

ISO-TOPICS: THE FIRMS NETWORK NEWSLETTER

October 2020

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.

FIRMS GUIDANCE FOR THE FORENSIC INTERPRETATION OF ISOTOPE RATIO DATA



If you have any comments on this interpretation guide, please feel free to contact us at gpg@forensic-isotopes.org.

WELCOME

Welcome to the FIRMS October 2020 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.

INTERPRETATION GUIDE

The FIRMS Network has produced its first guide for the forensic interpretation of isotope ratio data. The guide is available now, on the FIRMS website. It is aimed at providing both experienced practitioners and relative newcomers a helping hand when interpreting isotope ratio data in a forensic context.

FIRMS Guidance for the Forensic Interpretation of Isotope Ratio Data is now available!

For guidance on obtaining isotope ratio data in a forensic context, please see the Good Practice Guide. It is also available on the website.

On a related note, IRMS evidence from the analysis of human remains (hair) recently passed a formal admissibility challenge within the US court system. The challenge in *People of the State of Colorado v. Madani Ceus*, 2017CR29 (2019) involved the admissibility of isotope ratio data at the trial and the qualifications of the expert witnesses involved in analysis and interpretation.

UPDATES FROM THE STEERING GROUP

Don't forget: You are invited to submit a manuscript to the journal *Forensic Chemistry* for publication in an upcoming special issue. The Guest Editors are Phil Dunn and Federica Camin. Paper submissions should summarize novel, unpublished work related to forensic applications of IRMS (and other, allied techniques) and be based on presentations given at the 7th FIRMS Network Conference in Italy.

The Steering Group is already looking forward to 2022 and the 8th FIRMS Network Conference; planning is underway. If you have feedback on the 2019 conference you would like to share, don't hesitate to let us know. Feedback on this newsletter, the guidance documents produced by the Network, and/or the FIRMS Network itself is also welcome.

*The FIRMS Network Steering Group has welcomed a new member –
John Mering from Analytica Laboratories*

The Steering Group has a new member, Dr. John Mering from Analytica Laboratories. John is a geoscientist by training, currently working in the field of animal and plant product authentications. Please join us in welcoming him.

NEWS AND NOTICES

The current COVID-19 pandemic continues to have impacts on meetings and other events:

The 73rd Annual Scientific Meeting of the **American Academy of Forensic Sciences** (AAFS) will be held 15-20 February 2021 in a virtual format.

The 12th International Conference on the Applications of Stable Isotope Techniques to Ecological Studies (**IsoEcol**) has been postponed until 2021. It is currently scheduled to take place 20-26 June in Gaming, Austria.

The **European Academy of Forensic Science** plans to hold its next conference in Stockholm, Sweden from 30 August to 3 September 2021.

The **Joint European Stable Isotope User Meeting** (JESIUM) has been postponed to October 2022. It is still scheduled to take place in Kuopio, Finland.

The **European Society of Isotopes Research** (ESIR XVI), originally scheduled to meet in Salzburg, Austria in July 2021, has been rescheduled to July 2023.

The 23rd Triennial Meeting of the **International Association of Forensic Sciences**, in conjunction with the 26th Symposium of the **Australian and New Zealand Forensic Science Society**, is now scheduled to take place 20-24 November 2023 in Sydney, Australia.

HIGHLIGHTED PUBLICATIONS

Steering Group member Libby Stern and colleagues published an article in 2017 on the admissibility of soil evidence in the US court system. While the evidence did not include isotope ratio data, the admissibility challenge related to the case should be of interest to all forensic practitioners: <https://doi.org/10.18814/epiiugs/2017/v40i2/017013>.

Directors Phil Dunn and Jim Carter, along with Steering Group member Federica Camin, co-authored an article on food matrix reference materials for isotope-ratio measurements. The reference materials include collagen, flour, honey, and vegetable oil. The article was recently published in the *Journal of Agricultural and Food Chemistry*: <https://doi.org/10.1021/acs.jafc.0c02610>. The reference materials should be available soon from the USGS Reston Stable Isotope Laboratory.

Two articles on stable isotope scales and expressions were recently published in the journal *Rapid Communications in Mass Spectrometry*: (1) "Absolute isotope ratios defining isotope scales used in isotope ratio mass spectrometers and optical isotope instruments" <https://doi.org/10.1002/rcm.8890>; and (2) "Recalculation of stable isotope expressions for HCNOS: EasyIsoCalculator" <https://doi.org/10.1002/rcm.8892>. Both were co-authored by Director and Chair Phil Dunn.

For additional publications, please see the following 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.

Ammer S, Bartelink E, Vollner J, et al (2020) Socioeconomic and geographic implications from carbon, nitrogen, and sulfur isotope ratios in human hair from Mexico. *Forensic Science International* 316:110455.

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Ammer STM, Kootker LM, Bartelink EJ, et al (2020) Comparison of strontium isotope ratios in Mexican human hair and tap water as provenance indicators. *Forensic Science International* 314:110422.

<https://doi.org/10.1016/j.forsciint.2020.110422>

Bataille CP, Chartrand MMG, Raposo F, St-Jean G (2020) Assessing geographic controls of hair isotopic variability in human populations: A case-study in Canada. *PLOS ONE* 15:e0237105. <https://doi.org/10.1371/journal.pone.0237105>

Bontempo L, Camin F, Perini M, et al (2020) Isotopic and elemental characterisation of Italian white truffle: A first exploratory study. *Food and Chemical Toxicology* 145:111627. <https://doi.org/10.1016/j.fct.2020.111627>

Camin F, Simoni M, Hermann A, et al (2020) Validation of the ²H-SNIF NMR and IRMS methods for vinegar and vinegar analysis: An international collaborative study. *Molecules* 25:2932. <https://doi.org/10.3390/molecules25122932>

Driscoll AW, Howa JD, Bitter NQ, Ehleringer JR (2020) A predictive spatial model for roasted coffee using oxygen isotopes of α-cellulose. *Rapid Communications in Mass Spectrometry* 34:. <https://doi.org/10.1002/rcm.8626>

Ehleringer JR, Covarrubias Avalos S, Tipple BJ, et al (2020) Stable isotopes in hair reveal dietary protein sources with links to socioeconomic status and health. *Proceedings of the National Academy of Sciences* 201914087.

<https://doi.org/10.1073/pnas.1914087117>

Gautam MK, Song B-Y, Shin W-J, et al (2020) Datasets for spatial variation of O and H isotopes in waters and hair across South Korea. *Data in Brief* 105666. <https://doi.org/10.1016/j.dib.2020.105666>

Gautam MK, Song B-Y, Shin W-J, et al (2020) Spatial variations in oxygen and hydrogen isotopes in waters and human hair across South Korea. *Science of The Total Environment* 726:138365. <https://doi.org/10.1016/j.scitotenv.2020.138365>

Hamzić Gregorčič S, Potočnik D, Camin F, Ogrinc N (2020) Milk authentication: Stable isotope composition of hydrogen and oxygen in milks and their constituents. *Molecules* 25:4000. <https://doi.org/10.3390/molecules25174000>

Hamzić Gregorčič S, Strojnik L, Potočnik D, et al (2020) Can we discover truffle's true identity? *Molecules* 25:2217.

<https://doi.org/10.3390/molecules25092217>

Kootker LM, Plomp E, Ammer STM, et al (2020) Spatial patterns in ⁸⁷Sr/⁸⁶Sr ratios in modern human dental enamel and tap water from the Netherlands: Implications for forensic provenancing. *Science of The Total Environment* 729:138992.

<https://doi.org/10.1016/j.scitotenv.2020.138992>

Kootker LM, von Holstein ICC, Broeders J, et al (2020) The effects of decomposition and environment on antemortem H-Pb-Sr isotope compositions and degradation of human scalp hair: Actualistic taphonomic observations. *Forensic Science International* 110336. <https://doi.org/10.1016/j.forsciint.2020.110336>

Ma C, Vander Zanden HB, Wunder MB, Bowen GJ (2020) assignR: An R package for isotope-based geographic assignment. *Methods in Ecology and Evolution*. <https://doi.org/10.1111/2041-210X.13426>



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

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Plomp E, Holstein ICC, Kootker LM, et al (2020) Strontium, oxygen, and carbon isotope variation in modern human dental enamel. *American Journal of Physical Anthropology*. <https://doi.org/10.1002/ajpa.24059>

Potočnik D, Nečemer M, Perišić I, et al (2020) Geographical verification of Slovenian milk using stable isotope ratio, multi-element and multivariate modelling approaches. *Food Chemistry* 326:126958. <https://doi.org/10.1016/j.foodchem.2020.126958>

Regan LA, Bower NW, Brown SJ, et al (2020) Forensic isoscapes based on intra-individual temporal variation of $\delta^{18}\text{O}$ and $^{206}\text{Pb}/^{207}\text{Pb}$ in human teeth. *Forensic Sciences Research* 1–11. <https://doi.org/10.1080/20961790.2020.1795377>

Schimmelmann A, Qi H, Dunn PJH, et al (2020) Food matrix reference materials for hydrogen, carbon, nitrogen, oxygen, and sulfur stable isotope-ratio measurements: Collagens, flours, honeys, and vegetable oils. *Journal of Agricultural and Food Chemistry*. <https://doi.org/10.1021/acs.jafc.0c02610>

Shin W-J, Ryu J-S, Kim R-H, Min J-S (2020) First strontium isotope map of groundwater in South Korea: Applications for identifying the geographical origin. *Geosciences Journal*. <https://doi.org/10.1007/s12303-020-0013-z>

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Skrzypek G, Dunn PJH (2020) Recalculation of stable isotope expressions for HCNOS: EasyIsoCalculator. *Rapid Communications in Mass Spectrometry* 34:. <https://doi.org/10.1002/rcm.8892>

Strojnik L, Camin F, Ogrinc N (2020) Compound-specific carbon and hydrogen isotope analysis of volatile organic compounds using headspace solid-phase microextraction. *Talanta* 219:121264. <https://doi.org/10.1016/j.talanta.2020.121264>

Wang X, Tang Z (2020) The first large-scale bioavailable Sr isotope map of China and its implication for provenance studies. *Earth-Science Reviews* 103353. <https://doi.org/10.1016/j.earscirev.2020.103353>

Wijenayake K, Frew R, McComb K, et al (2020) Feasibility of casein to record stable isotopic variation of cow milk in New Zealand. *Molecules* 25:3658. <https://doi.org/10.3390/molecules25163658>