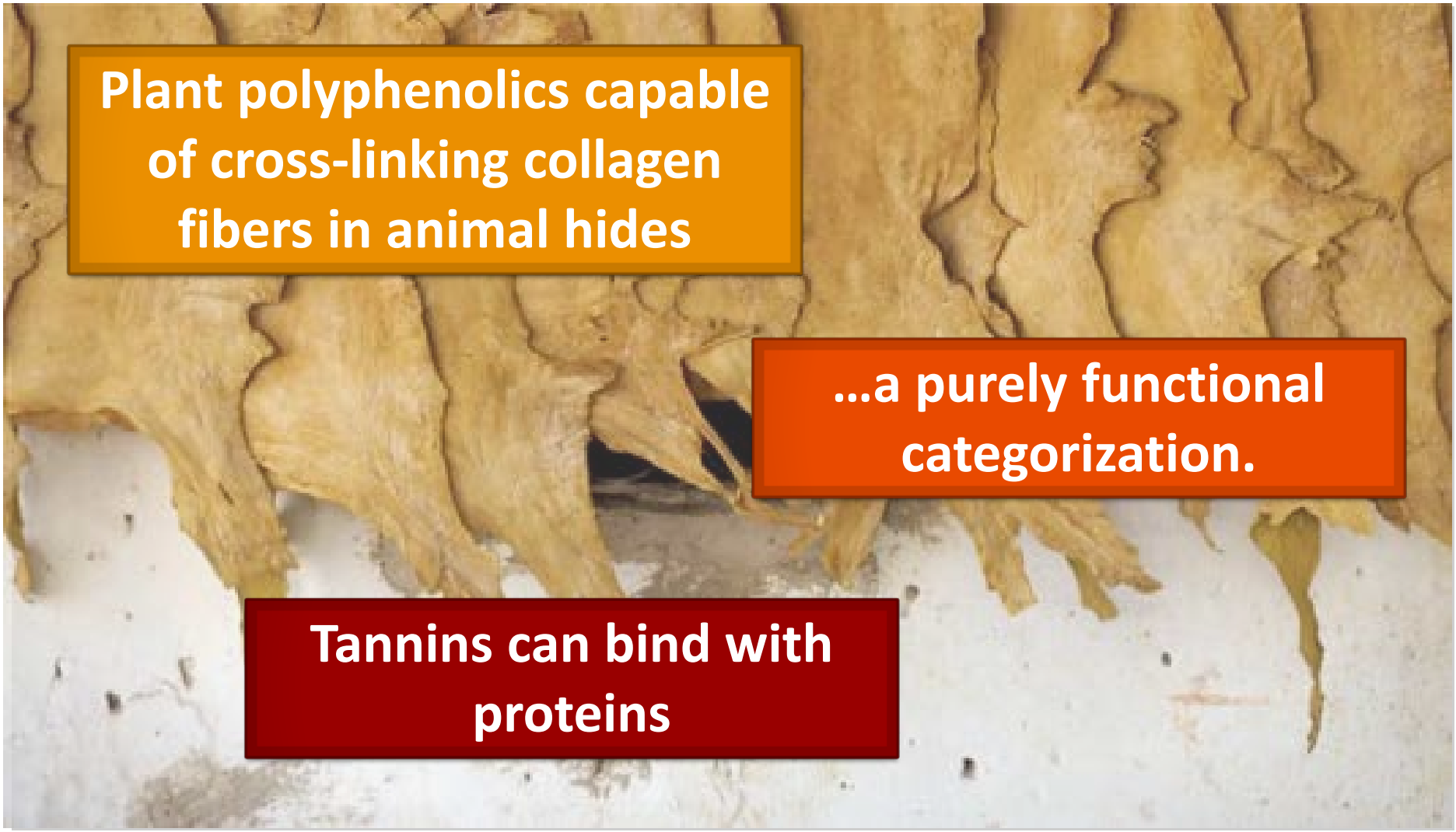
BUILDING THE PERFECT BODY

Tannin Strategies for Red Hybrid Wines

Anna Katharine Mansfield
Associate Professor of Enology
Cornell Enology Extension Lab

WHAT ARE TANNINS?



Plant polyphenolics capable of cross-linking collagen fibers in animal hides

…a purely functional categorization.

Tannins can bind with proteins


SKINS
CONDENSED
TANNINS

CONDENSED TANNINS

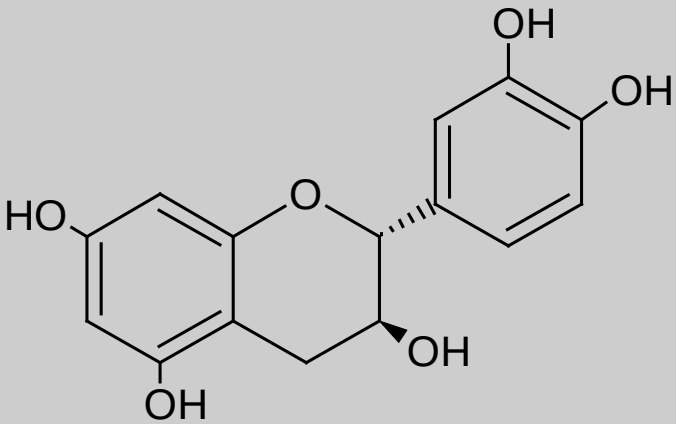
LOTS OF TANNIN!

Very hard to extract.

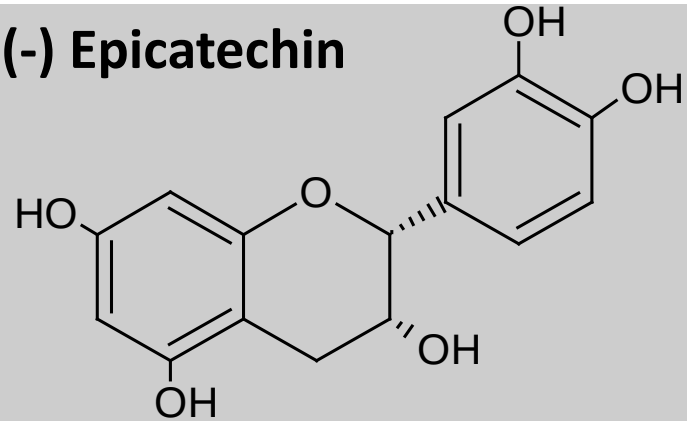
SKIN TANNINS DOMINATE IN WINE

FLAVAN-3-OLS

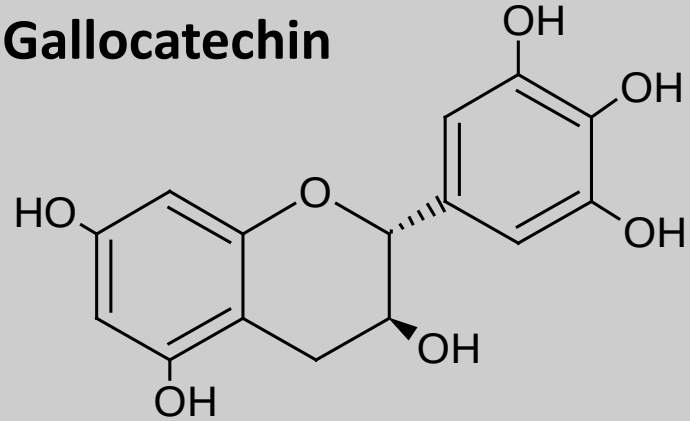
(+) Catechin



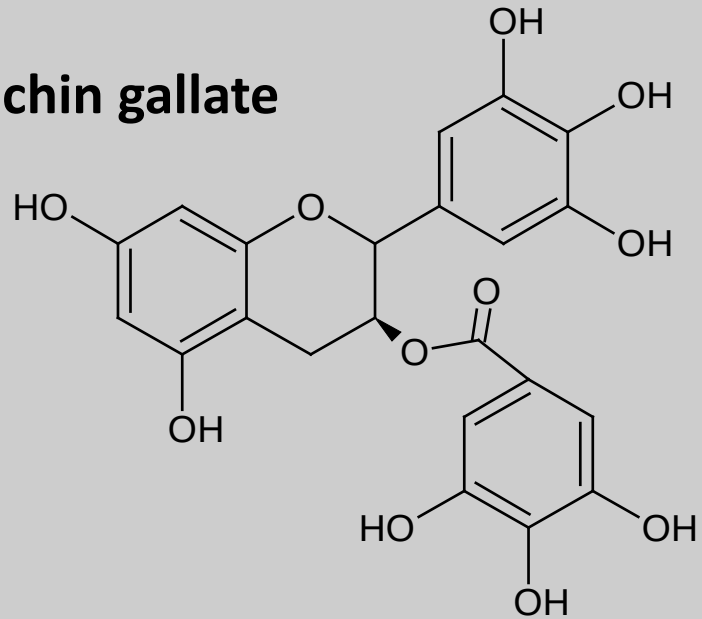
(-) Epicatechin



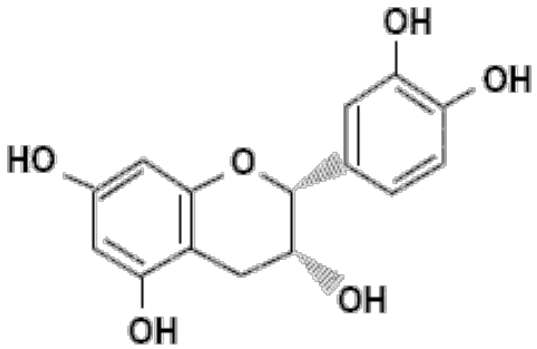
Gallocatechin



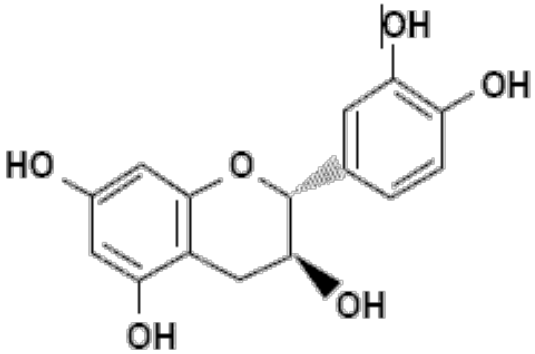
Gallocatechin gallate



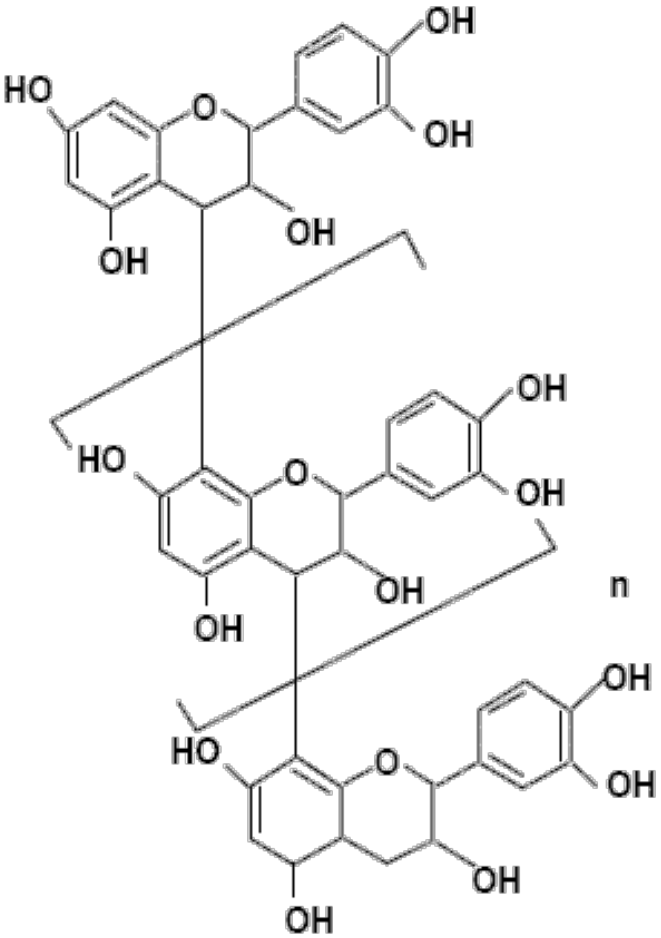
CONDENSED TANNINS



epicatechin



catechin



Condensed Tannin

CONDENSED TANNINS

CONDENSED TANNINS

Mean
Degree of
Polymerization

HYDROLYSABLE TANNINS

HYBRID WINE IS LOW IN TANNIN

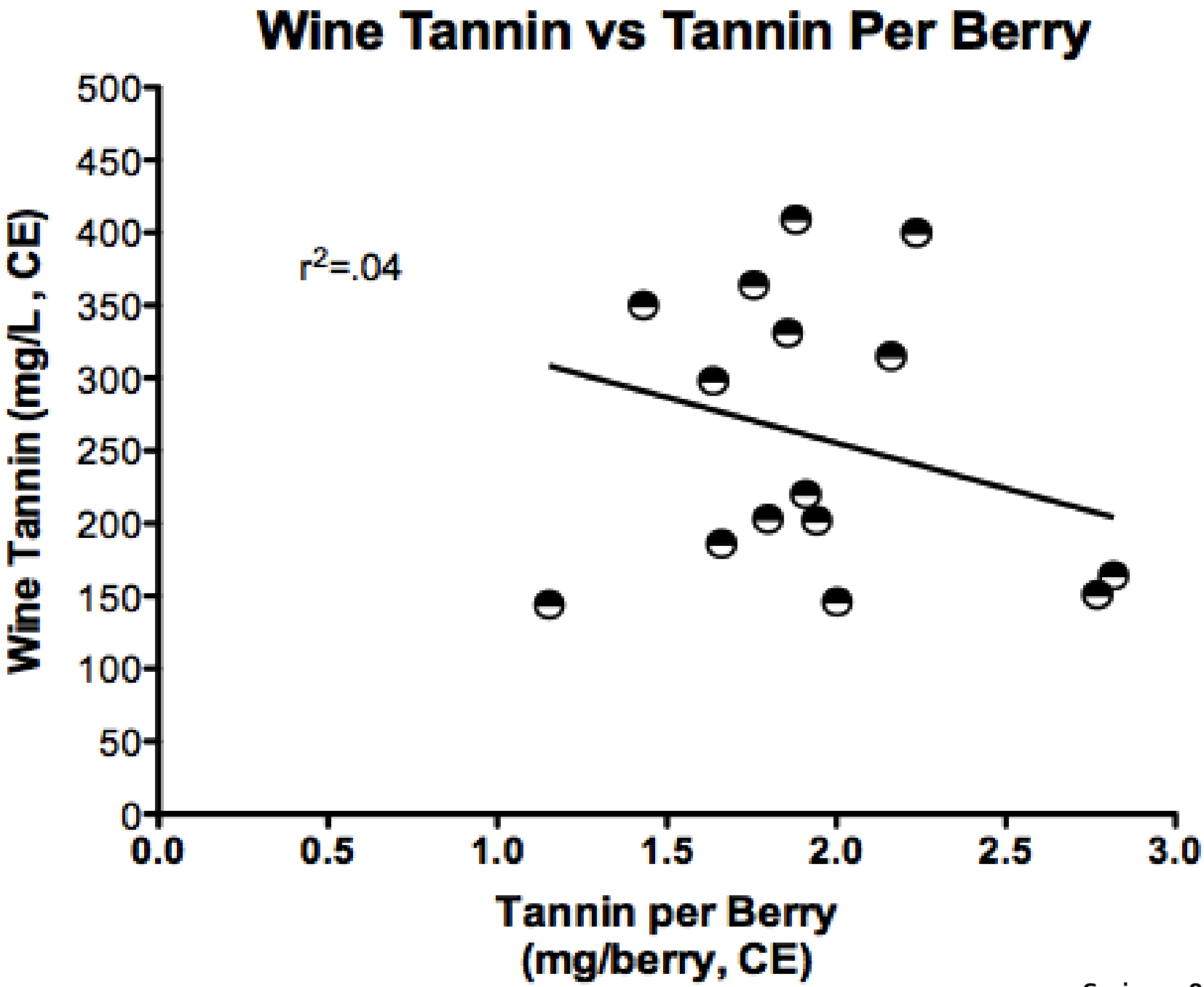
...& TANNINS ARE SMALL (mDP)

Corot noir	Maréchal Foch	Marquette
3.21	2.62	2.26

V. vinifera
7-13

HYBRID GRAPES HAVE LOWER TANNIN?

TANNIN PER BERRY



Springer & Sacks

≠


CABERNET SAUVIGNON
LEMBERGER
MARECHAL FOCH
WINE TANNIN / GRAPE TANNIN
X 100
TANNIN EXTRACTABILITY

TANNIN BINDING

2. DEFEAT SORPTION

1. ADD TANNIN

TANNIN ADDITIONS

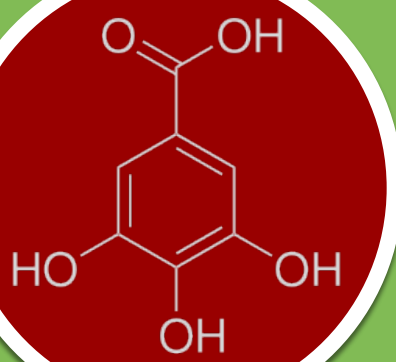
WINE TANNINS

CONDENSED	HYDROLYSABLE
Grape derived	Wood derived
tannin:protein = 20:1	tannin:protein = 40:1
Temperature independent	Temperature ↑ binding
Ethanol independent	Ethanol ↓ binding
Potential for color stabilization activity	No known potential for color stabilization

Harbertson et.al. Vit 2010

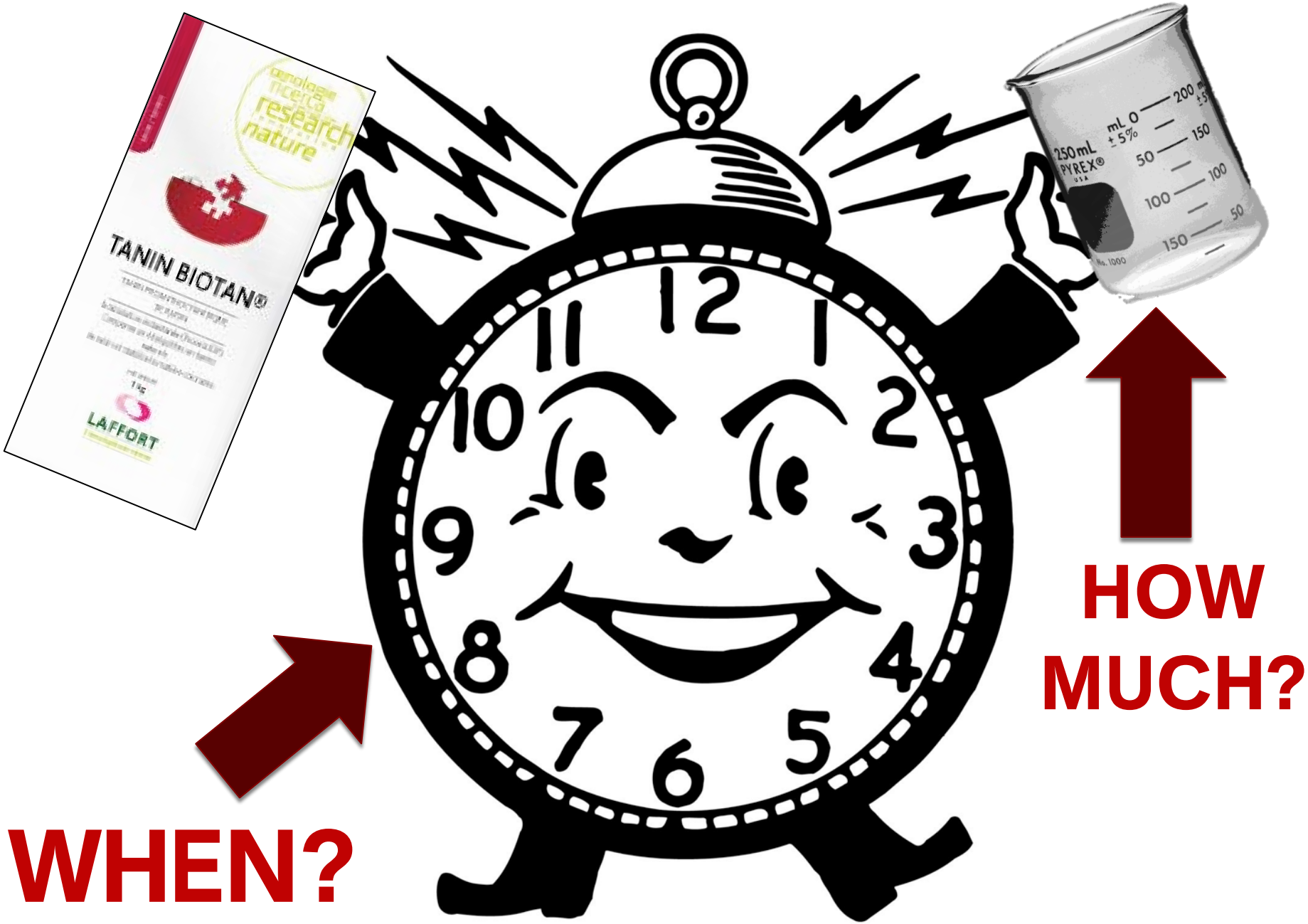
<50%

ACTIVITY?



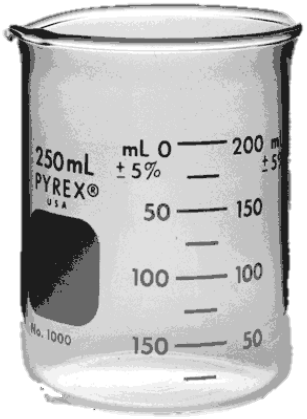
Processing aids

SENSORY?

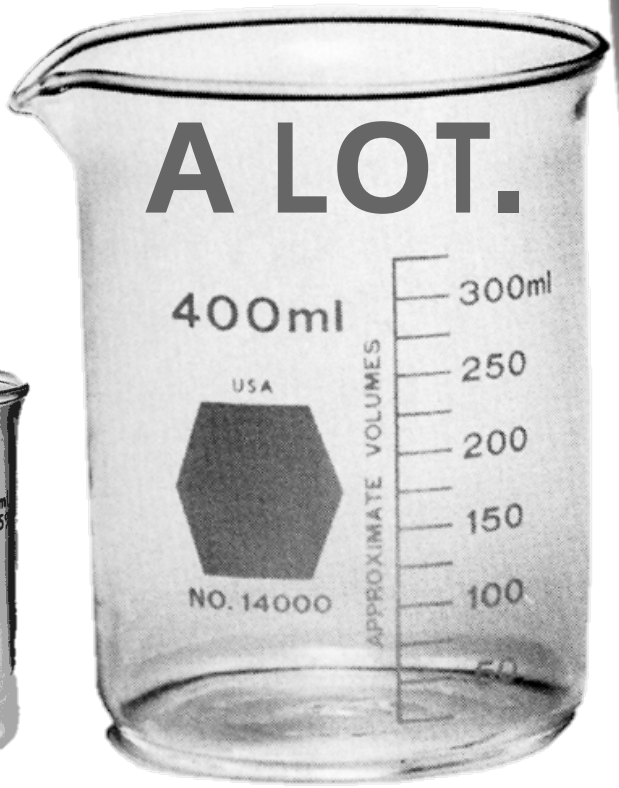

research
nature
TANIN BIOTAN®
LAFFORT
250mL
PYREX®
HOW MUCH?
WHEN?


enologia
ricerca
research
nature
TANIN BIOTAN®
LAFFORT

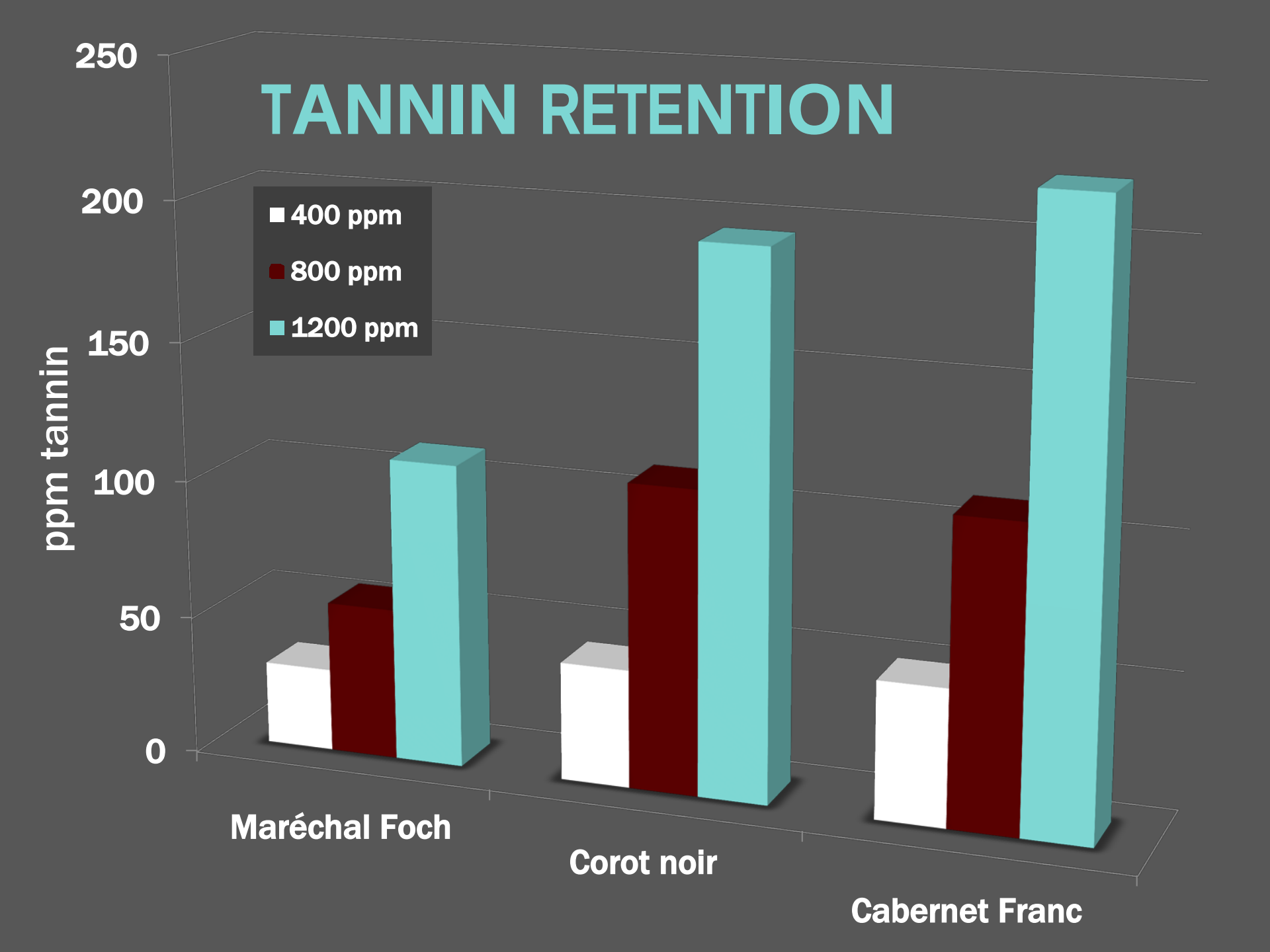
HOW MUCH?



A LOT.



MAYBE A WHOLE LOT.


TANNIN RETENTION
ppm tannin
250
200
150
100
50
0
400 ppm
800 ppm
1200 ppm
Maréchal Foch
Corot noir
Cabernet Franc


*except in Corot noir
400ppm & 800ppm
NO SENSORY DIFFERENCES*

WHEN?

EARLY ADDITIONS ALLOW WINE COMPONENTS TO 'INTEGRATE'

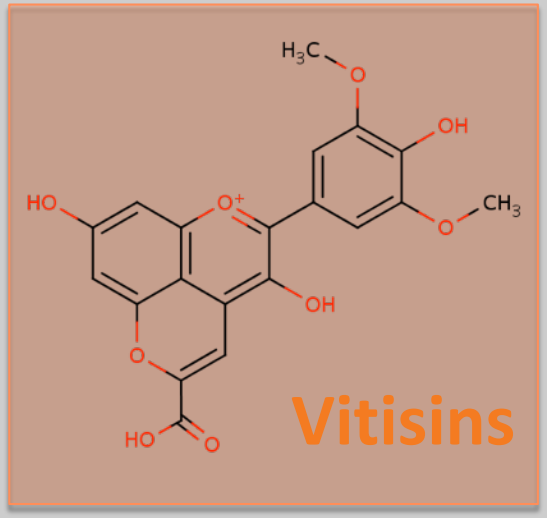
LATER ADDITIONS
=
GREATER RETENTION

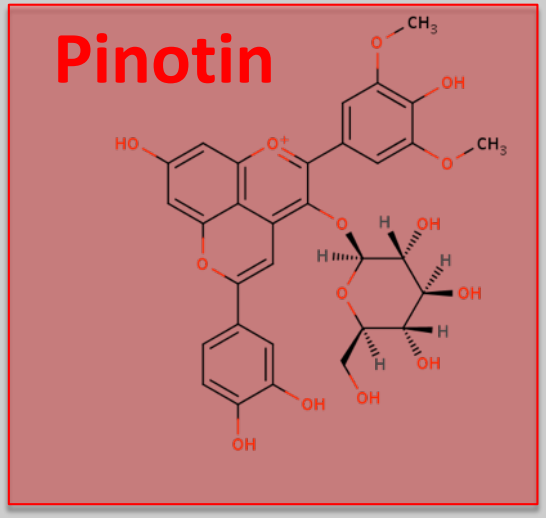

1. FERMENT RED WITHOUT TANNIN ADDITION
2. FERMENT RED AS WHITE +TANNINS
3.BLEND


White + & blend
+ 400ppm
Sensory difference in Corot noir,
but not Maréchal Foch or Cab Franc

COLOR STABILITY

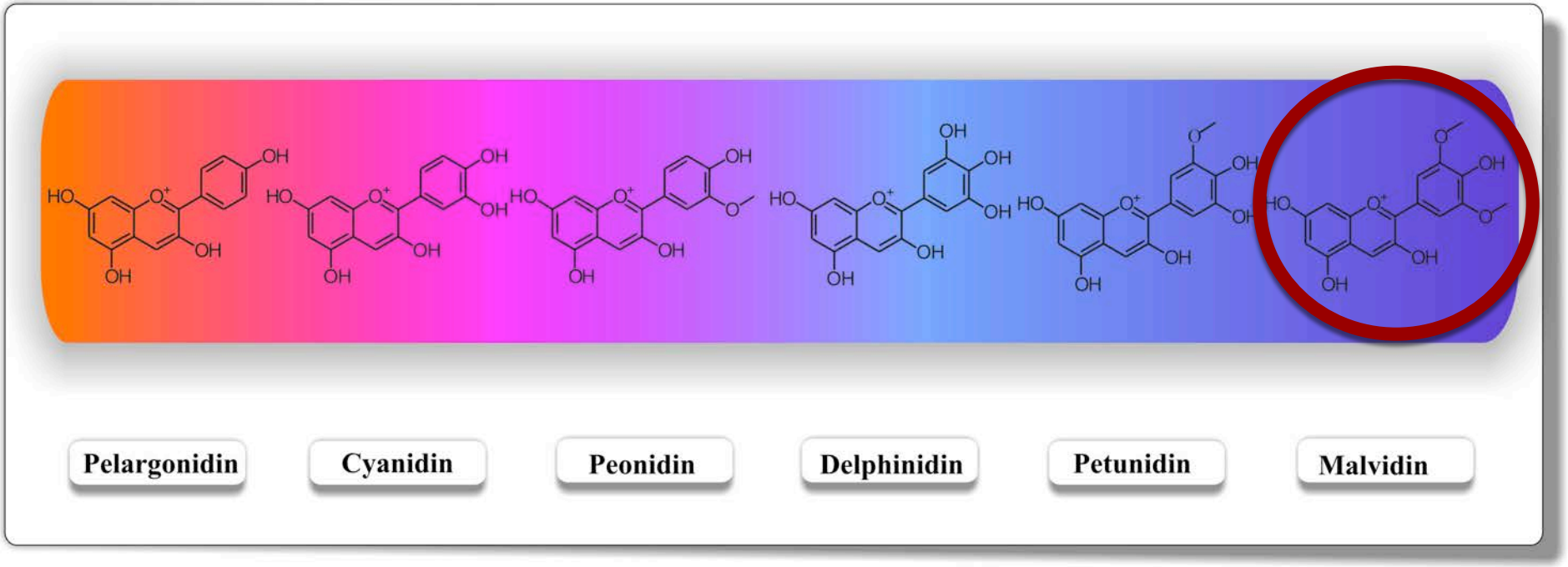
POLYMERIC PIGMENTS



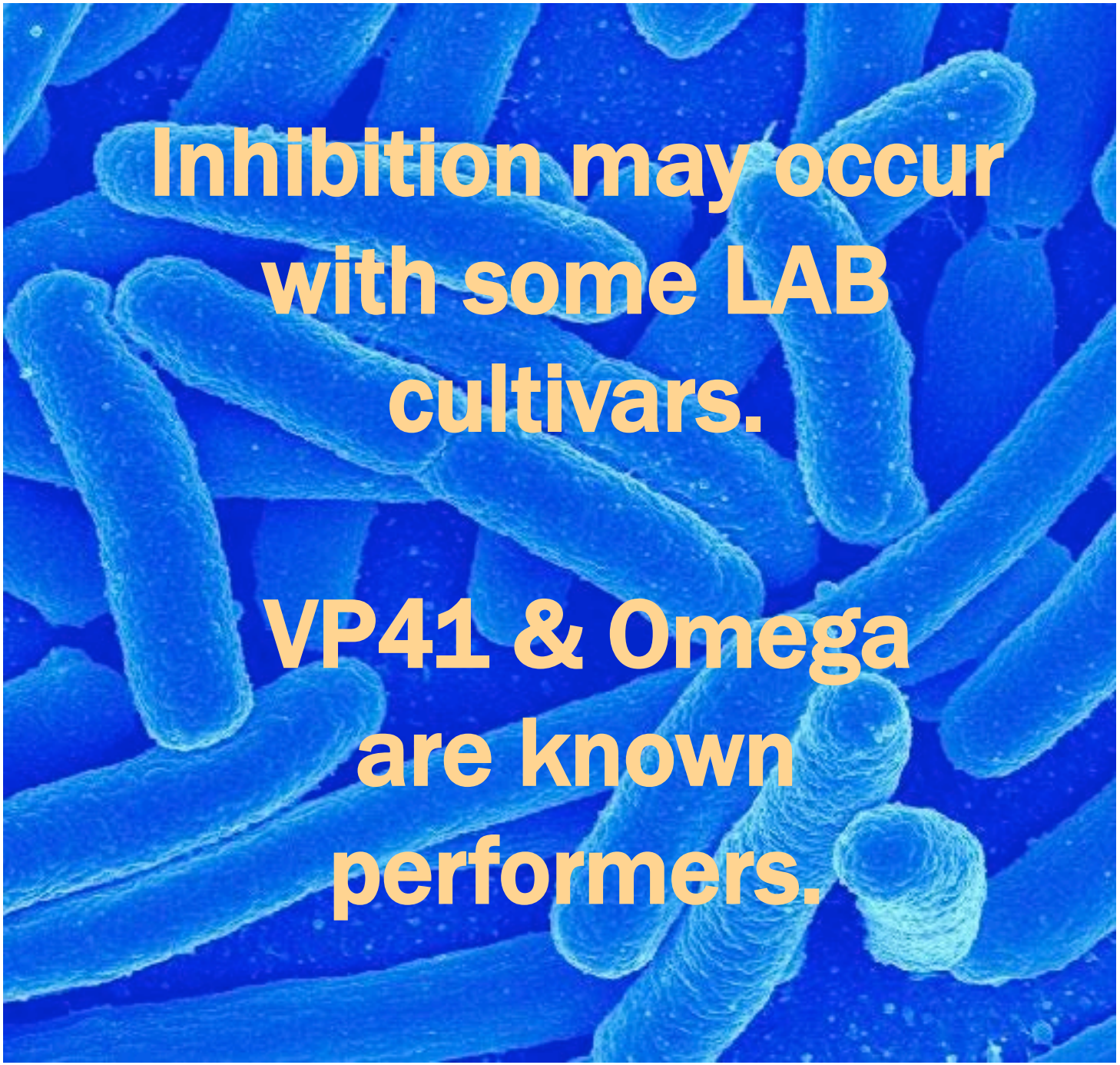


Tannin-Anthocyanin & Anthocyanin-Tannin Adducts

POLYMERIC PIGMENTS



MONOGLUCOSIDES (PRIMARILY MALVIDIN)

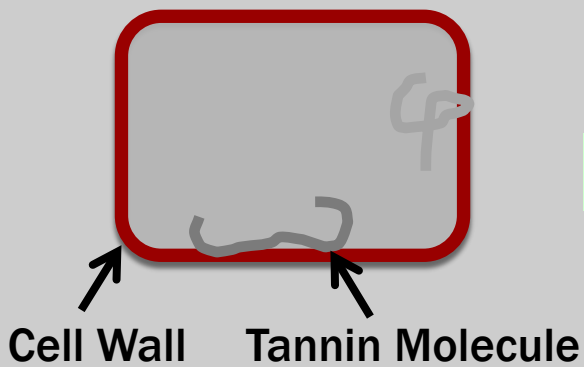


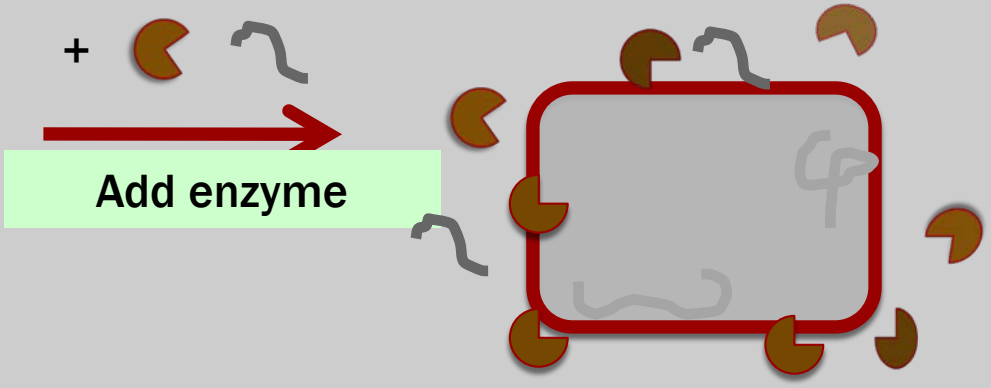
Inhibition may occur with some LAB cultivars.

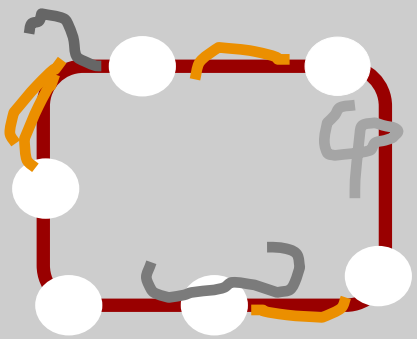
VP41 & Omega are known performers.

MLF

WHAT ABOUT ENZYMES?



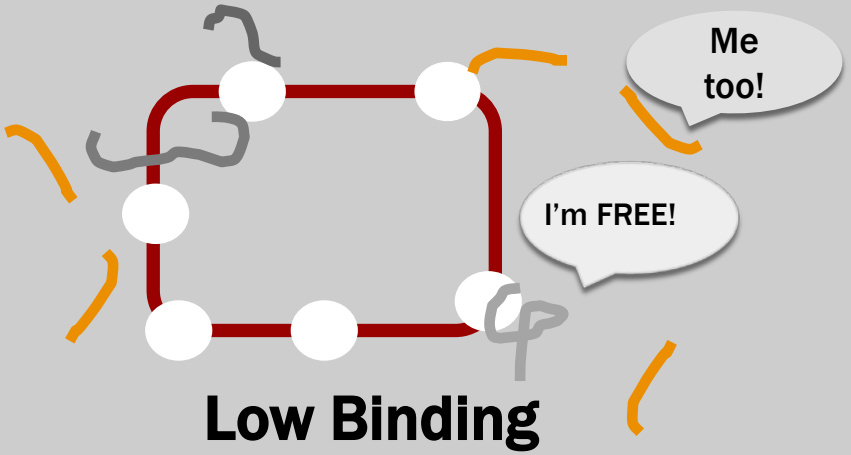




High Binding

Tannin remains bound to insoluble cell wall materials

Or...



Low Binding

Tannin leaves the insoluble cell wall and enters wine

Illustration by Lindsey Springer

TANNIN BOOST?

TYPICAL ADDITION RECOMMENDATIONS

Type	Fermentation	Cellaring	Finishing
Addition	Grapes at crusher or during first pumpover	During racking; 3-6 weeks prior to bottling	3-6 weeks prior to bottling
Goals	Color stabilization Mouthfeel/structure Antioxidant	Color stabilization Mouthfeel/structure	Mouthfeel/structure Flavoring agent

- **Condensed tannins best for color stabilization at fermentation**
- **Hydrolyzable may promote fuller mid-palate and softer mouthfeel (lower, slower protein interaction)**

HYBRID ADDITION RECOMMENDATIONS

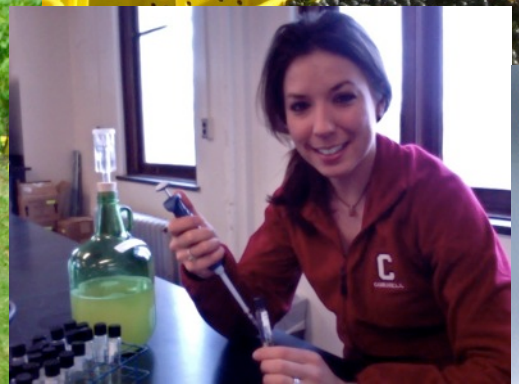
Type	Fermentation	Cellaring	Finishing
Addition	Grapes at crusher or during first pumpover	During racking; 3-6 weeks prior to bottling	3-6 weeks prior to bottling
Goals	Color stabilization Mouthfeel/structure Antioxidant	~~Color stabilization~~ Mouthfeel/structure	Mouthfeel/structure Flavoring agent

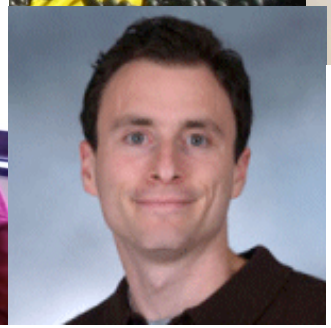
- ~~Condensed tannins best for color stabilization at fermentation~~
- Hydrolyzable may promote fuller mid-palate and softer mouthfeel (lower, slower protein interaction)

TANNIN STRATEGIES

- Add tannins as late as possible
- Avoid additions right before MLF
- Double or triple addition rate…
- …but do your research!

ACKNOWLEDGEMENTS





GRAPE & WINE QUALITY
EASTERN U.S. INITIATIVE

QUESTIONS?