PROGRAM

FRIDAY, JANUARY 23

6:00 - 9:00 pm **Registration**

SATURDAY, JANUARY 24

8:00 - 8:45 am **Posters** may be set up on the boards in the session room

- **Arsenic and Chromium Speciation in Environmental Waters**
  Kenneth Neubauer, Wilhad Reuter, Pamela Perrone, Zoe Grosser, *PerkinElmer Life and Analytical Sciences, Shelton, CT.* Page 5
- **Stable Isotopes from Tooth Enamel: Interpreting Diet and Climate from Ancient and Modern Mammal Teeth**
  Pennilyn Higgins and Bruce J. MacFadden, *Florida Museum of Natural History, Gainesville FL.* Page 6

8:45 - 9:00 am **Opening Remarks/Welcome, Charles Evans, Jr.**

9:00 – 12:00 pm **Session I: Bulk, Elemental Analysis**

9:00 – 9:30 am **Kenneth R. Marcus**, *Clemson University*
Glow Discharge Mass Spectrometry: Evolving Source Designs for Expanding Applications

9:40 - 10:10 am **Martin Kasik,** *Shiva Technologies*
Applications of GDMS: Detction Limits, Precision and Accuracy

10:20 – 10:40 am **Coffee Break**

10:40 - 11:10 am **Scott Anderson,** *Balazs-Air Liquide*
Ultra Trace Impurities in Process Liquids

11:20 - 11:50 am **Robert McDonald,** *Metara*
On-Line ES-Trap-ToF of Inorganic and Organic Impurities in Process Streams

12:00 - 2:00 pm **Complimentary Group Lunch Buffet**, *Pool Side*

2:00 – 4:20 pm **Session II: Secondary Ion Mass Spectrometry (SIMS) for Three-Dimensional Analysis of Materials**

2:00 – 2:30 pm **Charles Magee,** *Evans East*
Introduction and Applications in the Semiconductor Industry

2:40 – 3:10 pm **Scott Bryan,** *PHI-USA*
Time of Flight SIMS for Near Surface and Organic Materials Characterization

3:20 – 3:40 pm **Coffee Break**

3:40 – 4:10 pm **Barbara Garrison,** *Pennsylvania State University*
Computer Simulation of the Sputtering Process

SATURDAY continued

4:20 – 5:00 pm	**Session III: Lateral Imaging of Elemental and Isotopic Composition**
4:20 – 4:50 pm	**Claude Lechene,** *Harvard University* Applications of MIMS (Multi-isotopes Imaging Mass Spectrometry) in Biology
5:00 - 6:00 pm	**Cocktail Reception**, *Sanibel Captiva Room, Lobby Level*

SUNDAY, JANUARY 25

9:00 – 12:00 pm	**Session III: Lateral Imaging,** continued
9:00 - 9:30 am	**Ernst Zinner,** *Washington University* Applications of the NanoSIMS in the Planetary Sciences
9:40 – 10:10 am	**Rick Russo,** *Lawrence Livermore National Laboratory* Laser Ablation-ICP-MS for Spatially Resolved Elemental and Isotopic Analysis
10:20 – 10:40 am	**Coffee Break**
10:40 – 11:10 am	**Bill Perkins,** *University of Wales, UK* LA-ICP-MS in the Tracking of Organo-Metallic Contaminants in the Marine Environment
11:20 – 11:50 am	**Michael Pellin,** *Argonne National Laboratory* Trace Isotopic Analysis near the Atom Counting Limit
12:00 – 12:40 pm	**Session IV: Parallel, Multi-Detector Systems for Mass Spectrometry**
12:00 – 12:30 pm	**M. Bonner Denton,** *University of Arizona* A Near Single Electronic Charge System for Parallel Detection in Mass Spectrometry
12:40 PM	**Lunch on own and free afternoon**

MONDAY, JANUARY 26

9:00-11:40 am	**Session IV: Parallel, Multi-Detector Systems for Mass Spectrometry,** continued
9:00 - 9:30 am	**Gary Hieftje,** *Indiana University* Extended Detectors and ToF of ICP Ion Sources
9:40 - 10:10 am	**Peter J. Todd,** *Oak Ridge National Laboratory* Pulse Counting Array Detection.
10:20 - 10:30 am	**Coffee Break**
10:30 – 12:30 pm	**Session V: Accelerator Based Techniques for Mass Spectrometry**
10:30 - 11:00 am	**John Knezovich,** *Lawrence Livermore National Laboratory* Analysis of Rare Isotopes
11:10 - 11:40 am	**Ken Grabowski,** *Naval Research Laboratory* Trace Elemental Analysis (A Work in Progress)
11:50 - 12:20 pm	**Graham Lappin,** *Xceleron, UK* C14 AMS in Drug Research
12:30 – 1:30 pm	**Complimentary Group Lunch Buffet**, *Pool Side*
1:30 – 4:00 pm	**Session VI: Bulk, Geological, Isotopic Analysis: What Thermal Ionization MS Has Told Us**
1:30 – 2:00 pm	**Guenther Lugmair,** *Max Planck Institute for Chemistry, Germany* TIMS in Cosmochronology: Fine Scale Time Resolution of Early Solar System Evolution
2:10 – 2:40 pm	**Chris Ballentine,** *University of Manchester, UK* Noble Gas MS and Models of the Earth (He3, Ar-Ar, Neon, Krypton, Xenon
2:50 – 3:00 pm	**Coffee Break**
3:00 – 3:30 pm	**Rob Ellam,** *Scottish Universities, UK* From Elemental Abundances to Isotope Ratios: New Isotopes, New Interfaces and New Problems in Multi-Collector ICP-MS

3:40 – 4:20 pm	**Session VII: Elemental and Isotopic Analysis in Organic and Biological Systems**
3:40 – 4:10 pm	**Joseph Caruso,** *University of Cincinnati* *Quadrupole ICP-MS in the Analysis of Bio-Essential Elements*
4:20 – 5:00 pm	**Session VIII: Stable Isotope MS**
4:20 – 4:50 pm	**Max Coleman,** *Caltech, NASA, JPL* Stable Isotope Measurements in Forensic Science
5:00 pm	**Closing**

Thank you for attending the 16^{h} Sanibel Conference on Mass Spectrometry.
Please take a moment to complete the survey on page 7.

Directory of Participants begins on page 9.

POSTER

Arsenic and Chromium Speciation in Environmental Waters

Kenneth Neubauer, Wilhad Reuter, Pamela Perrone, Zoe Grosser
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Speciation of metals is increasingly important for environmental monitoring since the form of the metal can determine its toxicity, bioavailability, and potential for migration in the environment. Two environmentally important elements which exist in various forms are chromium and arsenic. For chromium, the trivalent form (Cr^{+3}) is a nutrient, while the hexavalent species (Cr^{+6}) is toxic. For arsenic, the trivalent form (As^{+3}) is more toxic than the pentavalent species (As^{+5}). Two other arsenic species which may have environmental importance are monomethyl and dimethylarsenic, both of which are less toxic than As^{+5}.

All of these chromium and arsenic species can be separated using HPLC and detected with ICP-MS. However, both chromium and arsenic suffer from interferences in ICP-MS, most notably ArC^{+} and $ClO(H)^{+}$ for $^{52}Cr^{+}$ and $^{53}Cr^{+}$, and $ArCl^{+}$ and $CaCl^{+}$ for ^{75}As. Because carbon, chloride, and calcium are commonly present in environmental waters, these species inhibit the determination of Cr and As. Additionally, organic solvents are typically used in the HPLC mobile phase, further contributing to a chromium interference. However, using Dynamic Reaction Cell (DRC) technology, the effects of these interferences can be eliminated, thereby allowing for the low-level determination of Cr and As in environmental water samples.

This work will demonstrate the rapid separation, detection, and measurement of chromium and arsenic in a variety of water samples by HPLC/ICP-MS. Separation is achieved via an isocratic, ion-pair HPLC method using a 3 cm C8 column packed with 3µm particles. Detection is accomplished with a DRC ICP-MS, using a single reaction gas to eliminate the effects of interferences. Measurements are made against external calibration curves. With this scheme, the separation and measurement of chromium and arsenic species are accomplished in under two minutes, thus making this technique suitable for routine, high-throughput analyses. An example chromatogram is shown in Figure 1.

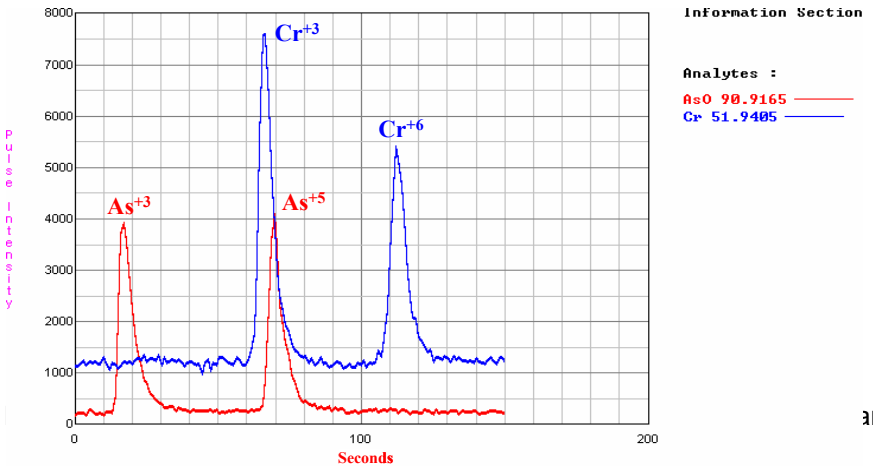


Figure 1 ard.

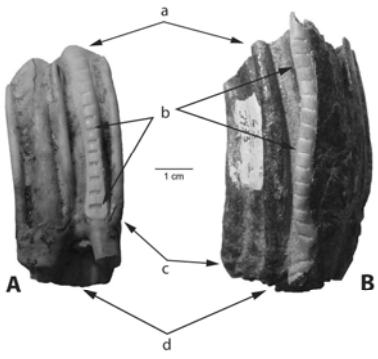
POSTER

Stable Isotopes from Tooth Enamel: Interpreting Diet and Climate from Ancient and Modern Mammal Teeth

Pennilyn Higgins and Bruce J. MacFadden
Florida Museum of Natural History, Gainesville FL

Inferences about ancient climates are often made based upon general assemblages of plants and animals within a particular fossil site. Computerized models have also been developed to investigate changes in climate, especially since the last glacial maximum. Few quantitative techniques are available to test these interpretations. Stable isotopes of oxygen, measured from diatoms and sedimentary minerals, have been used to investigate centennial to millennial patterns of global climate. New studies examining stable isotopes collected from fossilized teeth of horse and bison allow direct testing of modeled or inferred climate patterns on the scale of years. Tooth enamel preserves a record of changes in $\delta^{13}C$ (from diet) and $\delta^{18}O$ (from surface water, that varies according to climatic variables). A single third molar records these changes over a period of 18 months (*Bison*) to three years (*Equus*). Seasonal changes in temperature, rainfall, and diet can be interpreted from serial data collected from these teeth. Further studies of different mammal groups, both fossil and modern, may provide insights into ancient climates for which we have no other method for investigation.

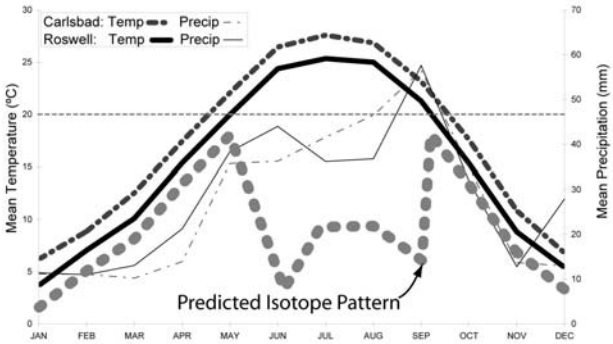
Photographs of teeth sampled for this type of analysis. (left)

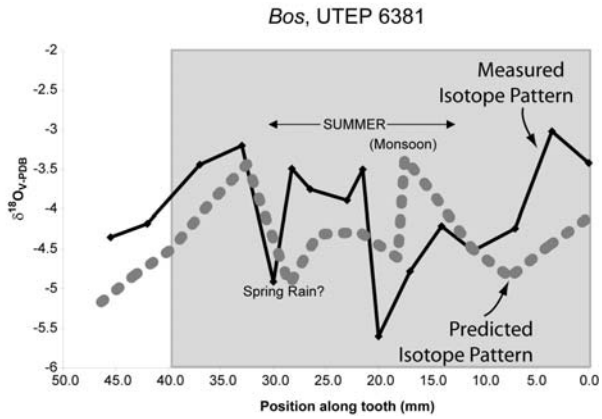


A. Bos (cattle) M3, modern
B. Equus (horse) M3, fossil

Modern climate data for the Carlsbad and Roswell areas of New Mexico. The heavy dotted line is the predicted isotopic pattern for water near Roswell. (below left)

Serial data from *Bos* tooth collected near Roswell. (below)





This research funded by NSF grant EAR 99-09186 to MacFadden.

SANIBEL CONFERENCE PARTICIPANT SURVEY

Inorganic Mass Spectrometry

Please circle appropriate number below

	Poor	Fair	Good	Excellent
PROGRAM CONTENT				
Topics	1	2	3	4
Lectures	1	2	3	4
Discussion	1	2	3	4
MATERIALS (Program)				
Pertinent	1	2	3	4
Current	1	2	3	4
Quality	1	2	3	4
ORGANIZATION				
Value with respect to fee charged	1	2	3	4
Location & facilities	1	2	3	4
Refreshments	1	2	3	4

We are considering moving the conference to South Seas Plantation on Captiva Island. The meeting room will be larger but costs may be higher. Do you favor this change? ☐ Yes ☐ No

COMMENTS.

Suggestions for Future Conference Topics

Please give to Chip Cody before you depart or fax to ASMS, 505-989-1073

Thank you.