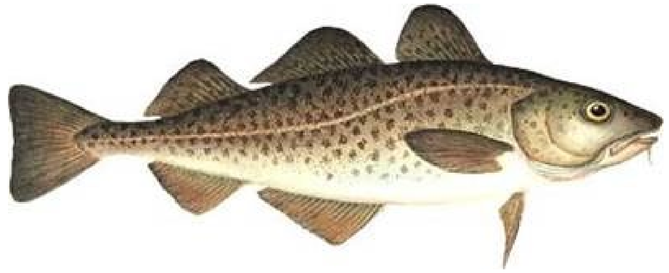
Pr Fabrice Neiers

UNIVERSITÉ BOURGOGNE EUROPE

À la découverte de l'olfaction : quand les molécules deviennent des parfums

Electrolocalisation

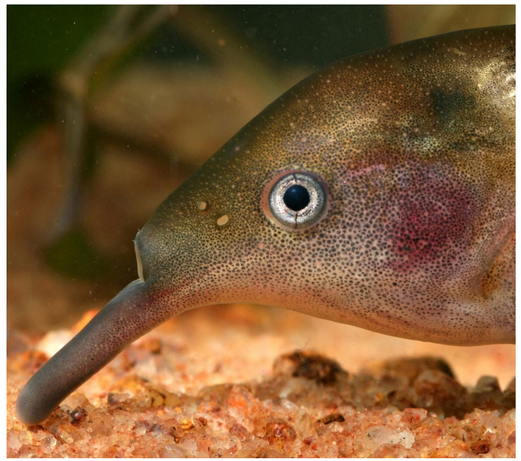


Courants marin

Infrason

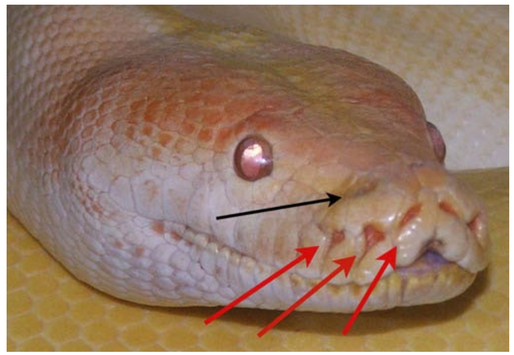
Echolocalisation

Lumière polarisé



Electro echolocalisation

Vision champs magnétique



Thermodétection


COMTE
COMTE
COMTE

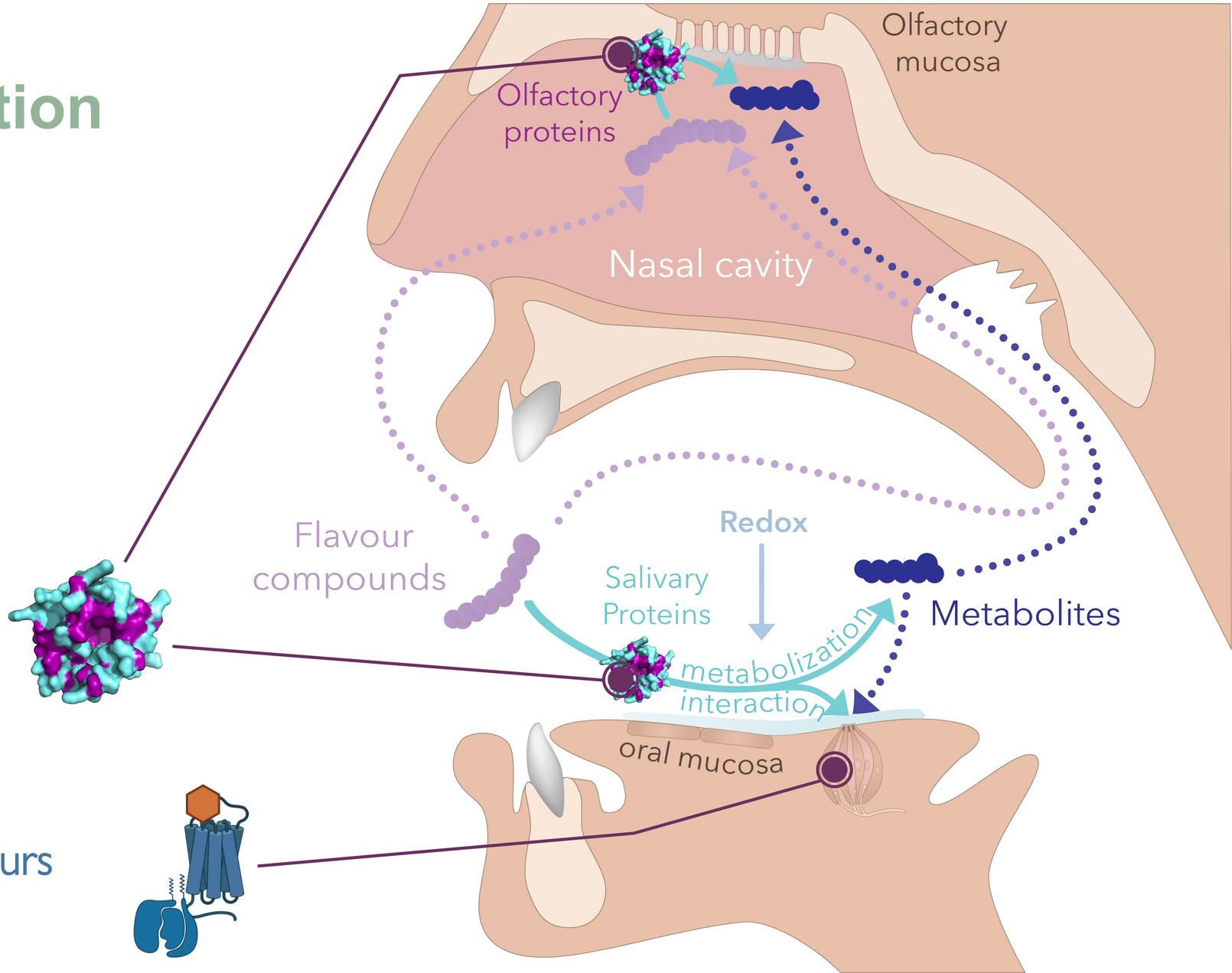
La perception

Flaveur

Goût

Olfaction

Sensations trigéminales



Récepteurs

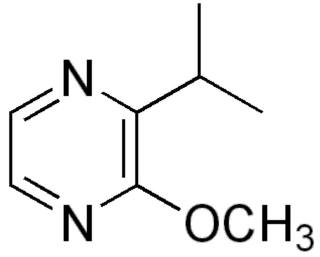
LES SENS CHIMIQUES

Les sens chimiques (le goût et l'odorat) sont **essentiels à la survie** des animaux. Ils permettent :

- aux organismes de trouver leur nourriture,
- d'éviter les substances dangereuses,
- de reconnaître leur partenaire sexuel,
- de favoriser les relations mères-enfants,
- de marquer le territoire, de reconnaître les individus du groupe,
- de servir de signaux d'alarme ou d'agression

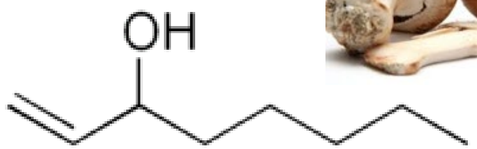
Tous les animaux sont pourvus de sens chimiques, sens très ancien

Capacité olfactives humaines : sous développées ?



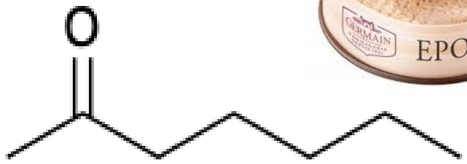
qlq µg dans une piscine olympique !

Les molécules odorantes

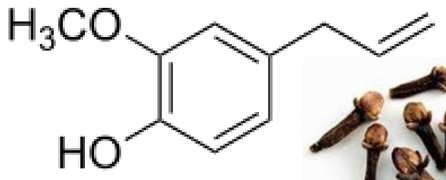


1-octene-3-ol

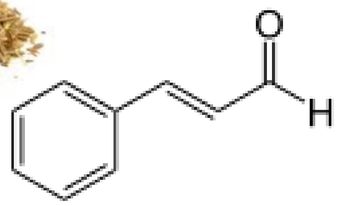
Cis-3-hexen-1-ol



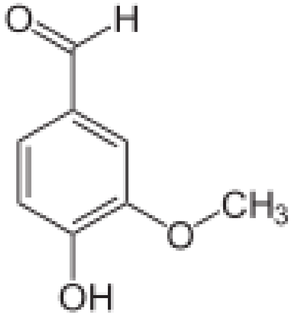
2-heptanone



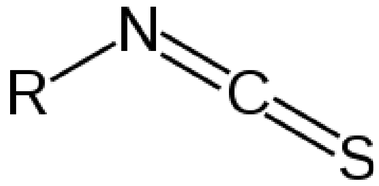
Eugenol



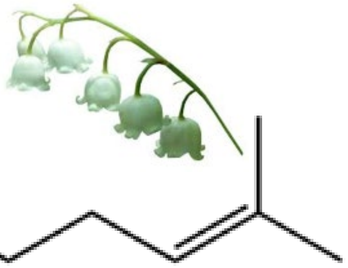
Cinnamaldehyde



Vanilline



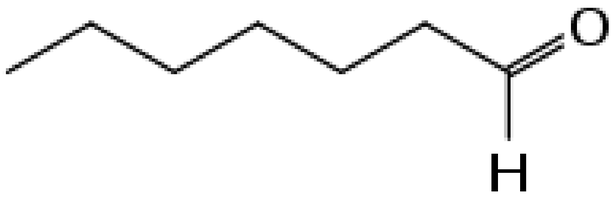
Isothiocyanate



Linalool

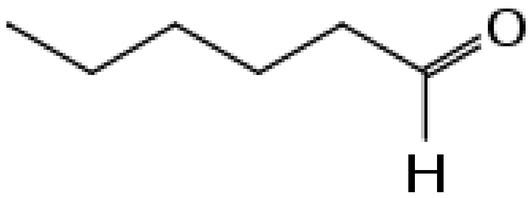
1 atome de carbone de différence = 2 odeurs!

heptanal



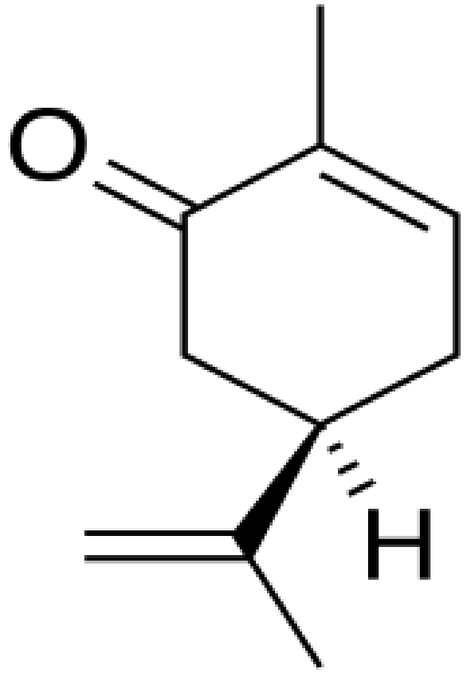
→ herbe

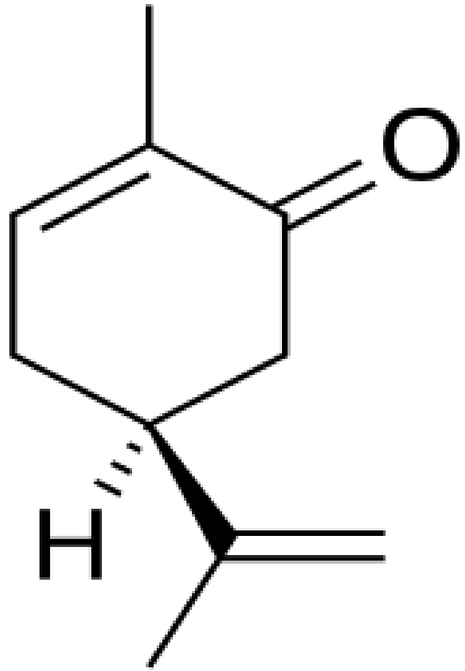
hexanal



→ savon

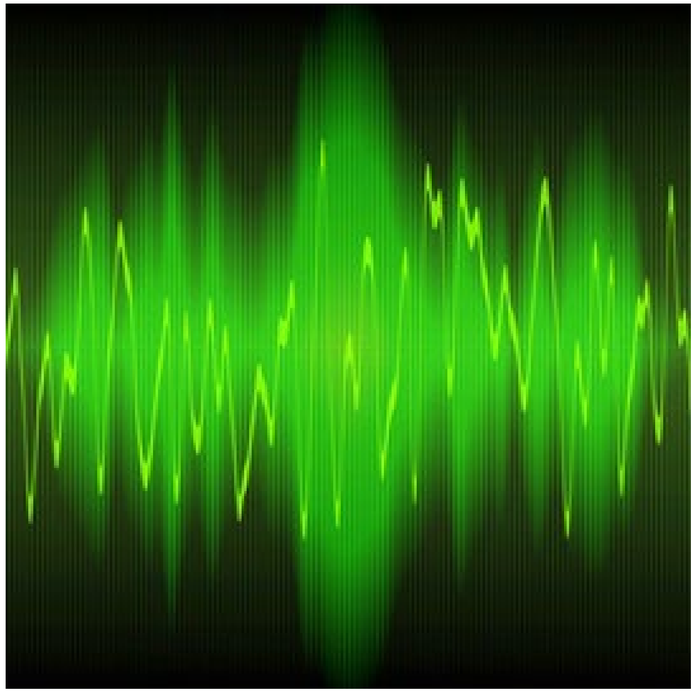
Même une simple différence de structure !



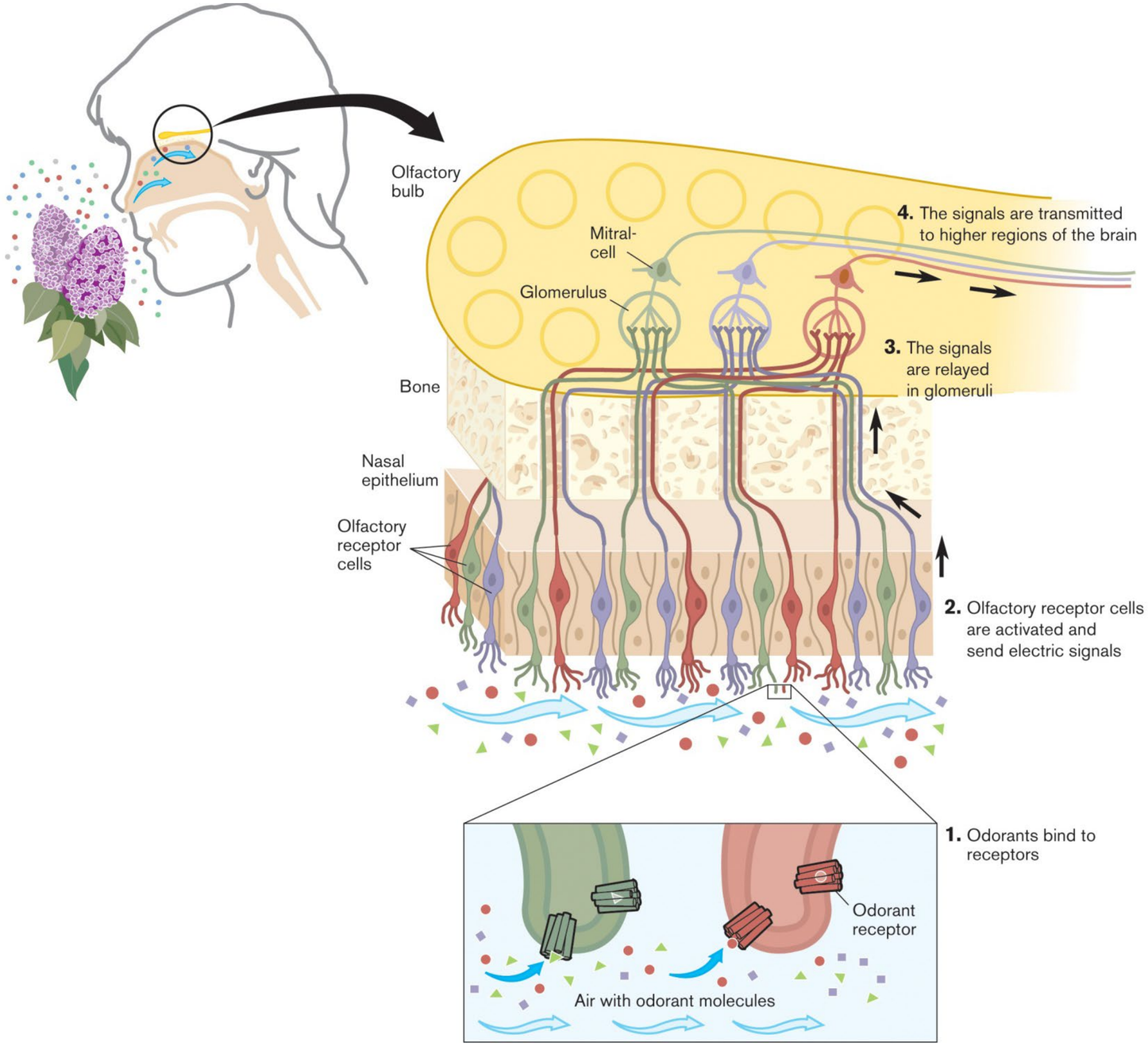


Les odeurs que nous sentons sont des mélanges de 100ène odeurs

Comment ça marche ? Nature vibratoire ?

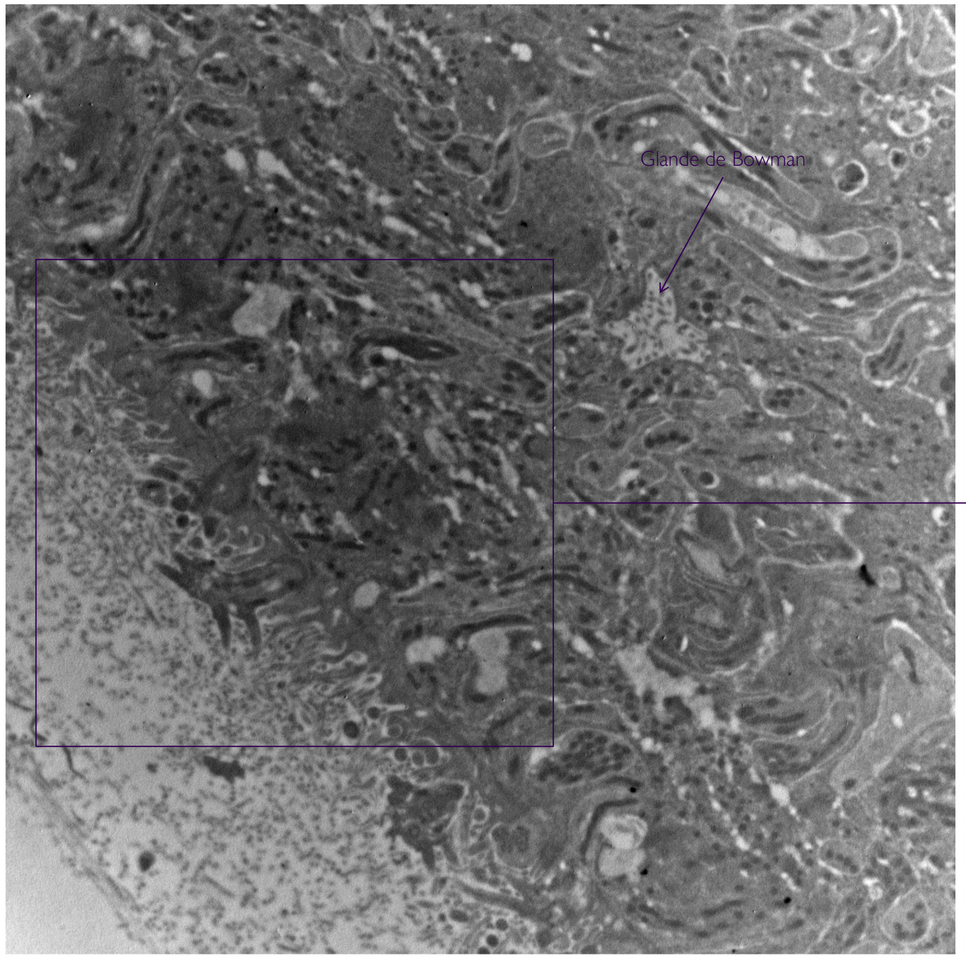


NON


Olfactory bulb
Mitral-cell
Glomerulus
4. The signals are transmitted to higher regions of the brain
3. The signals are relayed in glomeruli
Bone
Nasal epithelium
Olfactory receptor cells
2. Olfactory receptor cells are activated and send electric signals
1. Odorants bind to receptors
Odorant receptor
Air with odorant molecules

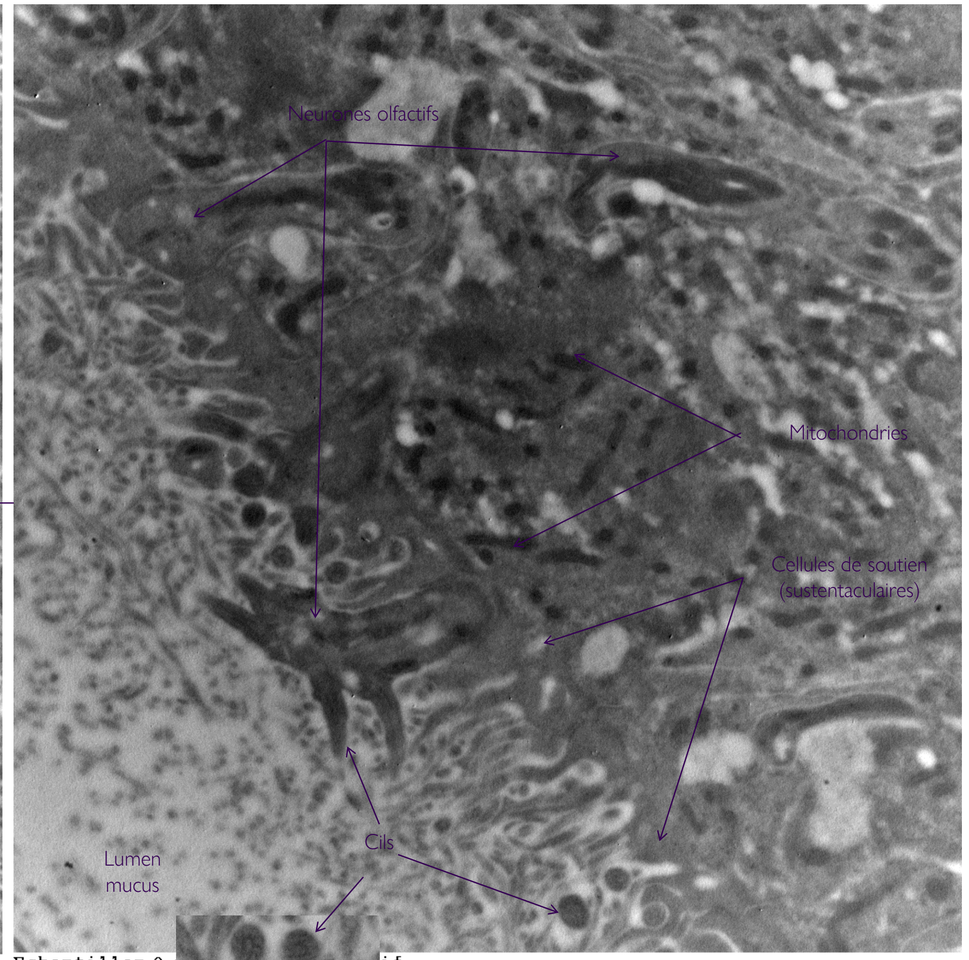
Les récepteurs olfactifs

Récepteur olfactif



Echantillon 2 chim LR White_002.tif
A1 (boite FM 1)
Epithelium olfactif rat
Print Mag: 6820x @ 130 mm

2 µm
HV=80.0kV
Direct Mag: 8000x

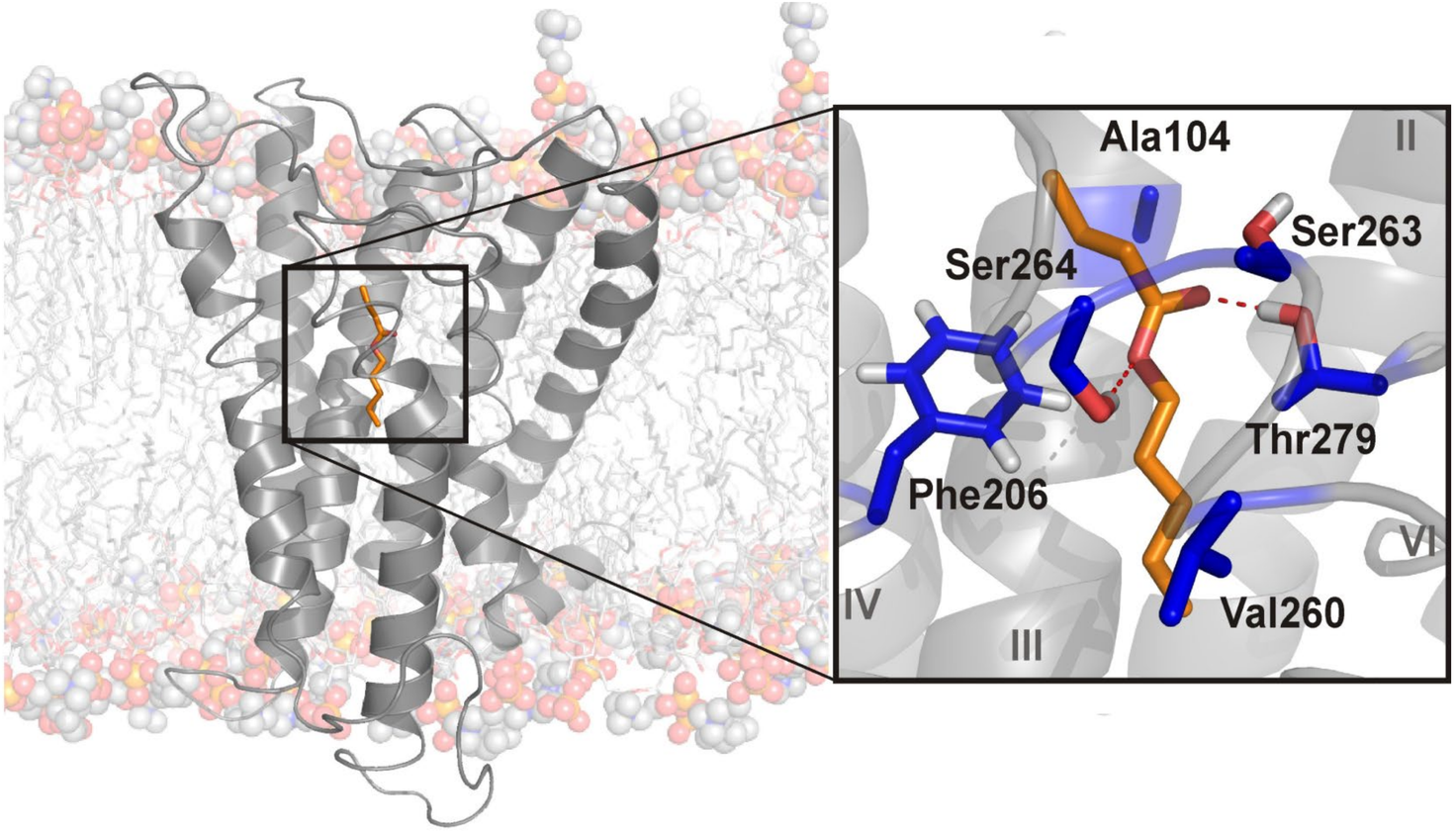


Echantillon 2 c if
A1 (boite FM 1)
Epithelium olf
Print Mag: 128

500 nm
HV=80.0kV
Direct Mag: 15000x

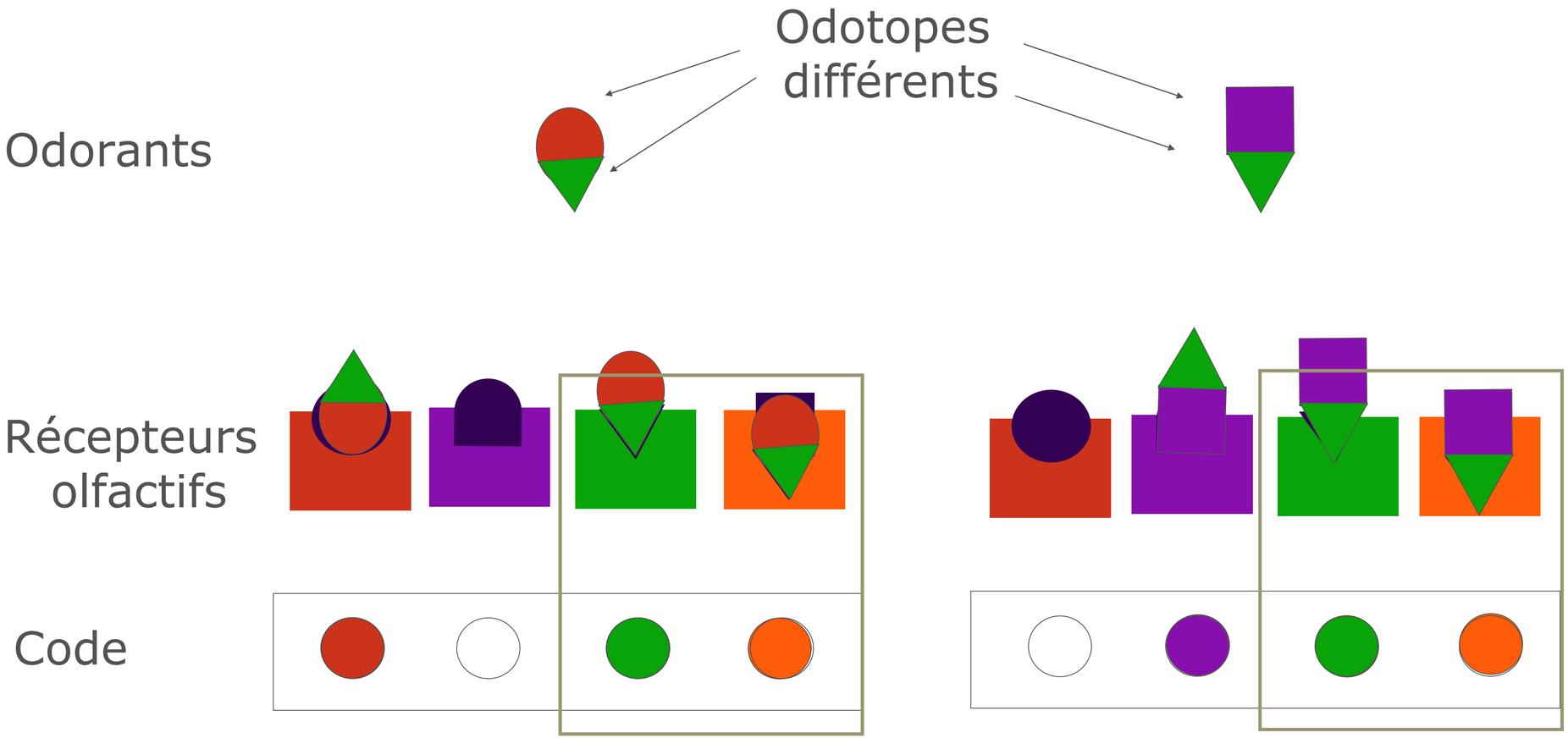
Récepteur olfactif

Linda Buck



Richard Axel

CODAGE COMBINATOIRE



- 1 odorant active plusieurs récepteurs différents
- 1 récepteur est activé par différents odorants

Malnic *et al*. 1999

INFLUENCE DE LA CONCENTRATION

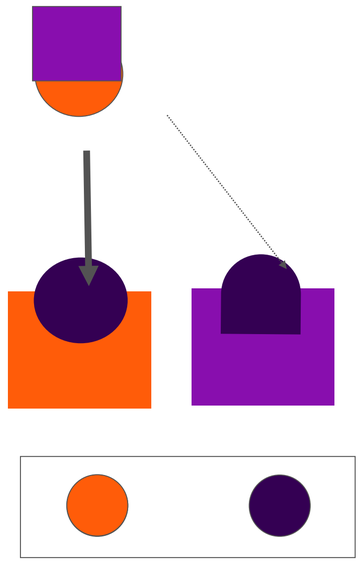
Faible concentration

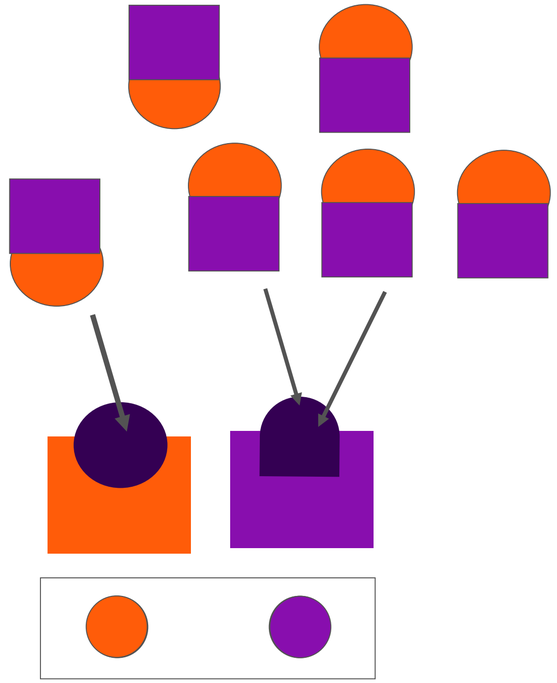
Forte concentration

Odorants

Récepteurs olfactifs

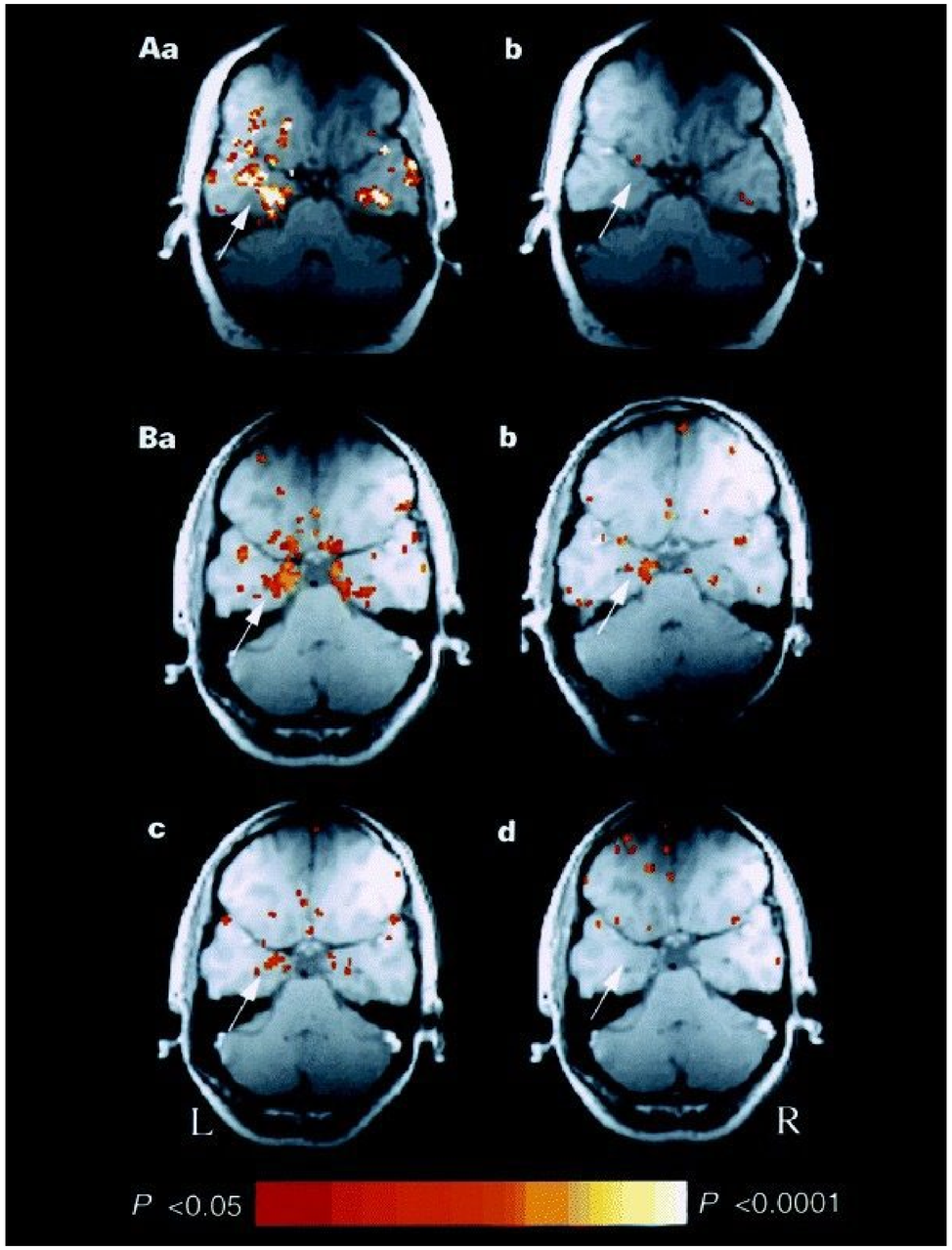
Code





Nombre

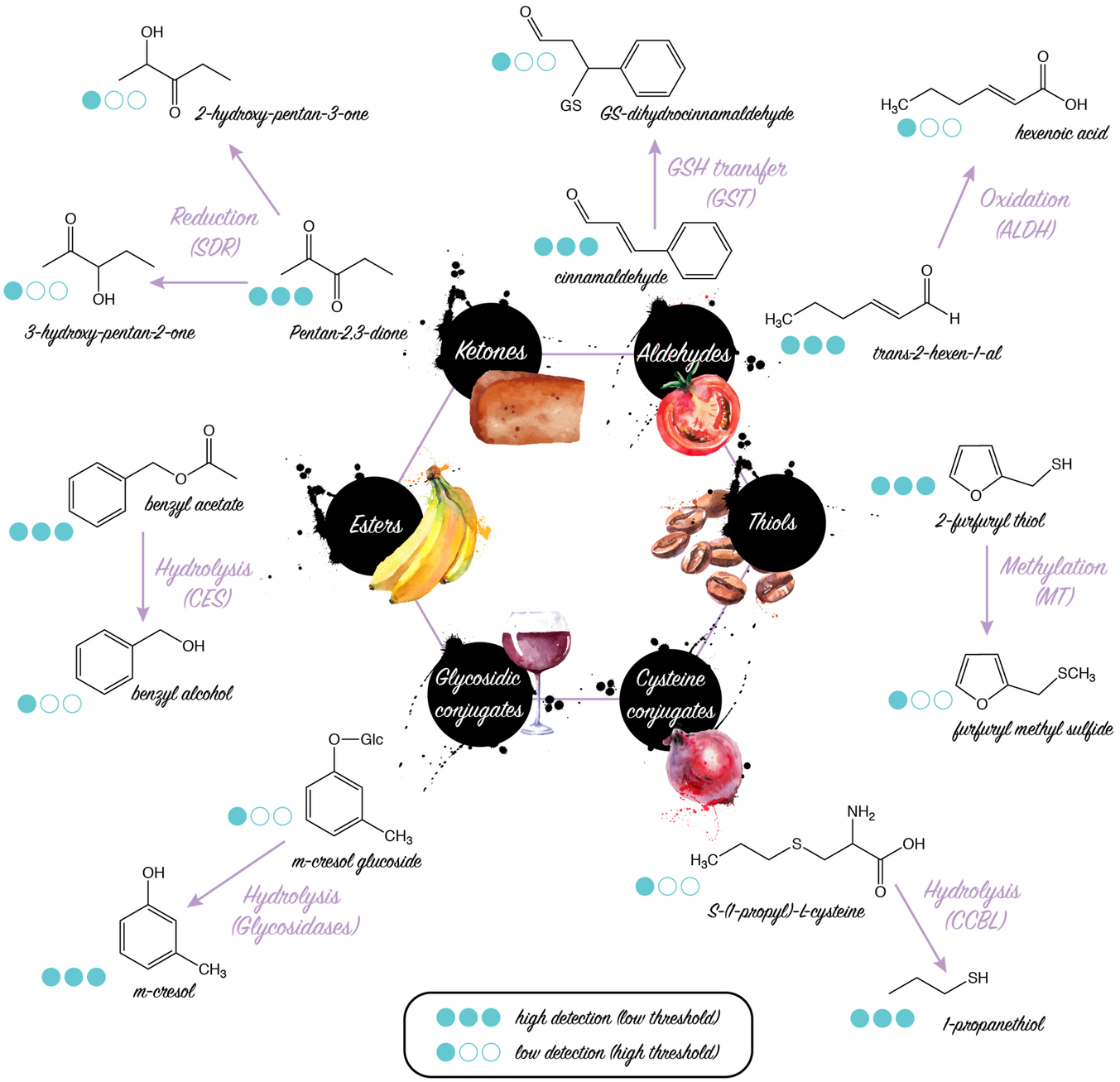
Human	Dog	Cow	Rat	Mouse	Elephant
380	811	1,186	1,278	1,510	1,948


Aa
b
Ba
b
c
d
L
R
P <0.05
P <0.0001

VARIABILITÉ INTER-INDIVIDUELLES

Référence	Odeur de	Pourcentage
Androsténone	Urines	40 %
Isobutanale	Malt	35 %
1,8-Cinéole	Camphre	33 %
1-Pyrroline	Sperme	20 %
Pantadéconolid	Musc	7 %
Triméthylamine	Poisson	7 %

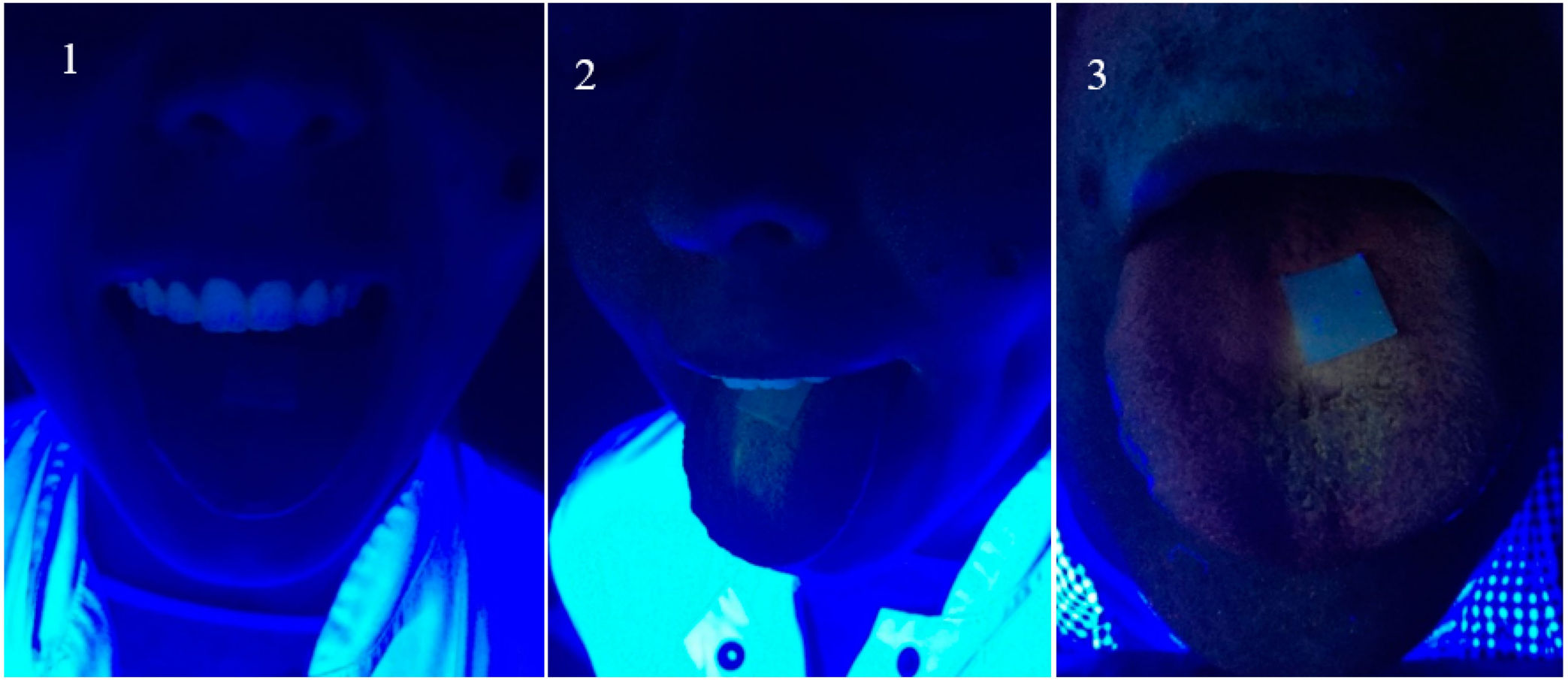
Tableau V : Epidémiologie (pourcentage de la population) de quelques anosmies partielles chez l'homme.



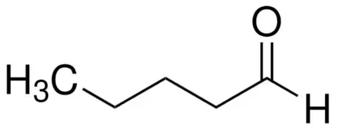
COMPREHENSIVE REVIEWS IN FOOD SCIENCE AND FOOD SAFETY

Oral enzymatic detoxification system: Insights obtained from proteome analysis to understand its potential impact on aroma metabolization

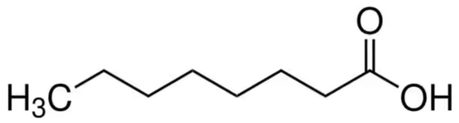
Mathieu Schwartz[1] | Fabrice Neiers[1] | Jean-Philippe Charles[1] | Jean-Marie Heydel[1] | Carolina Muñoz-González[2] | Gilles Feron[1] | Francis Canon[1]


1
2
3

Oxidoreductases

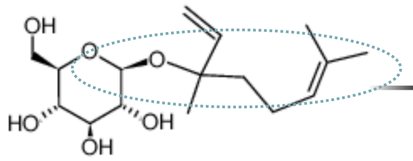


Octanal

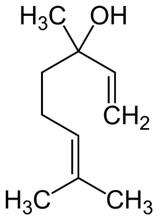


Octanoic acid

Glycosidases

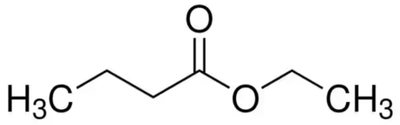


Linalyl β-D-glucoside

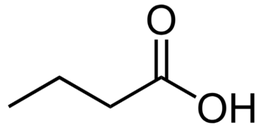


Linalool

Esterases

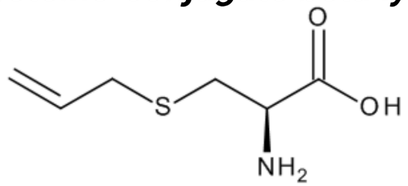


Ethyl butyrate

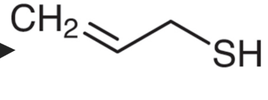


Butyric acid

Cysteine-conjugate beta lyases

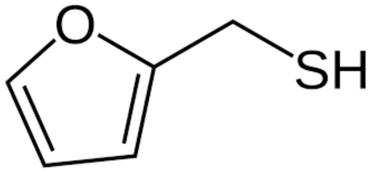


S-allyl-L-cysteine

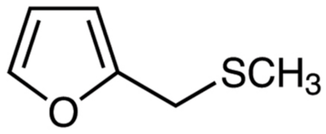


Allyl mercaptan

Methyltransferases

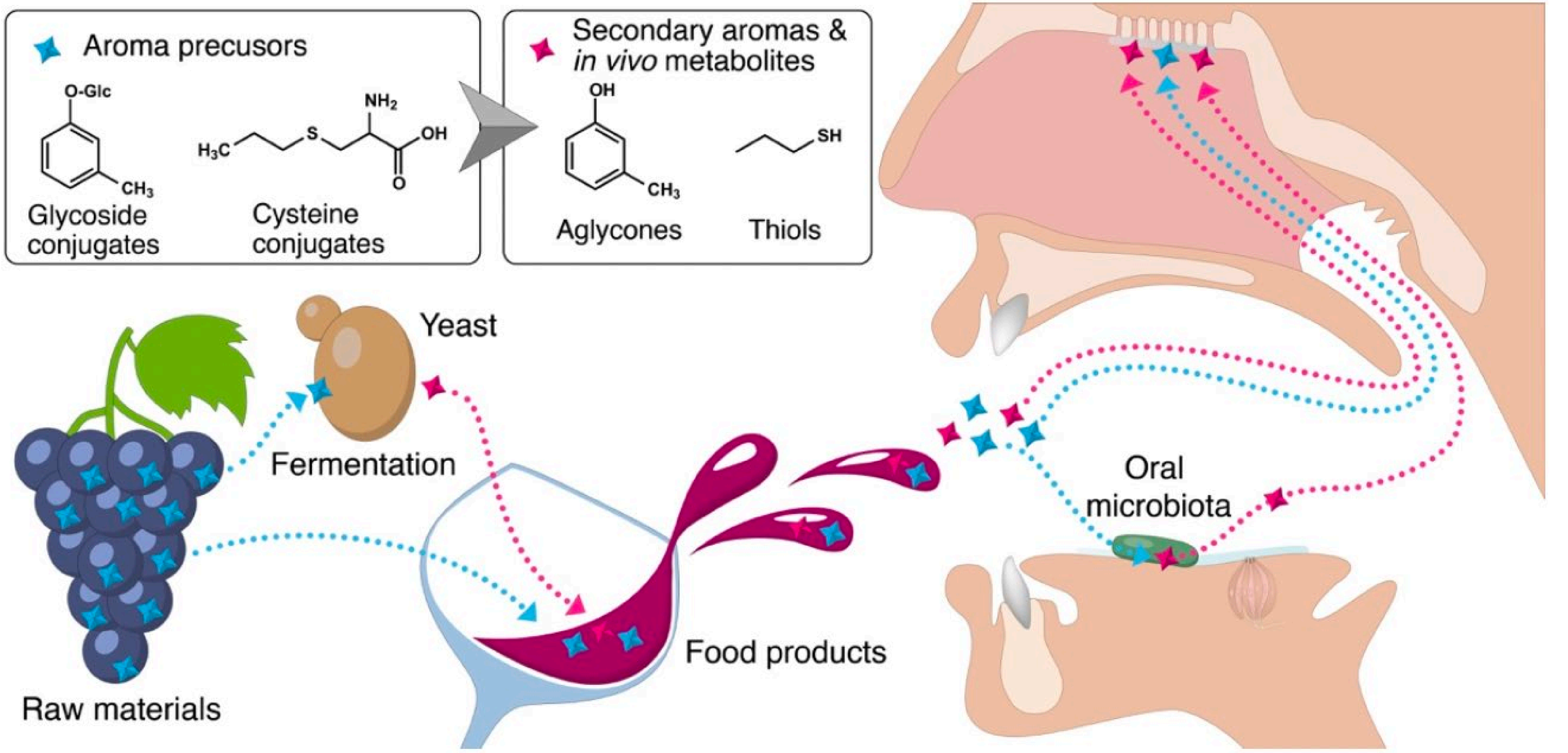


2-Furfurylthiol

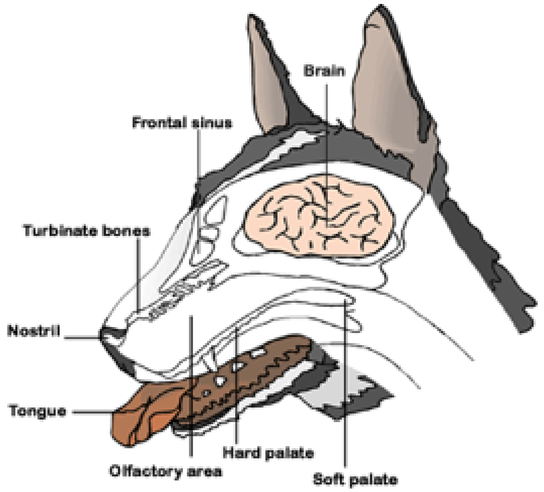


Furfuryl methyl sulfide

Boichot et al., 2023b; Muradova et al., 2023; Schwartz et al., 2023


Aroma precusors
O-Glc
CH3
NH2
H3C
S
OH
O
Glycoside conjugates
Cysteine conjugates
Secondary aromas & in vivo metabolites
OH
CH3
SH
Aglycones
Thiols
Yeast
Fermentation
Raw materials
Food products
Oral microbiota

OLFACTION DES CHIENS



Surface of olfactory epithelium

Human: **5 cm²**

Dog: **150 cm²**

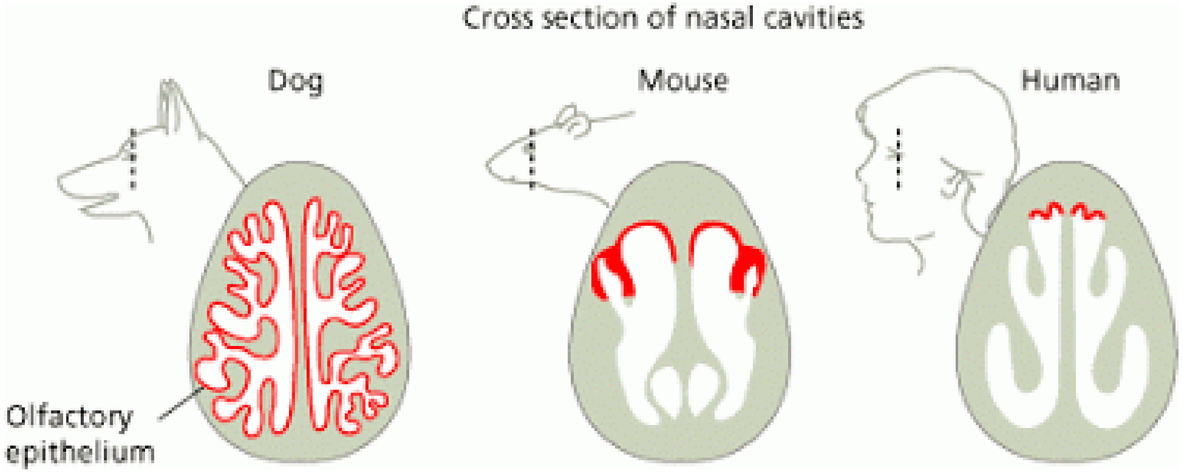
Number of olfactory neurons

Human : **5 millions**

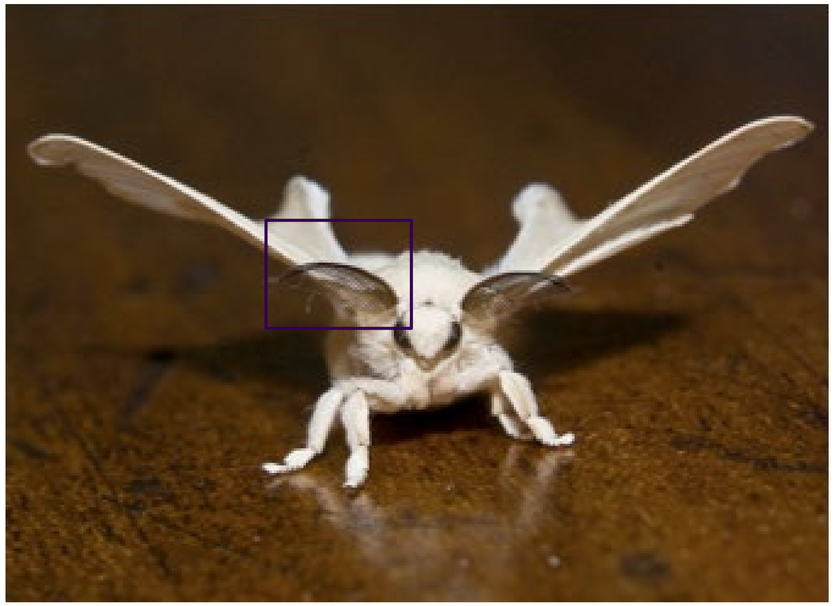
Dog: **300 millions**

More sensitive neurons

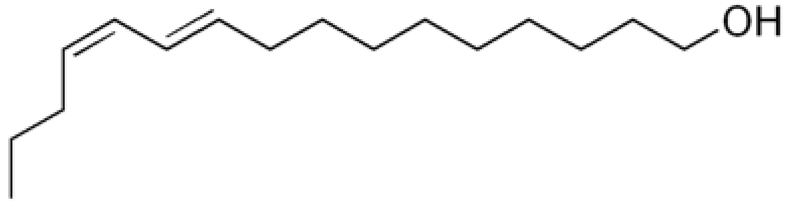
Area in brain **40 X** bigger in dog



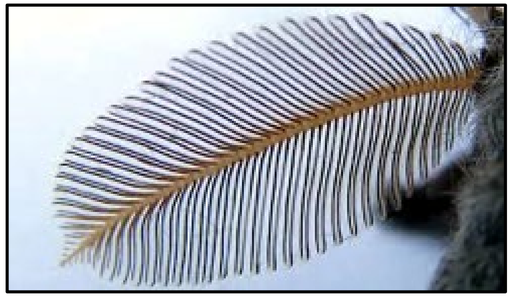
DETECTION DE LA FEMELLE

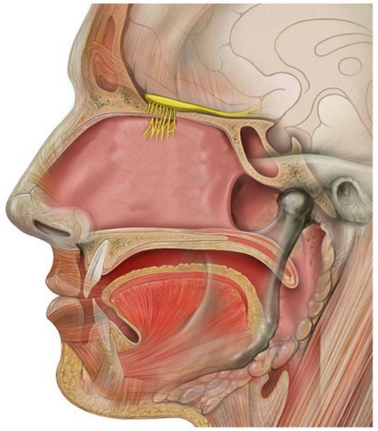


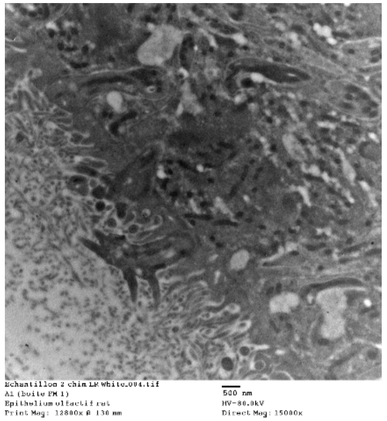
Bombyx mori

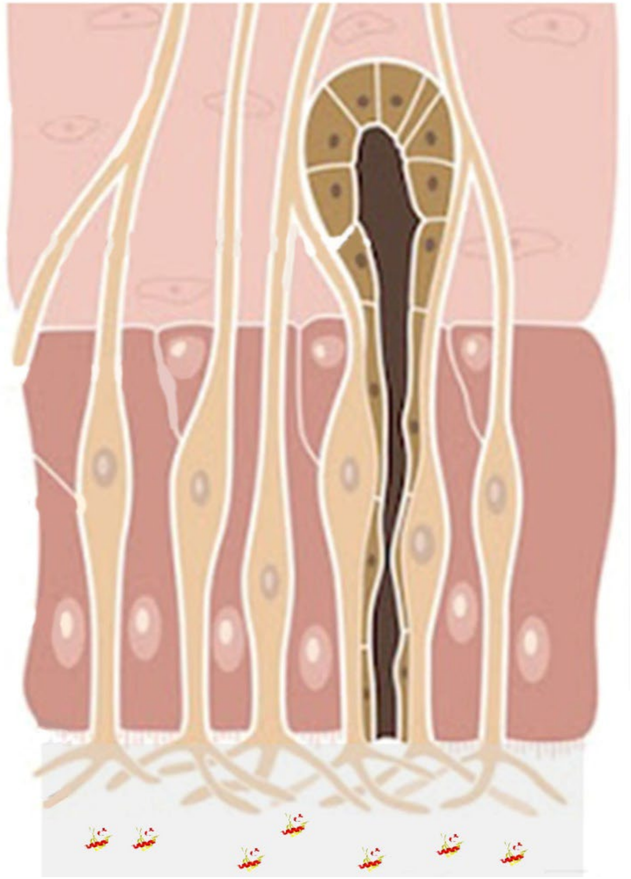


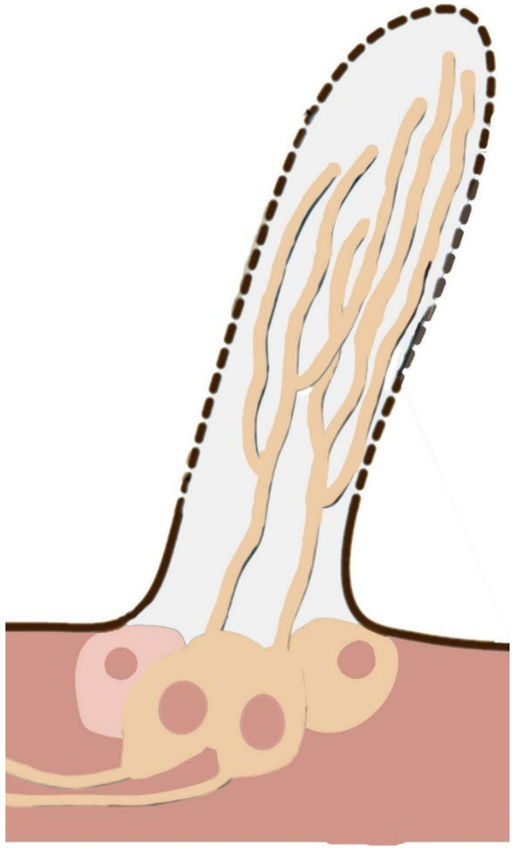
Sex pheromone: Bombykol

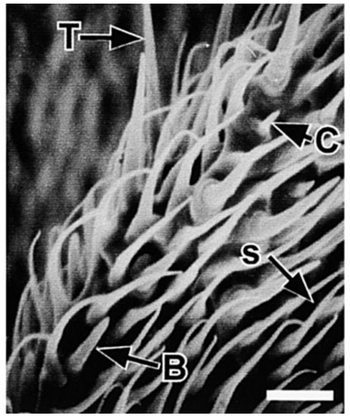





Echantillon 2 chim LR White.094.tif
A1 (buite PM 1)
Epithelium olfactif rwi
Print Mag: 12880x @ 130 mm
500 nm
HV=80.0kV
Direct Mag: 15080x






T
C
S
B