

Lavender Distillation: Beyond the Basics

Physical Realities
& How to Cope

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RavenCroft





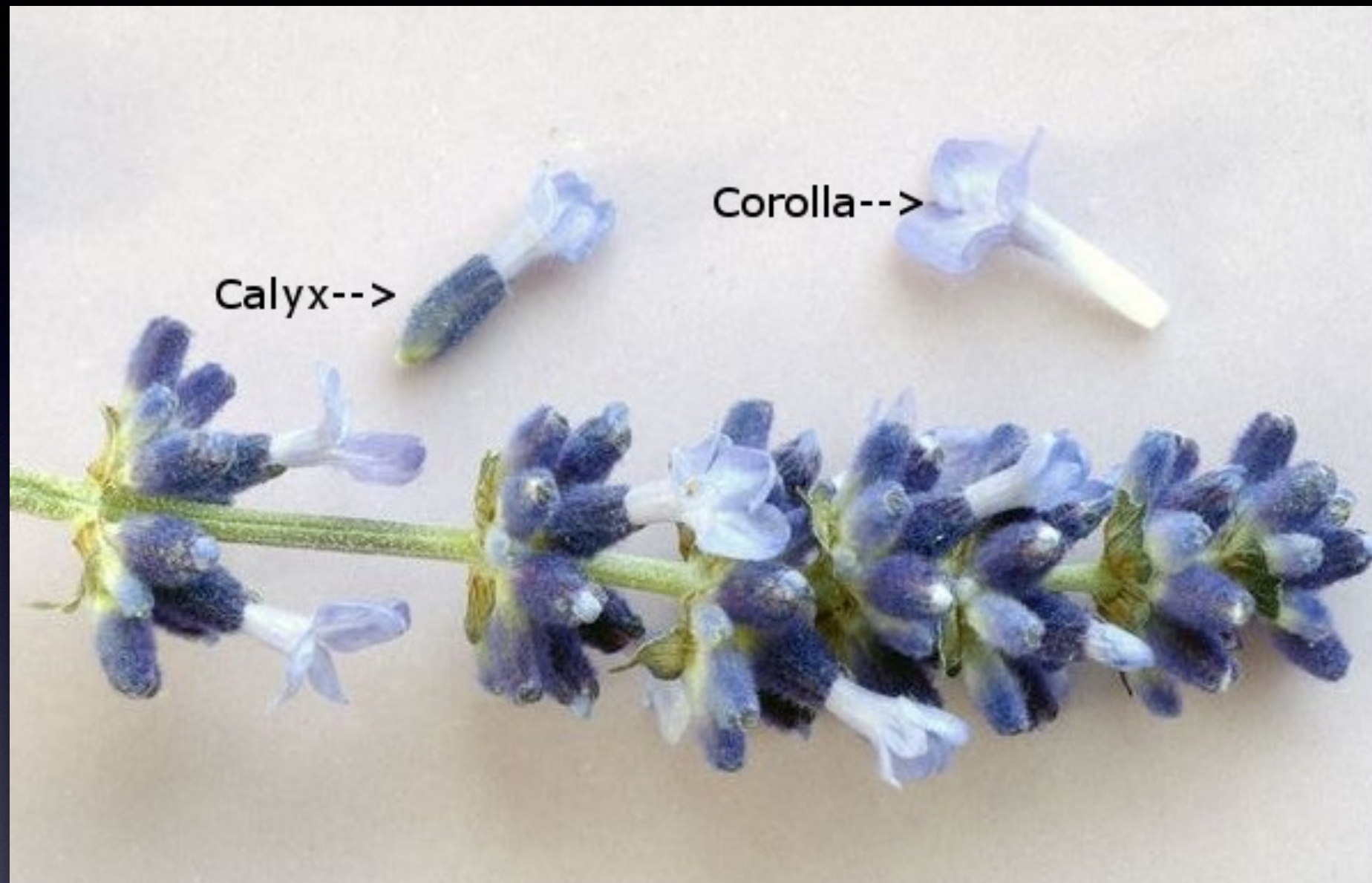
Biomass Fundamentals



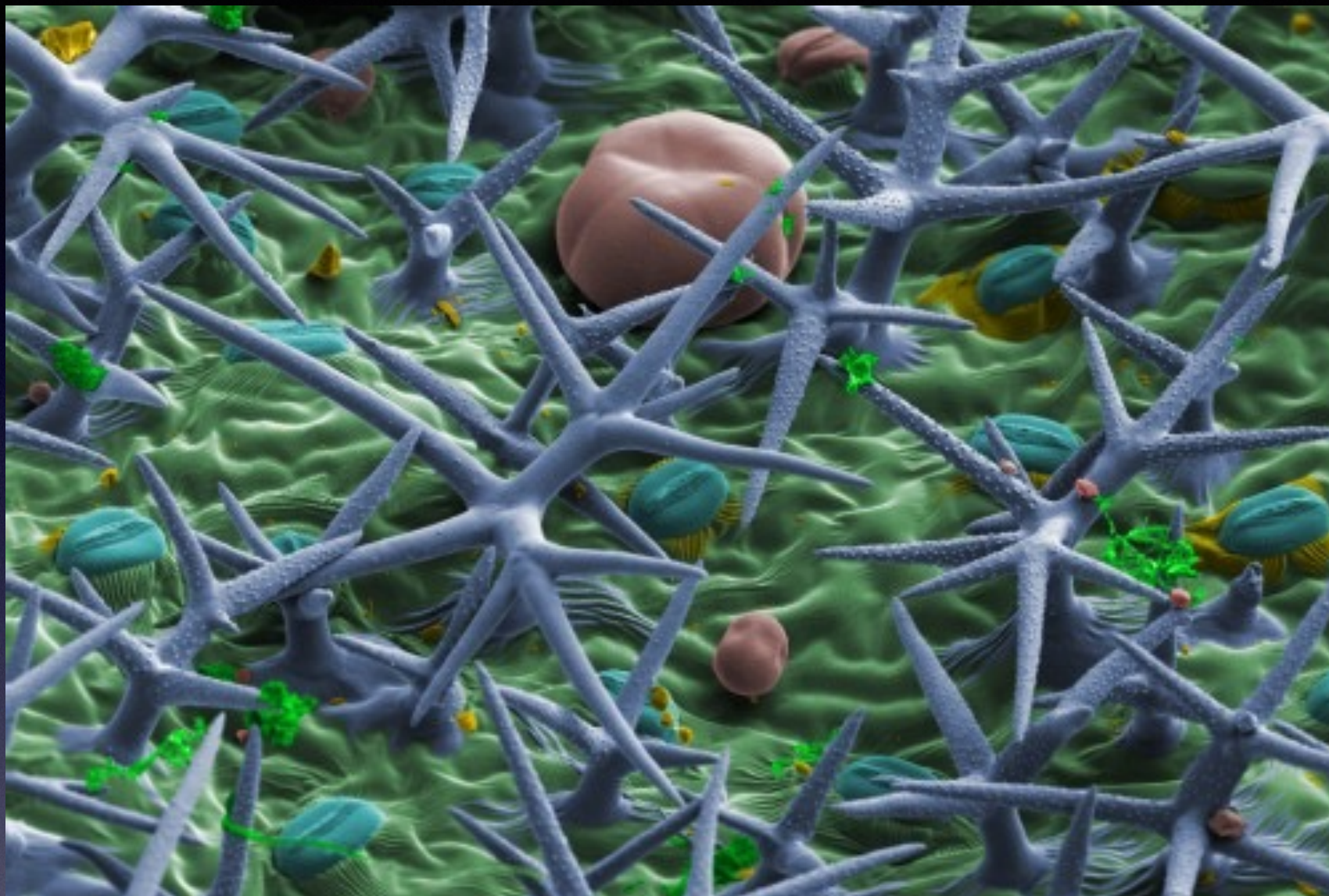
Start here



Prepare the biomass



“Buds”: Flower vs. Calyx



Oil “glands”



Notable “Oil” Varieties (LA)

Avice Hill
Bouquet
Buena Vista
Egerton Blue
Frances
Maillette
Melissa

Miss Katherine
No. 9
Opal Rain
Pacific Blue
Royal Velvet
Violet Intrigue
Wyckoff



Notable “Oil” Hybrid Varieties

LXI

Abrialis
Bogong
Grosso
Jaubert
Riverina Alan
Riverina Thomas
Sumian

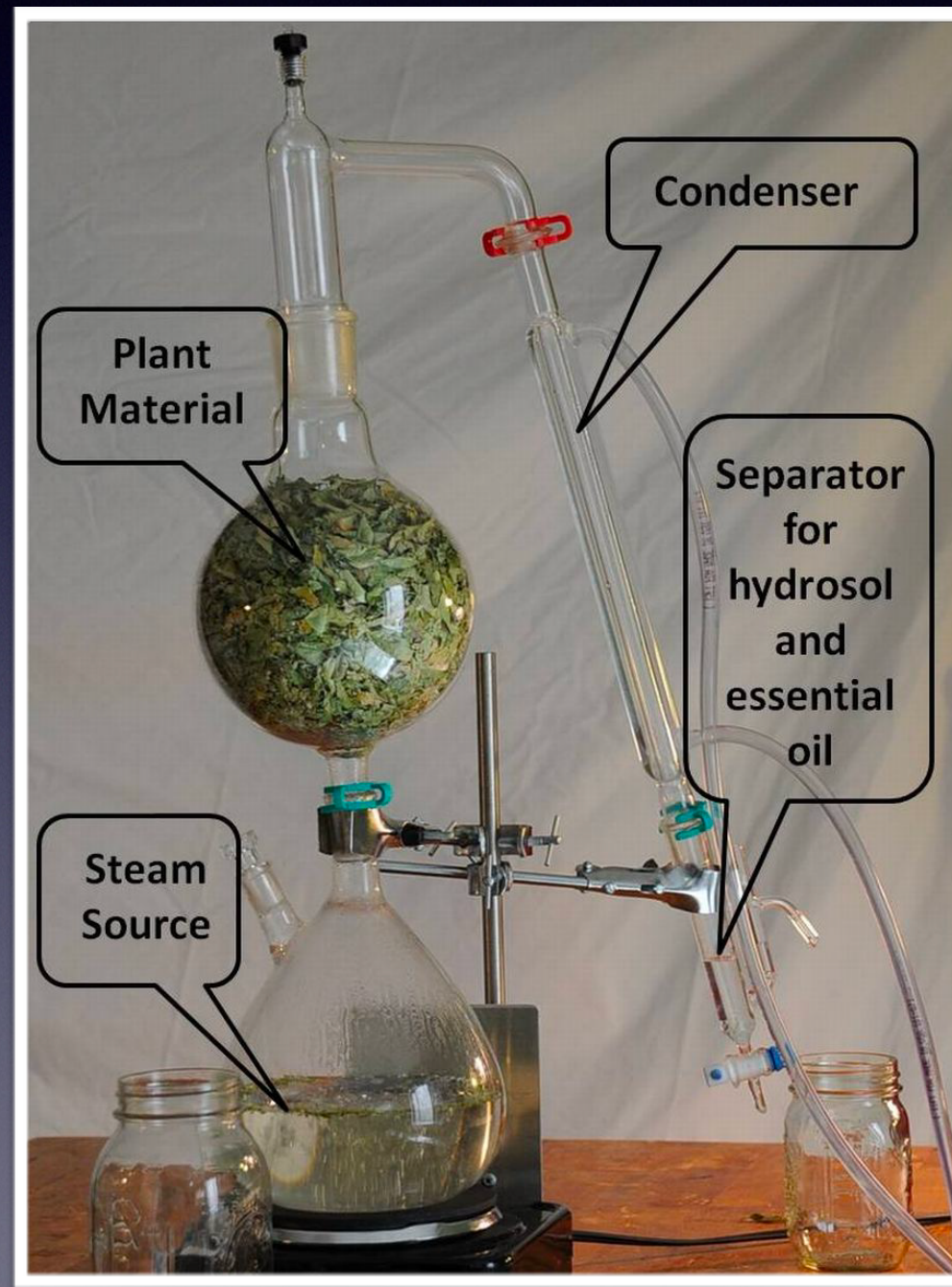
Super
Sussex

LXC

Ana Luisa
Isabel
Jennifer
Silver Frost

Steam Distillation of Lavender

Quick Review of the Basics





Typical lavender still



KEY CONCEPT:
Heat Exchange

HEAT

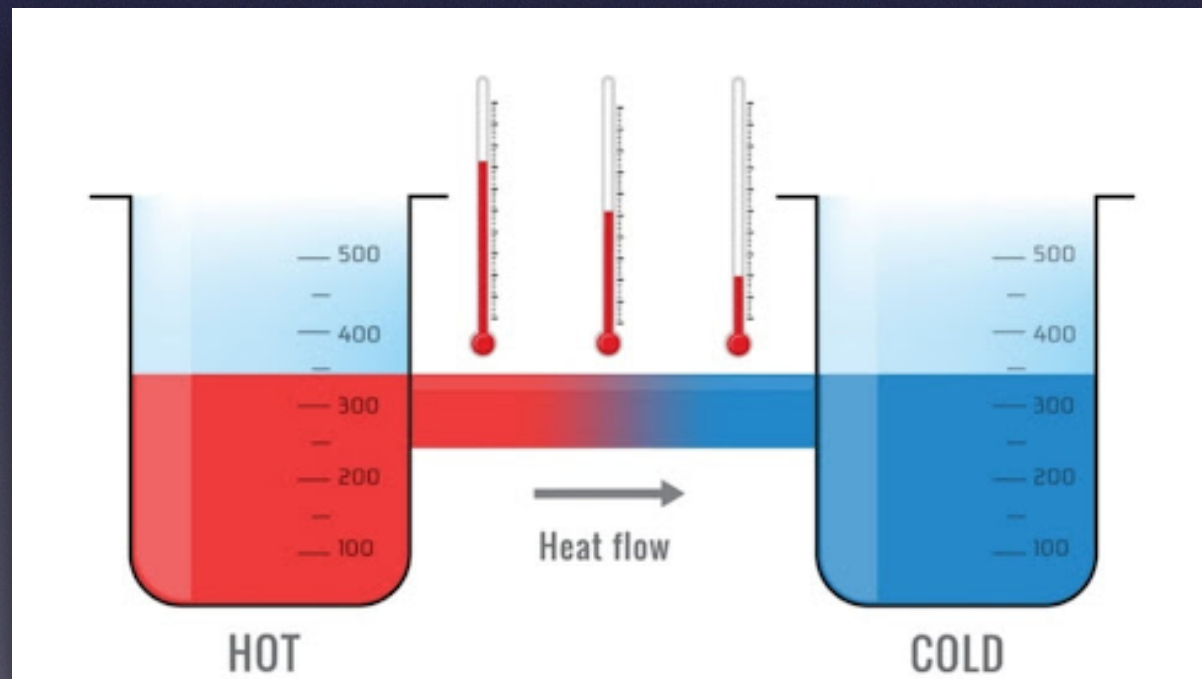
Asset



PHYSICAL PRINCIPLE

Heat increases the kinetic energy of molecules and the rate of transition into the gaseous phase.

PHYSICS EXERCISE



PHYSICAL PRINCIPLE

Fourier's Law
of heat conduction

$$Q = -kA[dT/dx]$$

PRACTICAL IMPLICATIONS

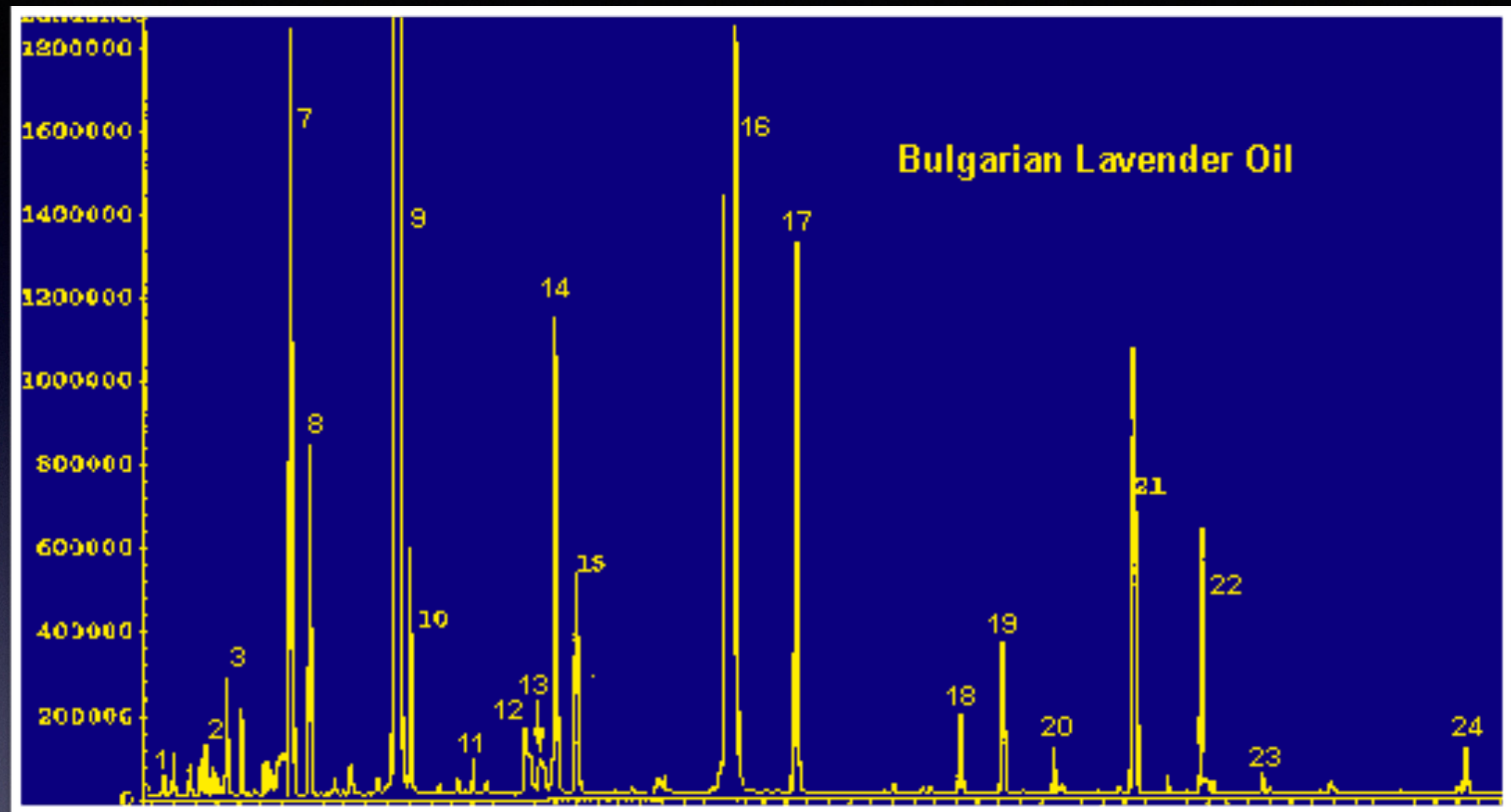
1. Assure a steady heat supply.
2. Assure declining pressure gradients.
3. Minimize energy escape.



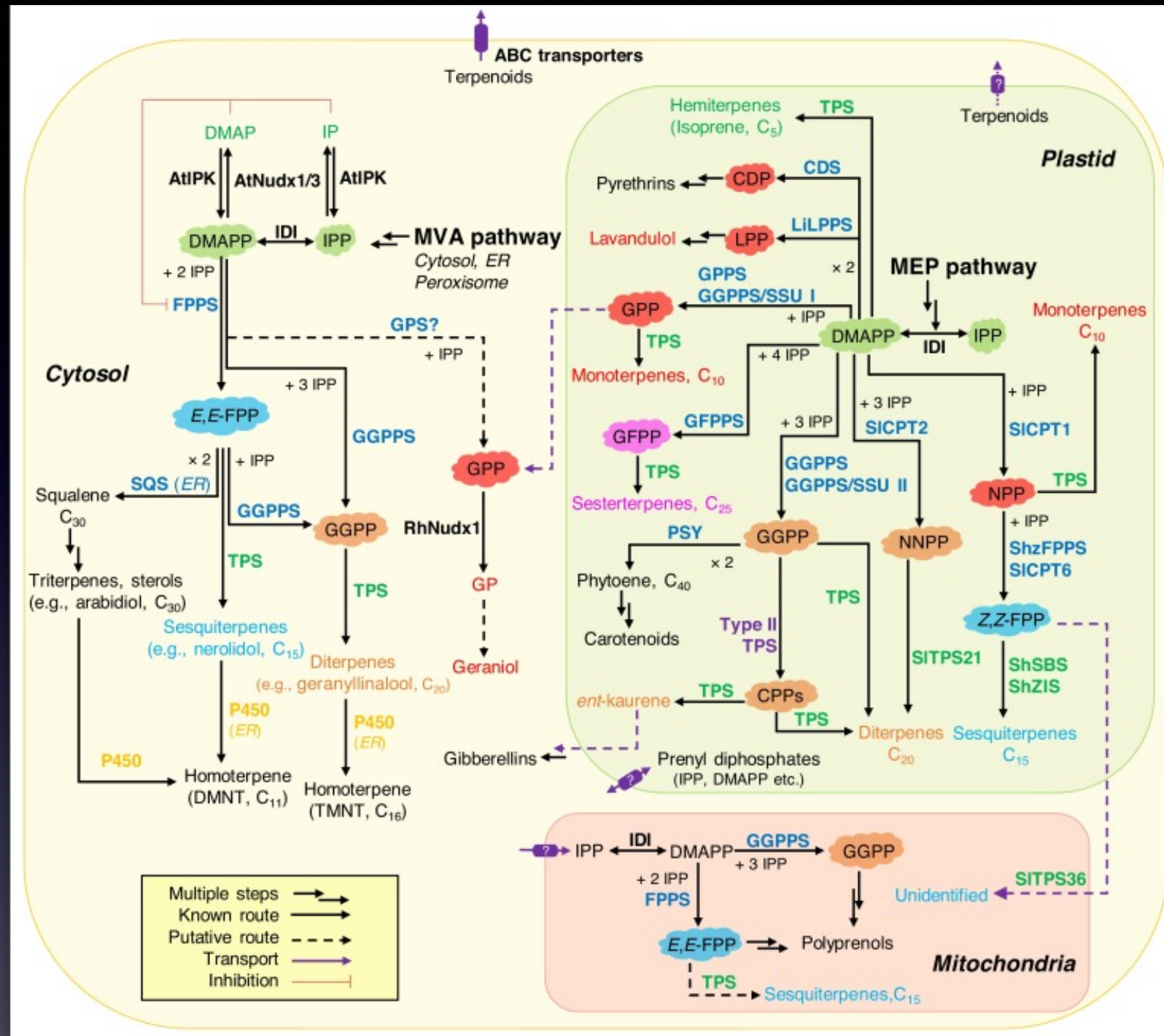
Essential Oil & Hydrolat



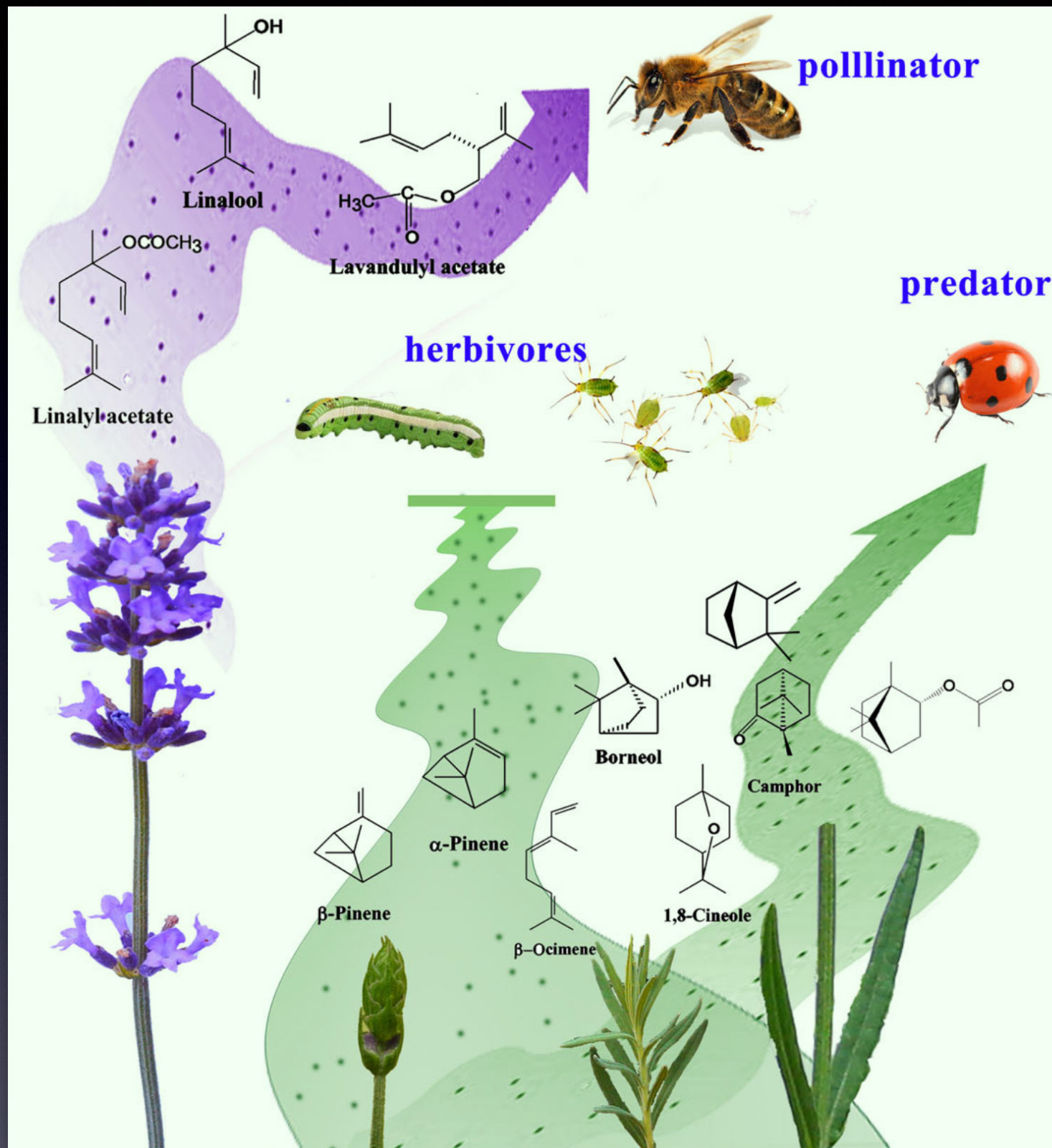
What is the vocabulary of the aromatic message?



The message is complex



Slaves to DNA



There are multiple messages



KEY CONCEPT DEMO: Differential Volatility

Lavender EO: Selected Components

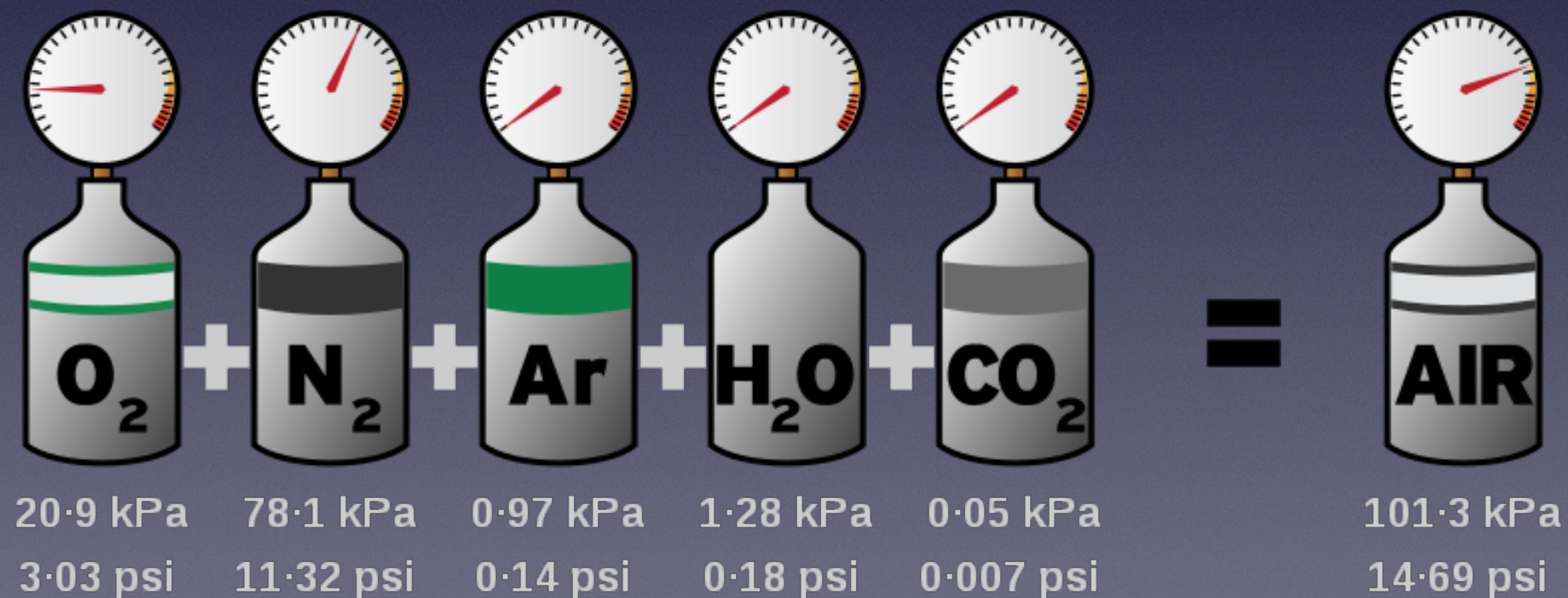
Component	MW	VP (mmHg)	BP (at 1 atm) °C
Alpha-pinene	136.24	4.750	155-156
Camphor	152.24	4.000	207
1,8-cineole	154.25	1.900	176-177
Beta-ocimene	136.24	1.559	176-178
3-octanone	127.22	1.504	167-170
Linalool	154.25	0.205	194-197
Limonene	136.24	0.198	175-177
Linalyl acetate	196.29	0.116	220
Terpinen-4-ol	154.25	0.048	209
Beta-caryophyllene	204.36	0.013	256-259
Water	18.02	24.475	100

Coming to Grips with
Differential Volatility



PHYSICAL PRINCIPLE

Dalton's Law of partial pressures



PRACTICAL IMPLICATIONS

1. Allow sufficient distillation time.
2. Assure adequate condenser heat dissipation.
3. Consider initial or terminal fractionation.

KEY CONCEPT: Hydro- phobicity

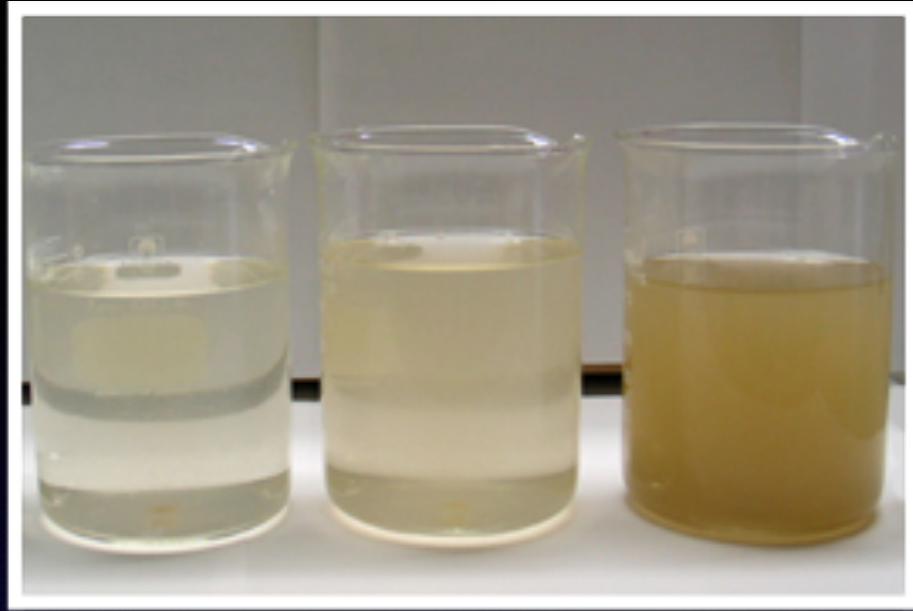




CLOUDY HYDROLAT

Early: Incomplete separation of organic
EO components from water.

Later: (1) Overgrowth of microorganisms
(2) Chemical degradation of organics



TURBID EO

Early: (1) Excessive retained water.
(2) Insoluble polymers & aggregates.

Later: Chemical degradation or
reactions of organic compounds.

Medical Moment



“When I smell a lot of lavender, my throat gets irritated, I cough, and my nose runs like crazy. Is it really safe for me to sniff lavender?”

Short Answer: Most likely, it's fine.

Reason: Respiratory irritant — too much of a good thing.



SNIFF TEST

EXPERIMENT

Mixed
Lavandin
Stems

75 Gallons



EXPERIMENT

Isolated
Lavandin
Buds

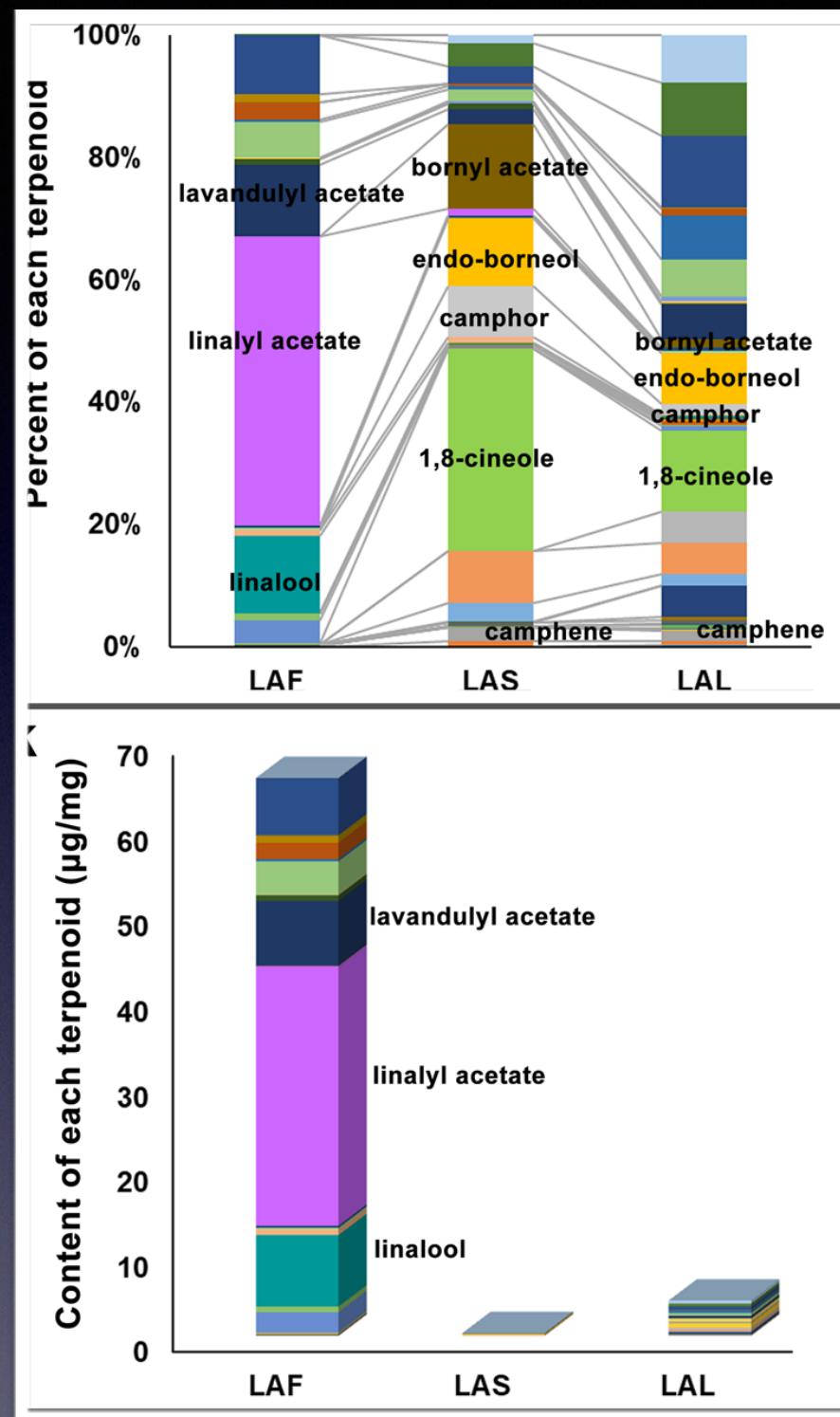
25 Gallons



RavenCroft: Mixed Lavandins 2022

	Portion 1	Portion 2	
	Buds on Stalks	Buds	Stalks
EO Yield	662 gm	621 gm	6.2 gm
Note:	Hydrolat portions: 1 = Portion 1, 2 = Portion 2, buds, 3 = Portion 2, stalks. A= first cut, B = second cut. All subsequent hydrolat discarded.		
Note:	Stalks-alone fraction was distilled long enough to obtain the same amount of combined distillate as the buds-alone fraction.		

A Real-world Experiment



LA: Flowers, Stems & Leaves



Cooking Plant Materials

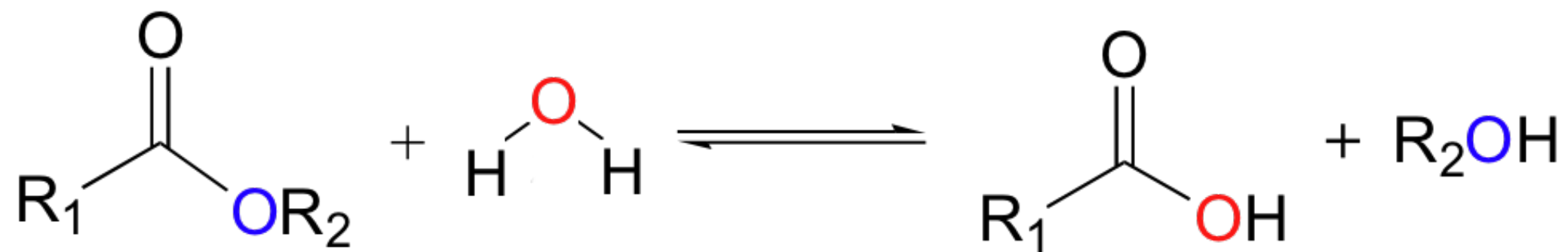
HEAT

Enemy



PHYSICAL PRINCIPLE

Heat increases
the thermal energy
available to promote
destructive chemical
reactions.

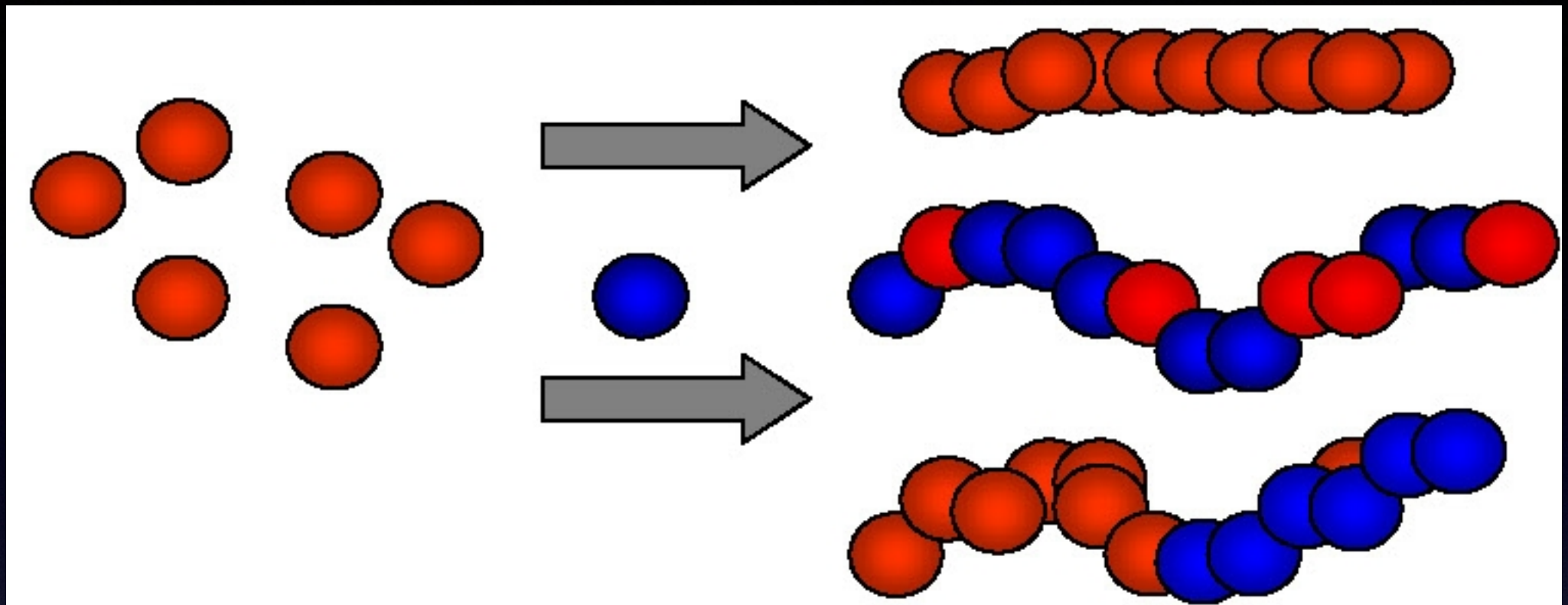


Hydrolysis

STILL NOTES - Examples

	MW	VP (mmHg)	BP °C	Odor Strength	Aroma
Dimethyl sulfide	62.13	648	37.3	High	Sulfurous, onion, sweet, vegetable
Isobutyral (2-methylpropanal)	72.11	173	63.0	High	Fresh, aldehydic, floral, pungent, green
2-methylbutanal	86.13	49.3	90-93	High	Musty, cocoa, phenolic, coffee, nutty, malty, fermented
Isovaleral (3-methylbutanal)	86.13	49.3	90-93	High	Ethereal, aldehydic, chocolate, peach, fatty
2-ethylfuran	96.13	53.9	92-93	High	Chemical, bean-like, ethereal, cocoa, bread, malty, coffee, nutty
Alpha-thujene *	136.24	4.77	150-152	High	Woody, green, herbal
3-methyl cyclohexanone**	112.17	1.58	169-170	High	Minty, camphoraceous, medicinal
*Note:	Alpha-thujene may accumulate as a reaction product of alpha-terpinene compounds.				
**Note:	3-methyl cyclohexanone may accumulate as a reaction product of monoterpenes such as pulegone or menthone. Pertinent to mint.				

Unwelcome Passengers



Polymerization



PRACTICAL IMPLICATIONS

1. Avoid reflux.

2. Avoid extended duration of distillation.

3. Avoid excessive internal surface temperature.



Blending



The Distiller's Challenge:
Capture & Convey



PAY ATTENTION!

INDIVIDUAL DETAILS MATTER

Altitude

Condition of Plant Material & Packing

Reliability of Steam Supply

Heat Retention in the Still

Efficiency of the Condensing Column

Separation & Storage of Distillates



Questions?
Personal Observations?