to see it, we are happy to arrange a demonstration. Please contact us, preferably before the meeting, to arrange a time and transportation.

For Further Information Contact (note new address):

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Palo Alto, California 94306, U.S.A.
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- **FTD**
- **LENGTH**, with a submenu of * TABLET TEST and * LENGTH MEASURE
- **GRIDSCAN**
- **RHO D**
- **STAGE CONTROL**
- **FTDPLOT**

☞ The **FTD** module is based on the same proven process as previous versions of our FTD software : the **External Detector Method**. Users of this laboratory technique will be familiar, in principle, with the required steps. Our new software is entirely menu-driven : any particular event can be easily repeated at will, and it is possible to immediately exit the program at any point. The "focus" events can be ignored by FTD workers who wish to mount their specimens at the same height. The X, Y and Z co-ordinates of the stage are displayed on-screen at all times. The ASCII data files can be printed out, examined on-screen with the DOS "TYPE" command, or used in other programs. The program is extensively supported by "on-line help screens" which appear when function key F1 is pressed, and offer detailed background information and assistance. There are over 150 help screens.

☞ Our **LENGTH** software requires a drawing tube and a digitizer tablet with an LED on the cursor (we will supply tablets, or modify user tablets at cost). The program works with both **HOUSTON TRUEGRID™** and **SUMMAGRAPHICS™**- compatible tablets. It tests functionality of the tablet, and calibrates the tablet for a given configuration, using a standard stage micrometer. In the **LENGTH MEASURE** mode, the program displays the co-ordinates of the two ends of the feature measured and the distance between them. While in this mode, the **AUTOSCAN** stage can be moved by joystick to examine the entire slide.

☞ The **GRIDSCAN** module is the perfect tool for point counting - it allows simultaneous and independent logging of the occurrence and positions of up to 26 different types of entity. The positions and related comments are stored to disk, and can later be reviewed. As well as storing the information about entity count in a particular field of view, it is also possible to separately store the position and a comment about a specific entity, for more exact re-location. An automatic "dwell time" (seconds) can be set, which causes the stage to step off the entire area automatically, pausing at each field of view for the specified delay time.

☞ For the characterization of standard glass/mica, we provide a program called **RHO D**, which is a simplified **GRIDSCAN** program. The user simply specifies the area to be examined and how many steps to take across and down. The stage then sequentially or randomly (user-selected) steps off the area.

☞ In the **STAGE CONTROL** module, the user has total control over stage movement. The stage can be moved, in all three axes, to any point relative to the current point or a selectable reference zero. Movement can be commanded from the keyboard by specifying a numeric distance, or by means of the joystick.

☞ **FTDPLOT** is a graphical presentation module which presents track lengths in histogram form and calculates basic statistical variables as well as FTD ages.

☞ **GENERAL IMPROVEMENTS** in our software include :

- the capability of operating the stage controller on either COM1: or COM2: ports
- automatic back-up of data files at user-selected time intervals to avoid data loss
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- user-selectable screen colours.
- data can be stored on any disk, in any directory
- if the unit encounters a limit switch, the program is not disrupted : the user simply uses the joystick to drive out of the limit area, and the program continues
- it is possible to "back up" any number of steps in the program using the "Esc" key, and to repeat any operation. It is possible to exit the program at any time
- context-sensitive help enables operation by users unfamiliar with the techniques
- other software suites are available for different applications, using the same hardware

Our new electronic controllers are able to automatically adapt to any supply voltage between 90 and 260 Volts a.c., and are thus truly portable anywhere in the world.

We offer an **Apple Macintosh™** version of our system. This provides all the benefit of the **Autoscan** software on the **Apple™**. The **Apple™** version is Version 5.1 of the FTD package, and includes the **GRIDSCAN, STAGE CONTROL** and **LENGTH MEASUREMENT** routines.

Our **TRAKSCAN™** program contains more than 100,000 lines of code. Such measures are often used by software houses, but equally often do not mean much. In our case, the count reflects the enormous degree of complexity and versatility of the program, which has been written in **BORLAND C++™**, an up-to-the-minute, efficient optimizing compiler. This program was developed in close collaboration with Geotrack International Pty. Ltd., and has been exhaustively tested in several FTD laboratories around the world. The result is a truly useful, and bug-free program structure.

The Autoscan system was developed in direct response to market demand.

We have made a point of staying in touch with our customers and have attended FTD meetings since 1984 :

- The 4th International FTD Workshop in Troy, NY, USA in 1984
- ICOG6 in Cambridge, UK in 1986
- The 5th International FTD Workshop in Besançon, France in 1988
- ICOG7 / FTD6 in Canberra, Australia in 1990
- The 7th International FTD Workshop in Philadelphia, PA, USA in 1992

To the best of our knowledge, no manufacturers of equipment for the FTD community such as ours were represented at any of these meetings prior to 1992.

- Our first systems date back to 1982 and, as **Autoscan Systems Pty. Ltd.**, we have been servicing the needs of the scientific community since 1984. We plan to be around for a long time yet.
- There is no substitute for after-sales support, and we have proven ourselves in that regard.
- Our policy of continuous development assures that our products are always tailored to our customers' needs.
- Our expenditure on R&D has been funded largely by the directors personally, and we have made this substantial commitment in the knowledge that the scientific community will respond by continuing to support our product strongly, as it has in the past.

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Please contact us NOW for details of our budget-price special FTD offer!

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Manufacturers of Fine Scientific Instruments

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