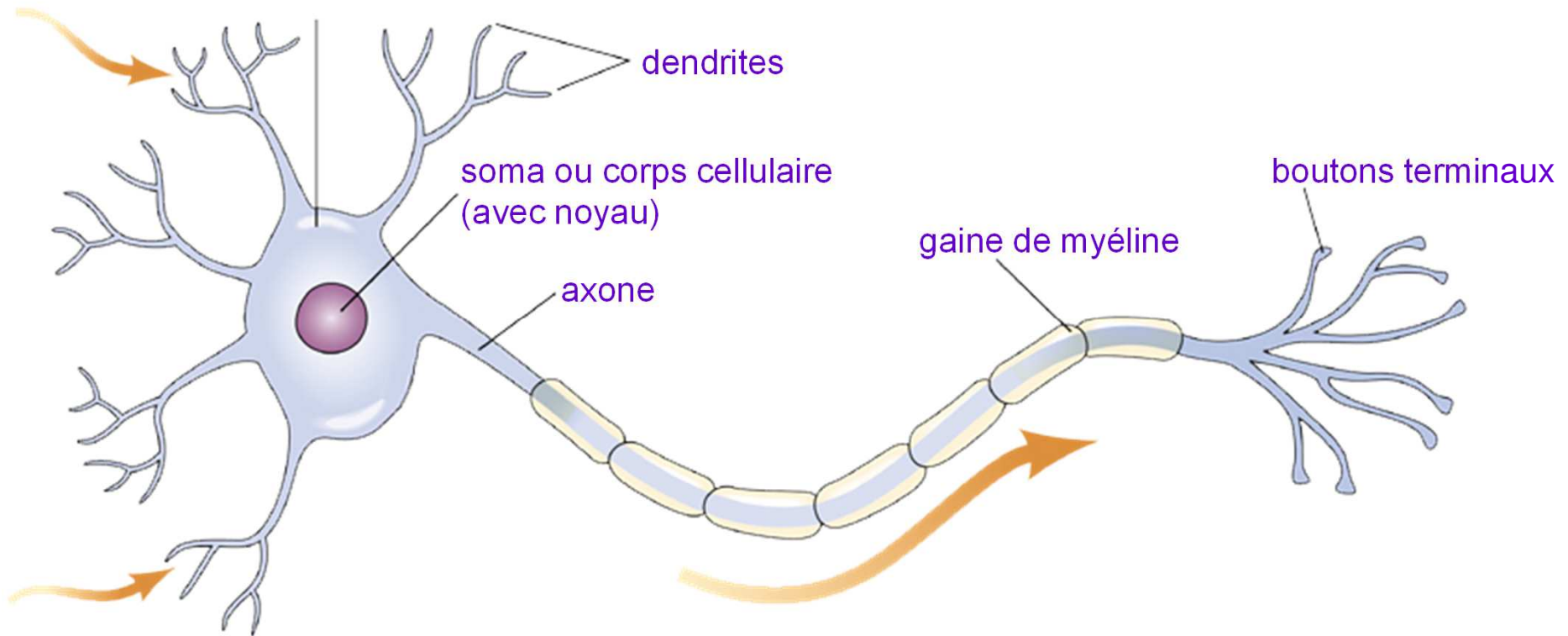


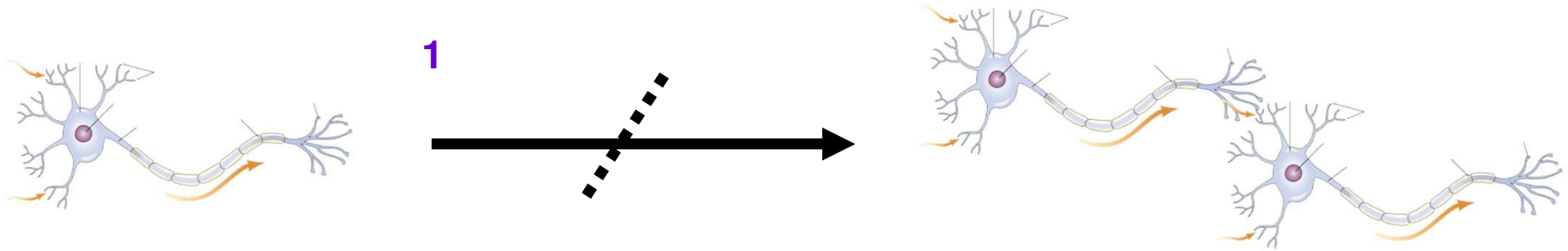
Bases de communication cellulaire:
systeme nerveux – systeme endocrinien

cesar.mattei@univ-angers.fr

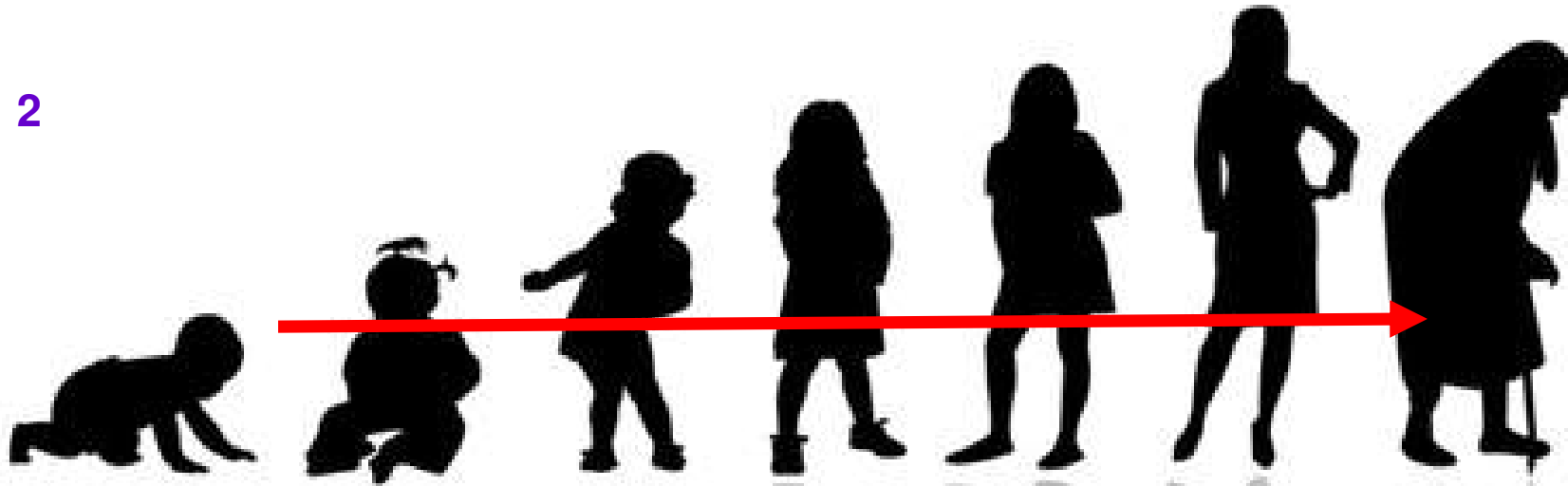
Les neurones : une polarité structurale et fonctionnelle



Les neurones : des caractéristiques spécifiques

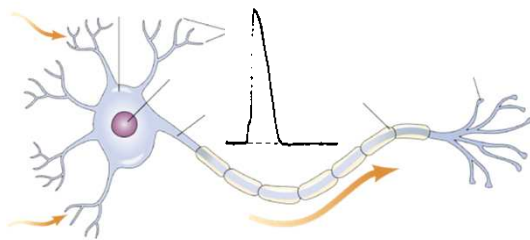


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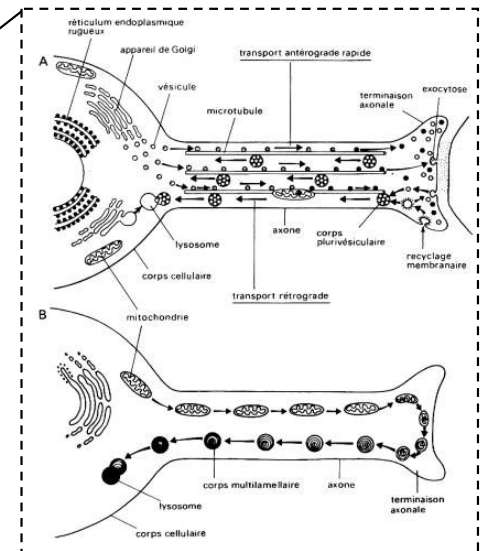
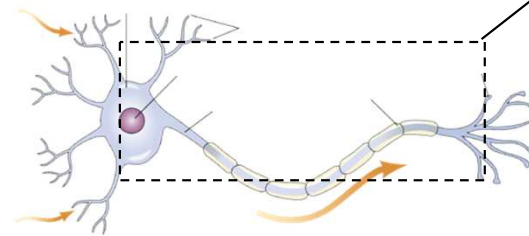


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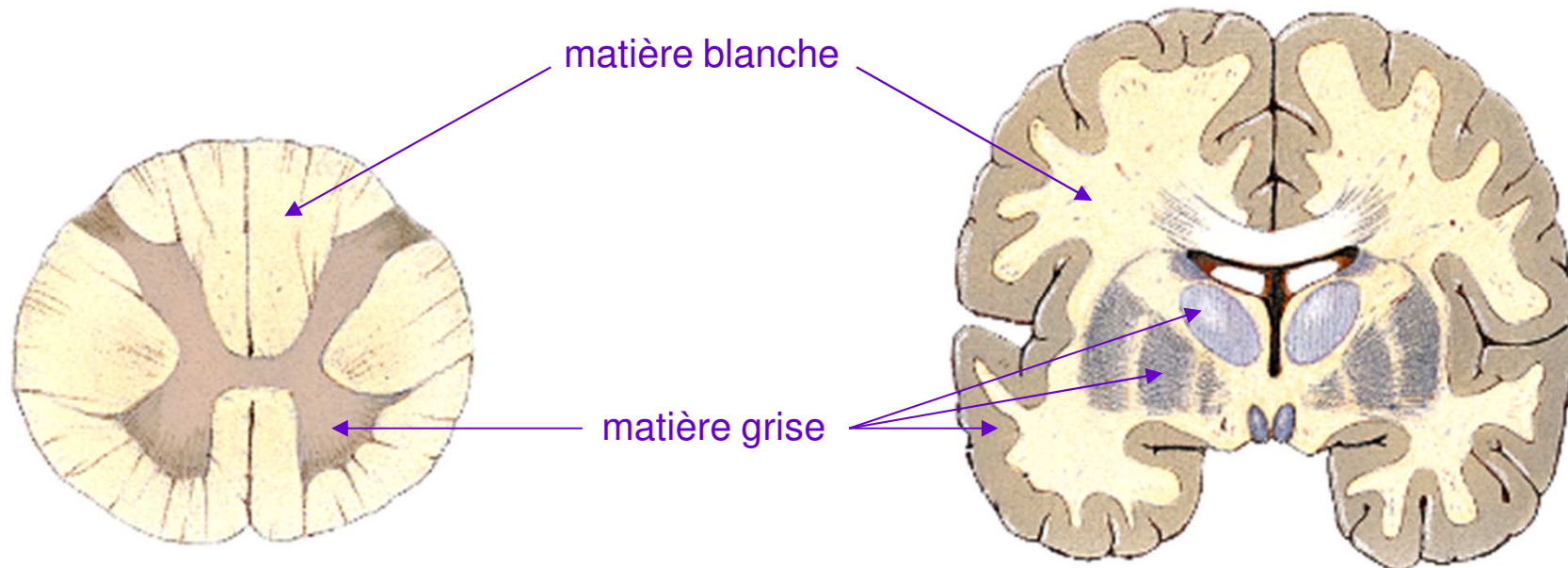
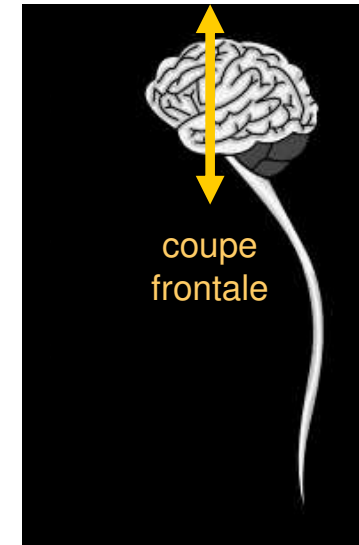
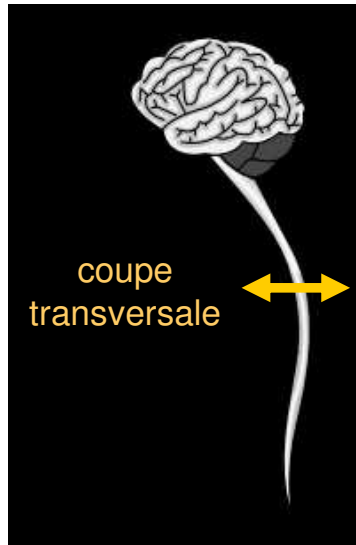
stimulus



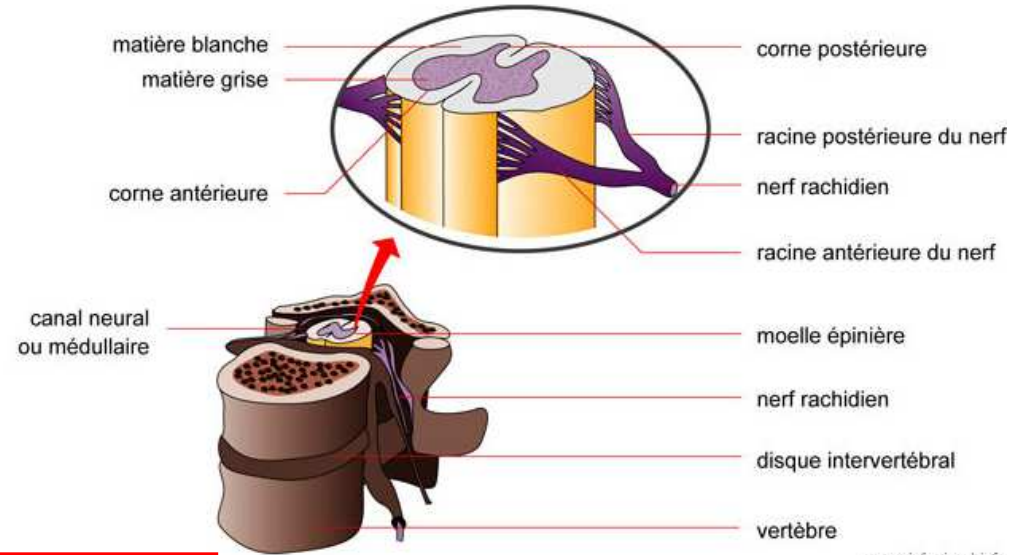
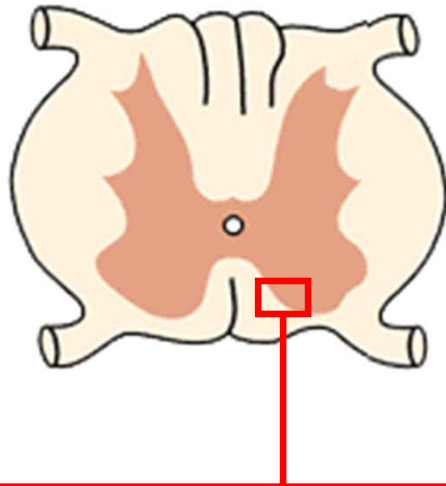
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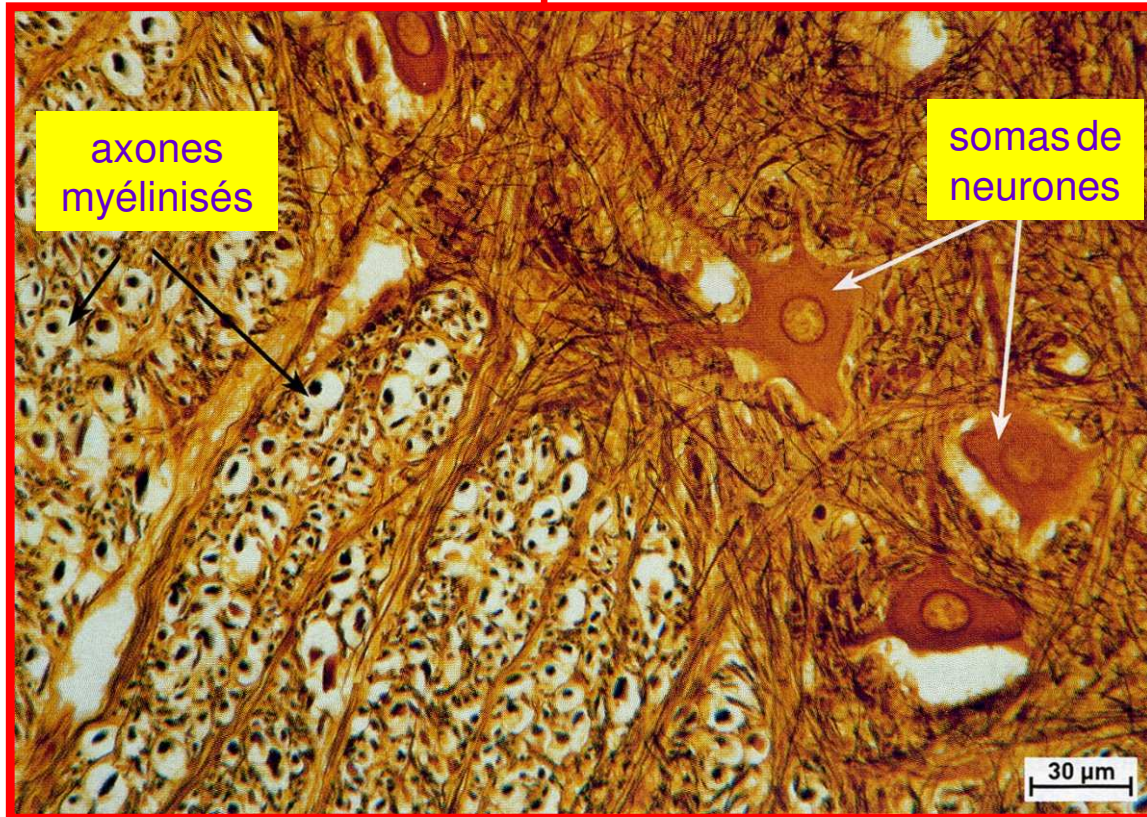
La répartition de la matière grise est \neq dans la moelle et le cerveau



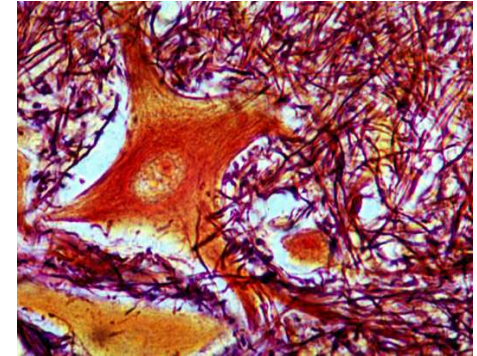
Matière grise et matière blanche contiennent des **éléments neuronaux** ≠



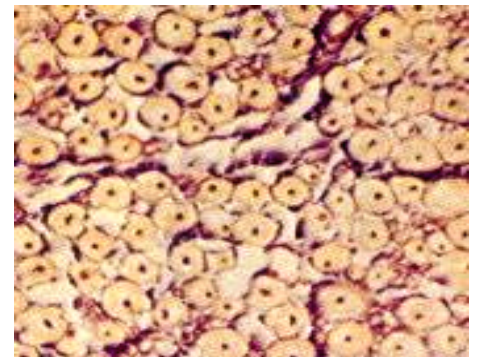
www.infovisual.info



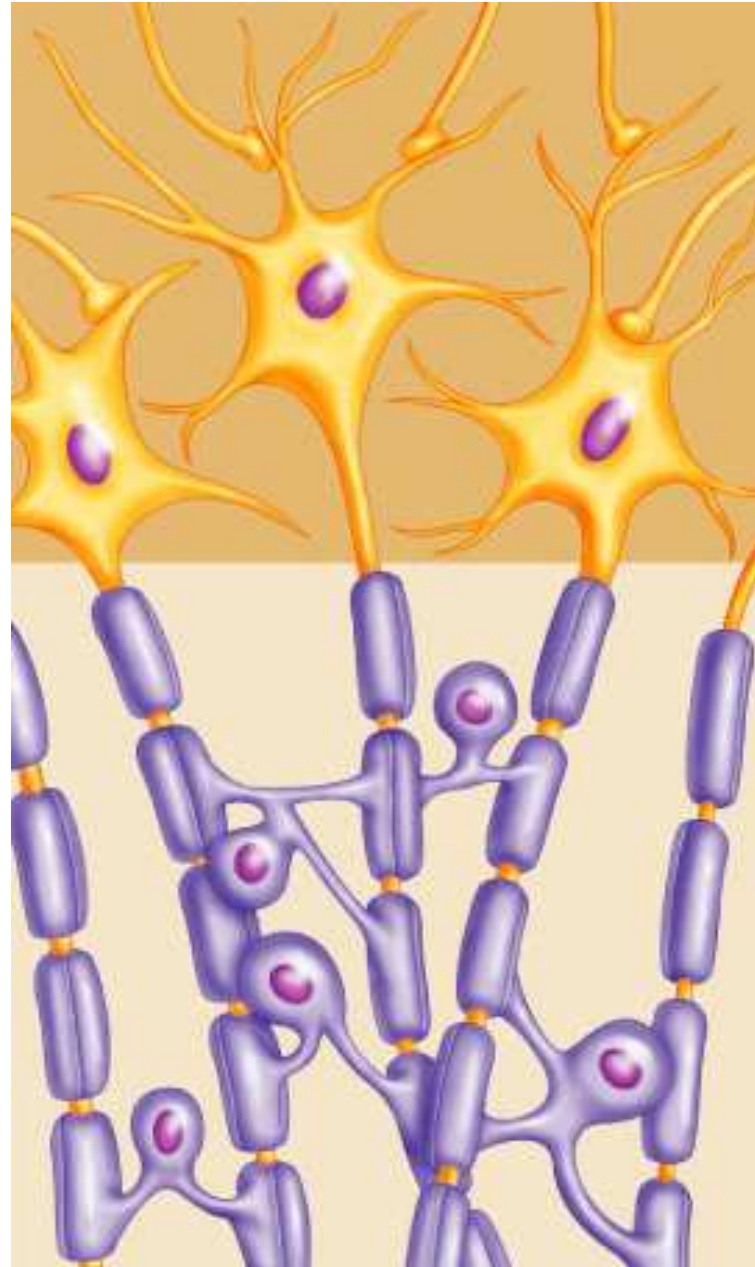
matière grise



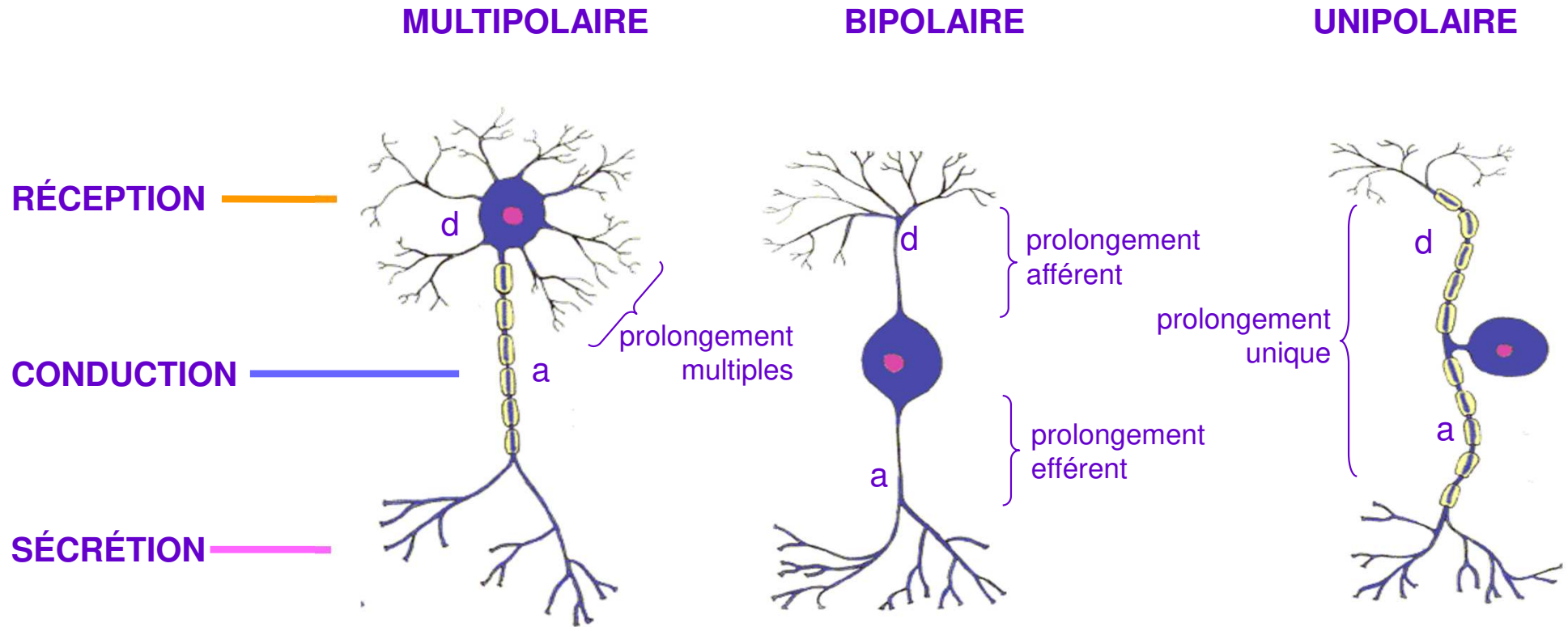
matière blanche



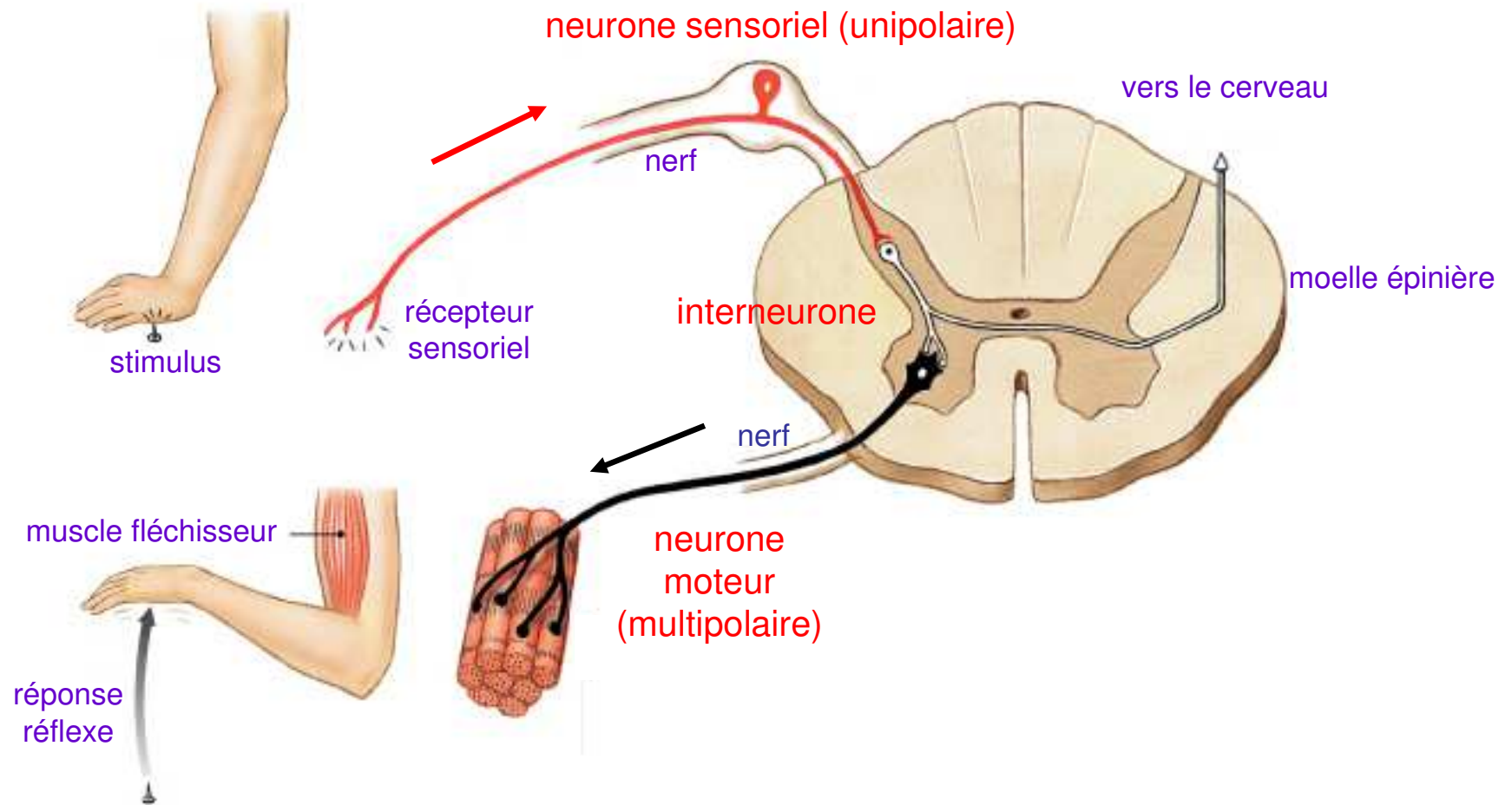
Matière grise et matière blanche contiennent des **éléments neuronaux** ≠



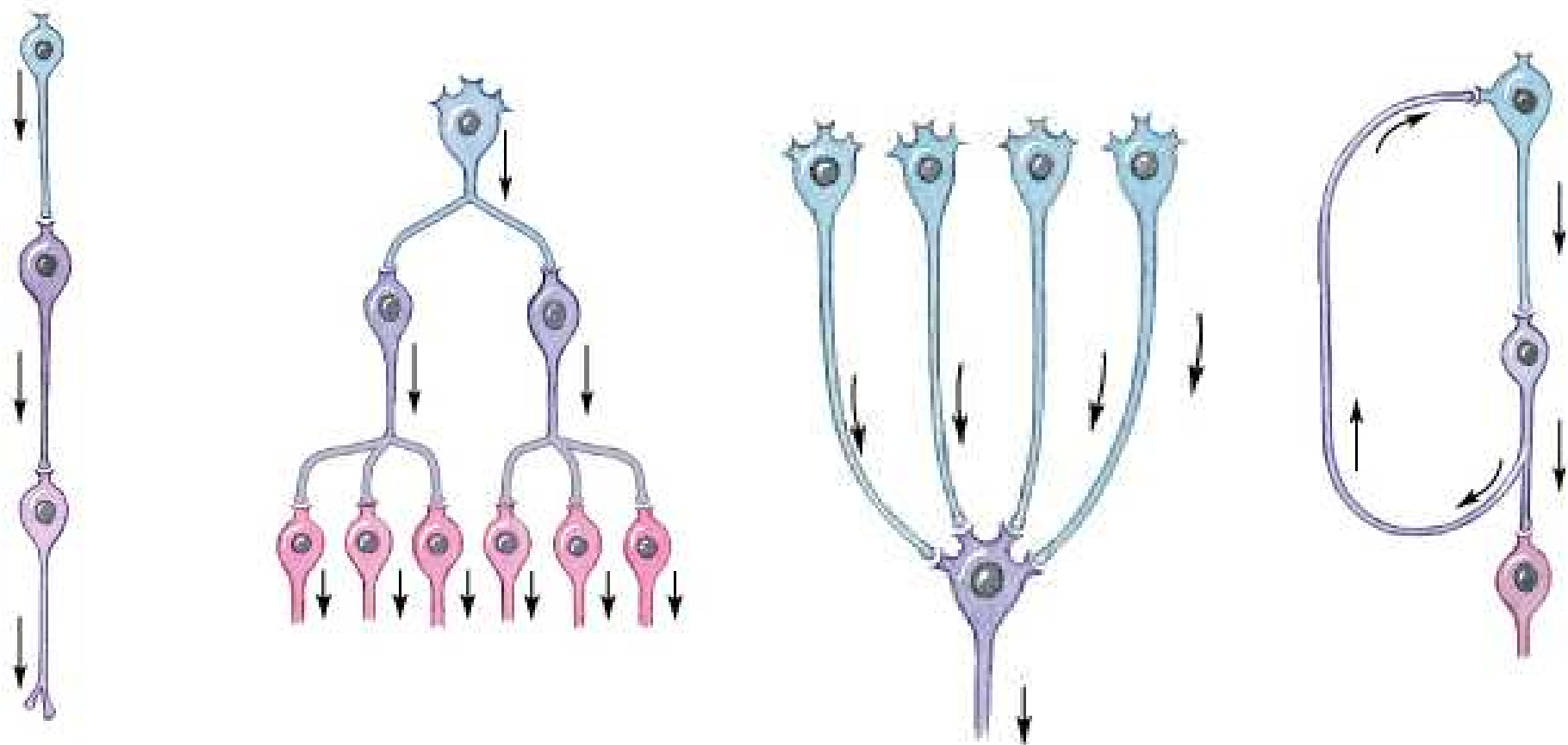
3 types structuraux de neurones



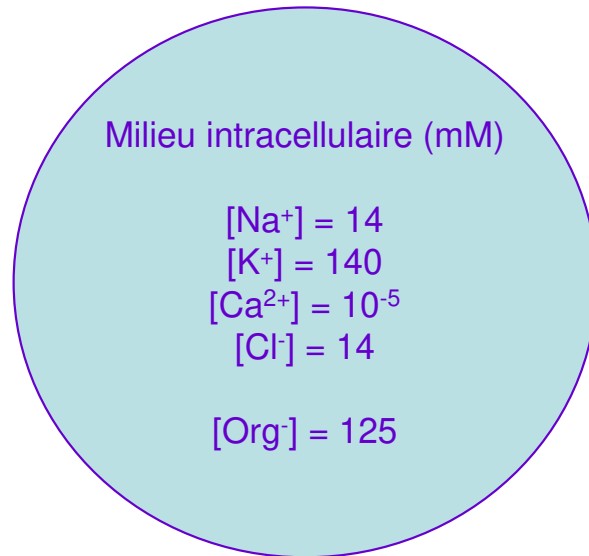
Il existe 3 types fonctionnels de neurones



Réseaux neuronaux



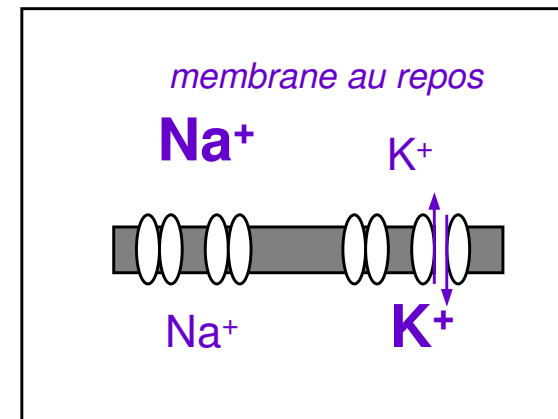
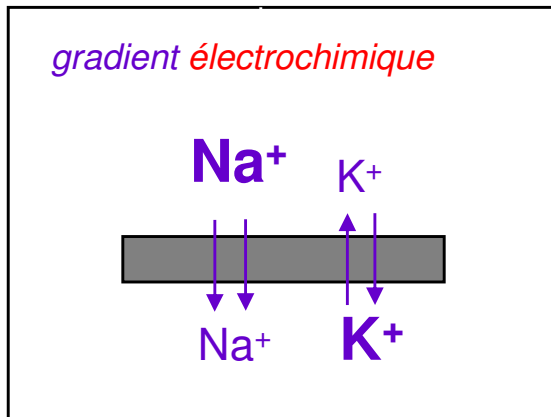
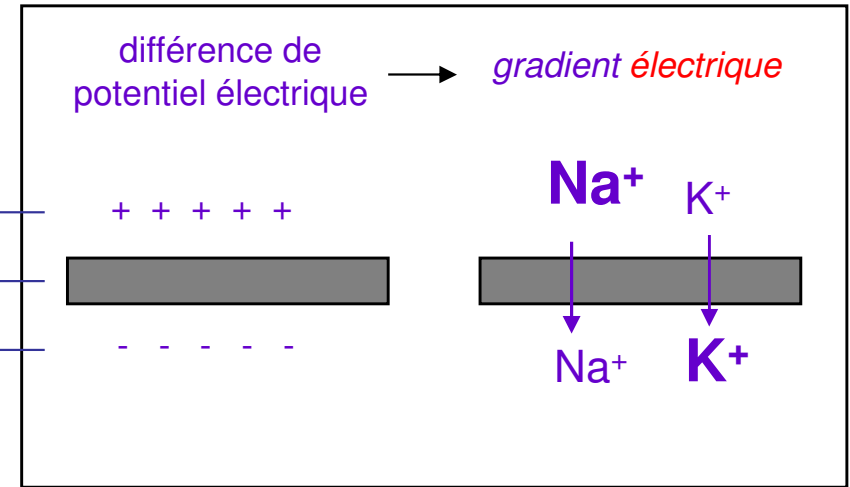
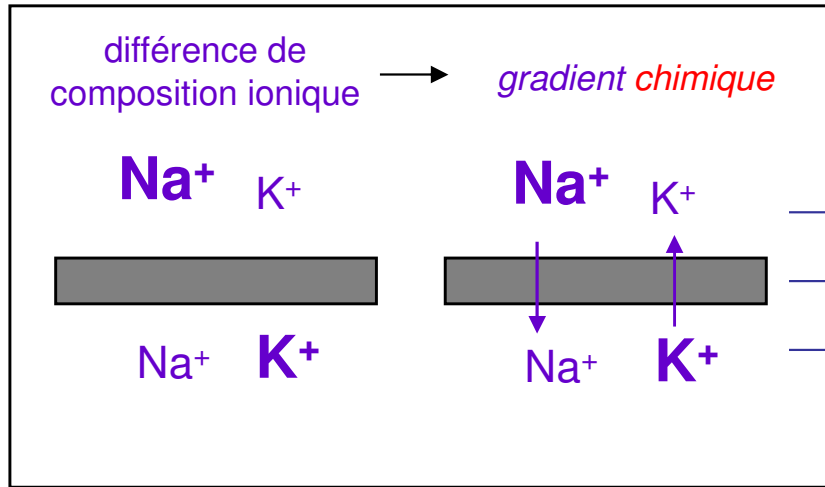
L'excitabilité neuronale



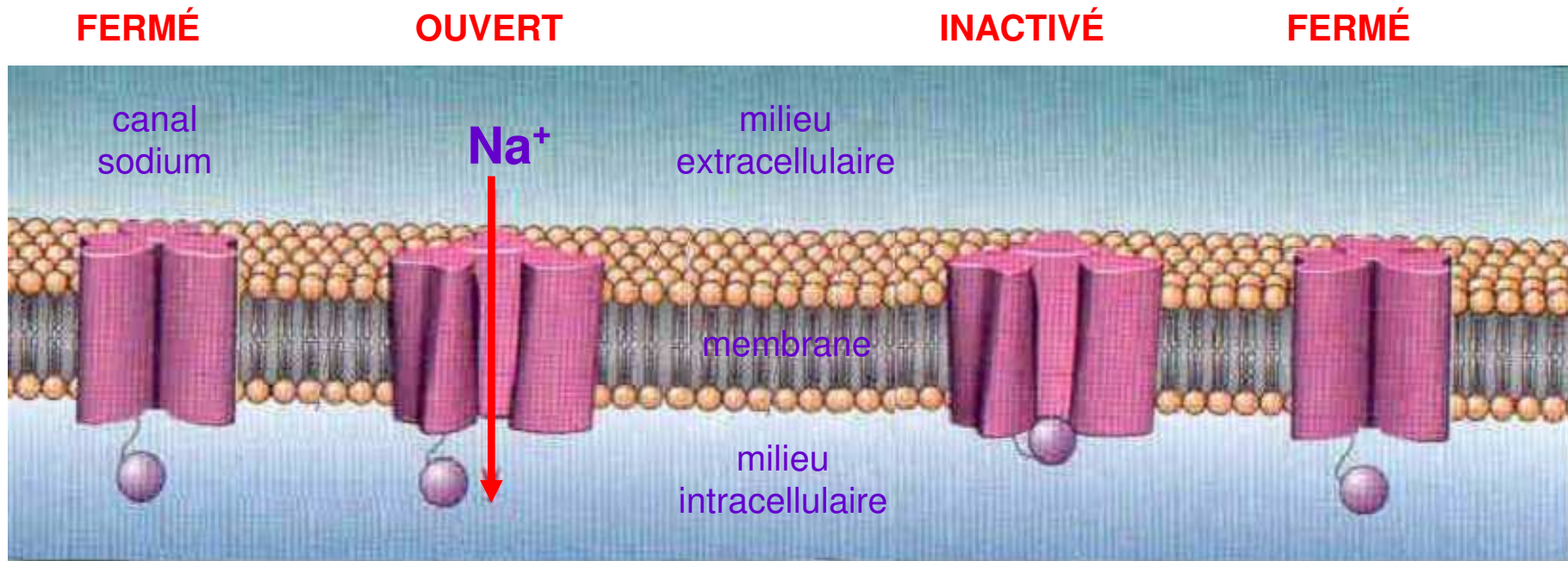
Milieu extracellulaire (mM)

$[\text{Na}^+] = 140$
 $[\text{K}^+] = 5$
 $[\text{Ca}^{2+}] = 1$
 $[\text{Cl}^-] = 147$

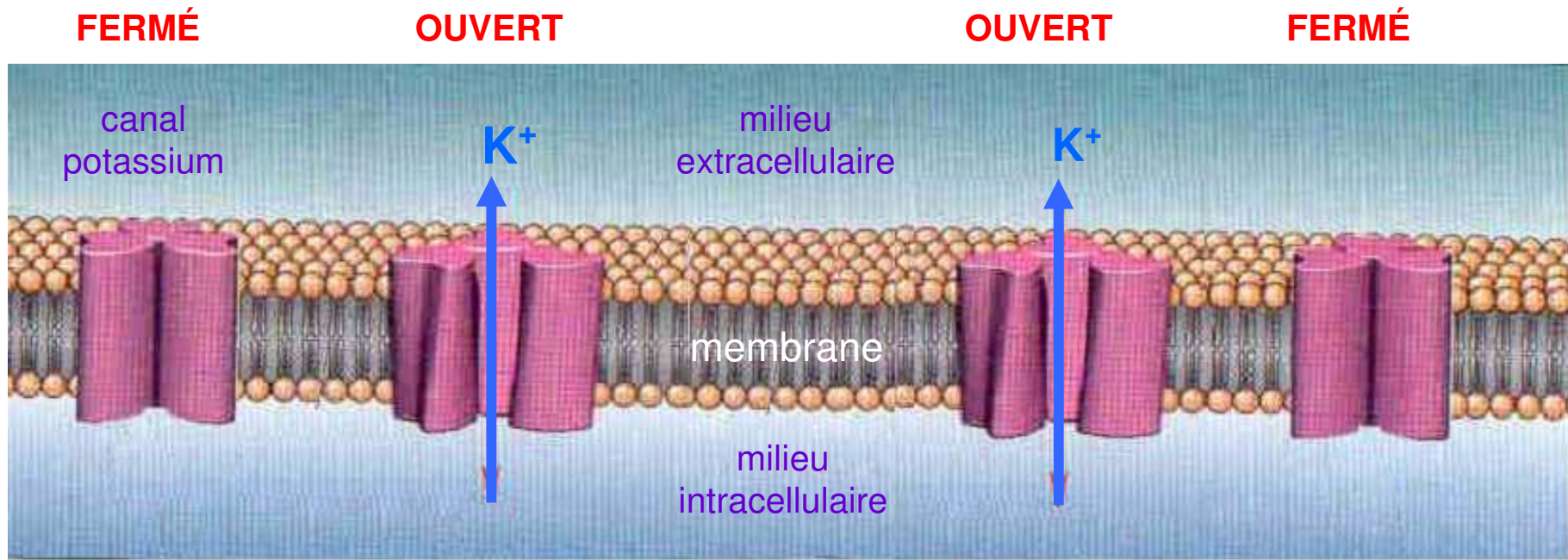
Etablissement d'un gradient électrochimique



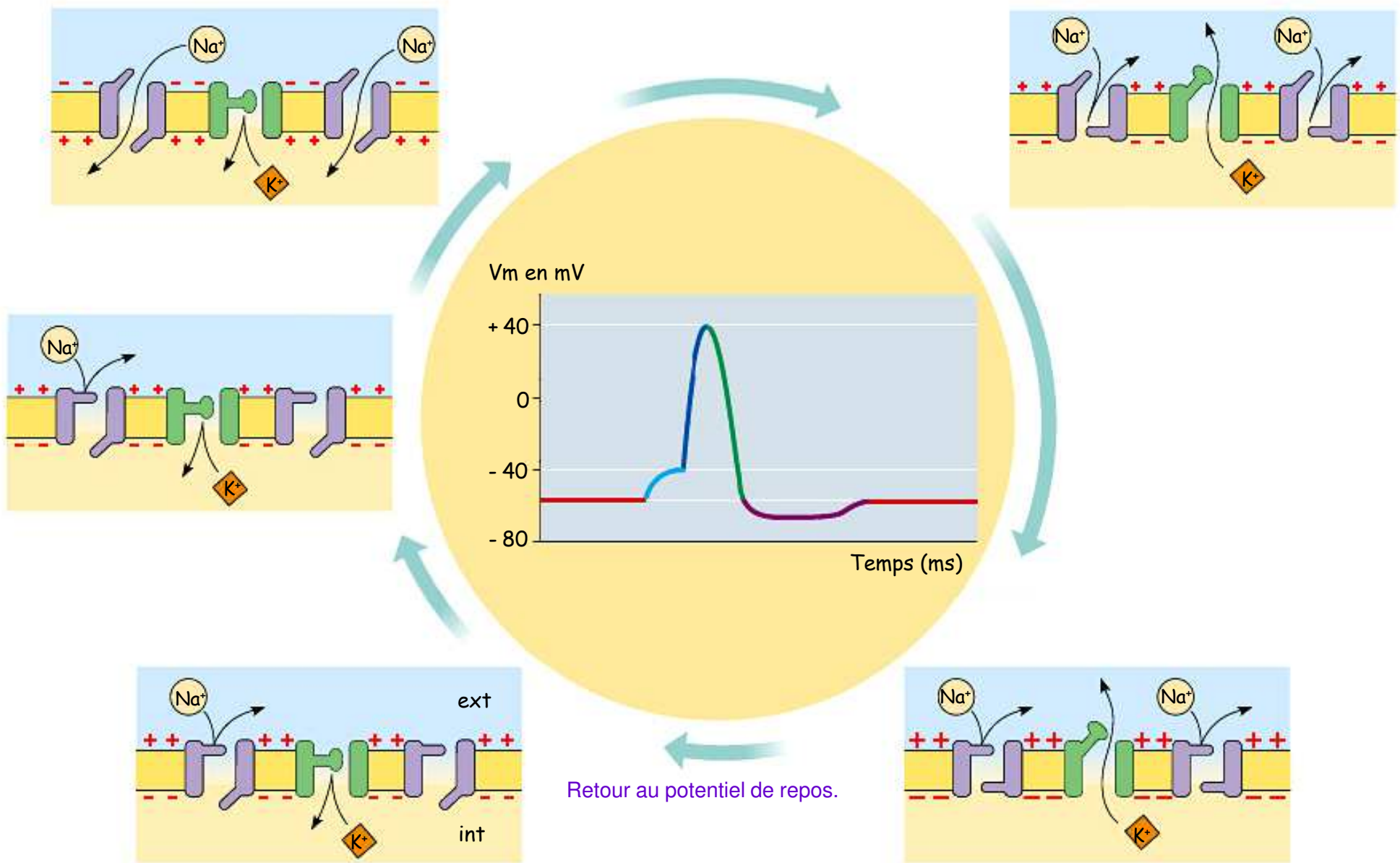
Le PA est dû à l'ouverture de canaux membranaires potentiel dépendants



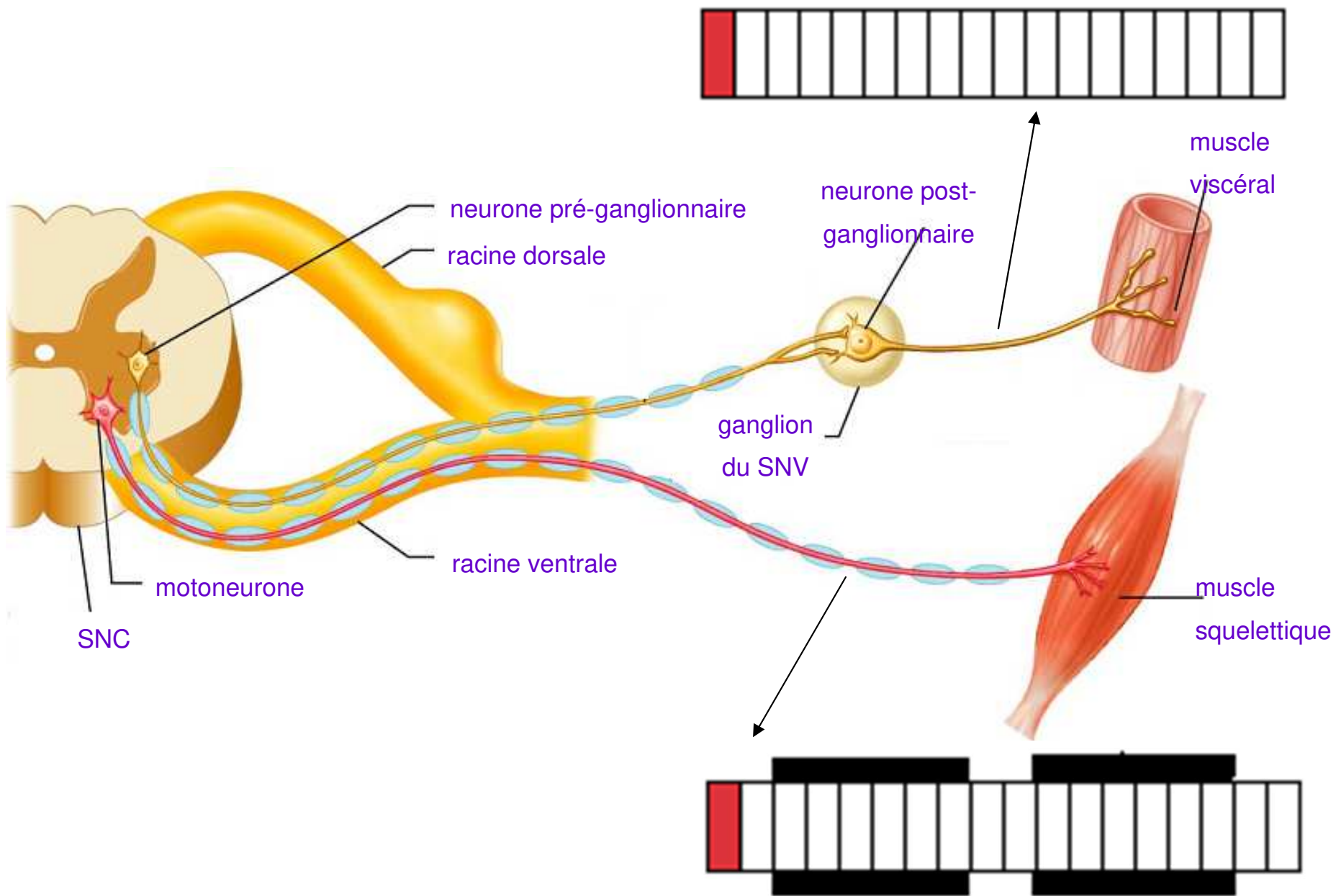
Le PA est dû à l'ouverture de canaux membranaires potentiel dépendants



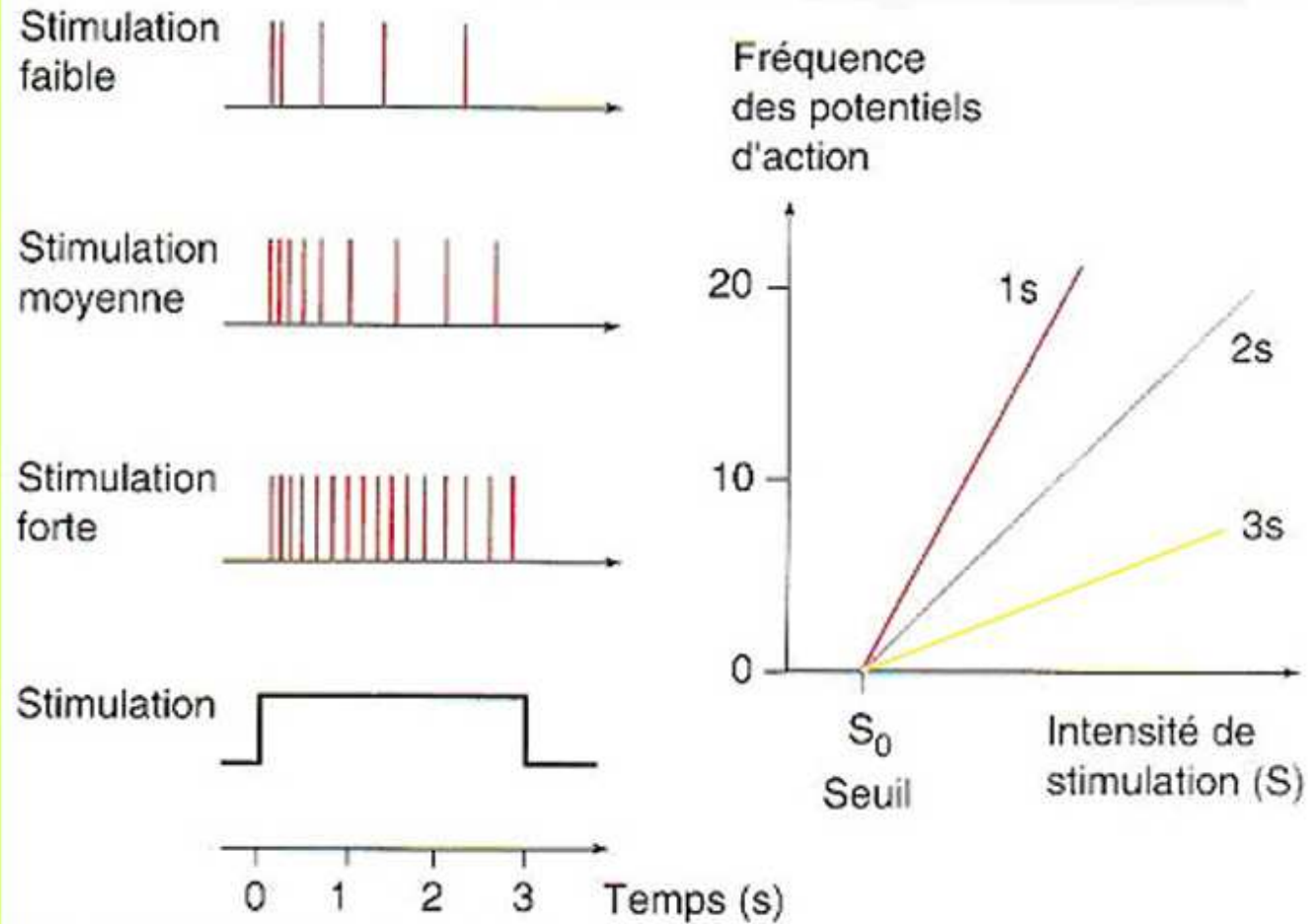
Le PA est dû à l'ouverture séquentielle de canaux Na^+ et K^+



Le PA se propage sans diminution d'amplitude

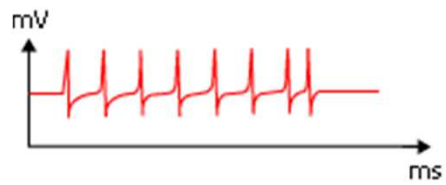
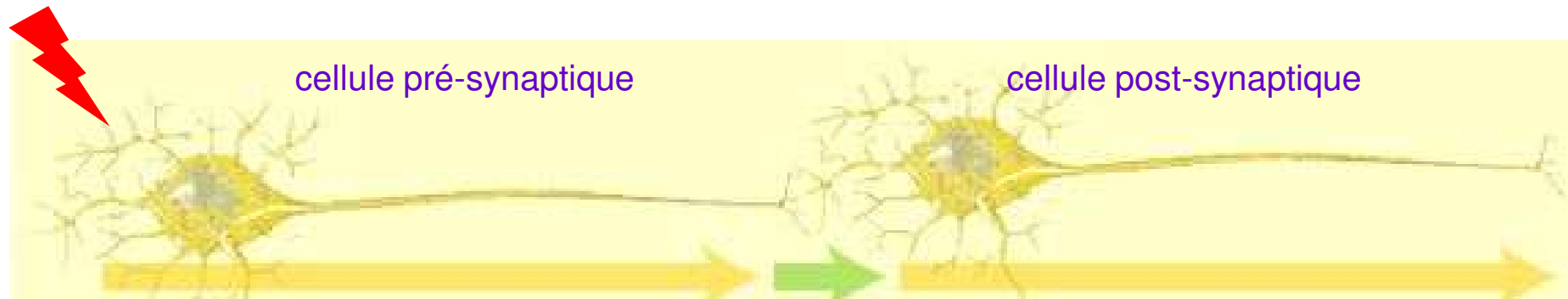


Codage du message nerveux

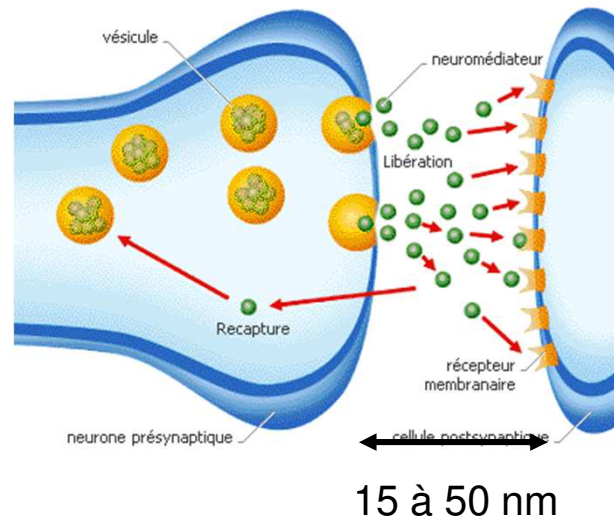
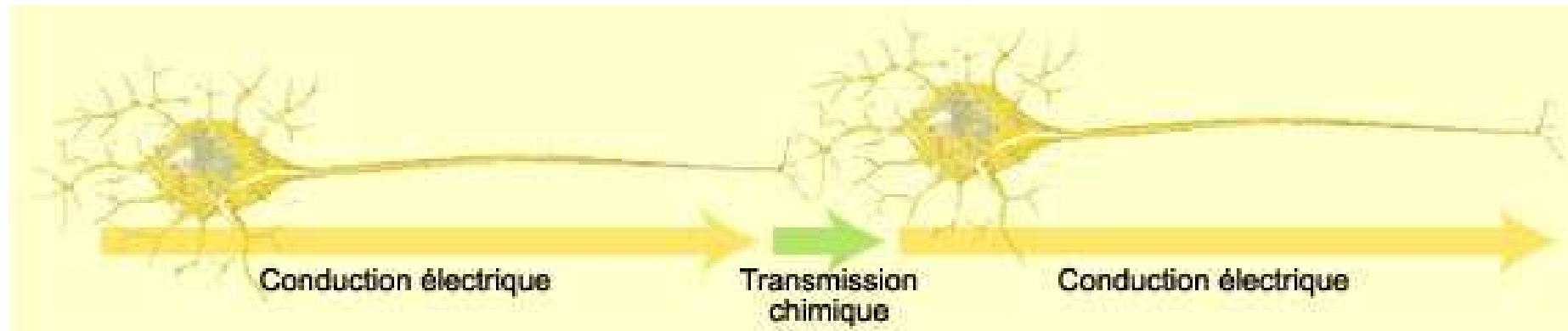


Fréquence des potentiels d'action en fonction de l'intensité de stimulation.

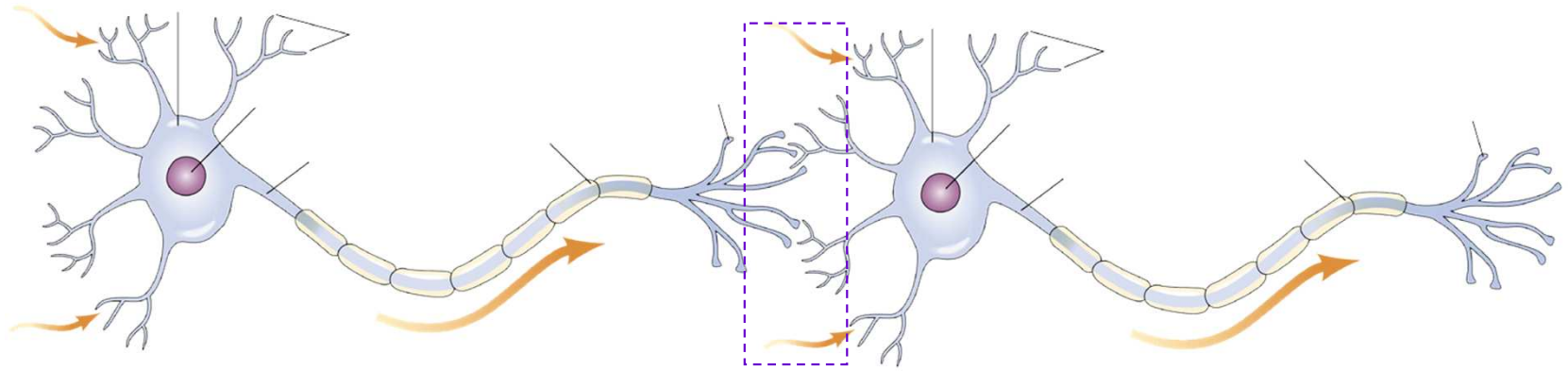
La communication entre cellules du SN



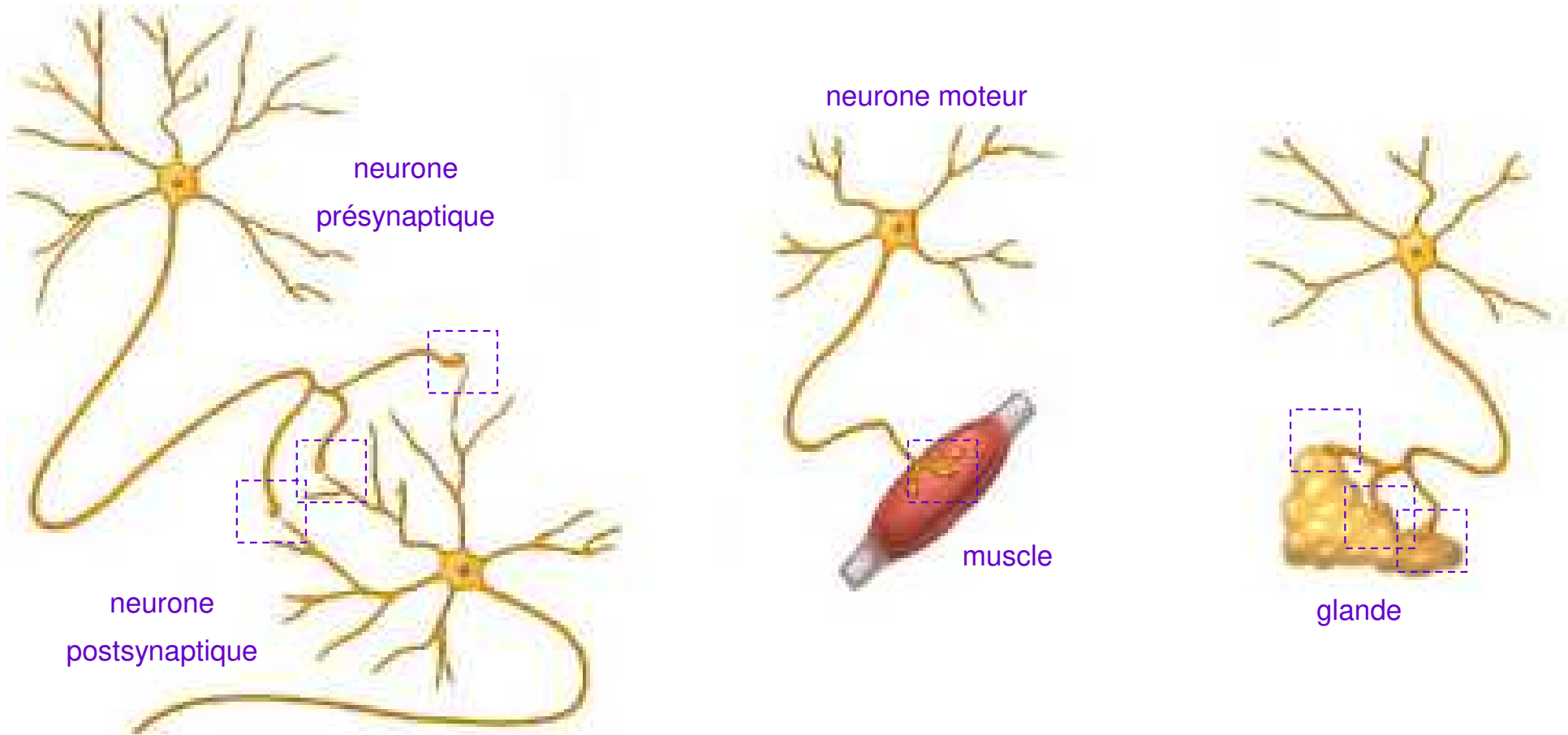
La communication entre cellules du SN



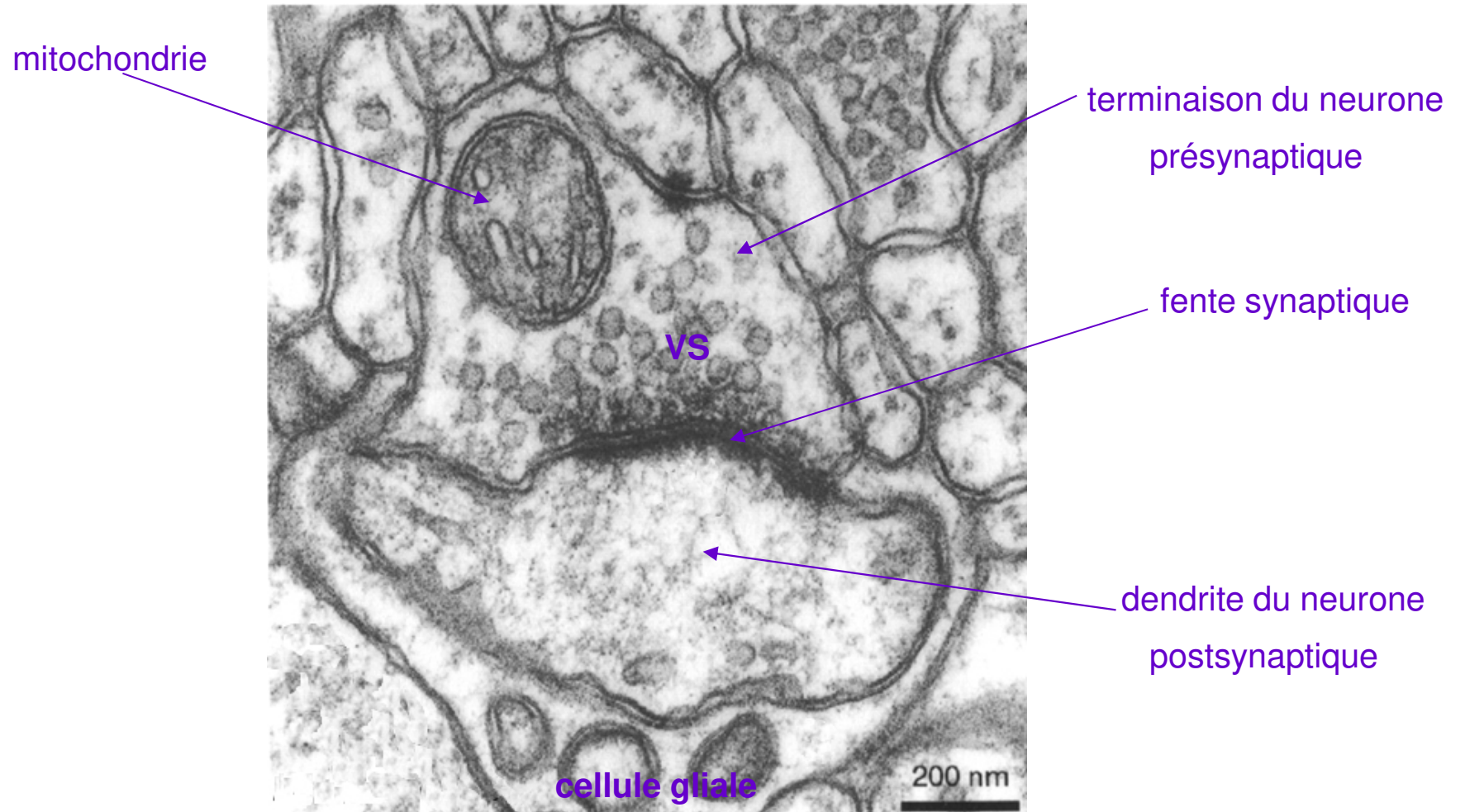
La transmission synaptique



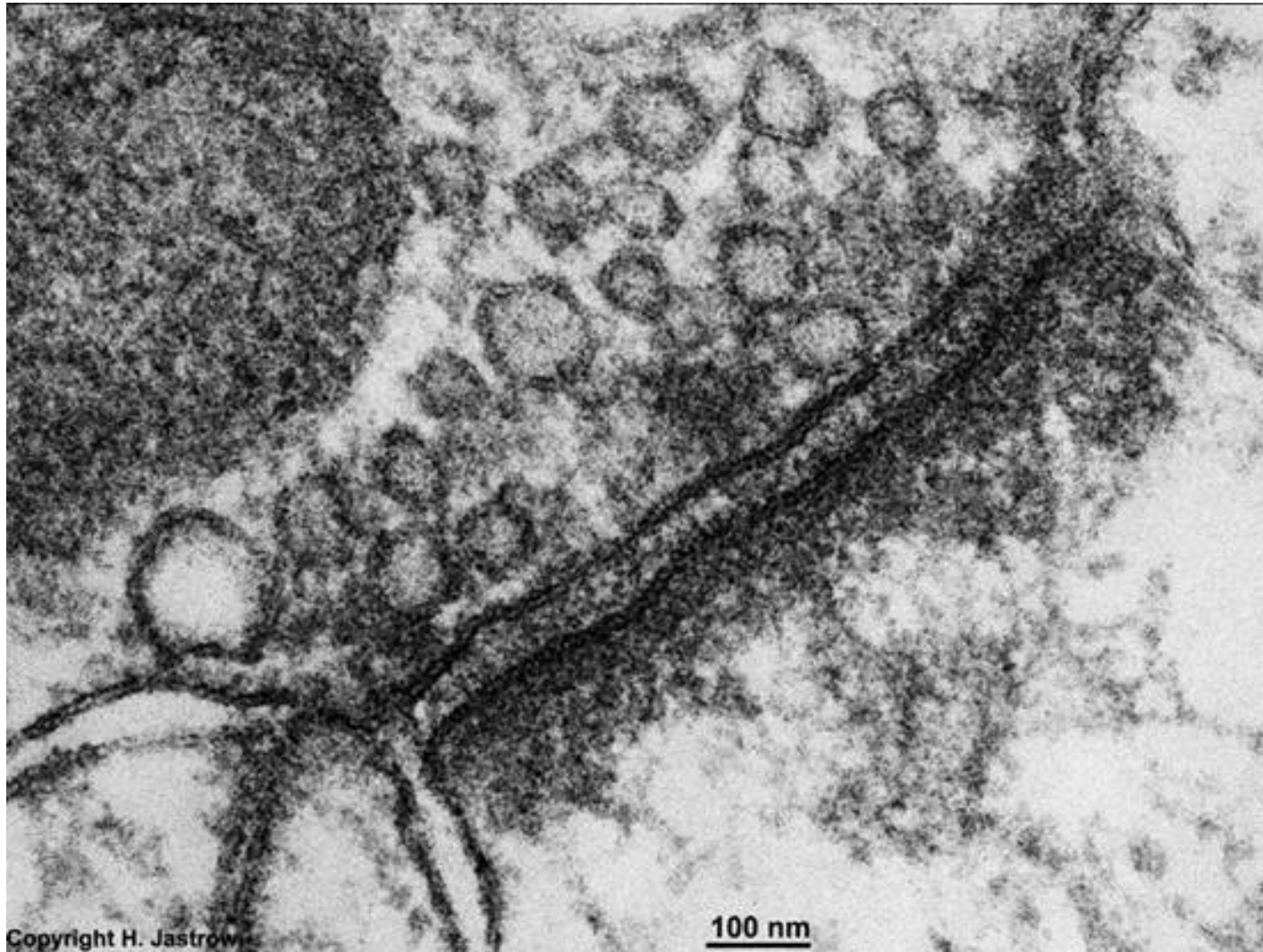
3 types de synapses selon la nature de la cellule post-synaptique



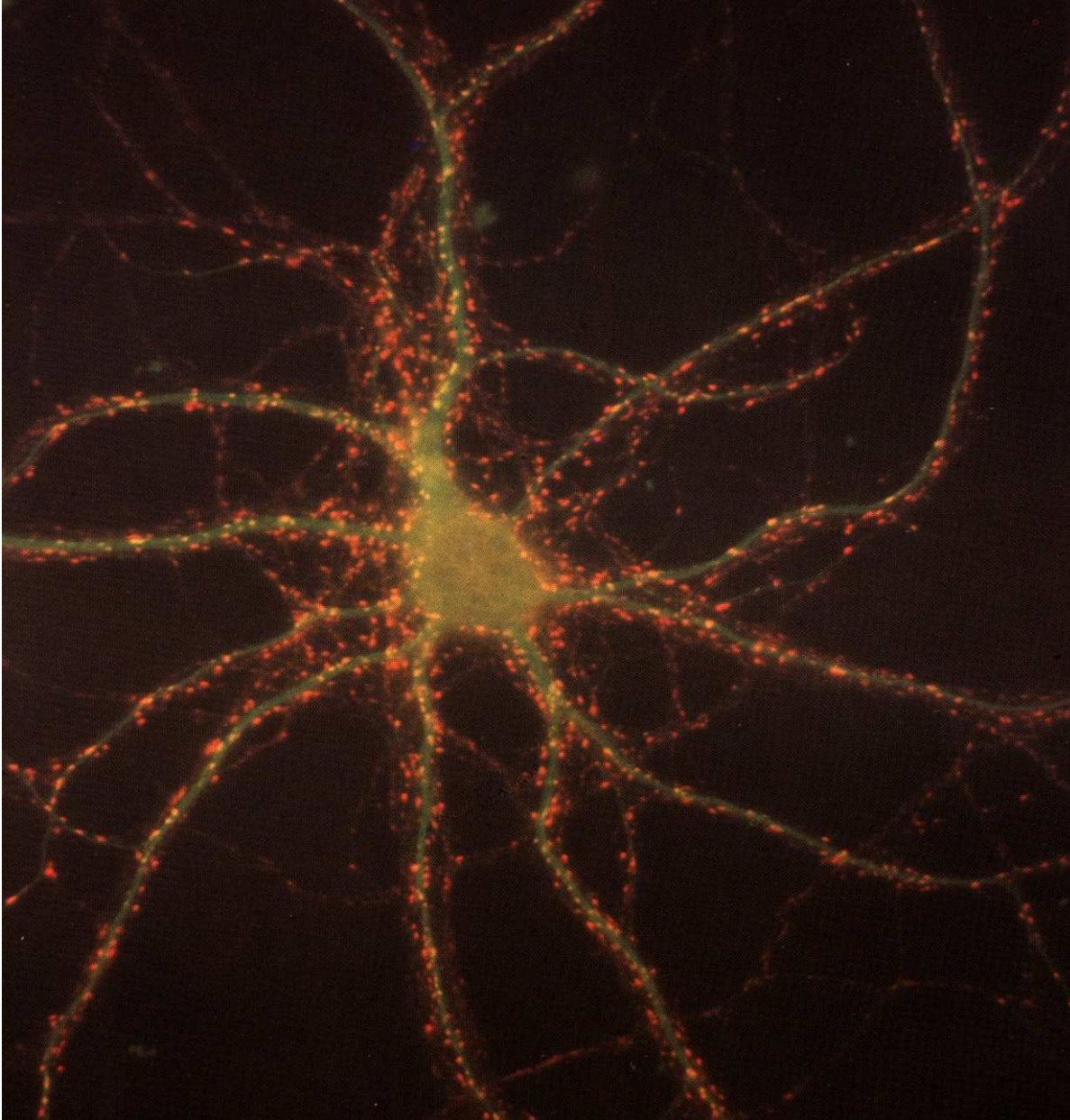
Les synapses **inter-neurales**



Les synapses **inter-neuronales**



Les synapses **inter-neurales**



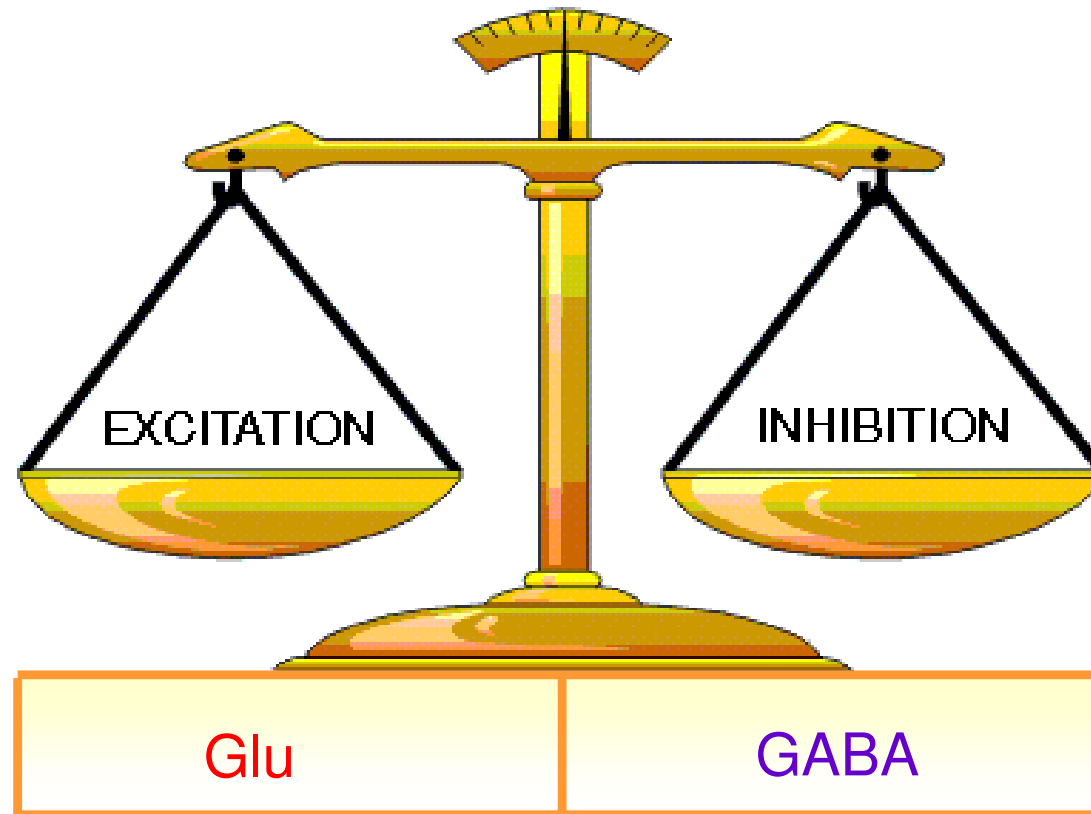
Neurone cérébral en culture :

→ grand nombre de contacts synaptiques

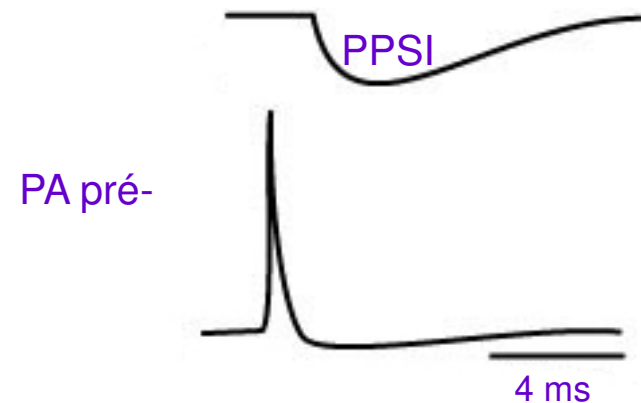
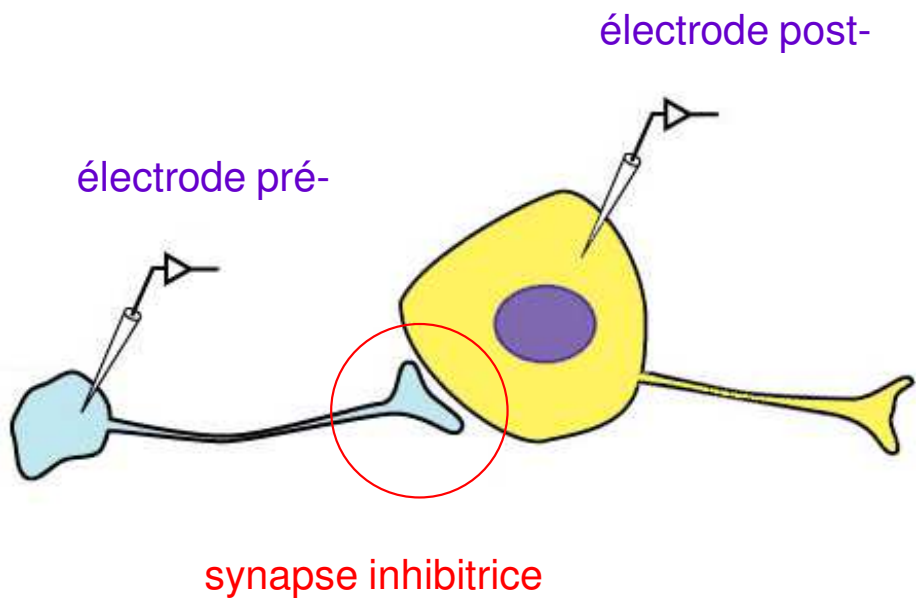
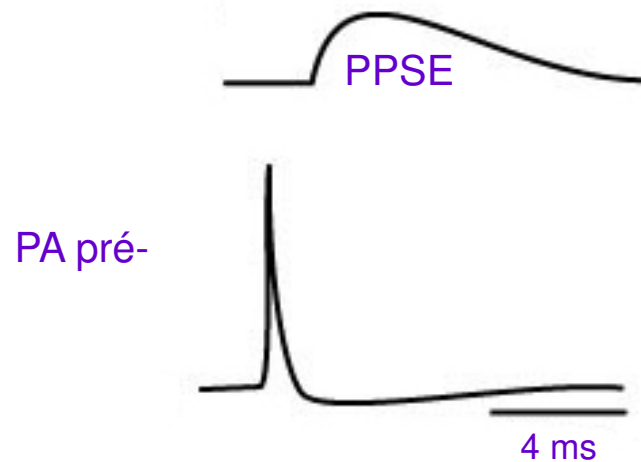
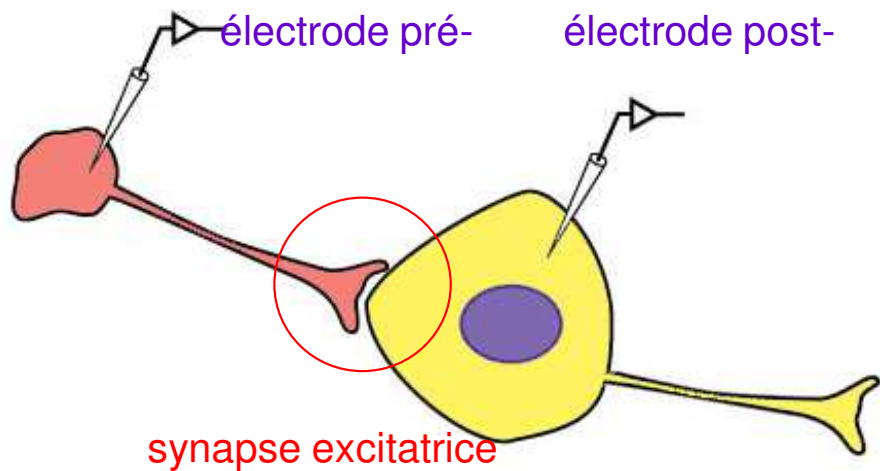
— soma + dendrites du neurone post-

— boutons terminaux des neurones pré-

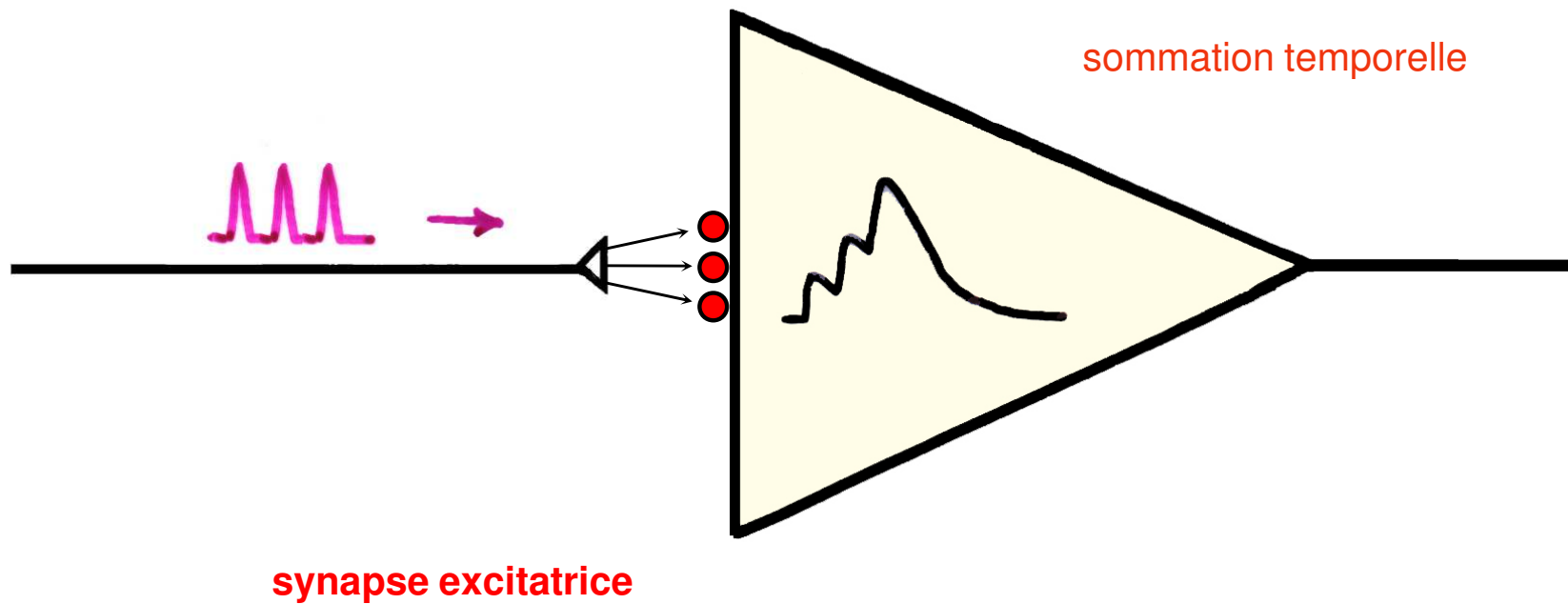
Les synapses cérébrales : excitation et inhibition



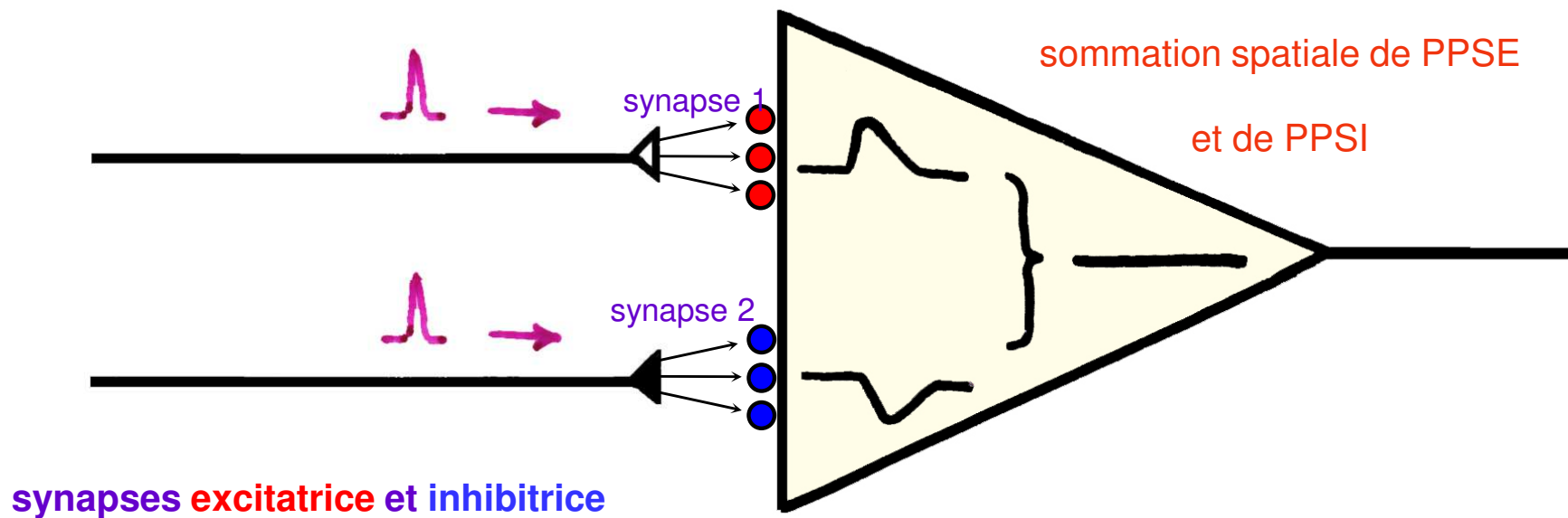
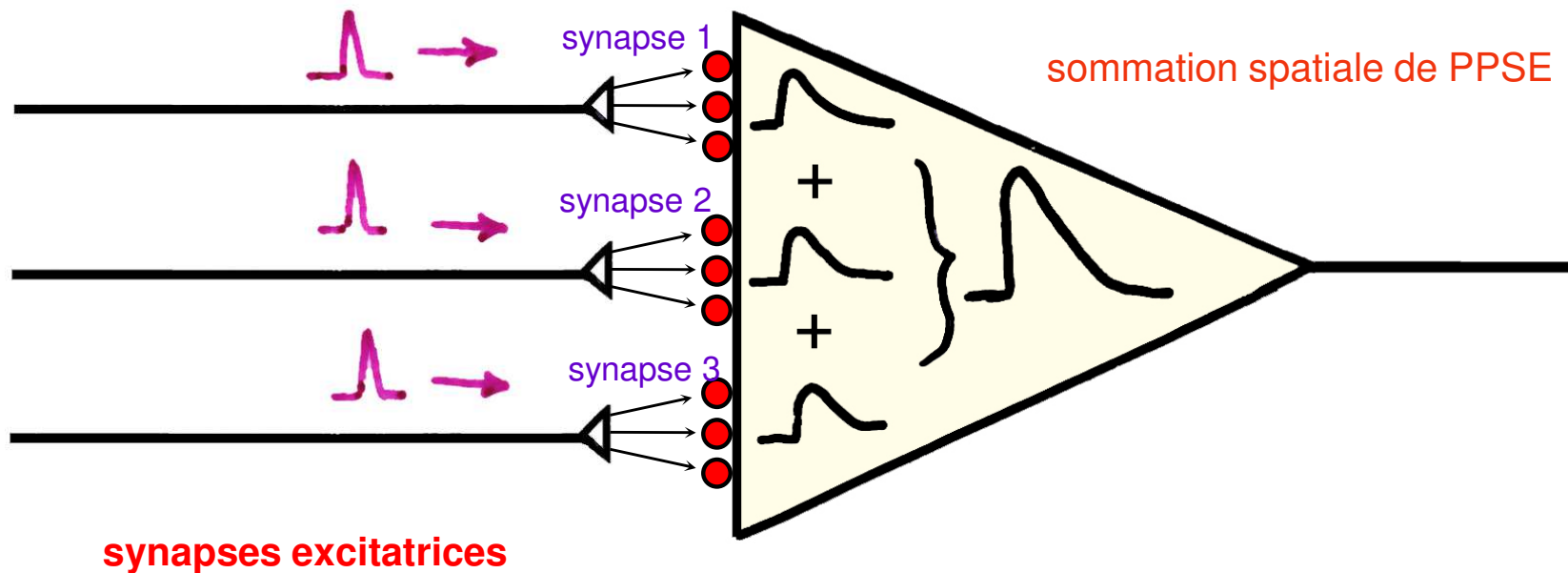
Les synapses cérébrales : excitation et inhibition



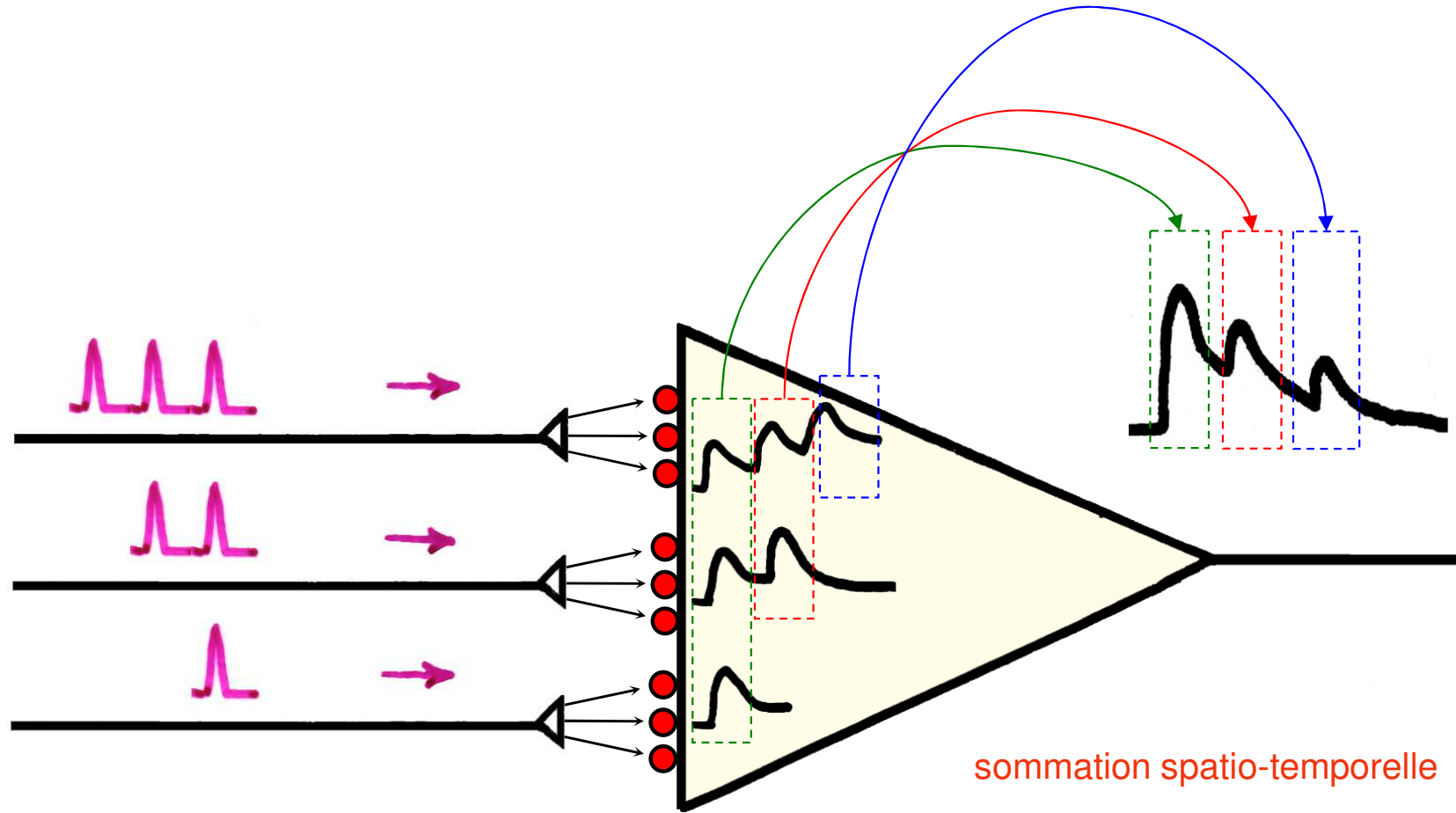
Les synapses cérébrales : sommation temporelle des PPS



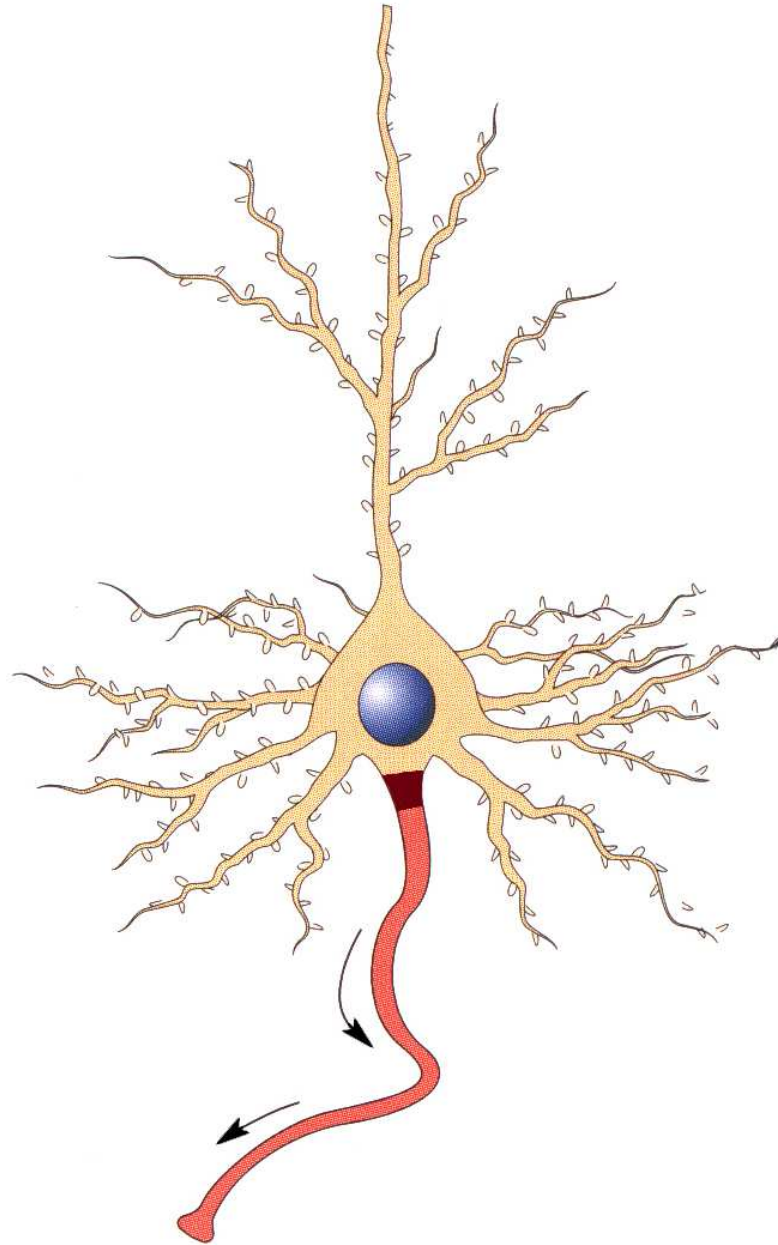
Les synapses cérébrales : sommation spatiale des PPS



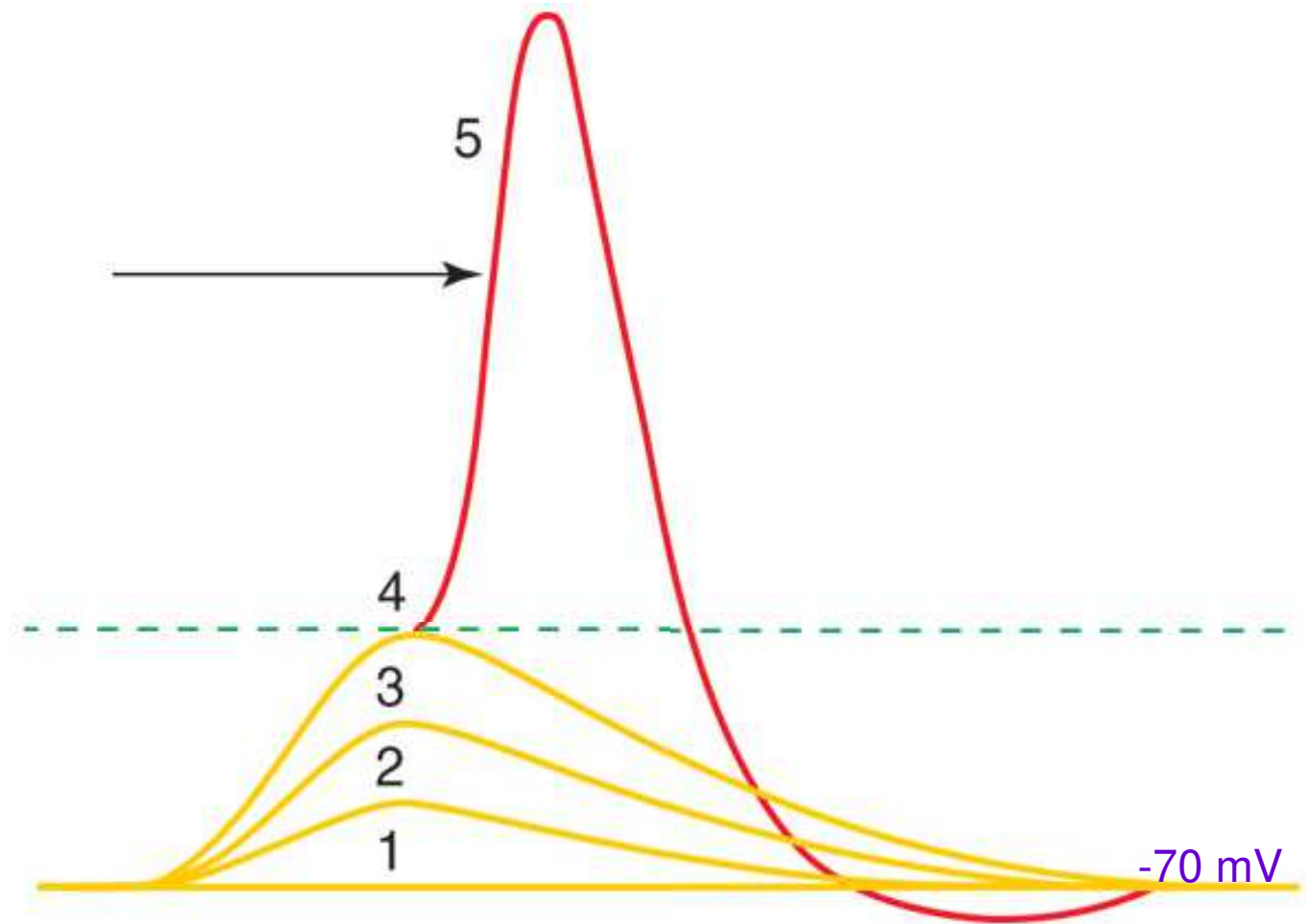
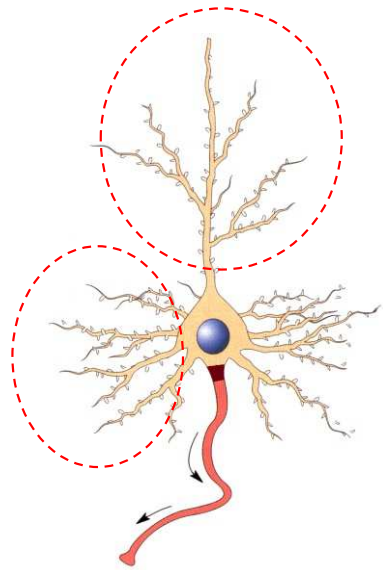
Les synapses cérébrales : sommation spatiale et temporelle des PPS



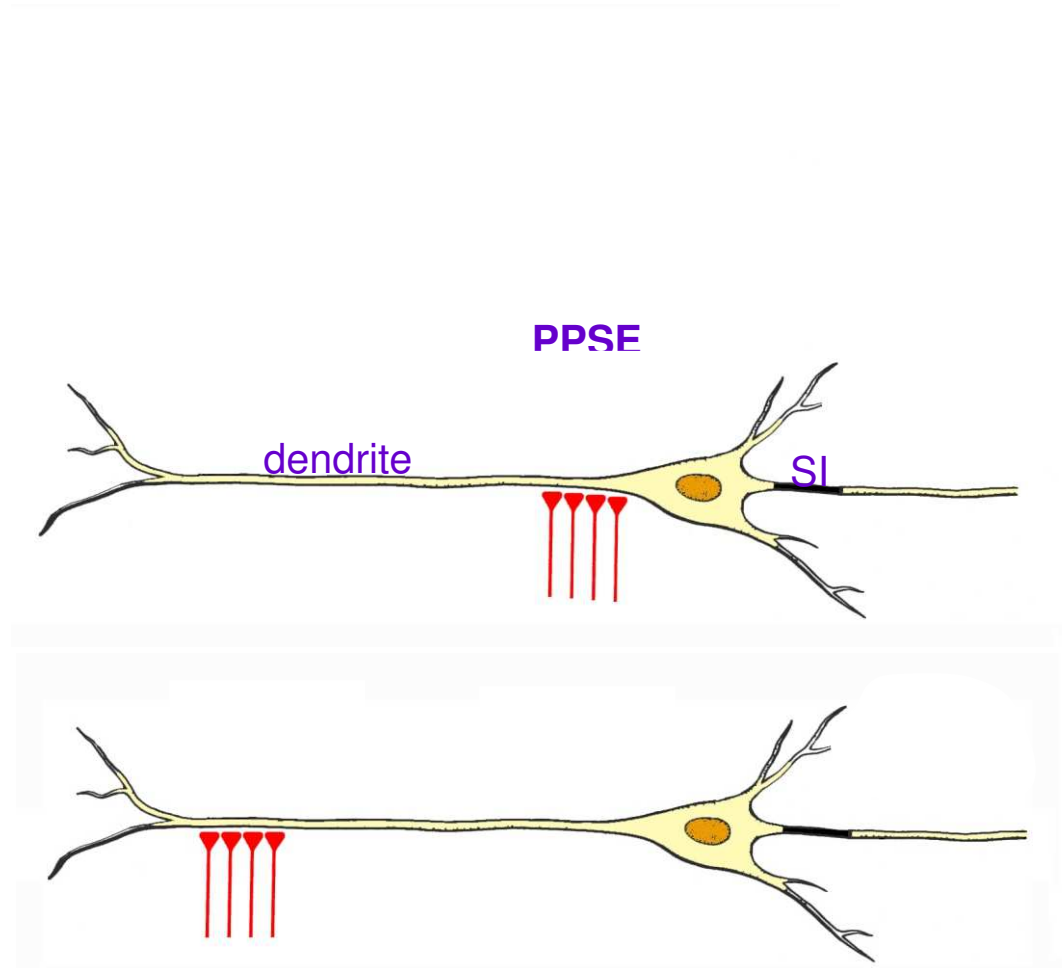
Les synapses cérébrales : importance de la localisation des synapses



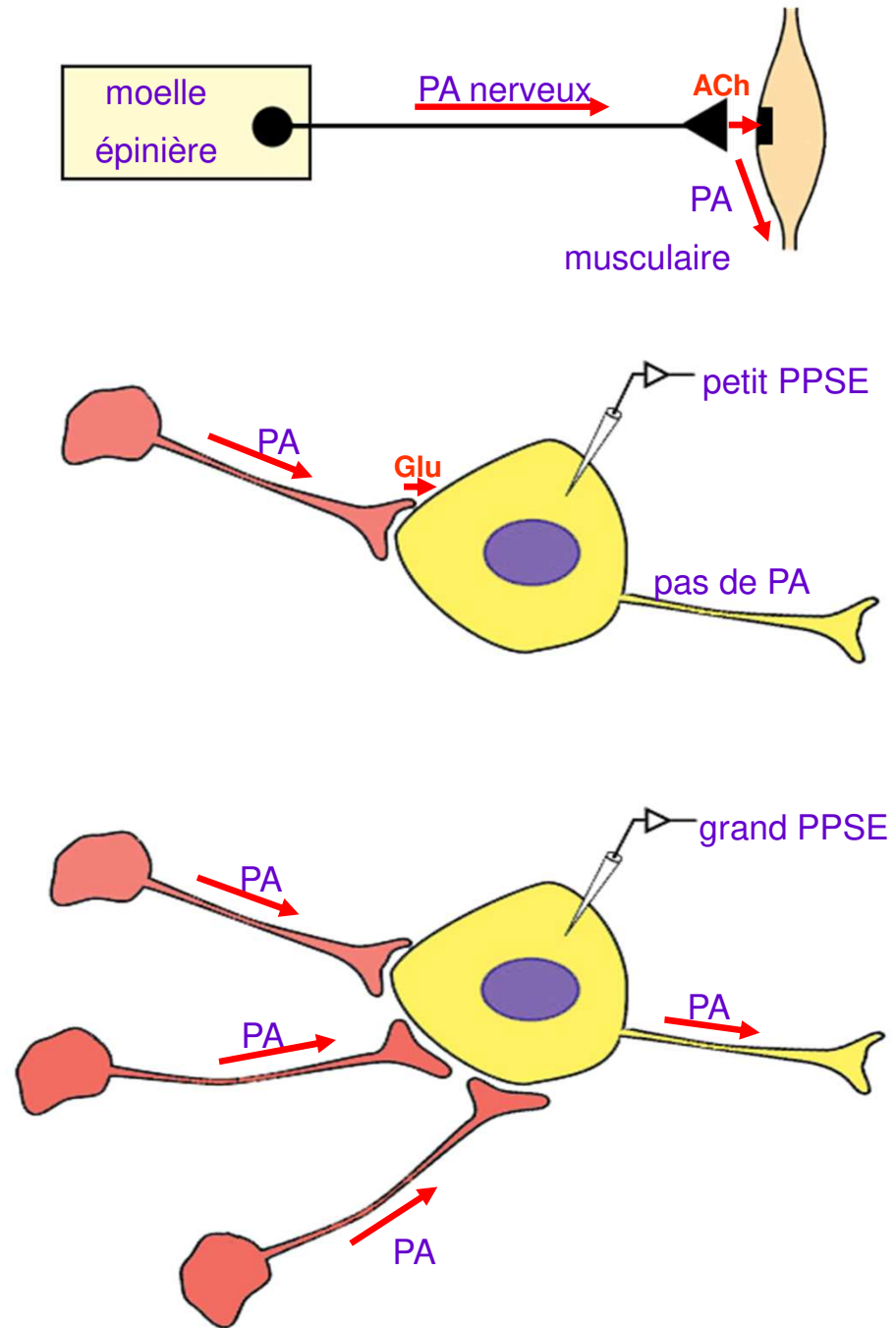
Les synapses cérébrales : du PPSE au PA



Les synapses cérébrales : importance de la localisation des synapses

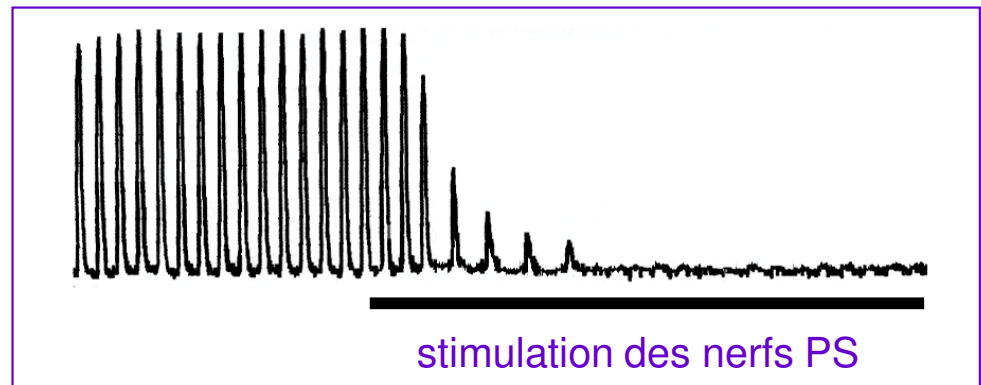
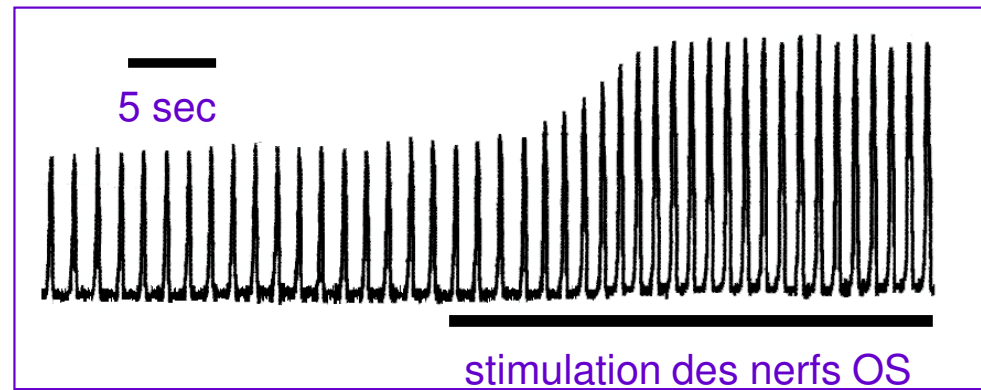
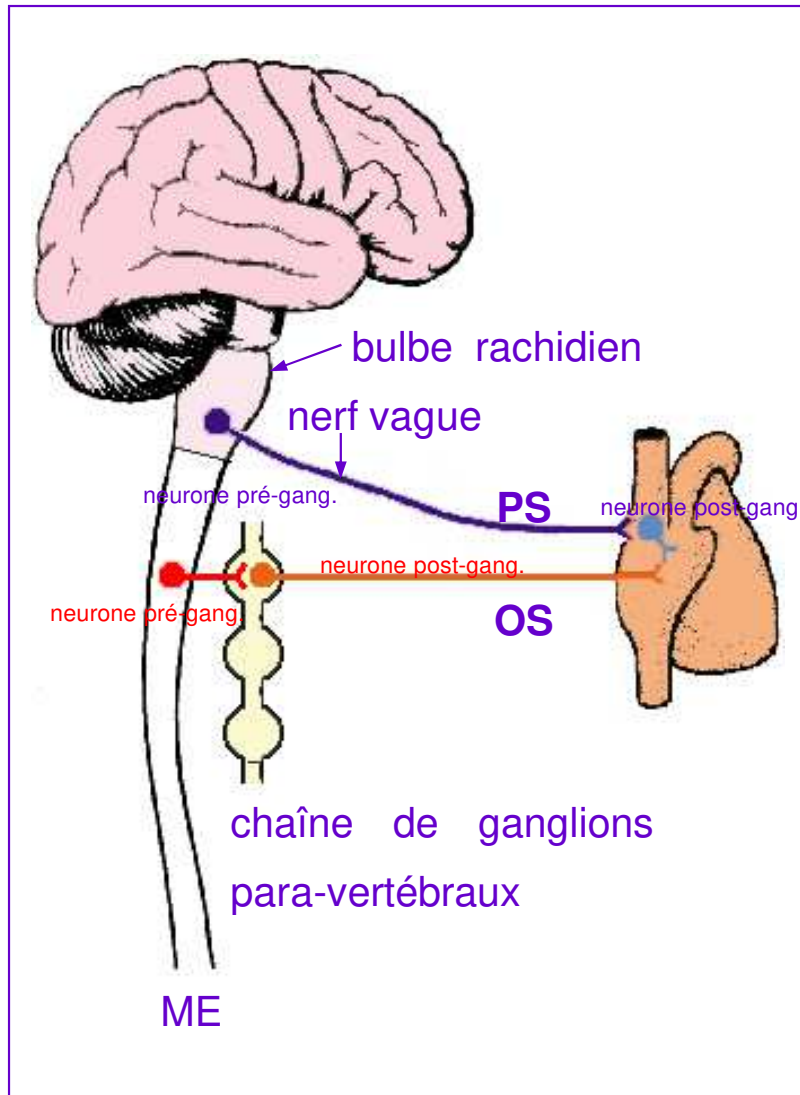


Comparaison entre JNM et synapses cérébrales



**Un exemple de communication nerveuse:
Influence de l'acétylcholine sur l'activité
cardiaque**

La neurotransmission : exemple de l'ACh

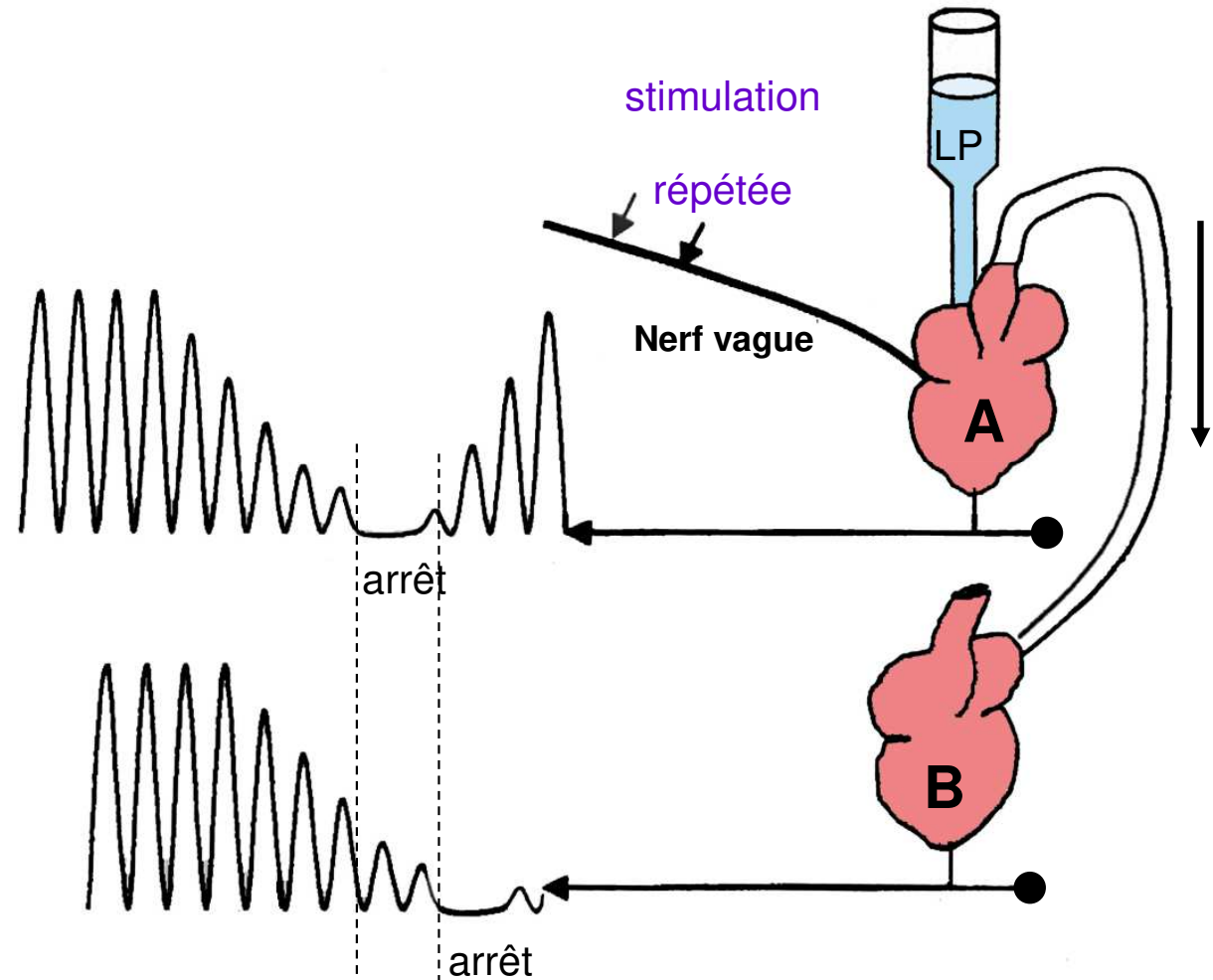


La neurotransmission : exemple de l'ACh



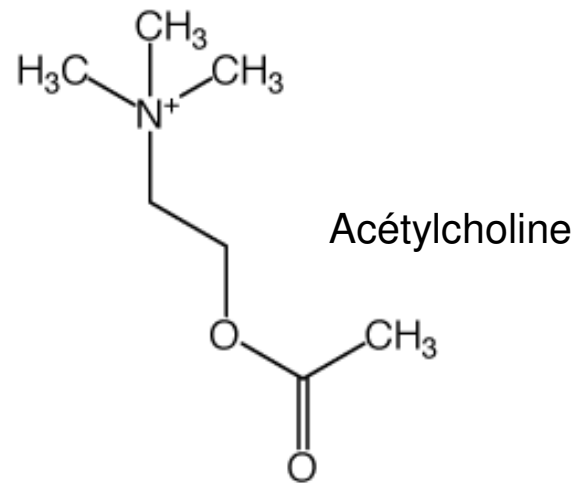
Otto LŒWI (1873-1961)

PN de M en 1936

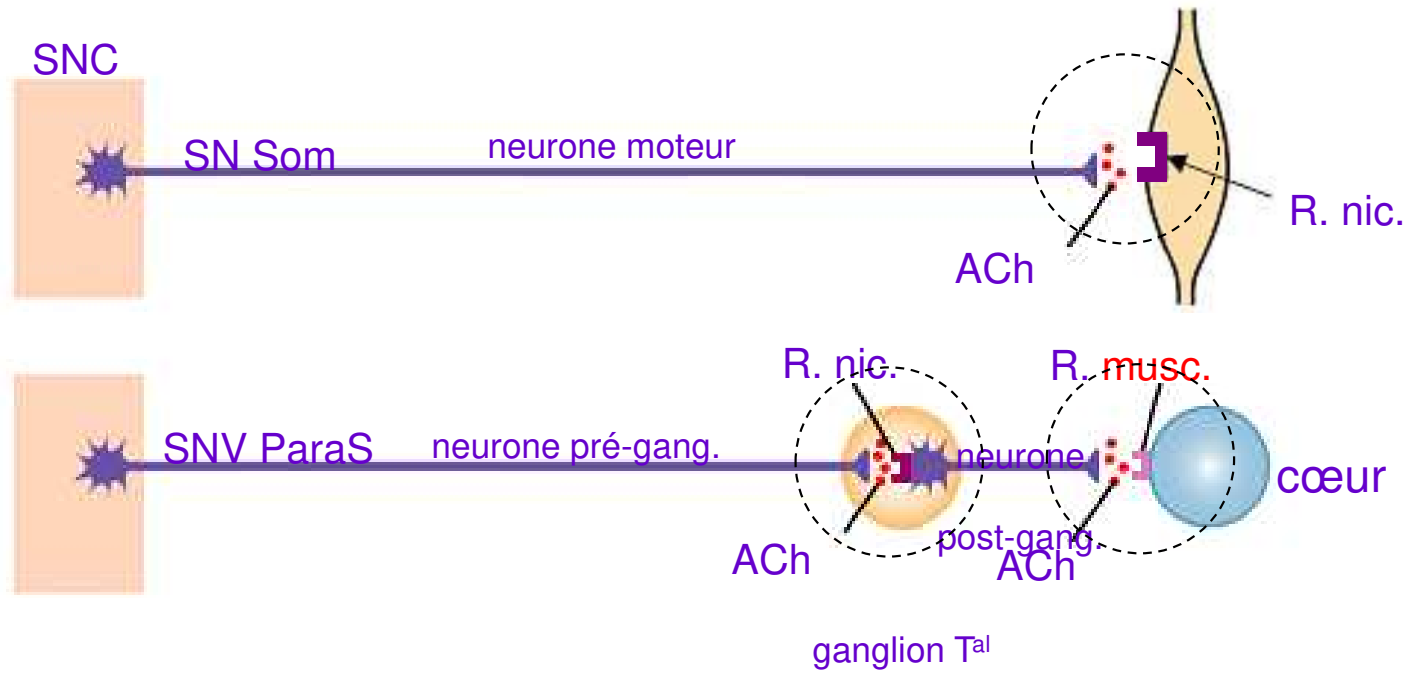


La neurotransmission : exemple de l'ACh

La substance vagale = ACh



La neurotransmission : exemple de l'ACh



La neurotransmission : exemple de l'ACh

TYPE DE R.	AGONISTES	ANTAGONISTES
R. nicotinique musculaire	nicotine	α -bungarotoxine
R. nicotinique neuronal	nicotine	κ -bungarotoxine
R. muscarinique	muscarine	atropine



Nicotiana tabacum



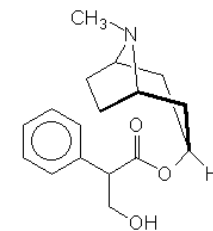
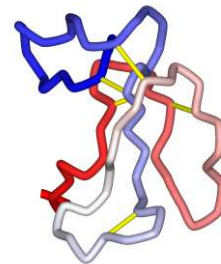
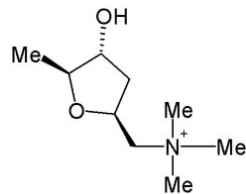
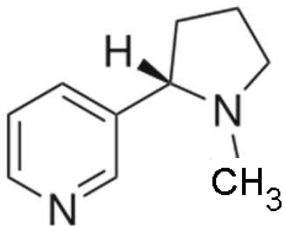
Amanita muscaria



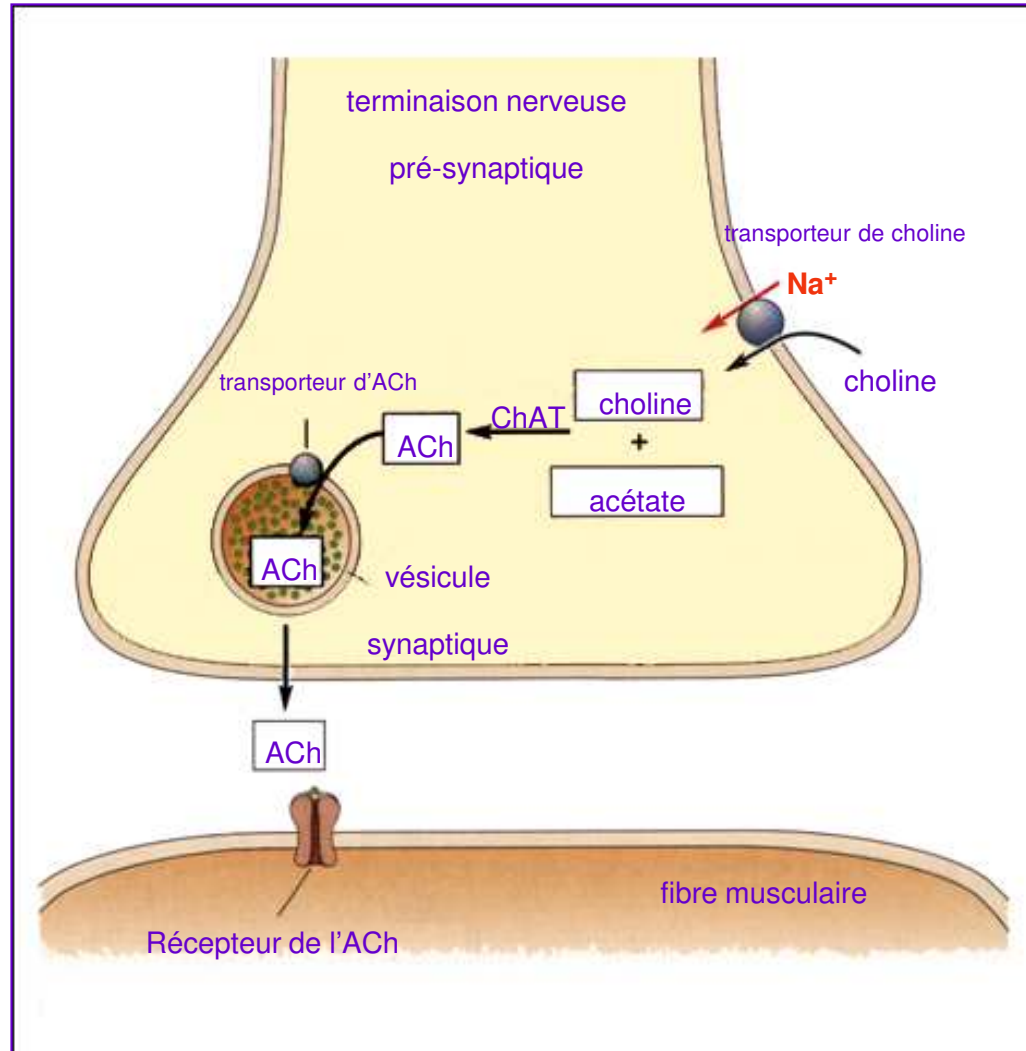
Bungarus fasciatus



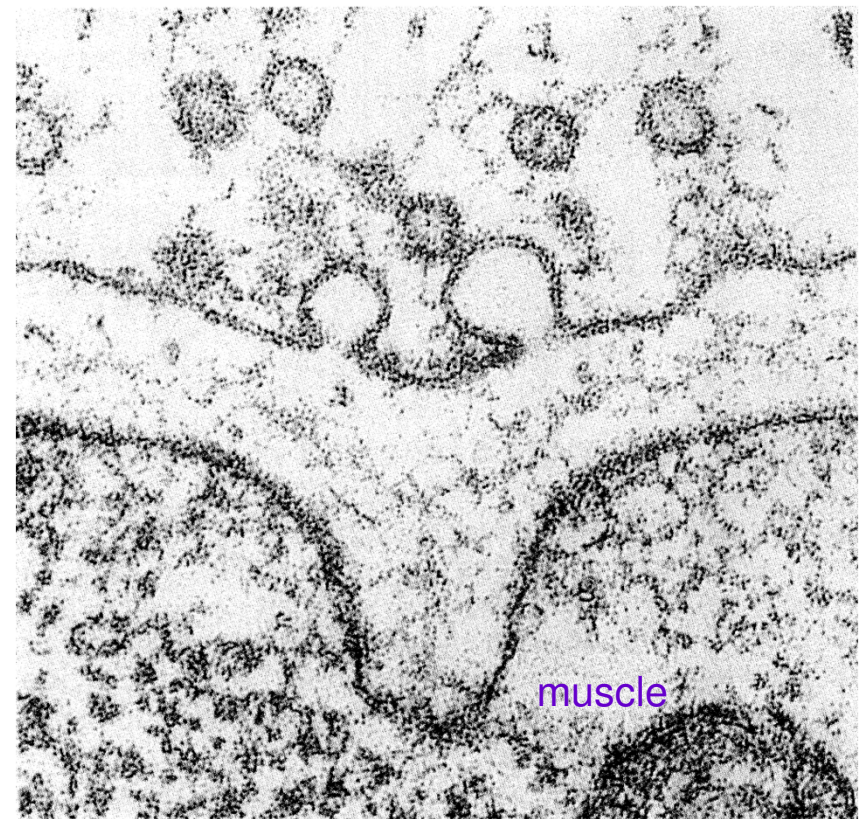
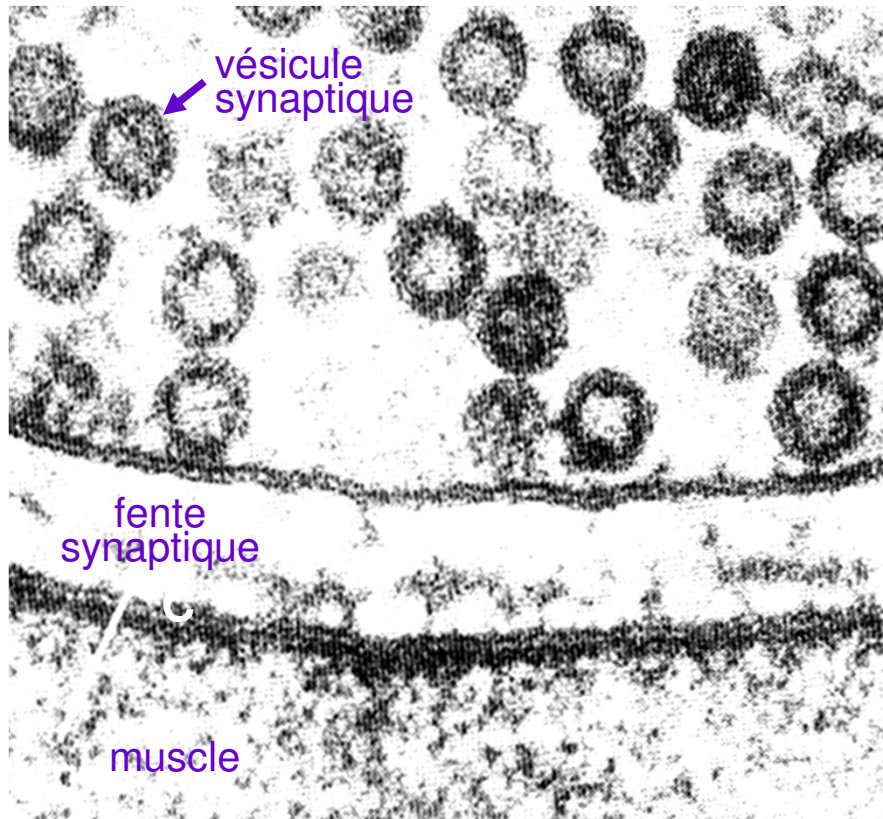
Atropa belladonna



Synthèse et stockage de l'ACh



Libération du NT

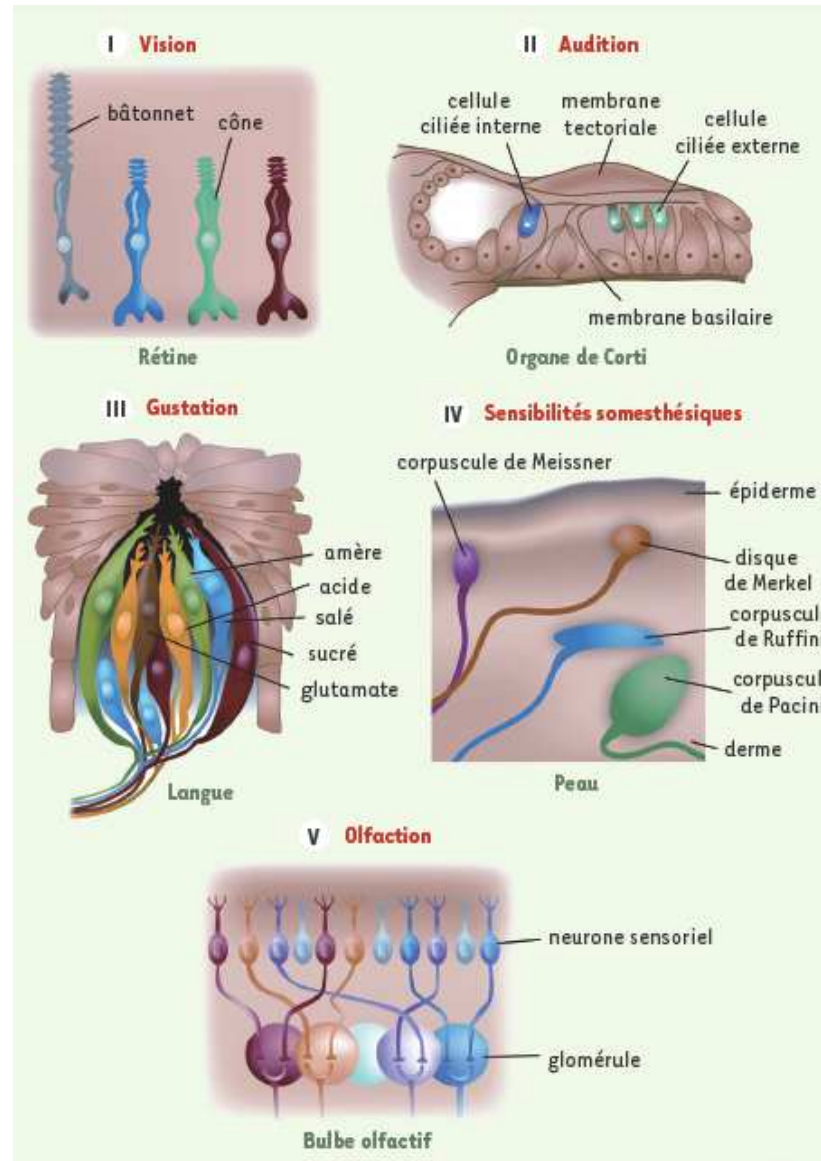


Un exemple de communication neuronale:

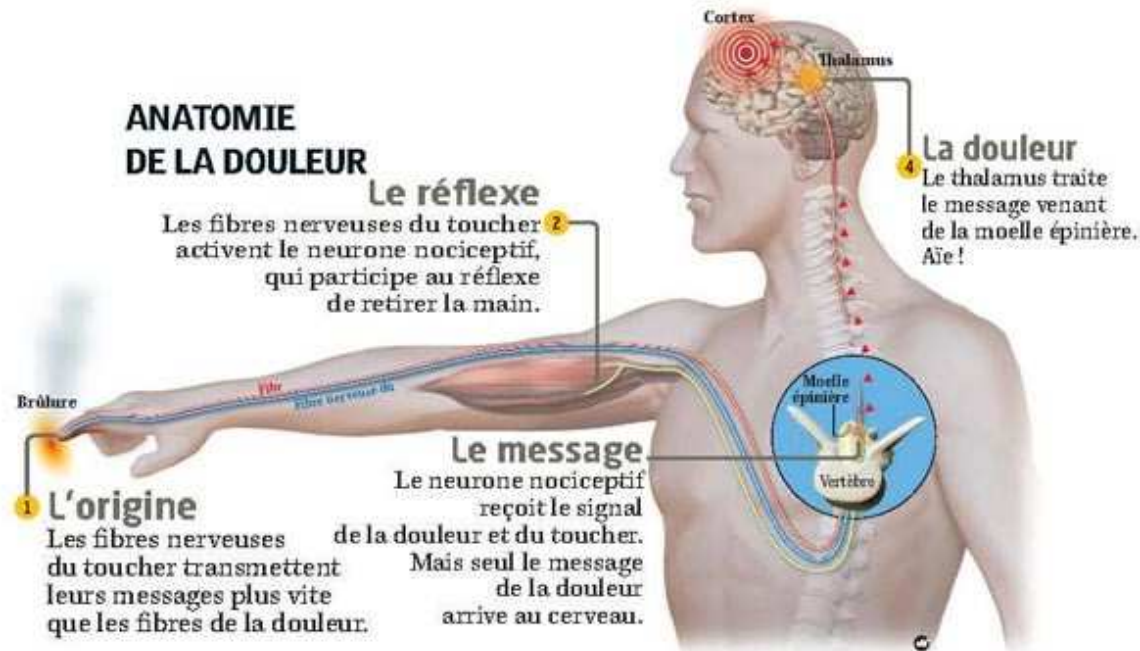
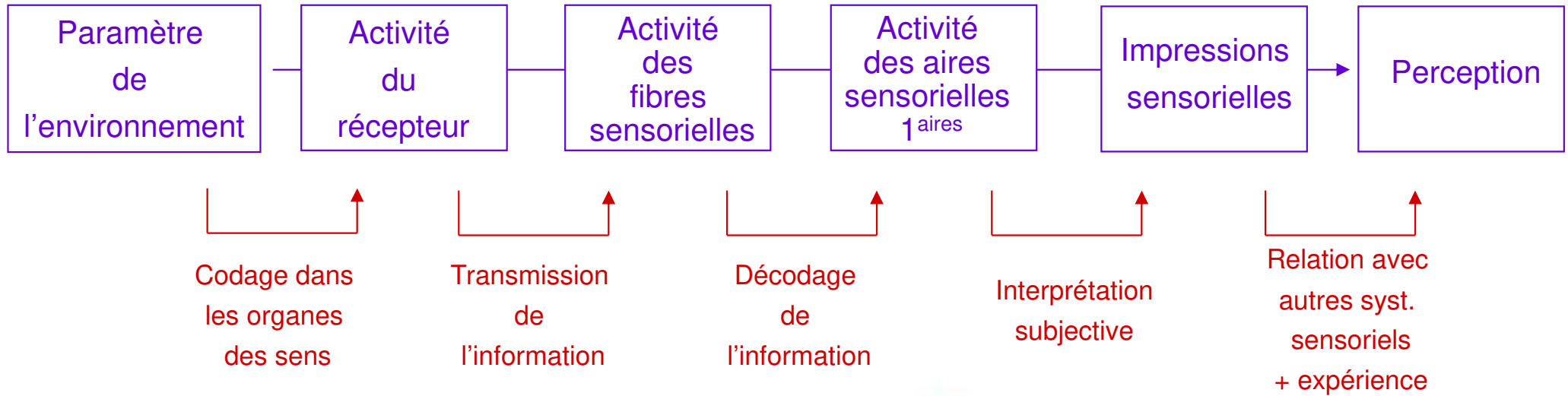
l'olfaction

Les systèmes sensoriels : principes généraux

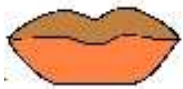
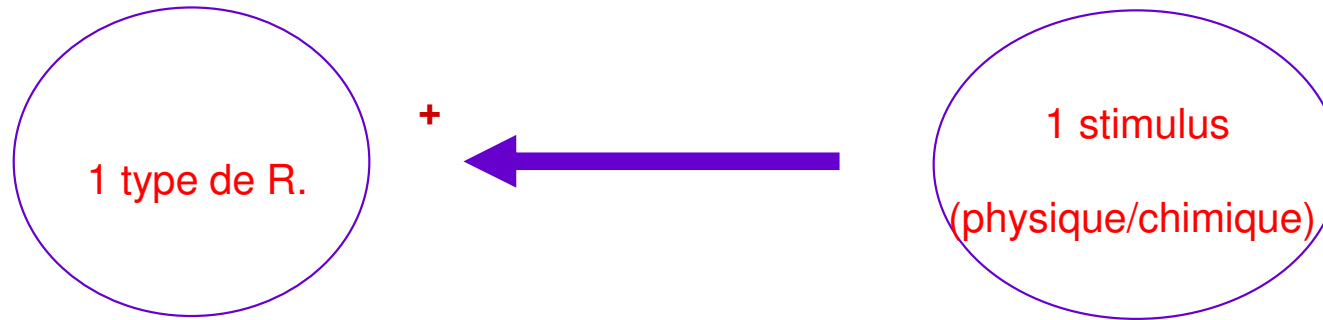
Recueil d'informations = **SNP sensoriel**



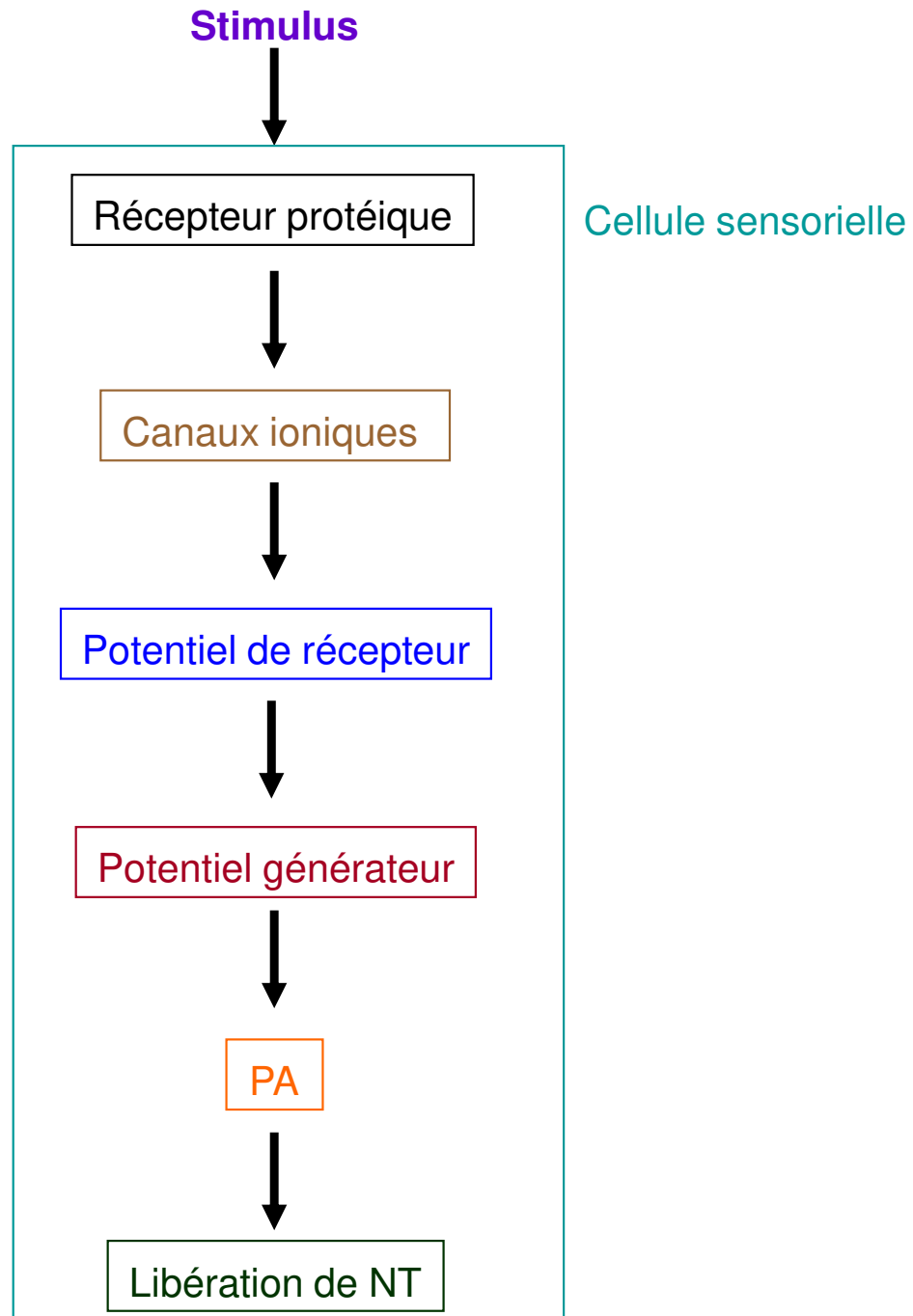
Les systèmes sensoriels : principes généraux



Exemple de modalités sensorielles



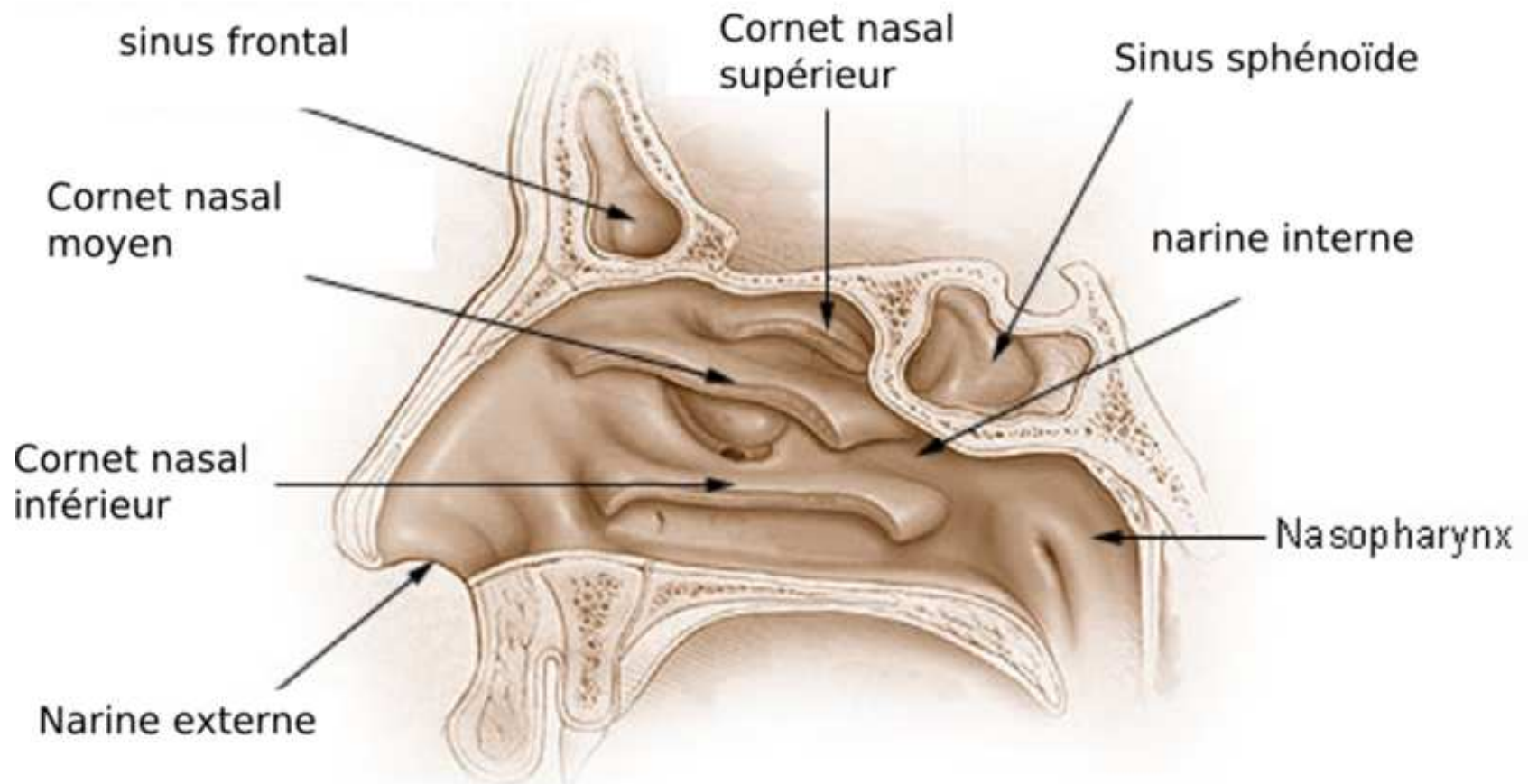
Codage de l'information sensorielle



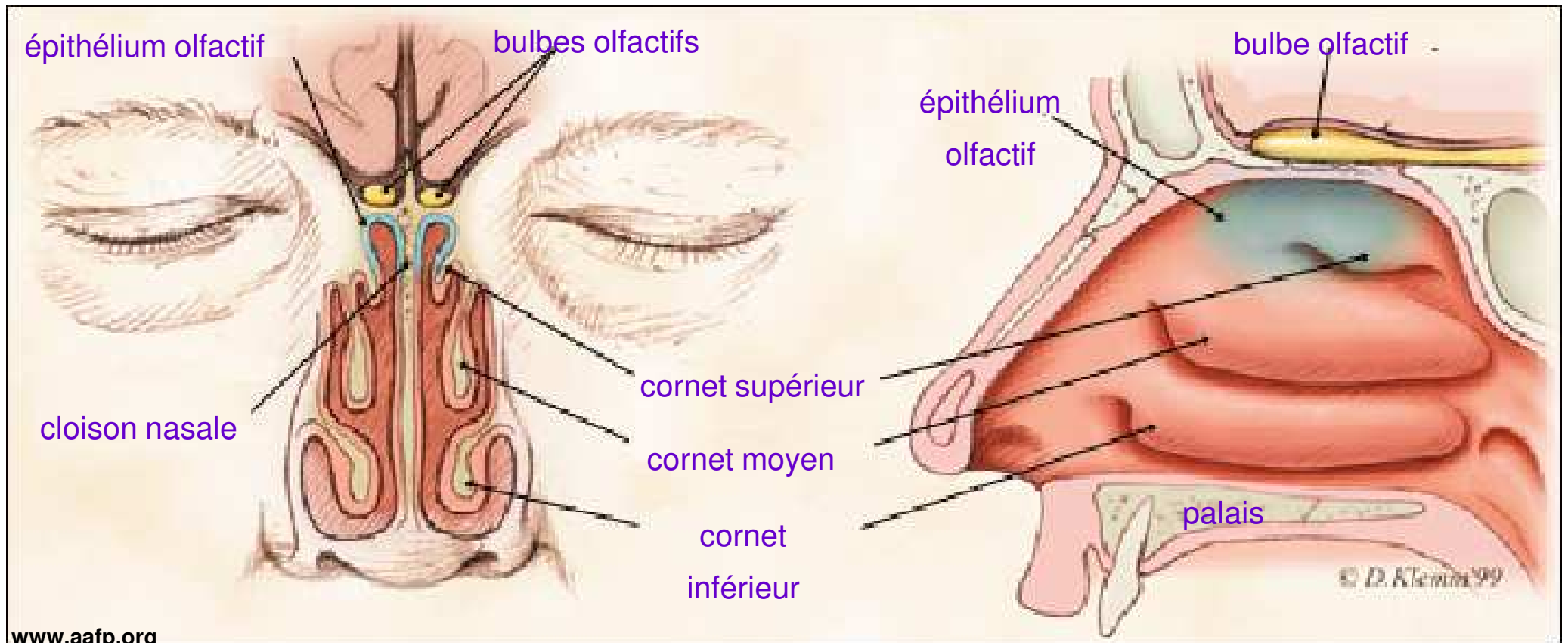
L'olfaction



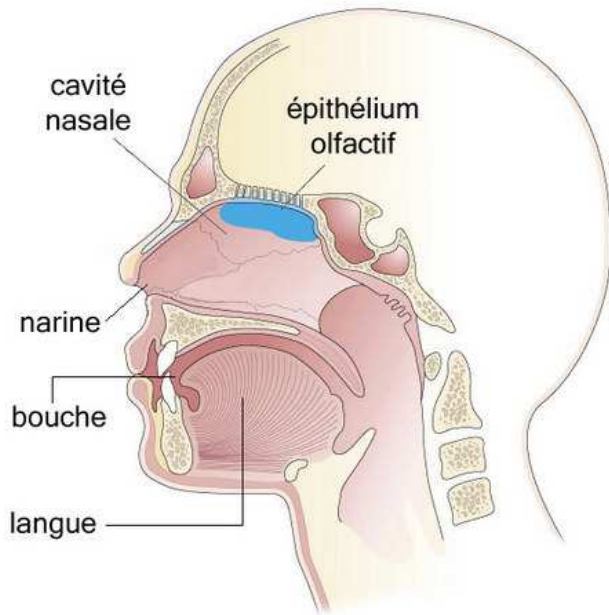
L'appareil olfactif



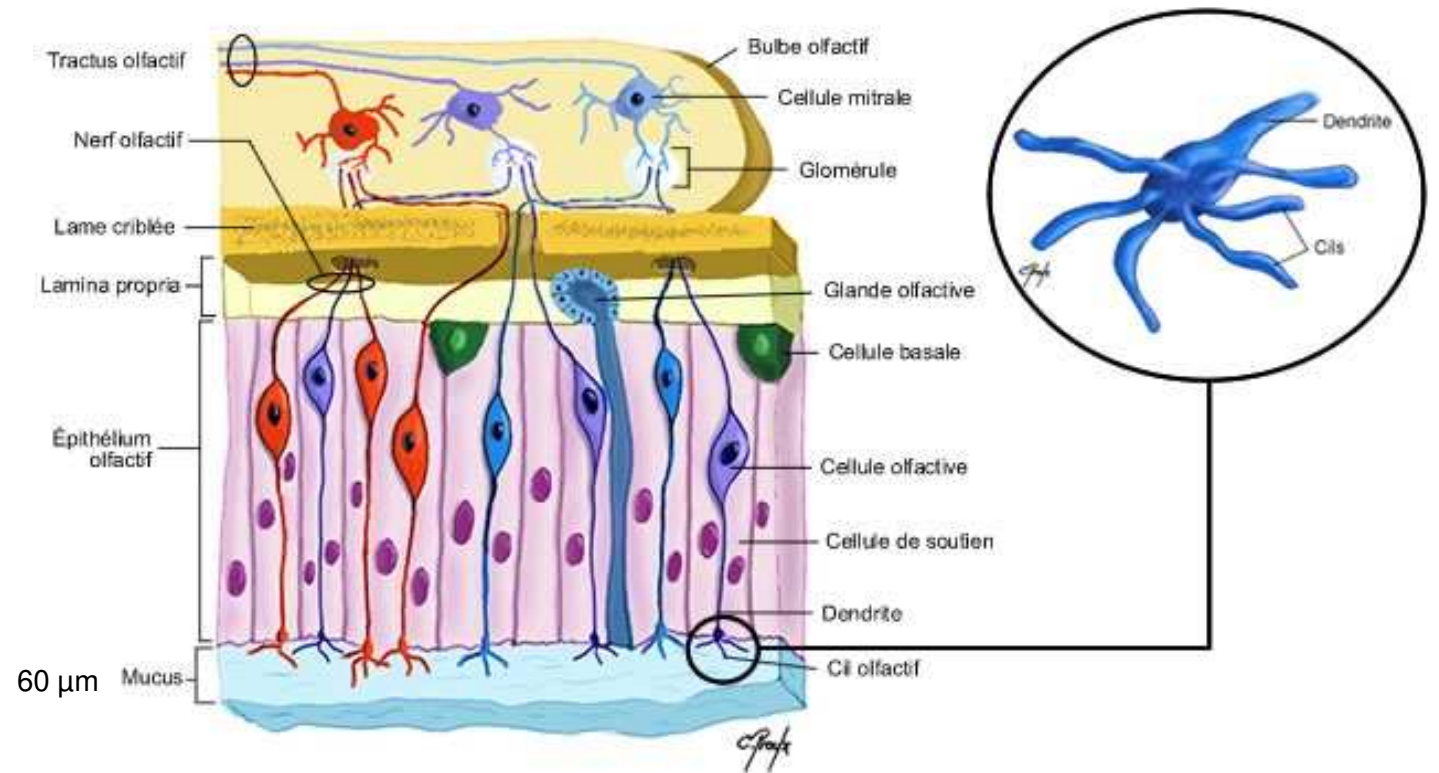
L'appareil olfactif



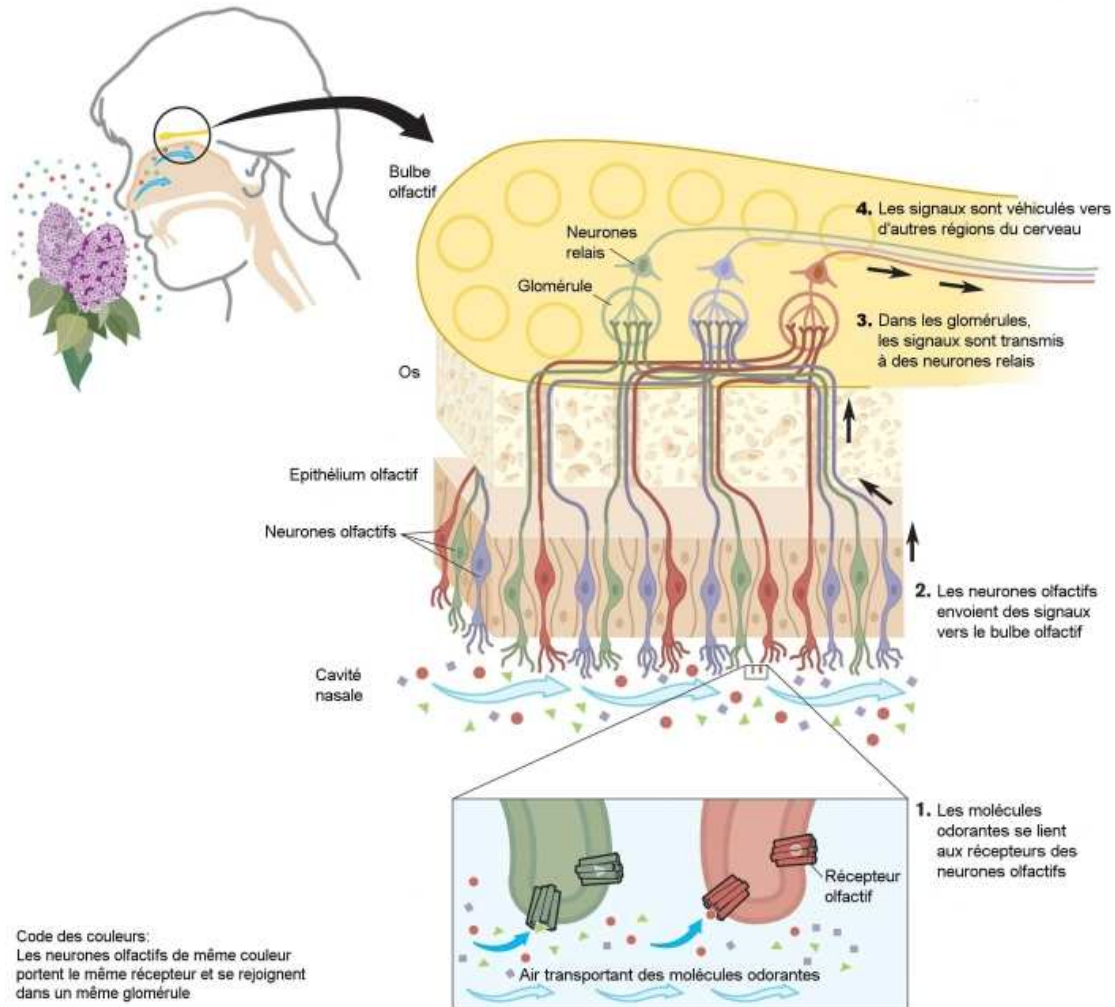
L'appareil olfactif



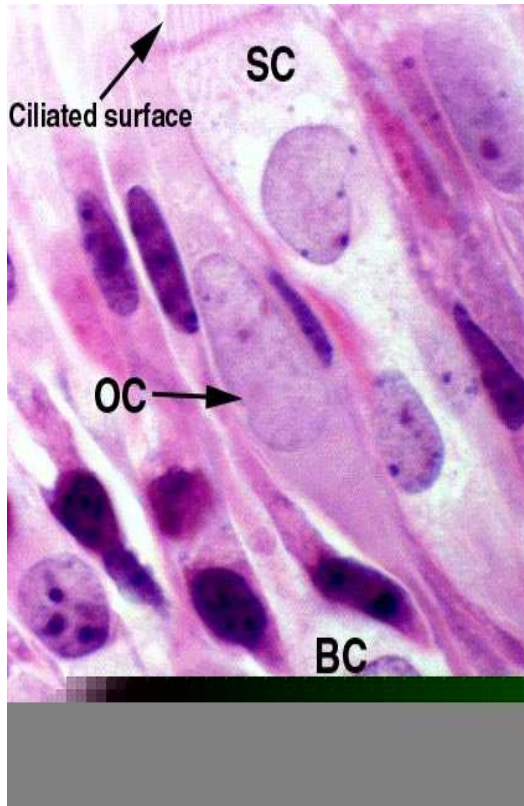
coupe sagittale de la tête
(d'après Lippincott, Williams & Wilkins 2001)



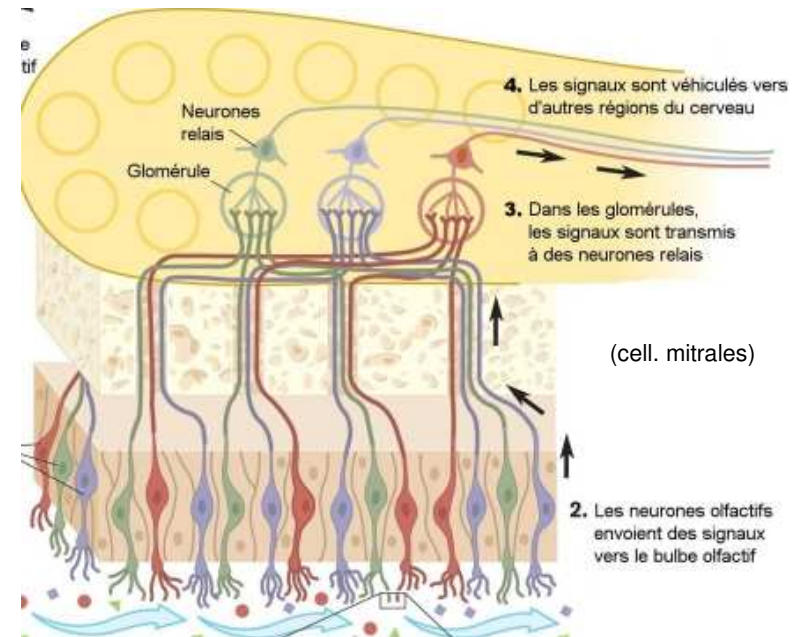
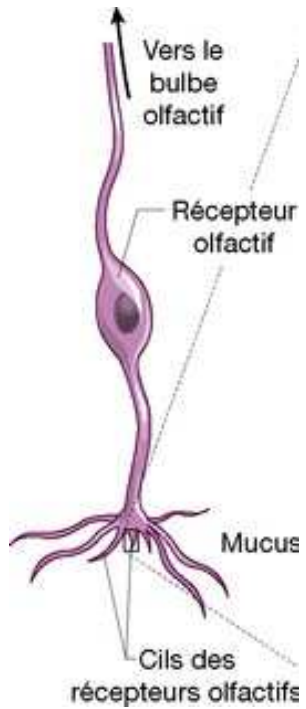
L'appareil olfactif



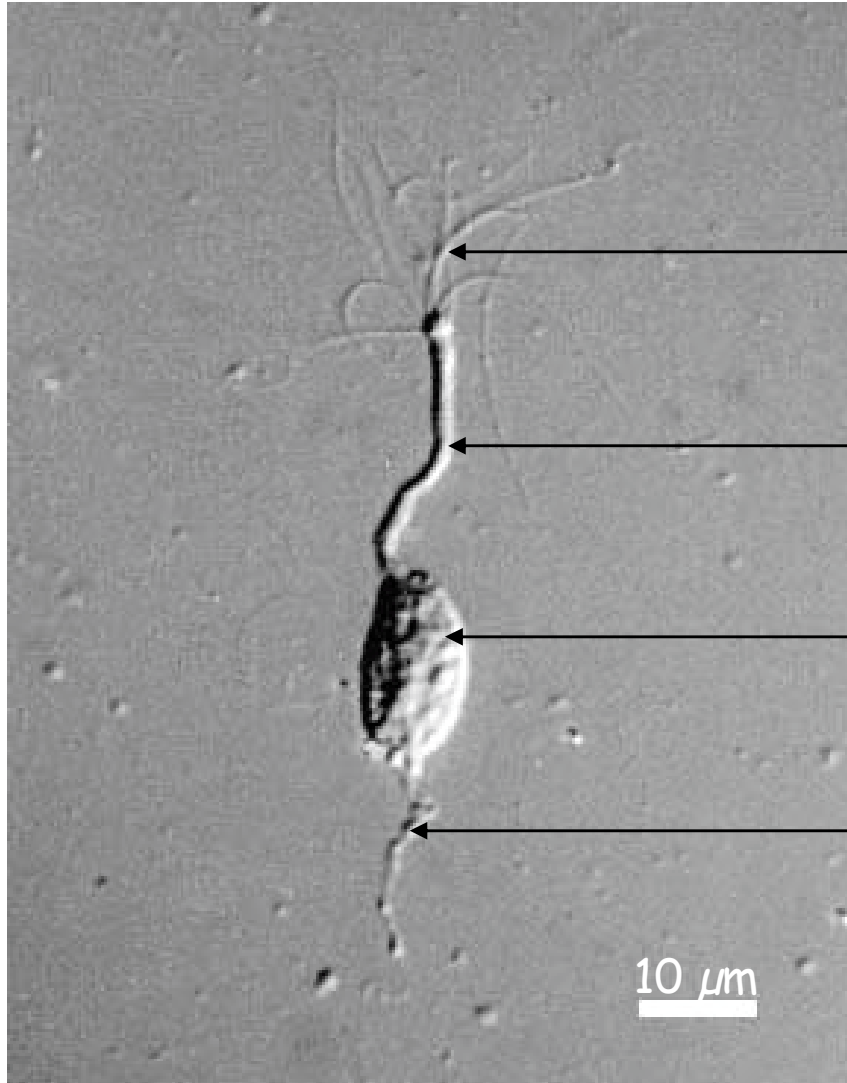
L'appareil olfactif



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Les neurones olfactifs

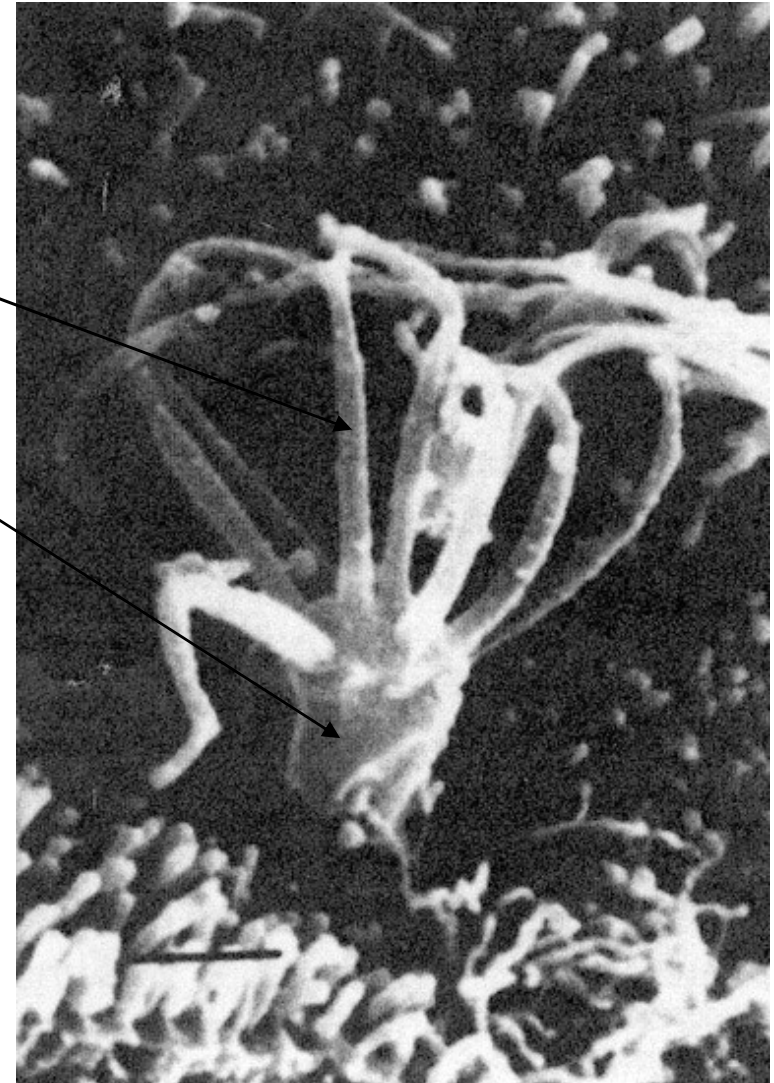


cils

dendrite

soma

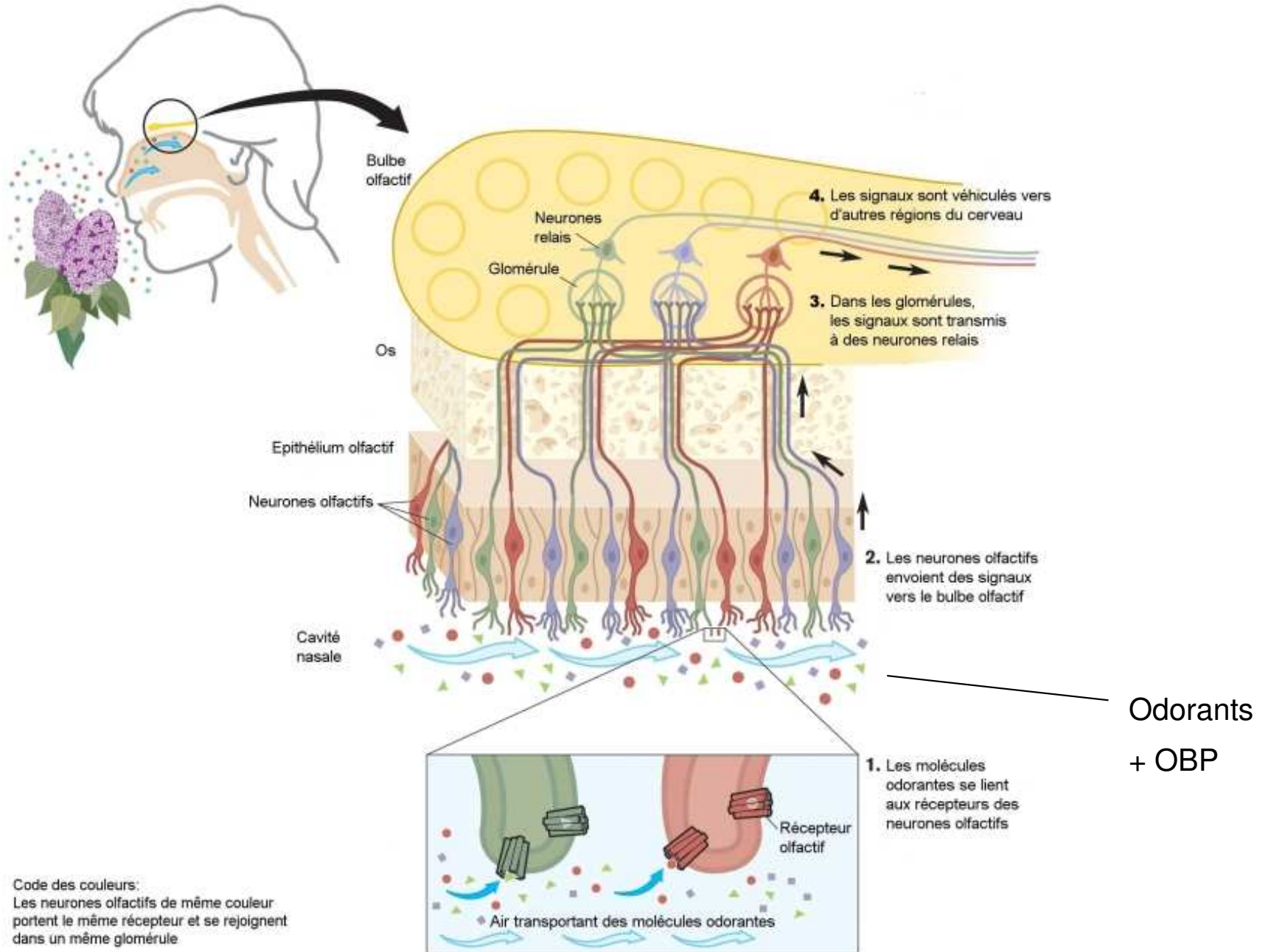
axone



Kleene & Gesteland (1981) Brain Res. 229: 536

Morrison & Constanzo, 1990

Transduction de l'information



Les récepteurs des molécules odorantes

Cell, Vol. 65, 175–187, April 5, 1991, Copyright © 1991 by Cell Press

A Novel Multigene Family May Encode Odorant Receptors: A Molecular Basis for Odor Recognition

Linda Buck* and Richard Axel*†

*Department of Biochemistry and Molecular Biophysics

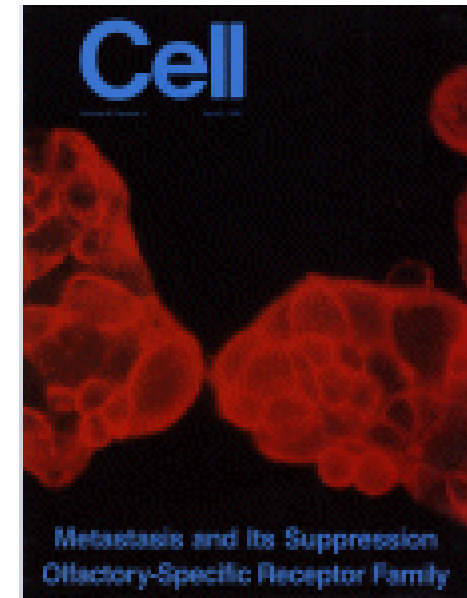
†Howard Hughes Medical Institute

College of Physicians and Surgeons

Columbia University

New York, New York 10032

the sense of smell ma
receptors each capabl
number of odorants. It
guish which receptors
vated to allow the discr
stimuli. Insight into th
perception is likely to



Les récepteurs des molécules odorantes



souris : ~ 1000 gènes

Génome: 30 000



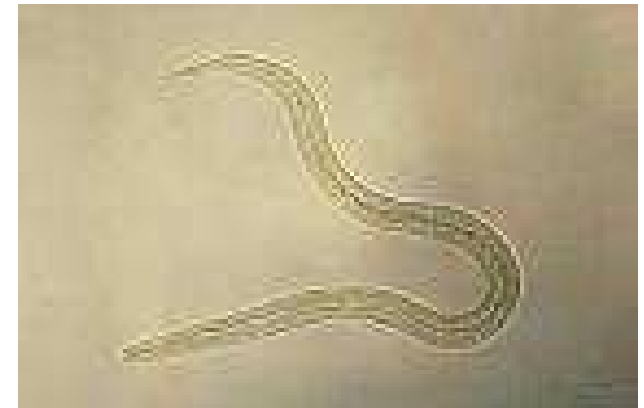
drosophile : 57 gènes

Génome: 15 000



poisson zèbre : ~ 100 gènes

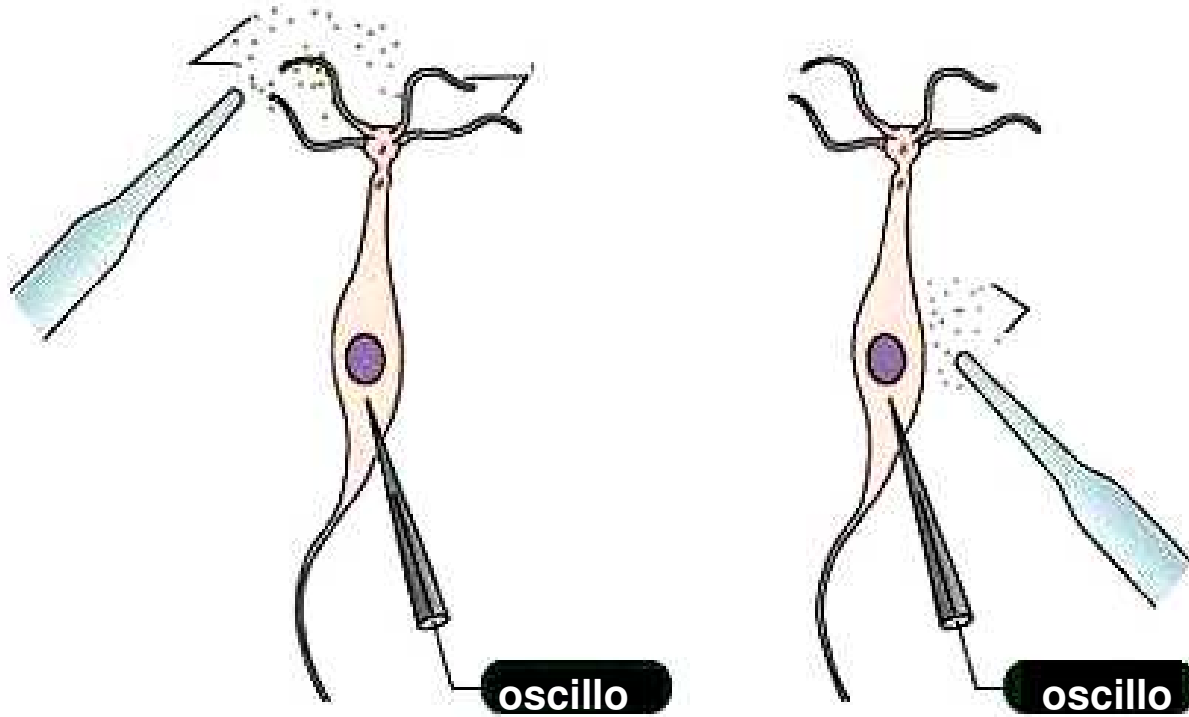
Génome: 26 000



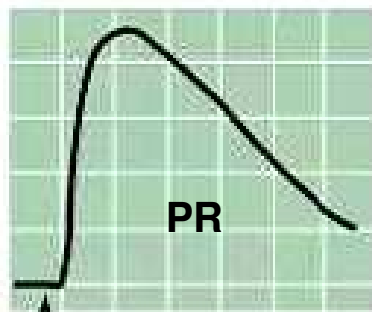
C. elegans : ~ 500 gènes

Génome: 19 000

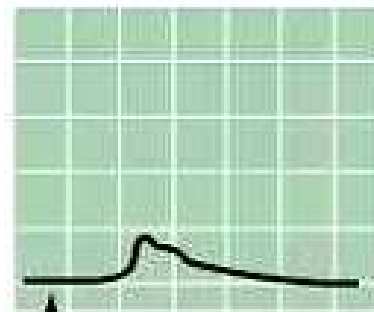
De la stimulation chimique au phénomène électrique



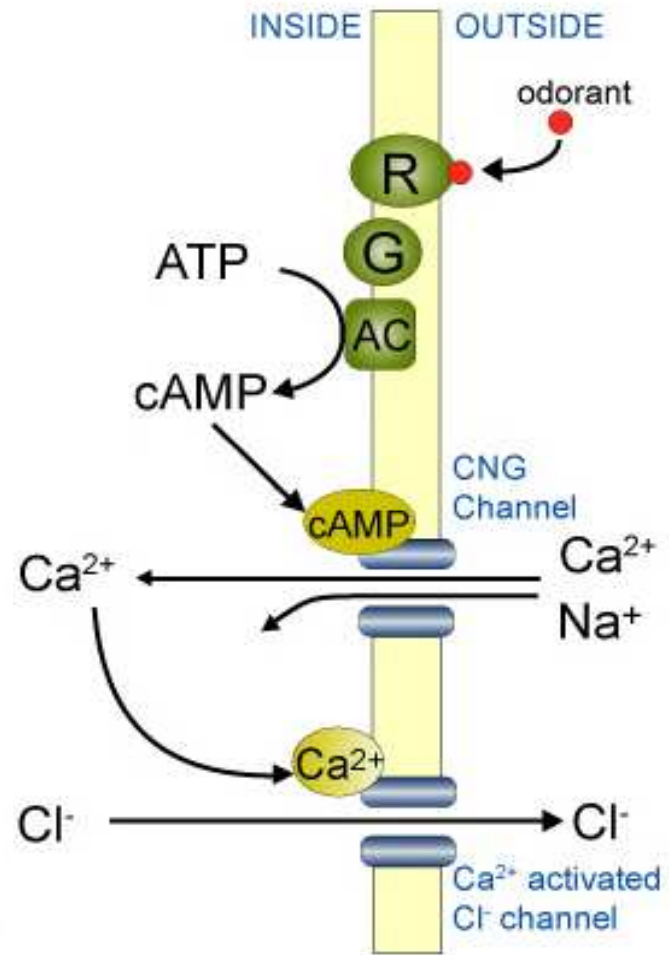
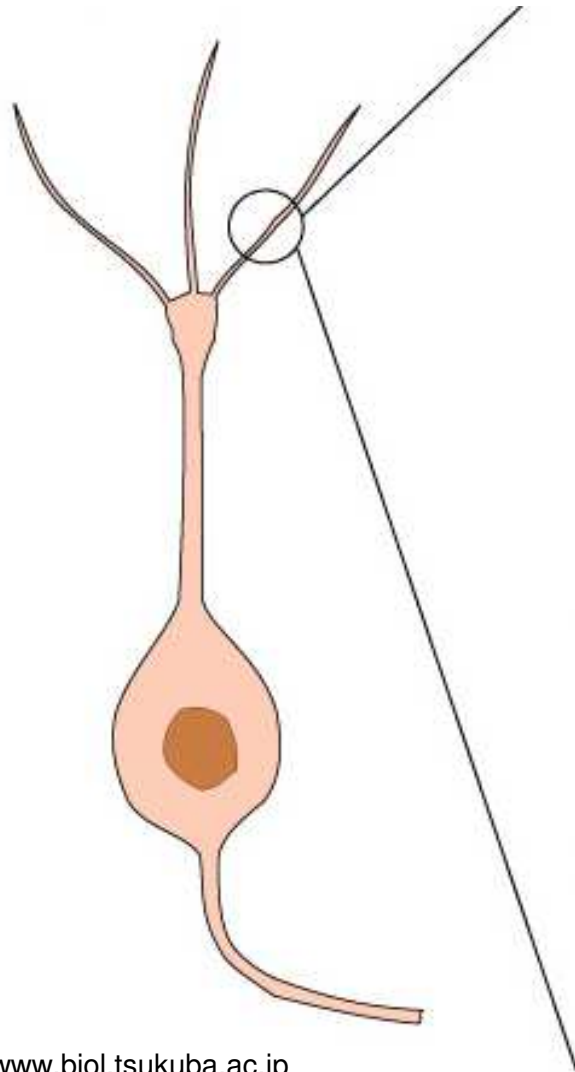
dépolarisation
membranaire



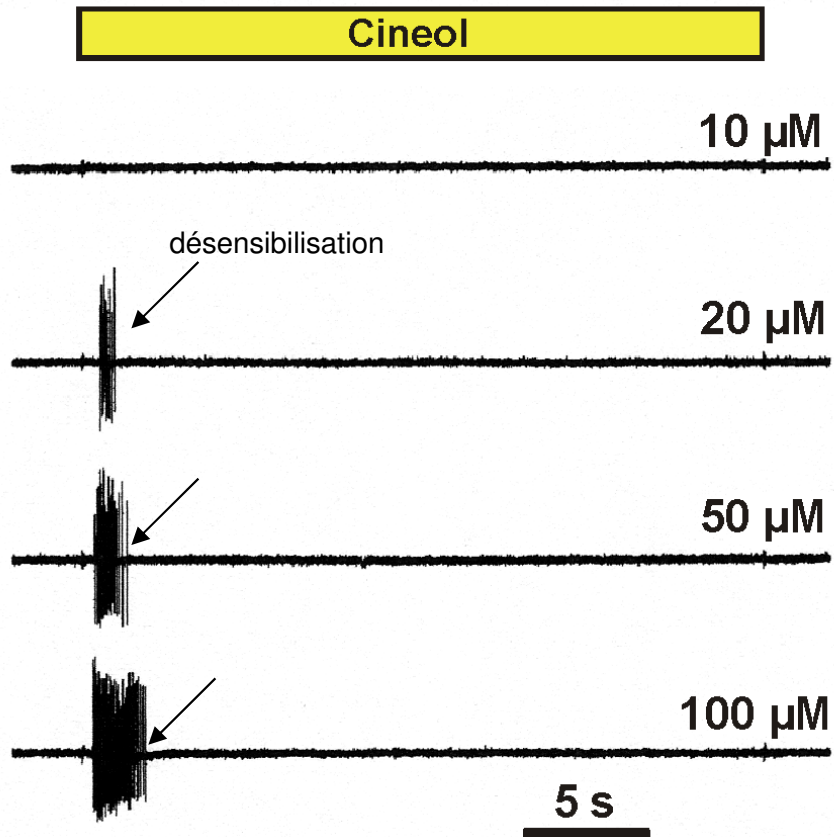
odeur



Les mécanismes de la transduction olfactive

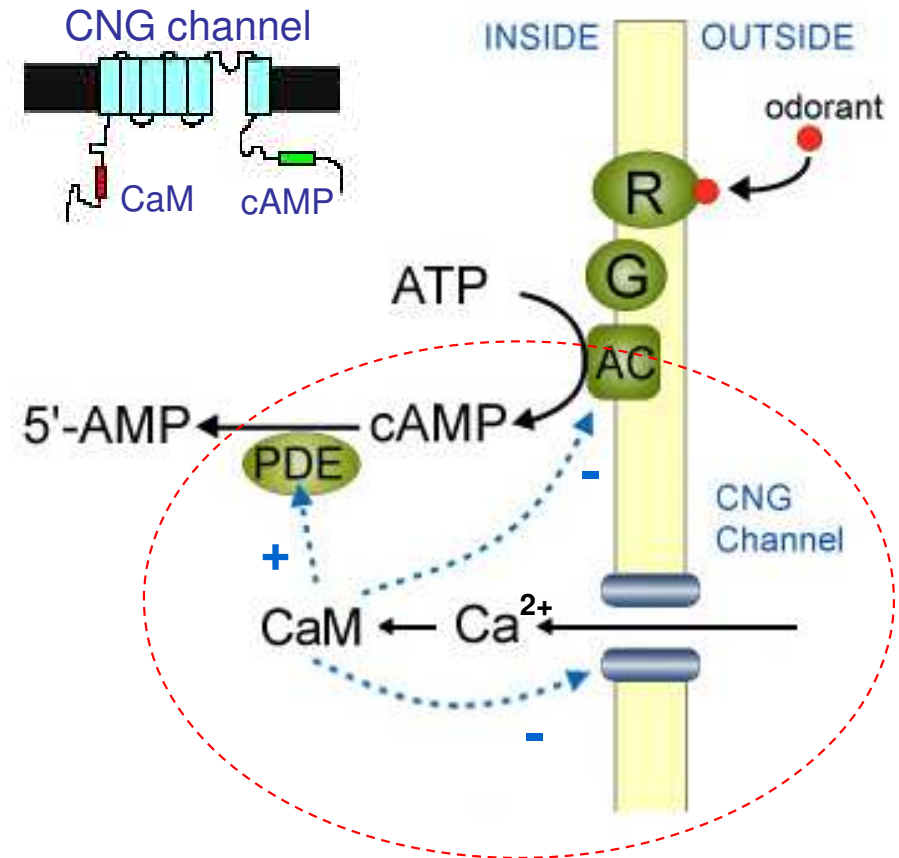


La désensibilisation : rôle du calcium

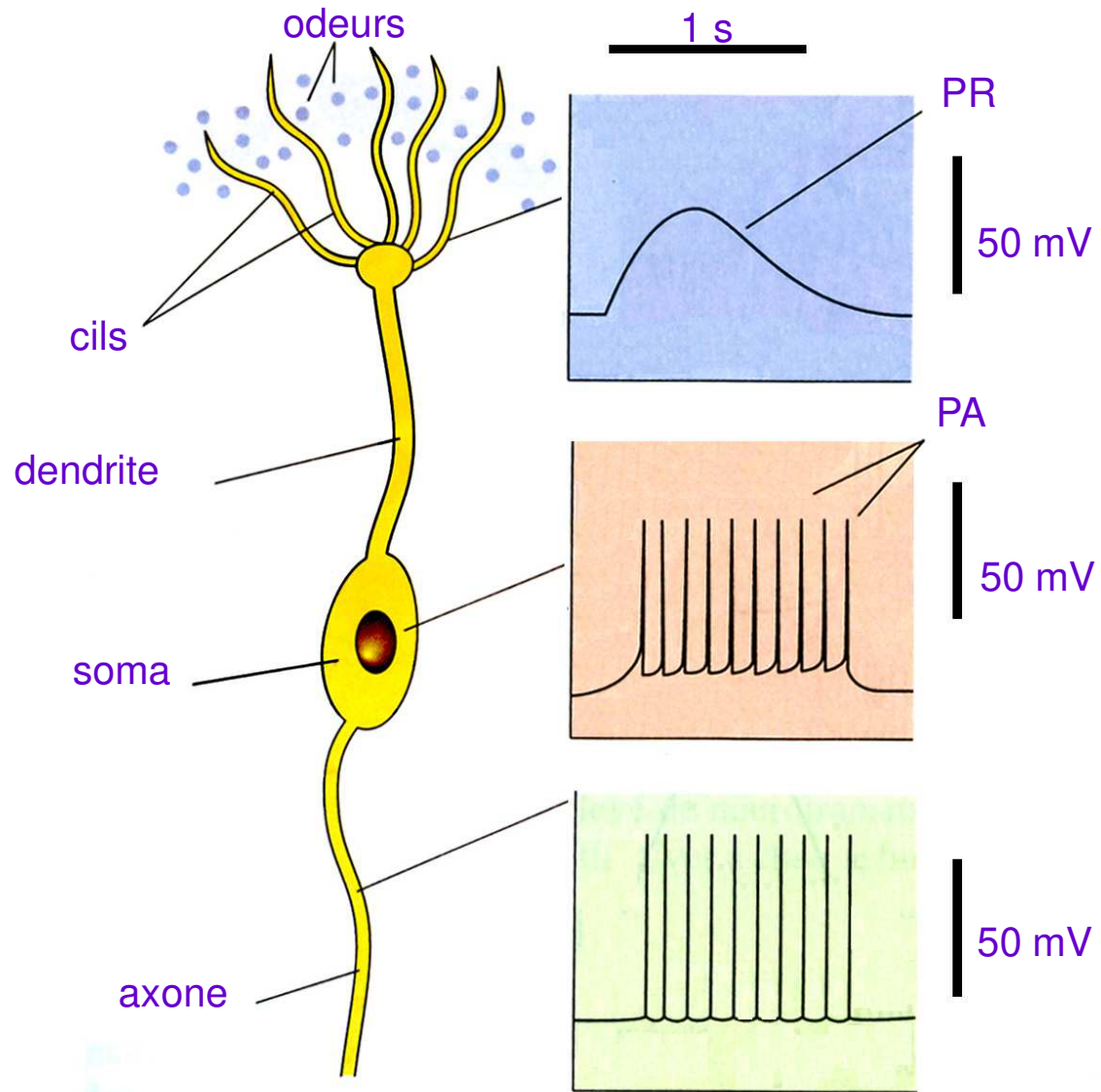


Reisert & Matthews (2001) J. Physiol. 534:179

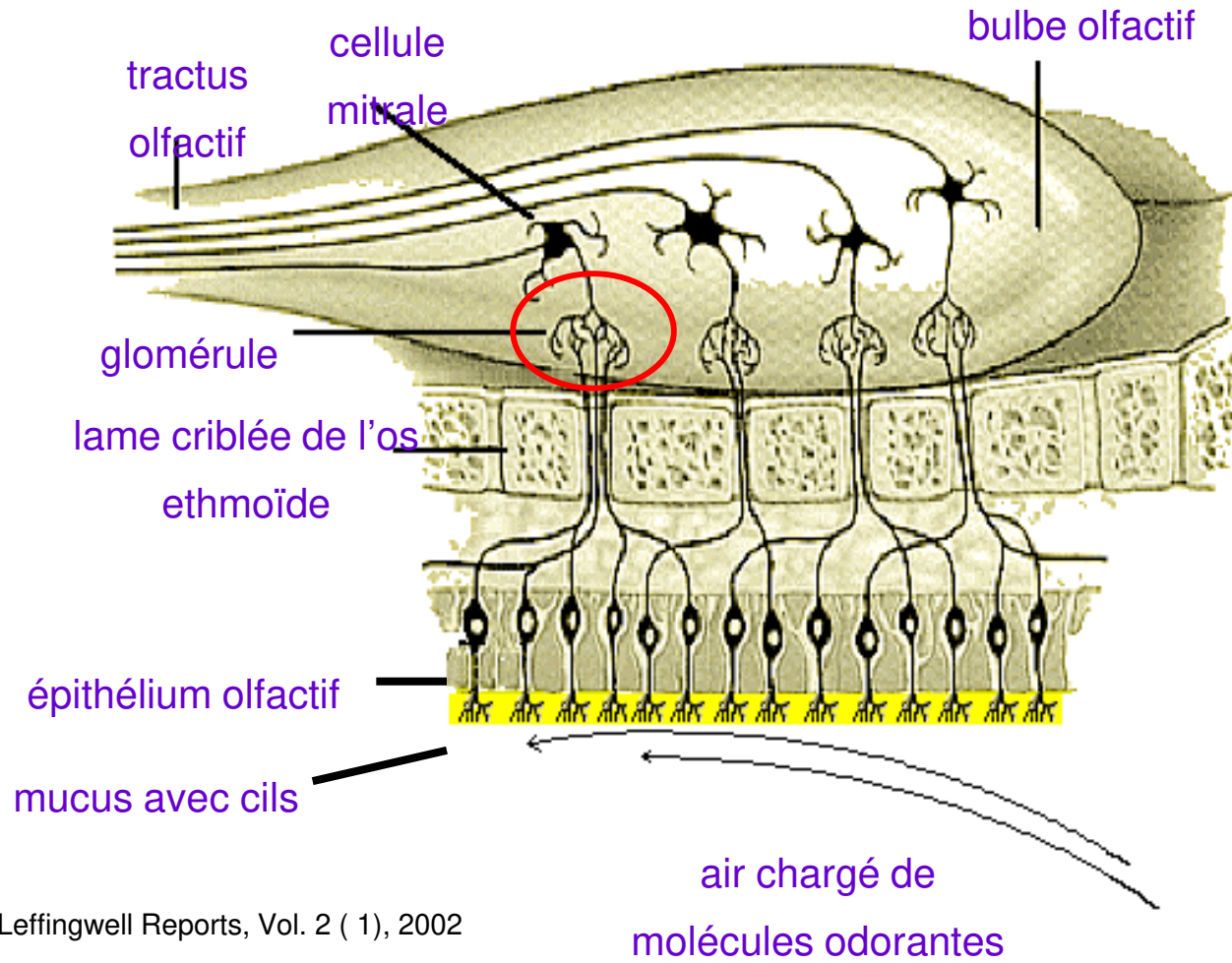
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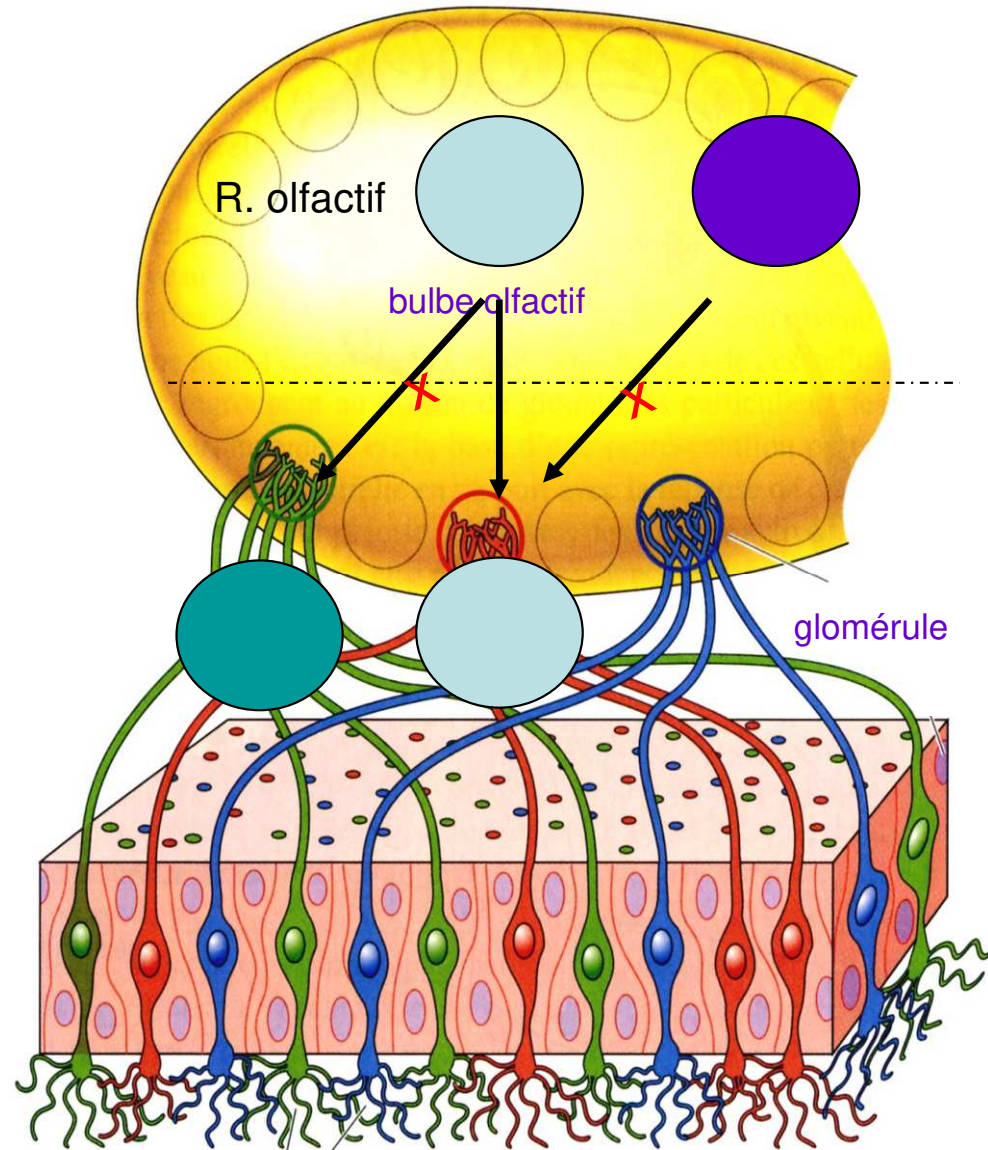
Du PR au PA



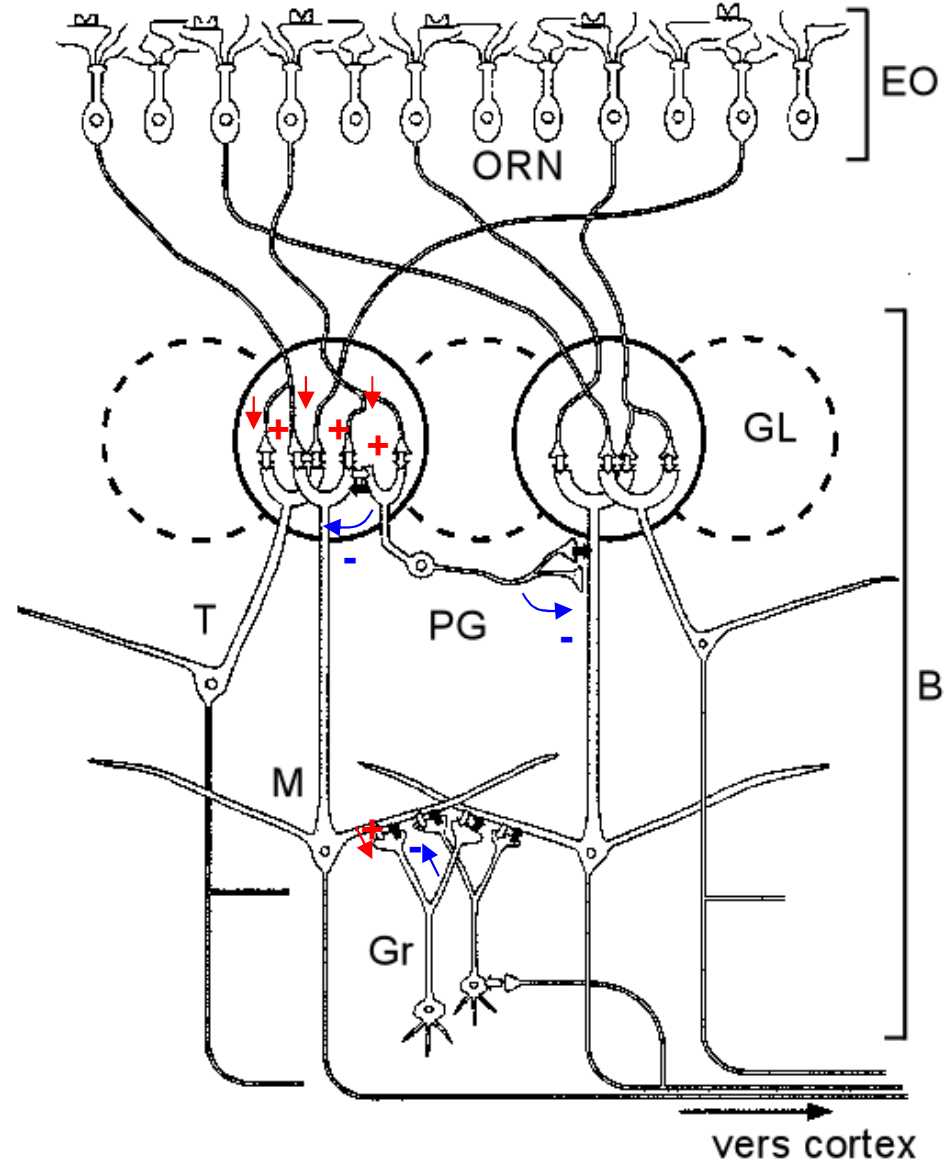
Bulbe olfactif : convergence de l'information



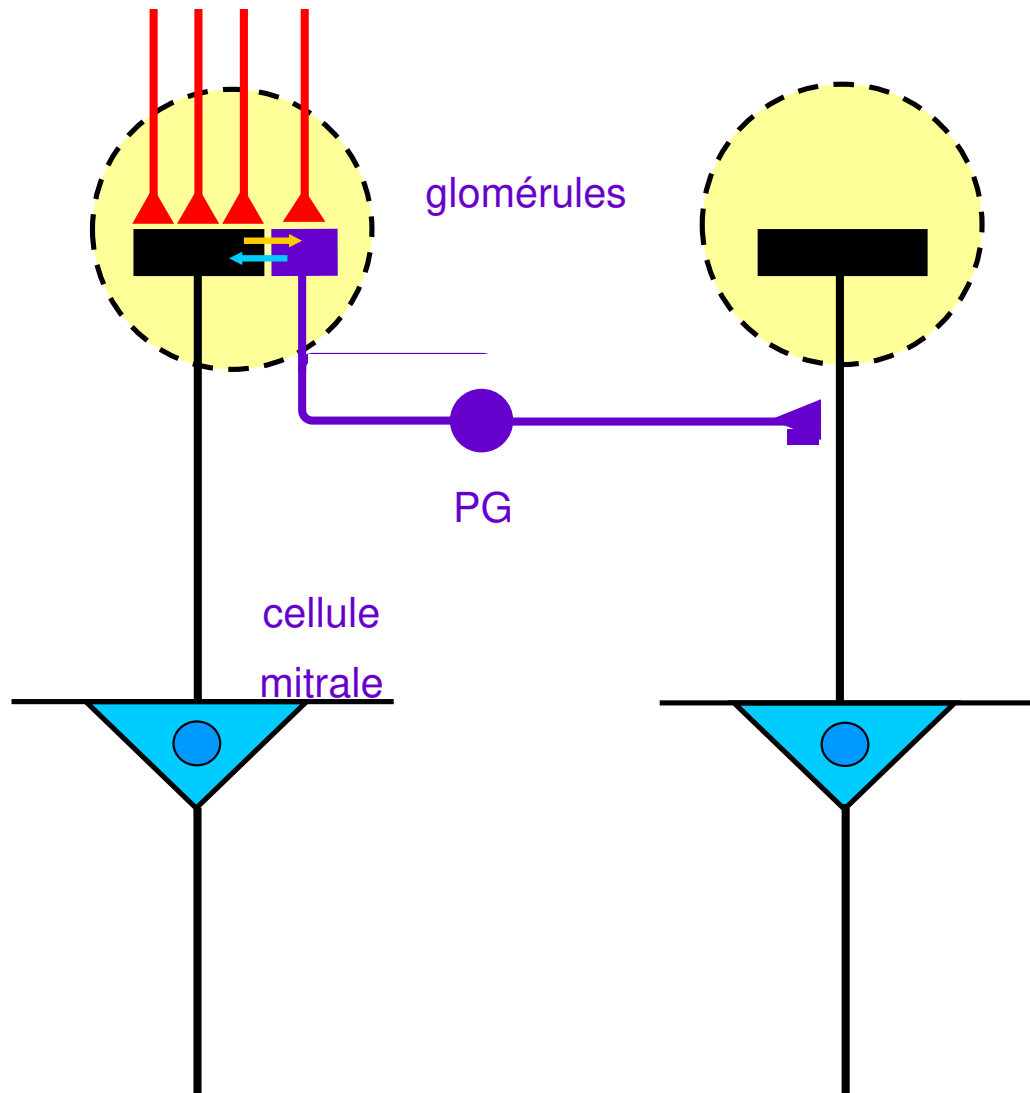
Bulbe olfactif : convergence de l'information



Bulbe olfactif : convergence de l'information



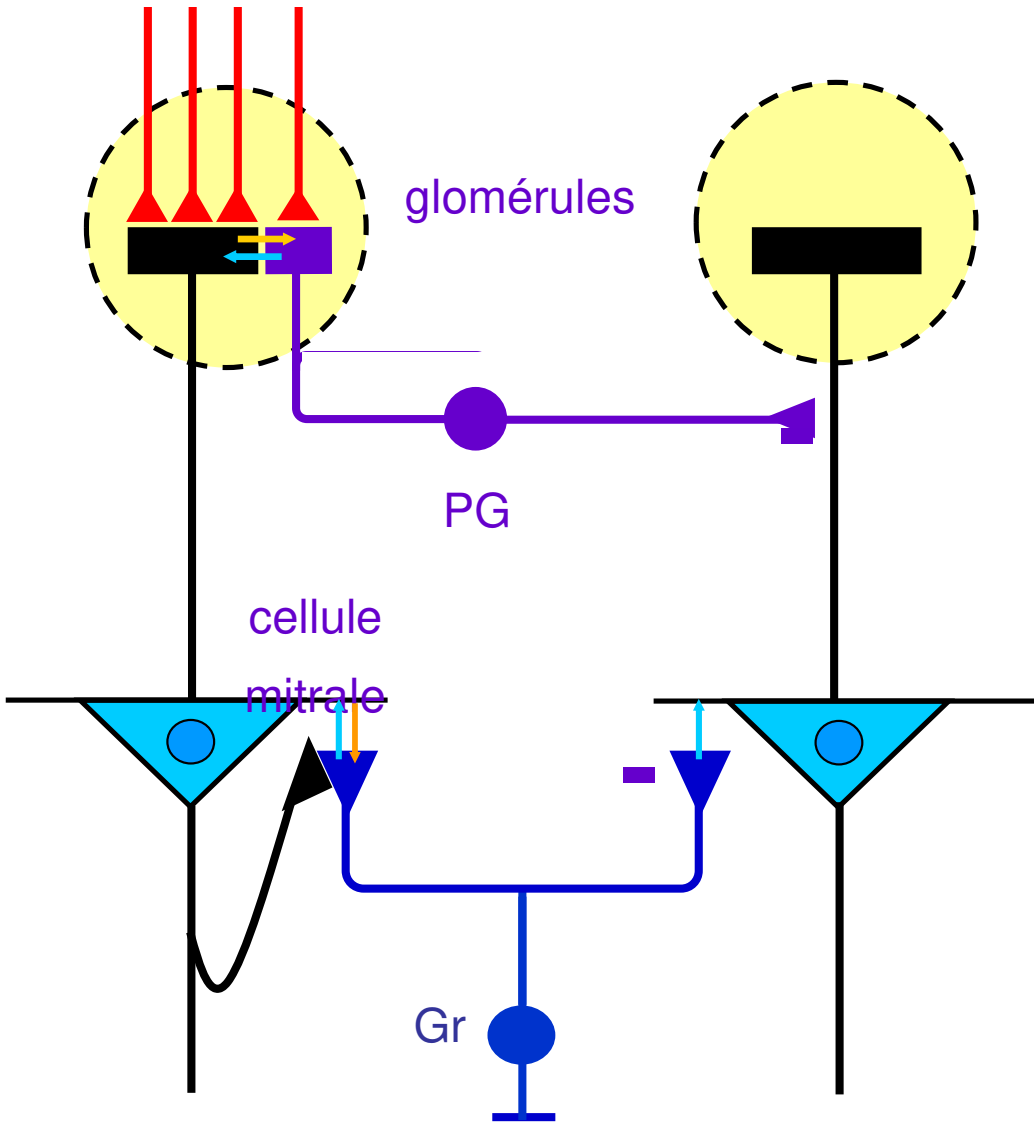
Le 1^{er} relais synaptique (glomérules) : inhibition



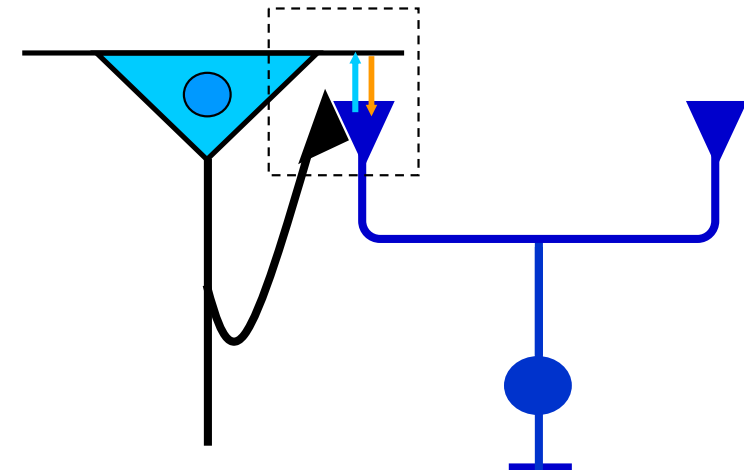
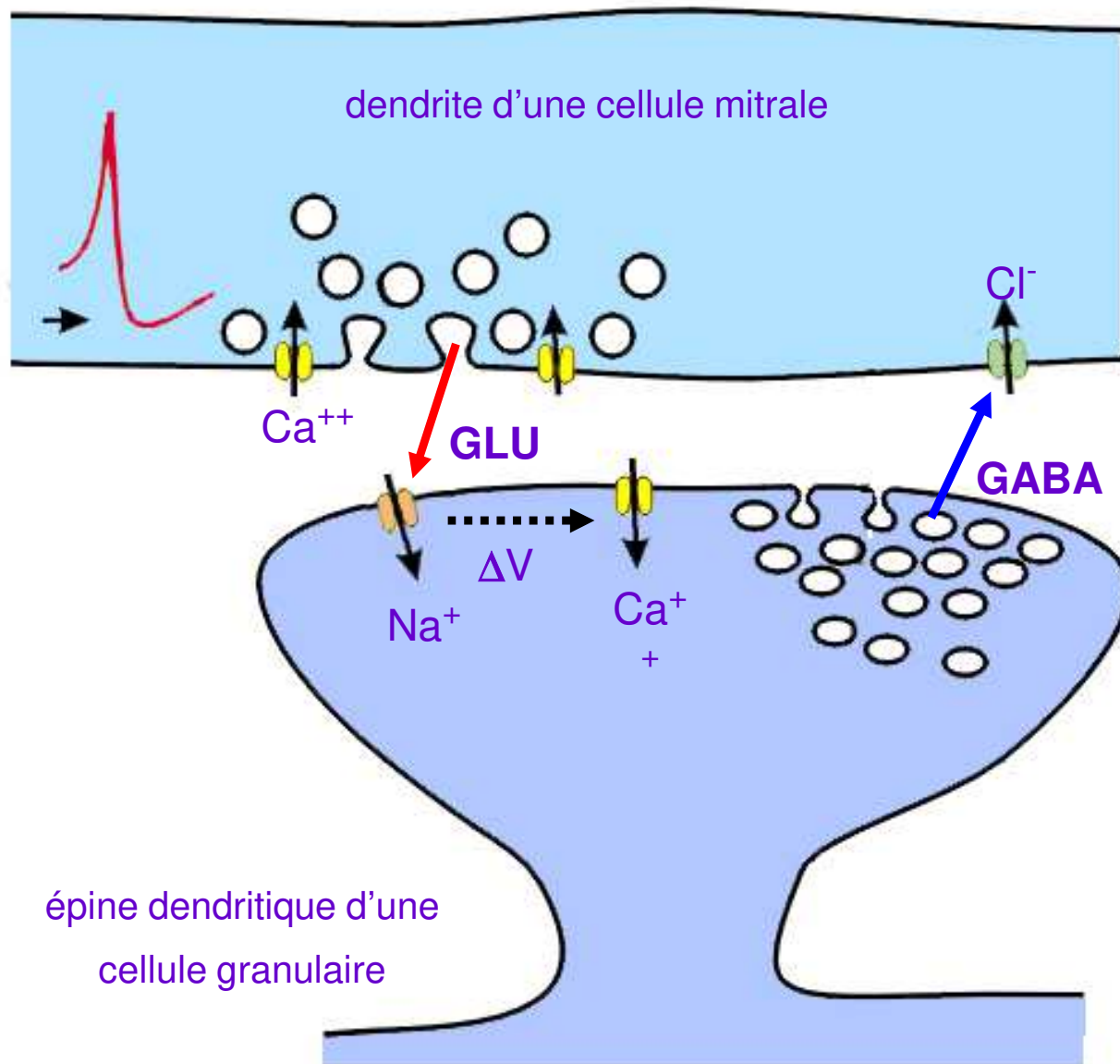
odeur

Buonviso et Chaput, J.Neurophysiol., 1990

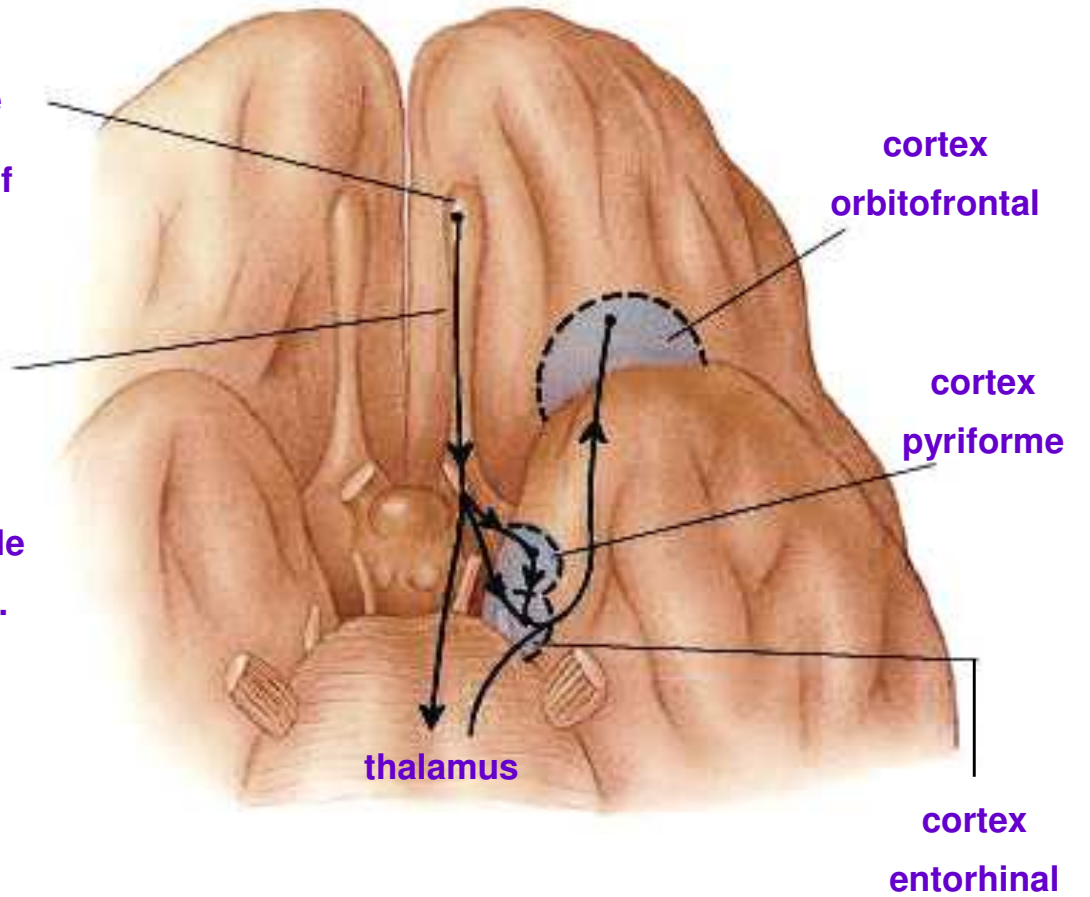
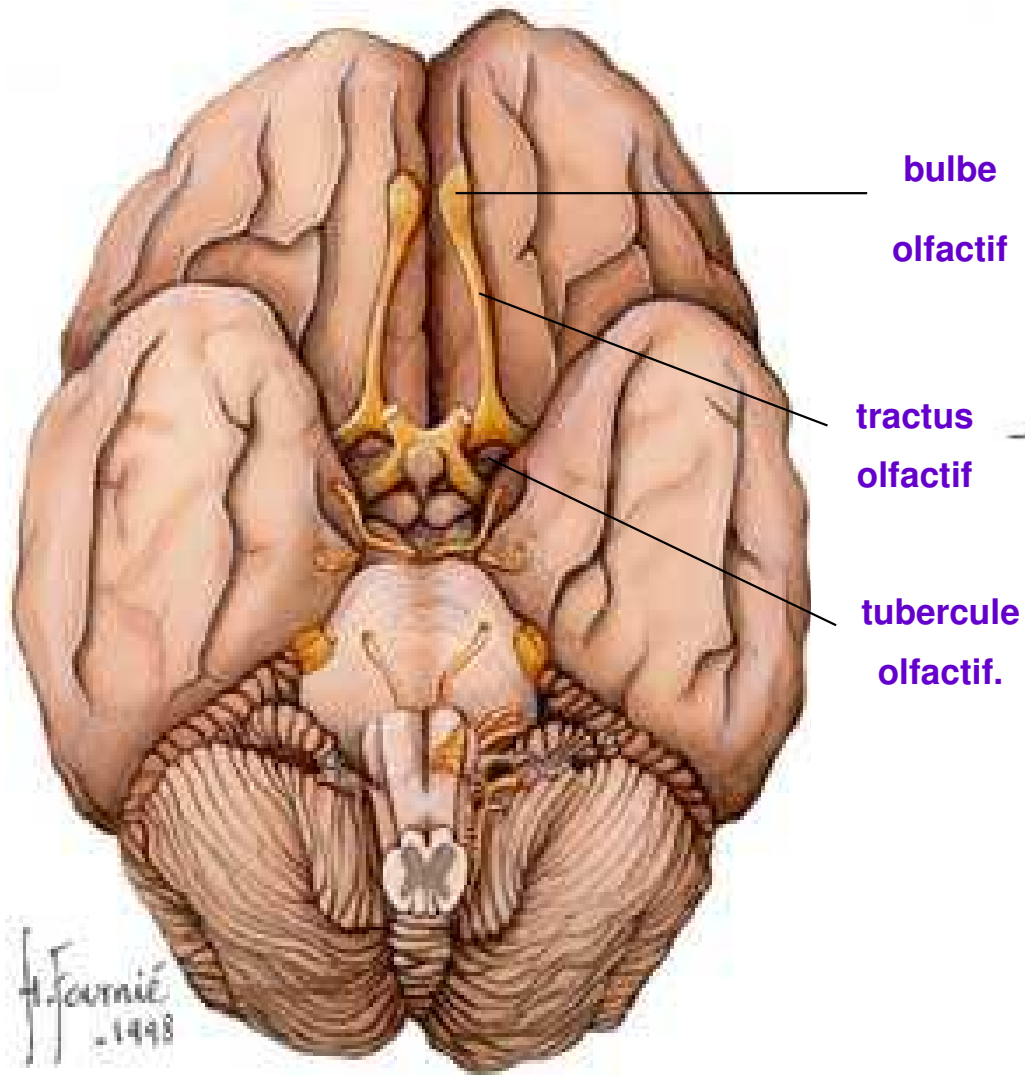
Le 1^{er} relais synaptique (glomérules) : inhibitions



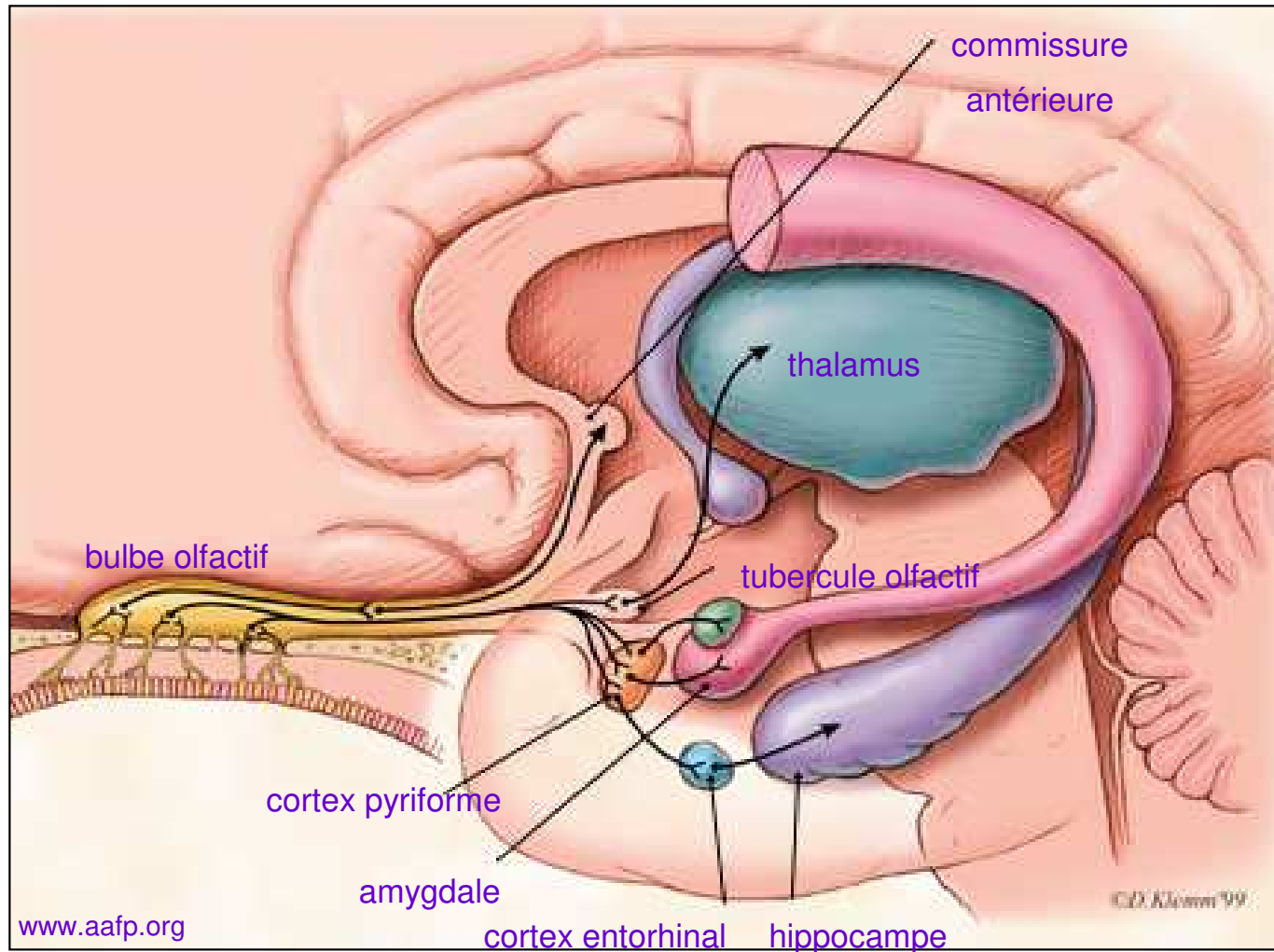
Le 1^{er} relais synaptique (glomérules) : inhibitions



Voies olfactives centrales



Voies olfactives centrales



Voies olfactives centrales

