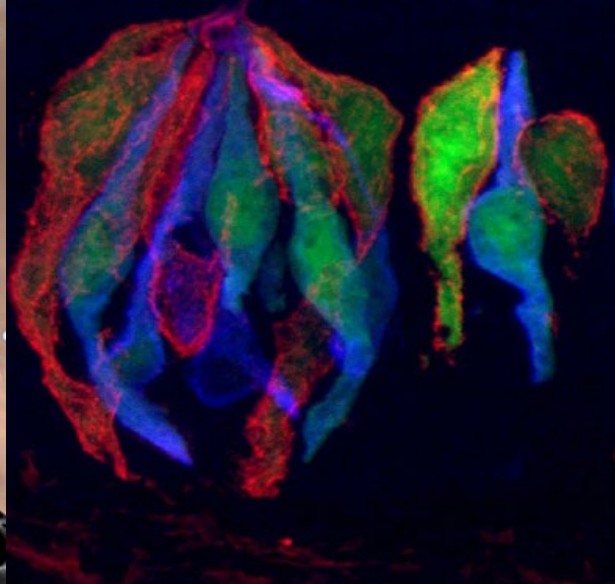
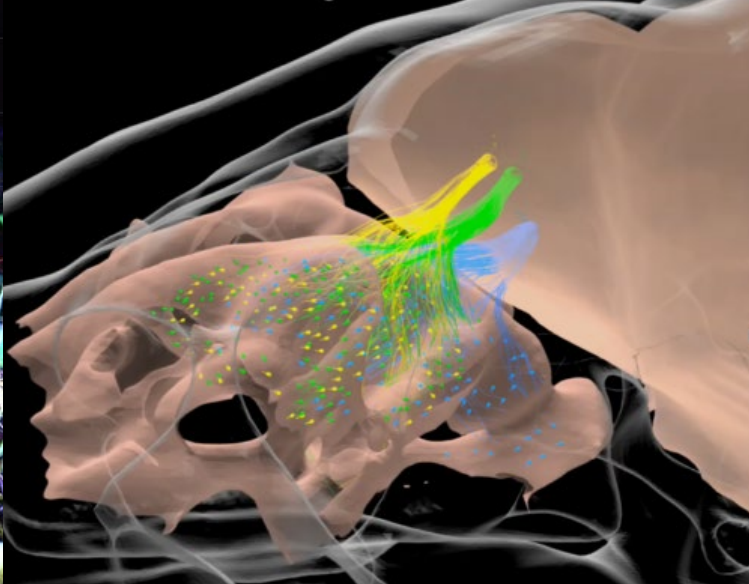




Les sens chimiques
Prof. Alan Carleton
Département de Neurosciences Fondamentales



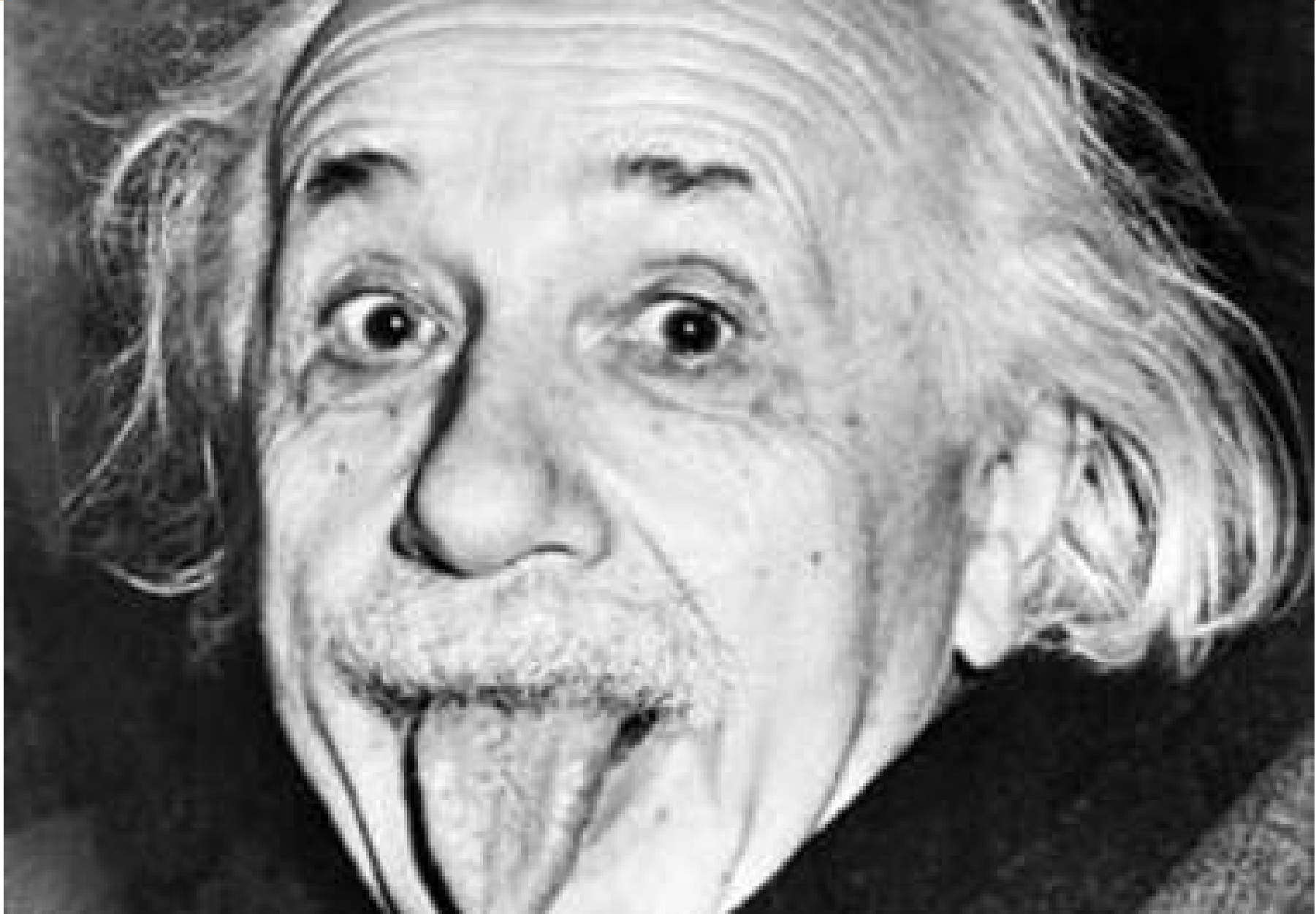
Introduction: Les sens chimiques



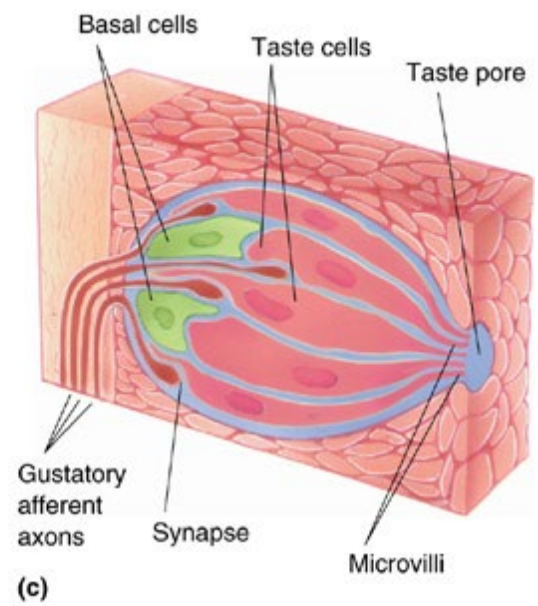
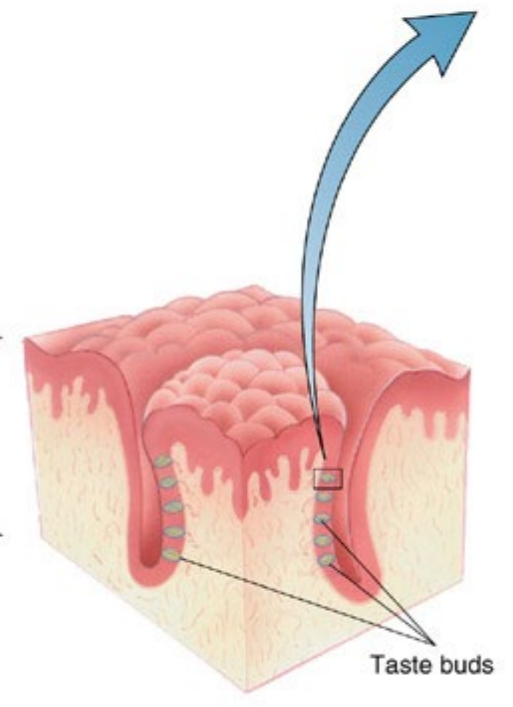
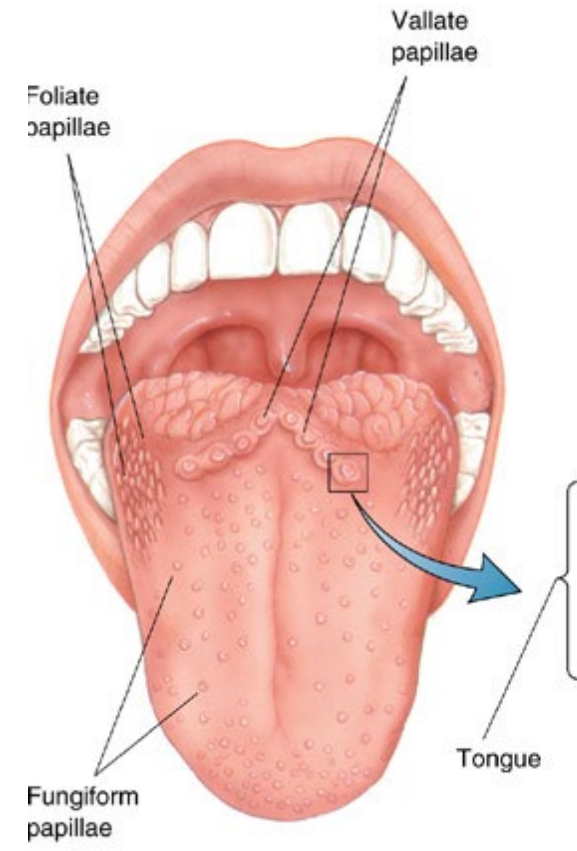
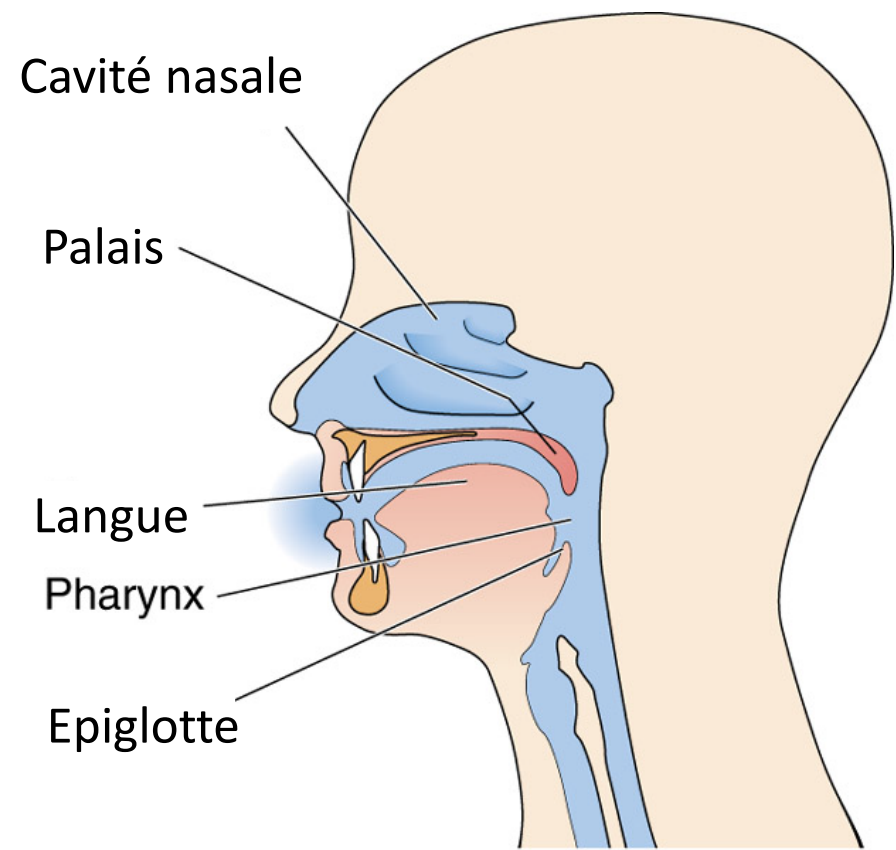
- **Gustation:** La perception des goûts
- **Olfaction:** La perception des odeurs (épithélium olfactif principal et système olfactif principal)
- Perception des phéromones (organe voméronasal et système olfactif accessoire)



Gustation: perception des goûts



Localisation des organes sensoriels: les bourgeons du goût



Les 5 modalités (composantes) du goût

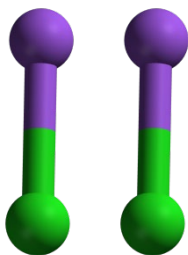


Salé



NaCl

KCl

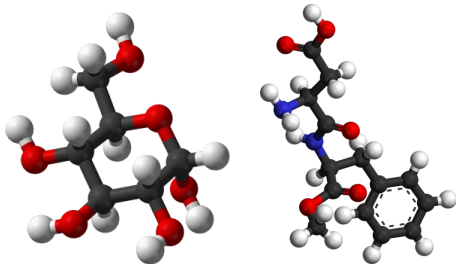


Sucré



Glucose

Aspartame

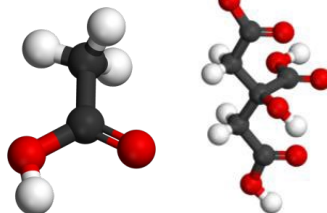


Acide



Acide acétique

Acide citrique

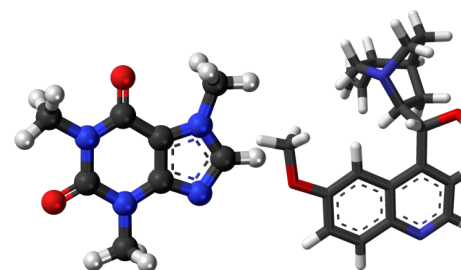


Amer



Caffeine

Quinine

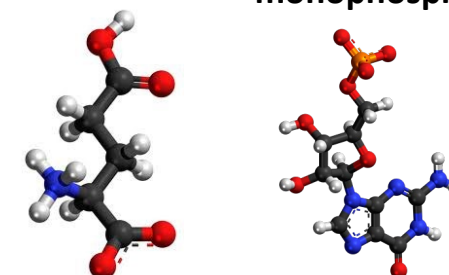


Umami

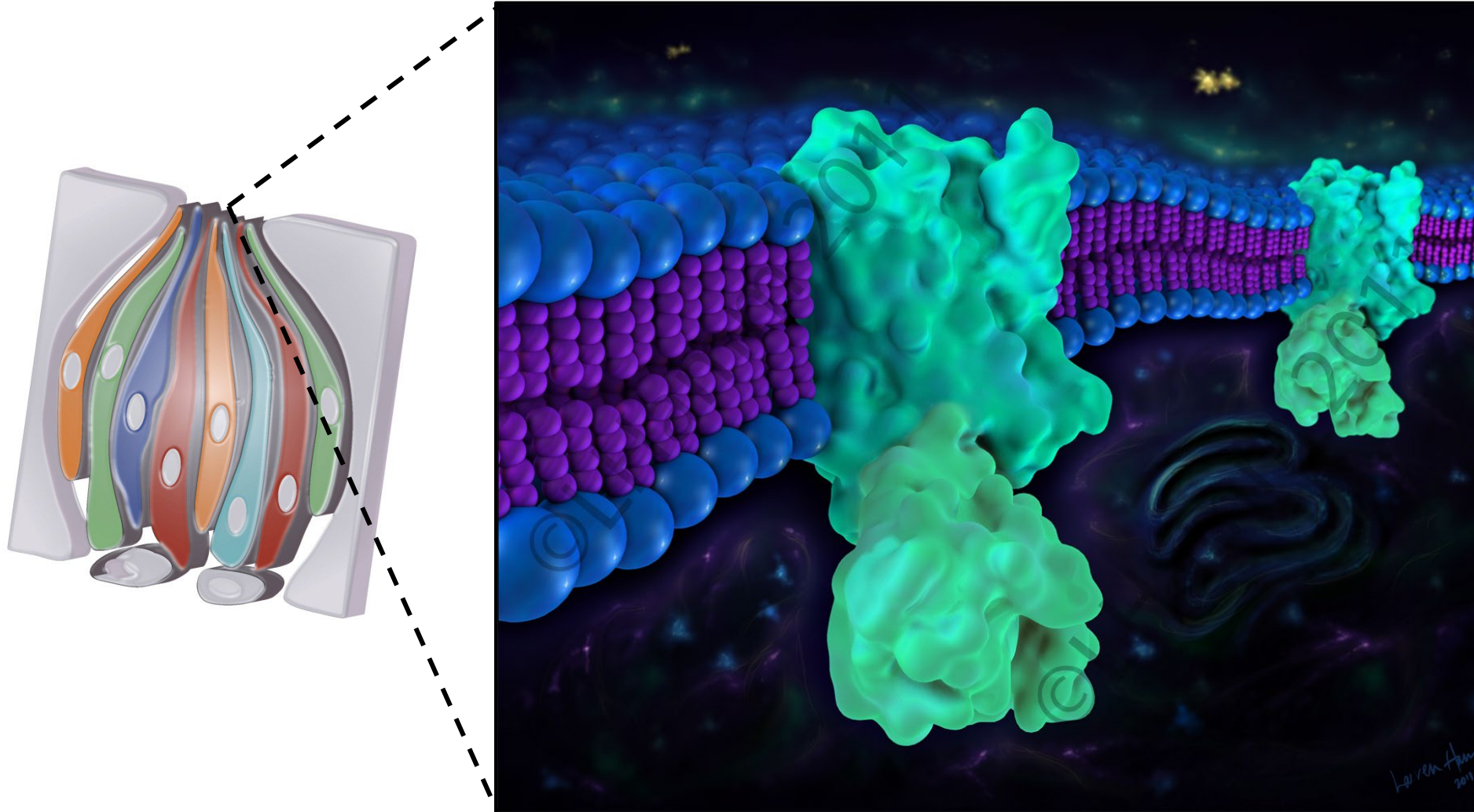


Glutamate

Guanosine monophosphate



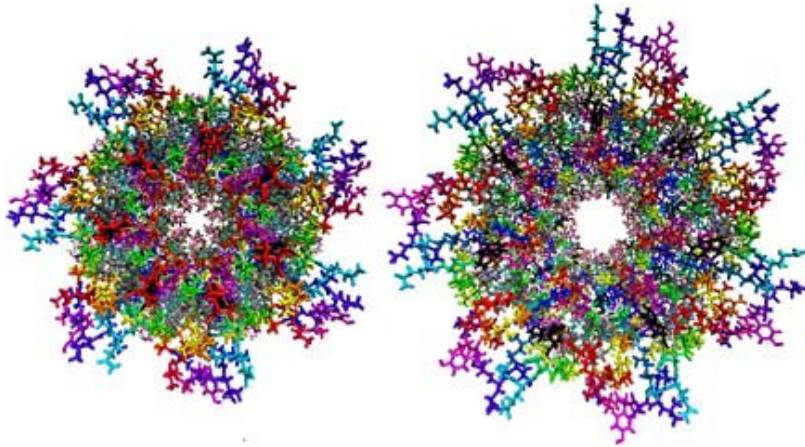
Les récepteurs gustatifs sont localisés sur la partie apicale des cellules réceptrices du goût



Les récepteurs gustatifs

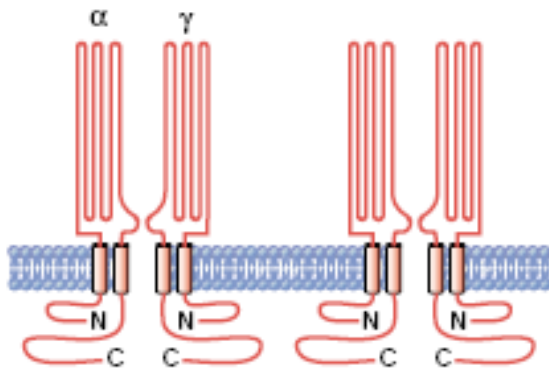


Canaux ioniques



Salé

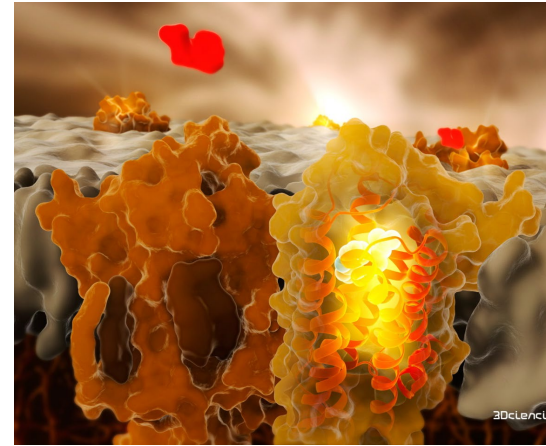
Acide



ENAC

Otop1

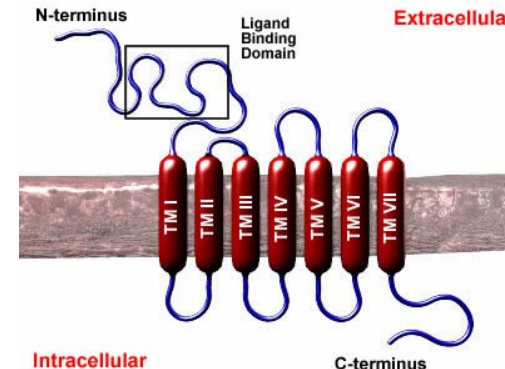
Récepteurs métabotropiques



Sucré

Umami

Amer



T1R2/T1R3

T1R1/T1R3

40 T2Rs

Hétérodimères de deux récepteurs métabotropiques différents

Perte de la perception sucrée chez les félins



Sucré

T1R2/T1R3



Umami

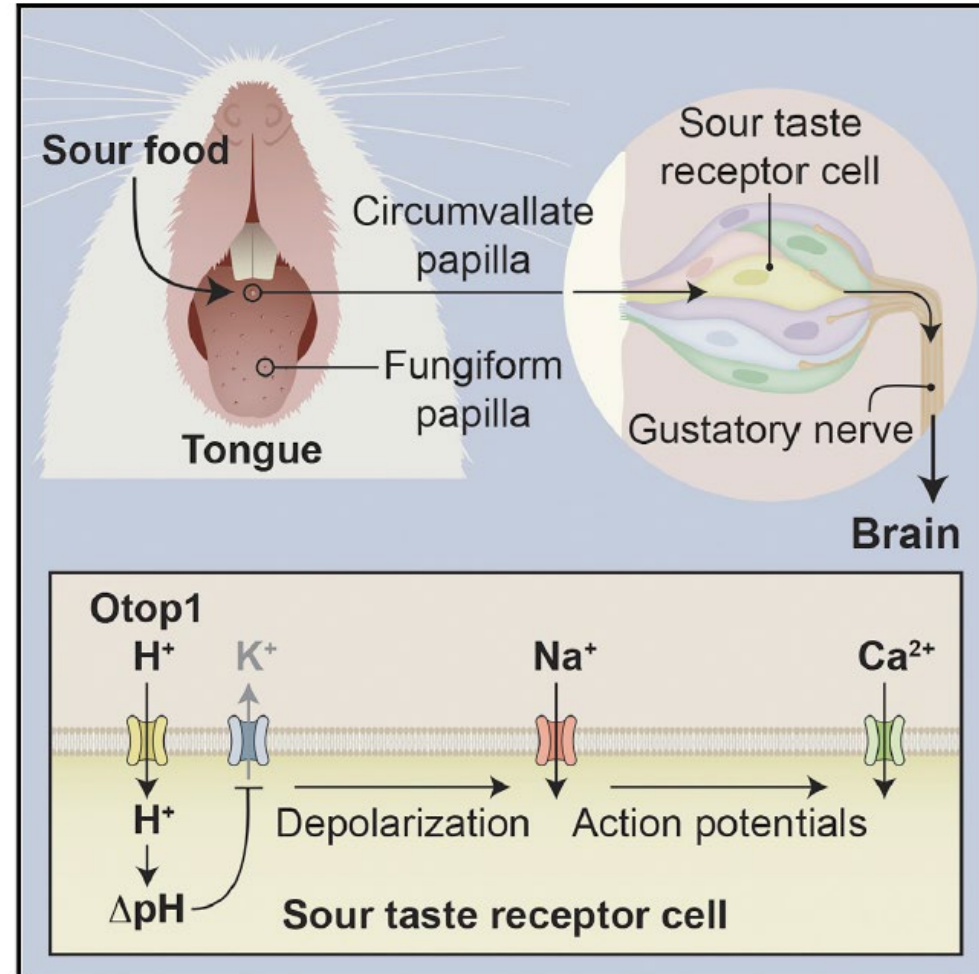
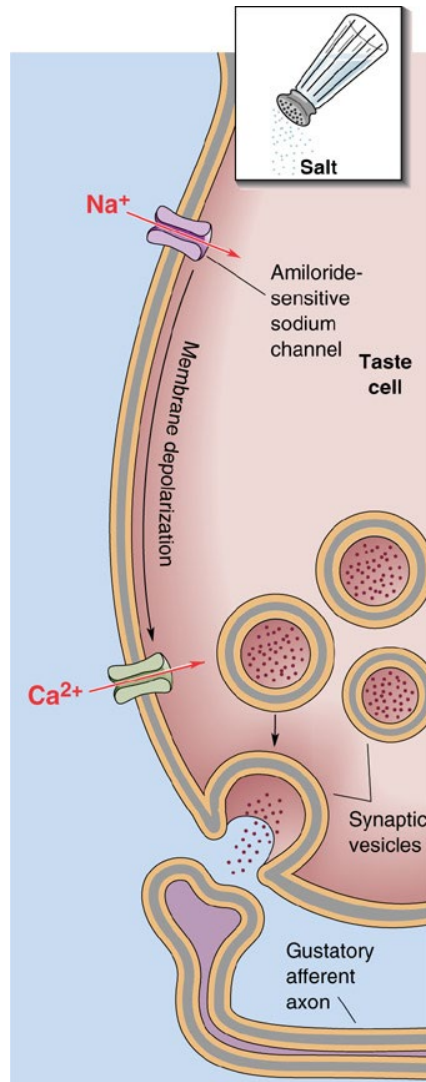
T1R1/T1R3

Transduction du signal gustatif



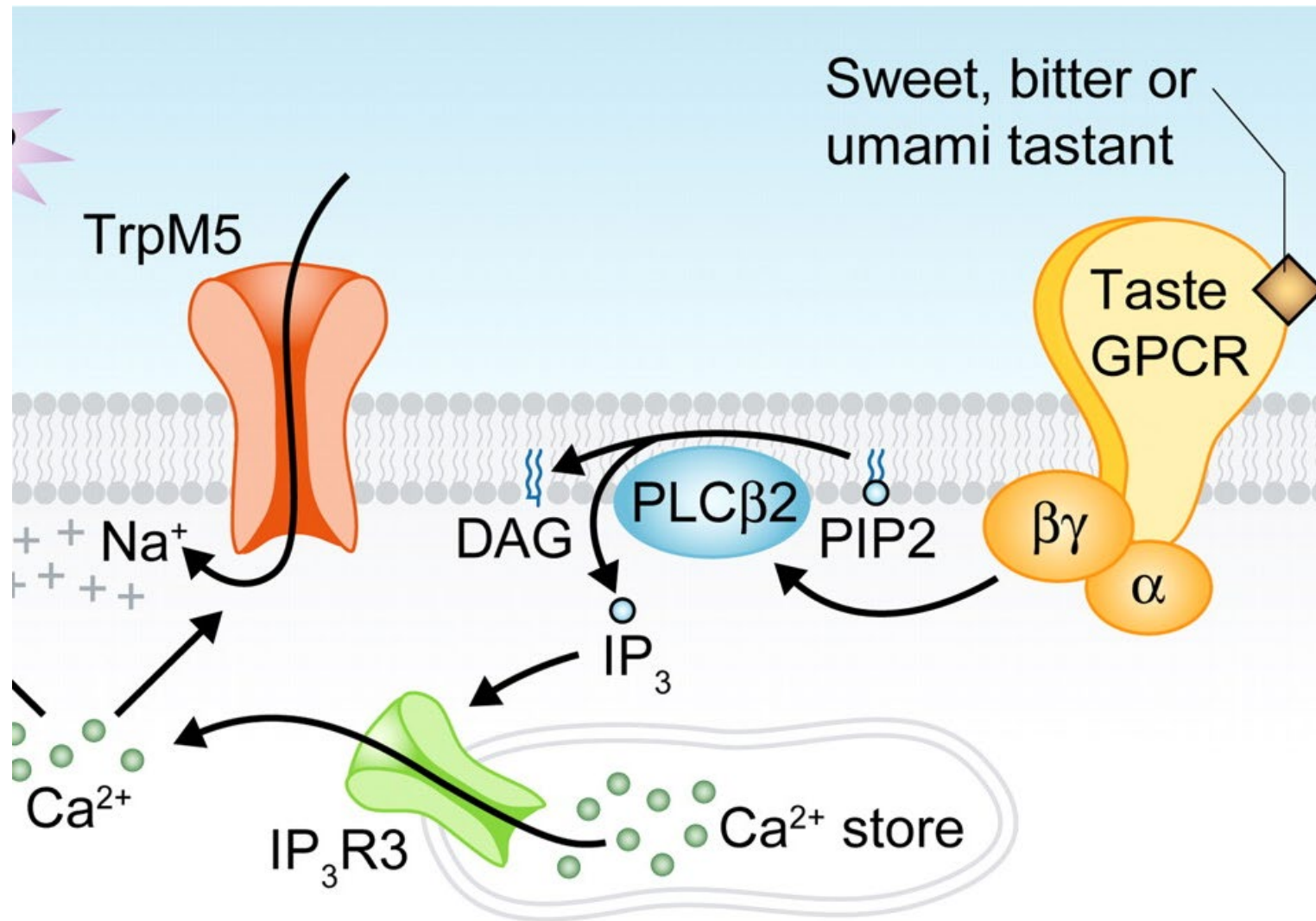
ENAC

Epithelial Na Chan.

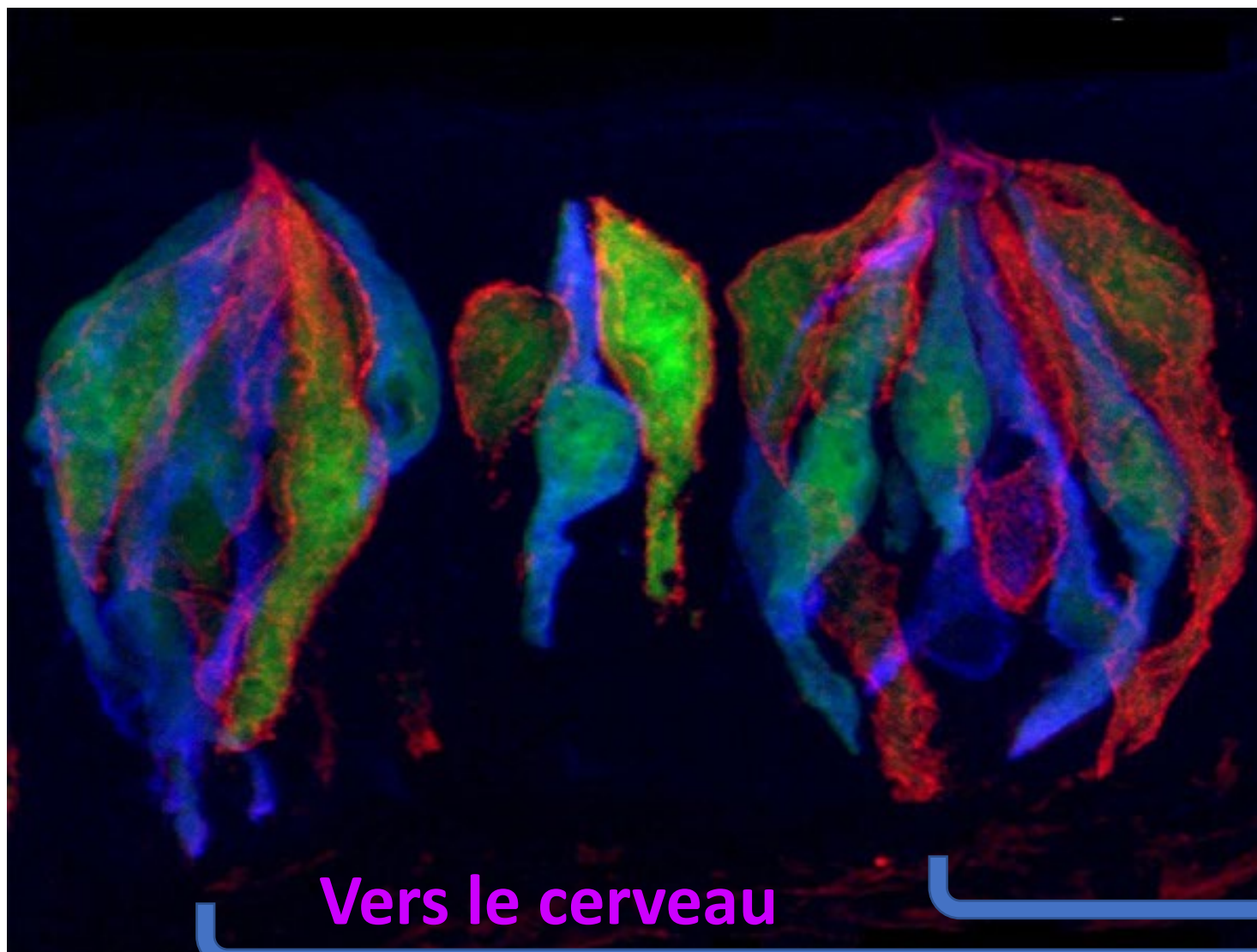
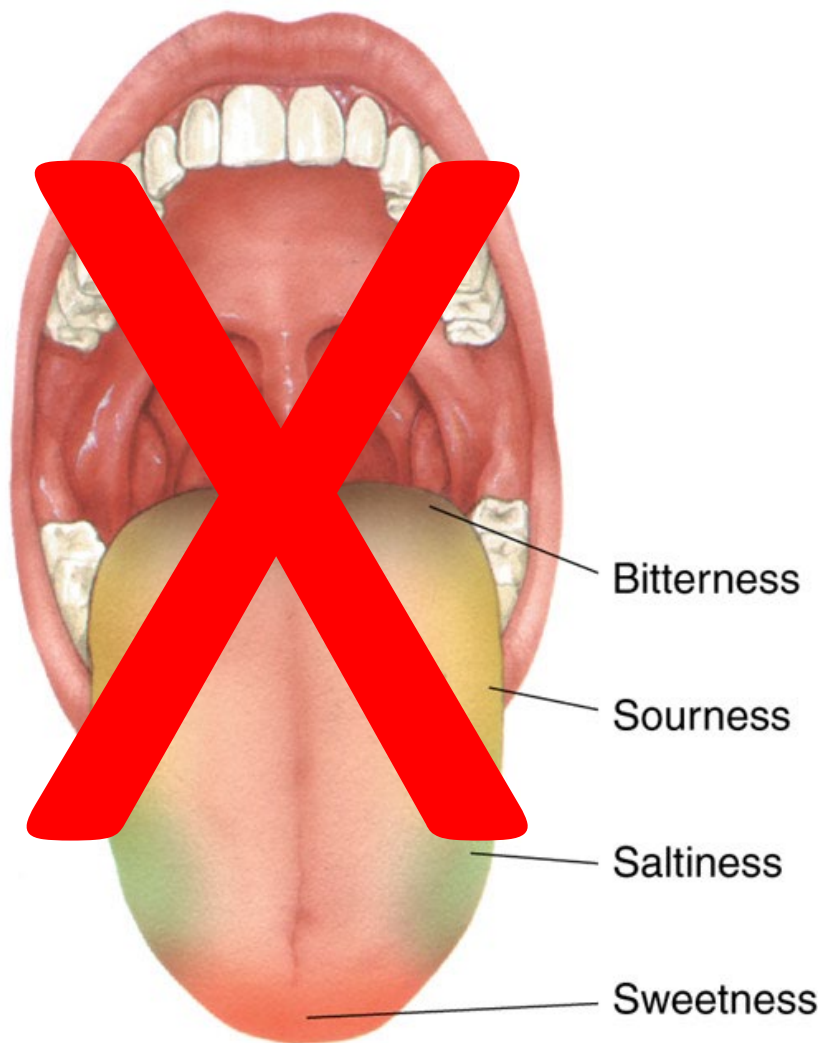


Teng et al. Current biology (2019)
Zhang et al. Cell (2019)

Transduction du signal gustatif



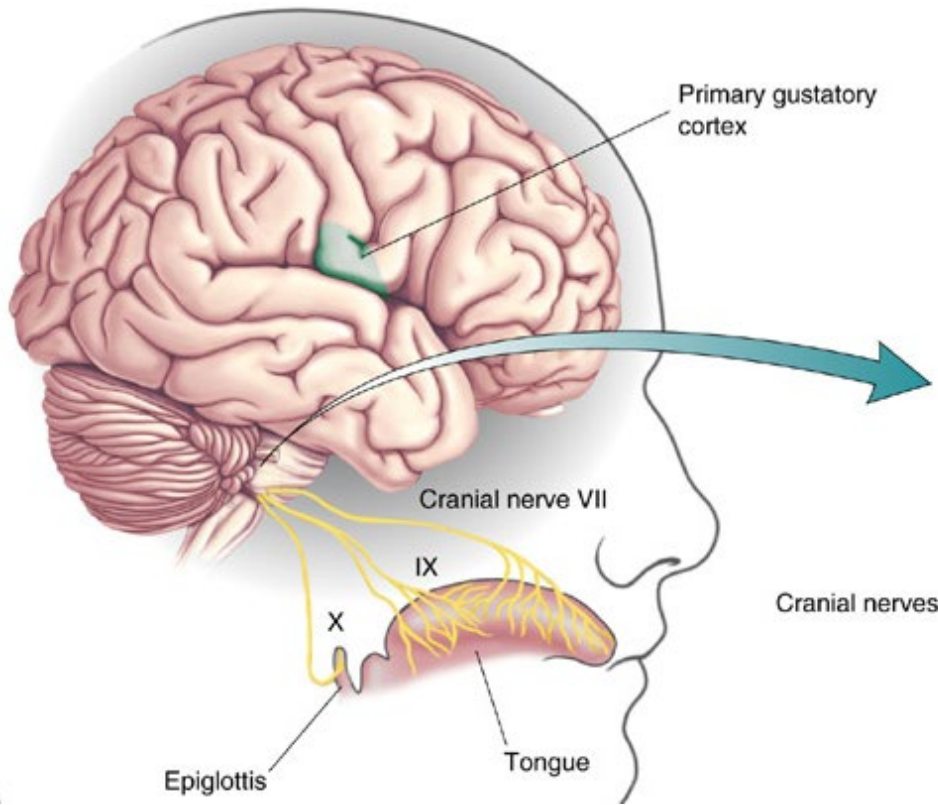
Représentation sensorielle des goûts



Vers le cerveau



Voie gustative



Primary gustatory cortex

Cranial nerve VII

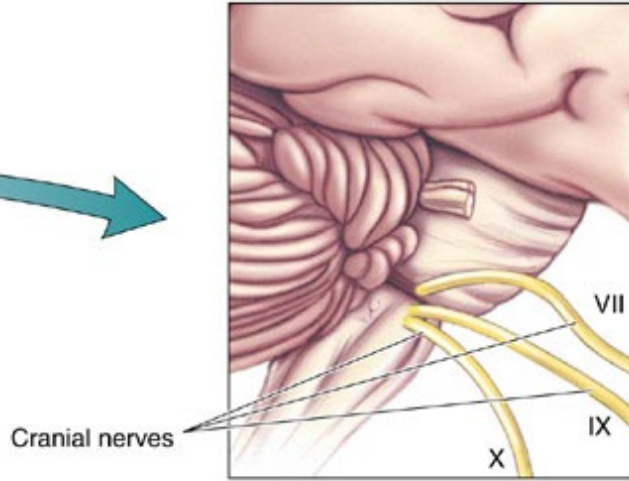
IX

X

Epiglottis

Tongue

Nerf facial (VII)
Nerf glossopharyngien (IX)
Nerf vague (X)

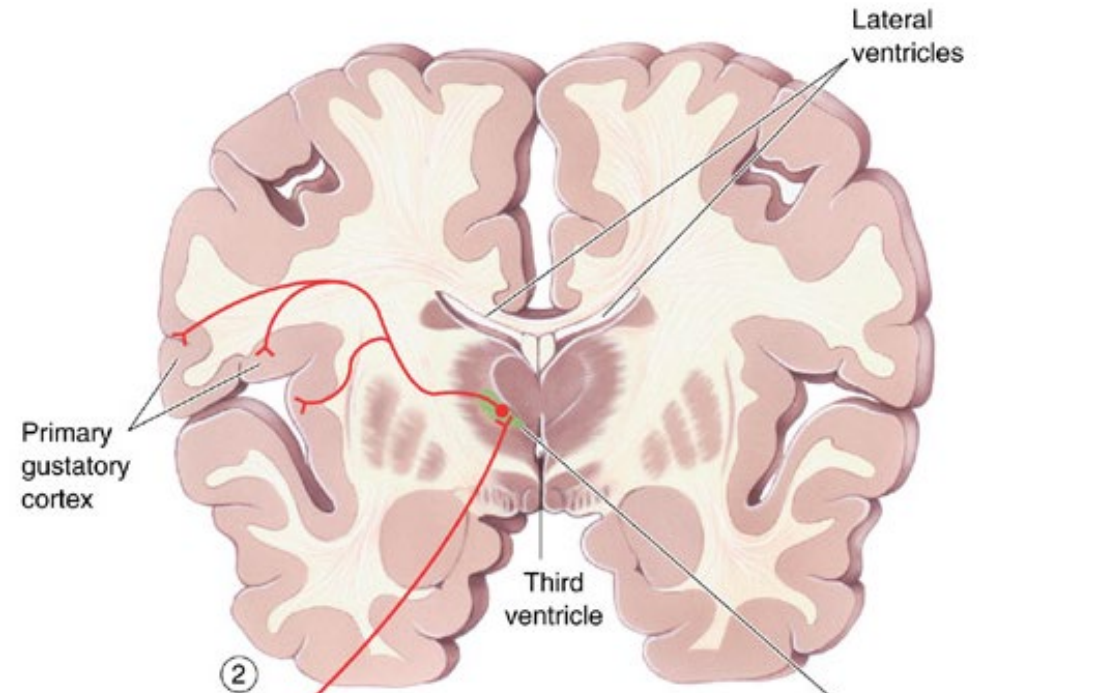


Cranial nerves

VII

IX

X



Lateral ventricles

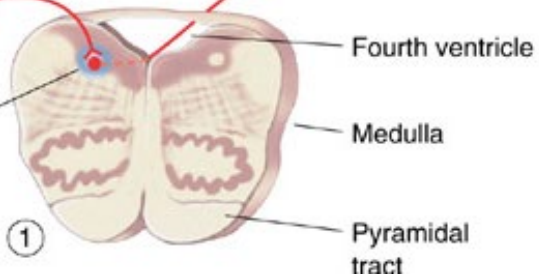
Primary gustatory cortex

Third ventricle

Left ventral posterior medial (VPM) nucleus of the thalamus

Afferents from tongue and epiglottis

Noyau du tractus solitaire



Fourth ventricle

Medulla

Pyramidal tract

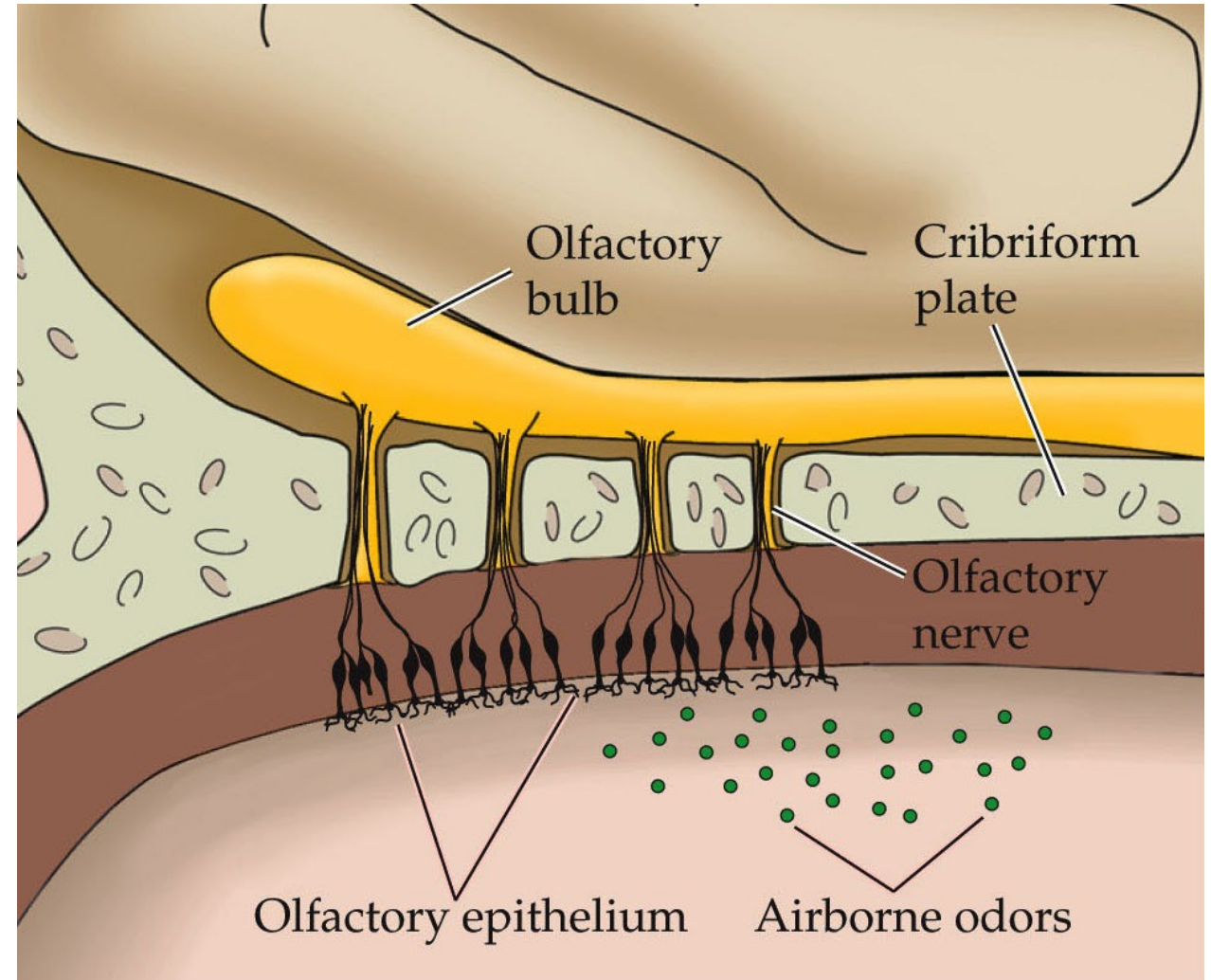
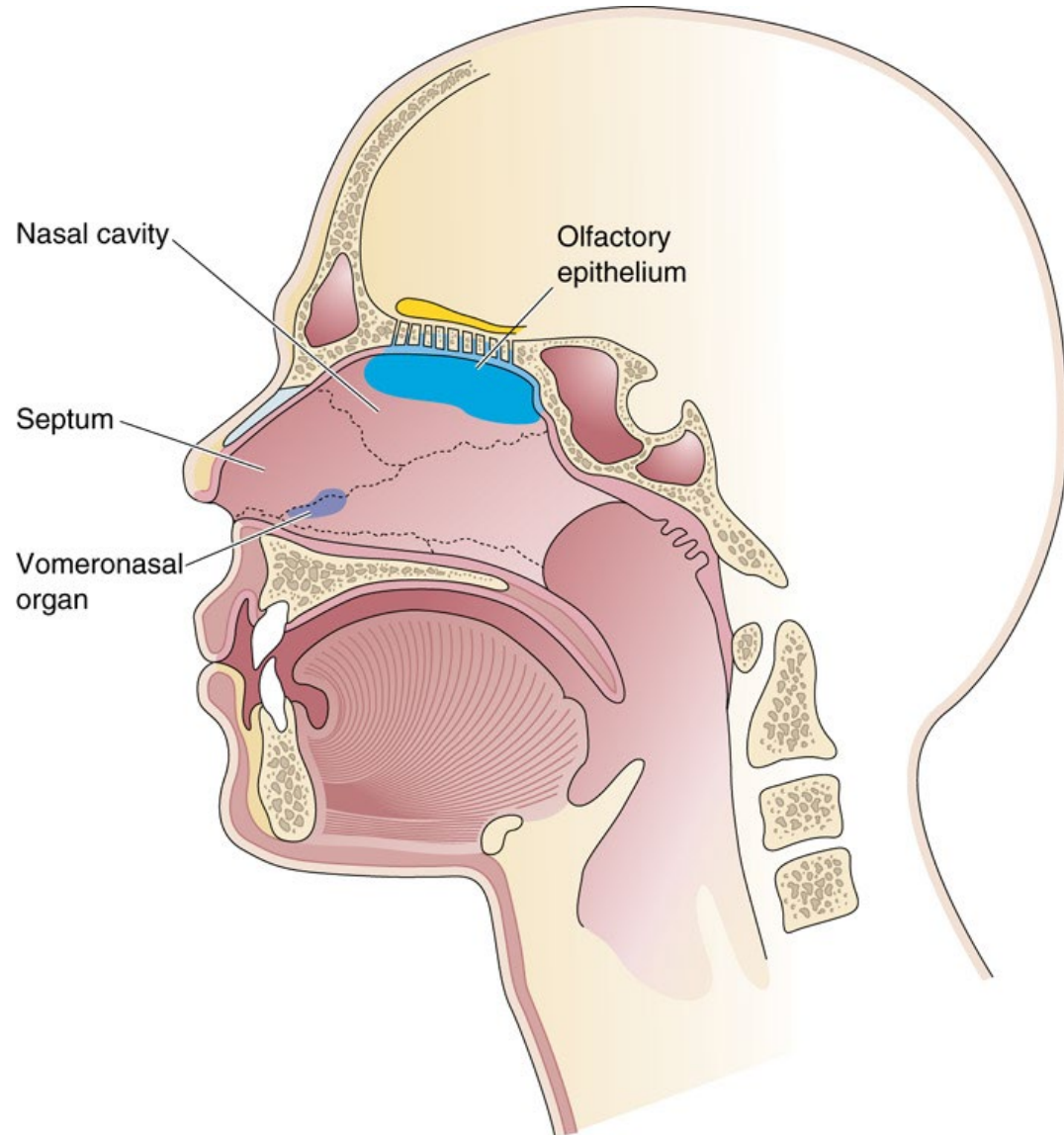
①

②

Olfaction: perception des odeurs



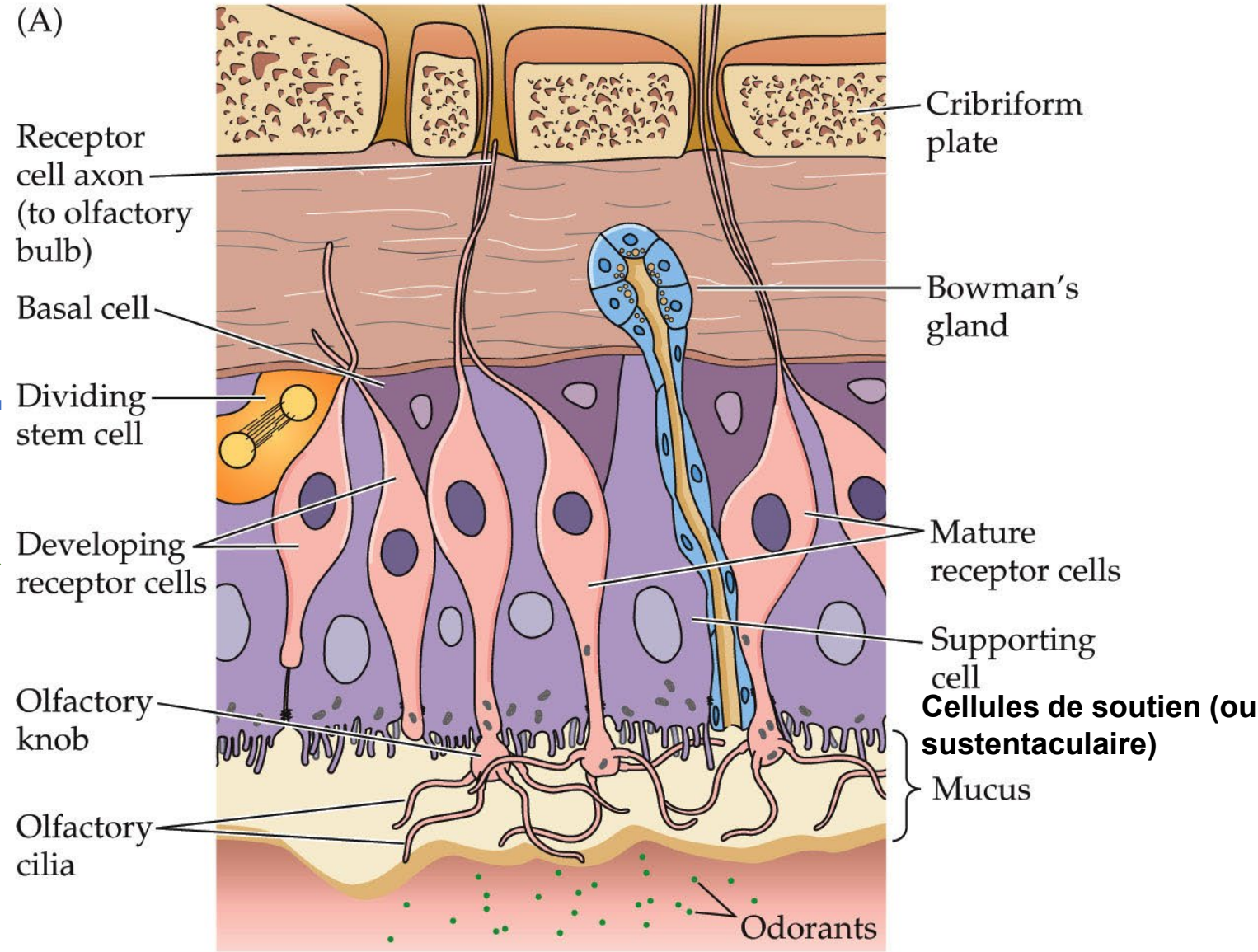
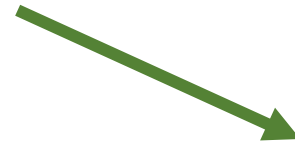
Localisation de l'organe sensoriel: l'épithélium olfactif



L'épithélium olfactif

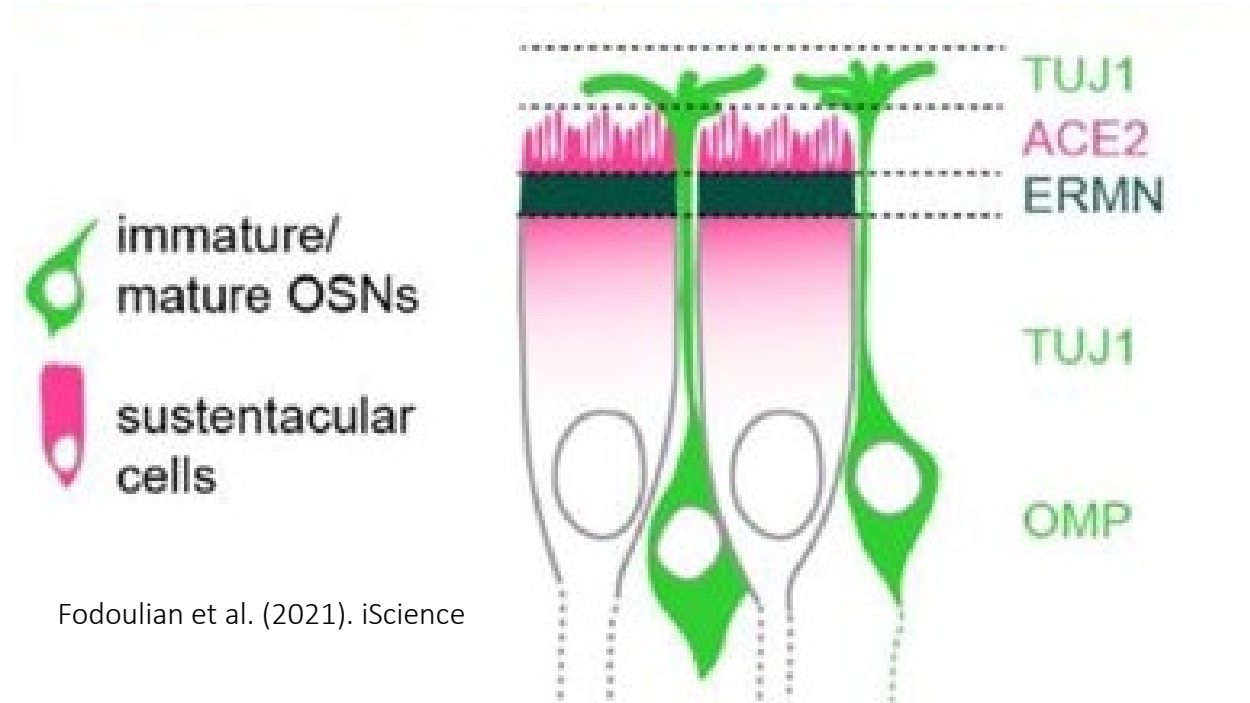
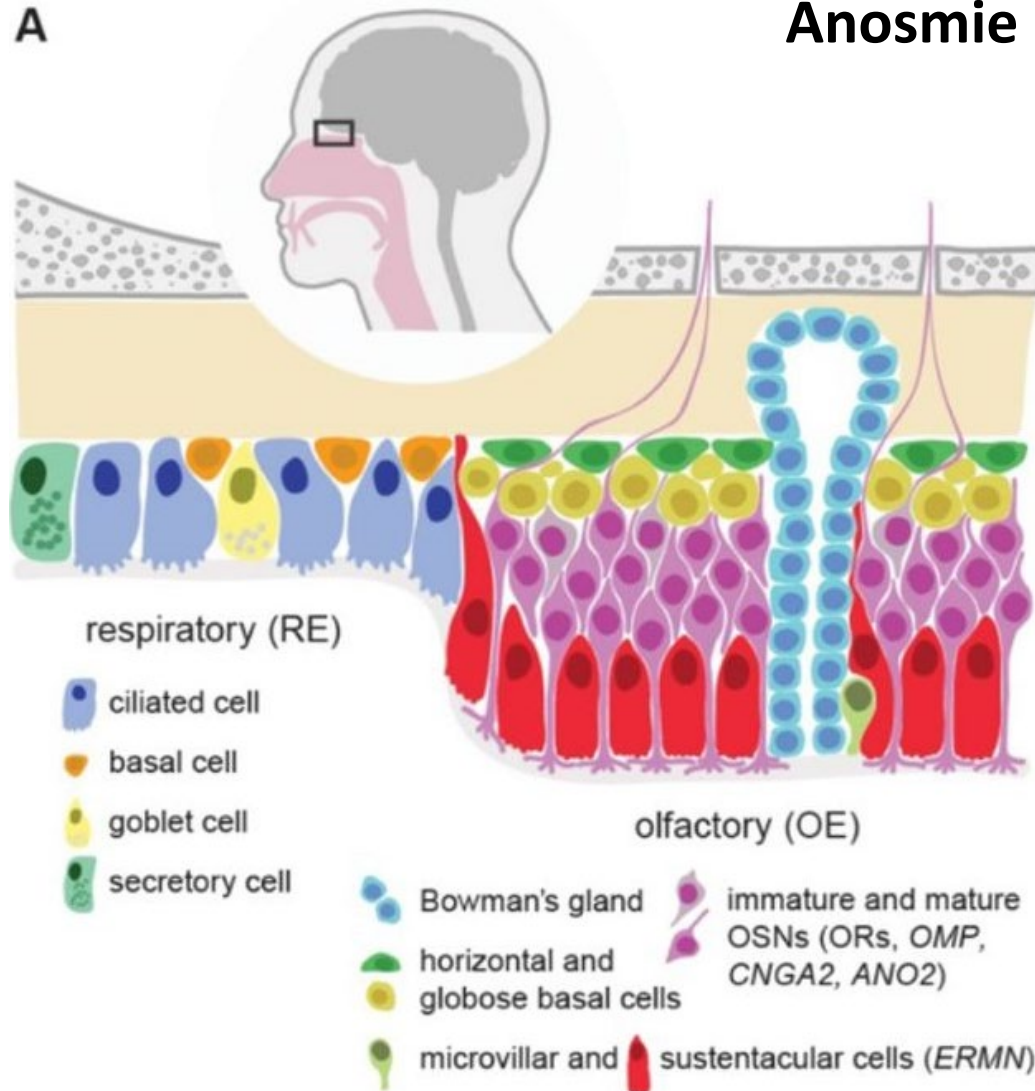
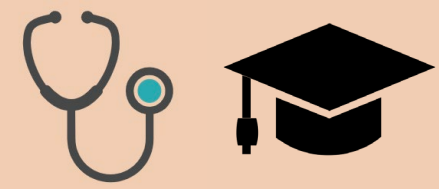


Neurogenèse des cellules sensorielles olfactives tout au long de la vie



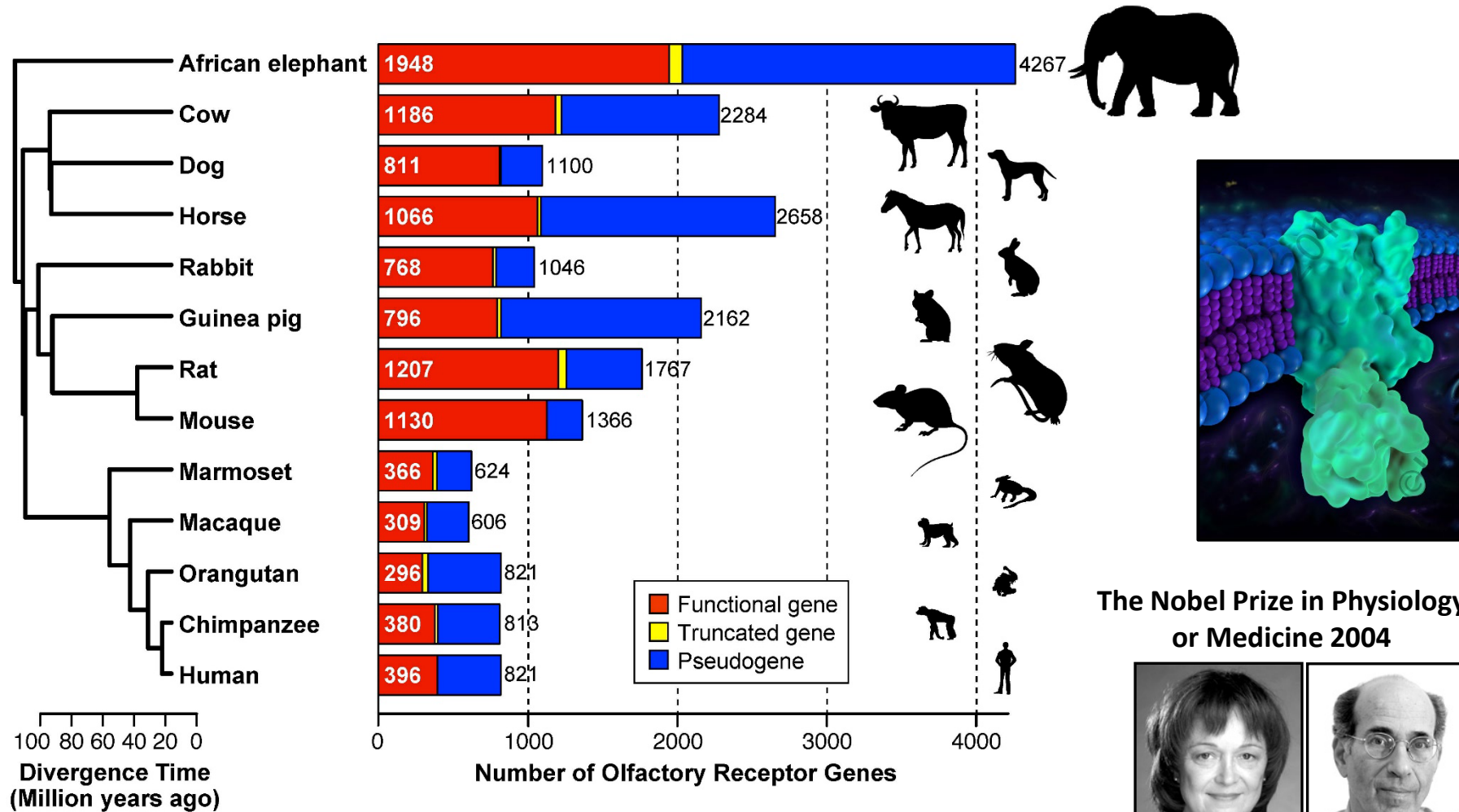
NEUROSCIENCE, Fourth Edition, Figure 15.6 (Part 1)

Anosmie induite par le Sars-cov2



Destruction des cellules de soutien (sustentaculaire) conduisant à un dysfonctionnement des neurones olfactifs

Les récepteurs olfactifs: récepteurs métabotropiques (GPCR)



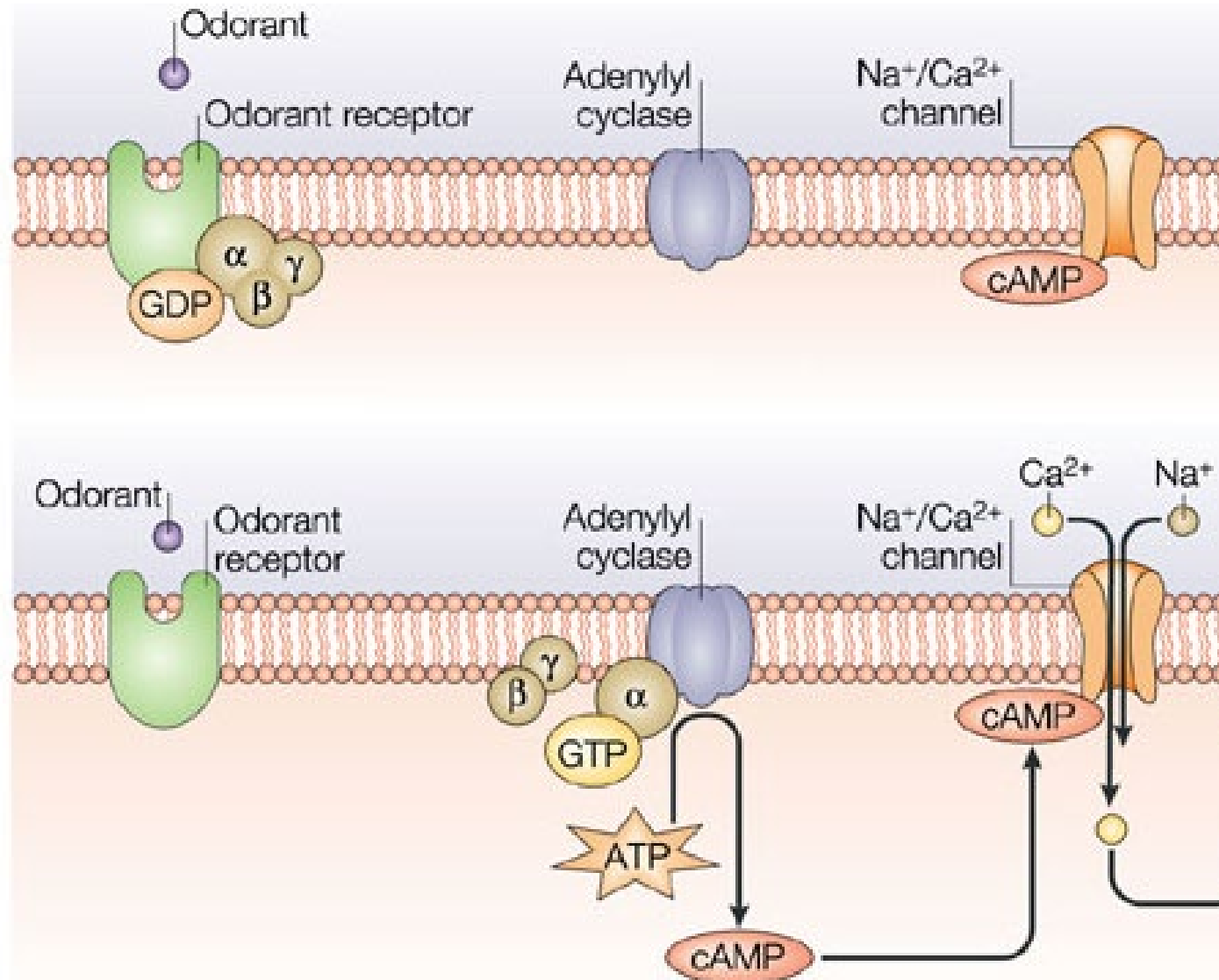
The Nobel Prize in Physiology or Medicine 2004



L. Buck R. Axel

Yoshihito Niimura, Atsushi Matsui, and Kazushige Touhara
 Genome Research, July, 23, 2014, doi:10.1101/gr.169532.113

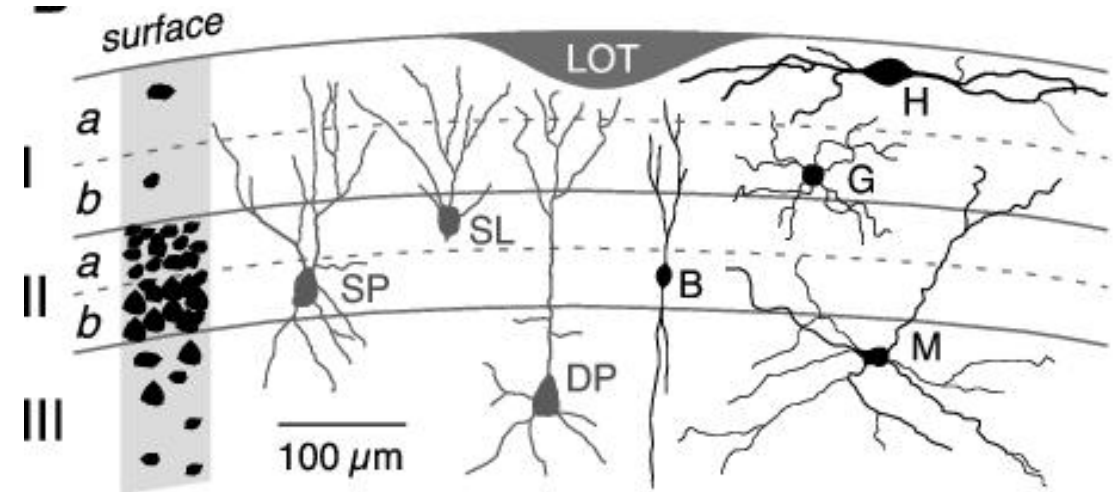
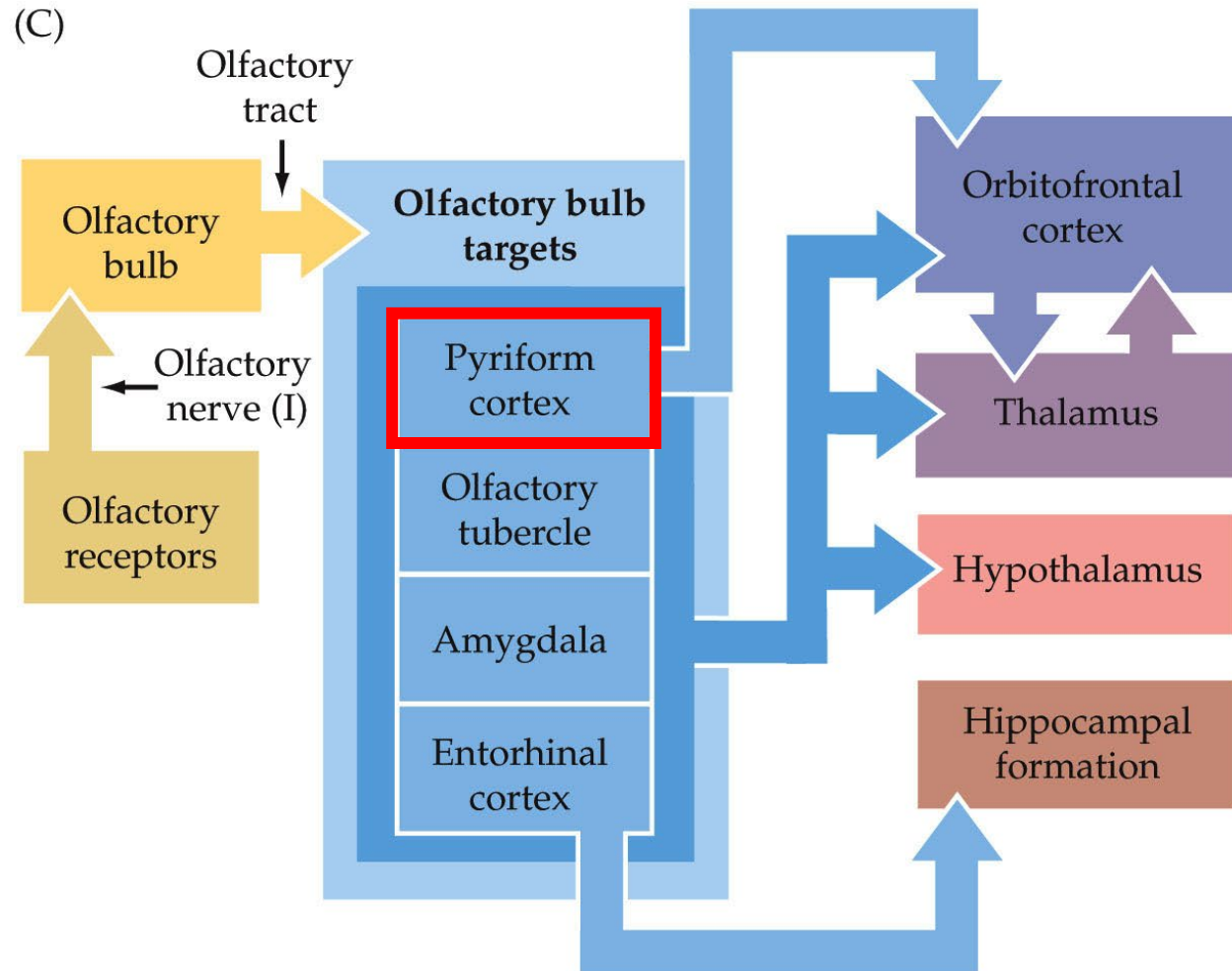
Transduction du signal olfactif



Voie olfactive

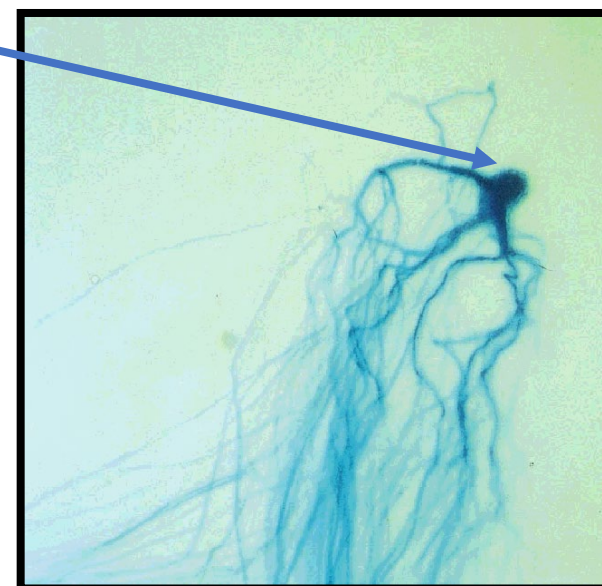
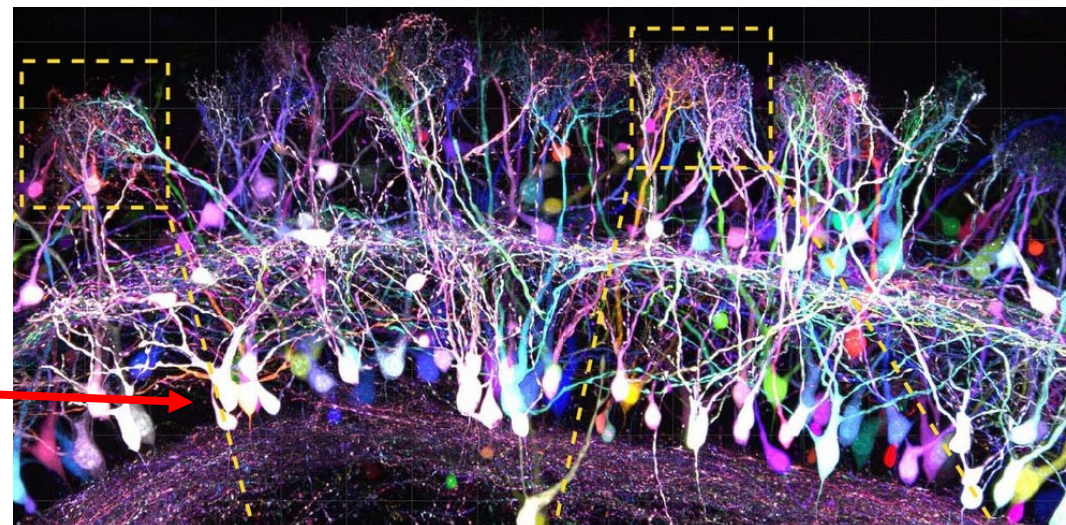
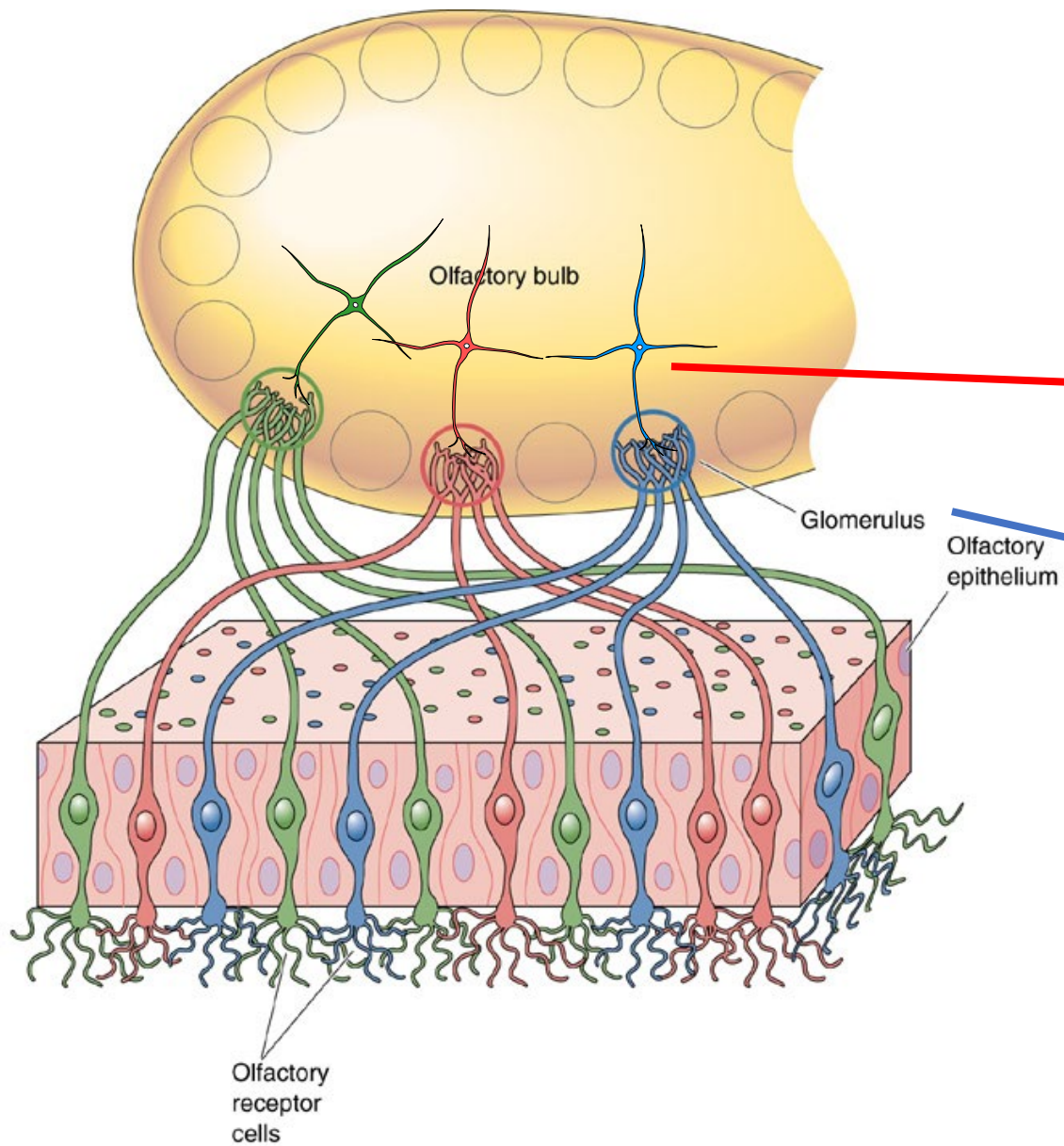


Cortex piriforme/pyriforme = cortex olfactive primaire



**Cortex piriforme n'est pas un neocortex
mais un paleocortex à trois couches**

Les deux principes de la perception olfactive



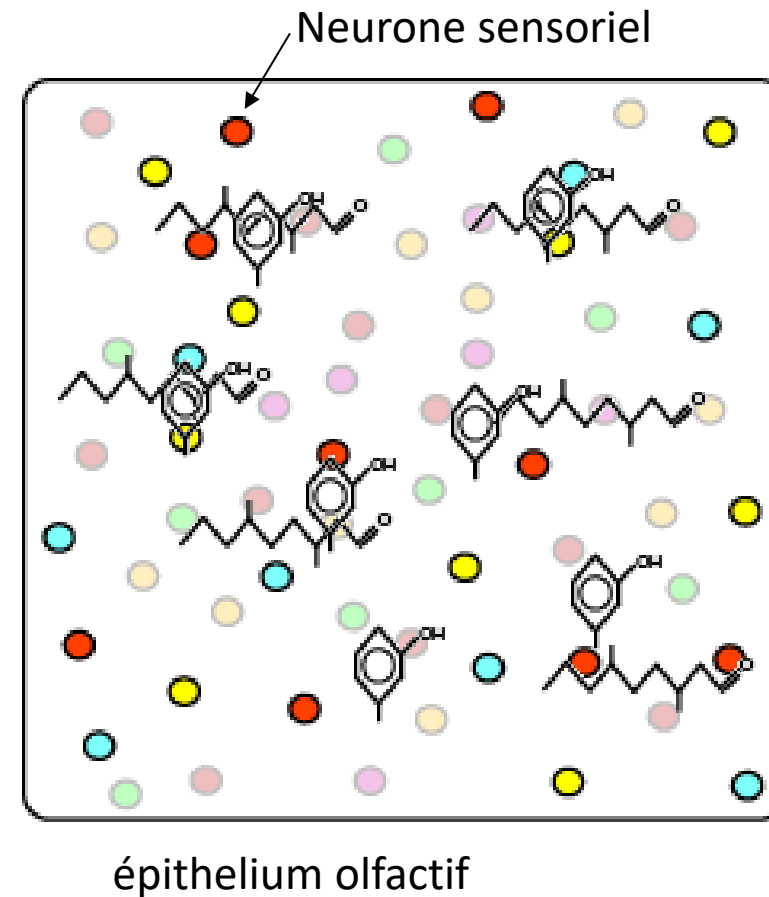
(M50-TauLacZ) Tg mouse

Chémodétection et codage combinatoire

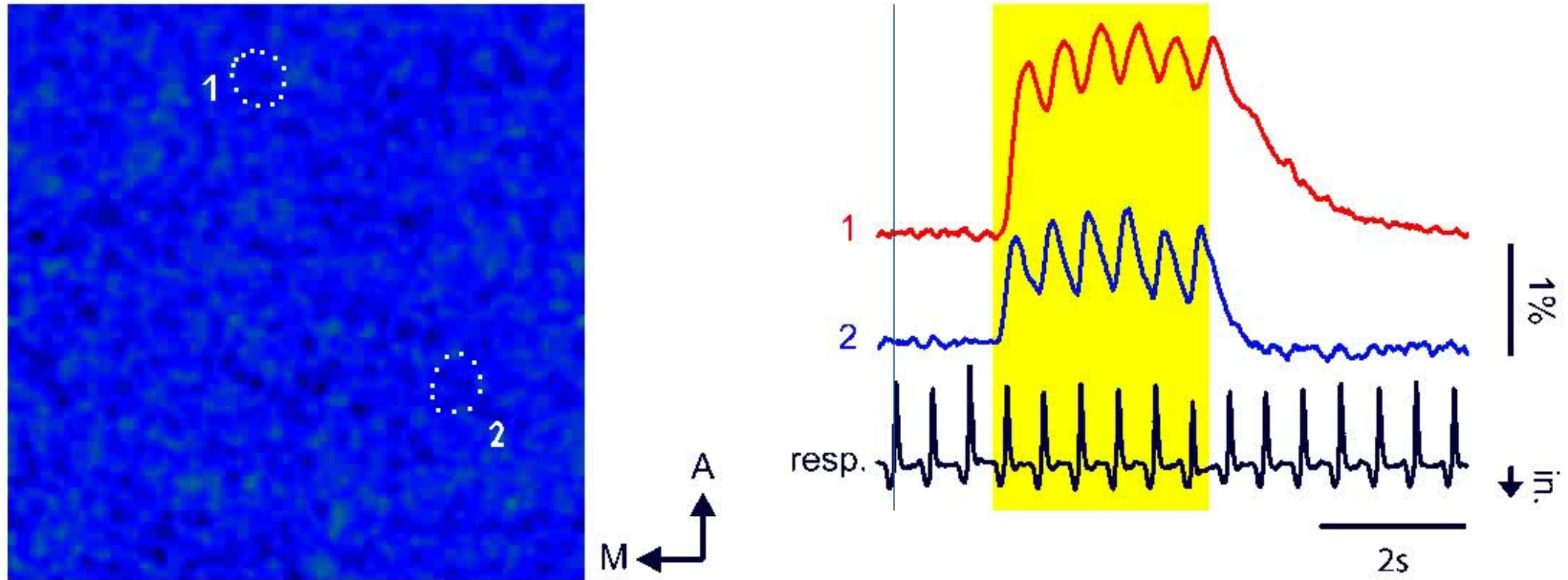


Un récepteur olfactif peut être activé par différentes molécules odorantes

Une molécule odorante peut activer plusieurs récepteurs olfactifs



Réponses glomérulaires aux odeurs

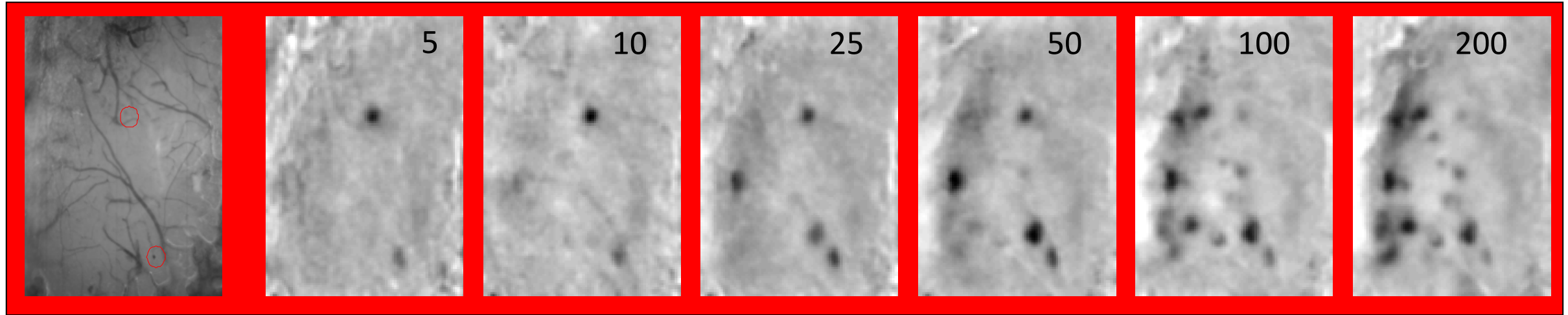


On mesure l'entrée de calcium lors de l'arrivée des PA dans les terminaisons axonales des cellules sensorielles

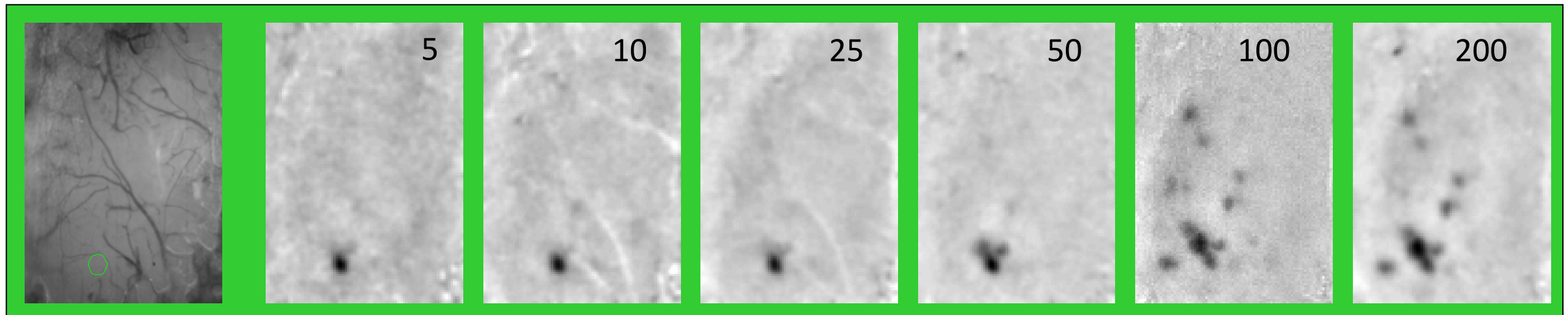
Réponses glomérulaires aux odeurs: identité vs. intensité



Amylacetate



Methyl Benzoate



Codage combinatoire des odeurs

