

ISO-TOPICS: THE FIRMS NETWORK NEWSLETTER

October 2023

ABOUT US

The Forensic Isotope Ratio Mass Spectrometry (FIRMS) Network was founded to develop the scope of stable isotope techniques in forensic applications.

FIRMS brings together chemists, physicists, materials scientists, and life scientists who employ isotopic analysis in their respective fields. FIRMS is helping to focus collective knowledge and expertise on improving methods for crime detection and reduction.



Rich Sleeman watching the last flight of Concorde, Bristol 2003.

WELCOME

Welcome to the FIRMS October 2023 newsletter.

DISCLAIMER

Reference to or mention of any commercial product or process by specific trademark or manufacturer within this newsletter does not necessarily represent an endorsement by the FIRMS Network.

IN REMEMBRANCE OF DR. RICHARD SLEEMAN, FRSC

The FIRMS Network is saddened to learn of the death of Dr. Richard Sleeman. Rich was a true polymath; aside from his wide-ranging scientific knowledge, Rich could converse in several languages and was known as a great (vegetarian) cook, wine expert, keen sportsman, and cat lover.

As the Scientific Director of Mass Spec Analytical (MSA) Ltd, Rich provided support and a physical base for the FIRMS Network from its early days to its incorporation and beyond.

The FIRMS Network extends its deepest condolences to Rich Sleeman's family.

Rich was a chemist who recognized the potential of new analytical techniques such as MS/MS and IRMS. Drawing on his entrepreneurial and pioneering spirit, Rich went on to realize that potential. MSA became one of the first commercial laboratories to offer IRMS services and possibly the first to be accredited to ISO/IEC 17025. With Rich in charge, MSA also provided a study place for many BSc, MSc, and PhD students, many of whom worked with the company's state-of-the-art IRMS and other bespoke instruments. These projects generated many publications which Rich co-authored. Anyone who worked with Rich knew him as a skilled linguist who could improve almost any piece of writing although, by his own admission, he was not Oscar Wilde.

Rich was a good friend to many FIRMS Network members, past and present, and will always be remembered as someone who was generous with his time, knowledge, and expertise.

UPDATES FROM THE STEERING GROUP

The FIRMS Network has occupied the website (<https://www.forensic-isotopes.org/>) for over ten years and is currently seeking a refreshed design and update to functionality of the site. A Request for Quotation with a requirements document are now available for the website redesign. If you could suggest potential vendors, contact Helen Salouros (elenisalouros@gmail.com) and Stephan Hlohowskyj (srhlohowskyj@fbi.gov) for a copy of the documents.

Please reach out with potential vendors for the planned redesign of the FIRMS Network website.

As a reminder, the Steering Group is actively collating additions and updates for a 3rd edition of the *Good Practice Guide for Isotope Ratio Mass Spectrometry*. **FIRMS Network members are encouraged to submit suggested edits** to gpg@forensic-isotopes.org.

Director **Jim Carter co-authored a piece for *The Conversation***, a non-profit independent news organization that publishes with “academic rigor, journalistic flair.” You can read the piece (“Ever wonder how your body turns food into fuel? We tracked atoms to find out”) here: <https://theconversation.com/ever-wonder-how-your-body-turns-food-into-fuel-we-tracked-atoms-to-find-out-211047>

NEWS AND NOTICES

The **International Conference on Isotope Hydrology and Geochemistry** is scheduled for 11-12 January 2024 in Zurich, Switzerland.

A cavity ring down spectroscopy (CRDS) session is scheduled for the American Geophysical Union’s **2024 Ocean Sciences Meeting** that takes place in New Orleans, Louisiana, USA from 18 to 23 February 2024.

The 28th Advances in Stable Isotope Techniques and Applications (**ASITA 2024**) conference will be held at Dalhousie University, Halifax, Nova Scotia, Canada 16-19 June 2024.

The 13th International Conference on the Applications of Stable Isotope Techniques to Ecological Studies (**IsoEcol 2024**) will take place 29 July 29 to 2 August 2024 at the University of New Brunswick, Fredericton, Canada.

HIGHLIGHTED PUBLICATIONS

Chair Helen Salouros, along with FIRMS Network Directors Jim Carter, Phil Dunn, and Sean Doyle, recently published a Letter to the Editor in the journal *Food Chemistry* stressing the importance of following IUPAC reporting recommendations in compound specific isotope analysis (<https://doi.org/10.1016/j.foodchem.2023.136776>).

On a related note, Phil Dunn co-authored a paper with Grzegorz Skrzypek on hidden biases in isotope delta values and the necessity for full reporting regarding data handling practices (<https://doi.org/10.1002/rcm.9623>).

Finally, the first articles in the special issue of the journal *Science & Justice* for the Proceedings of the 8th Conference of the FIRMS Network are available online as preprints. These publications are marked with an asterisk (*) in the below list.

PUBLICATIONS LIST

Disclaimer: This section contains a non-comprehensive list of recent publications that may be of interest to members. Inclusion does not necessarily mean that the FIRMS Network approves the content. You are encouraged to consider critically whether (i) the experimental work complies with SI guidelines and the Good Practice Guide; and (ii) the conclusions drawn are based on sound scientific background information.

Ahn SV, Park J-K (2023) The association between carbon and nitrogen stable isotope ratios of human hair and hypertension. *Clinical Hypertension* 29:4. <https://doi.org/10.1186/s40885-022-00228-z>

Al-Qattan N, Herbert GS, Spero HJ, et al (2023) A stable isotope sclerochronology-based forensic method for reconstructing debris drift paths with application to the MH370 crash. *AGU Advances* 4:e2023AV000915. <https://doi.org/10.1029/2023AV000915>

Baczynski AA, Brodie CR, Kracht O, Freeman KH (2023) Sequential measurement of ¹³C, ¹⁵N, and ³⁴S isotopic composition on nanomolar quantities of carbon, nitrogen, and sulfur using nano-elemental analysis/isotope ratio mass spectrometry. *Rapid Communications in Mass Spectrometry* 37:e9444. <https://doi.org/10.1002/rcm.9444>

Brlík V, Procházka P, Hansson B, et al (2023) Animal tracing with sulfur isotopes: Spatial segregation and climate variability in Africa likely contribute to population trends of a migratory songbird. *Journal of Animal Ecology* 92:1320–1331. <https://doi.org/10.1111/1365-2656.13848>

Brodie C (2023) Simple software solution for N₂ diversion when measuring δ¹⁸O values of nitrogen-rich samples materials using a Thermo Scientific EA-IRMS System. *MethodsX* 11:102268. <https://doi.org/10.1016/j.mex.2023.102268>

Carvalho MC (2023) Automated weighing in the stable isotope lab: When less is more. *MethodsX* 10:102207. <https://doi.org/10.1016/j.mex.2023.102207>

Castellanos D, DiGangi EA, Bethard JD, et al (2023) Assessment of carbon, oxygen, strontium, and lead isotopic variation in modern Colombian teeth: An application to human identification. *Journal of Forensic Sciences* 1556-4029.15372. <https://doi.org/10.1111/1556-4029.15372>

*Doyle S, Chau T, Howa J (2023) IRMS Based Evidence Passes the Test. *Science & Justice* S1355030623001016. <https://doi.org/10.1016/j.scijus.2023.10.002>

Dunn PJH, Skrzypek G (2023) Perspective: Hidden biases in isotope delta results and the need for comprehensive reporting. *Rapid Communications in Mass Spectrometry* 37:e9623. <https://doi.org/10.1002/rcm.9623>

Fabroni S, Bontempo L, Campanelli G, et al (2023) Innovative tools for the nitrogen fertilization traceability of organic farming products. *Horticulturae* 9:723. <https://doi.org/10.3390/horticulturae9060723>

Fry B, Carter JF, O'Mara K (2023) Fingerprinting eukaryotic metabolism across the animal kingdom using position-specific isotope analysis (PSIA) ¹³C/¹²C measurements. *Science Advances* 9:eadg1549. <https://doi.org/10.1126/sciadv.adg1549>

Guo H, Hu C, Wang P, et al (2023) Application of lead isotope signature and likelihood ratio evaluation in a shooting incident investigation. *Forensic Science International* 351:111812. <https://doi.org/10.1016/j.forsciint.2023.111812>

Guo H, Mei H, Wang P, et al (2023) Lead isotope measurement of primer gunshot residues and likelihood ratio predictions for forensic cartridge discrimination and individualization in China. *Journal of Forensic Sciences* 68:638–646. <https://doi.org/10.1111/1556-4029.15204>

Hlohowskyj SR, Kew K, Stern L, Yamnitz CR (2023) Forensic discrimination of smokeless powders using carbon and nitrogen isotope ratios. *Journal of the American Society for Mass Spectrometry* 34:1349–1358. <https://doi.org/10.1021/jasms.3c00047>

Jackson GP, Barkett MA (2023) Forensic mass spectrometry: Scientific and legal precedents. *Journal of the American Society for Mass Spectrometry* 34:1210–1224. <https://doi.org/10.1021/jasms.3c00124>

Khatri PK, Paolini M, Larcher R, et al (2023) Botanical characterization and authentication of lavender essential oil using its volatile organic compounds and compound-specific carbon and hydrogen isotope ratio analysis. *Food Control* 154:110002. <https://doi.org/10.1016/j.foodcont.2023.110002>



This newsletter was compiled and edited by Lesley Chesson. It was created using a Microsoft® Word template.

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Khatri PK, Paolini M, Larcher R, et al (2023) Validation of gas chromatographic methods for lavender essential oil authentication based on volatile organic compounds and stable isotope ratios. *Microchemical Journal* 186:108343. <https://doi.org/10.1016/j.microc.2022.108343>

*Lambrigger T (2023) Oxygen isotope variation in drinking water in Oaxaca, Mexico and its implications for forensic provenancing efforts of undocumented border crossers. *Science & Justice* S1355030623001028. <https://doi.org/10.1016/j.scijus.2023.10.001>

Salouros H, Carter JF, Dunn PJH, Doyle SPG (2023) Letter to the Editor regarding: A review of recent compound-specific isotope analysis studies applied to food authentication. *Food Chemistry* 428:136776. <https://doi.org/10.1016/j.foodchem.2023.136776>

Smeti S, Camin F, Bontempo L, et al (2023) Fatty acid and multi-isotopic analysis (C, H, N, O) as a tool to differentiate and valorise the Djebel lamb from the mountainous region of Tunisia. *Molecules* 28:1847. <https://doi.org/10.3390/molecules28041847>

*Valenzuela LO, Otero F, Loupias LL, et al (2023) BITACORA: An isotopic database of modern human tissues (keratin, teeth) for Argentina. *Science & Justice* 63:680–688. <https://doi.org/10.1016/j.scijus.2023.10.003>

Versteegh EAA, Van Dover CL, Van Audenhaege L, Coleman M (2023) Multiple nutritional strategies of hydrothermal vent shrimp (*Rimicaris hybisiae*) assemblages at the Mid-Cayman Rise. *Deep Sea Research Part I: Oceanographic Research Papers* 192:103915. <https://doi.org/10.1016/j.dsr.2022.103915>

Wassenaar LI, Sisti L, Pilecky M, Kainz M (2023) Reproducible measurements of the $\delta^2\text{H}$ composition of non-exchangeable hydrogen in complex organic materials using the UniPrep2 online static vapour equilibration and sample drying system. *MethodsX* 10:101984. <https://doi.org/10.1016/j.mex.2022.101984>

Wilson T, Szpak P (2023) Comparing the performance of demineralization agents (HCl and EDTA) for stable isotope analysis of bone collagen with implications for quality control criteria and collagen yield. *International Journal of Osteoarchaeology* oa.3222. <https://doi.org/10.1002/oa.3222>