

US Forest Service Wood Identification & Screening Center

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Outline

- What is the US Forest Service?
- Why do we care about illegal logging?
- What is WISC?
- Overview of wood identification methods
- Direct Analysis in Real Time-Time of Flight Mass Spectrometry (DART-TOFMS)

What is the US Forest Service?

“Caring for the Land and Serving People”

- One of the primary land management agencies in the United States, managing about 8.5% of the total land (78 million hectares)
- USFS is a multiple use agency and manages lands in all tiers of protected areas
- One of the largest Natural Resource Management research institutions in the world



US Forest Service Wood Identification & Screening Center

US FOREST SERVICE



→ International Programs

→ Global Illegal Logging Program

→ Wood Identification & Screening Center



International Programs

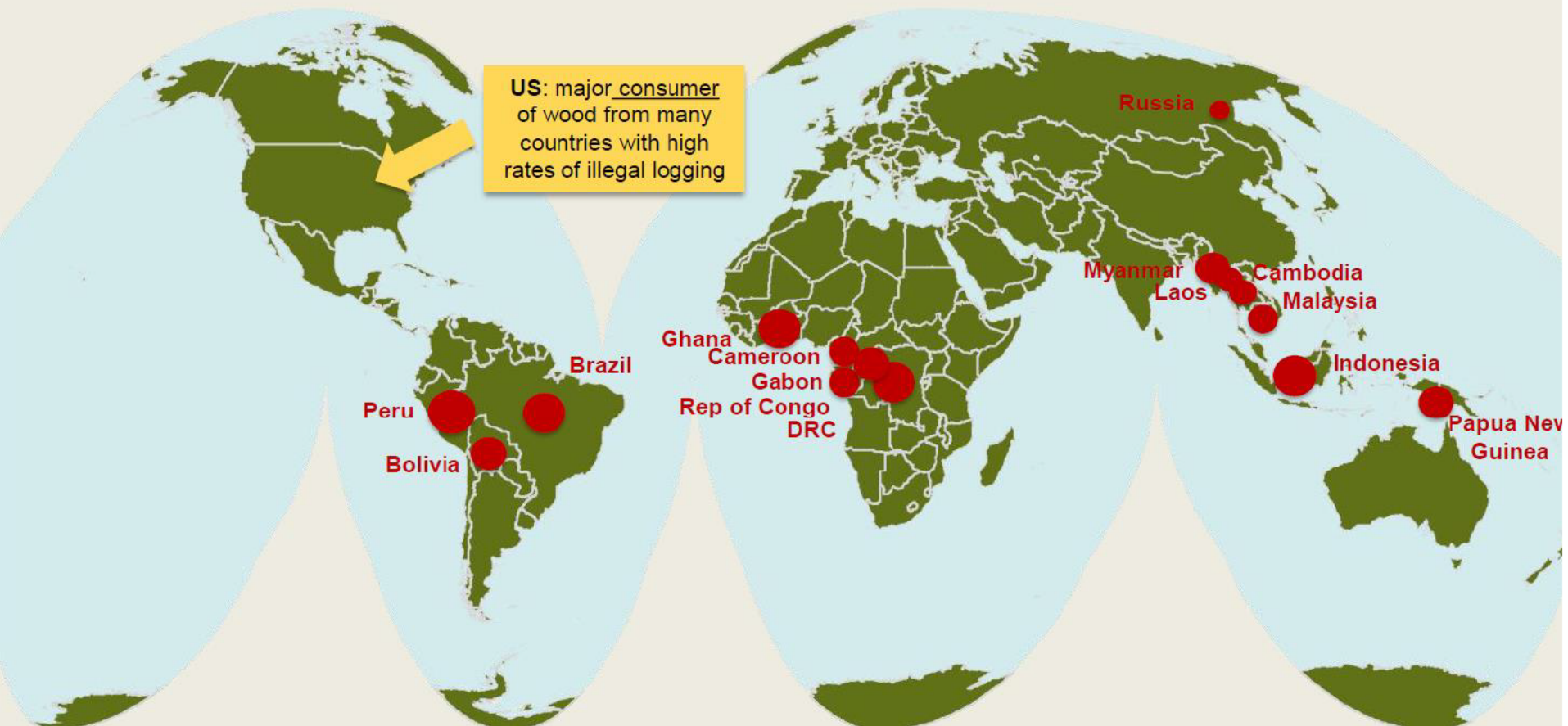
OUR GOALS

- **Improve People's Lives Globally** through conservation and natural resource management activities, disaster preparedness and response, policy development, and trade issues
- **Supporting the American Forestry Community** through promoting the global trade environment for U.S. forest products and protecting U.S. forest resources from international threats

What is Illegal Logging?

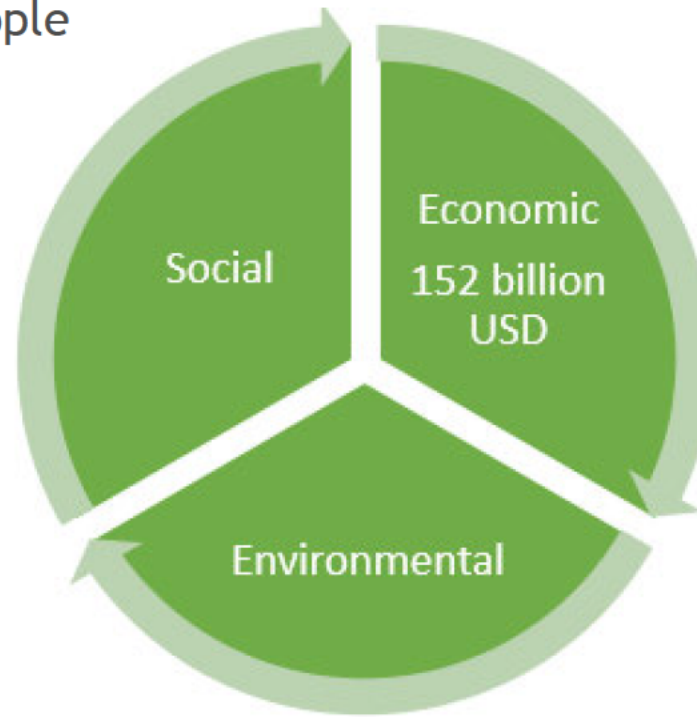
- The illegal harvest, transport, purchase, or sale of timber

Countries with highest rates of illegal logging



Why Care About Illegal Logging?

1.6 billion people
in the world
dependent on
forests



Tax evasion,
depressed
timber prices

Deforestation and forest degradation
Climate change
Biodiversity loss

Wood Identification & Timber Legality

- Illegal timber exporters and importers mis-declare species or origin of wood products in trade
 - Species misdeclarations hide CITES species as well as frequently trafficked species
 - Tariff code violations
 - Origin misdeclarations hide origin as high-risk countries
- Wood identification technologies can be used to confirm the validity of declarations
- In order to more widely use these technologies, there is a need for
 - Comprehensive reference databases
 - Continued technology development
 - Service providers and trainers



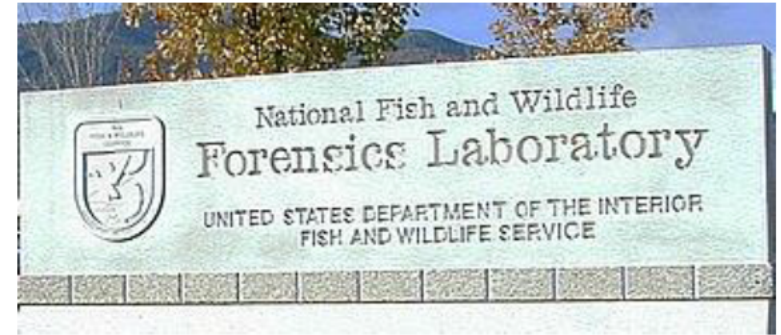
US Government Lacey Act and CITES Enforcement

- Lacey Act
 - In 2008 the US was the first country globally to pass a law making it illegal to trade in illegal wood products
 - 9+ US government agencies involved
- Conventional on the International Trade in Endangered Species (CITES)
 - US Fish & Wildlife Service is the lead agency but many other involved

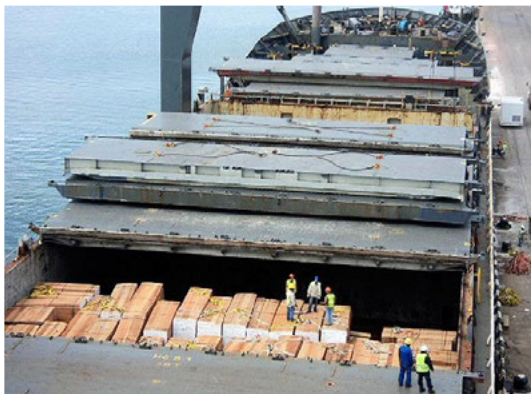


USFS Wood Identification & Screening Center

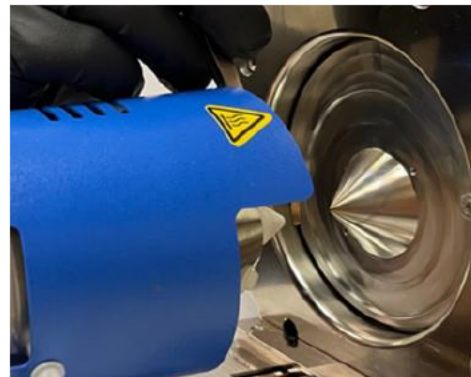
- One of two USG forensic service providers for wood identification
- Established in 2017 in partnership with the National Fish & Wildlife Service Forensics Lab in Ashland, OR



Our main mission is as a service provider



Wood import determined suspicious and samples taken
- Customs & Border Protection
- Homeland Security Investigations



WISC conducts species identification on the evidence items



EVIDENCE RECEIVED:

The following evidence was received in the USFS International Programs Wood Identification & Screening Center (Ashland, OR location) on 04/02/2021:

LAB-1: "One (1) wood sample" [A7155400,Item#1]

WISC issues a report with the results

USFS Wood Identification & Screening Center

In addition to being a service provider...

- Research to improve wood ID technologies to best meet enforcement needs
- Training for domestic and international partners
 - Technical trainings on wood ID
 - Internships
- Building reference databases
 - Close cooperation with World Forest ID
 - Many Xylaria partners
 - ForeST© Database
 - ~1,600 species, 16,000 samples



Preguntas y técnicas de investigación



¿QUÉ especie es?

- DART
- Anatomía
- Genética
- Y otras

¿De DÓNDE es?

- Análisis de proporción de isótopos estables
- Genética
- Y otras

¿Son del mismo individuo?

- Genética

DART for wood identification

Ionización Ambiental Directa para la identificación de madera



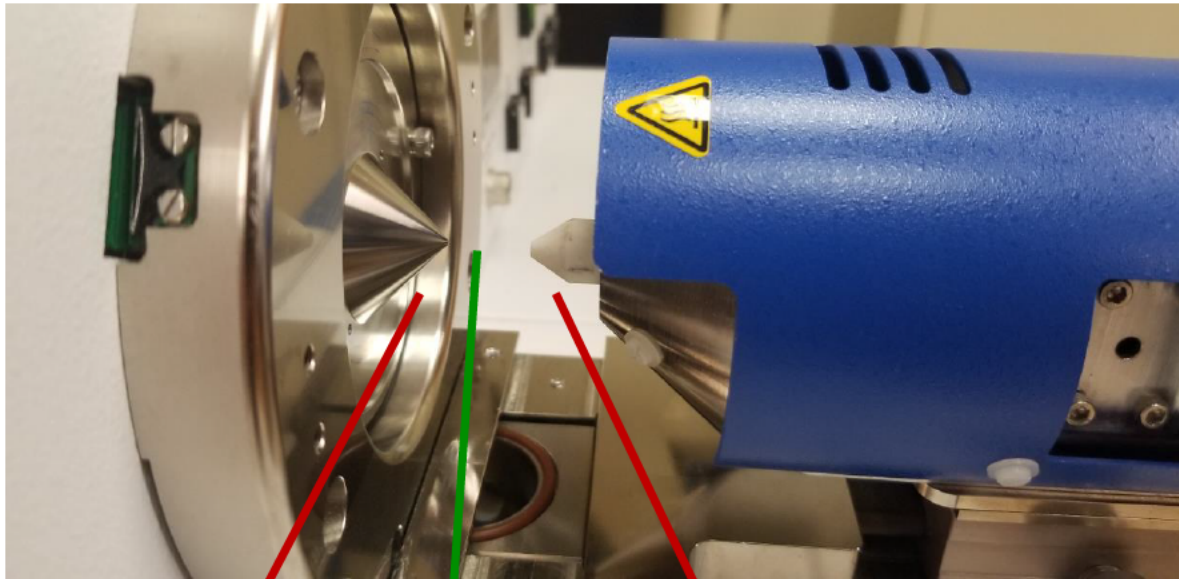
DART for wood identification

Ionización Ambiental Directa para la identificación de madera



DART for wood identification

Ionización Ambiental Directa para la identificación de madera

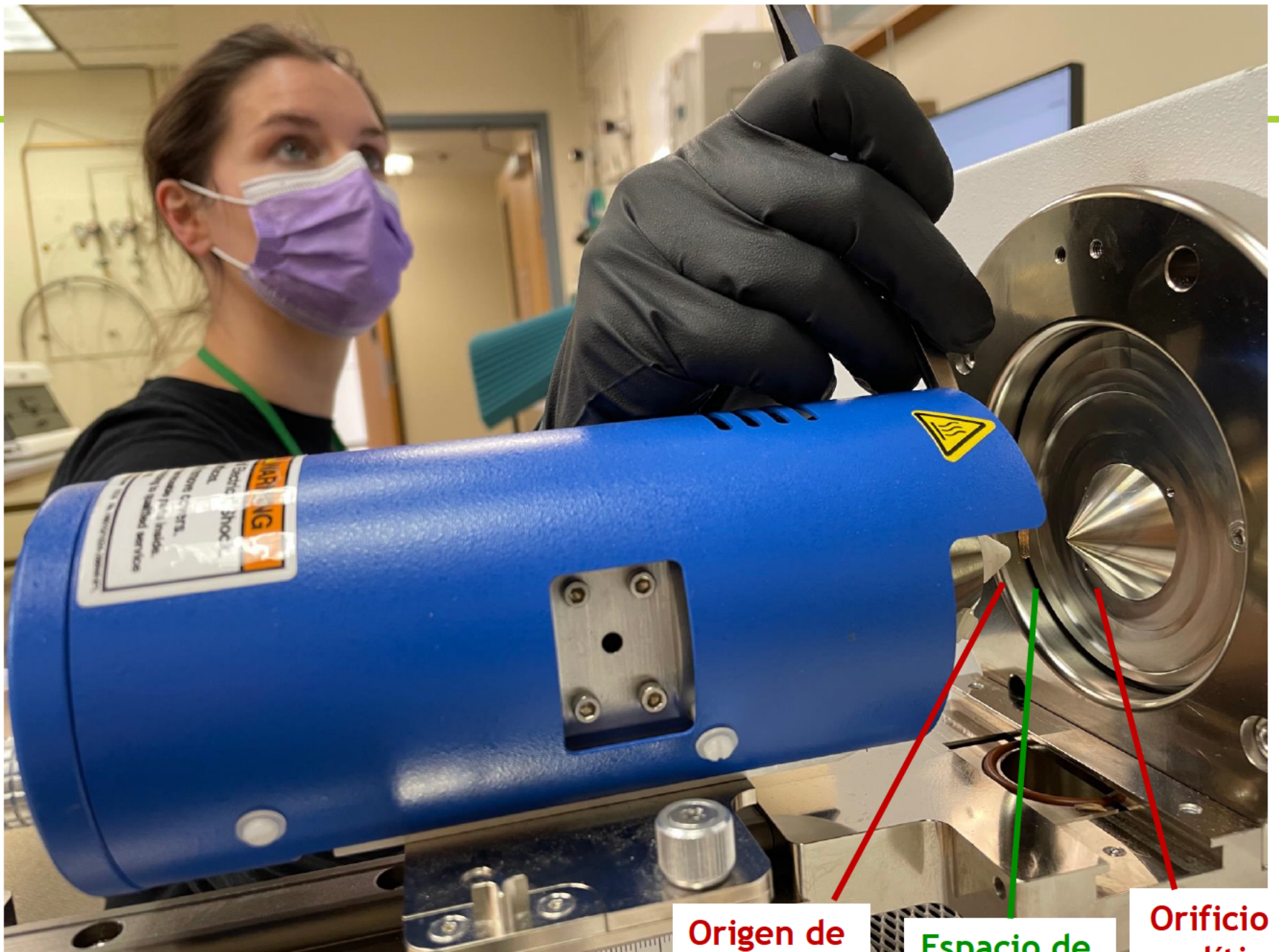


**Orificio
analítico**

**Espacio de
análisis**

**Origen de
protones**



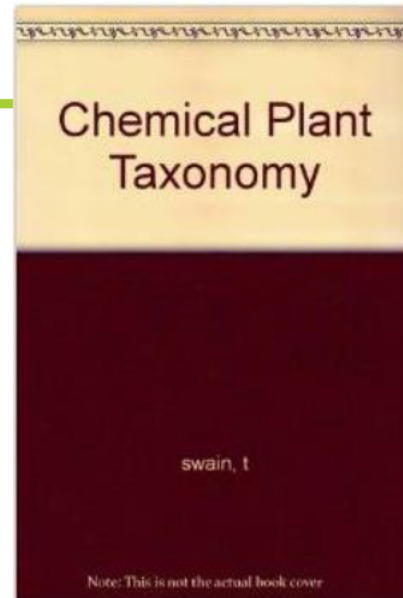
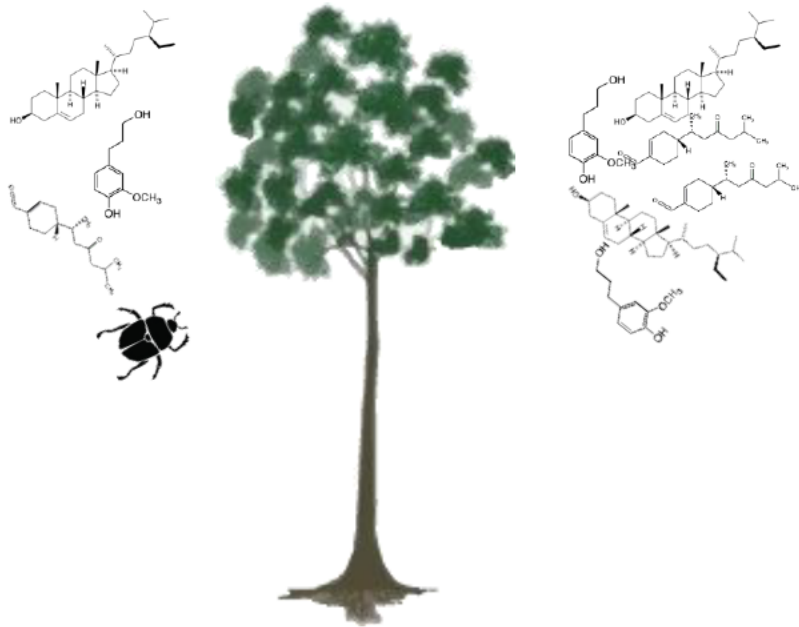


Origen de protones

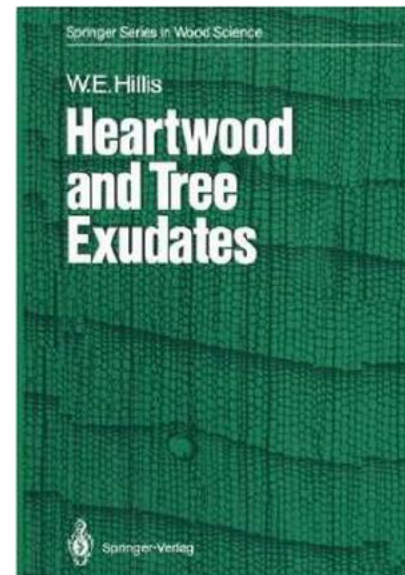
Espacio de análisis

Orificio analítico

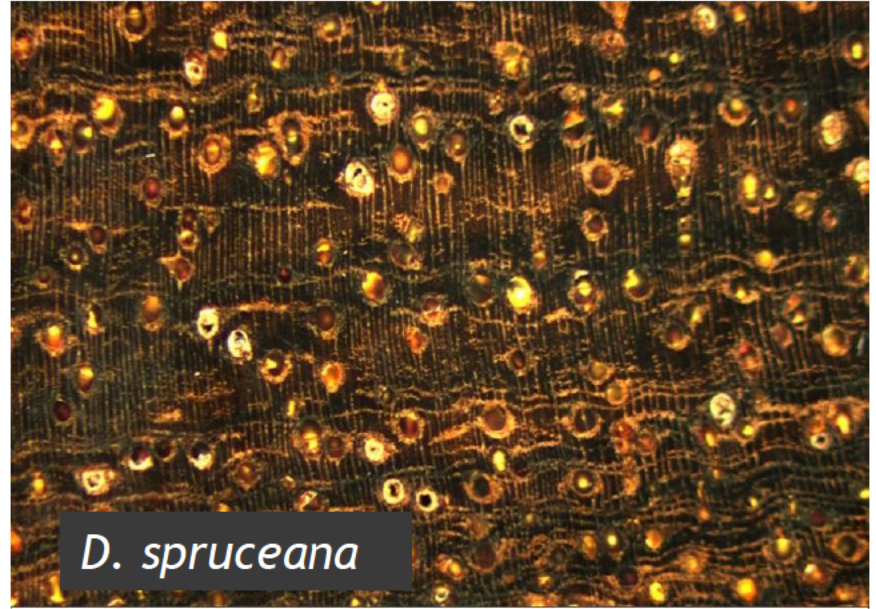
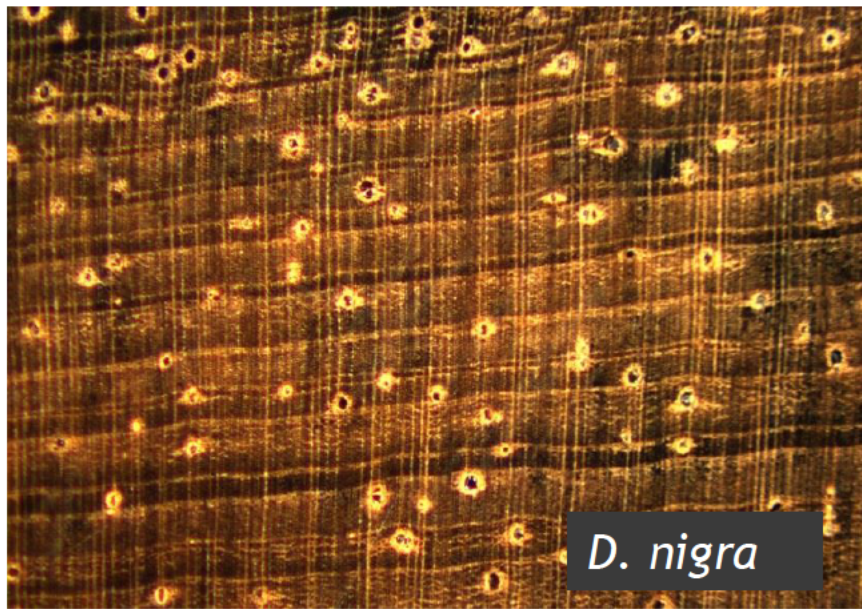
La ciencia de moléculas



1963



1987



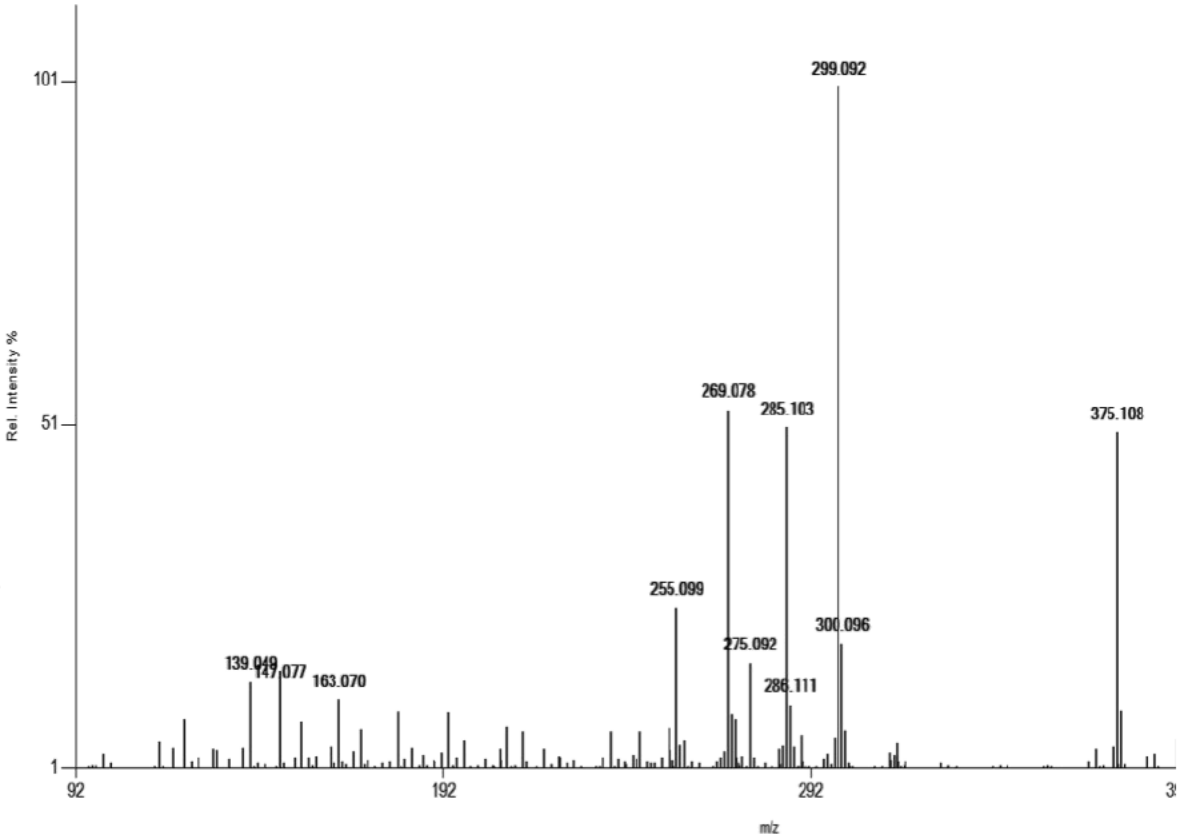
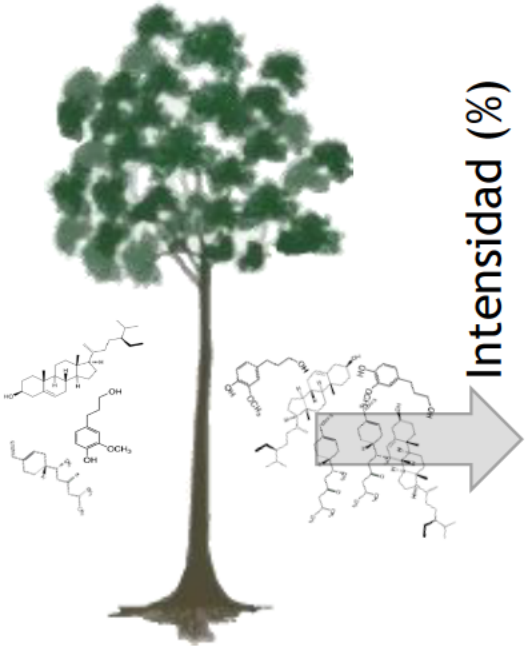
EJEMPLO CORTO DEL ANÁLISIS USANDO DART TOFMS Y

Dalbergia nigra (CITES App I)

vs

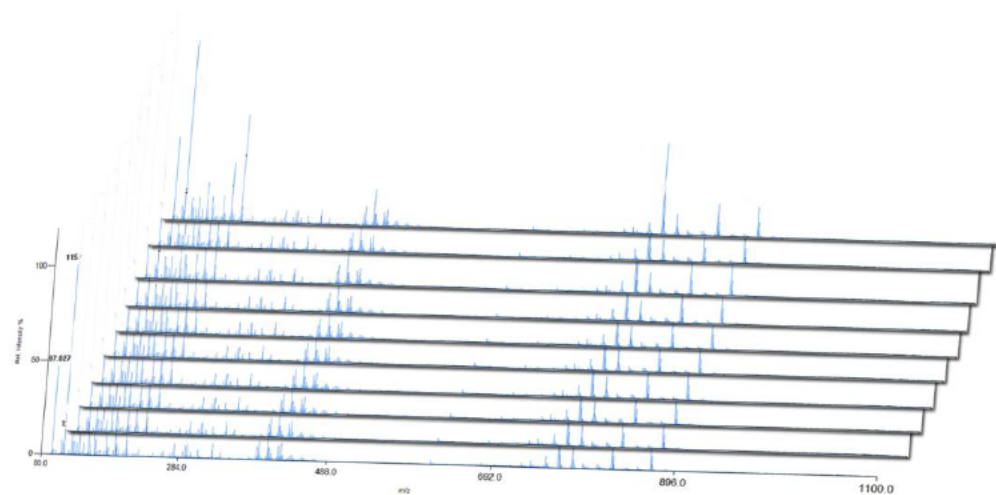
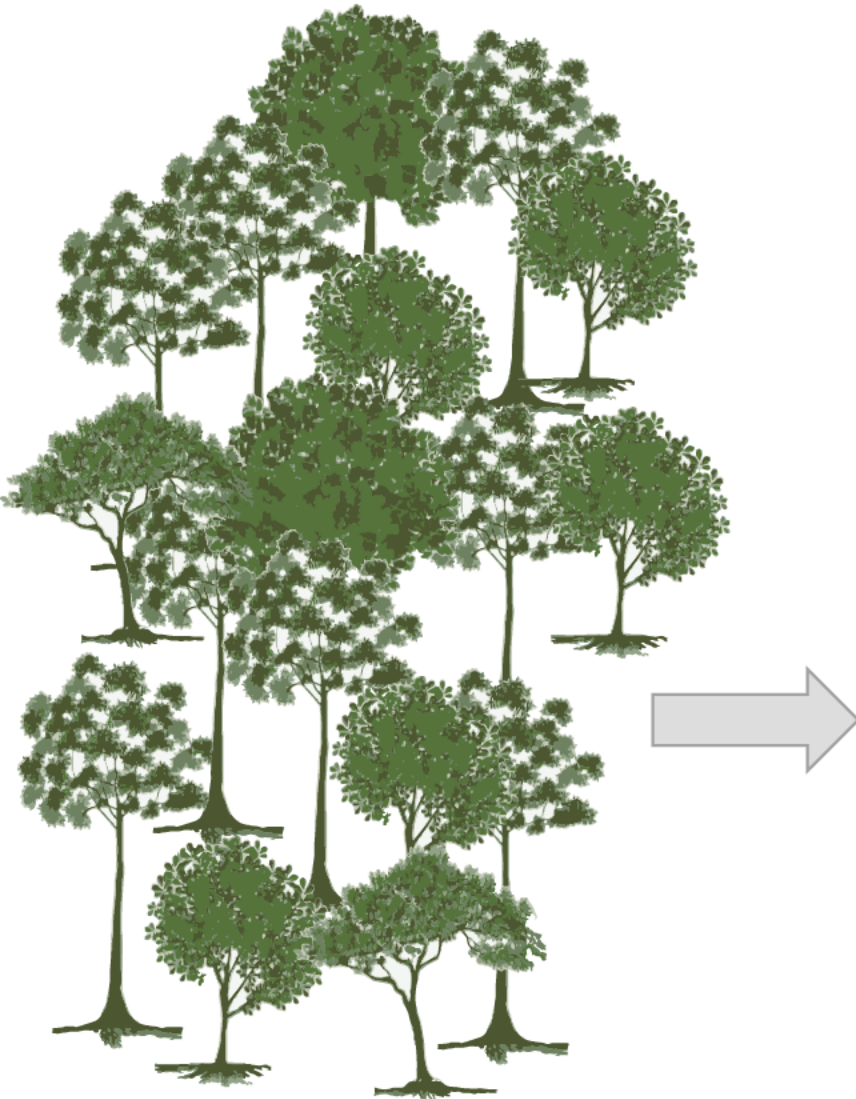
Dalbergia spruceana (CITES App II)

Espectro de masas



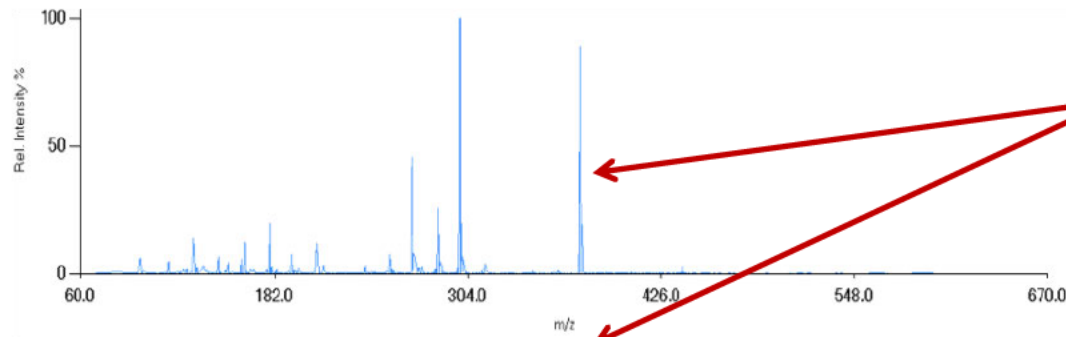
Relación masa a carga eléctrica (m/z)

Población de espectros de masas



Base de datos de referencia de maderas:

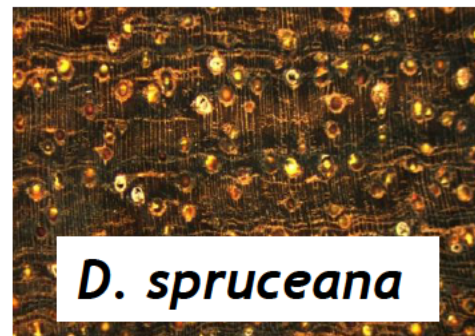
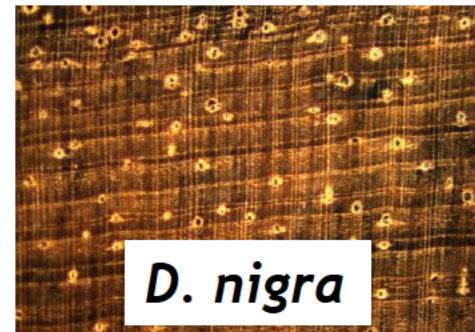
**Forensic Spectra of Trees
Database or ForeST©**



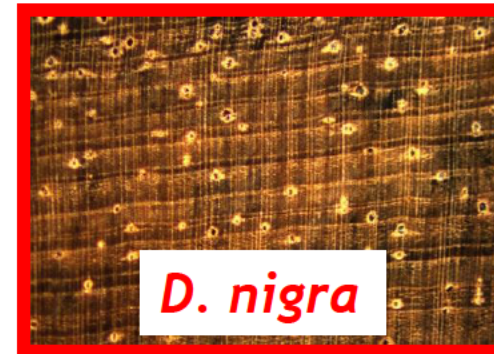
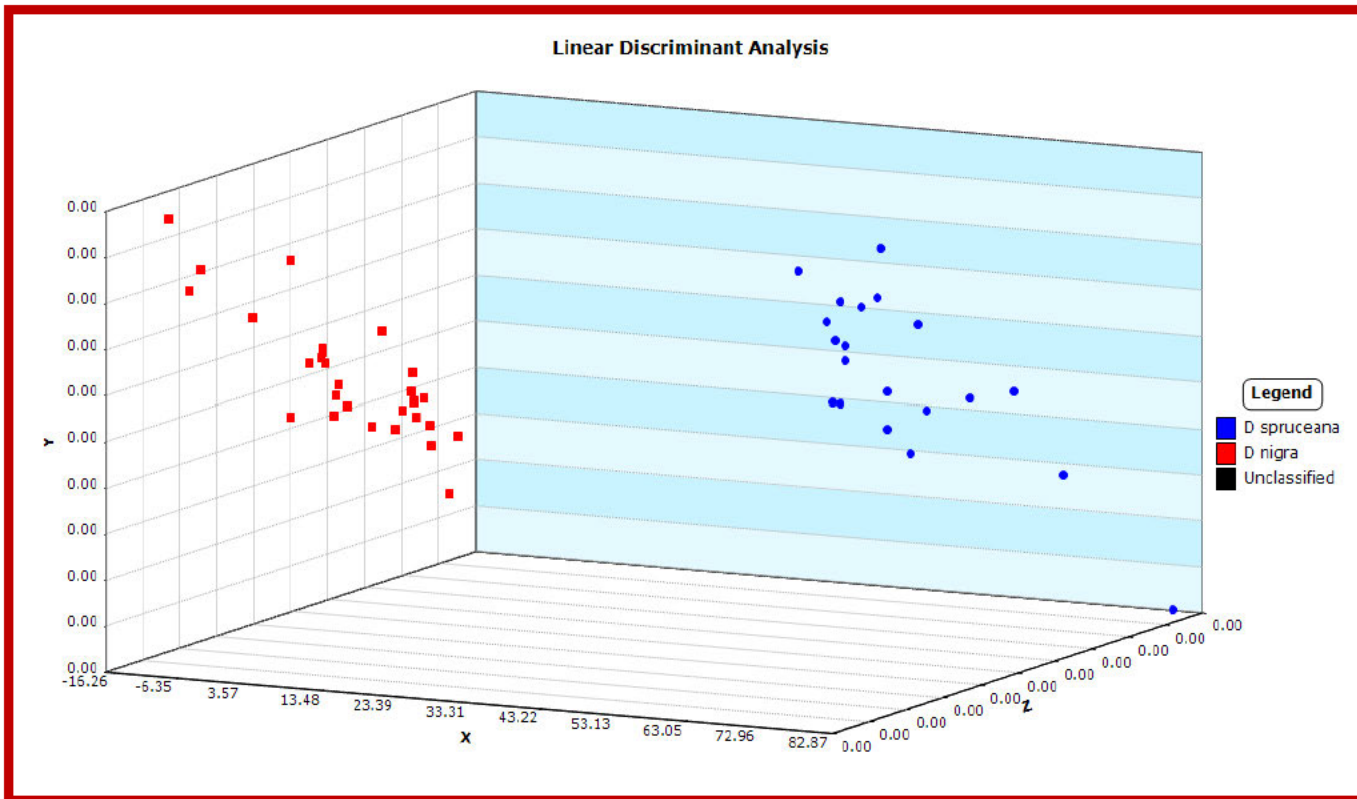
Caviunin m/z 375.108

Intensidad < Intensidad

Mapa de calor



analisis multivariada

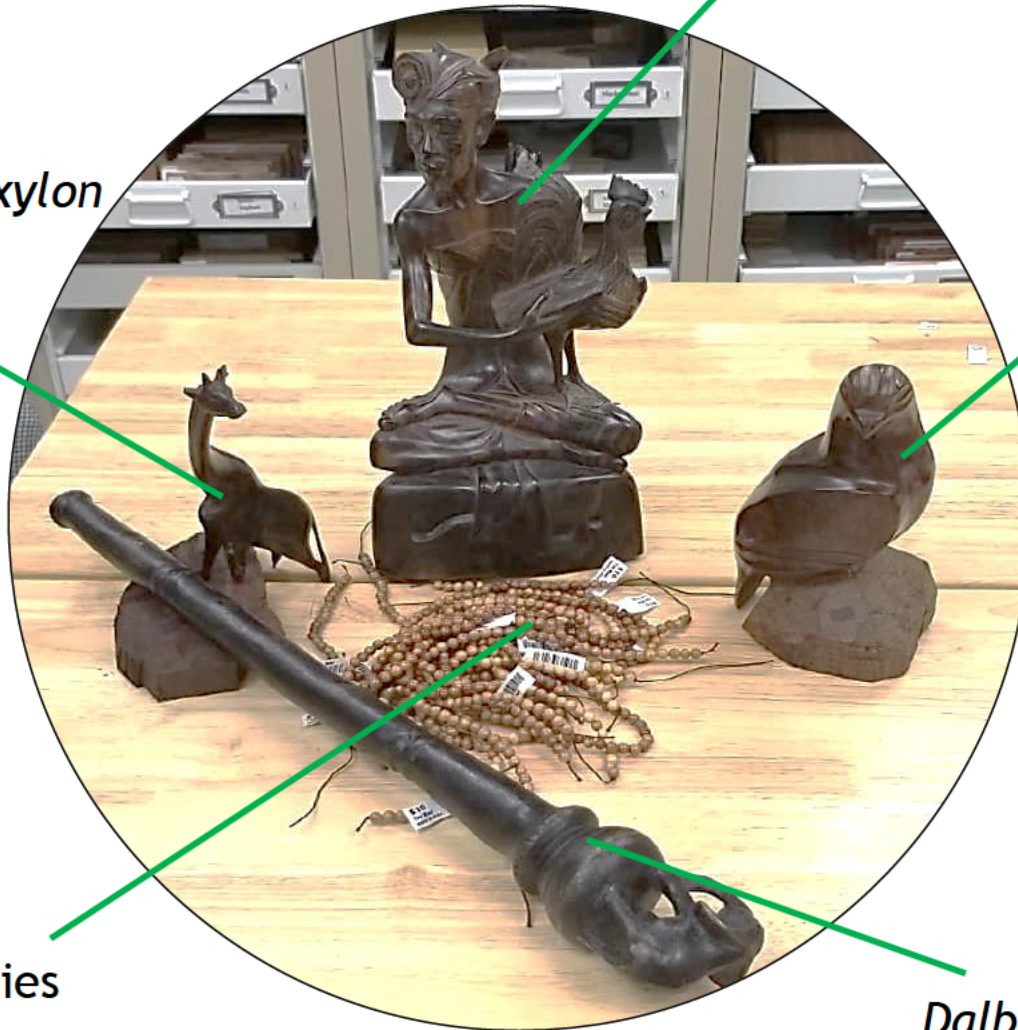


Identificación de madera

Diospyro celebica

Dalbergia melanoxylon

Dipteryx sp.



Various species

Dalbergia melanoxylon

Madera desconocida de Yachats, OR EEUU



Identificación de madera



Identificación de madera (y otros)

Thuja plicata
Western red cedar



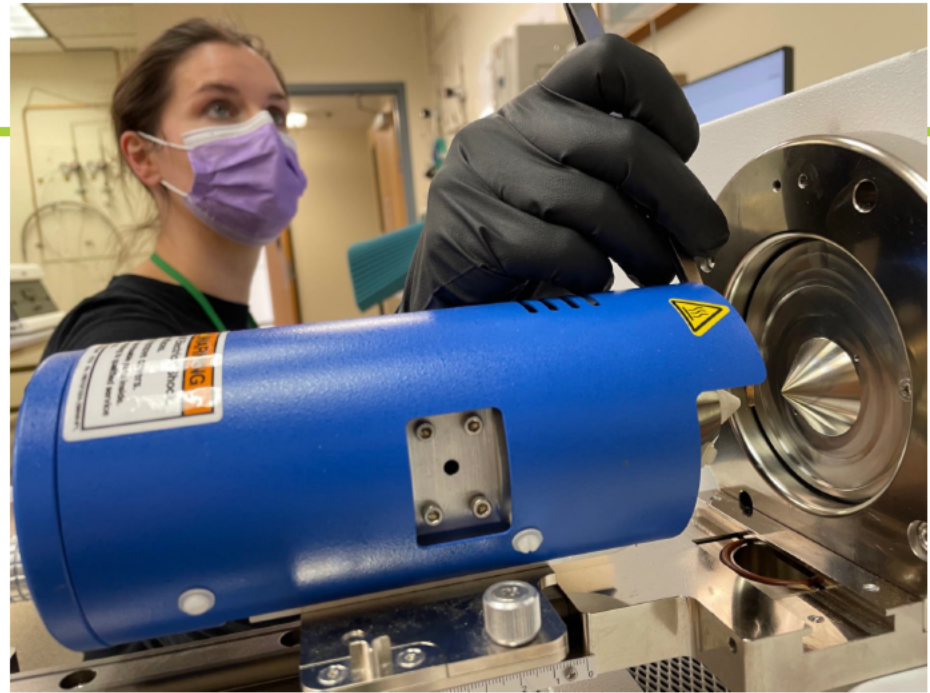
Kristen = *Homo sapiens*



Willie = *Canis lupus familiaris*

Metas de investigación

- Investigación y desarrollo de:
 - técnicas en identificación de madera; DART y más
 - técnicas que combinan métodos
- Colaboraciones internacionales:
 - World Forest ID
 - Kew
 - AgroisoLab
 - Natural Resources Canada
 - CITEMadera (Lima)
 - Y más



THANK YOU

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