

The Scent of Orchids

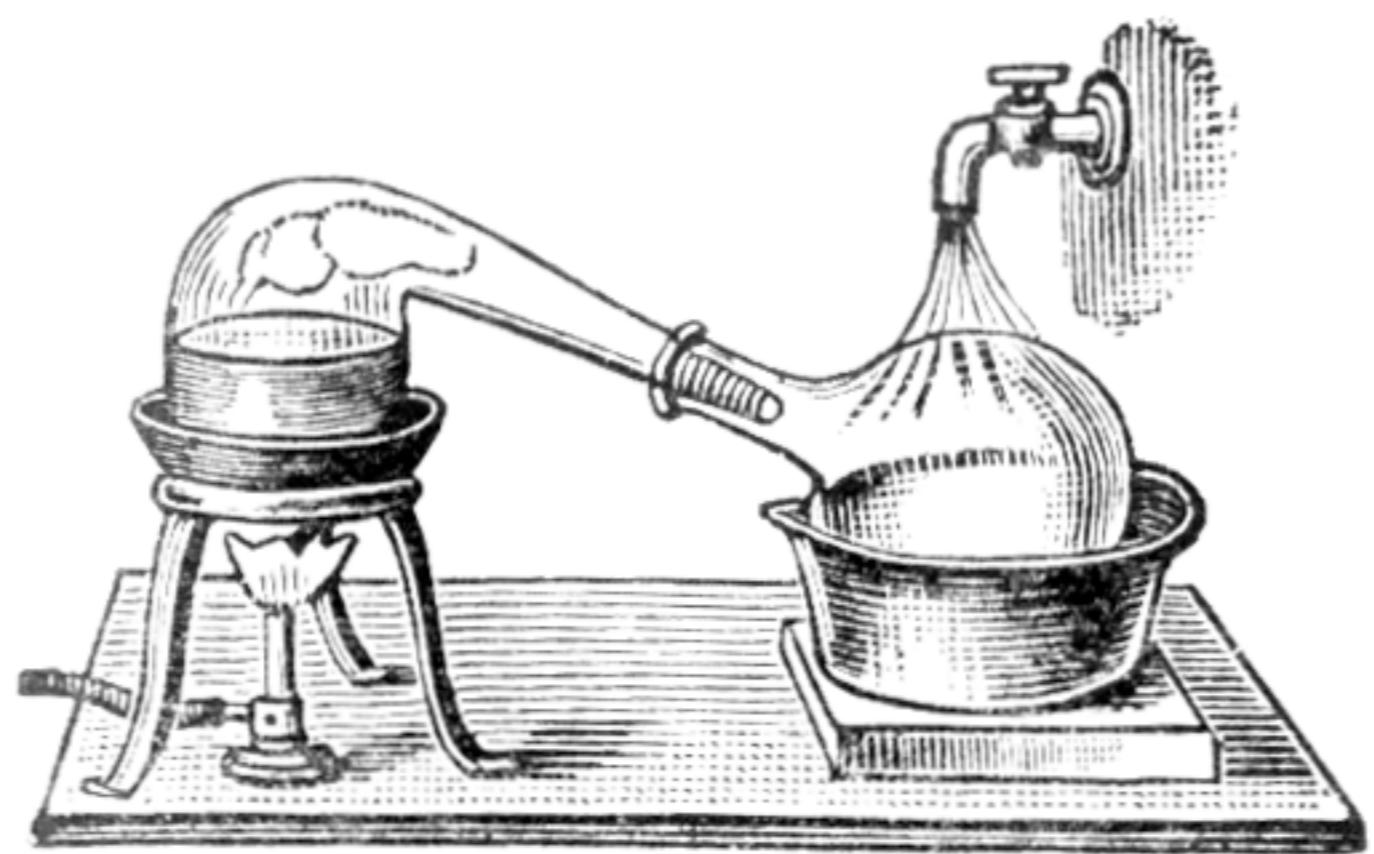
Al Fischer

Northeast Georgia Orchid Society

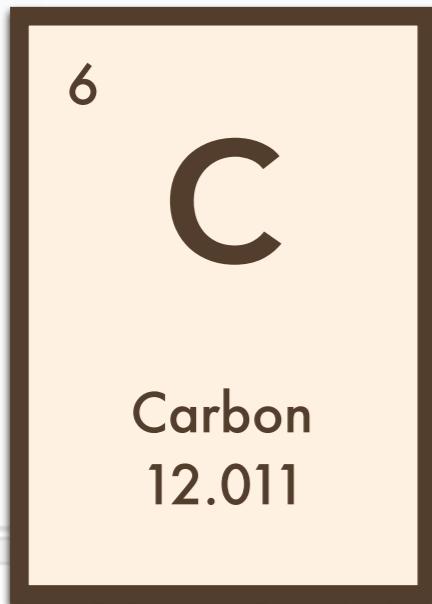
March 20, 2016



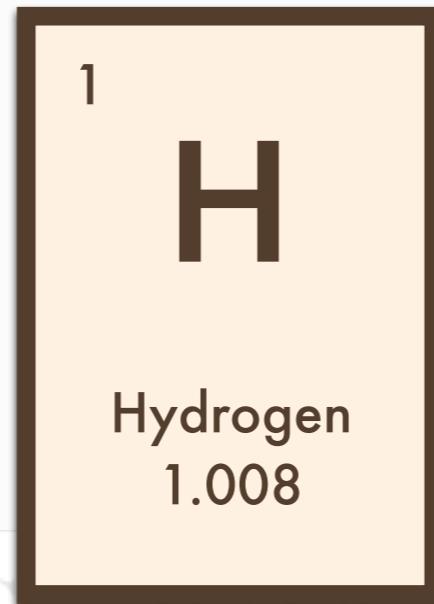
Peter Presslein (CC BY-SA 3.0)



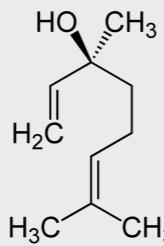
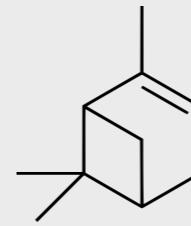
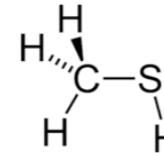
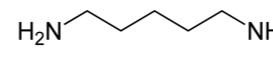
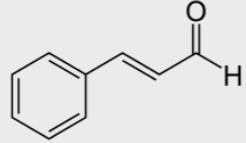
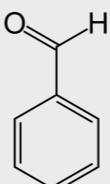
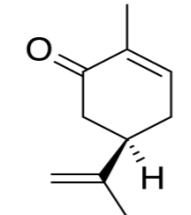
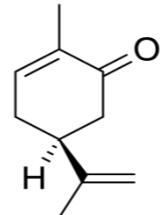
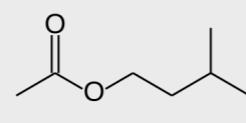
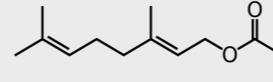
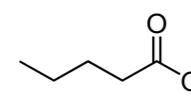
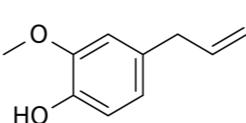
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He	HELIUM	4
Ne	NEON	20
Ar	ARGON	40
Kr	KRYPTON	84
Xe	XENON	131
Rn	RADON	222
Uuo	UNINOCTIUM	294
Lu	LUTETIUM	175
Y	YTTRIUM	89
Zr	ZIRCONIUM	91
Nb	NIOBIUM	93
Mo	MOLYBDENUM	96
Tc	TECHNETIUM	98
Ru	RUTHENIUM	101
Rh	RHODIUM	103
Pd	PALLADIUM	106
Ag	SILVER	108
Cd	CADMIUM	112
In	INDIUM	115
Sn	TIN	119
Sb	ANTIMONY	122
Te	TELLURIUM	128
I	IODINE	127
Pt	PALLADIUM	124
Au	AU	197
Hg	MERCURY	201
Tl	THALLIUM	204
Pb	LEAD	207
Po	POLONIUM	210
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Class	Examples		Scent
Terpenes	 Linalool (Floral)	 Pinene (<i>Pinus</i>)	Floral, pine, citrus
Sulfur, Nitrogen Compounds	 Methyl-mercaptan	 Cadaverine	Decay, feces
Aldehydes	 Cinnam-aldehyde	 Benzaldehyde (Almonds)	Fruity, spicy
Ketones	 Carvone (Caraway)	 Carvone (Spearmint)	Fruity, spicy
Esters	 Isoamyl Acetate	 Geranyl Acetate	fruity, herbaceous
Fatty Acids, Phenylpropanoids	 Valeric Acid	 Eugenol (Clove)	Various

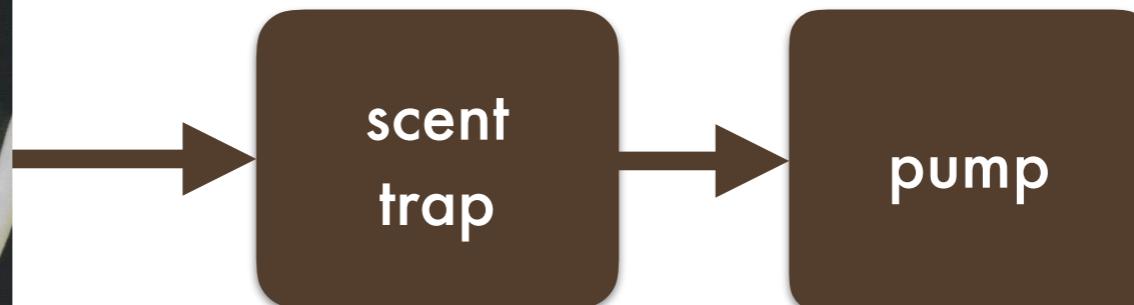
The Science of Scent | Trapping Scents

Scents must be trapped for analysis.

bag around flower



Franklinia alatamaha



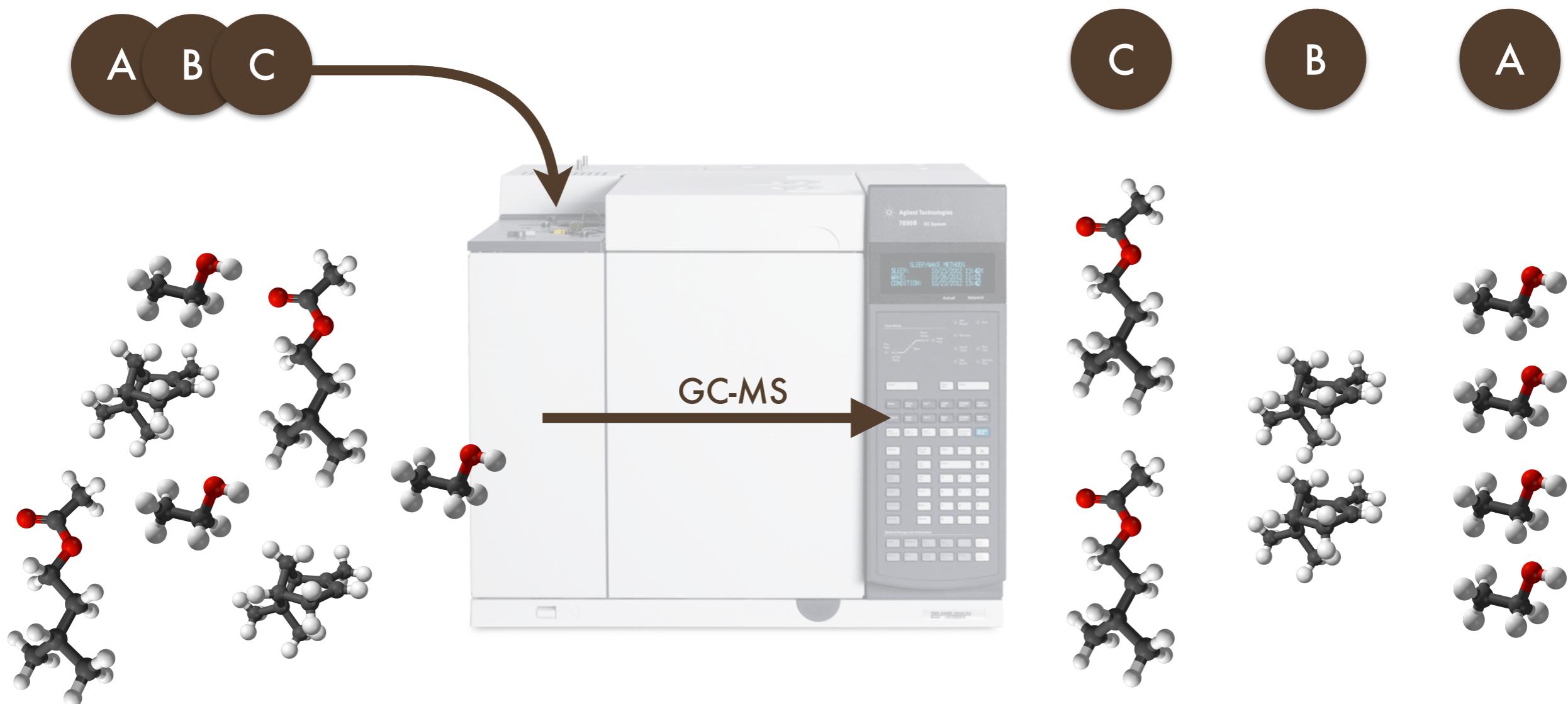
The Science of Scent | Measuring Scents

The trap is placed in a gas chromatograph.

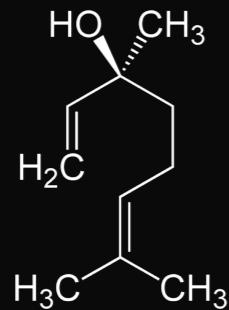


The Science of Scent | Measuring Scents

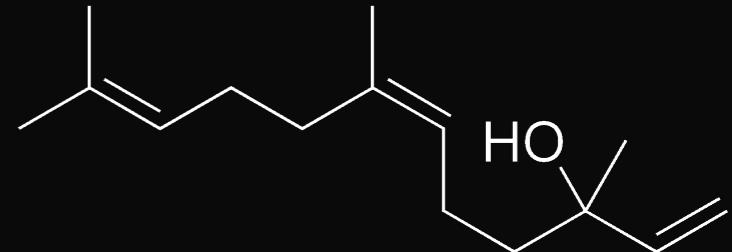
Gas chromatography separates mixtures of molecules.
Mass spectrometry provides a molecular “fingerprint”



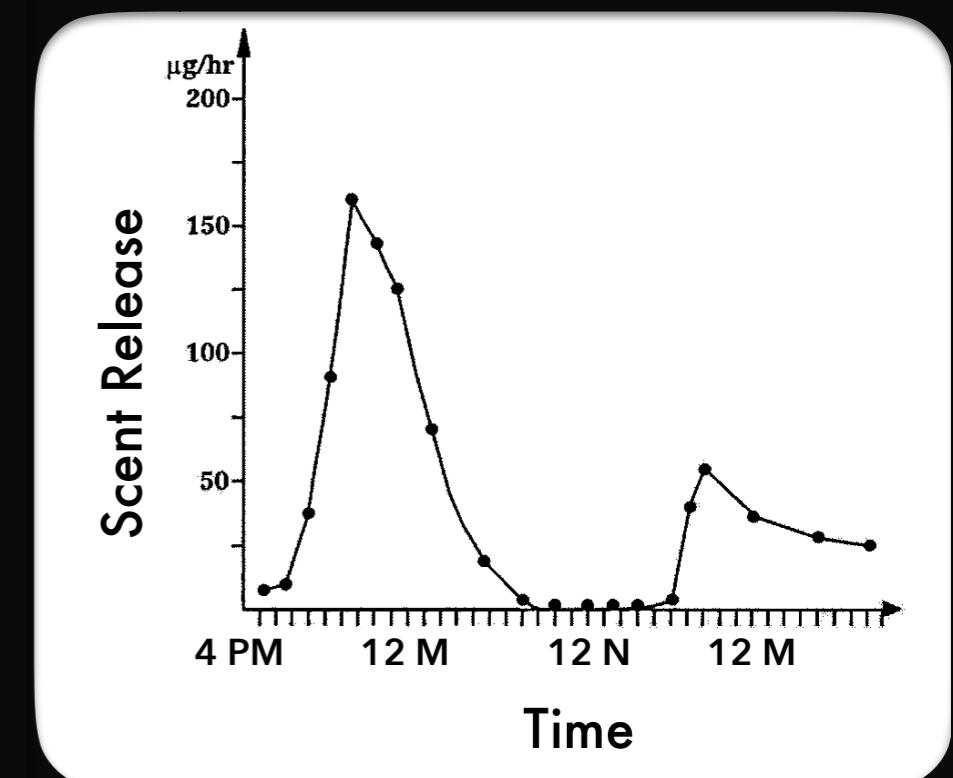
Orchid Scents | 'White Floral' Brassavola



linalool

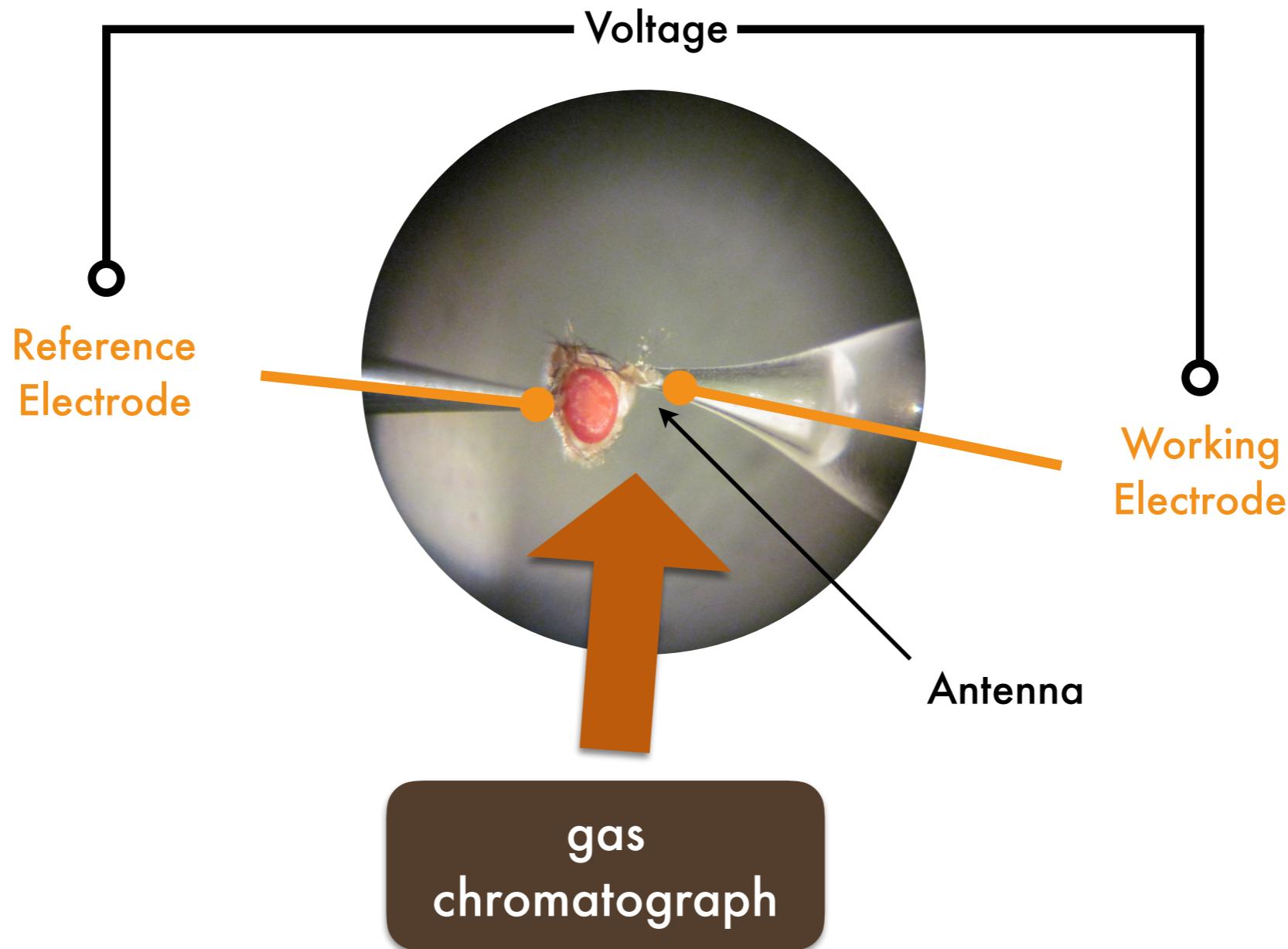


nerolidol



The Science of Scent | Electroantennography

Electroanntenographic detection (EAD)
reveals which chemicals insects respond to.



Orchid Scents | *Ophrys*

Scent is thought to be more important than appearance in sexually deceptive bee orchids.



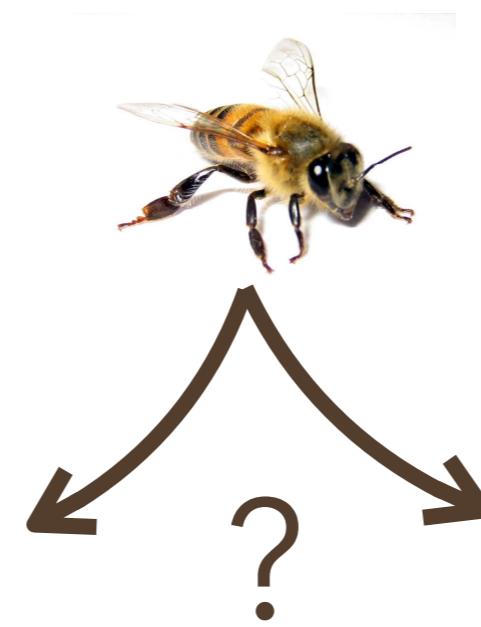
*Andrena
nigroaenea*



*Ophrys
sphegodes*

Orchid Scents | *Ophrys*

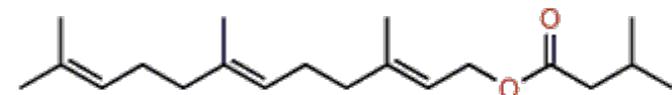
Before Pollination



After Pollination



farnesyl hexanoate

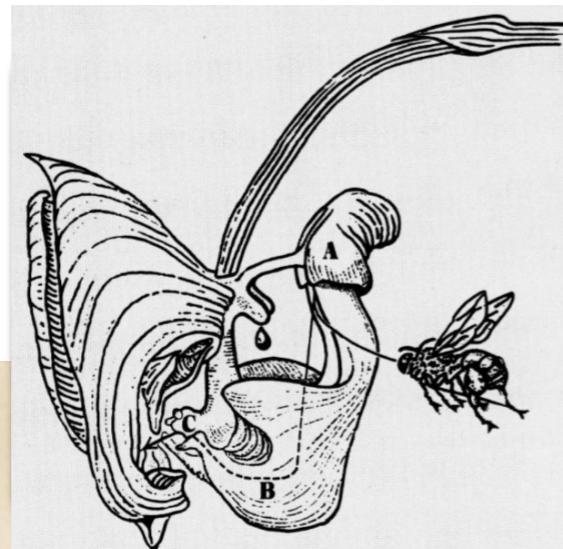
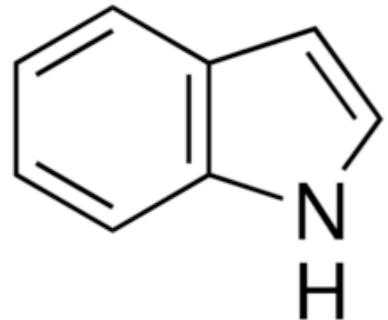


Scent matches “receptive” female.

Scent matches “non-receptive” female.

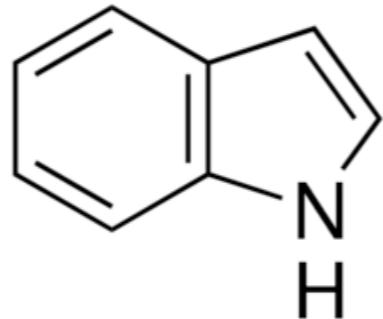
Orchid Scents | *Coryanthes* & Euglossine Bees

indole

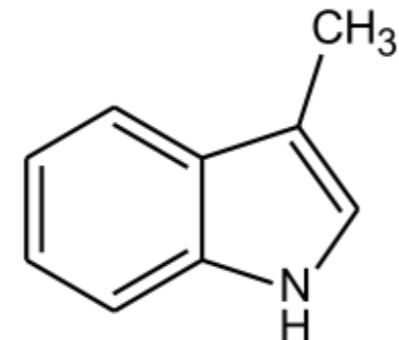


Orchid Scents | *Bulbophyllum*

indole



skatole



A Lot



A Little



Orchid Scents | *Calypso bulbosa*

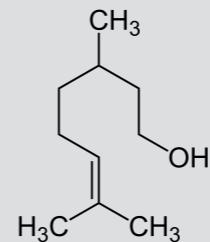
"An ideal example...that known fragrance compounds, composed in a unique way, may lead to a unique fragrance."

-Roman Kaiser, *Scent of the Vanishing Flora*

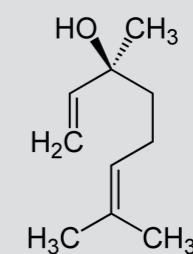


Calypso bulbosa
Fairy Slipper Orchid

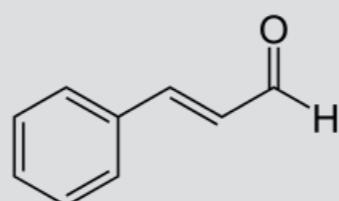
cintronellol



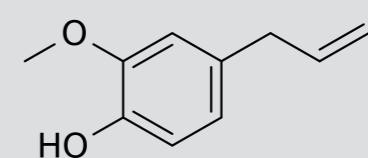
linalool



cinnamaldehyde



eugenol





Inspired by:
The Scent of Orchids (1993)
Scent of the Vanishing Flora (2011)

Roman Kaiser