



Vino in fermento: quando la scienza guarda nel bicchiere !

Bergamo – 20 ottobre 2013



FONDAZIONE
EDMUND
MACH



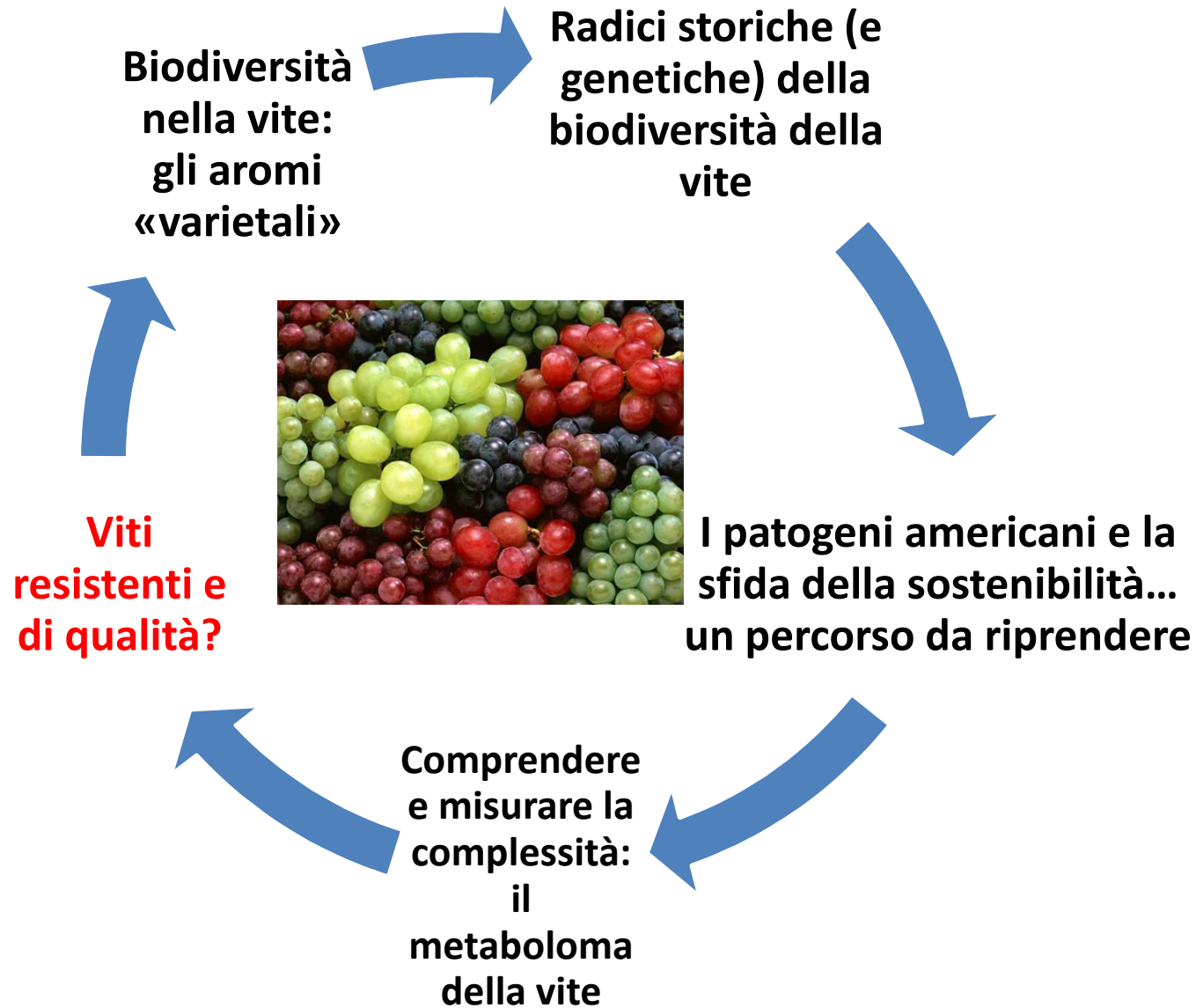
Fulvio Mattivi

Department of Food Quality and Nutrition
Research and Innovation Centre,
San Michele all'Adige, Italy

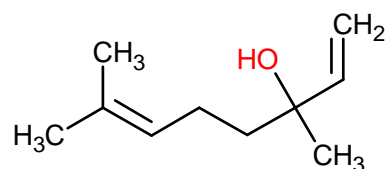


Centro Ricerca ed Innovazione

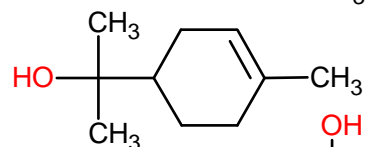
Mappa



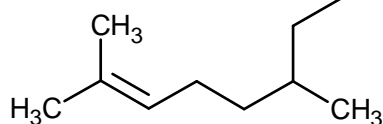
I **monoterpeni** e loro derivati nell'uva e nel vino sono importanti per le varietà a sapore floreale (Moscati, Malvasie, Riesling, Traminer...)



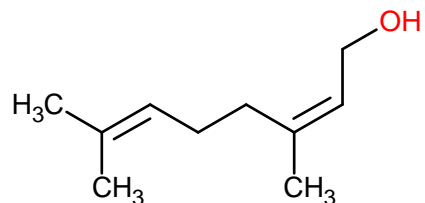
linalolo 50



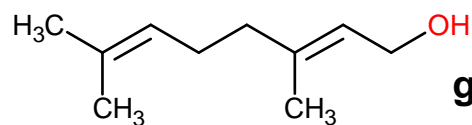
α-terpineolo 400



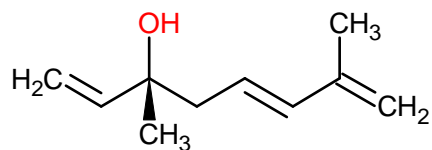
citronellolo 18



nerolo 400



geraniolo 130



hotrienolo 110

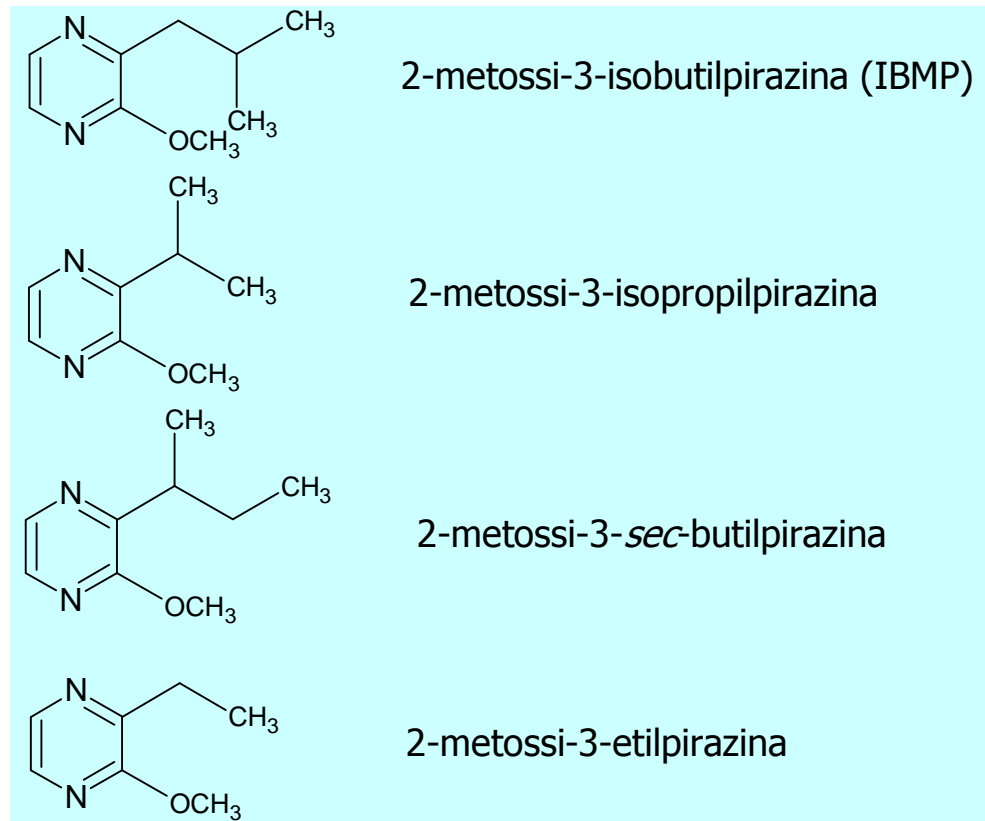
Soglia olfattiva nel vino
(microgrammi/L)



Le **metossipirazine** sono importanti in alcune varietà francesi

(**Sauvignon blanc, Cabernet Sauvignon, Cabernet Franc, Merlot, Carmenere, etc.**)

✓ forte sentore olfattivo da peperone verde, asparago, patata cotta, fagiolini cotti, con toni terrosi



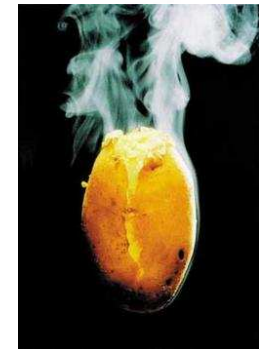
2

2

1

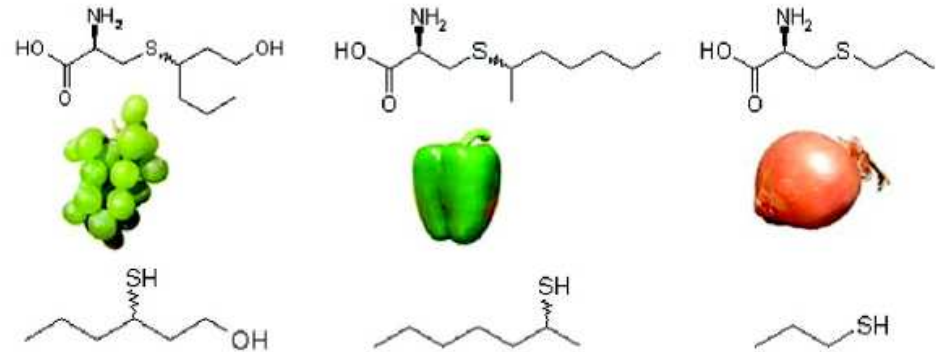
400

Soglia olfattiva in acqua
(nanogrammi/L)



I mercaptani varietali conferiscono una nota da frutta tropicale

✓ che ricorda in particolare il pompelmo ed il frutto della passiflora e la ginestra



composto

descrizione

soglia olfattiva
(*)

4-mercapto-4-metil-pentan-2-one bosso, ginestra 0,8

4-mercapto-4-metil-pentan-2-olo limone, pompelmo, passiflora 55

3-mercapto-3metil-butanolo porro cotto 1500

3-mercapto-esanolo pompelmo, passiflora, limone 60

3-mercapto-esanolo acetato bosso, pompelmo, passiflora 4

(*) nanogrammi per litro, in soluzione modello



Il rotundone è un sesquiterpene presente "in tracce" in diverse piante

Cyperus rotundus
Kapadia. et al.
Tetrahedron Lett. 1967



Agarwood
Ishihara et al.
Phytochemistry 1991



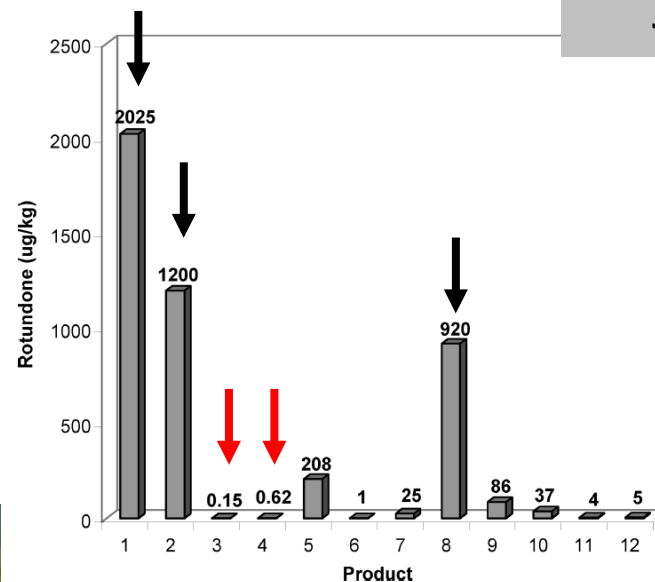
Black pepper



White pepper



*Vitis vinifera**



Origanum majorana



Thymus vulgaris



Ocimum basilicum



Rosmarinus officinalis

- Vespolina
- Schioppettino
- Gruene Veltliner
- Gropello di Revò

(Mattivi et al, RCM 2011, OICCE Times 2012, Caputi et al., JAFc 2011)

**V. Vinifera* cv. Shiraz, Durif, Mourvedre Wood C. et al. JAFc 2008

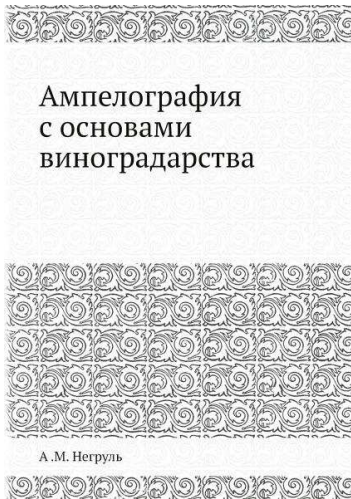
2. Le radici storiche (e genetiche) della biodiversità della vite



Antica pressa, Shivta, Negev (Israele)



Forno per cottura anfore, Telavi (Georgia)



Prof. Alexandr Mikhailovich Negrul

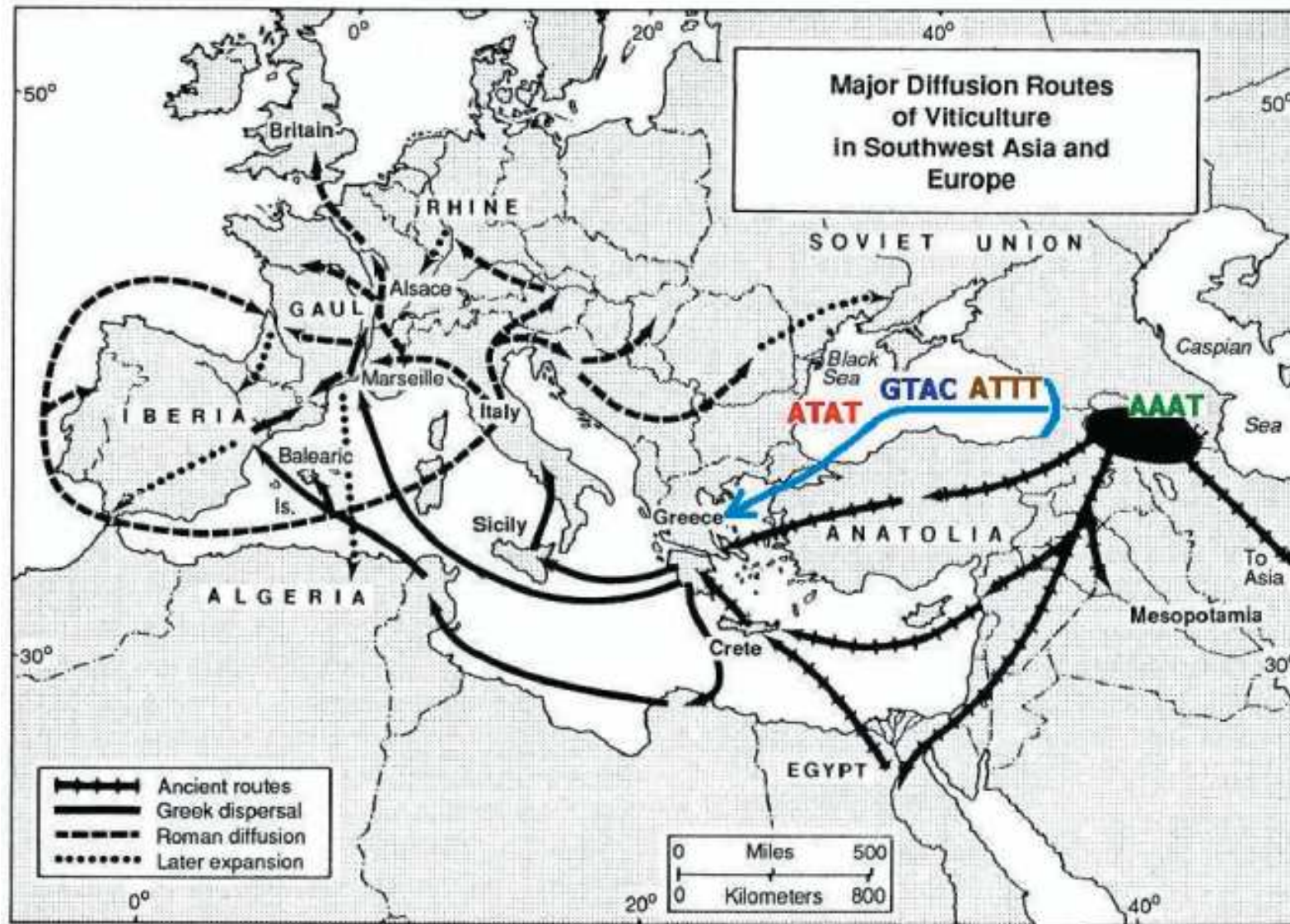
Condusse studi sulle viti aborigene dei territori asiatici dell'Unione Sovietica, dove la *Vitis vinifera* L. era presente fin dai tempi più remoti.



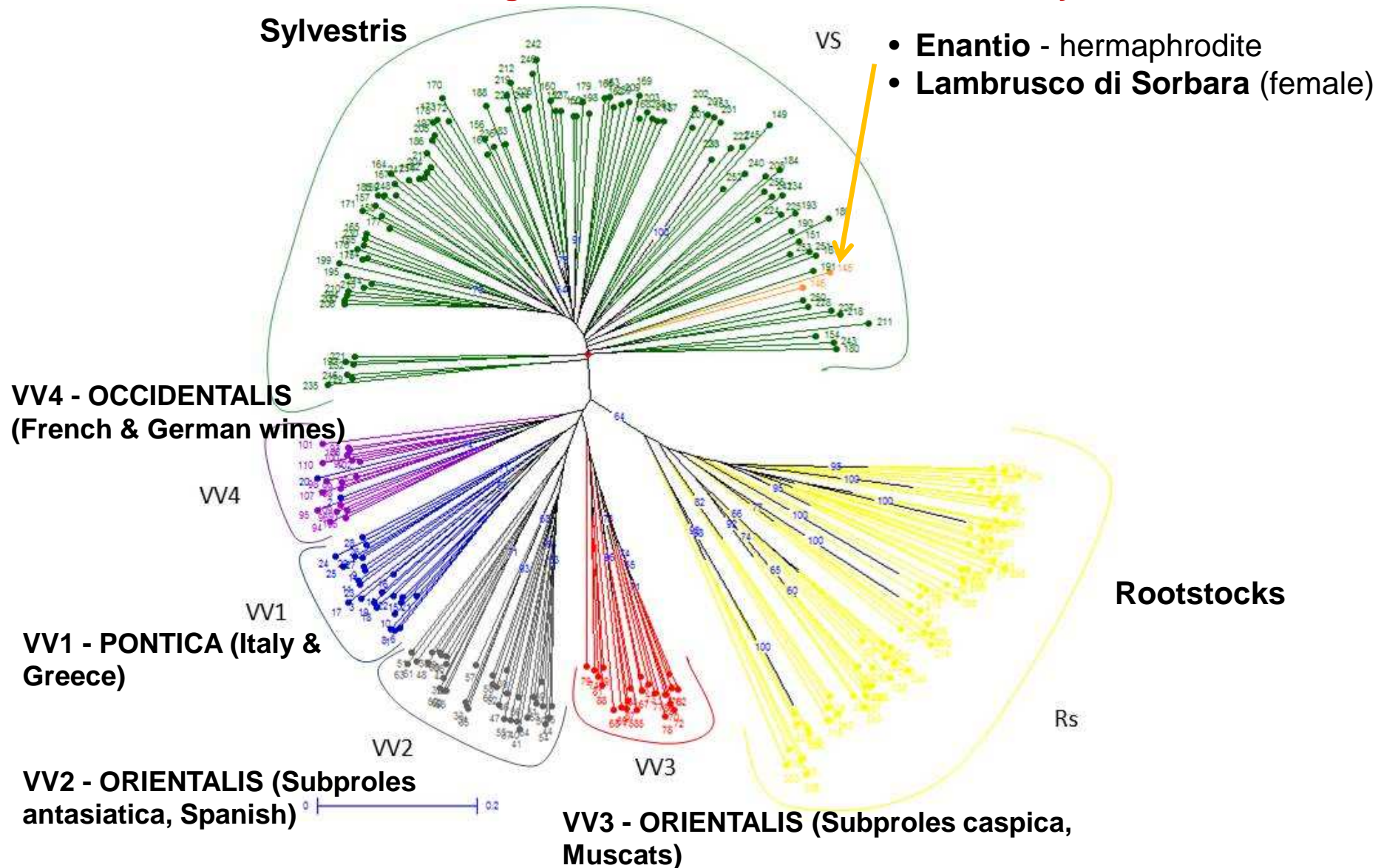
- Suggestendo una classificazione in 3 gruppi o »*proles*»:
 - ✓ ***proles pontica*** (diffusi dalla Georgia all'Asia Minore, e nei paesi dell'Oriente europeo)
 - ✓ ***proles occidentalis*** (diffusi in Italia, Francia, Penisola Iberica, Germania)
 - ✓ ***proles orientalis*** (diffusi nell'Asia centrale, Persia, Armenia, Afghanistan, etc.)

Negrul AM "Origin and classification of cultivated grape" In The Ampelography of the USSR. Baranov A, Kai YF, Lazarevski MA, Negrul AM, Palibin TV, Prosmoserdov NN. Eds. Moscow: 1946, 159–216

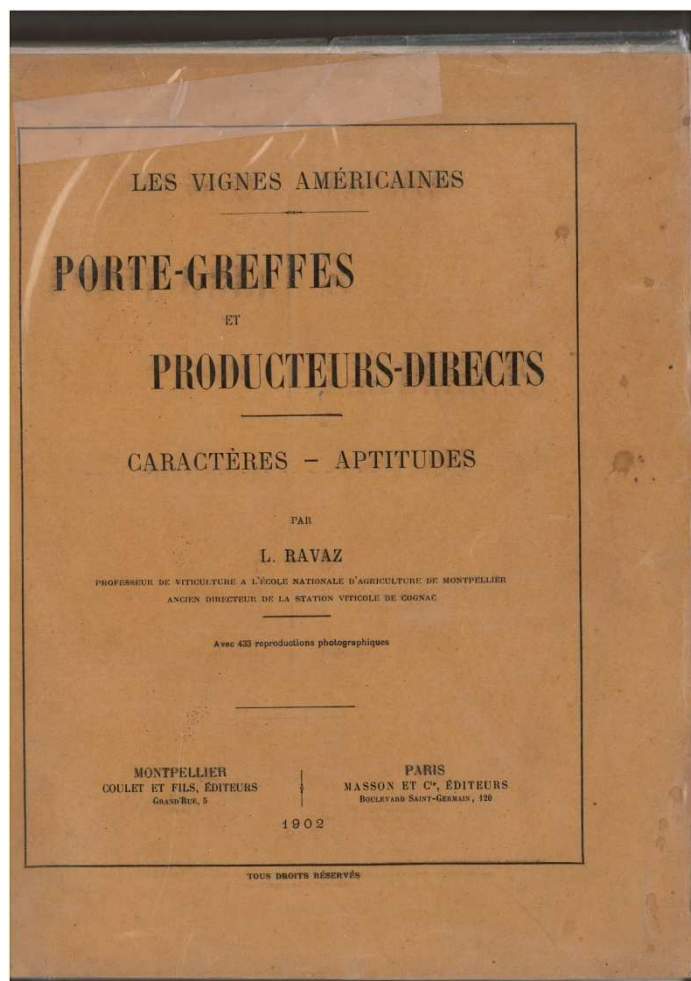
Principali vie di diffusione della viticoltura (DE BLIJ, 1983). Con aggiunta (in azzurro) la via attraverso il Mar nero



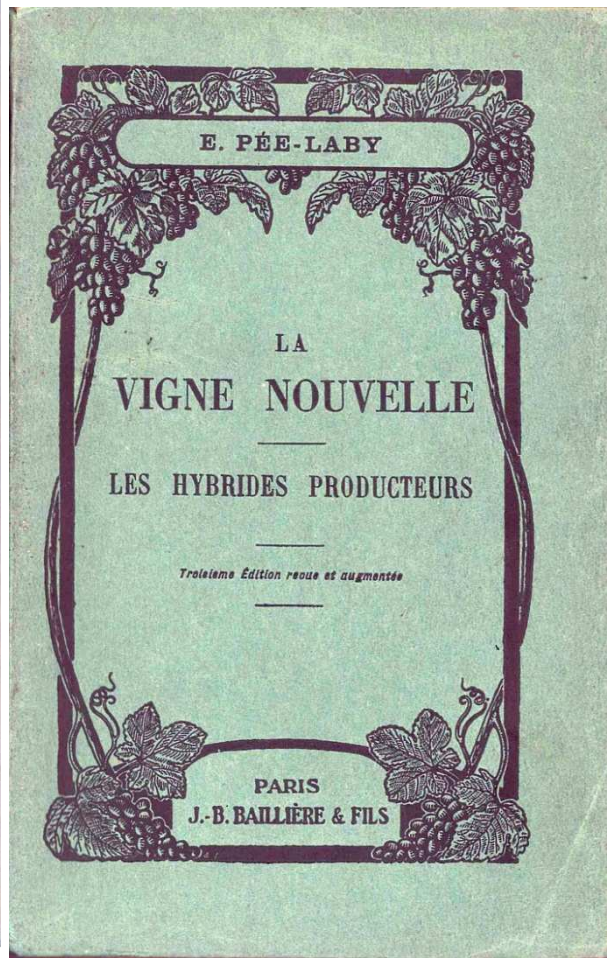
Neighbour-joining dendrogram based on simple matching dissimilarity matrix calculated from the dataset of 22 SSRs across 330 genotypes clustered through the hierarchical STRUCTURE analysis



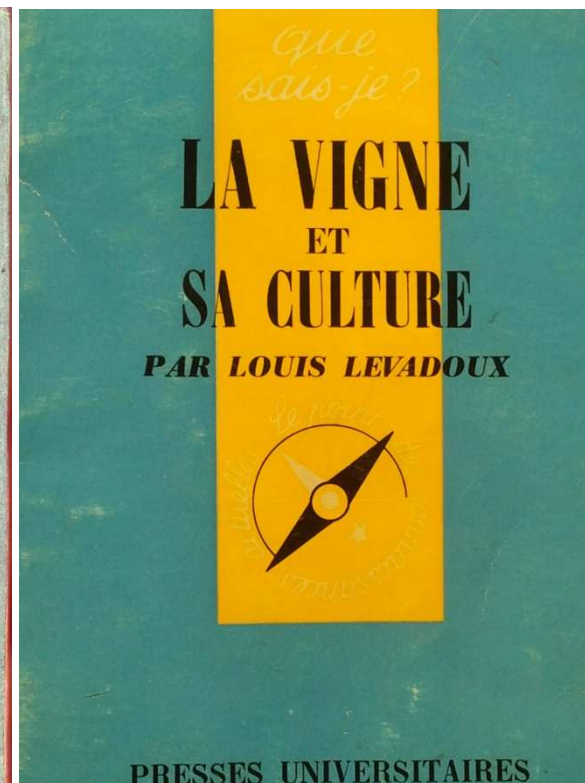
3. I patogeni americani e la sfida della sostenibilità... un percorso interrotto



Ravaz (1902)



Pée-Laby (1929)



Levadoux (1961)

1960-2010... anni persi ?

...c'entra la chimica?

VITICULTEURS, PROPRIÉTAIRES, FERMIERS
*Produisez en quantité du très bon Vin rouge ou blanc
pour la consommation bourgeoise*

à **25** Centimes le Litre

En cultivant des
HYBRIDES PRODUCTEURS
:: DIRECTS ::

*C'est une assurance contre la baisse menaçante des prix
et une garantie de production régulière*

60 VARIÉTÉS les MEILLEURES
Boutures et Racinés
AUTHENTICITÉ GARANTIE

Notice et Prix-Courant adressés sur demande à
M. J.-F. RAVAT, Ingénieur Civil des Mines
à **MARCIGNY (S.-et-L.)**

VIGNES AMÉRICAINES
Grande production de Boutures greffables et Pépinières
Racinés premier choix. Greffés soudés. Producteurs directs
AUTHENTICITÉ GARANTIE

MAISON
ROQUE d'ORBCASTEL
PROPRIÉTAIRE
à **BELLOC, par ALZONNE (Aude)**

Pépinières sous le contrôle de l'Etat

PLANTS DE VIGNES
Boutures -:- Racinés -:- Greffés

STATION D'ESSAIS D'HYBRIDES PRODUCTEURS

LÉON CROUZAT, Viticulteur
TÉLÉPHONE 6-32 **CARCASSONNE (Aude)** TÉLÉPHONE 6-32

*accepte de donner toute garantie d'authenticité
que désire l'acheteur*

Pépinières et Plantations sous le contrôle phytopathologique

On peut visiter toute l'année — Greffage par souscription

**GRANDES
PÉPINIÈRES de VIGNE du POITOU**

Les Grandes Pépinières de Vigne du Poitou doivent
leur renommée à la parfaite authenticité et à la
sélection de leurs plants.

MAISON DE CONFIANCE FONDÉE EN 1894
Grande Spécialité de Producteurs Directs Nouveaux
CHAMPS D'EXPÉRIENCES
Envoi du Prix-Courant sur demande

A. MAGNON & FILS AINÉ
Officier du Mérite Agricole, Propriétaires-Viticulteurs
POITIERS

Alcune varietà ibride
interessanti coltivate in
Francia (1964):

- ✓ **Colobel** (8357 S.)
- ✓ **Chambourcin** (26-205 J.S.)
- ✓ **Landal** (244 L.)
- ✓ **Plantet** (5455 S.)
- ✓ **Rubilande** (11803 S.)
- ✓ **Seyval** (5-276 S.V.)
- ✓ **Seinoir** (8745 S.)
- ✓ **Varounet** (23-657 S.V.)
- ✓ **Villard blanc** (12-375 S.V.)
- ✓ **Villard noir** (18-315 S.V.)

4. Comprendere e misurare la complessità: il **metaboloma** della vite

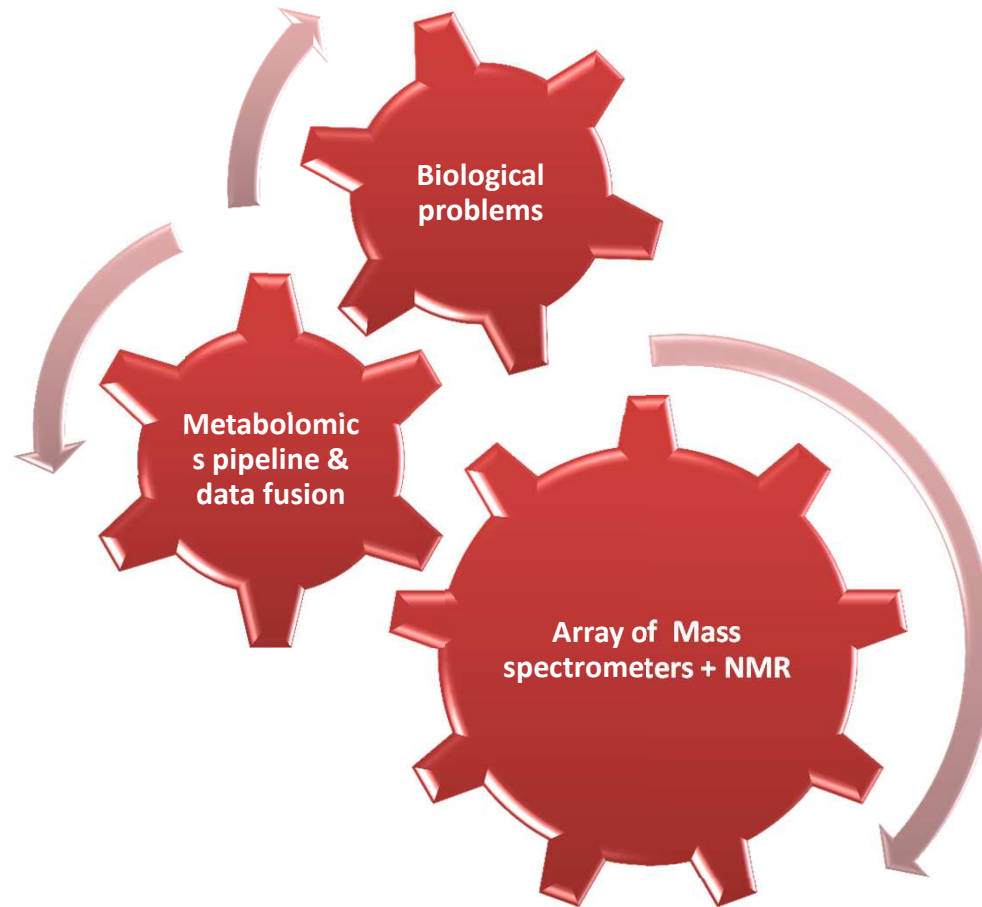
“Untargeted metabolomics”



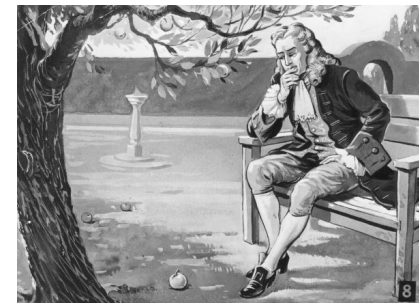
“Targeted metabolomics”



Mutua interdipendenza & interdisciplinarietà



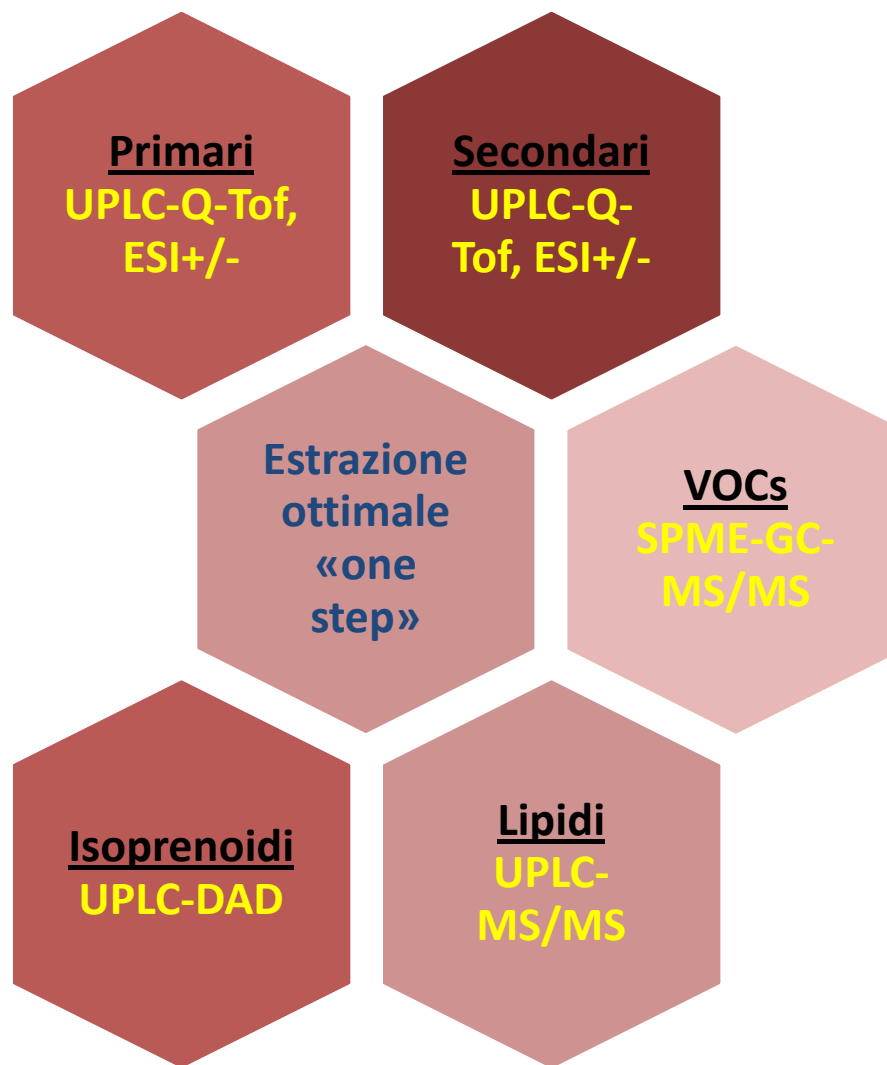
... non accessibile al ricercatore isolato!



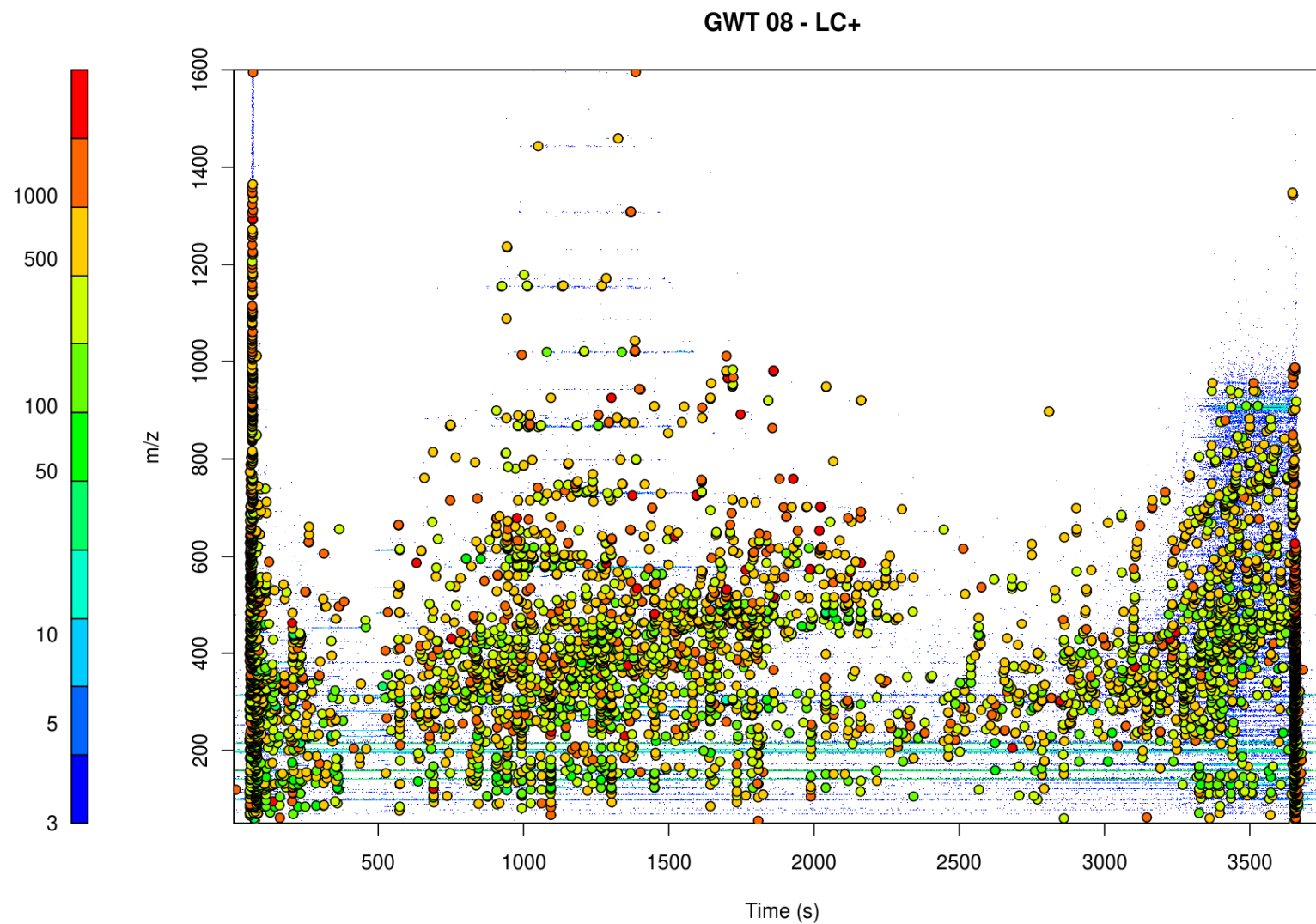
Progetto metaboloma dell'uva: protocolli complementari



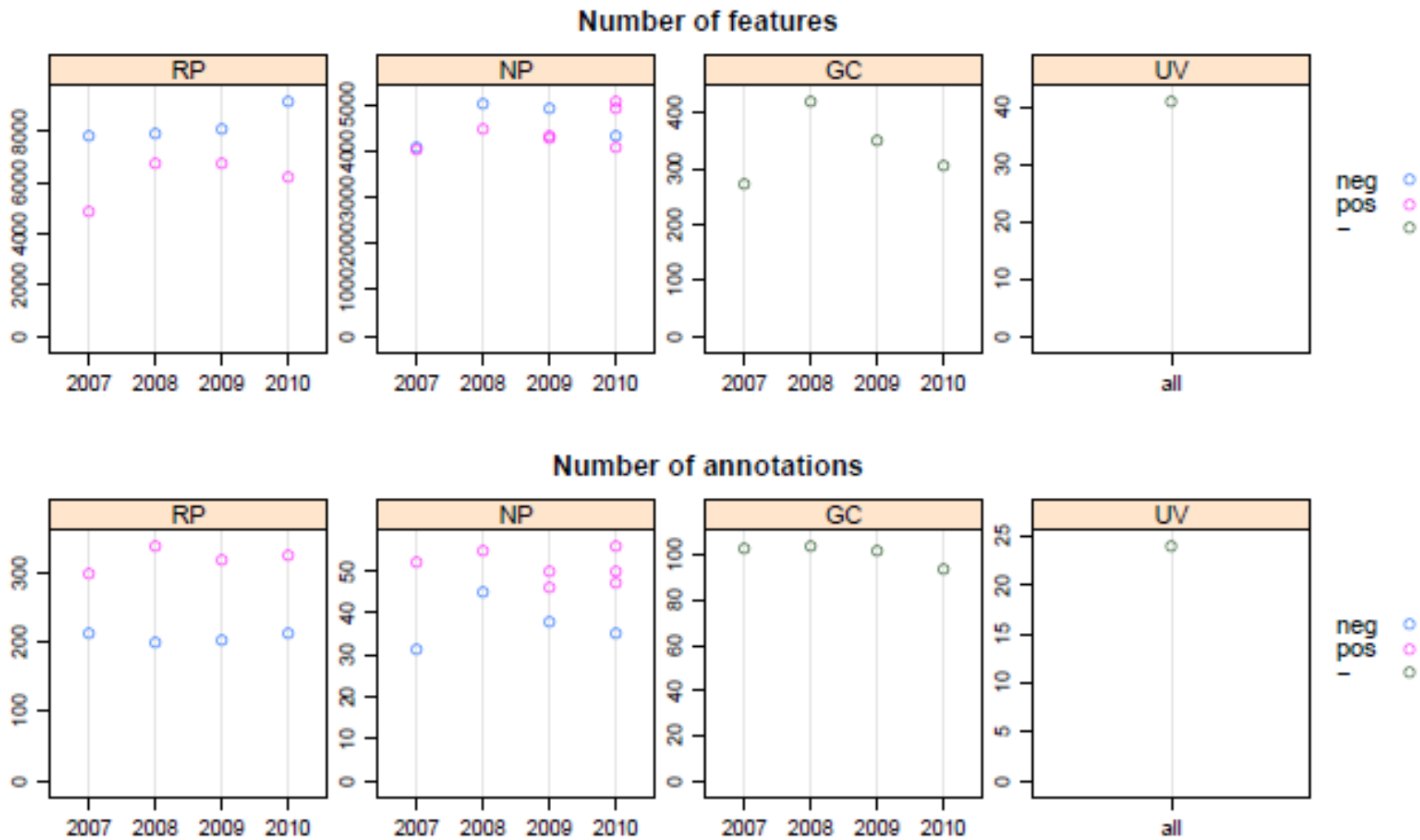
- 400+ varietà di vite
- Librerie MA in-house (ca. 800 standard)



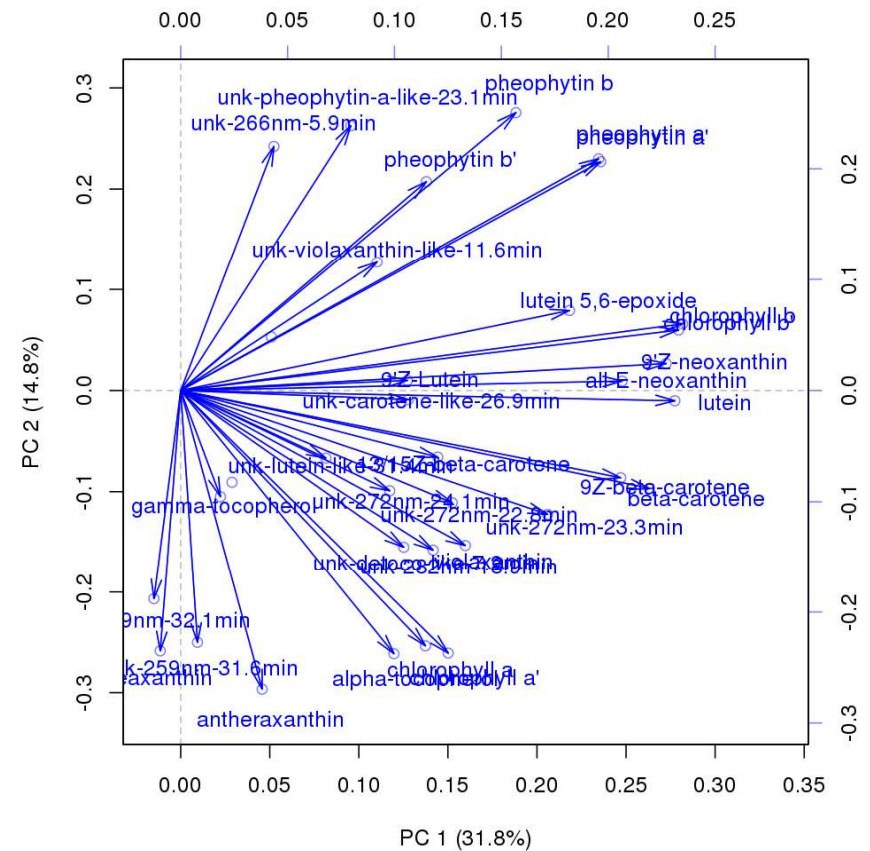
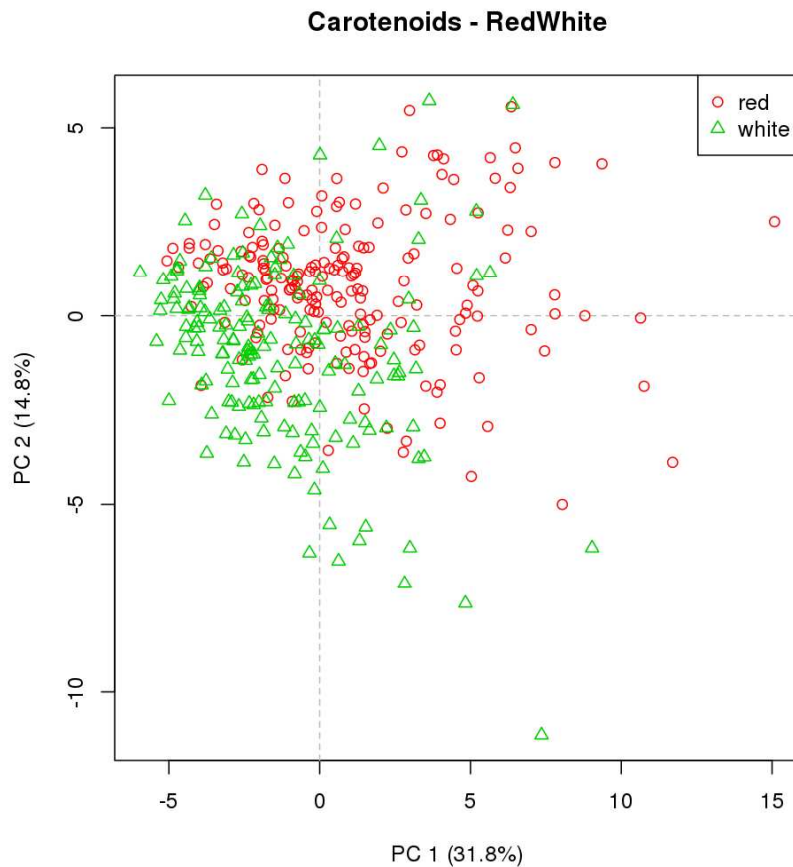
Estrazione delle "features"



Metaboloma dell'uva: risultati del processo (provvisori)



Ora è possibile **interrogare i dati** in cerca delle differenze tra i gruppi...



VitisCyc: le mappe metaboliche della *Vitis vinifera* (cortesia di Sushma Naithani)

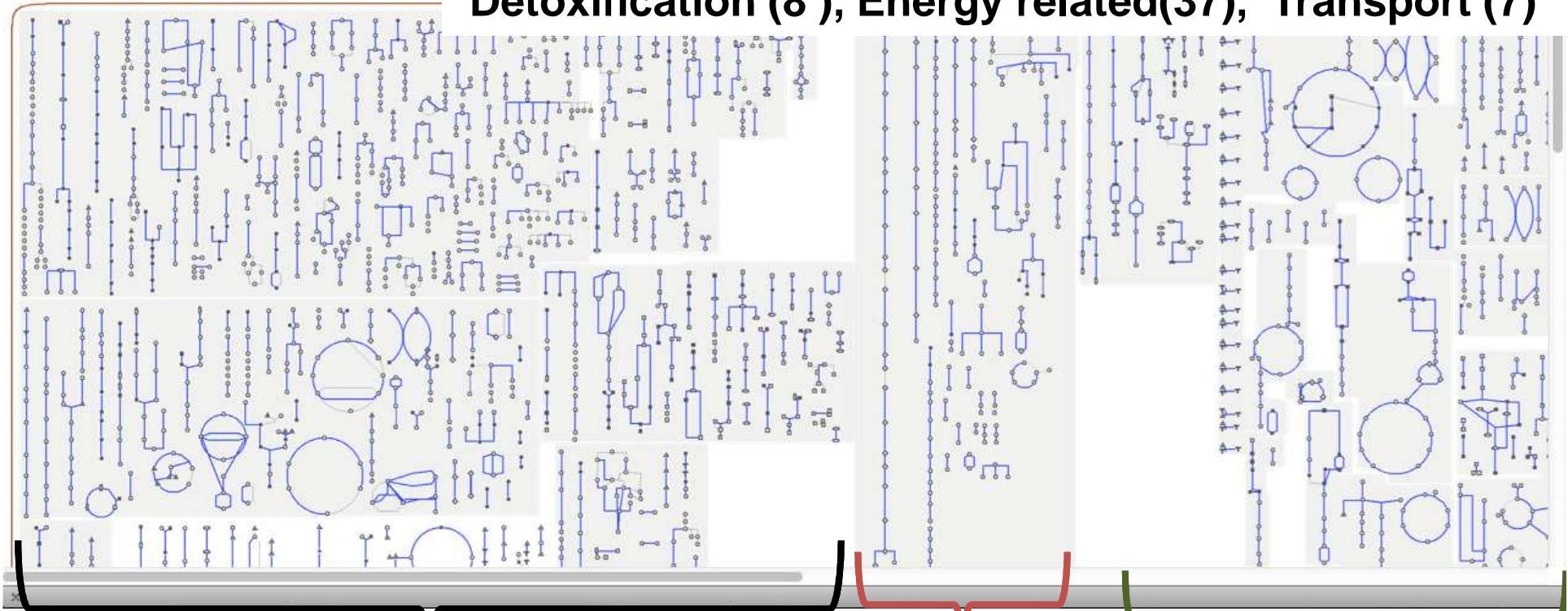
Home Search Tools Help

Note: there is a new Cellular Overview Implementation, please see new Cellular Overview. The new Cellular Overview of the *Vitis vinifera* Metabolic Map

Overview of the *Vitis vinifera* Metabolic Map

This diagram provides a schematic of all pathways of *Vitis vinifera* metabolism. Nodes represent metabolites, with shapes

- [Instructions](#)
- [Omics Viewer: Paint omics data onto this diagram](#)
- [Species Comparison: Highlight reactions shared with other organisms](#)



Super-pathways (54): Biosynthesis (376),
Degradation/Utilization/Assimilation (154),
Detoxification (8), Energy related(37), Transport (7)

Biosynthesis

**Generation of
Precursor Metabolites
and Energy**

Degradation

Grazie!



BASILICA DI SANTA MARIA
MAGGIORE - BERGAMO

