

BTI Institute

Borders • Trade • Immigration

A Department of Homeland Security Center of Excellence

Newsletter

April to June 2020 | Program Year 5 Quarter 4

A globe of the Earth is shown from a high angle, with a network of glowing yellow and green lines connecting various points across the continents, symbolizing global connectivity and technology. The lines are most dense in North America and Europe, with some lines extending to South America and Africa. The background is a deep blue sky with a bright sun or starburst effect on the right side, creating a lens flare effect.

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This product, along with everything we do, is dedicated to the men and women of the United States Department of Homeland Security. We thank them for their tireless efforts to secure our Nation and safeguard our economic prosperity by facilitating lawful travel and trade.



The Origins of Honey

DNA Assays for Determining Honey Origins

Identifying the true origins of honey imported into the United States is of considerable interest to U.S. Customs and Border Protection. A University of Houston research team, led by Richard Willson, Ph.D., has developed a means to identify the source country of origin using fragments of pollen DNA in honey.

The team is using DNA as a unique identifier based on variation in “barcode” sequences found in most plants. Building on experience in metagenomic sequencing and analysis, the research team is developing a battery of testing methods and accumulating a database which can be used as a library for honey source identification by

DNA sequencing of these barcodes.

Additionally, the research team is extending the sequencing results to faster, cheaper, RPA isothermal DNA amplification assays for identification of honey originating from regions of particular interest. The assays resemble those used for diagnosing infectious diseases - DNA amplification to detect the presence of signature sequences in a sample, giving focused assays with turnaround times of a few hours.

As of May 2020, the research team had collected 149 honey samples from 27 countries. The team had obtained next-generation sequencing (NGS) for pollen DNA isolated from 14 honey samples

This project is championed by the U.S. Customs and Border Protection Laboratories and Scientific Services

The Research Team



Richard C. Willson, Ph.D.
Huffington-Woestemeyer Professor of
Chemical and Biomolecular Engineering
Professor of Biochemical & Biophysical
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Aniko Sabo, Ph.D.
Assistant Professor
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Katerina Kourentzi, Ph.D.
Research Associate Professor
University of Houston

from seven different countries. Additionally, they have obtained NGS data for soluble DNA captured from the same honey sample using three different methods: Anti-dsDNA antibodies coupled to magnetic nanoparticles, Ceramic hydroxyapatite Type I (batch mode), and Q Sepharose Anion exchanger (batch mode).

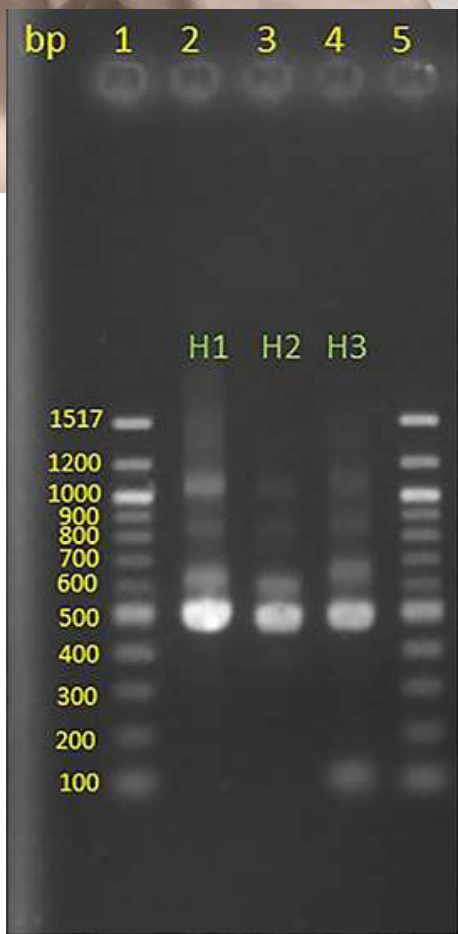
With more testing to go, this project is on track to provide the processes and methodologies for U.S. Customs and Border Protection to rapidly and accurately identify the country of origin for honey products.

University of Houston Graduate Student Dimple Chavan utilizes a PCR hood to set up DNA amplification reaction tubes.

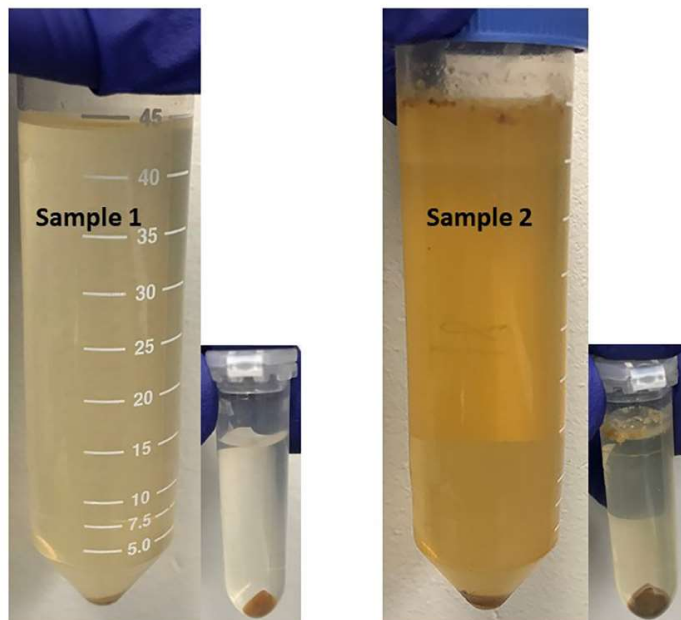


Nearly 150 honey samples for use in honey origin testing in the Willson Lab.

Agarose gel electrophoresis of ITS2 (plant DNA target) PCR products of three different honey samples.



Centrifuged honey sample showing the amount of pollen pellet obtained from 30g honey sample.



BTI Summer Research Team

Harshica Fernando, Ph.D., Assistant Professor with Prairie View A&M University, and her students Aijlon Bettis and Shandrel Boykin, will be working with project mentor Richard Willson, Ph.D., Huffington-Woestemeyer Professor at the University of Houston, as part of the BTI Institute Summer Research Team. Dr. Fernando and her team are working on the project “Development of Lateral Flow Assays based on Novel Nanoparticles.”

The objectives of the project are to prepare novel particles us-

ing natural materials, characterize using analytical techniques, and develop the lateral flow assay. The project is scheduled to conclude at the end of July.

The purpose of the DHS Summer Research Team Program is to increase and enhance the scientific leadership at Minority Serving Institutions in research areas that support the mission and goals of DHS.

More on the program can be found at orau.gov/dhseducation/faculty/index.html.



Harshica Fernando, Ph.D.
Assistant Professor
Prairie View A&M

Professional Course Offerings

The BTI Institute and the College of Technology at the University of Houston have partnered with U.S. Customs and Border Protection Office of Training and Development to offer online professional development courses. These courses are designed for Homeland Security Enterprise professionals including current DHS employees or industry professionals engaged in the security and trade facilitation efforts.

These courses are fully online and self-paced. Each course may take on average 40 hours to complete. The course is instructor facilitated as needed by the students. Two courses are currently available with a third pending final review.

Introduction to Homeland Security

This course introduces participants to a comprehensive study of the homeland security system at the federal, state, and local levels. The course details the structure of the U.S. homeland security system and operational areas as well as programs aimed at minimizing the nation’s vulnerability to attacks. It is designed as an intensive technical writing course aimed at developing critical thinking skills and mastering technical writing in the discipline.

Fundamentals of Border Operations Management

This course introduces participants to the history, purpose, and benefits of borders and boundaries, while various case studies demonstrate the sovereignty of nations, trade agreements, and the geopolitical and socio-economic implications.

uh.edu/bti/education/certificates/cert-security/



Sep
15

Port of the Future Conference 2021

Call for Panels - Due 15 September 2020

uh.edu/bti/news/docs/call-for-panels-2021-port-of-the-future-conference.pdf

Mar
2021

Port of the Future Conference 2021

Save the Date.

16-19 March 2021

May
2021

2021 COE Summit

The third COE summit will occur in May 2021. Look for more information in the coming months. Watch the recap and read more about the 2019 COE Summit at

cina.gmu.edu/coesummit19/.

Final Deliverables



Transforming Trade and Ensuring Global Supply Chain Security with Blockchain and Smart Contracts

Author: Weidong (Larry) Shi, Ph.D., University of Houston

Final Report

uh.edu/bti/research/shi-iakovou-blockchain/



Validating Deterrence Models for Scanning Technologies

Author: George Thompson, ANSER

Final Report

uh.edu/bti/research/deterrence-models/



Exploring Homeland Security Applications for Unmanned Autonomous Systems at Maritime Ports

Author: Ben Rohrbaugh, Lantern UAS

Final Report

uh.edu/bti/research/lantern-uas/



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