



Chemical Fingerprints of Uruguayan Propolis

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Apimondia
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Polo Tecnológico



Pando, Canelones
25 Km from Montevideo



Polo Tecnológico

New department in Facultad de Química,
Universidad de la República (Uruguay)



It's a strategy to bridge the gap between academic
research and industry



Promote research, development and innovation in
uruguayan industry

Research Areas at Polo Tecnológico

Analytical
Chemistry

Food
Technology and
Nutrition

Biotechnology

Nanotechnology

Pharmaceutical
Technology

Propolis

Resinous product
of the honey bee
Apis Mellifera

Its composition
varies with local
flora



Figures from: www.apiter.com

Propolis medicinal properties

Antibiotic

Antifungal

Anti-inflammatory

Immunomodulator

Anti-tumor growth agent



Figures from: <http://es.wikipedia.org/wiki/Propóleo>

Composition of Propolis

European ("Poplar type")

- Flavanones
- Flavones
- Phenolic acids and esters

Brazilian (*Baccharis* type)

- Prenylated p-coumaric acids
- Diterpenes

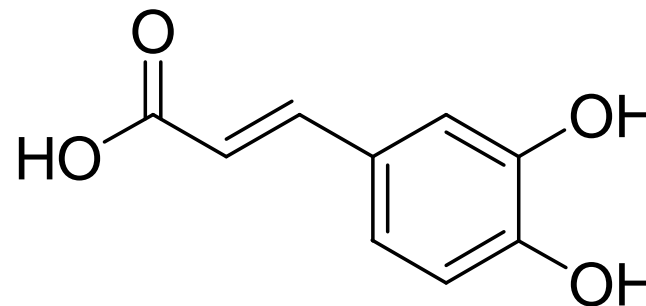
Cuban (Red propolis)

- Prenylated benzophenones

Chemical Composition of Propolis from temperate zones

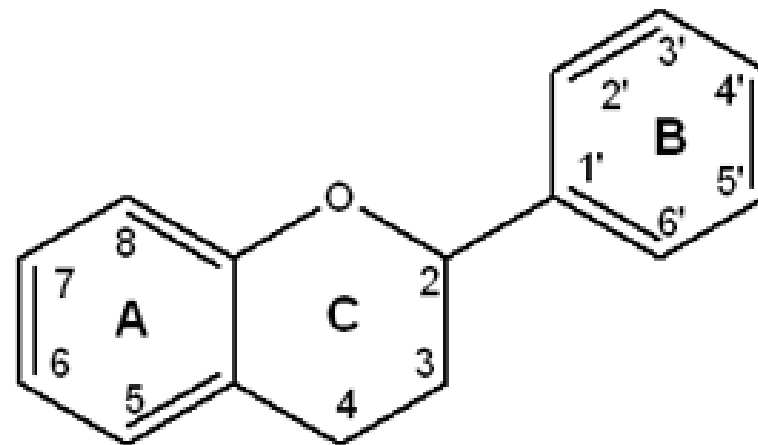
Phenolic acids
and their
derivatives

- Caffeic acid
- p-coumaric acid
- Caffeic acid isoprenyl esters



Flavonoids

- Flavanones and dihydroflavonols
- Flavones and flavonols



Characterization of Propolis from Uruguay

What are its main components?

- It is Propolis from temperate climate
- Rich in flavonoids

Geographical differentiation

- Regions in Uruguay
- Can be related to flora?

Can a uruguayan propolis profile be defined?

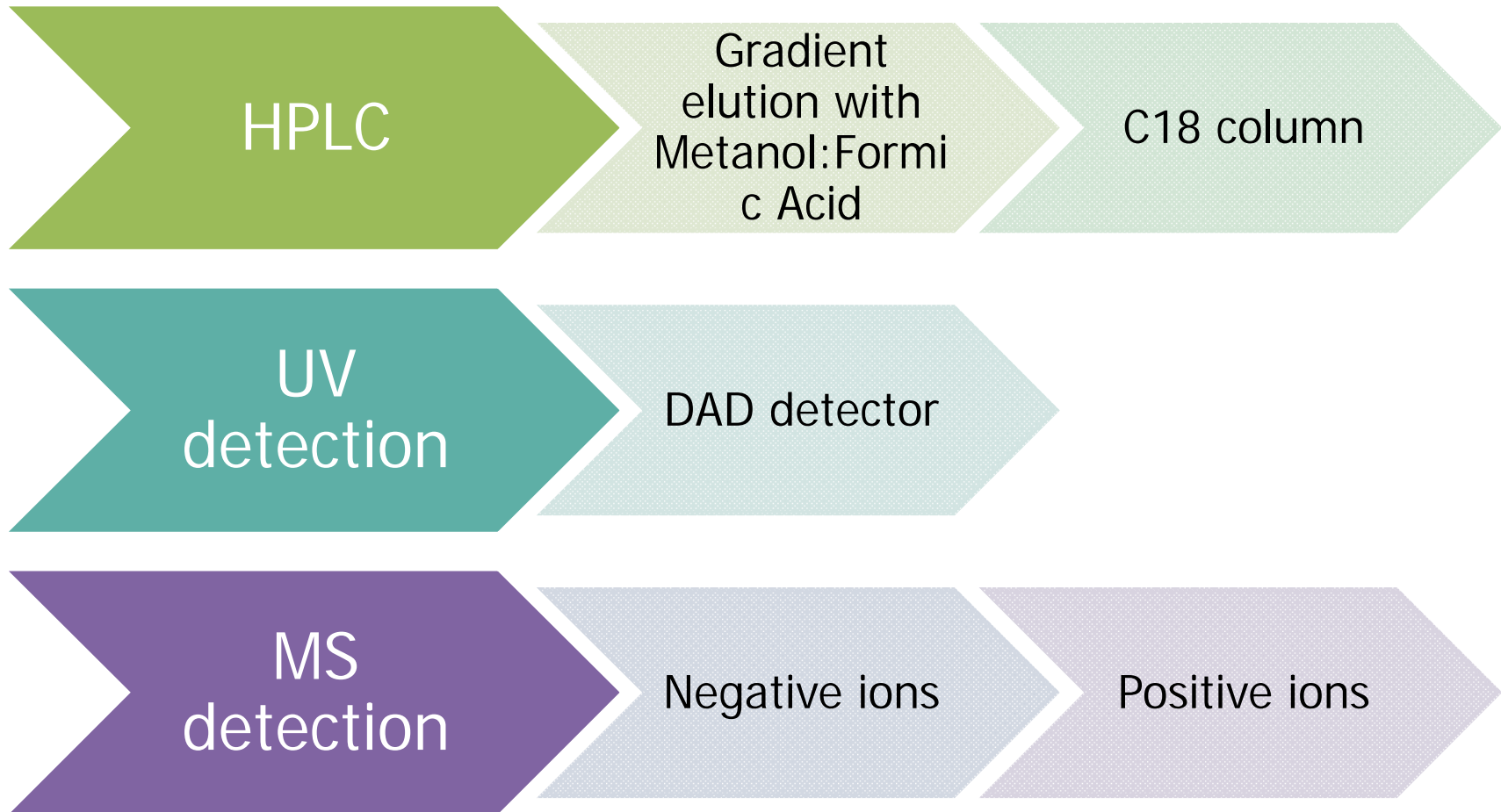
Characterization of Propolis from Uruguay

What are its main components?

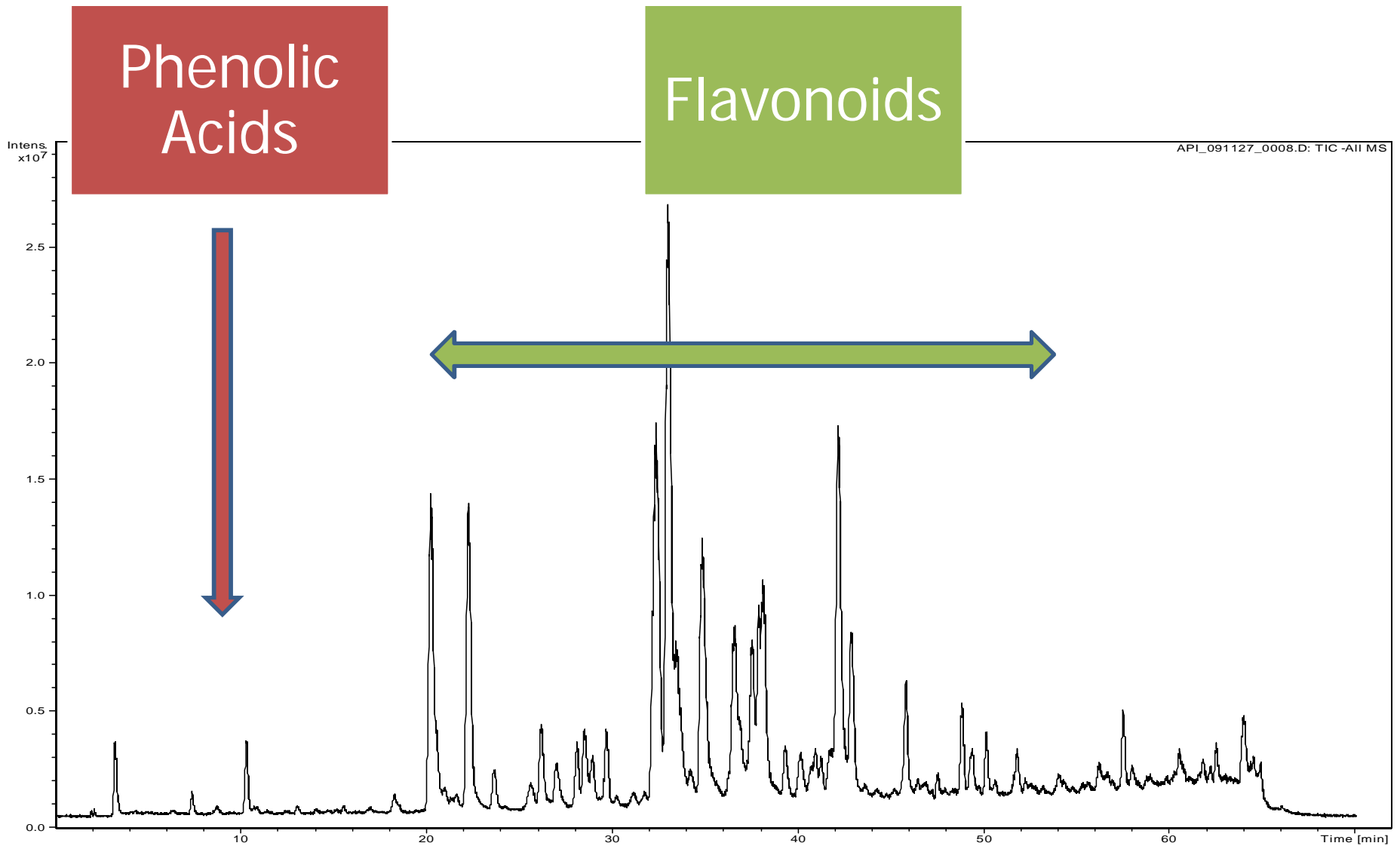
Analytical methods used

Compounds identified

Analytical Method



Propolis chromatogram



How were compounds identified?

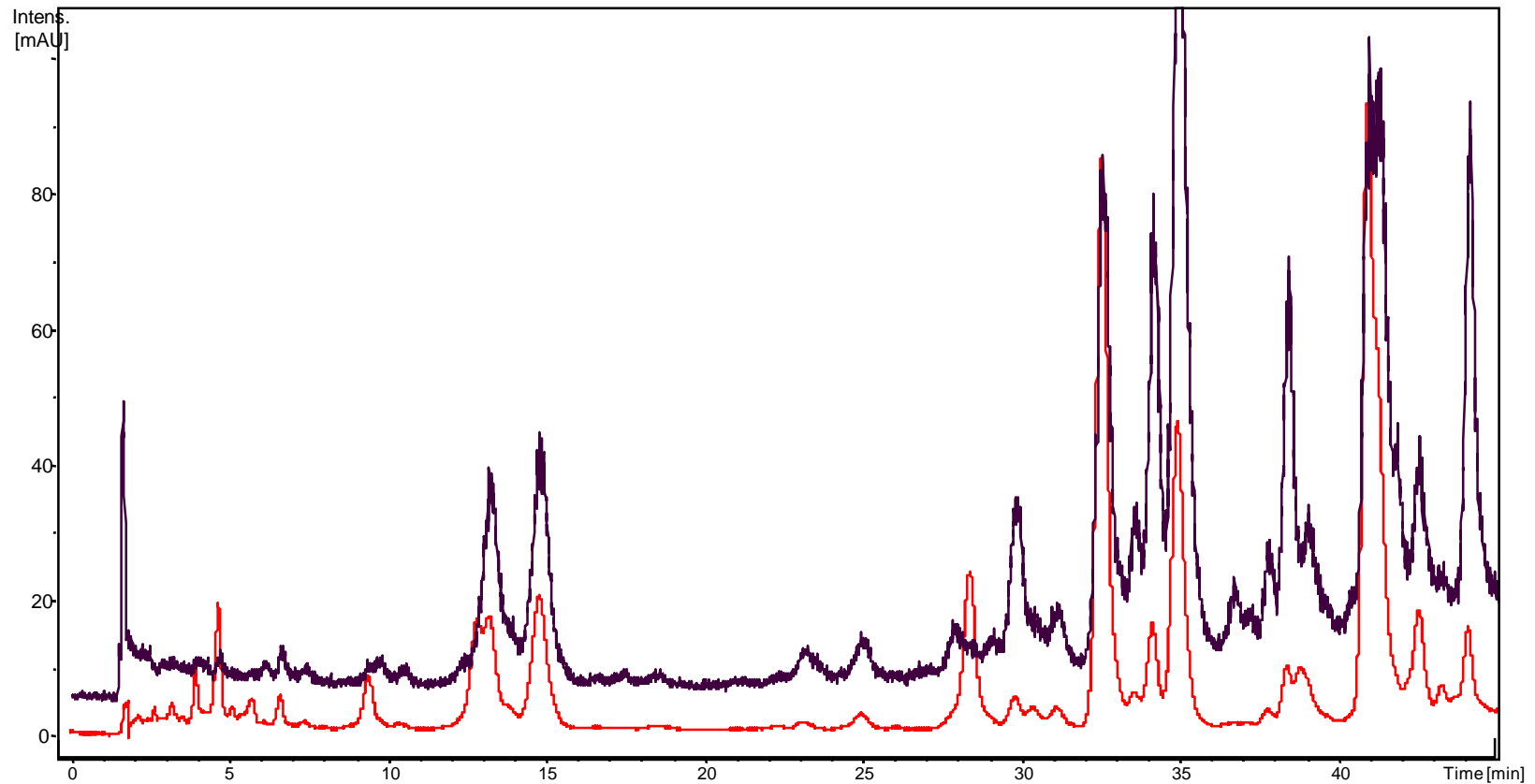
Mass spectrum
of each
chromatographic
peak

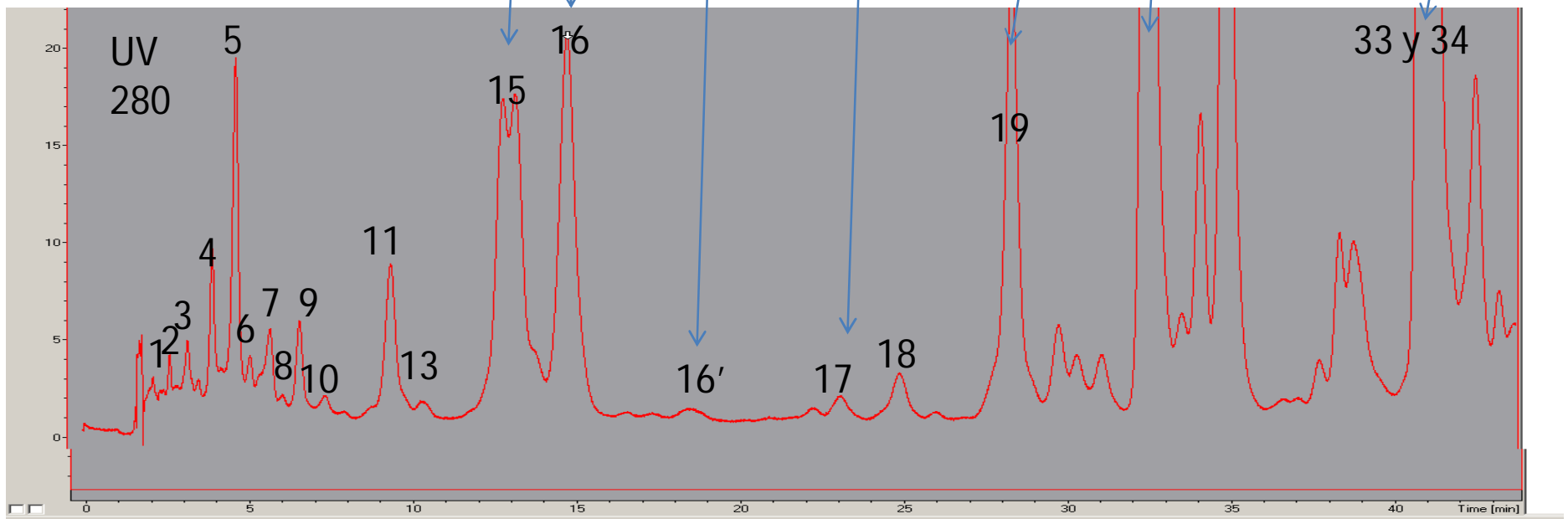
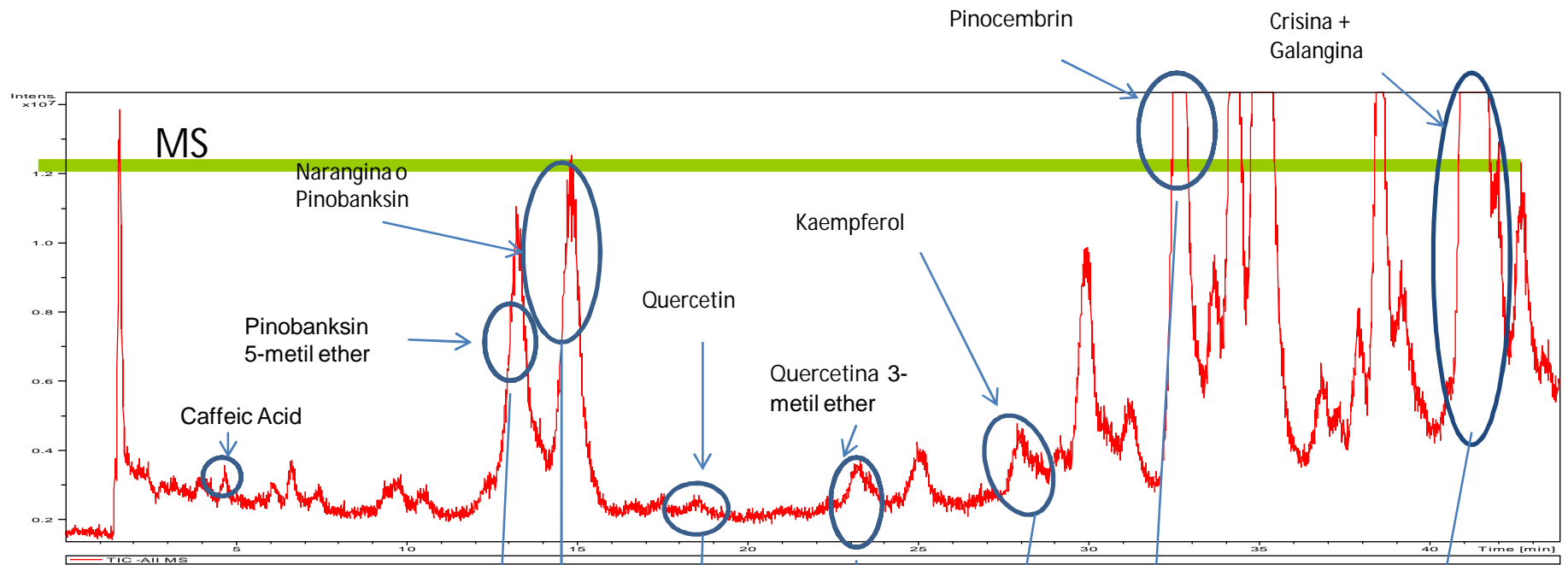
- Usually several coeluting compounds

MS/MS

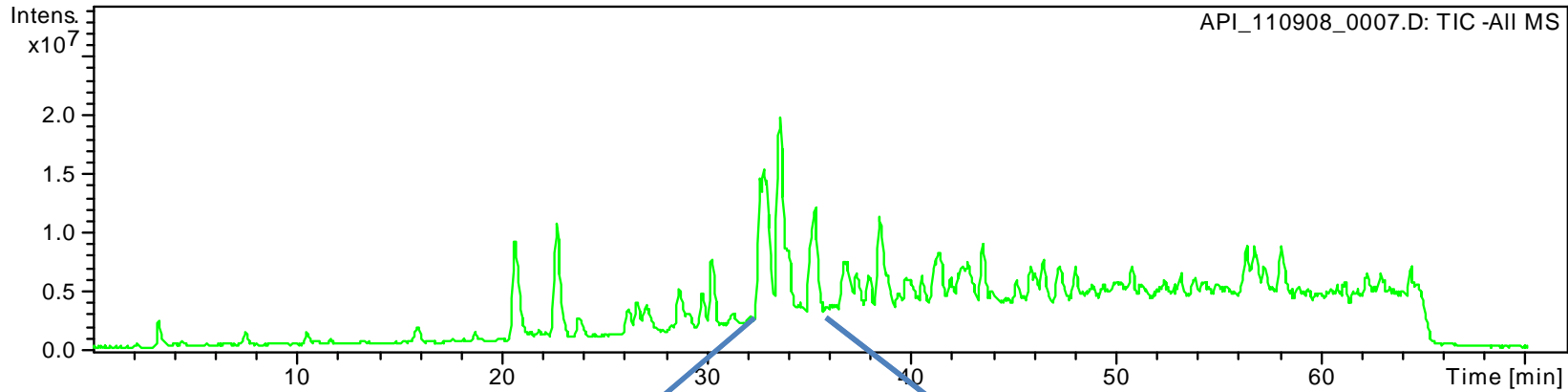
- Comparison with reported MS/MS spectra
- Comparison with standards

Propolis: MS and UV detection

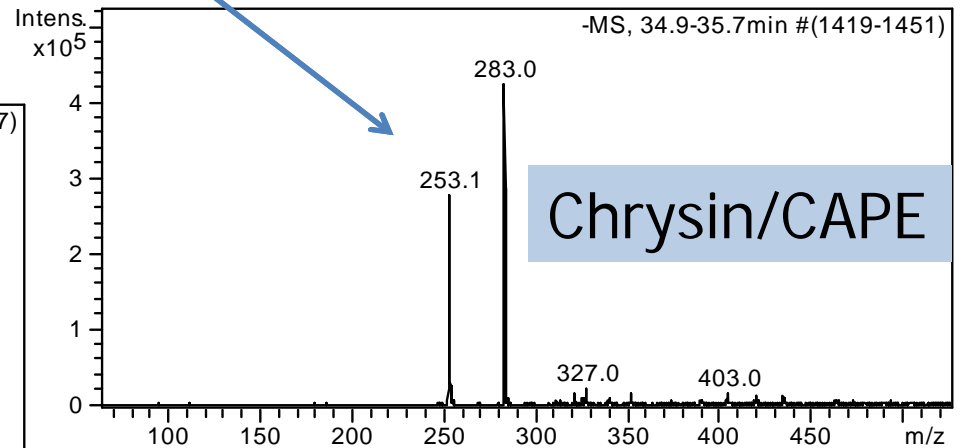
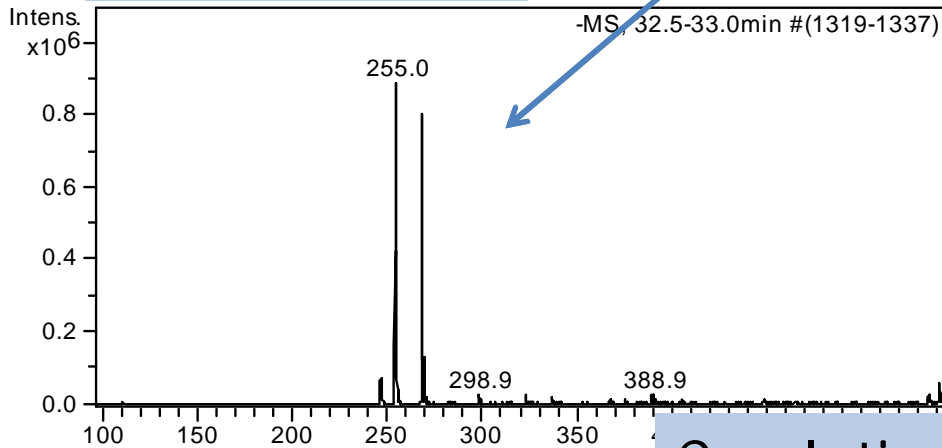




MS of chromatographic peaks



Pinocembrin/?



Chrysin/CAPE

Co-eluting compounds

MS/MS of abundant ions

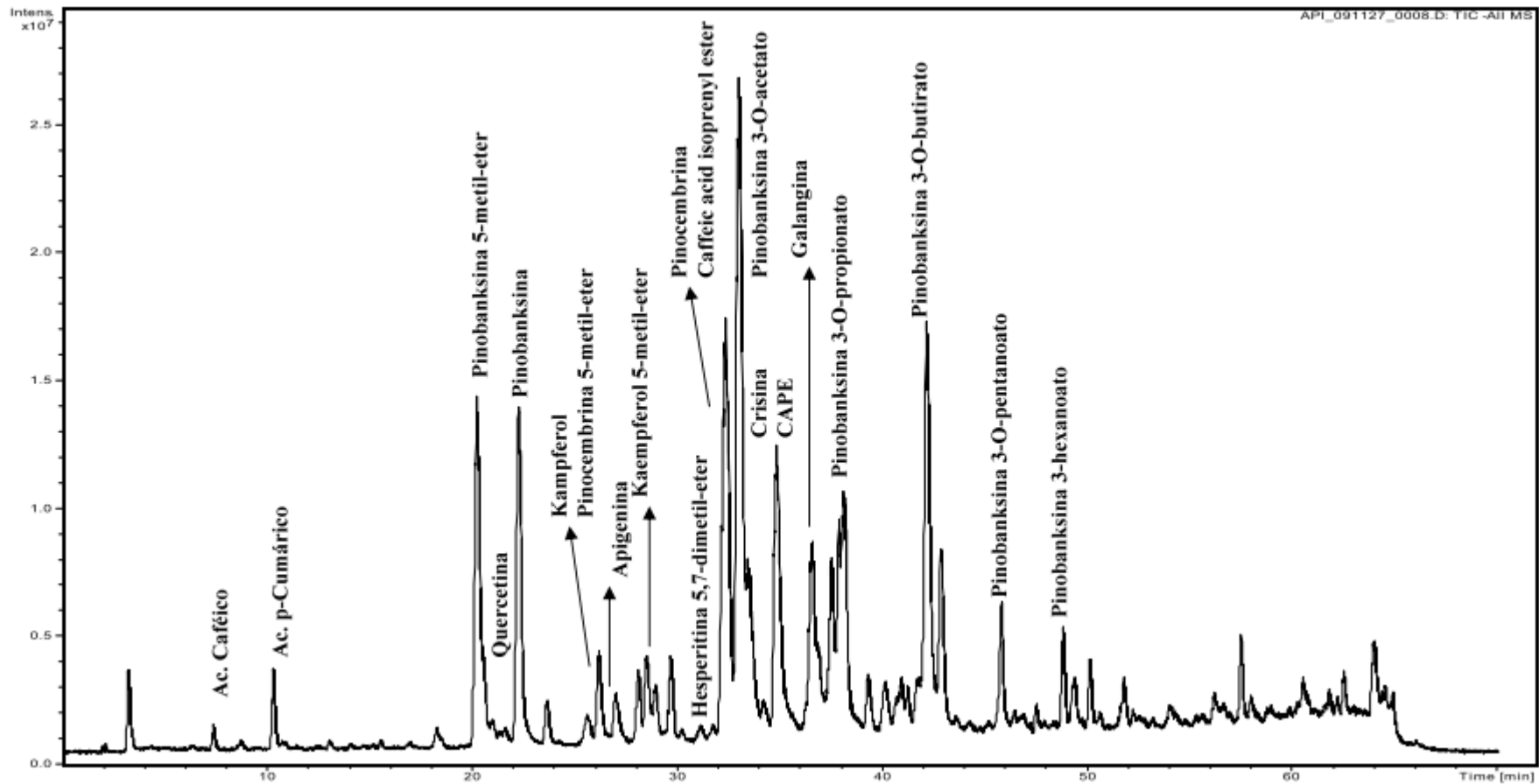
Comparison
with
standards

- Pinocembrin, Quercetin, Chrysin, Galangin, Kaempferol, etc

Comparison
with
reported
spectra

- Used published MS/MS of compounds found in propolis

Cromatographic profile of Uruguayan Propolis



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Can a uruguayan propolis profile be defined?

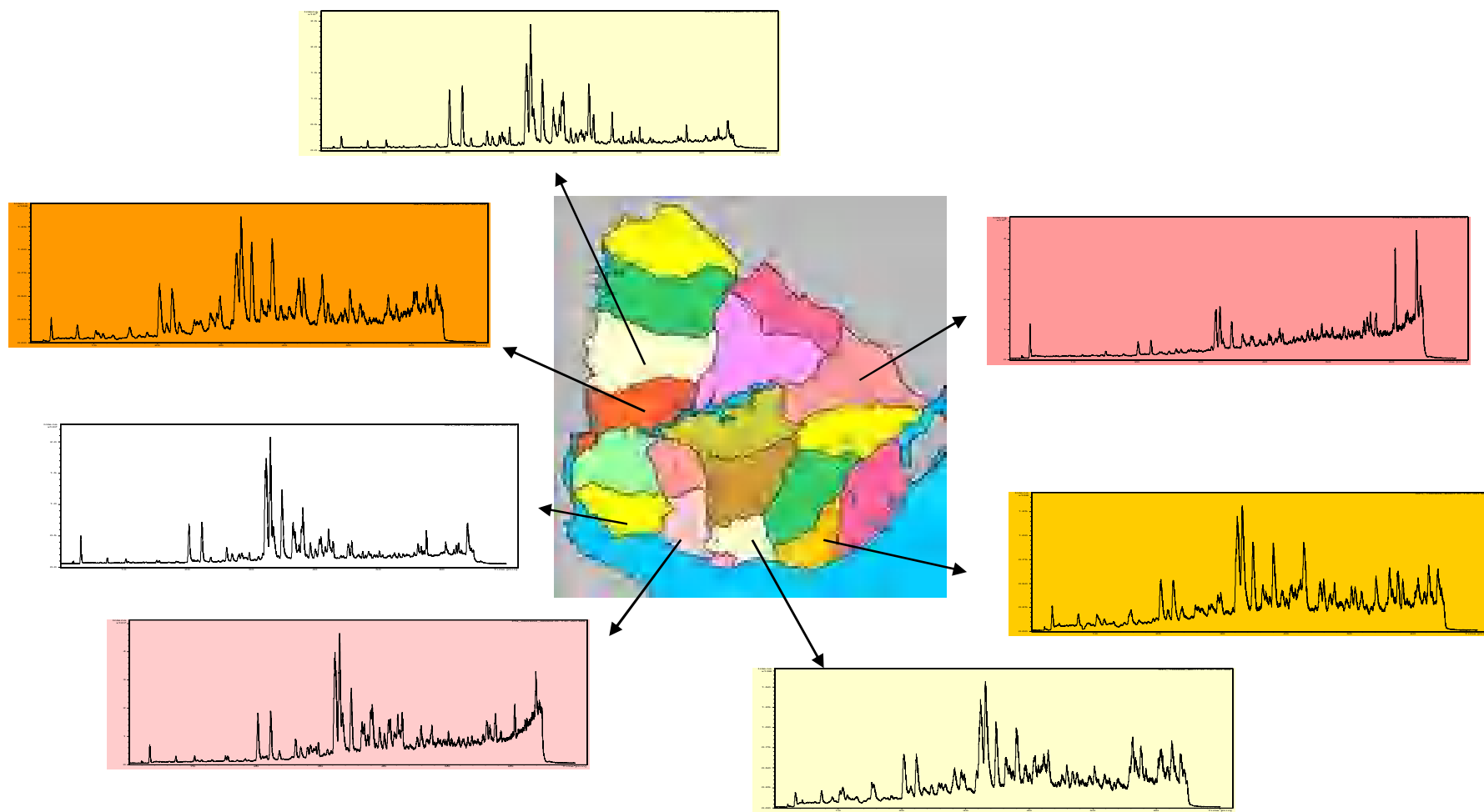
Characterization of Propolis from Uruguay

Geographical differentiation

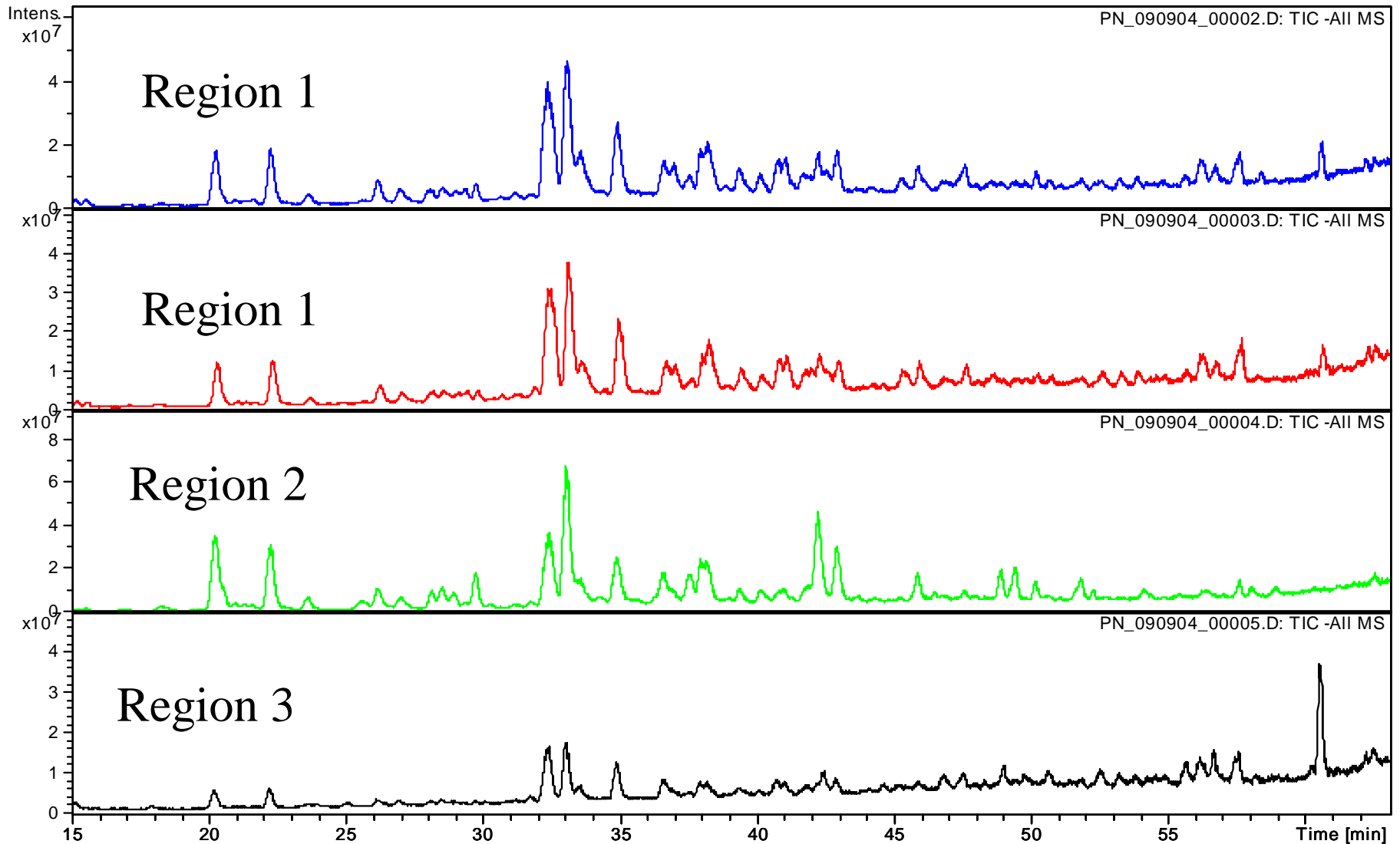
Profiles of regions of Uruguay

How different are the profiles?

Propolis from different regions of Uruguay



Propolis Fingerprinting



Semiquantitative Analysis

Analytical Standards?
Not available for all; can
be costly



Chrysin +
External Calibration
Curve

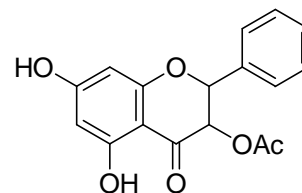
Detection of most
compounds? Coeluting
substances?



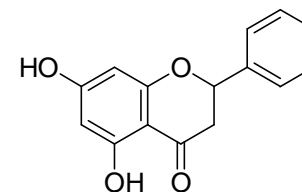
MS using Negative
ions

Results: Main components

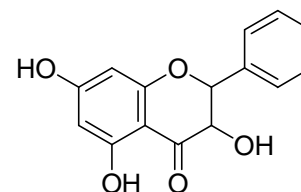
Pinobanksin 3-O-Acetate



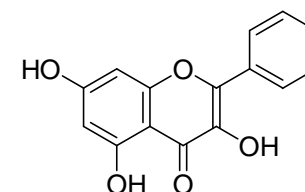
Pinocembrin



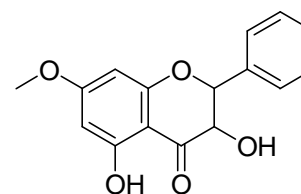
Pinobanskin



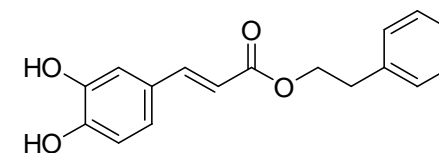
Galangin



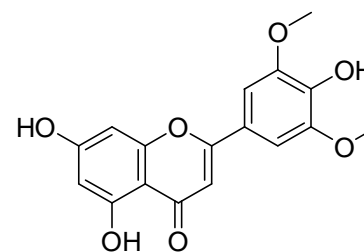
Pinobanksin-5 metil ether



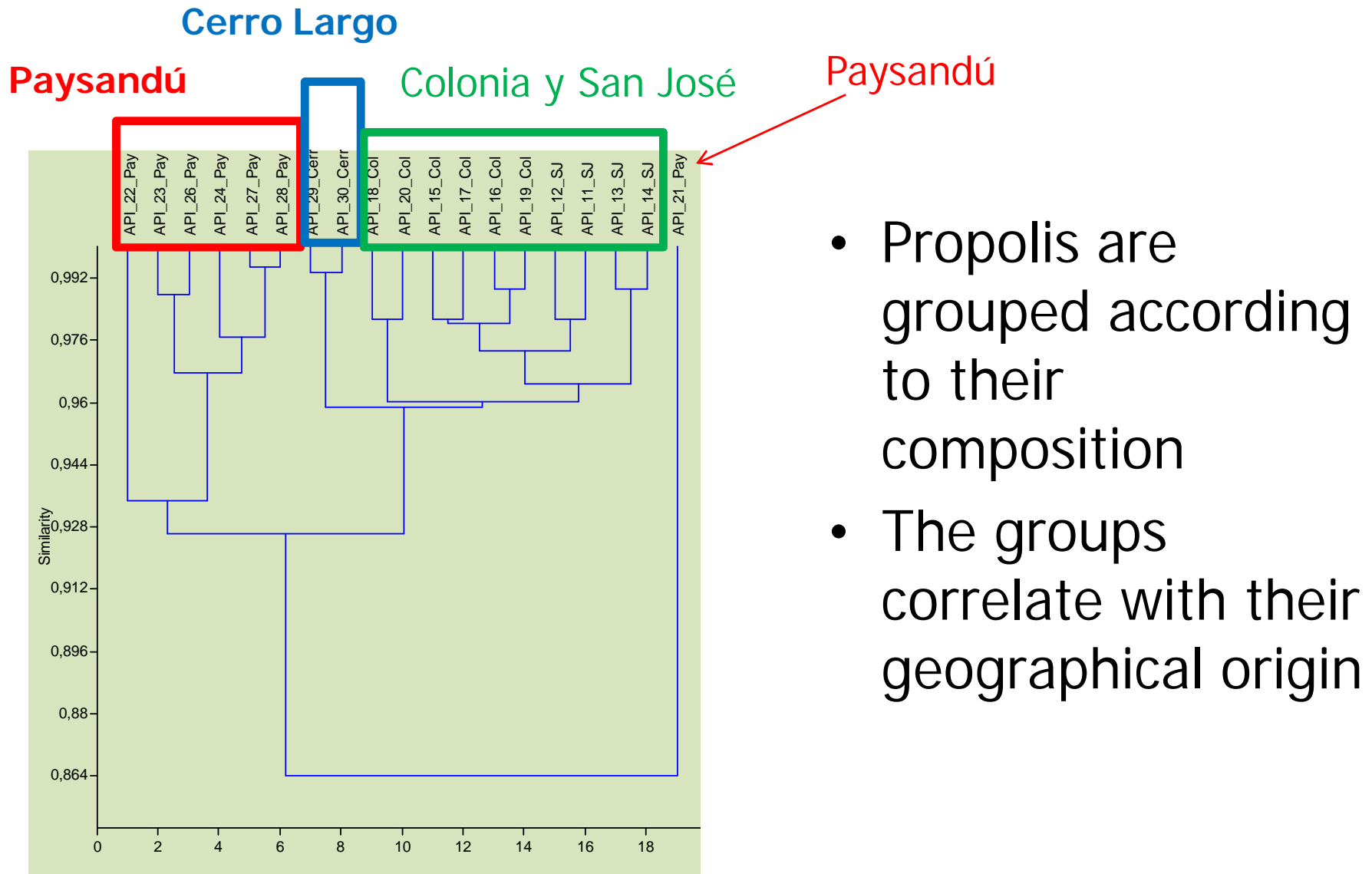
CAPE



Chrysin

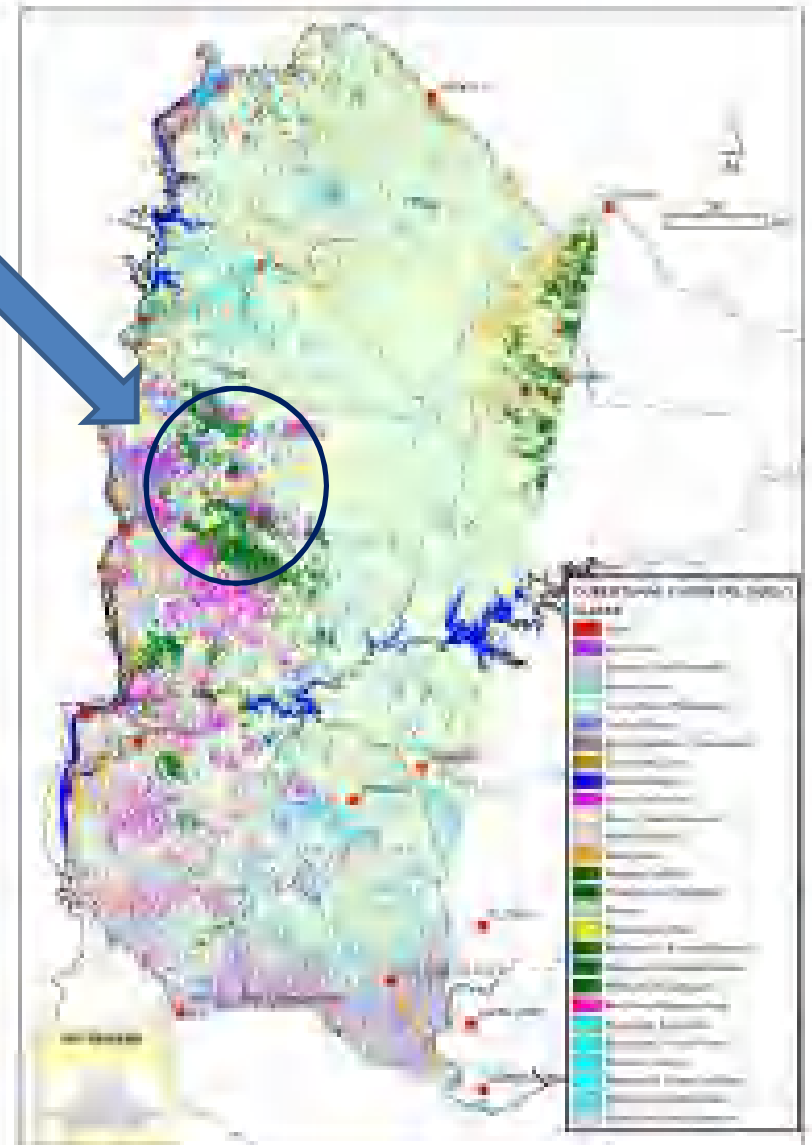
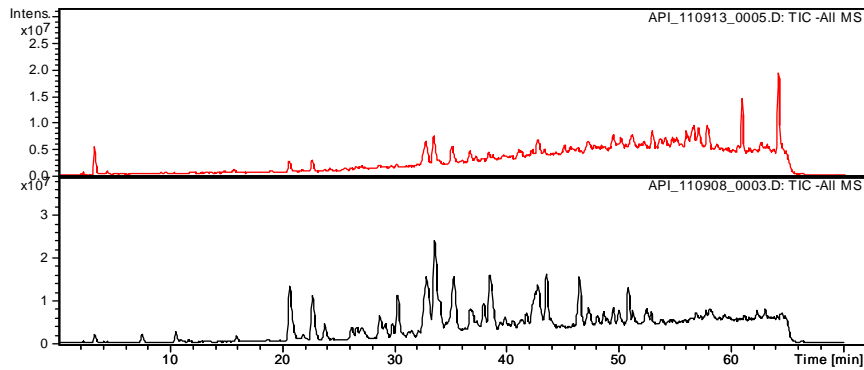


Are propolis profiles different in each region?



Type of vegetation

Forestry: mainly eucalyptus



DellAcqua, Petraglia, MGAP, Uruguay, 2009

Characterization of Propolis from Uruguay

Can a profile of Uruguayan Propolis be defined?

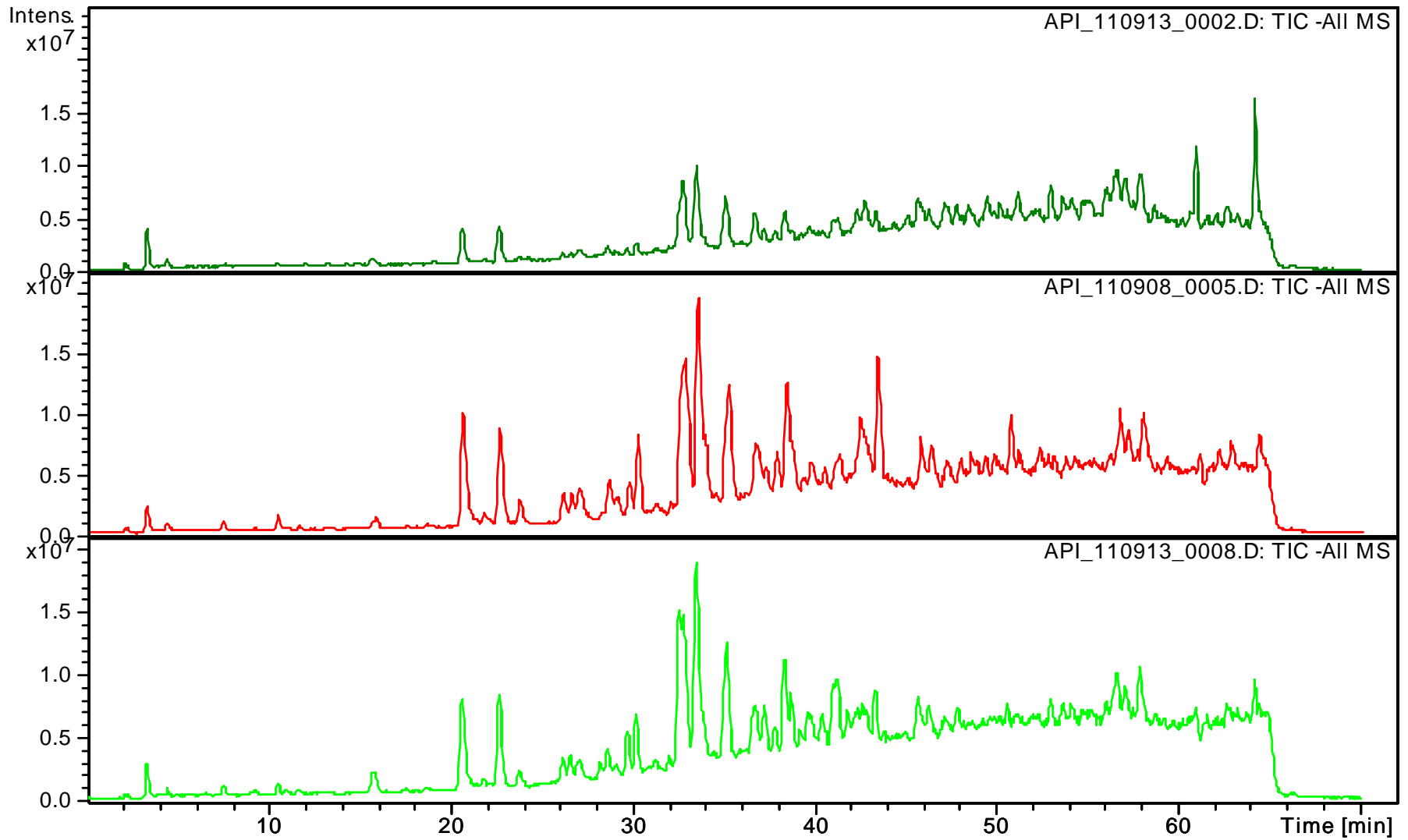
Samples of different regions represent most of 2009 production

Profile of commercial products

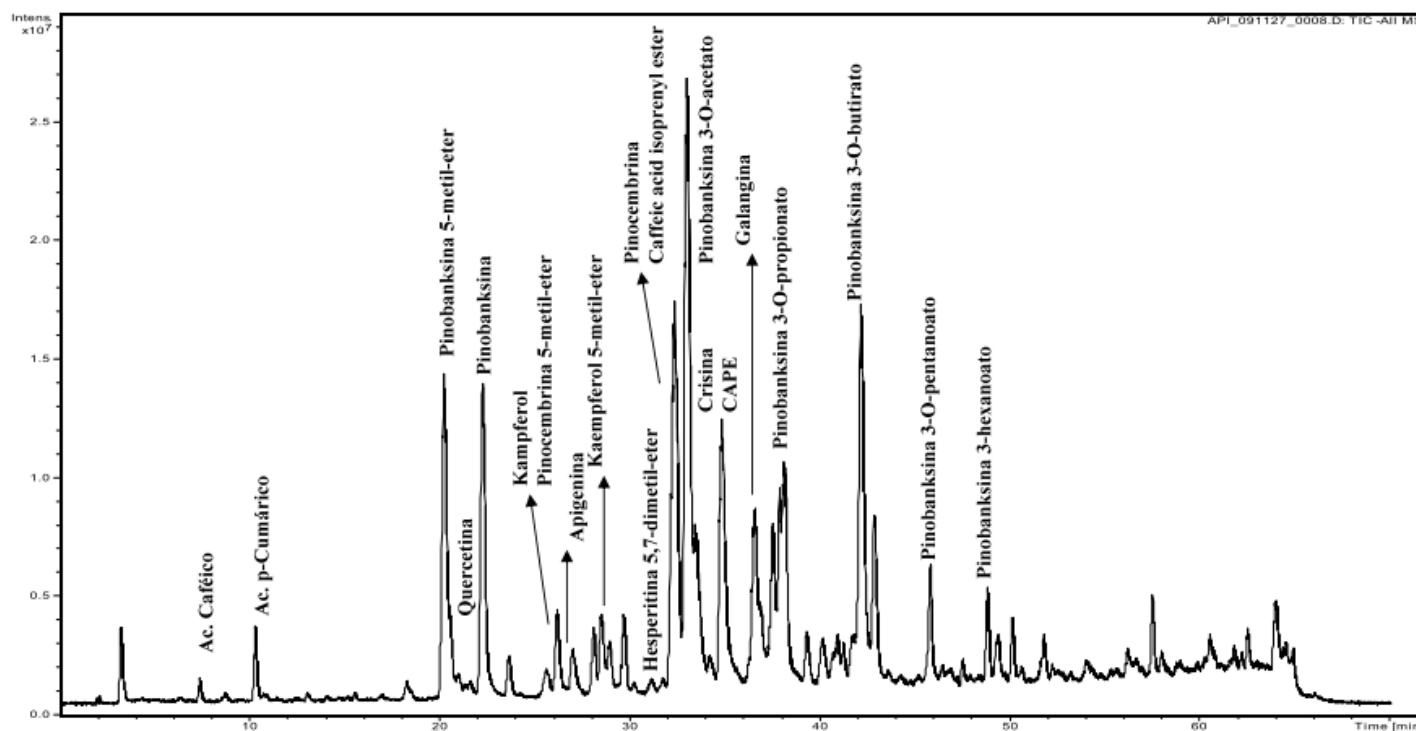
Profile of Uruguayan Propolis

	Pb-3-O-Ac (mg/g)	Pcb (mg/g)	Pbk (mg/g)	Gal (mg/g)	Pbk 5 ME (mg/g)	CAPE (mg/g)	Chrys (mg/g)
Regions	13-84	13-45	5-35	8-37	4-37	5-43	2-41
Regions 2009	3-100	8-38	2-23	0.4-24	2-31	0.8-28	1.6-9
Comm. Extracts	32-70	15-30	10-26	11-17	7-12	8-15	7-10

Propolis Fingerprinting



Cromatographic profile of Uruguayan Propolis



	Pb3OAc (mg/g)	Pcb (mg/g)	Pbk (mg/g)	Gal (mg/g)	Pbk 5 ME (mg/g)	CAPE (mg/g)	Chrys (mg/g)
Regions 2009	3-100	8-38	2-23	0.4-24	2-31	0.8-28	1.6-9
Stand. Extracts	32-70	15-30	10-26	11-17	7-12	8-15	7-10

Conclusions and perspectives

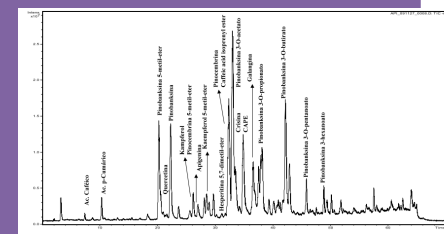
Main components

- Other compounds need to be identified

Geographical differentiation

- Compare with other regions

Profile of uruguayan propolis
(of commercial products)



Area Analisis Quimicos

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Sebastián
DePaula

Aknowledgements

Proyecto Enlaces-UE URY 2003-
5906 e Innova UE URY 2009

Proyecto PDT-UVT-Dicyt

ANII Proyectos con Empresas

Aptiter