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Regulatory tools for DNA-based seafood testing in Canada: DNA barcoding and beyond

DNA barcoding, first developed in Canada in 2003, has evolved into a standard method for species identification over a wide range of organisms. In particular, food authenticity is one of the most common uses of this technology. The correct labeling of the biological species in food products is one of the critical components of authentic food. Mislabelling of species has economic, health and conservation impacts on a wide scale. As a result, DNA barcoding has been adopted as a regulatory tool by food agencies in several countries. This presentation reviews the use of DNA barcoding for seafood authenticity in particular with a focus on Canadian studies we have conducted. We compare findings from samples collected in restaurants or markets to those collected at import, showing generally increased levels of mislabelling incidences further in the supply chain. We also discuss our work to assess the readiness of public sequence databases to support regulatory testing in Canada and the ways in which citizen scientists can contribute. Finally, we conclude with the next step in DNA authenticity testing. Building on the databases of sequences available, the generation of a regulatory quality database with curated sequences of high quality has been used to create portable real-time PCR testing based on DNA barcoding data. This testing brings the power of the DNA barcode sequence library to the field by allowing testing for target species to be done on site by non-experts without needing to send samples out for Sanger sequencing. The increased accessibility to screening for particular species may help to address potential food fraud at multiple points in the supply chain.

Recent Publications

- 1. Shehata H R, Naaum A M, Garduño R A and Hanner R (2018) DNA barcoding as a regulatory tool for seafood authentication in Canada. Food Control 92:147-153.
- 2. Naaum A M, Shehata H R, Chen S, Li J, Tabuiara N, Awmack D, Lutze Wallace C and Hanner R (2018) Complementary molecular methods detect undeclared species in sausage products at retail markets in Canada. Food Control 84:339-344.
- 3. Naaum A M and Hanner R (2015) Community engagement in seafood identification using DNA barcoding reveals market substitution in Canadian seafood. DNA Barcodes DOI: 10.1515/dna-2015-0009.
- 4. Naaum A M and Hanner R (2016) Seafood authenticity and traceability: a DNA-based perspective. ISBN: 9780128015926.
- 5. Warner K A, Miller D D and Naaum A M (2017) Unsupported conclusions on net conservation benefits of mislabeling seafood. Conservation Letters DOI:10.1111/conl.12359.

Biography

Amanda M Naaum completed her undergraduate studies in Molecular Biology at the University of Guelph, followed by a PhD focused on molecular diagnostics for Food Authenticity and Traceability at the same institute. Her research focus is DNA-based assay development for species identification. She was awarded the IUFoST Young Scientist Award (2016). From 2015-2018 she was the Lead Molecular Biologist at TRU-ID Ltd., developing tests for use in certification of food and natural health product authenticity. She is currently a Visiting Research Fellow at Queen's University Belfast.

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