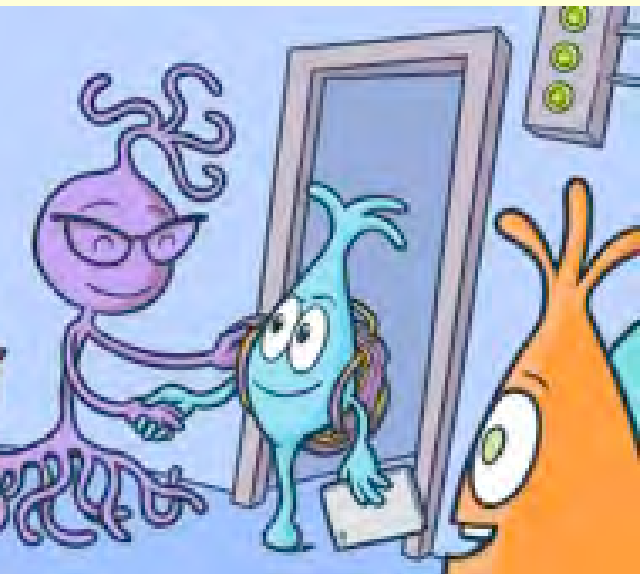


# Le cerveau



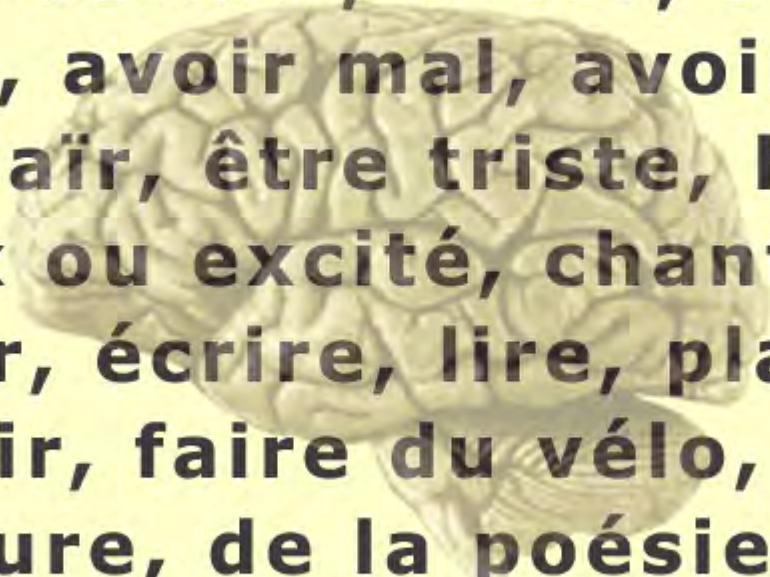
et ses neurones !

Un cerveau humain,  
ça sert à quoi ?



# À tout !

**bouger, voir, entendre, sentir,  
goûter, toucher, se souvenir,  
parler, dormir, rêver, avoir du  
plaisir, avoir mal, avoir peur,  
aimer, haïr, être triste, heureux,  
anxieux ou excité, chanter, rire,  
pleurer, écrire, lire, planifier,  
courir, faire du vélo, de la  
peinture, de la poésie, de la  
philosophie, de la science et  
être conscient de tout cela...**



Mais surtout, le cerveau nous aide  
à rester en vie !



Mais surtout, le cerveau nous aide  
à rester en vie !



Mais surtout, le cerveau nous aide à rester en vie !



Deux choses  
vont évoluer  
chez tous  
les animaux :



Perception



Action

Deux choses  
vont évoluer  
chez tous  
les animaux :





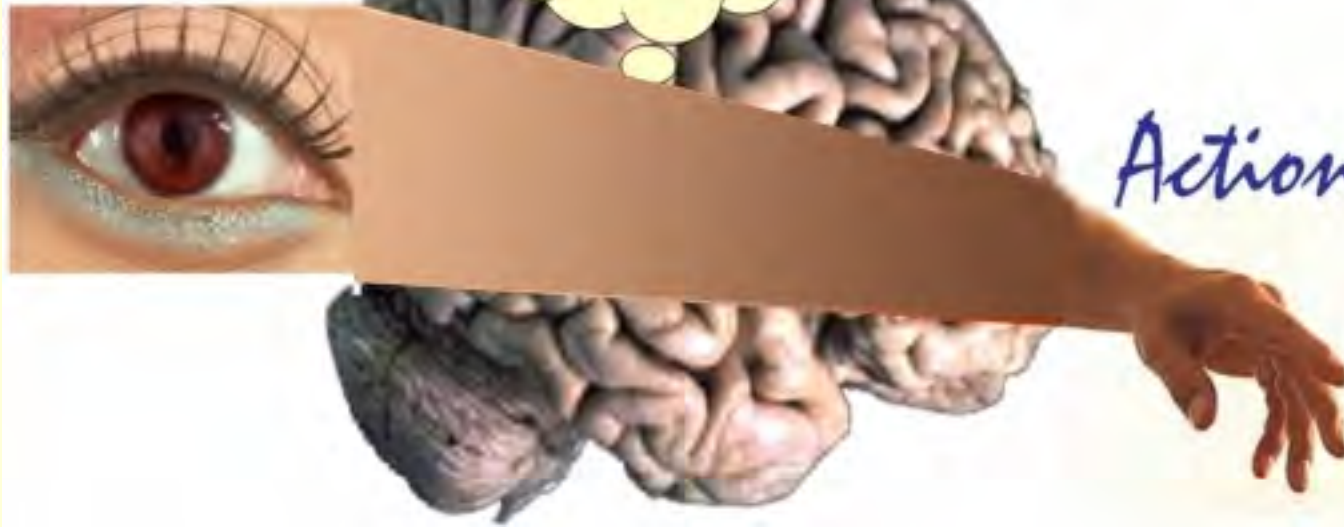
Deux choses  
vont évoluer  
chez tous  
les animaux :



Perception

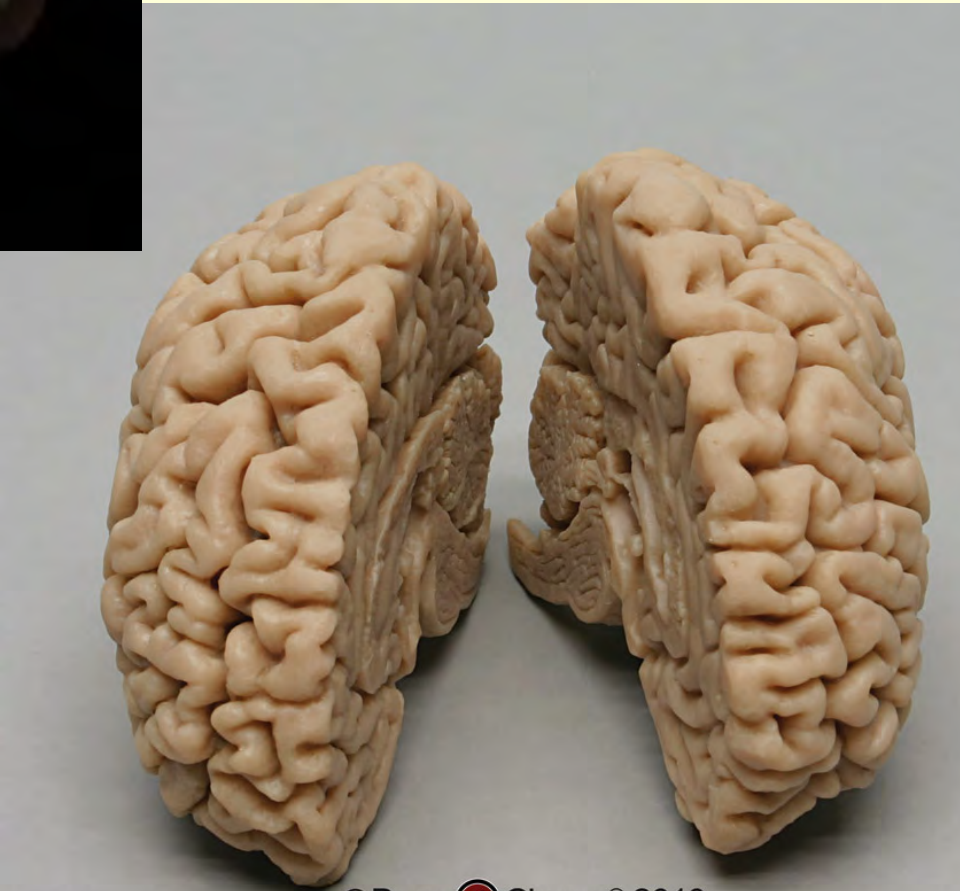
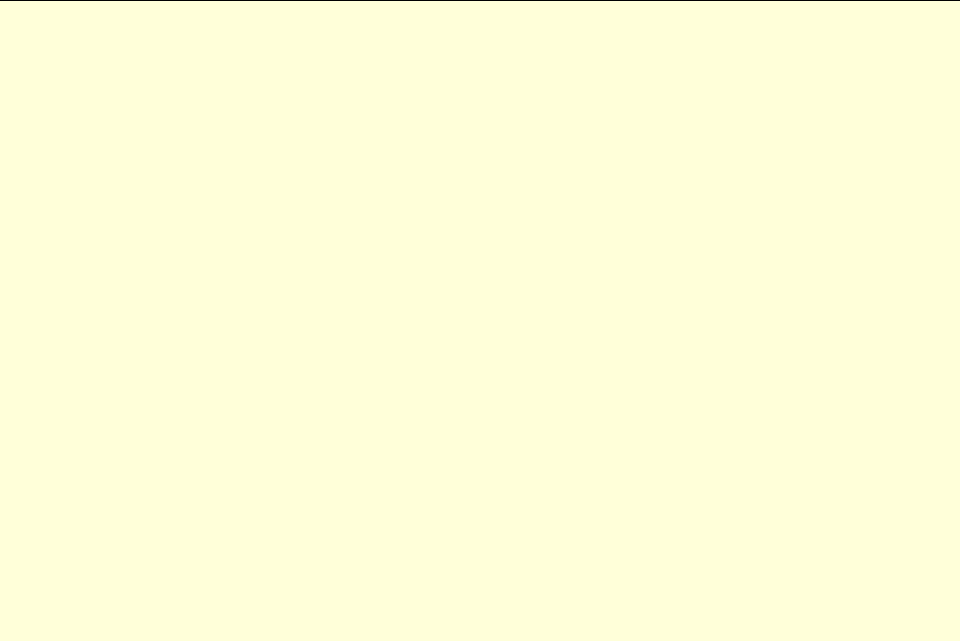
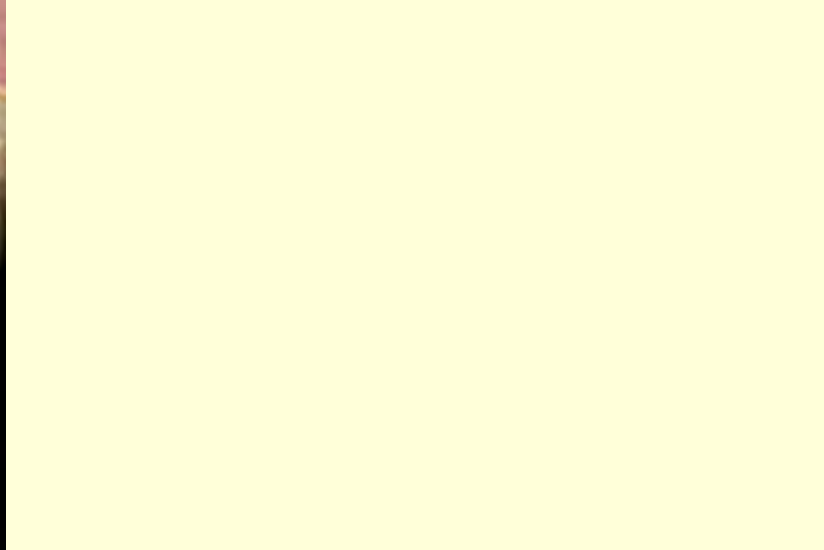
Apprendre  
Mémoriser

Action



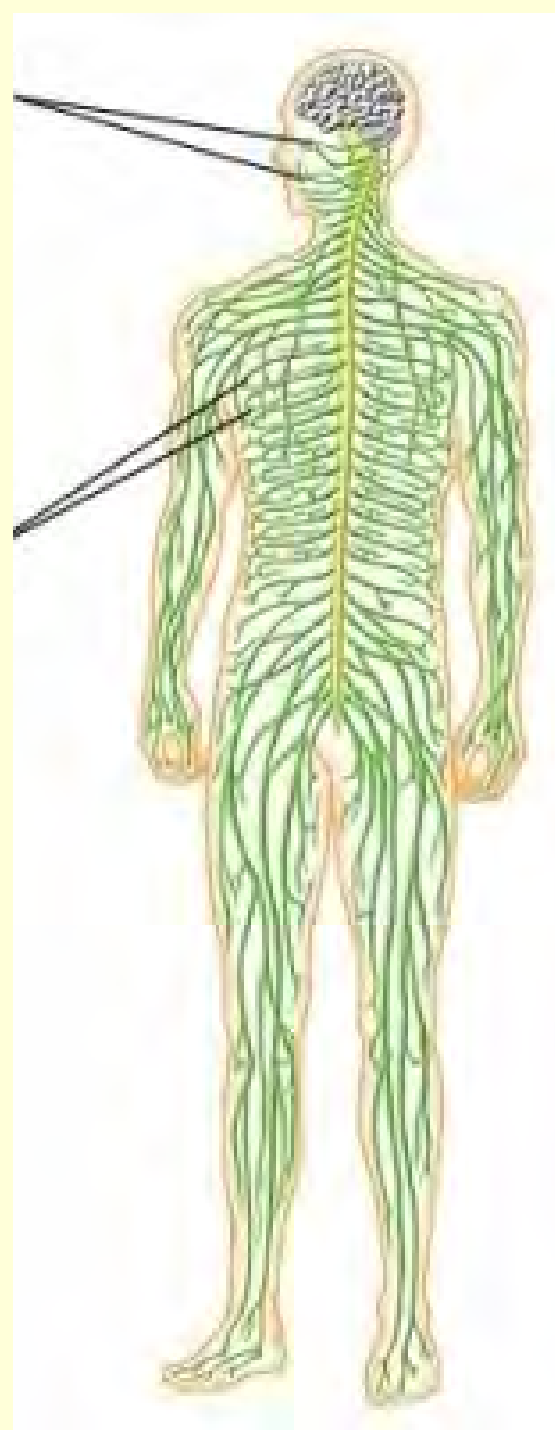












# Nerfs du visage (ou « crâniens »)





**Nerfs du visage**  
(ou « crâniens »)

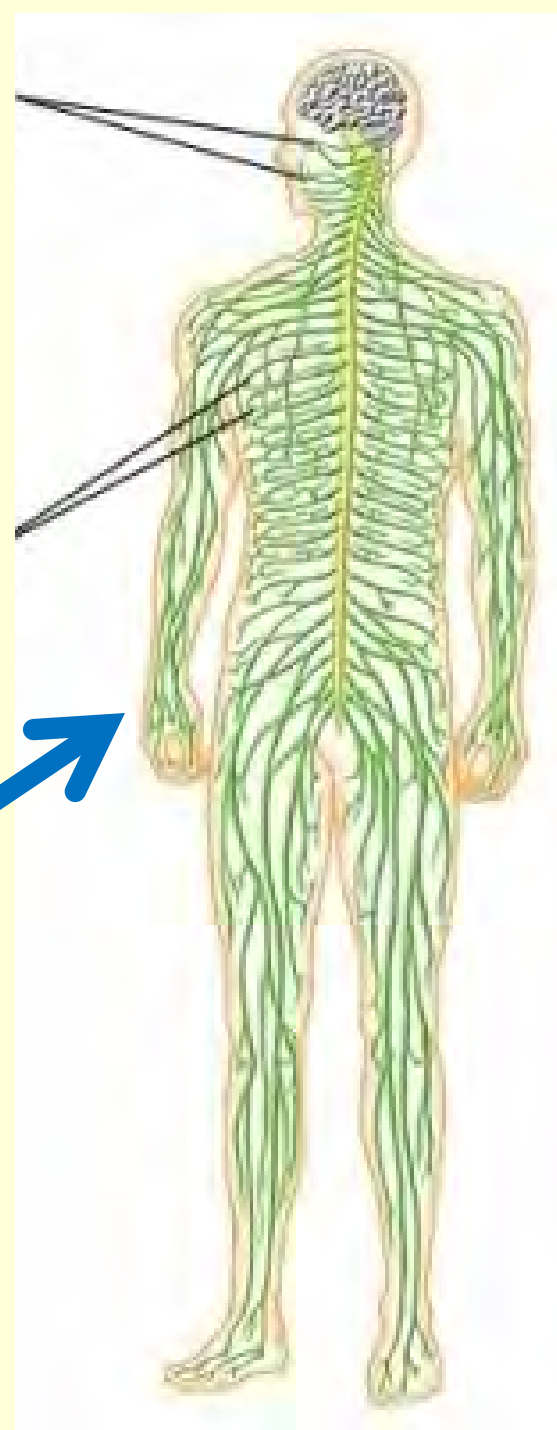
**Nerfs du corps**  
(ou « spinaux »)



Nerfs du visage  
(ou « crâniens »)

Nerfs du corps  
(ou « spinaux »)

Perception

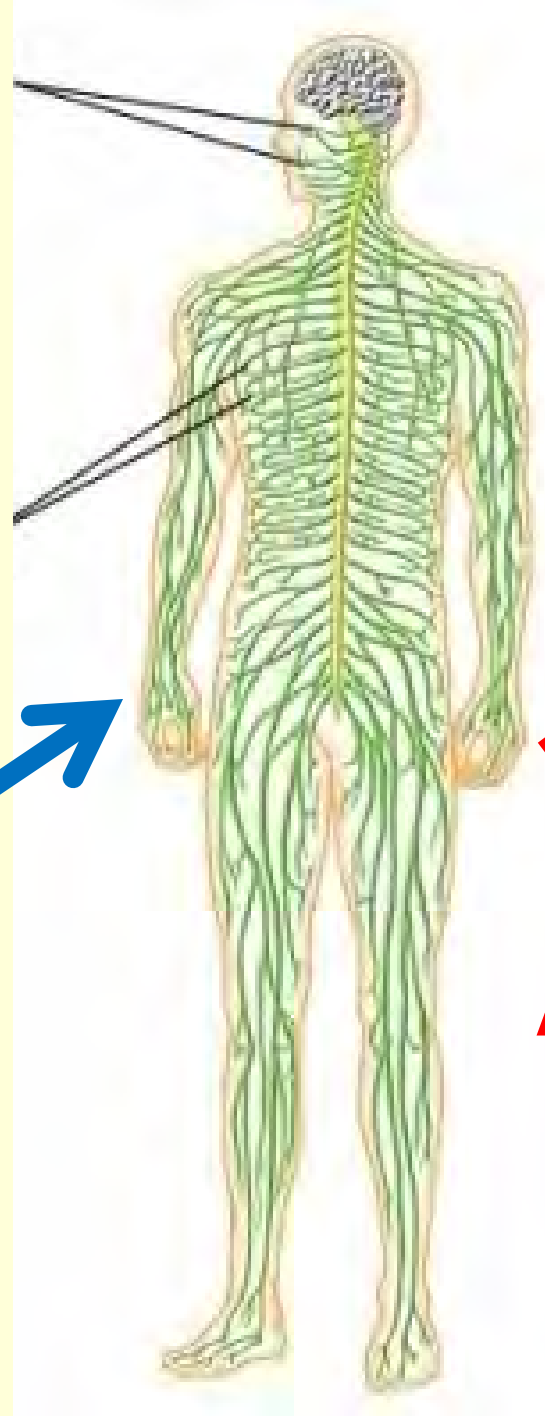


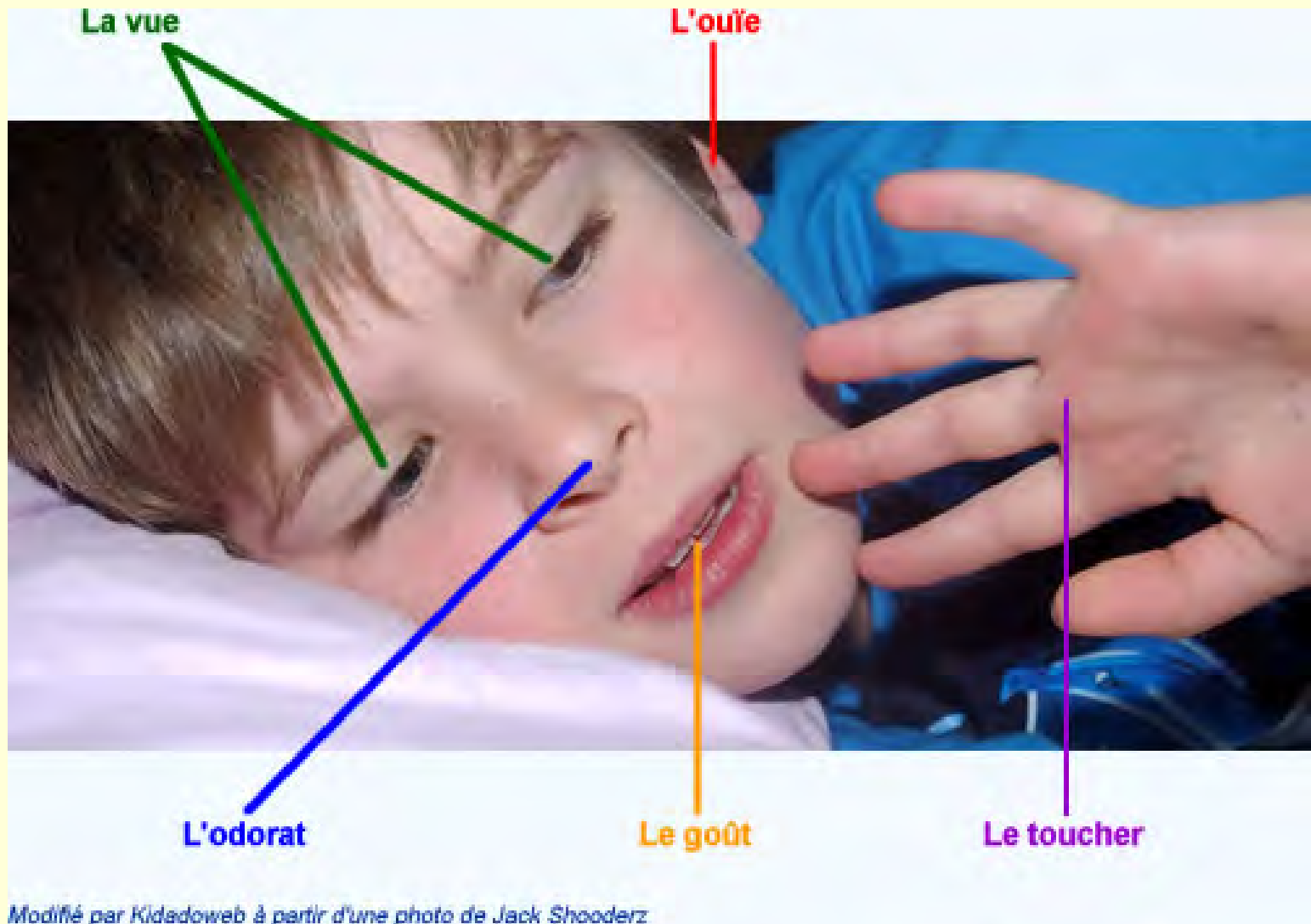
Nerfs du visage  
(ou « crâniens »)

Nerfs du corps  
(ou « spinaux »)

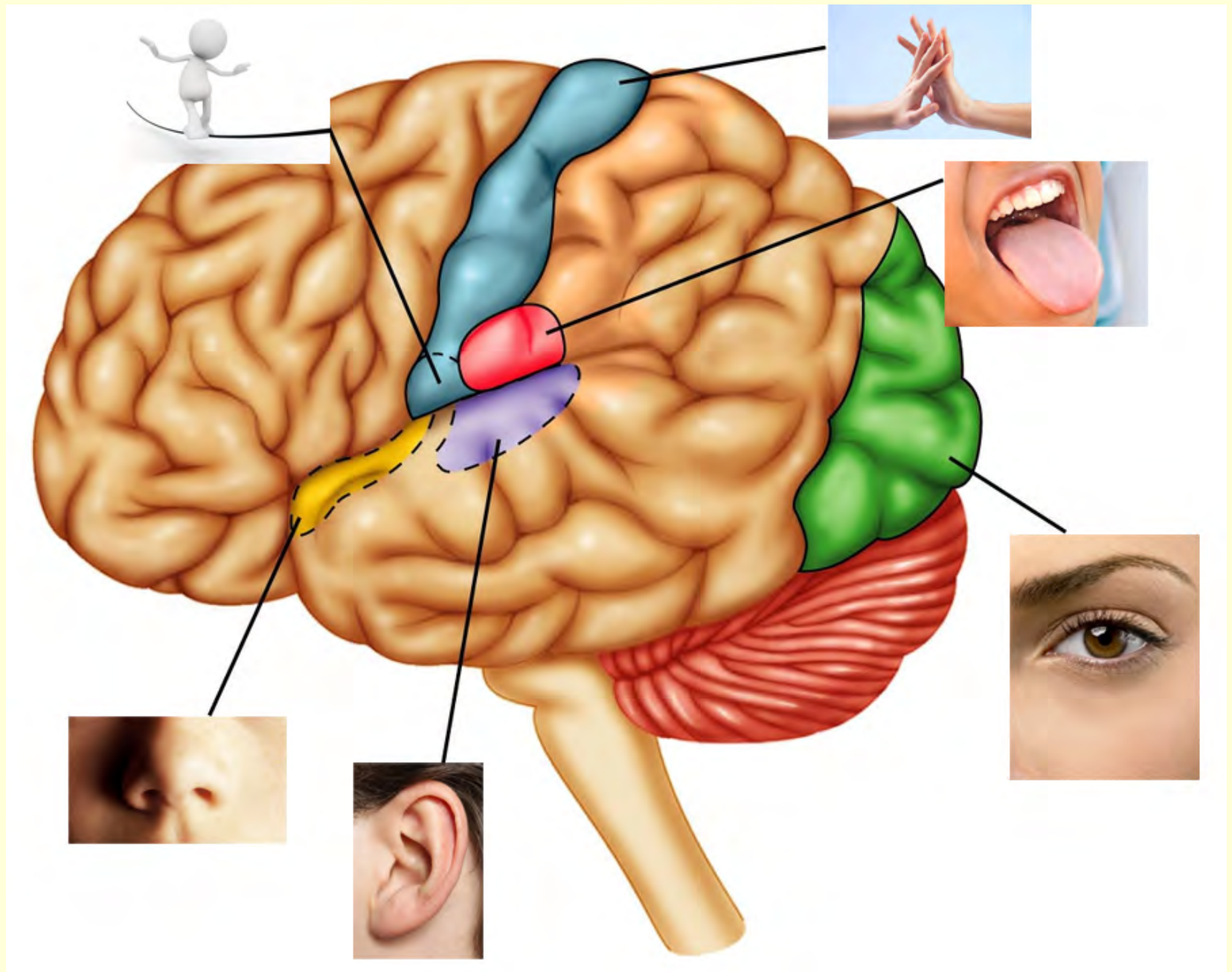
Perception

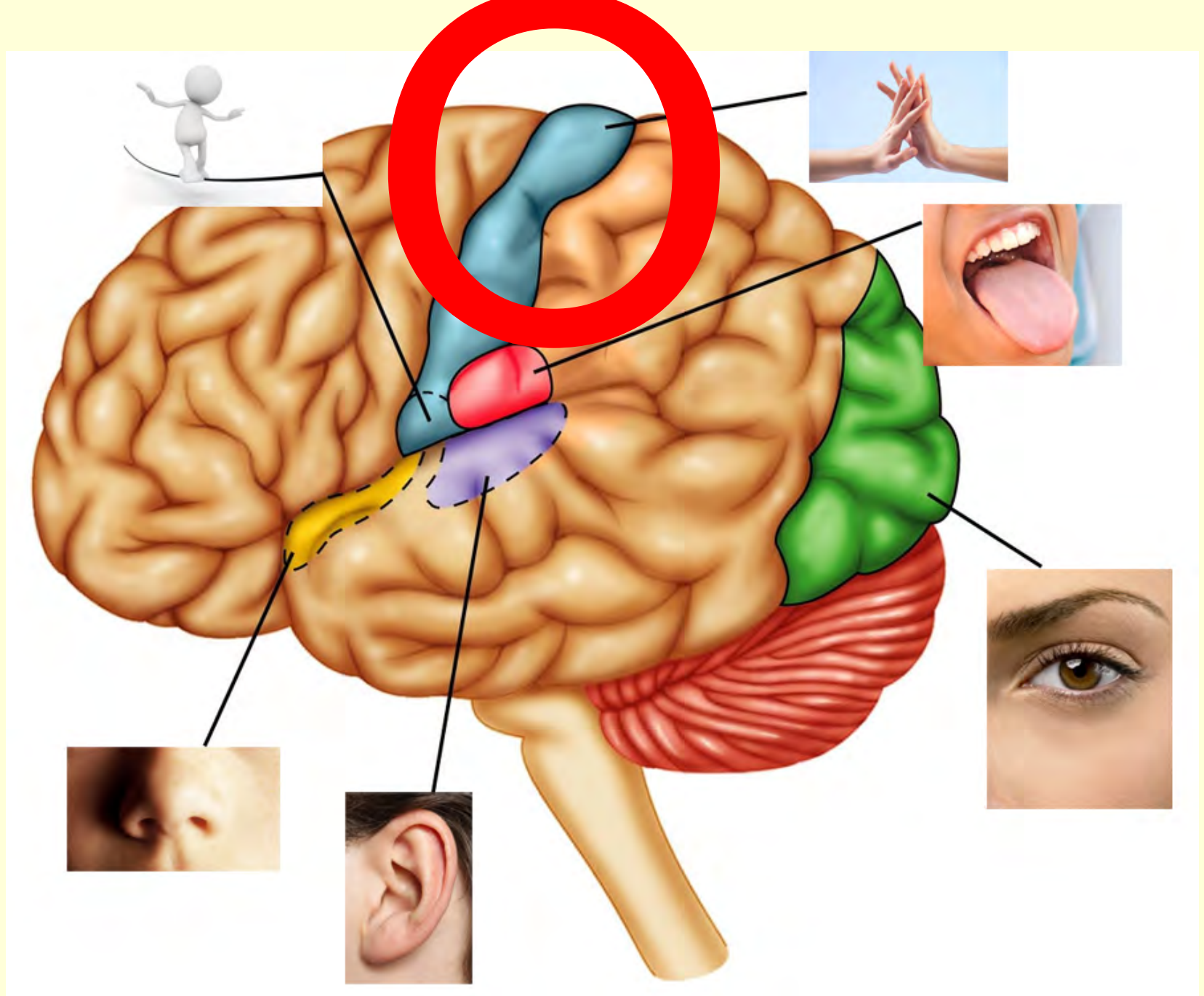
Action

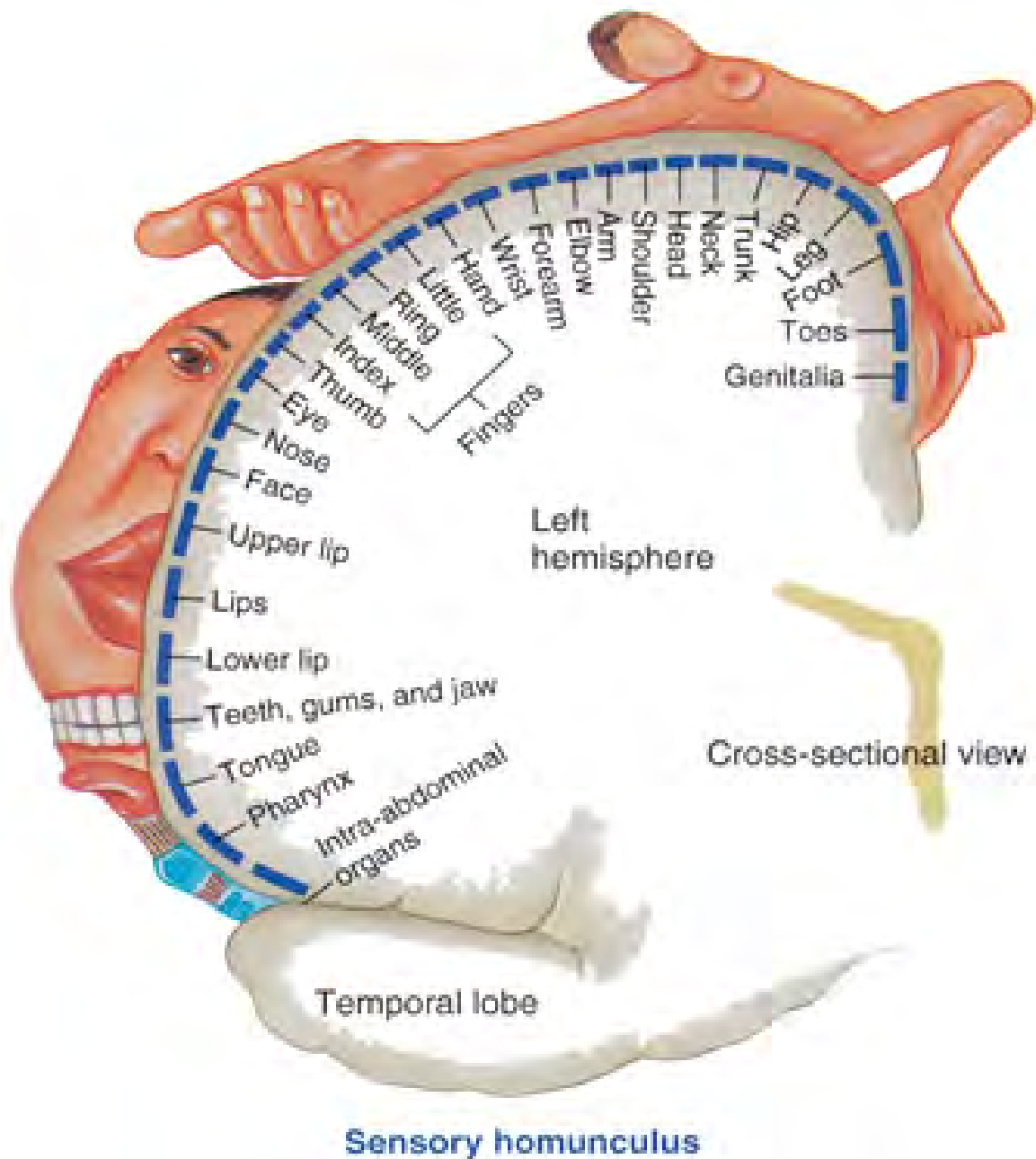


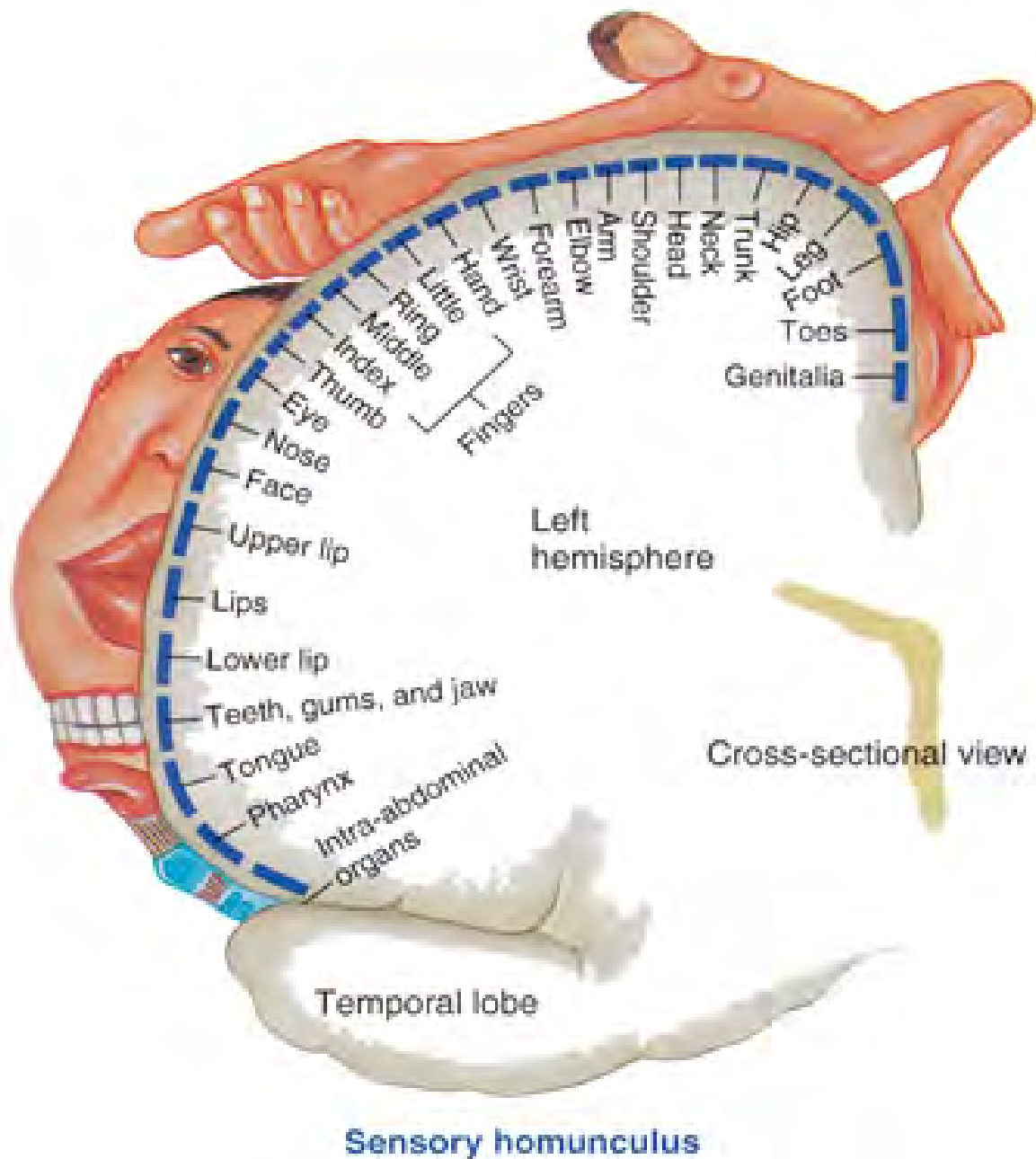


*Modifié par Kidadoweb à partir d'une photo de Jack Shooderz*

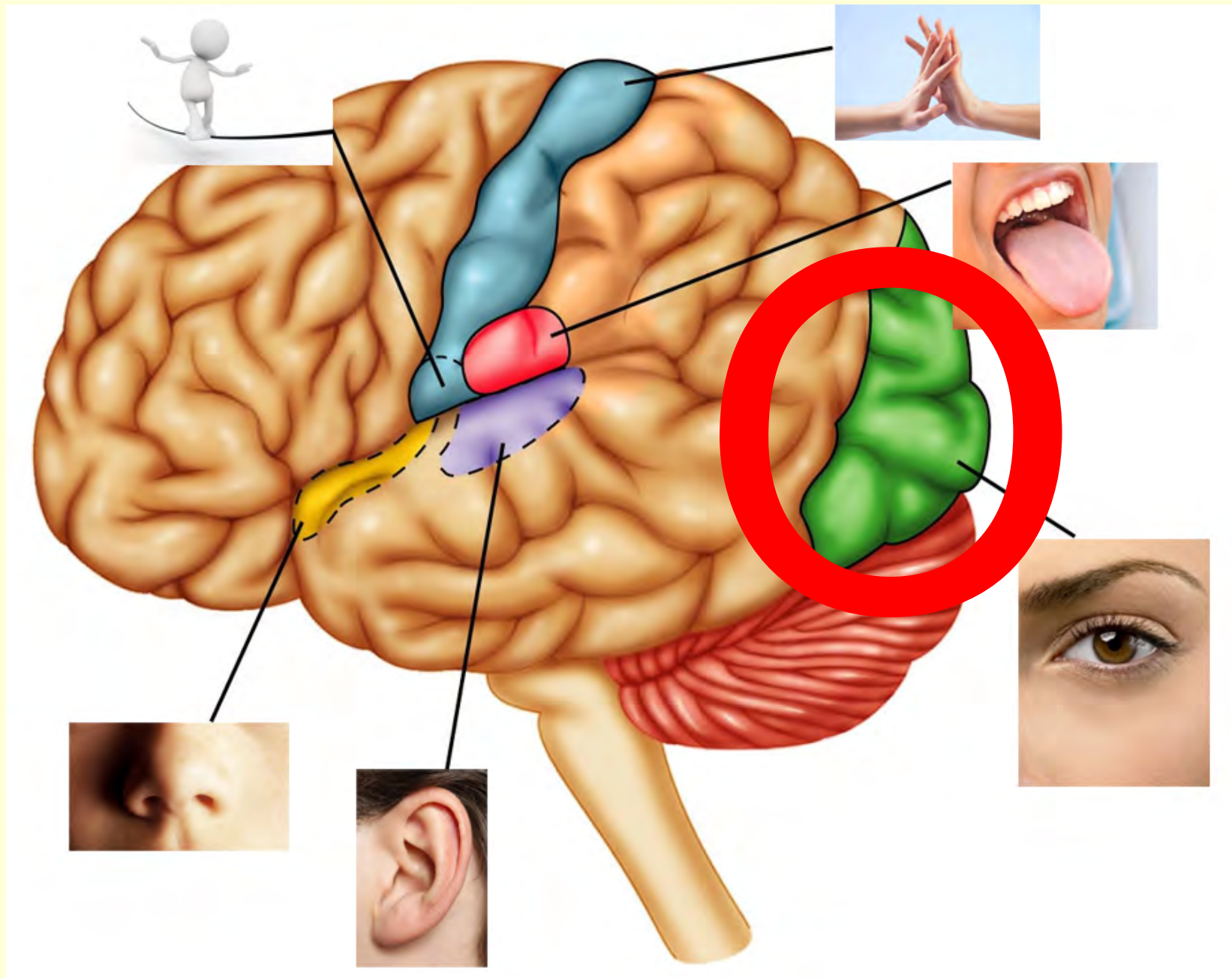


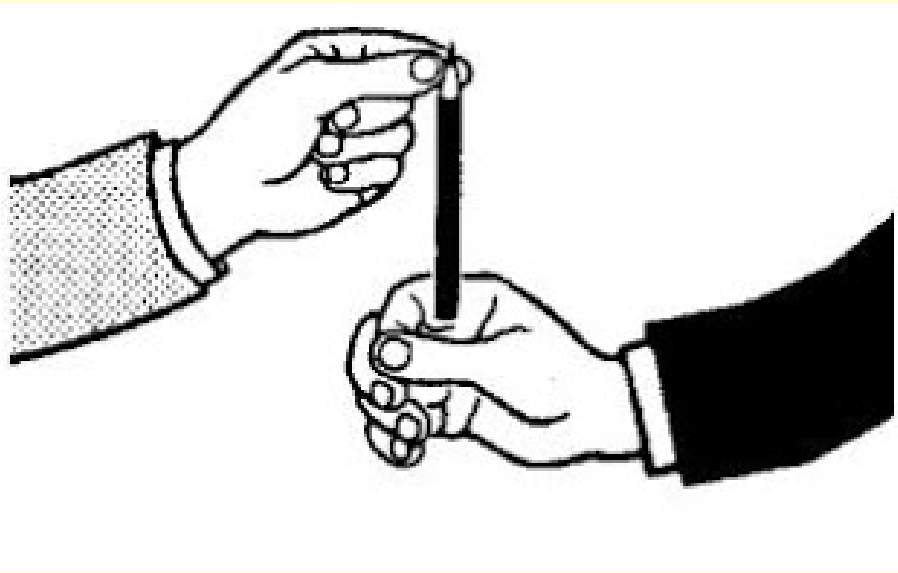






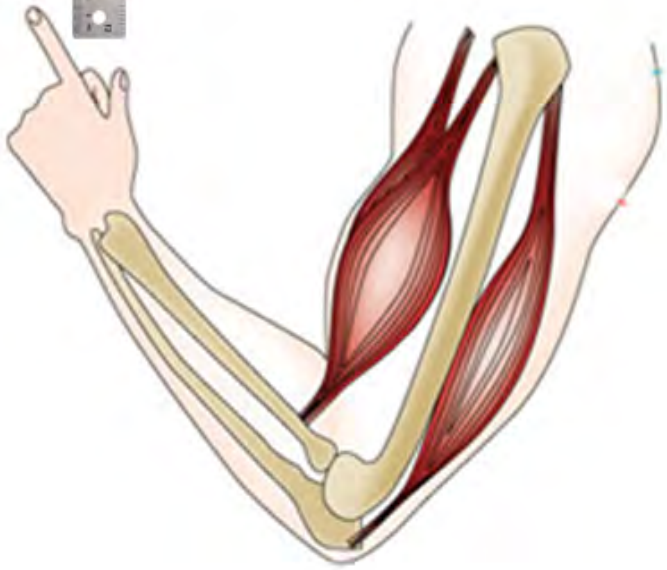


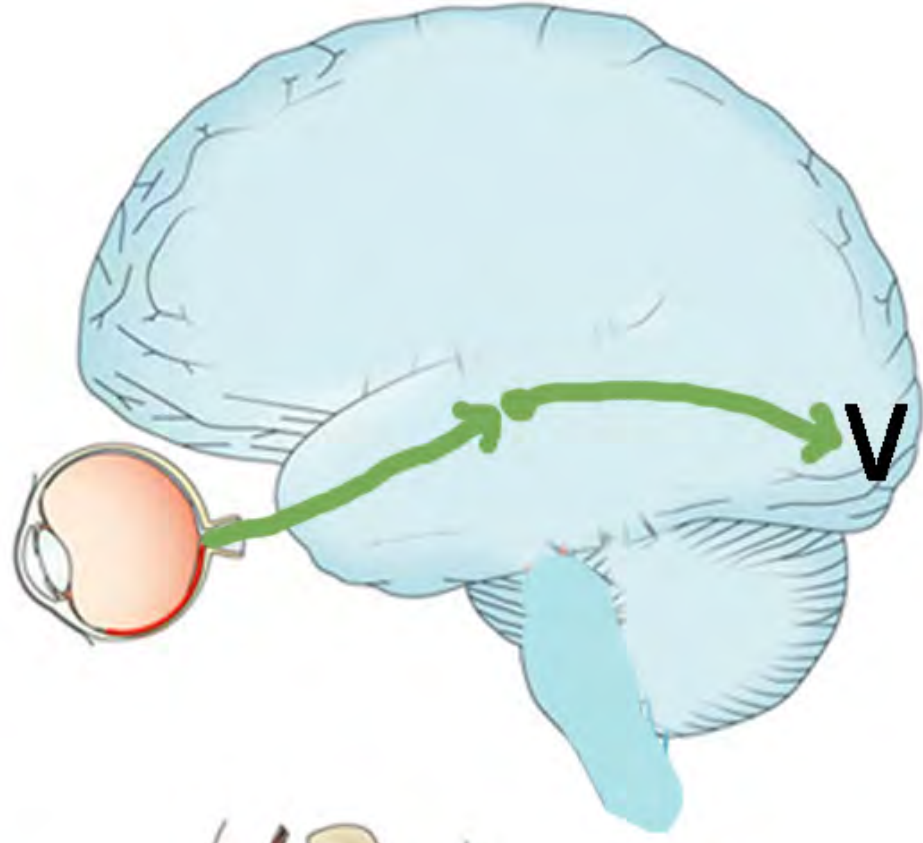
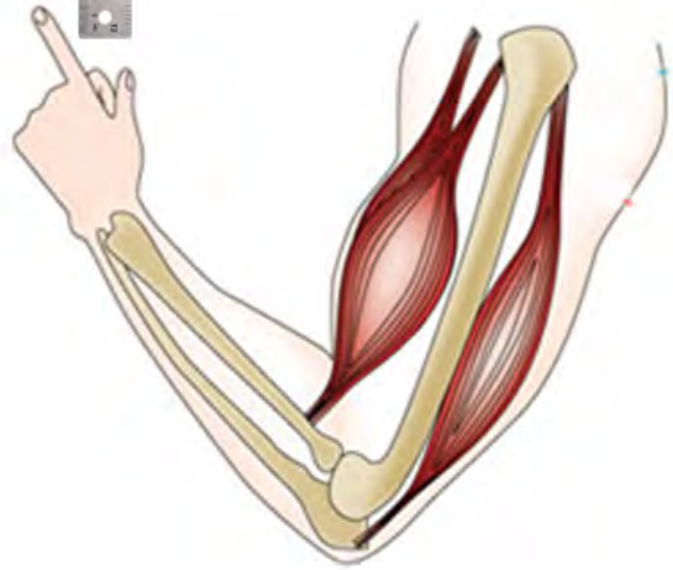


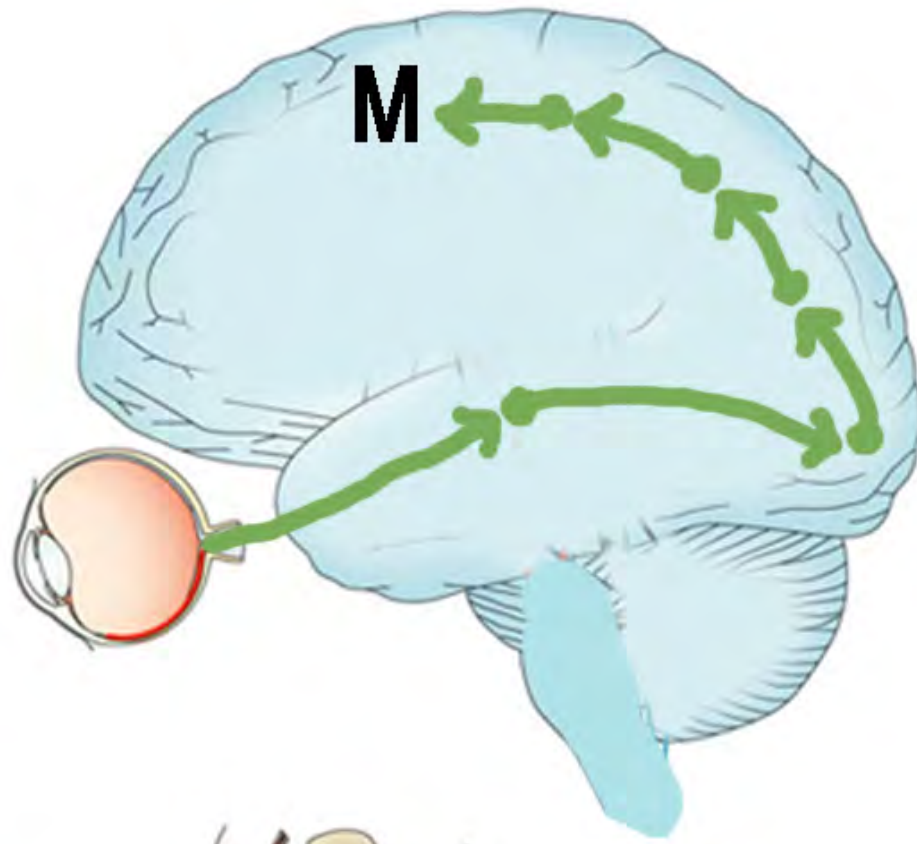
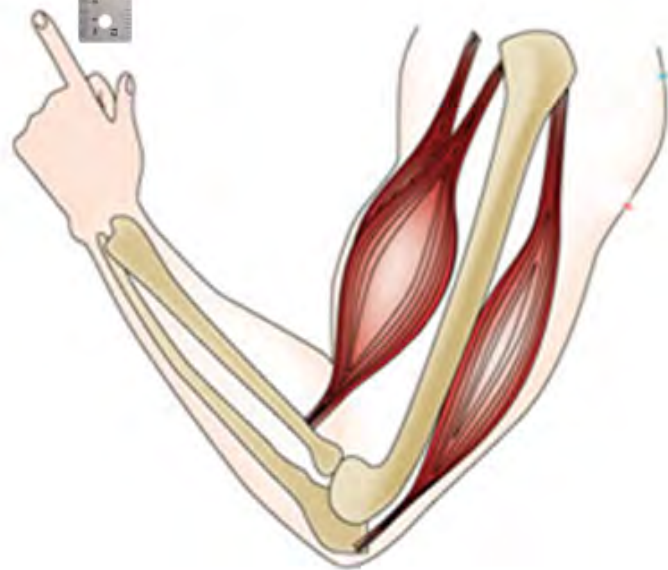


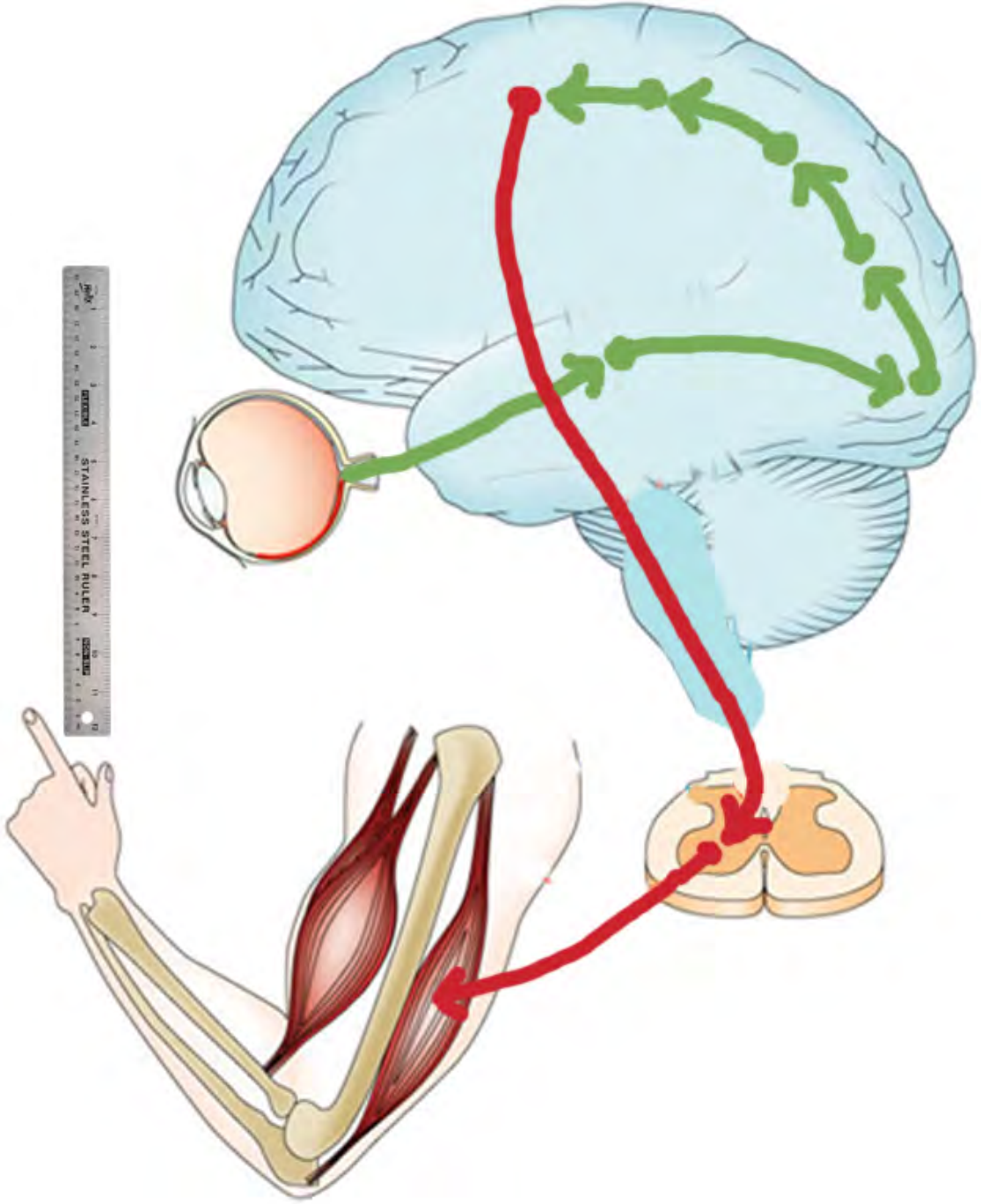
# Temps de réaction





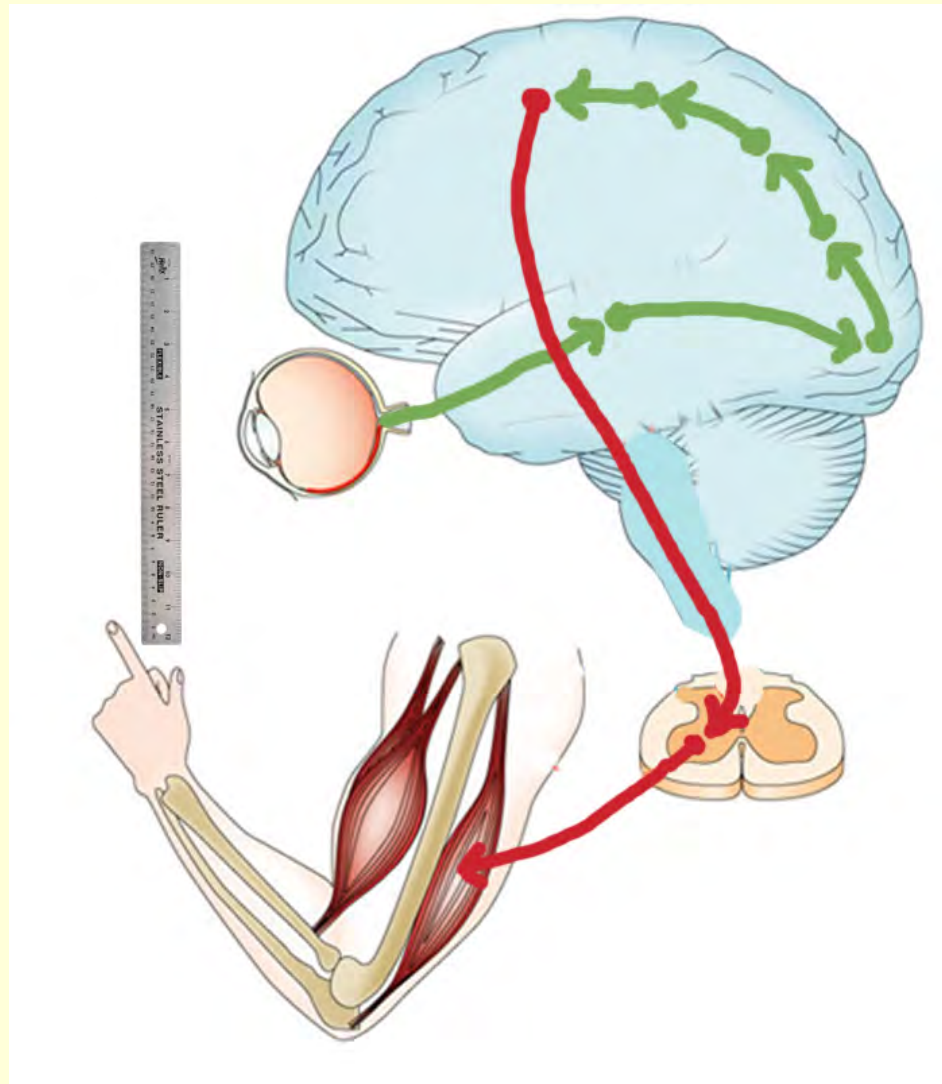








À quelle vitesse voyage l'influx nerveux ?





# À quelle vitesse voyage l'influx nerveux ?

Pour le toucher :

100 km/h

à

250 km/h



# À quelle vitesse voyage l'influx nerveux ?

Pour le toucher :

100 km/h

à

250 km/h



**L'électricité** ou la **lumière** voyage environ 1 millions de fois plus vite que l'influx nerveux !

Pourquoi le cerveau est-il tout plissé ?



—  
1 cm

Rat

Lapin

Chat

Mouton

Chimpanzé

Homme

Rat

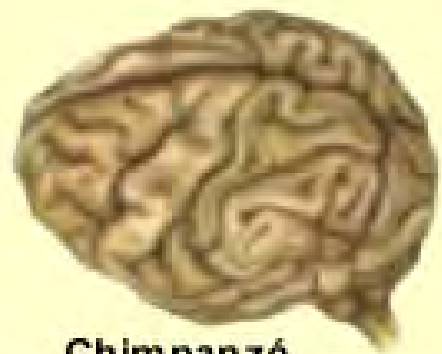
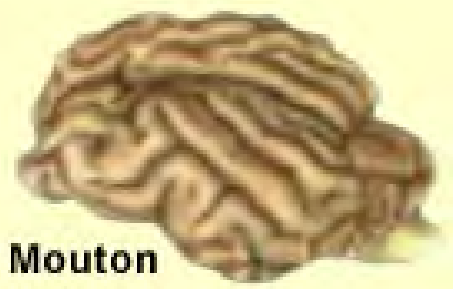
Chat

Chimpanzé

Lapin

Mouton

Humain



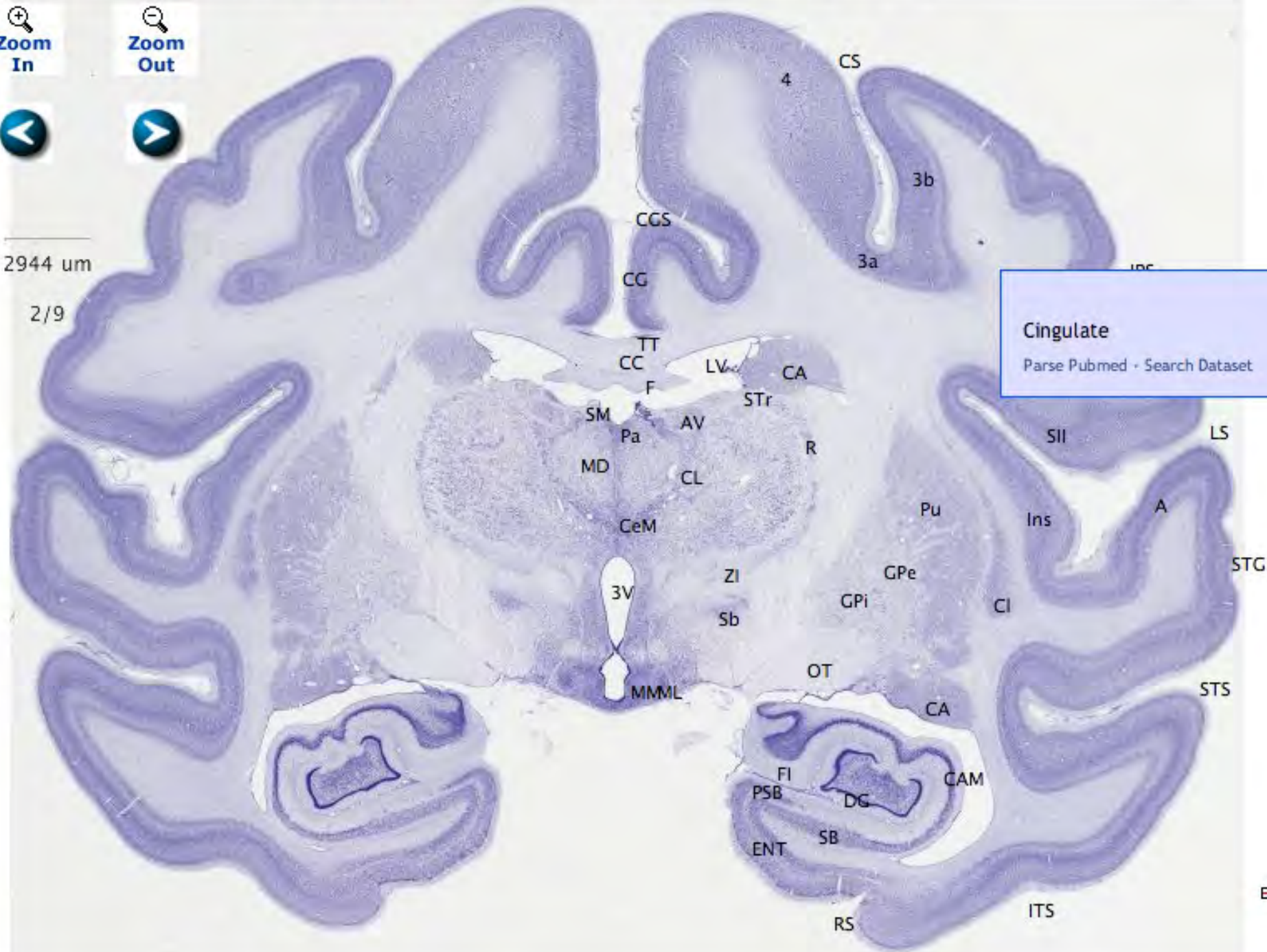
Zoom In

Zoom Out



2944 um

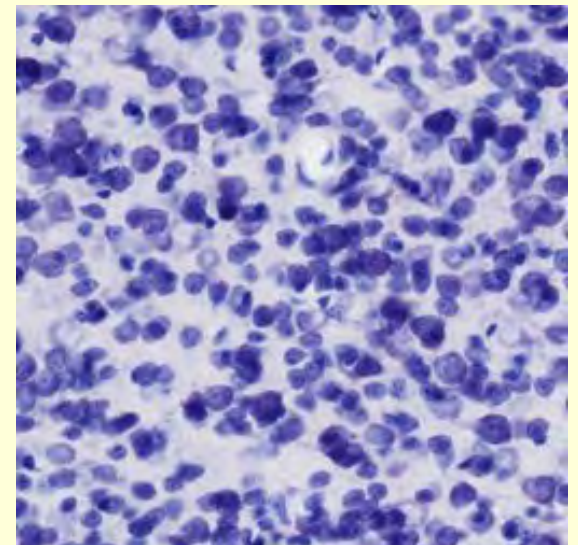
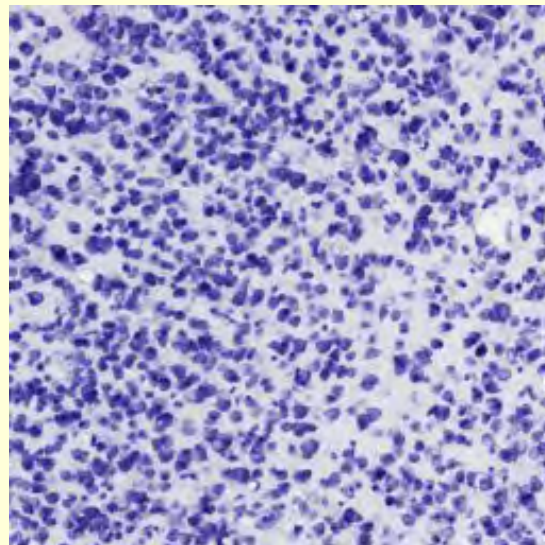
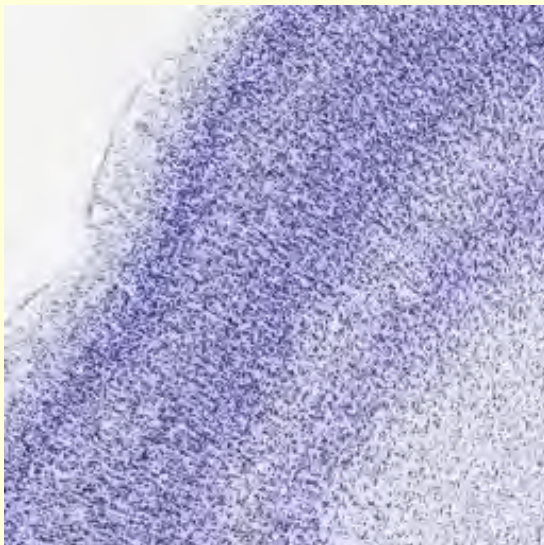
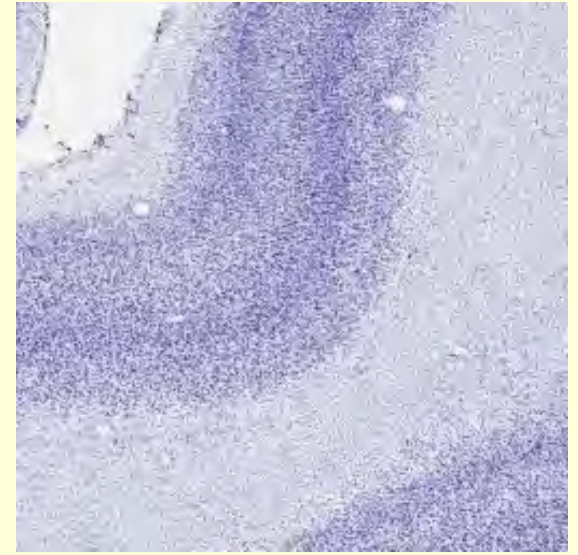
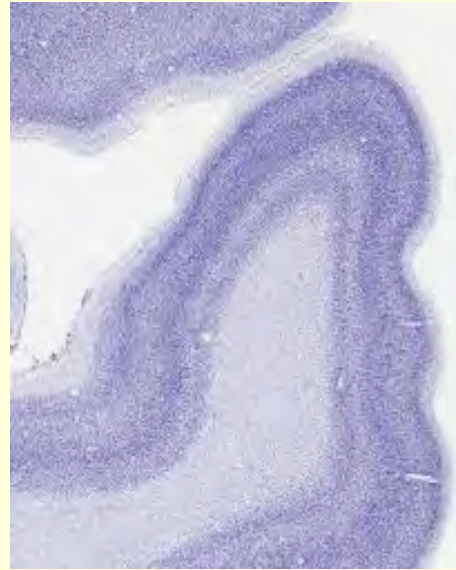
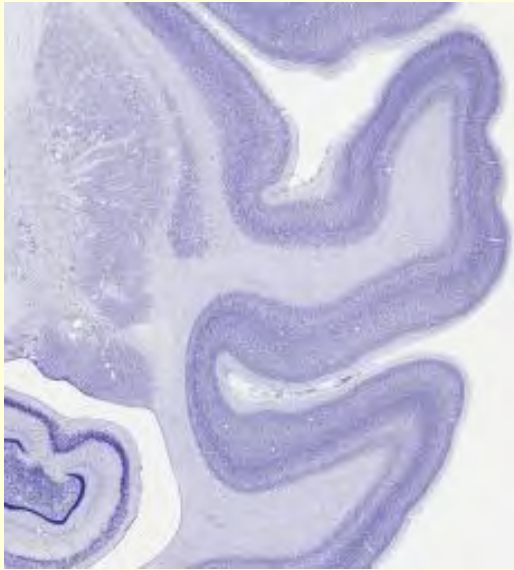
2/9



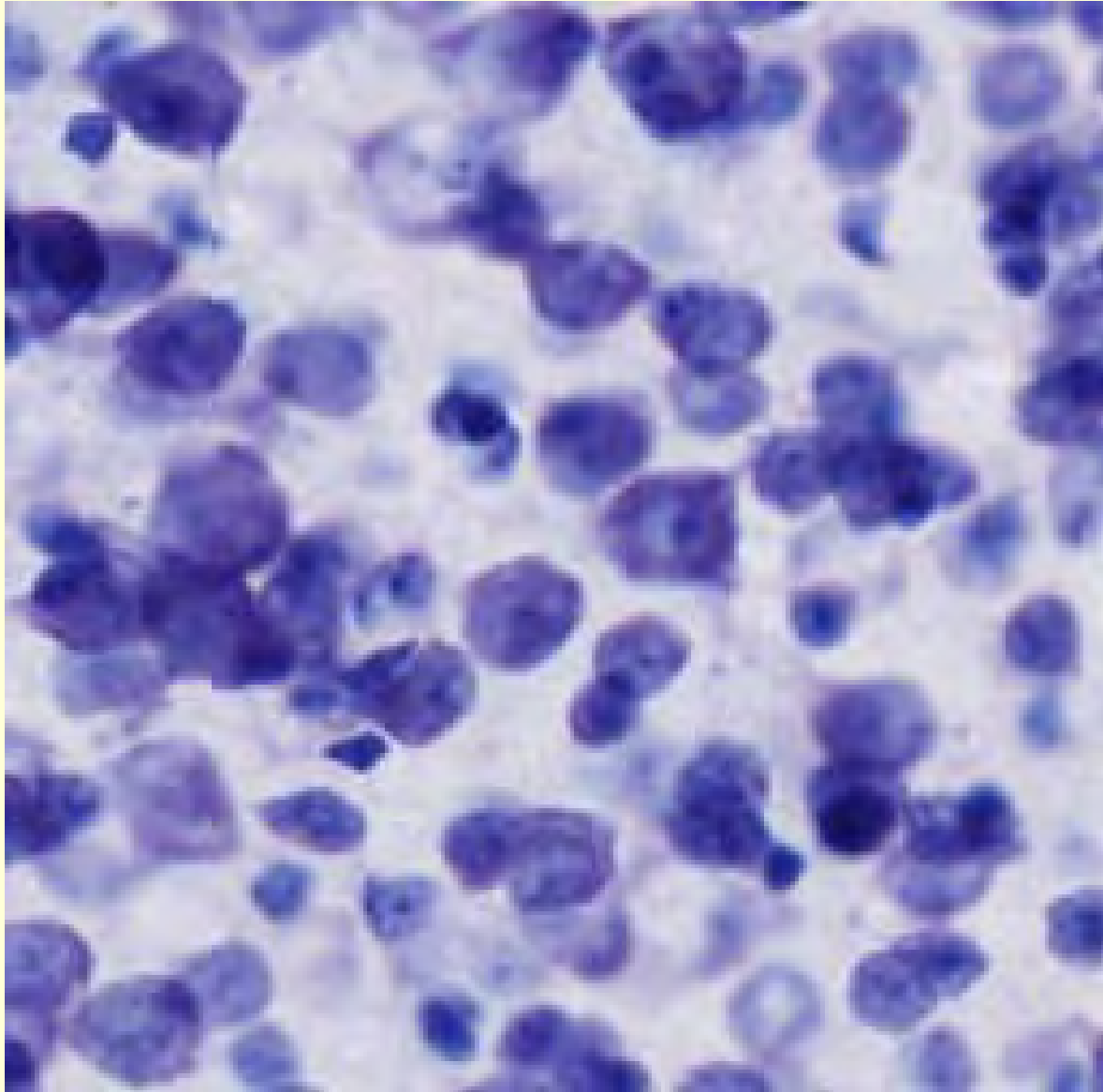
Cingulate

[Parse Pubmed - Search Dataset](#)

zoom in sur sa région foncée, aussi appelée matière grise...



matière grise : corps cellulaires des cellules du cerveau, les neurones



—  
1 cm

Rat

Lapin

Chat

Mouton

Chimpanzé

Homme

Rat

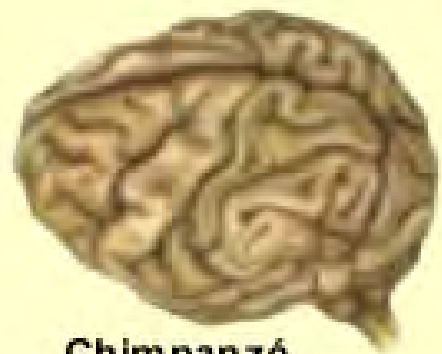
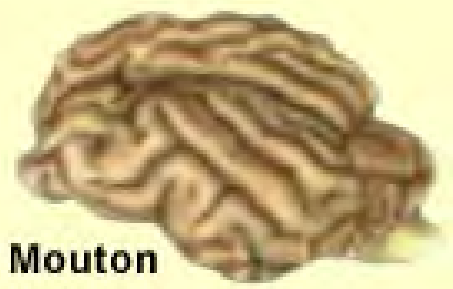
Chat

Chimpanzé

Lapin

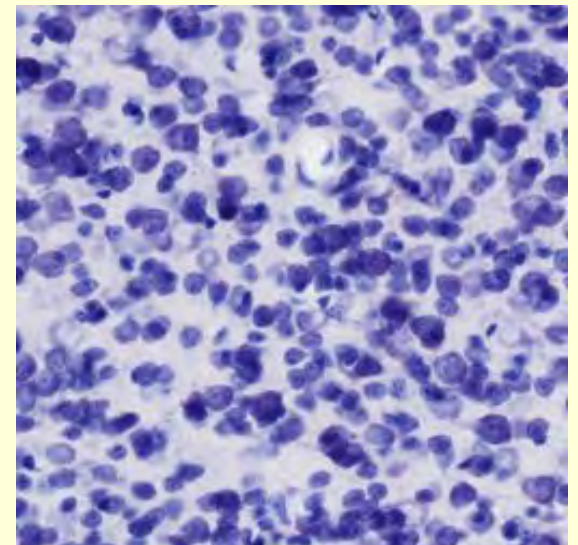
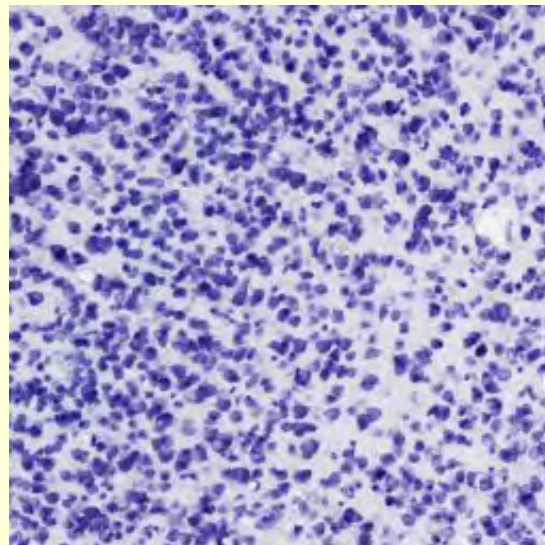
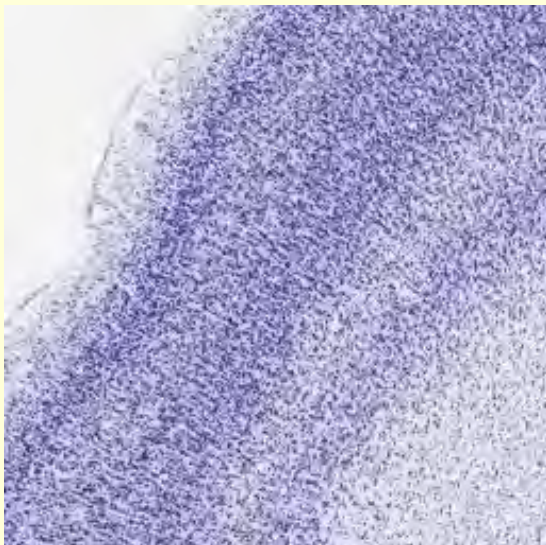
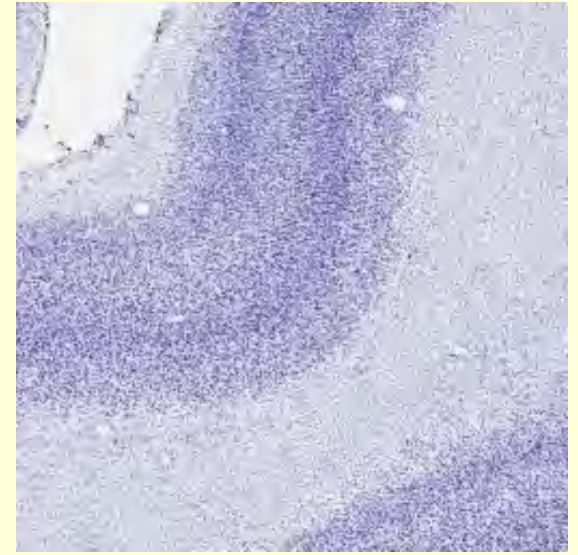
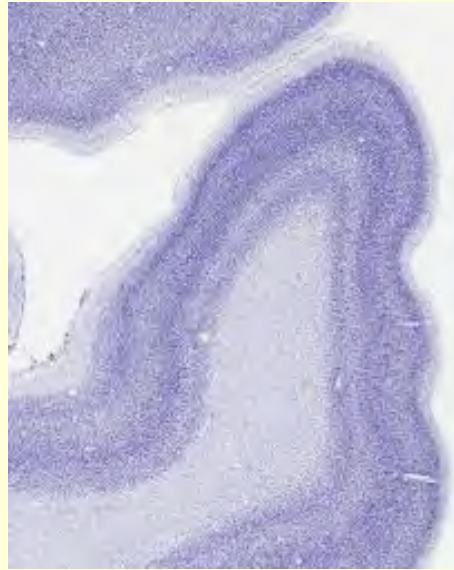
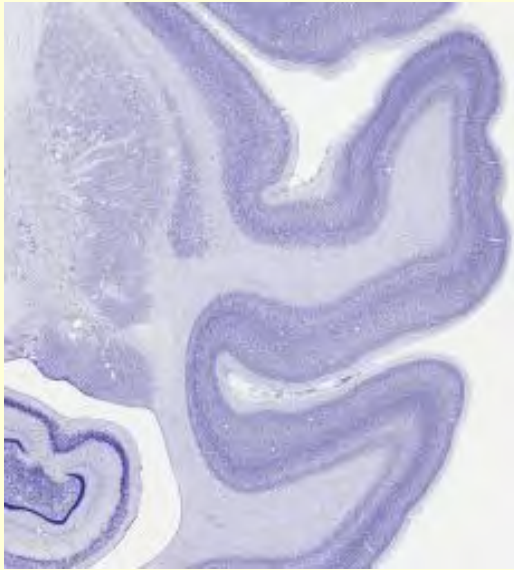
Mouton

Humain

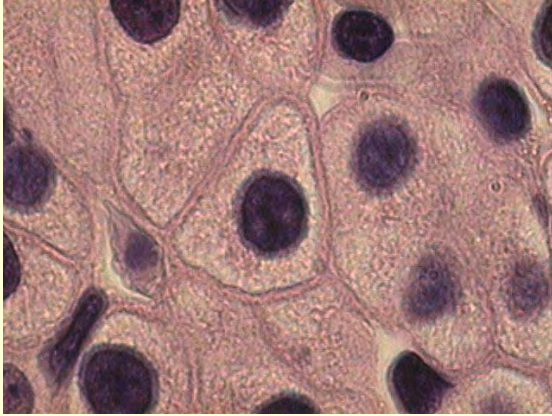




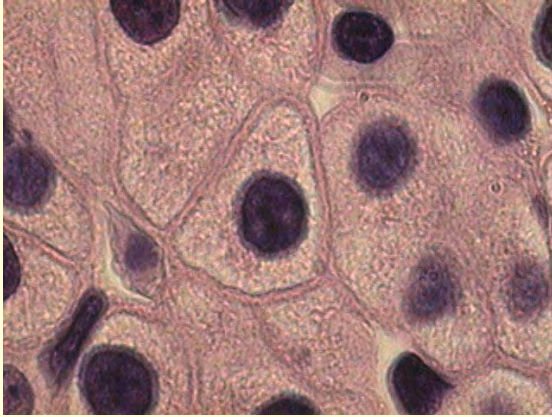
zoom in sur sa région foncée, aussi appelée matière grise...



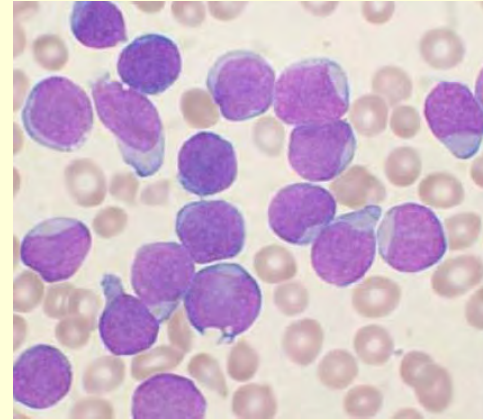
## Cellules de foie



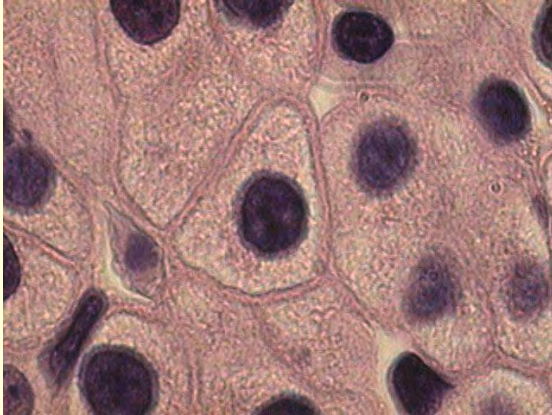
Cellules de foie



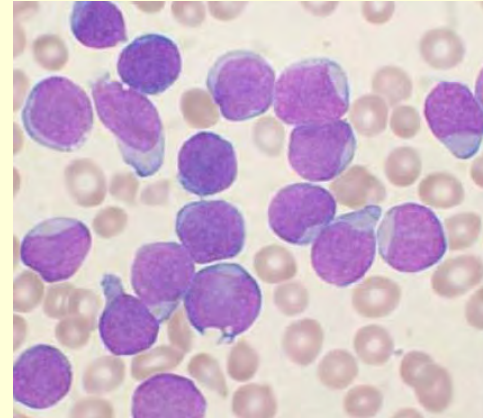
Cellules du sang



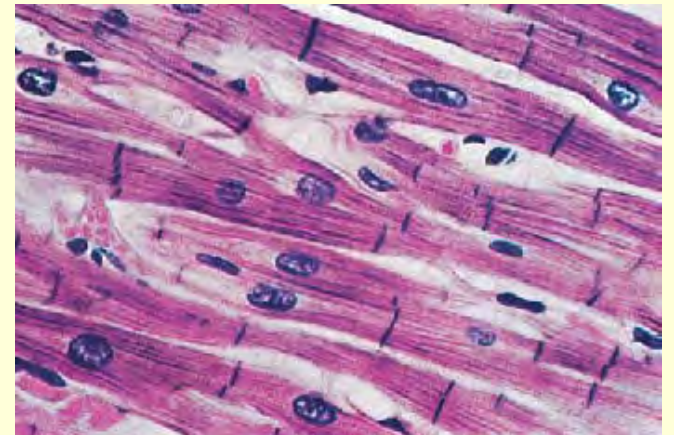
Cellules de foie



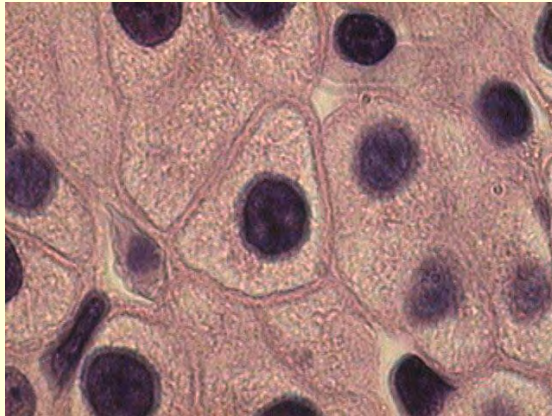
Cellules du sang



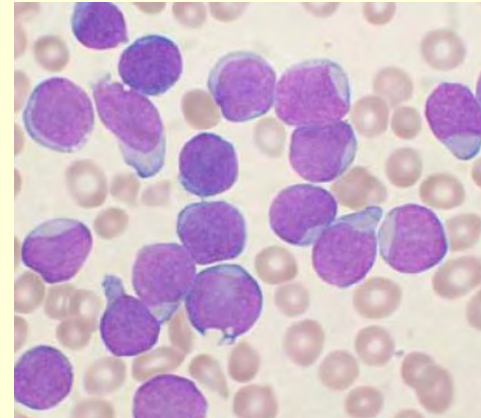
Cellules du coeur



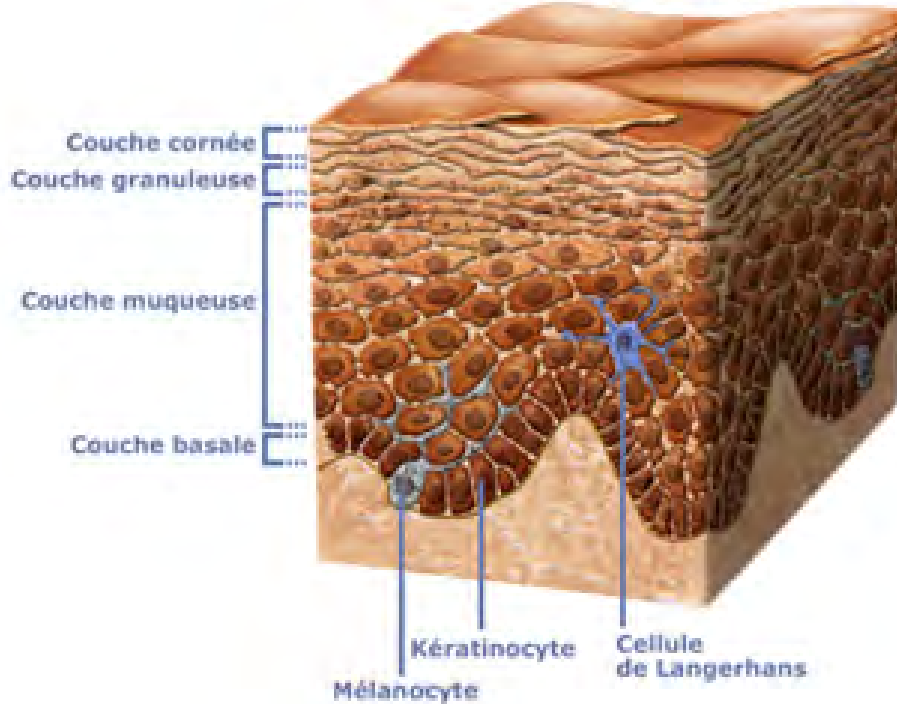
Cellules de foie



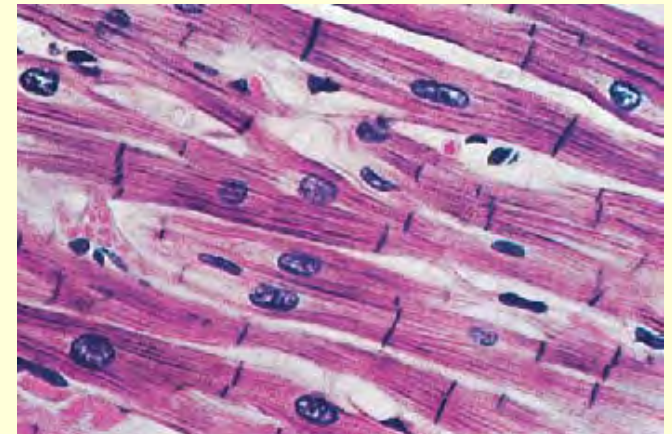
Cellules du sang

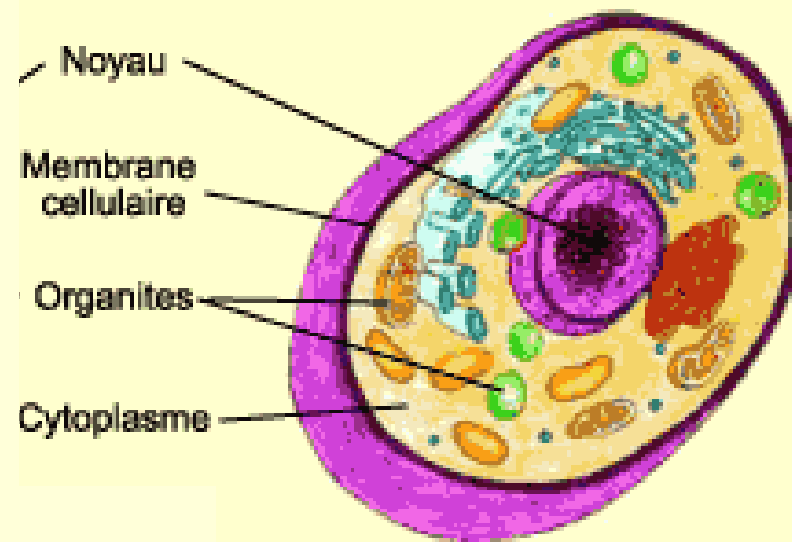


## L'ÉPIDERME

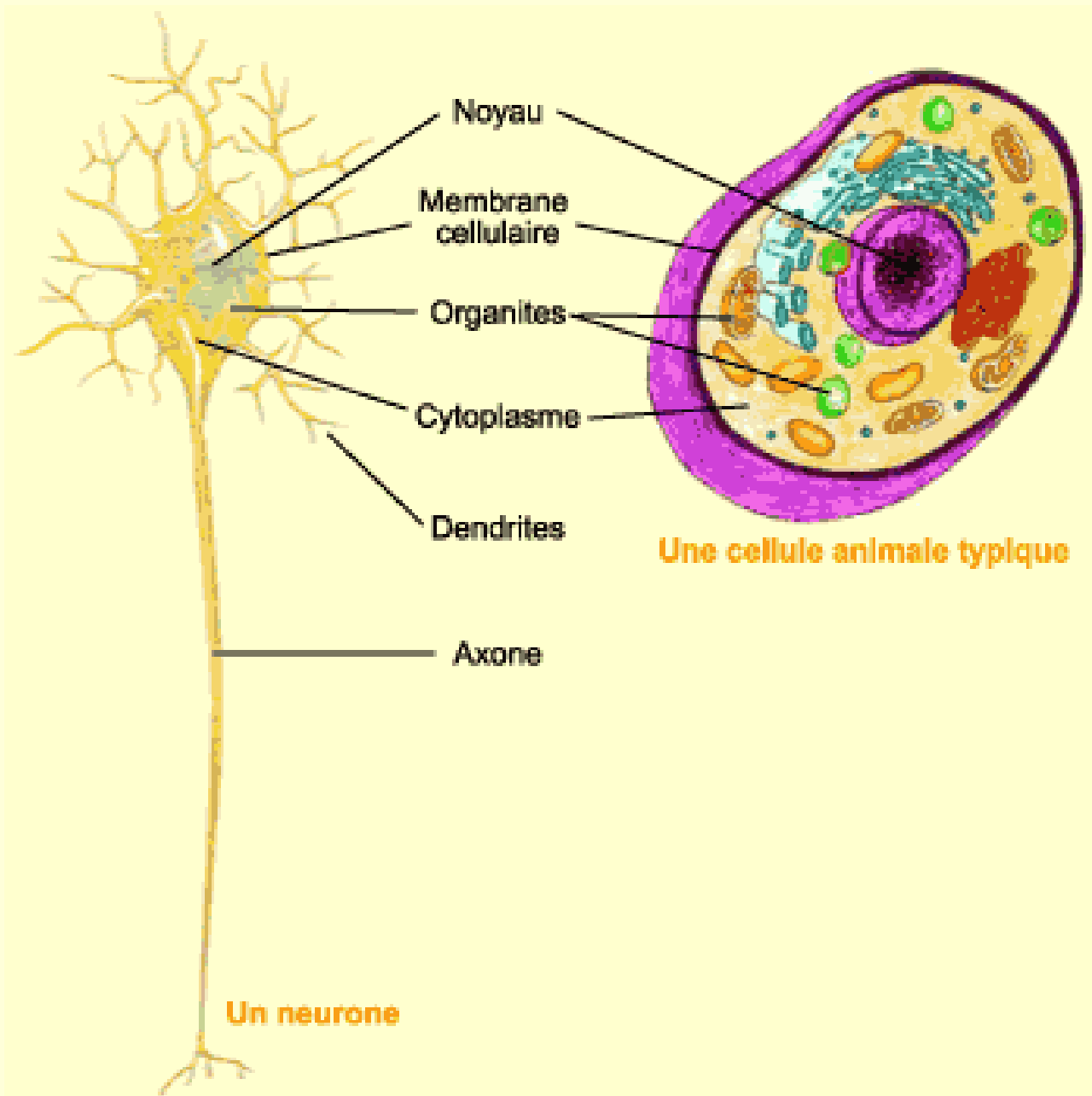


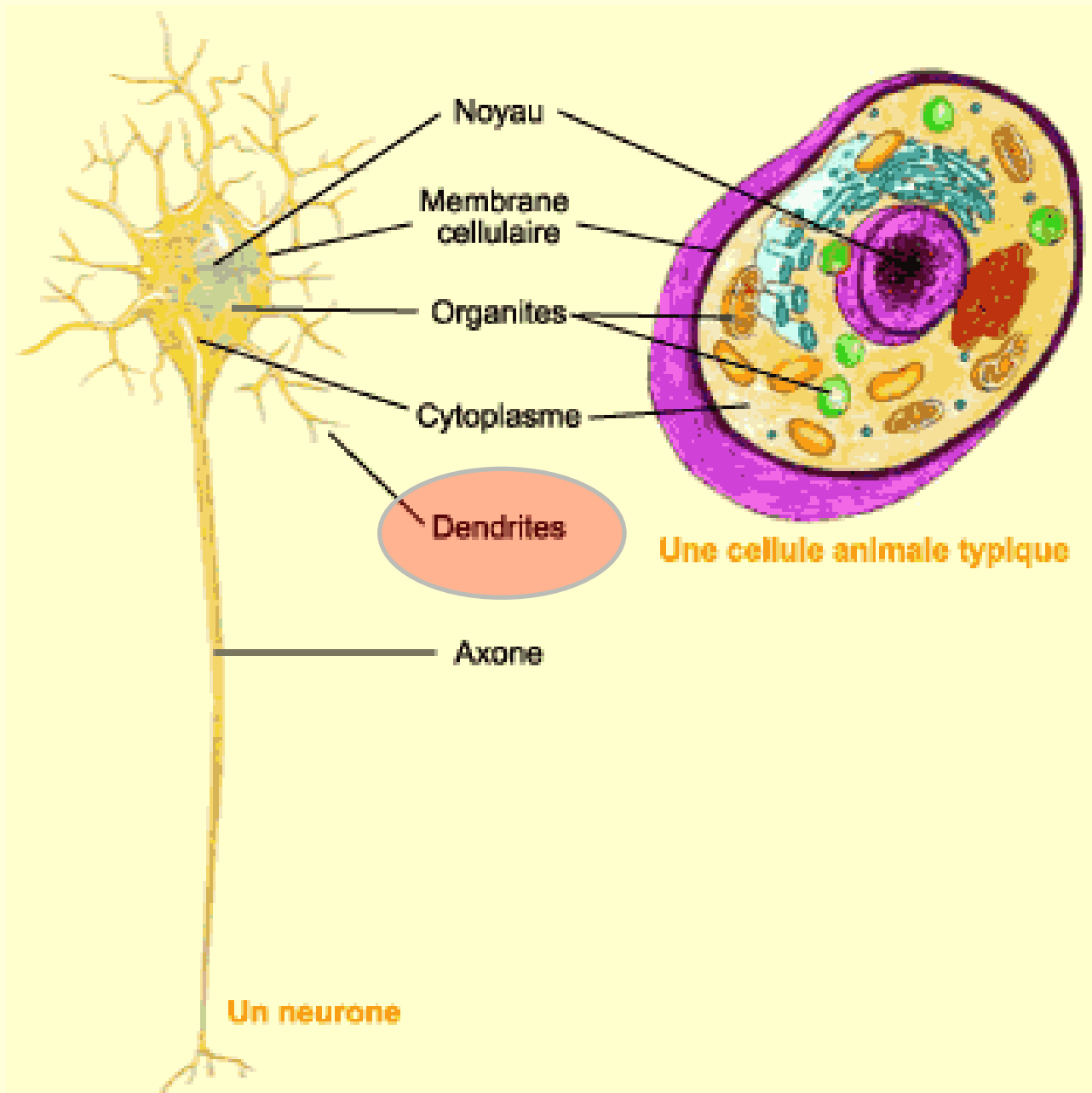
Cellules du coeur



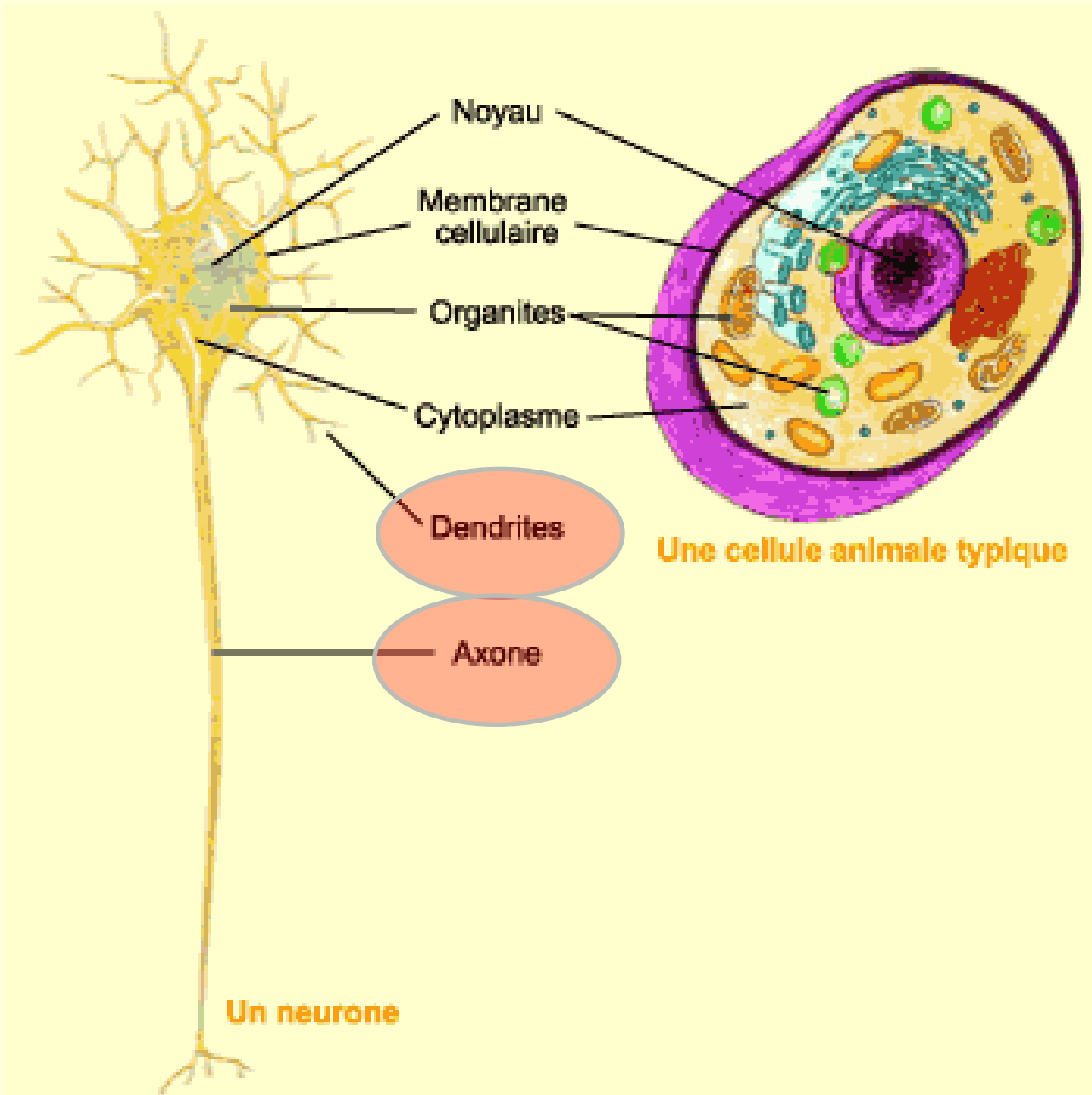


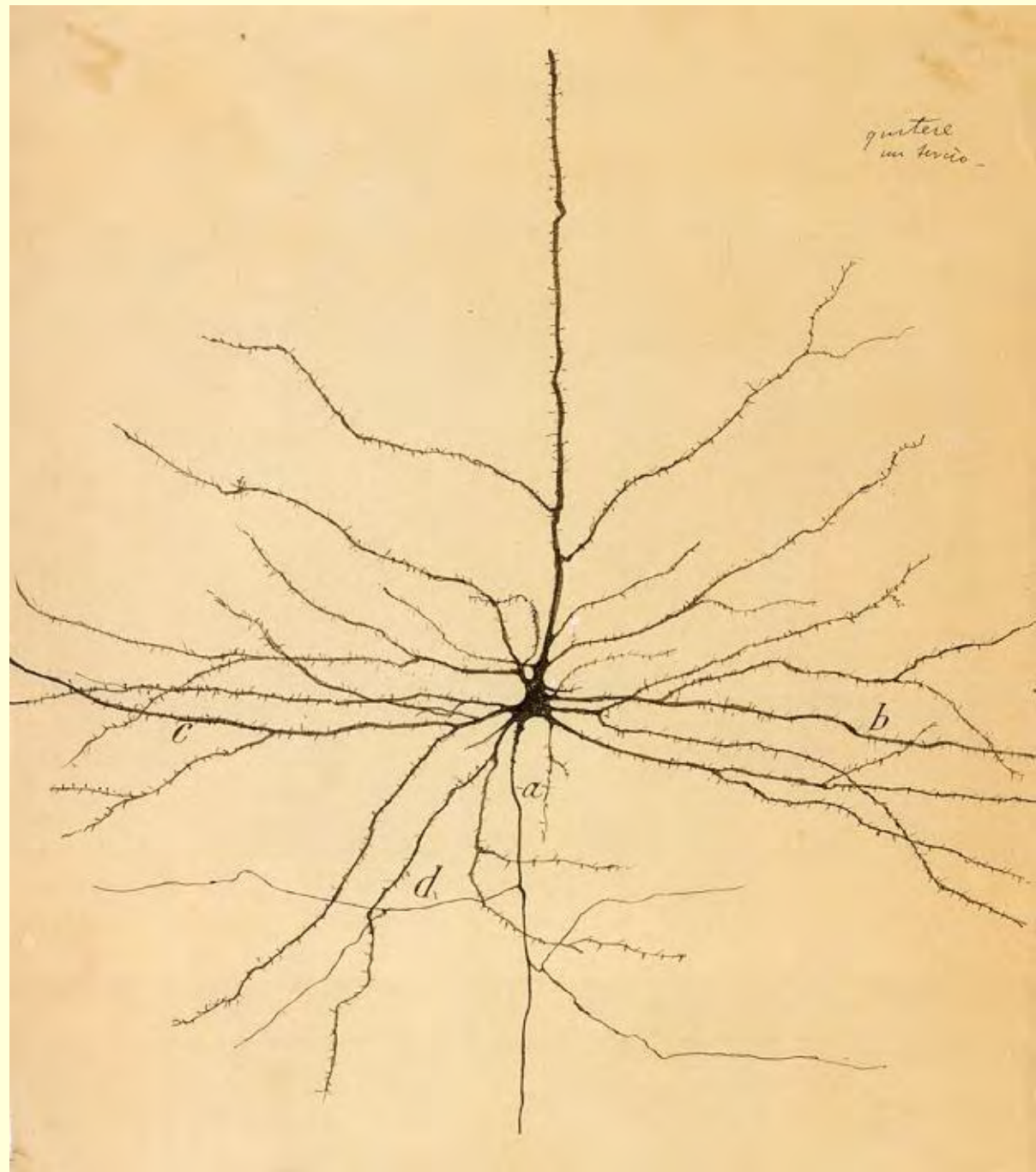
**Une cellule animale typique**





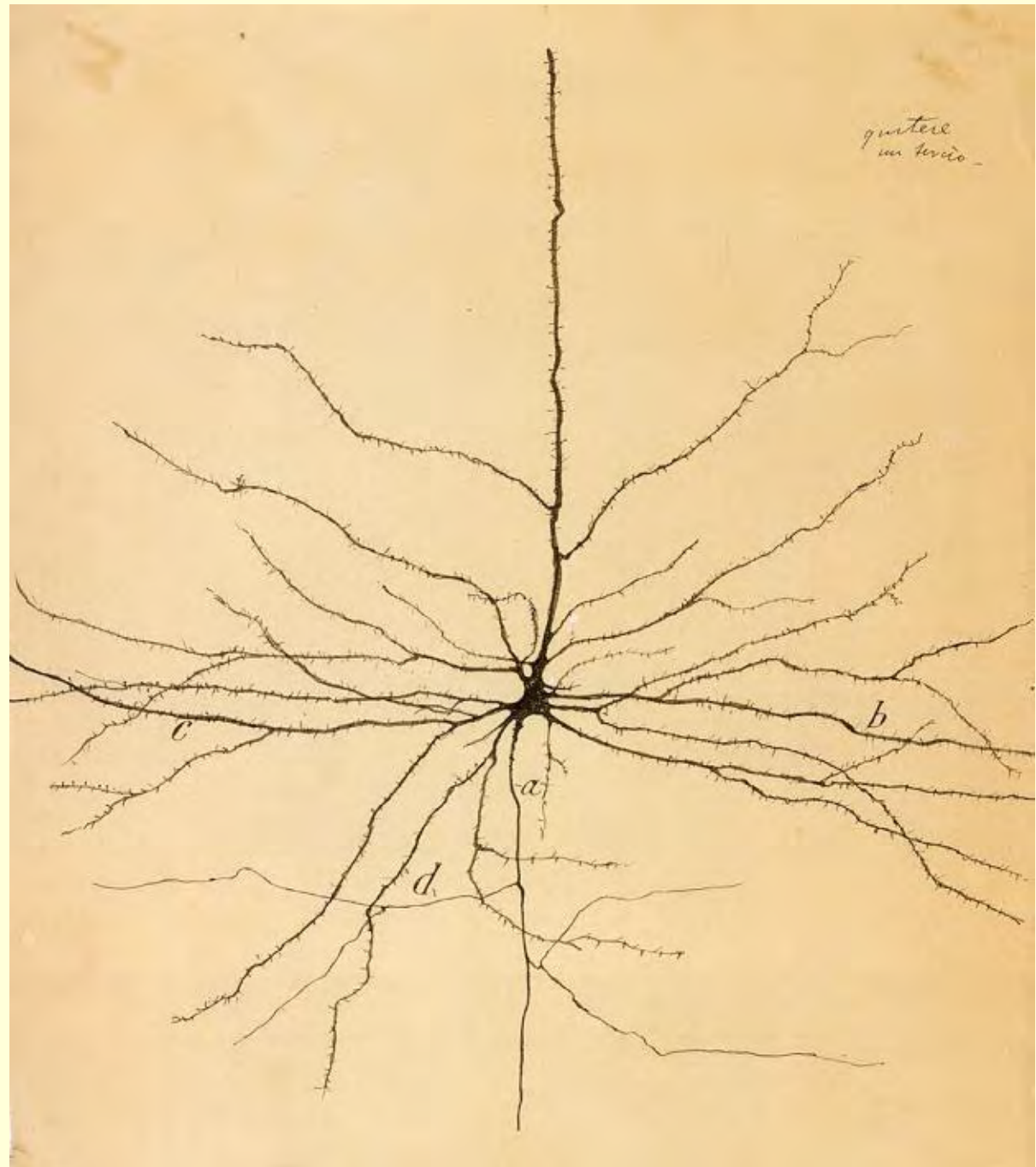




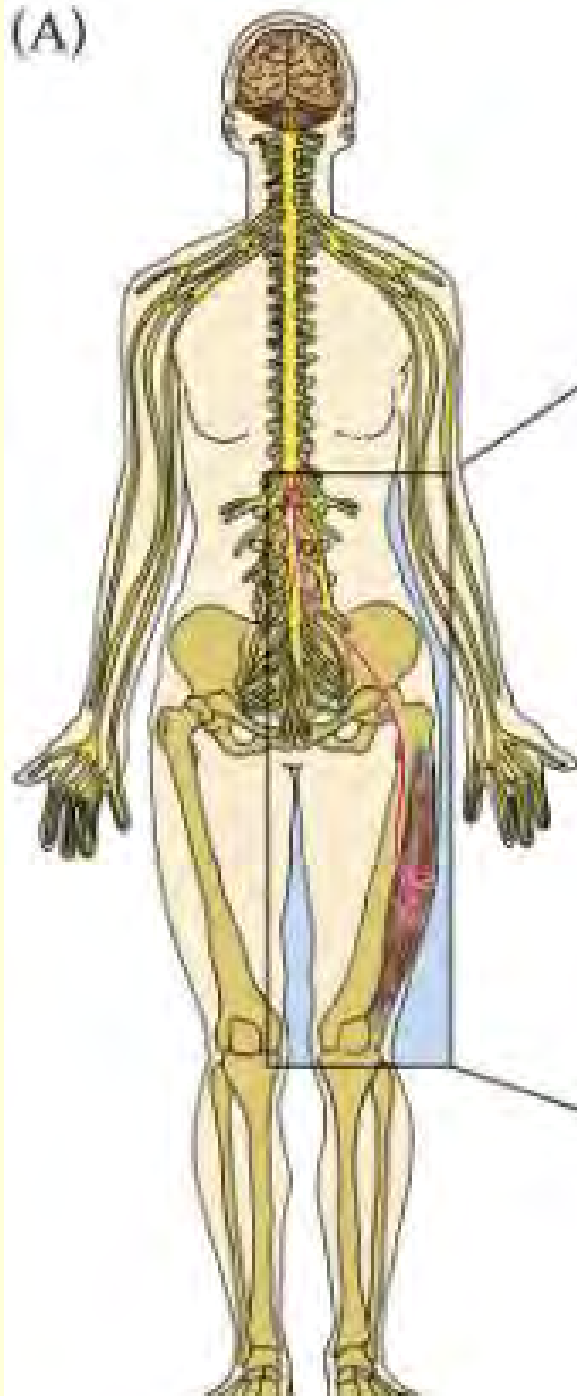


Diamètre du  
corps cellulaire  
d'un neurone  
pyramidal  
(les plus gros) :

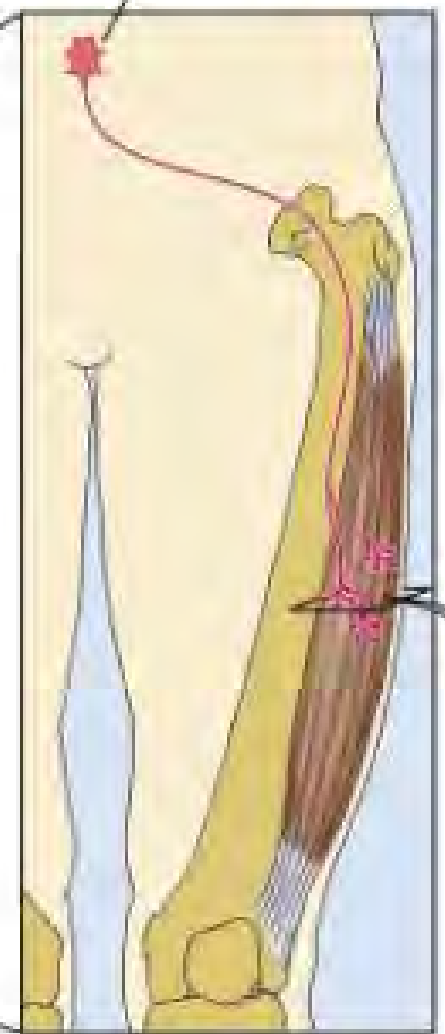
**0,02  
millimètre**



(A)

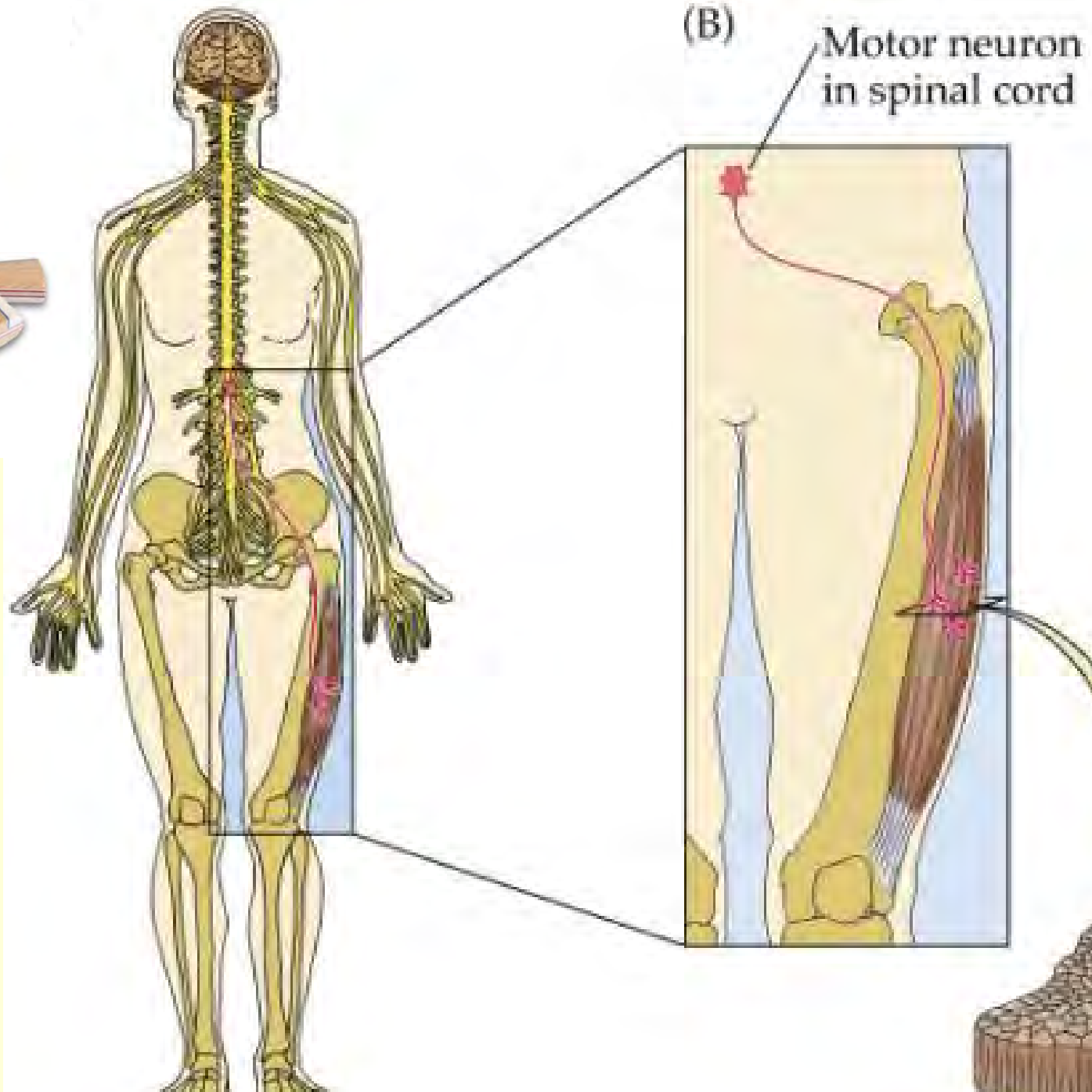


(B)



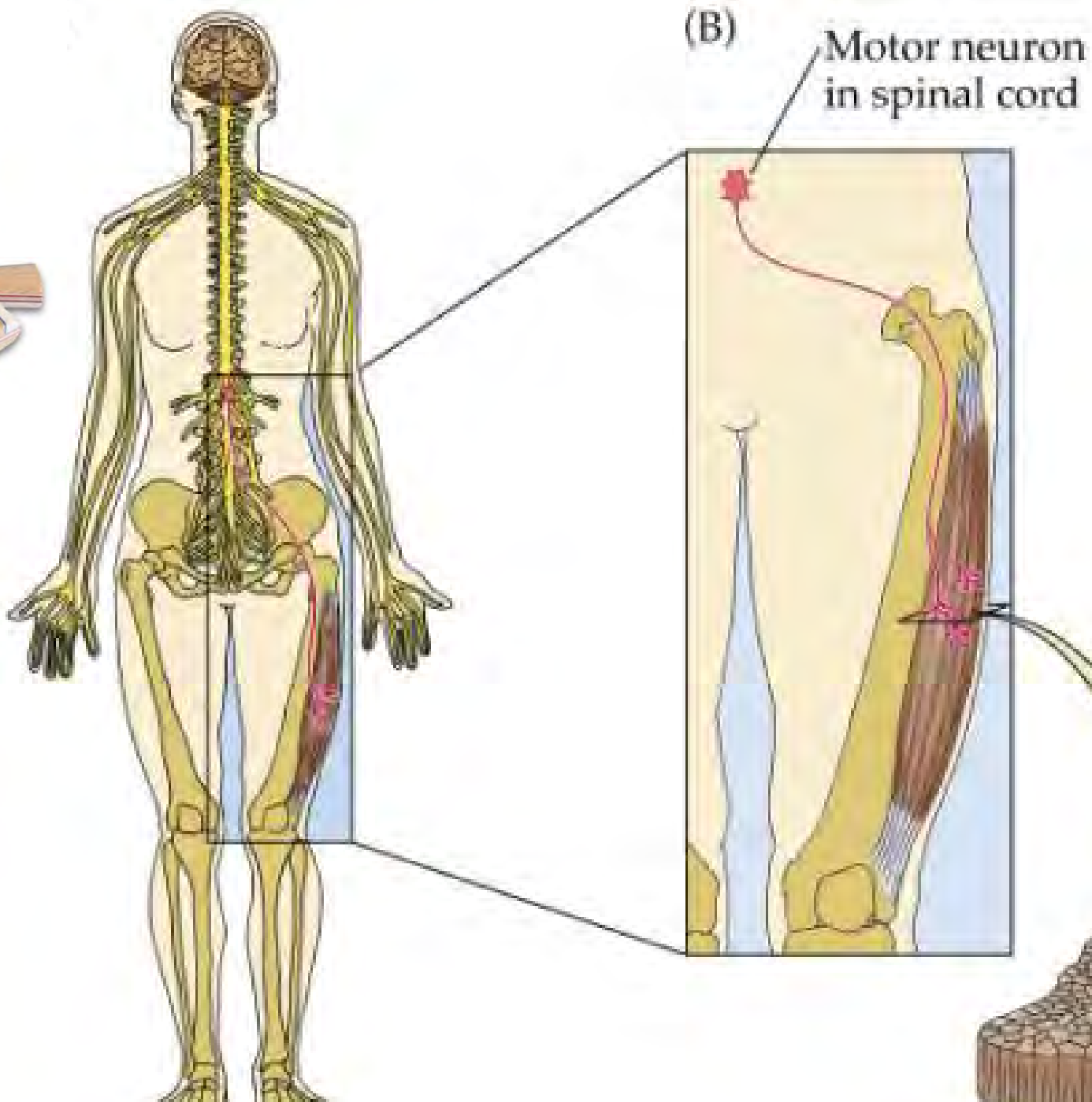
Motor neuron  
in spinal cord

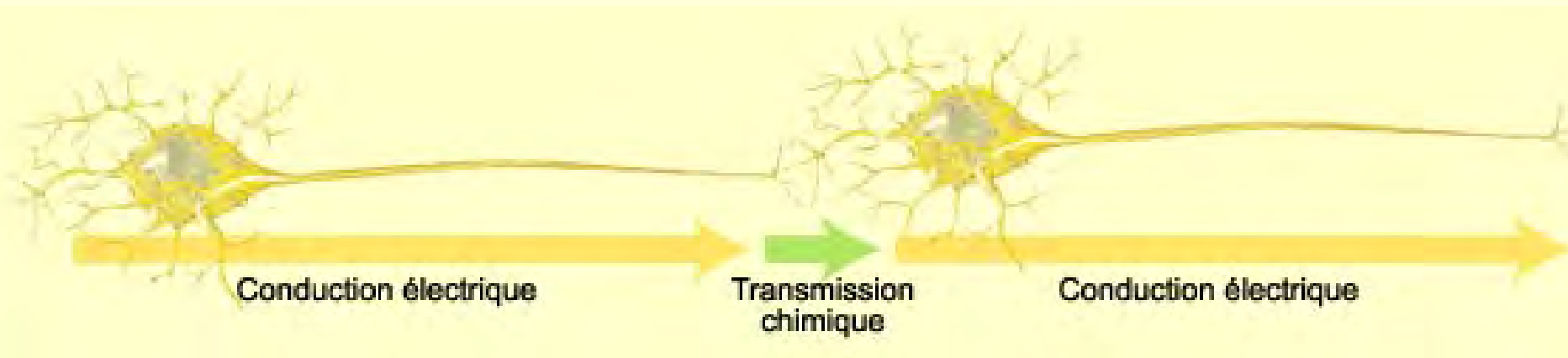


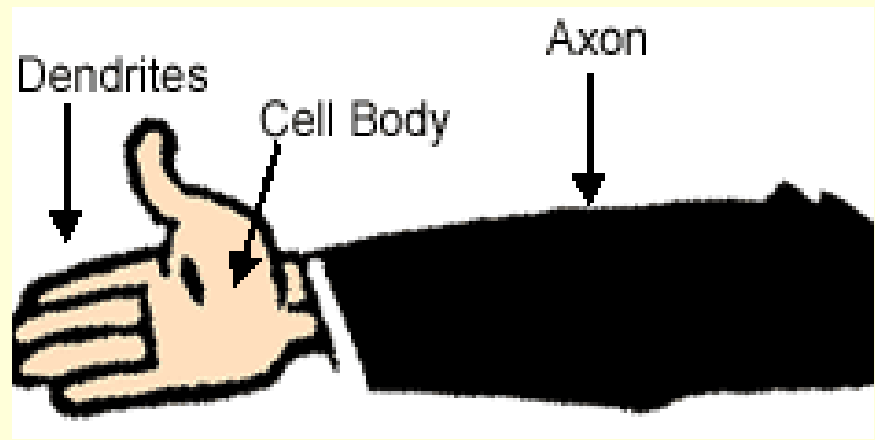
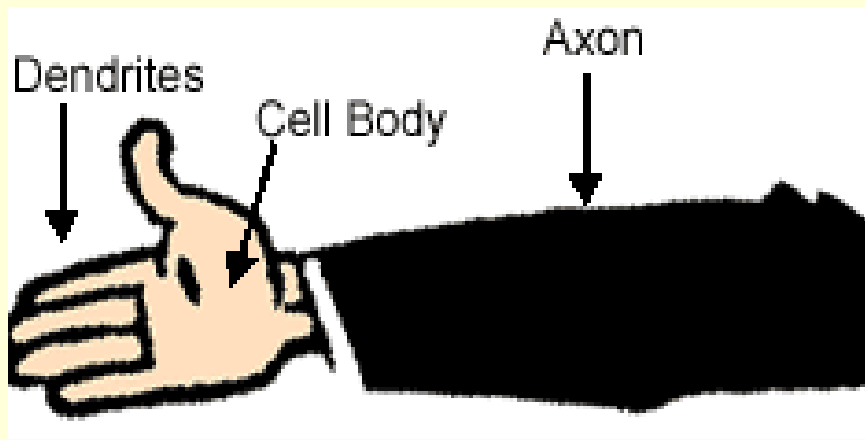
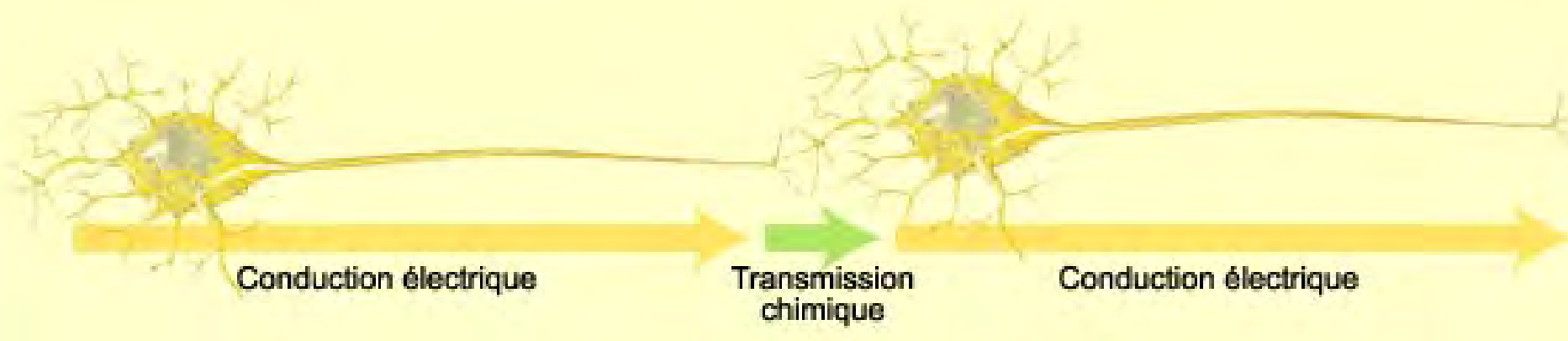




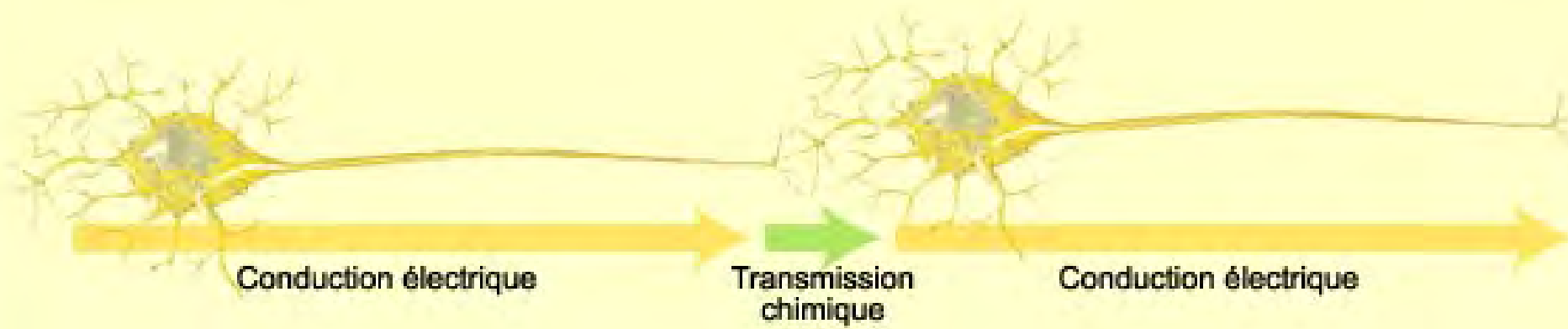
**400  
mètres !**









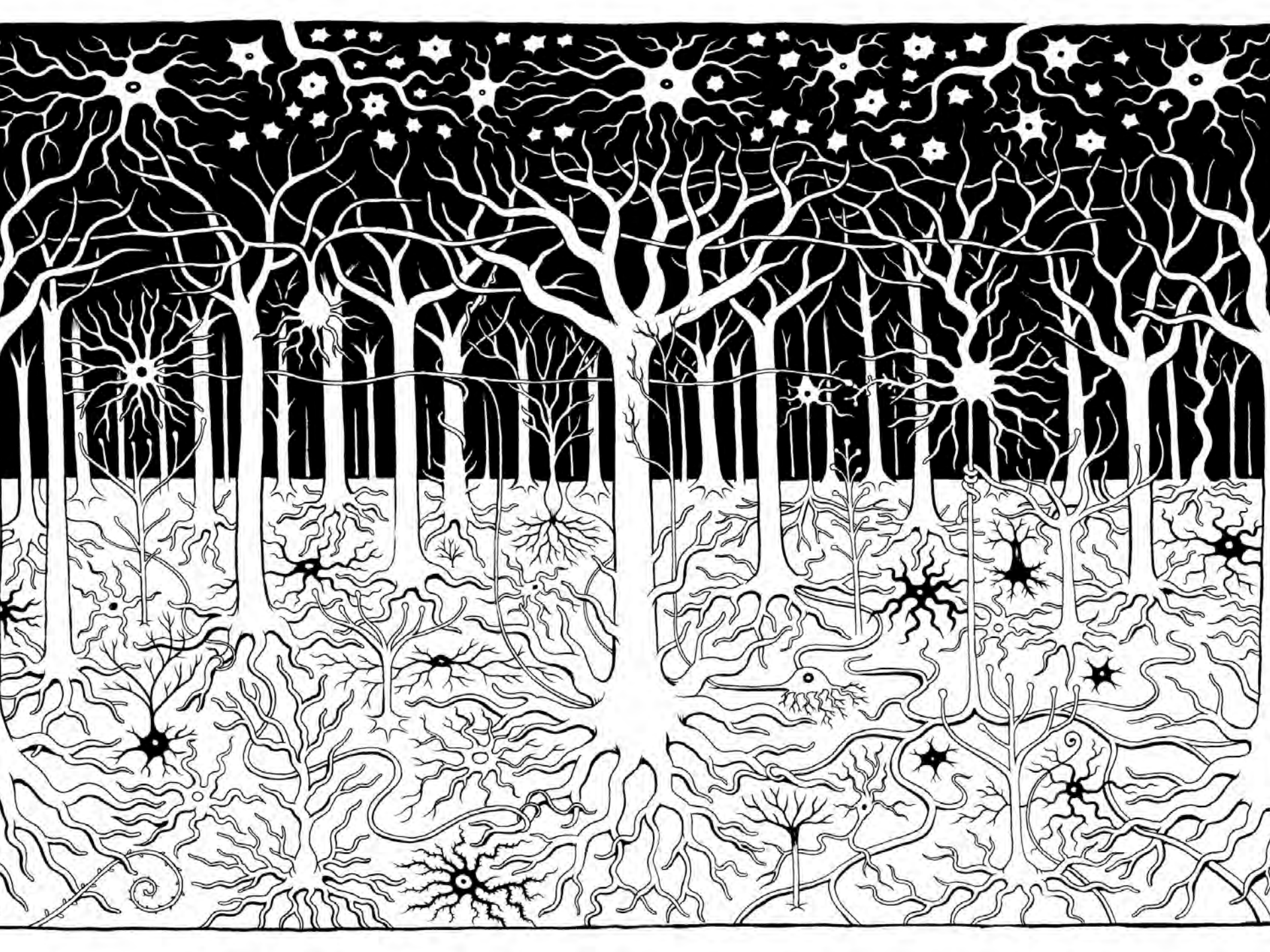














Combien y a-t-il de neurones  
dans le cerveau humain ?



Combien y a-t-il de neurones  
dans le cerveau humain ?

20 000 ?

Combien y a-t-il de neurones  
dans le cerveau humain ?

20 000 ?



Combien y a-t-il de neurones  
dans le cerveau humain ?

20 000 ?

1 000 000 ?



# Combien y a-t-il de neurones dans le cerveau humain ?



20 000 ?  
1 000 000 ?



# Combien y a-t-il de neurones dans le cerveau humain ?



20 000 ?

1 000 000 ?

1 000 000 000 ?



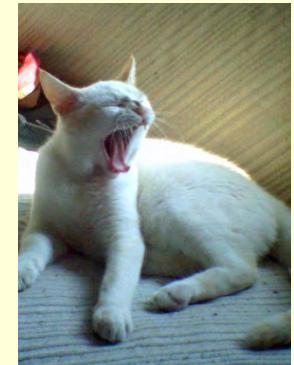
# Combien y a-t-il de neurones dans le cerveau humain ?



20 000 ?

1 000 000 ?

1 000 000 000 ?



# Combien y a-t-il de neurones dans le cerveau humain ?

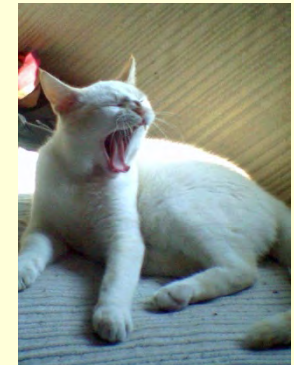


20 000 ?

1 000 000 ?

1 000 000 000 ?

7 000 000 000 ?



# Combien y a-t-il de neurones dans le cerveau humain ?

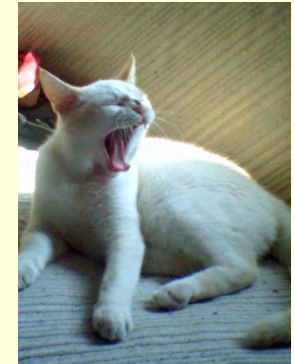


20 000 ?

1 000 000 ?

1 000 000 000 ?

7 000 000 000 ?





# Combien y a-t-il de neurones dans le cerveau humain ?

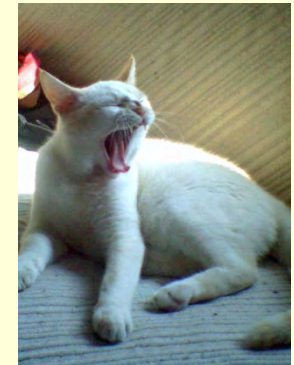


20 000 ?

1 000 000 ?

1 000 000 000 ?

7 000 000 000 ?



**85 000 000 000 !**

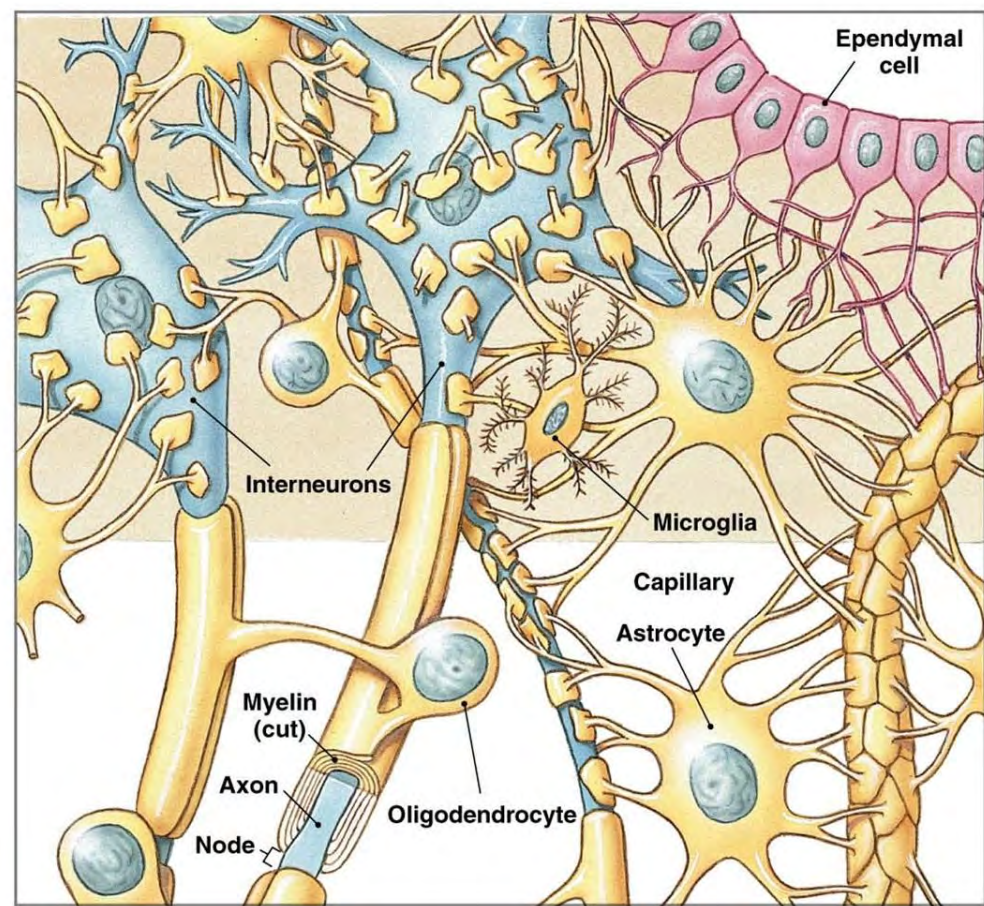


**85 000 000 000  
neurones !**



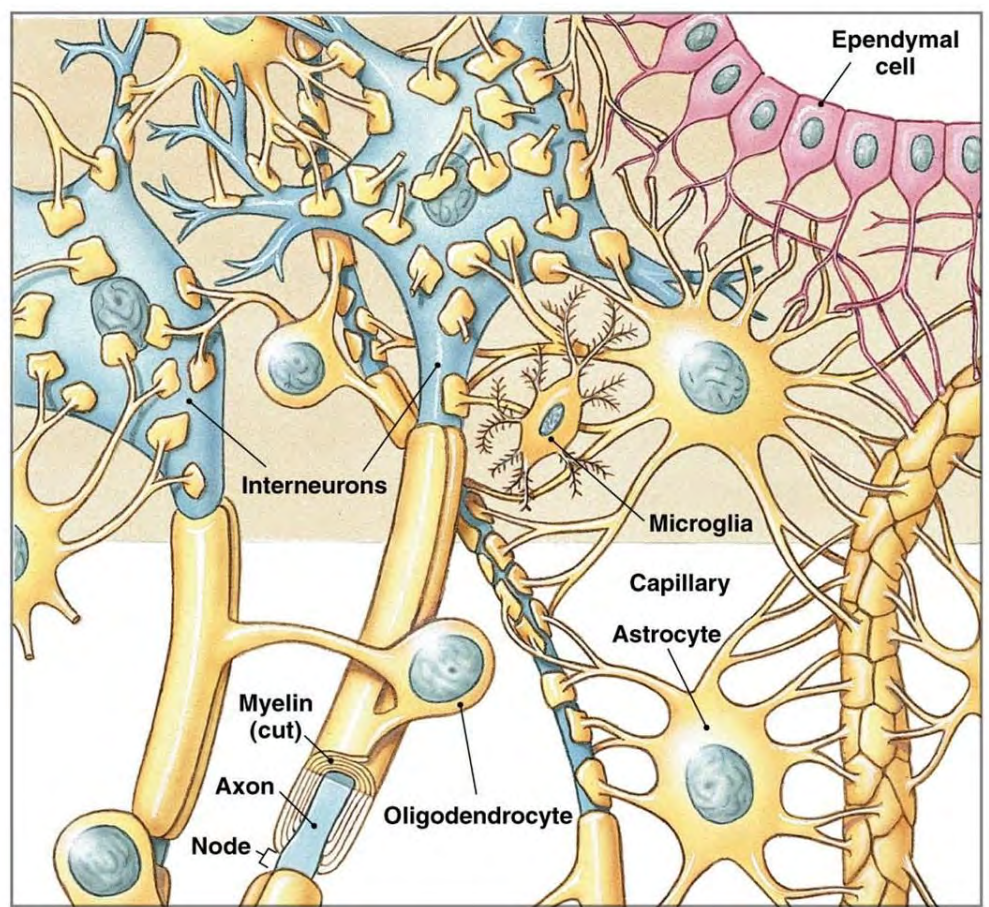
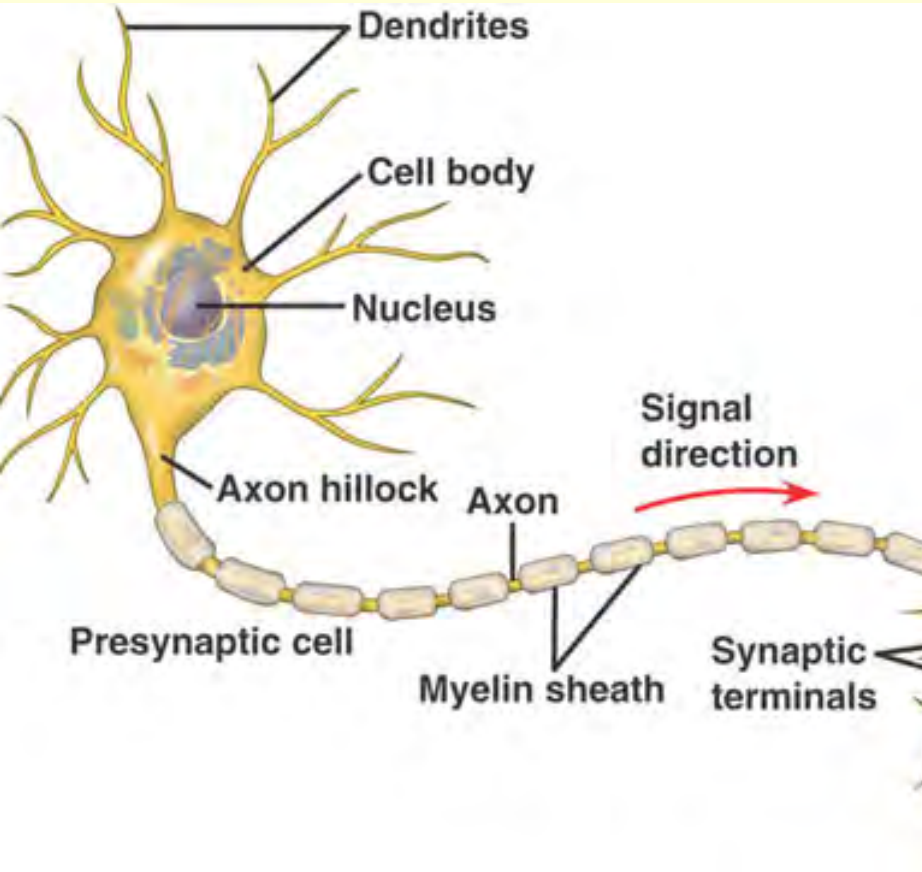
**85 000 000 000**  
**cellules gliales**

**+**



**85 000 000 000**  
**neurones !**





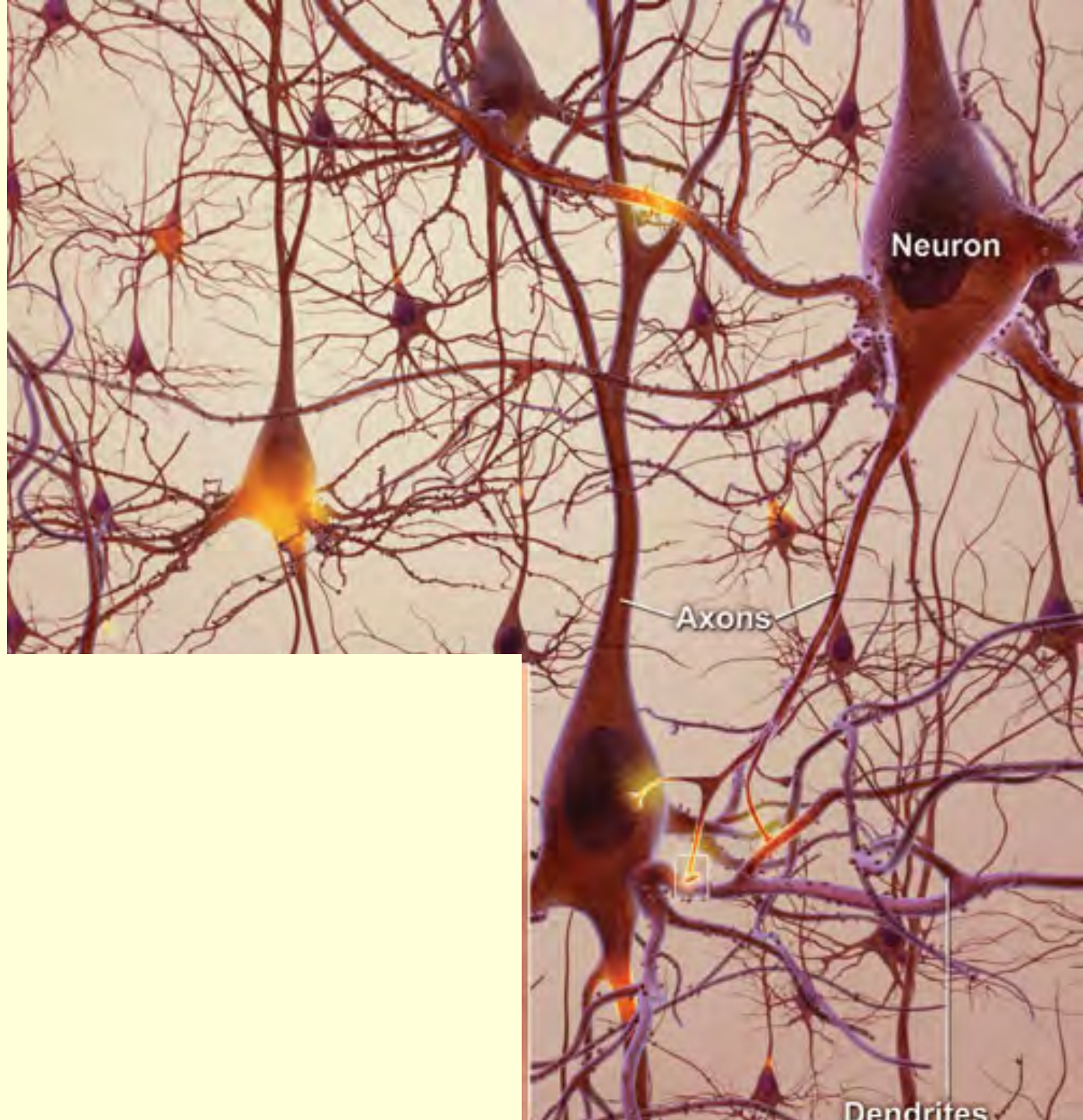
Signal direction

Synapse

Synaptic terminals

Postsynaptic cell

Chaque neurone peut faire jusqu'à 10 000 connexions avec d'autres neurones.



Chaque neurone peut faire jusqu'à 10 000 connexions avec d'autres neurones.



Si on mettait bout à bout tous ces petits câbles, on a estimé qu'on pourrait faire plus de **4 fois le tour de la Terre** avec le contenu d'un seul cerveau humain !

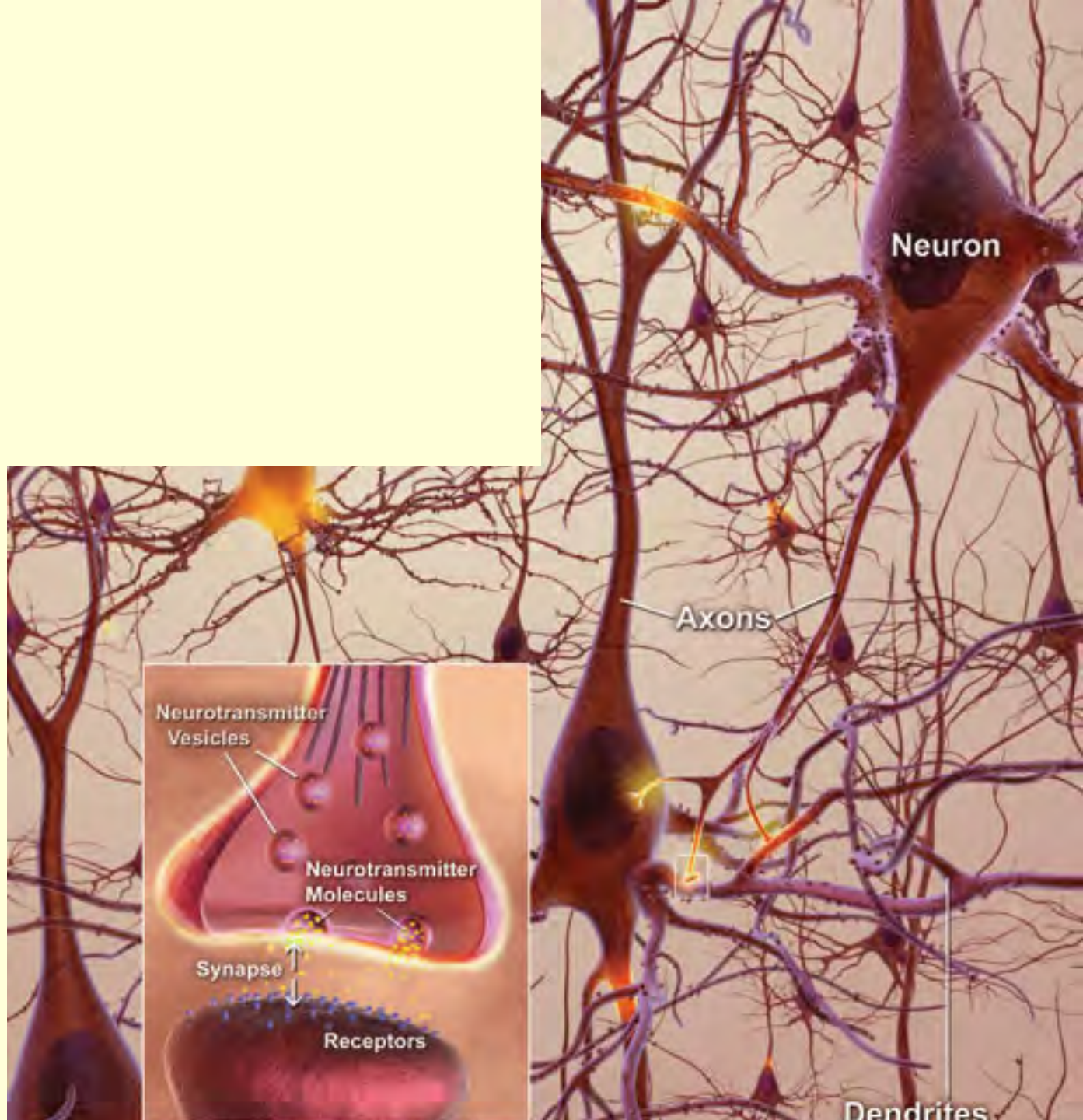




Est-ce que les neurones  
qui font des connexions  
se touchent ?



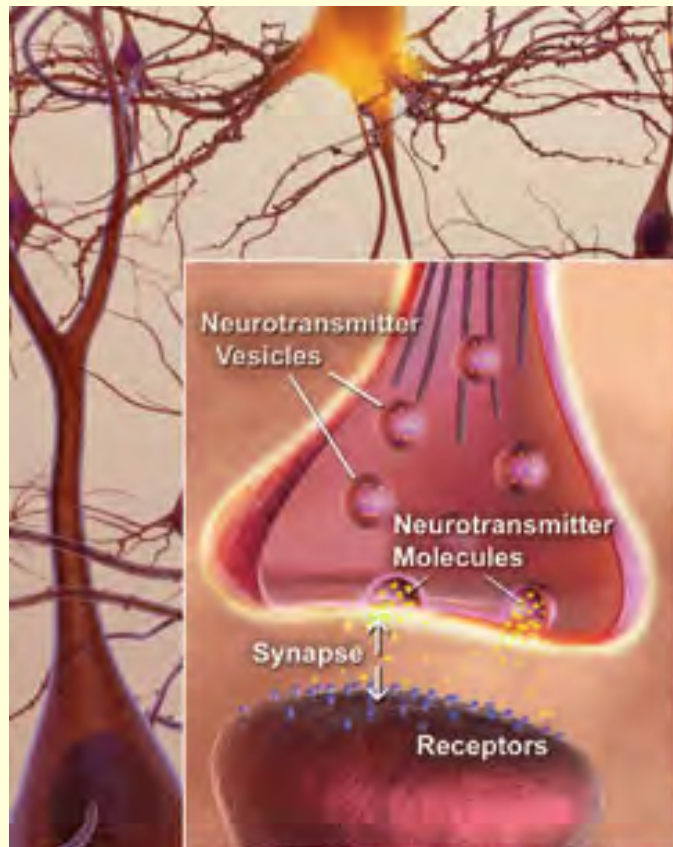
# Non !

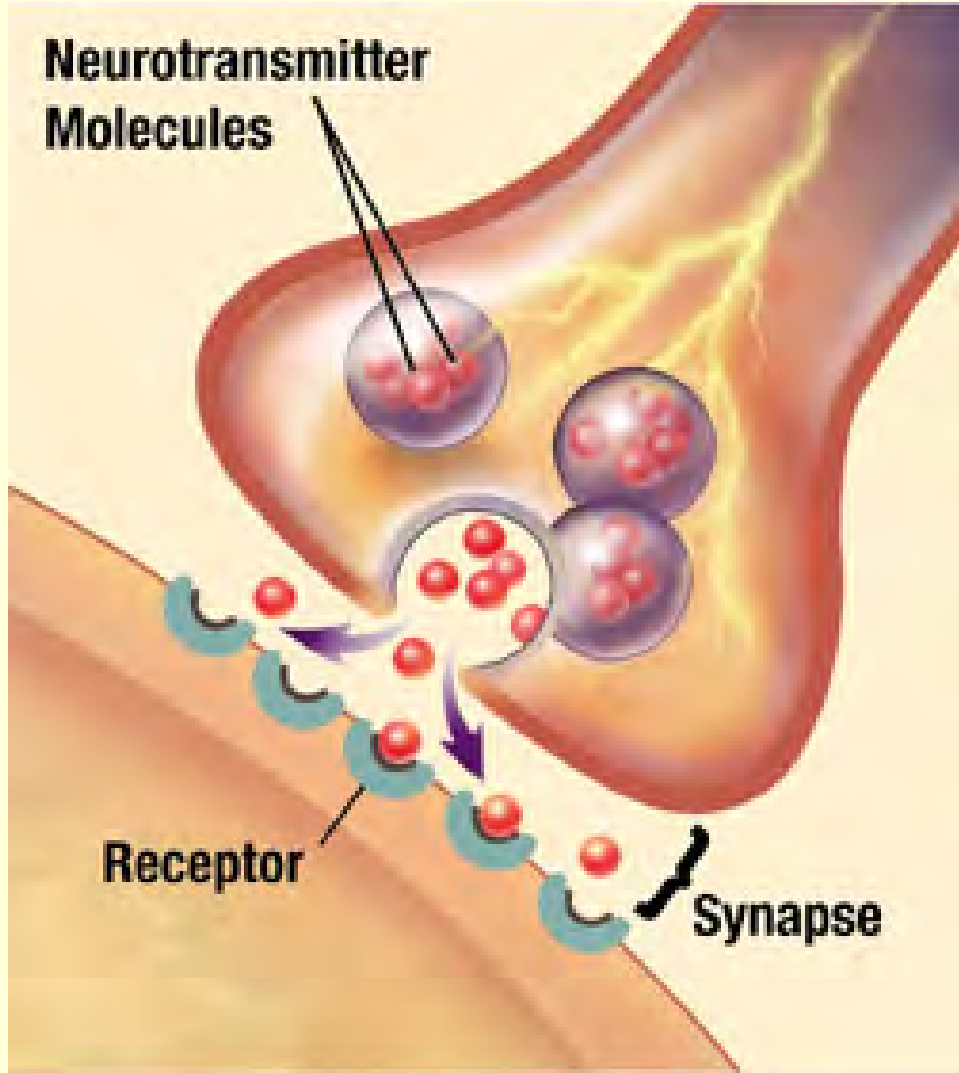


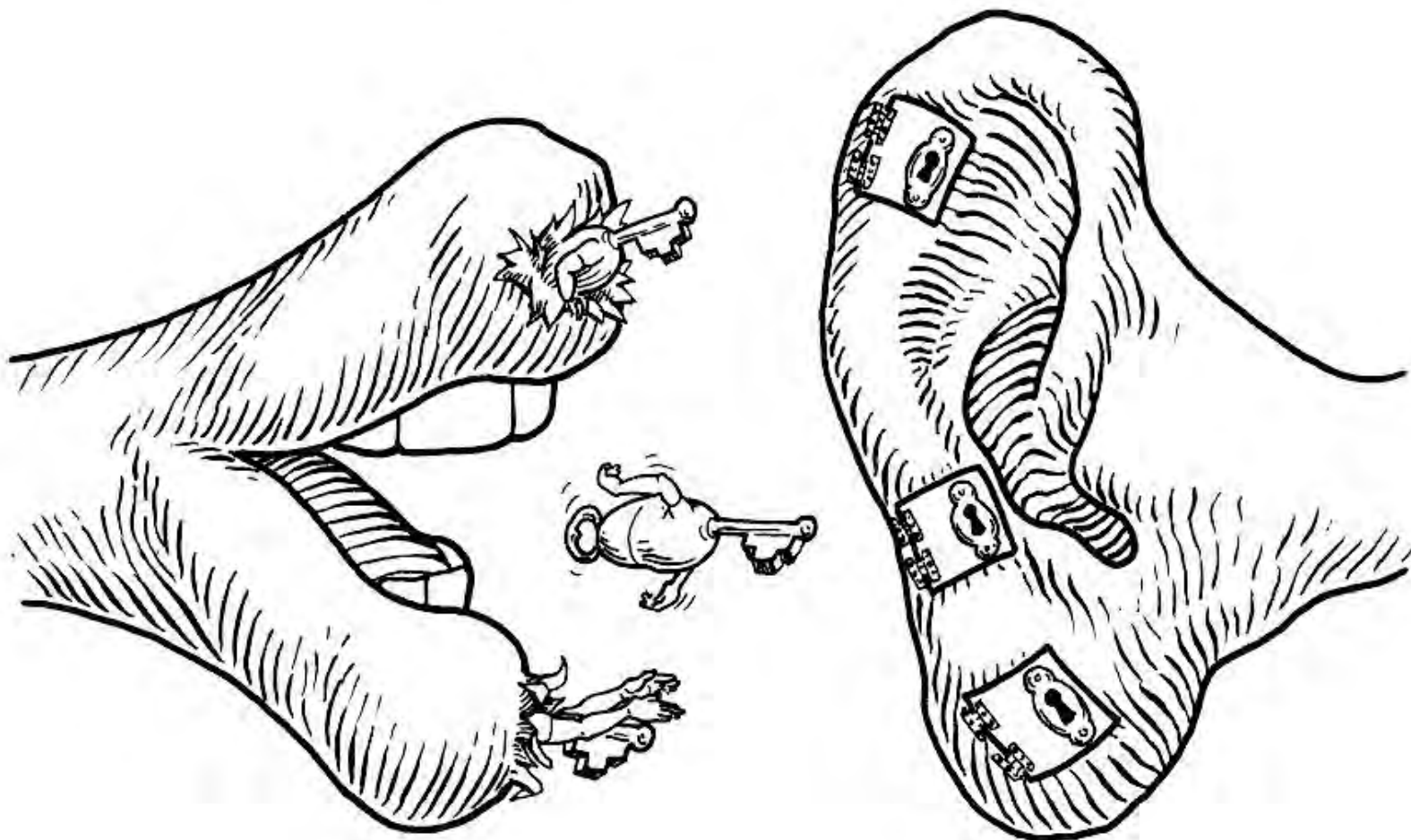


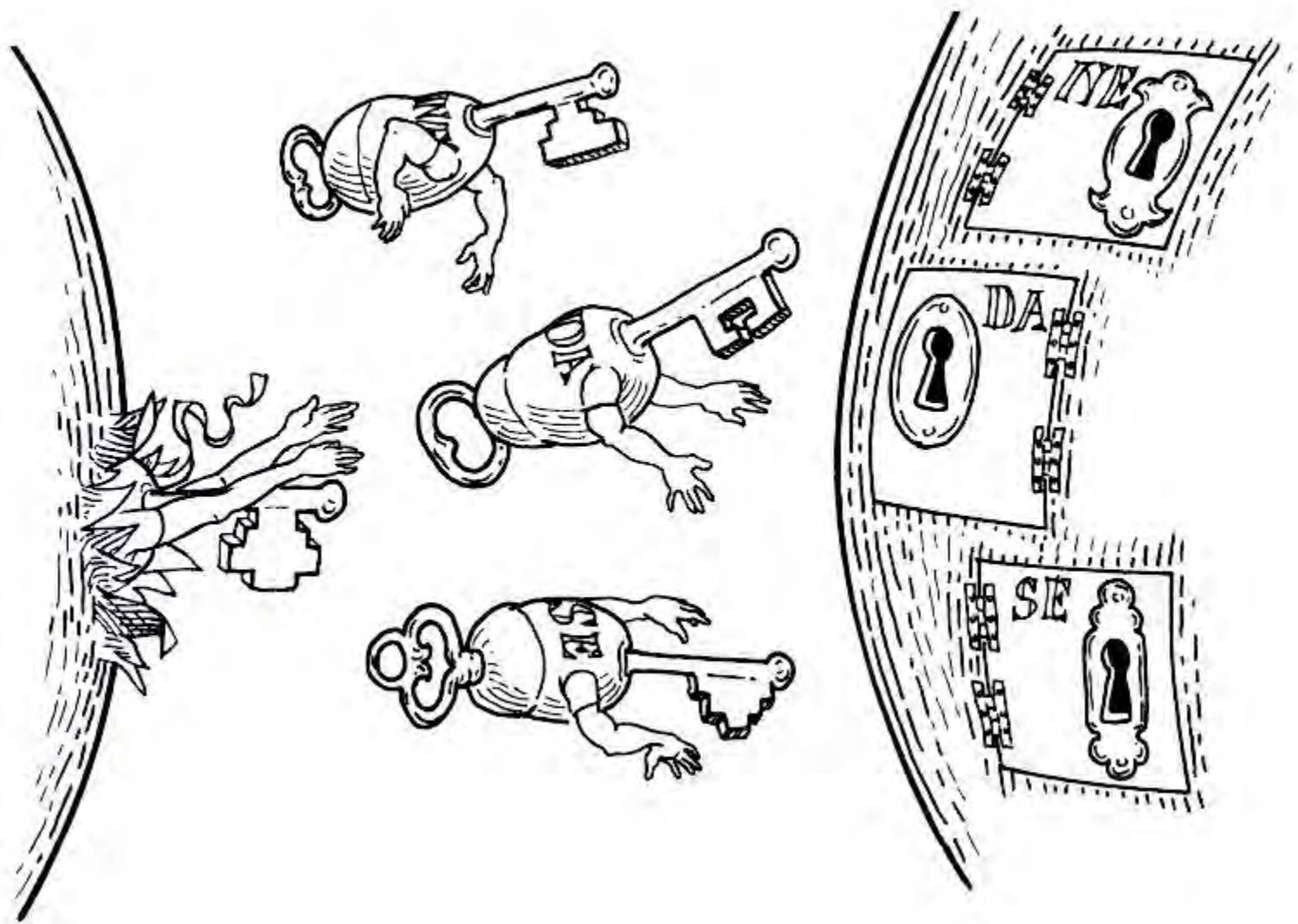
# Non !

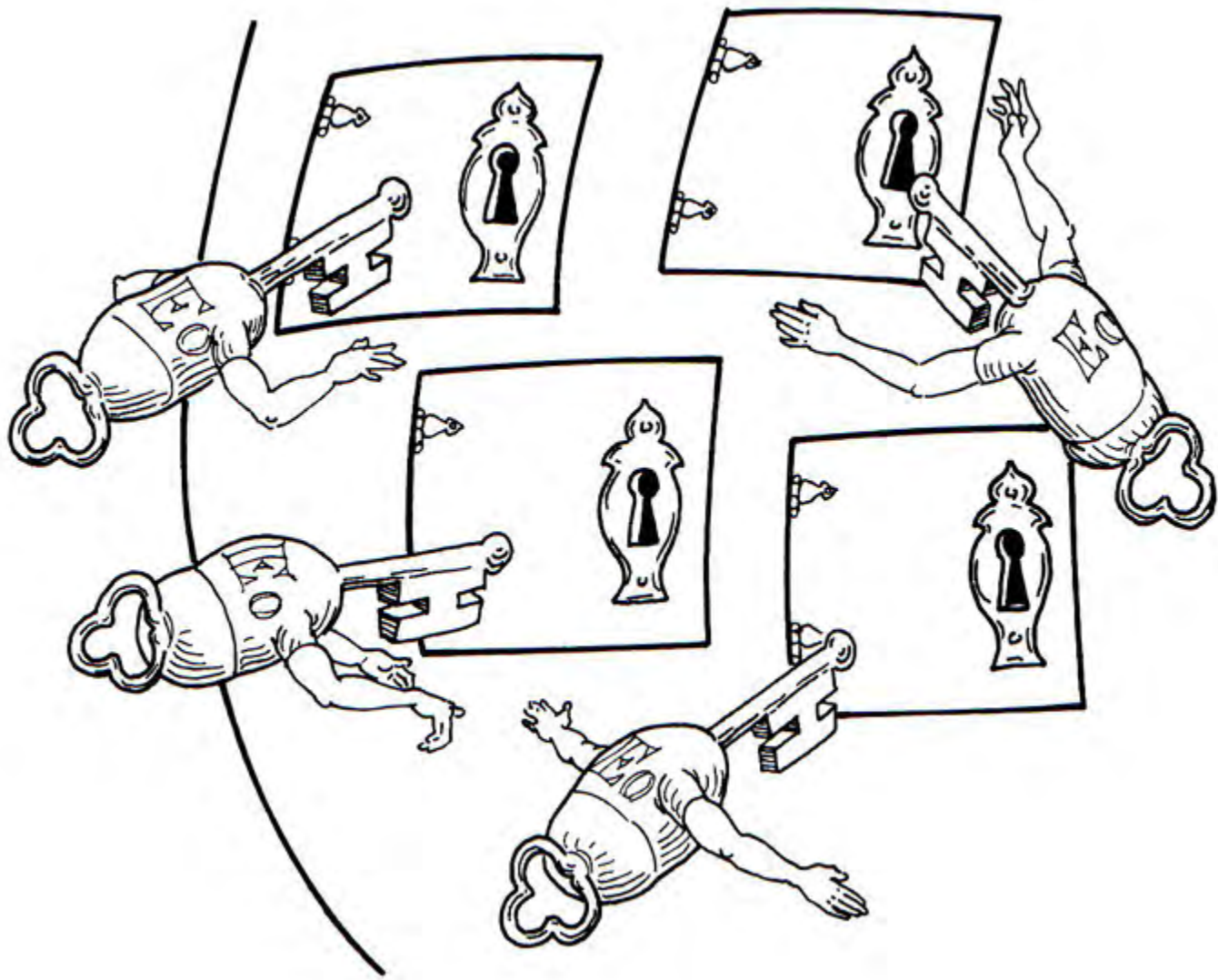
Comment se transmet l'influx nerveux si les neurones ne se touchent pas ?

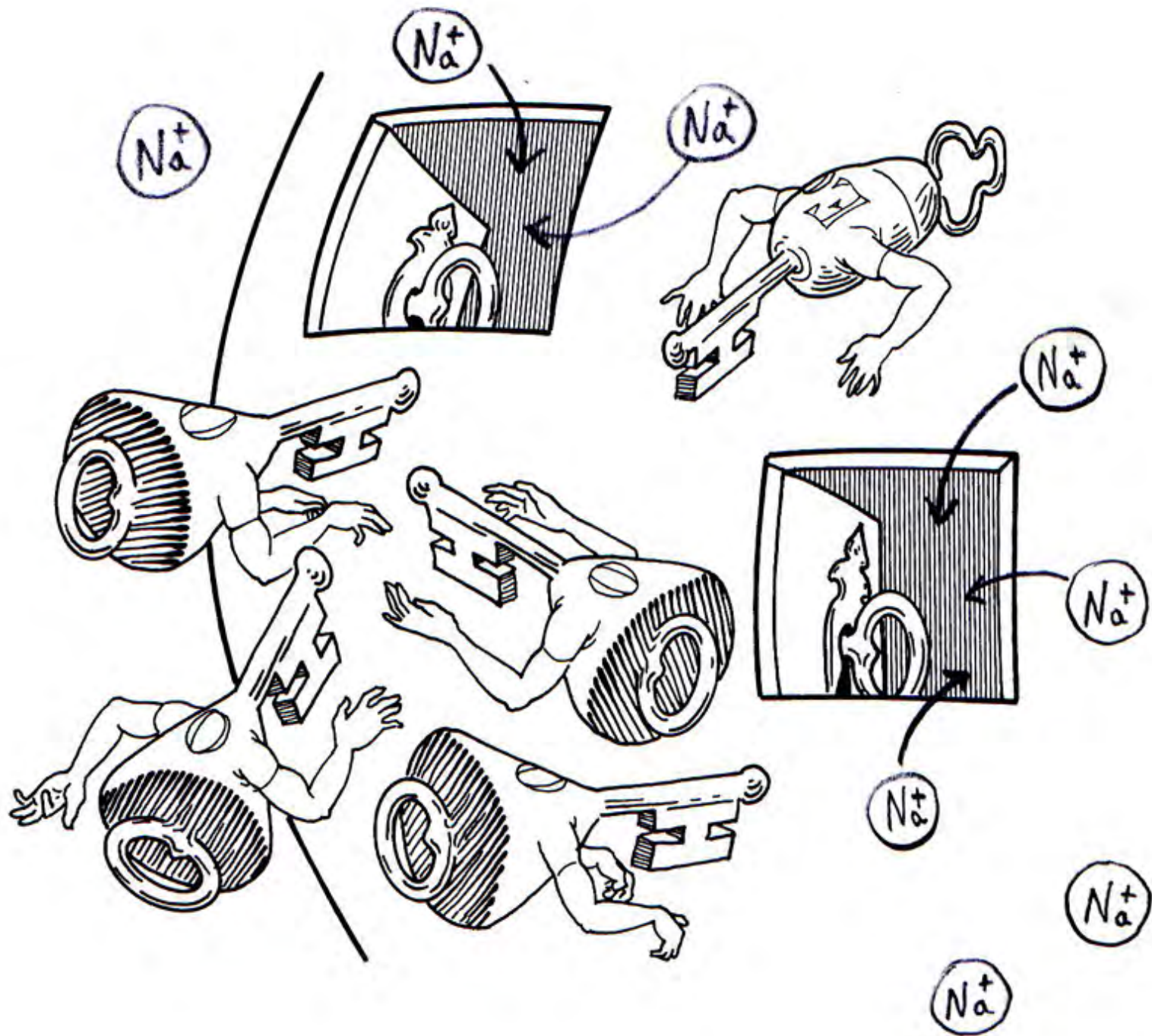






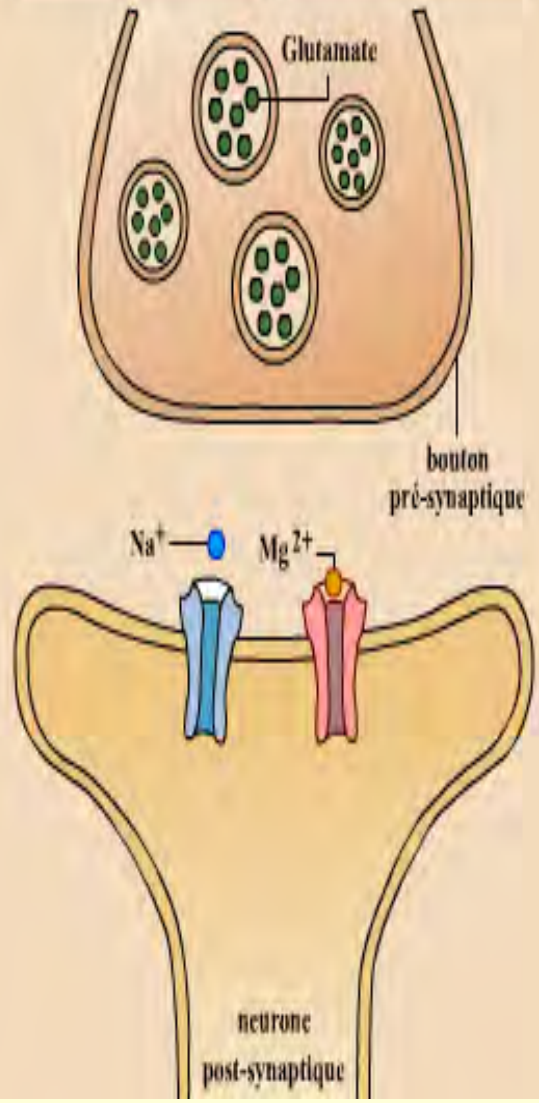


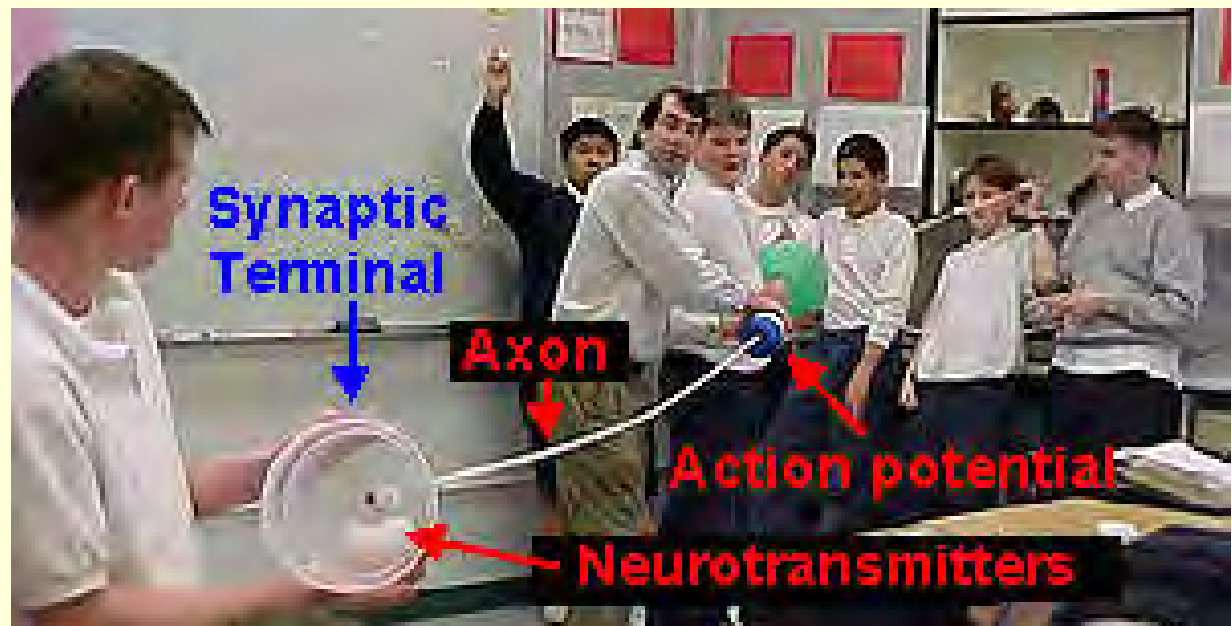
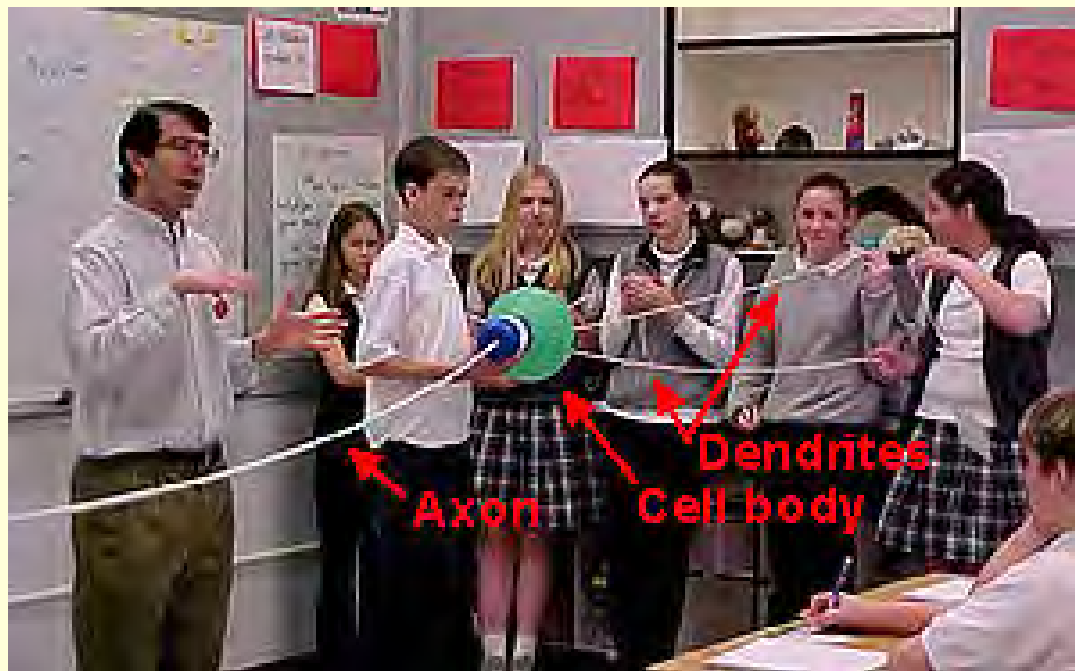




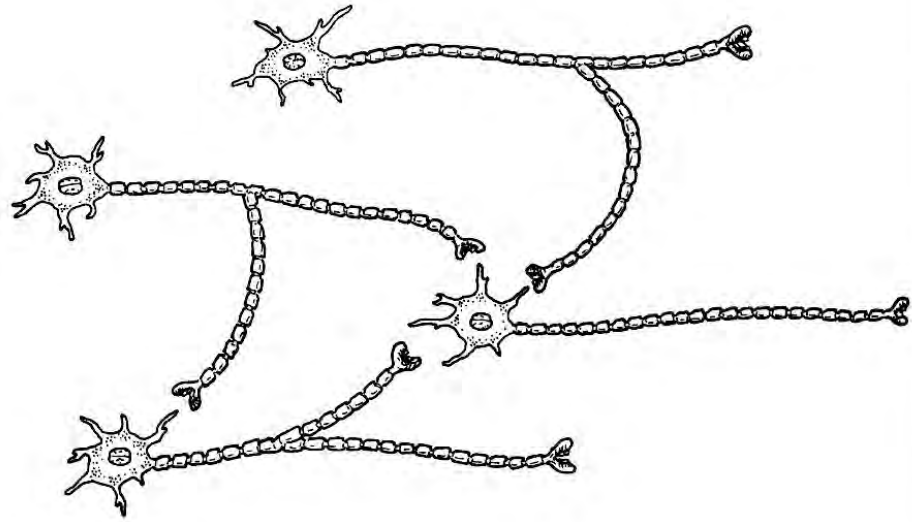
Transmission d'un  
potentiel d'action  
unique

Stimulation à haute  
fréquence produisant  
la PLT

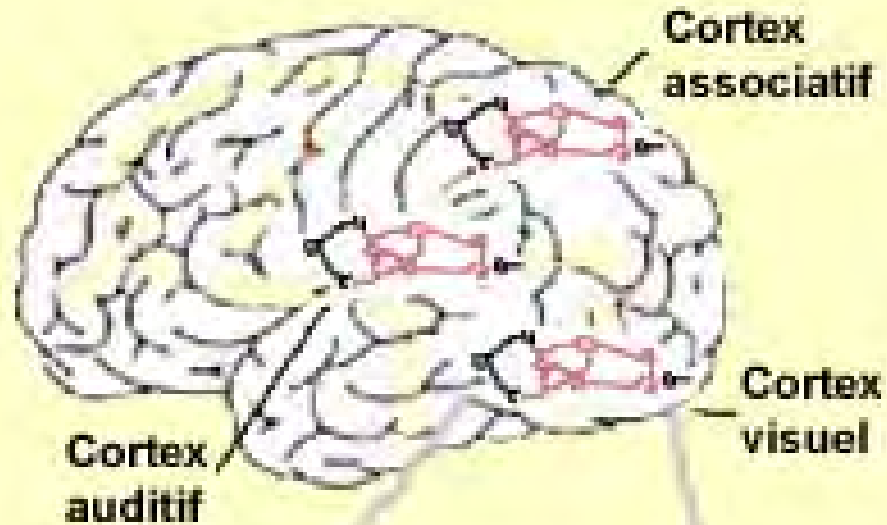
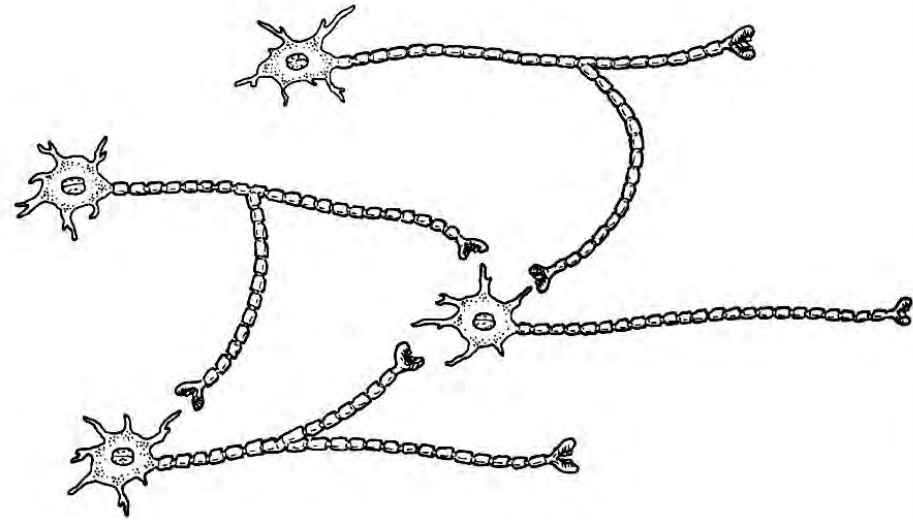








# Assemblées de neurones



chat

jeudi

moulin

soleil

facteur

lapin

plante

sur

## Voir passivement des mots



chat

jeudi

moulin

soleil

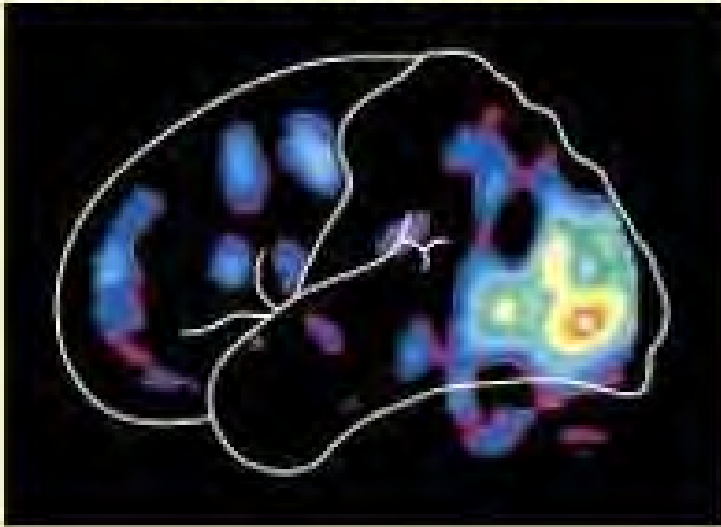
facteur

lapin

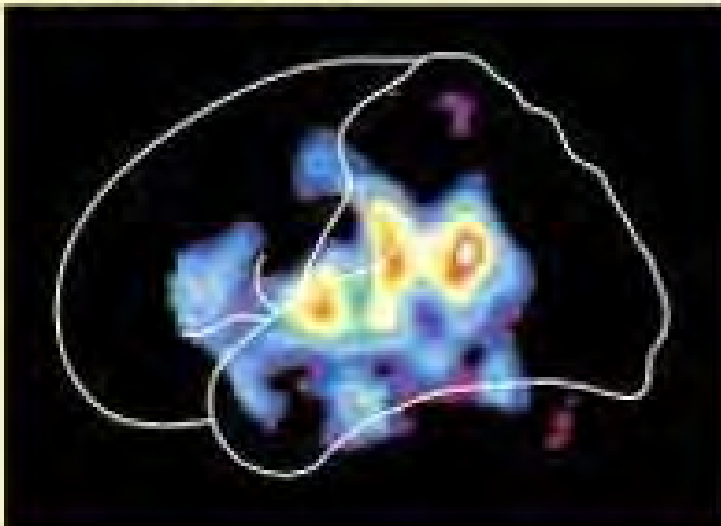
plante

sur

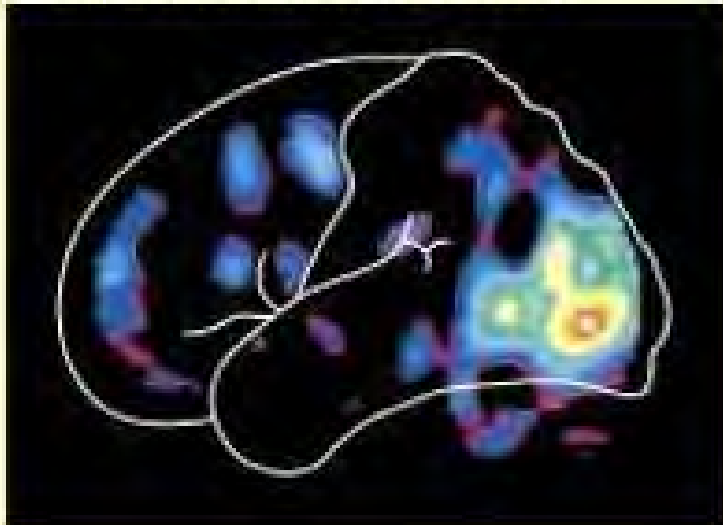
## Voir passivement des mots



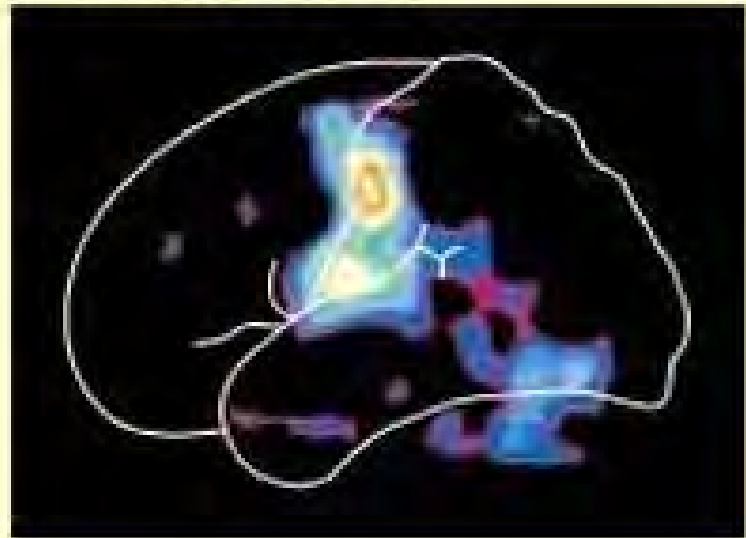
## Écouter des mots



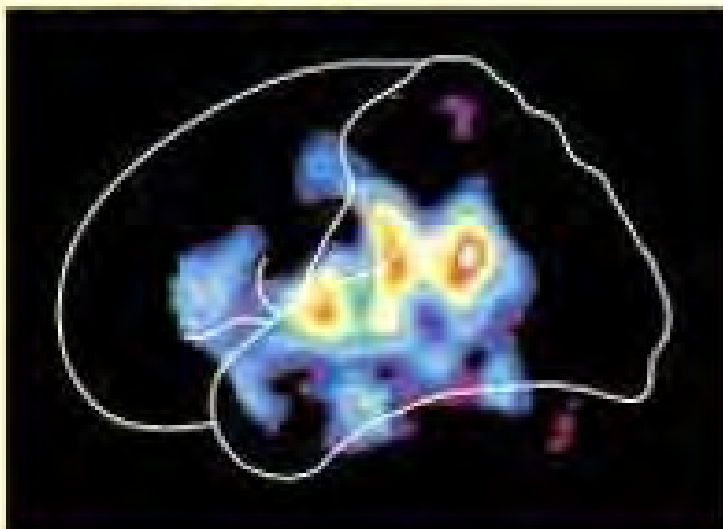
**Voir passivement des mots**



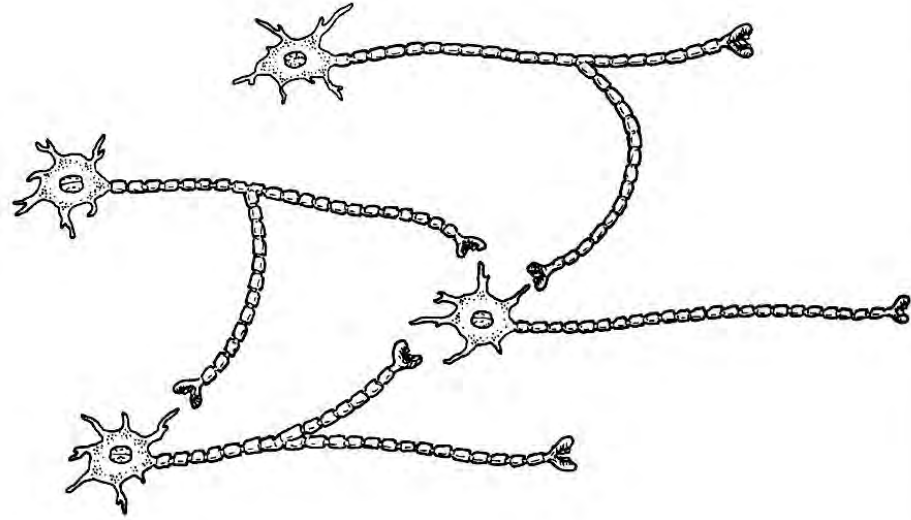
**Prononcer des mots**



**Écouter des mots**

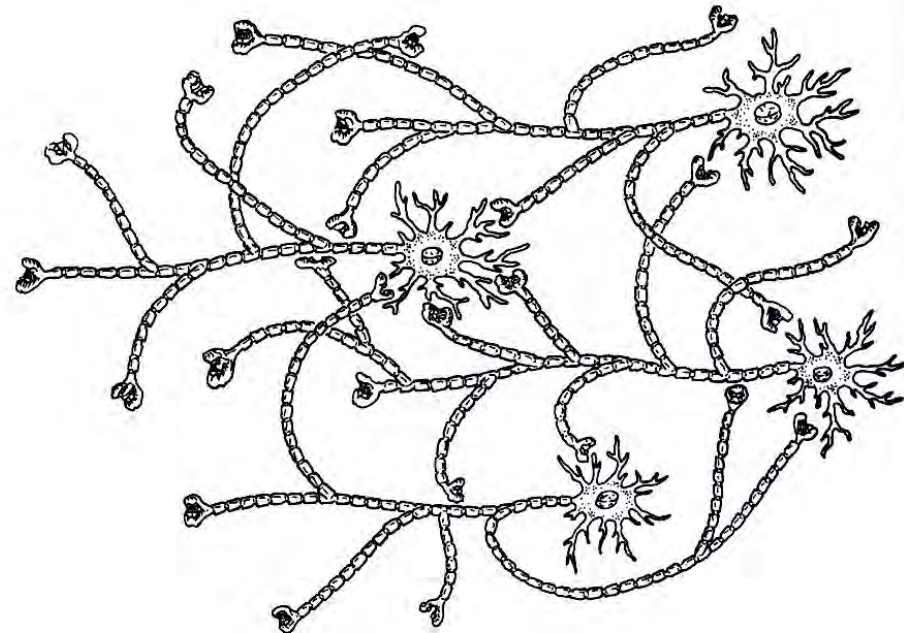
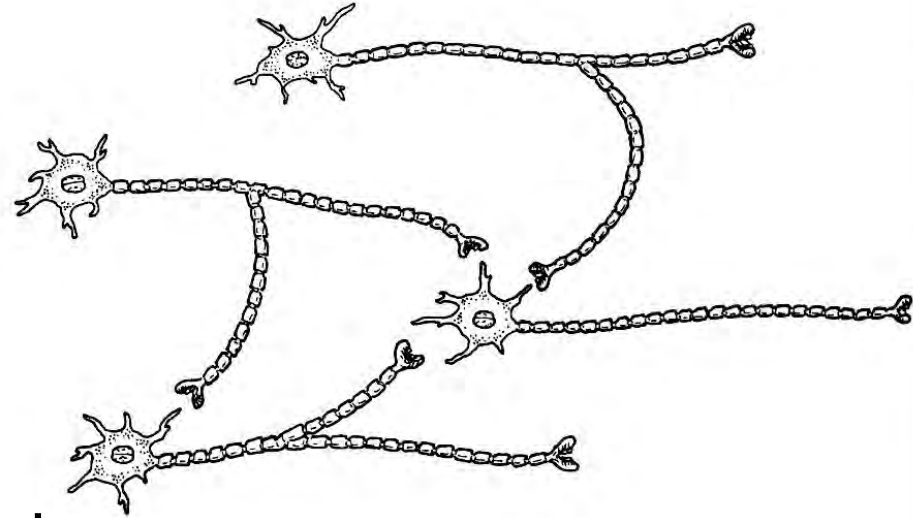


Étudier ou s'entraîner...

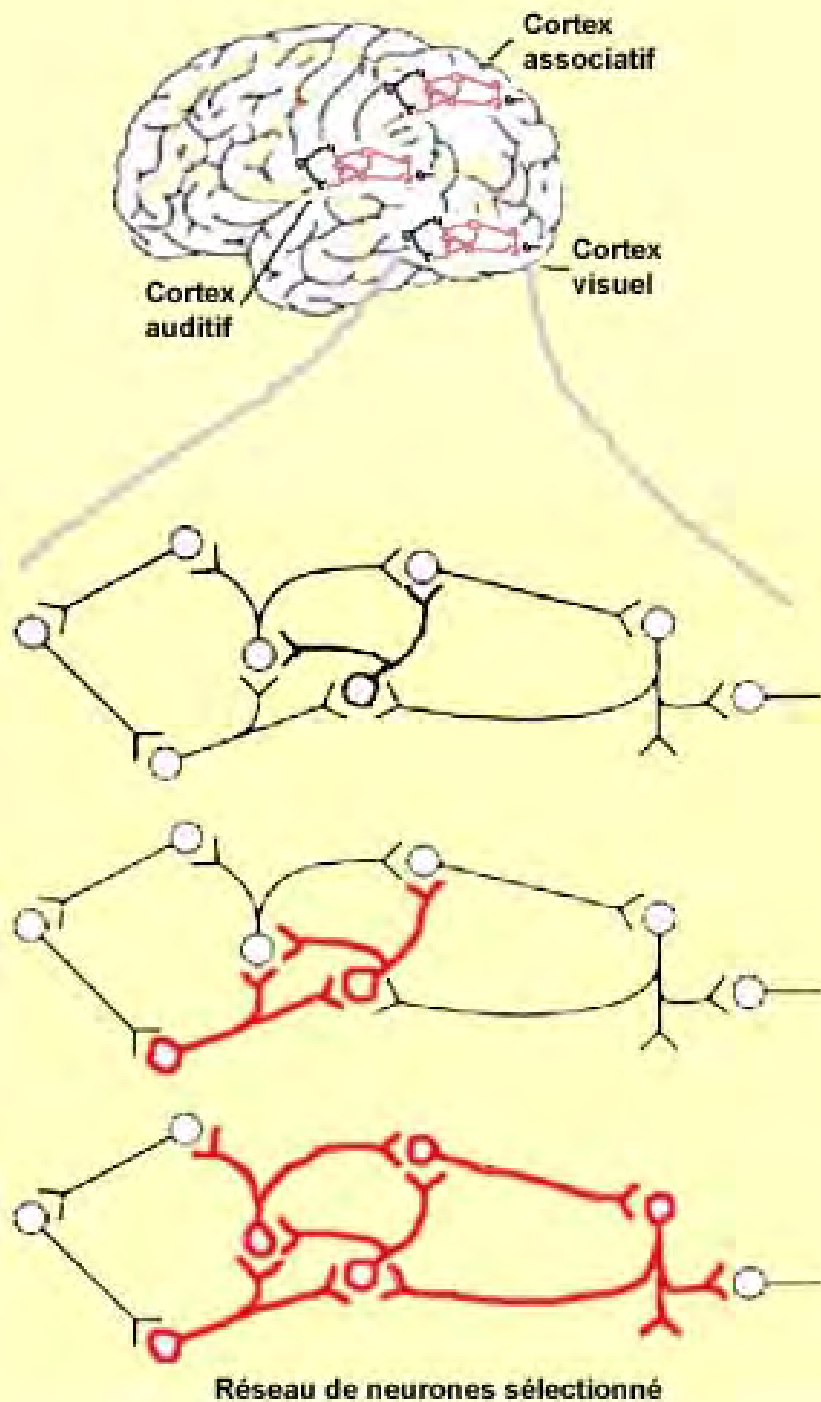


Étudier ou s'entraîner...

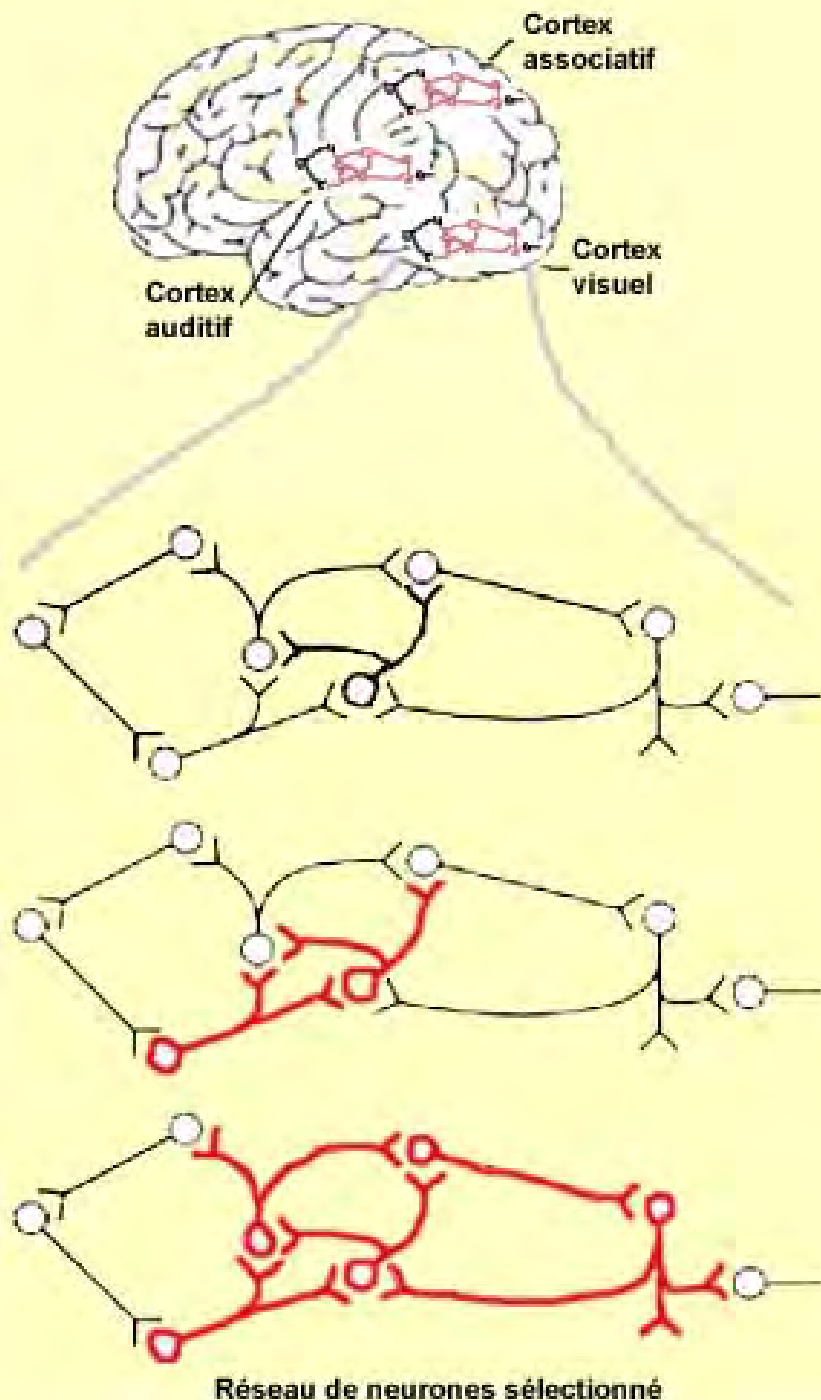
...crée de nouvelles connexions !





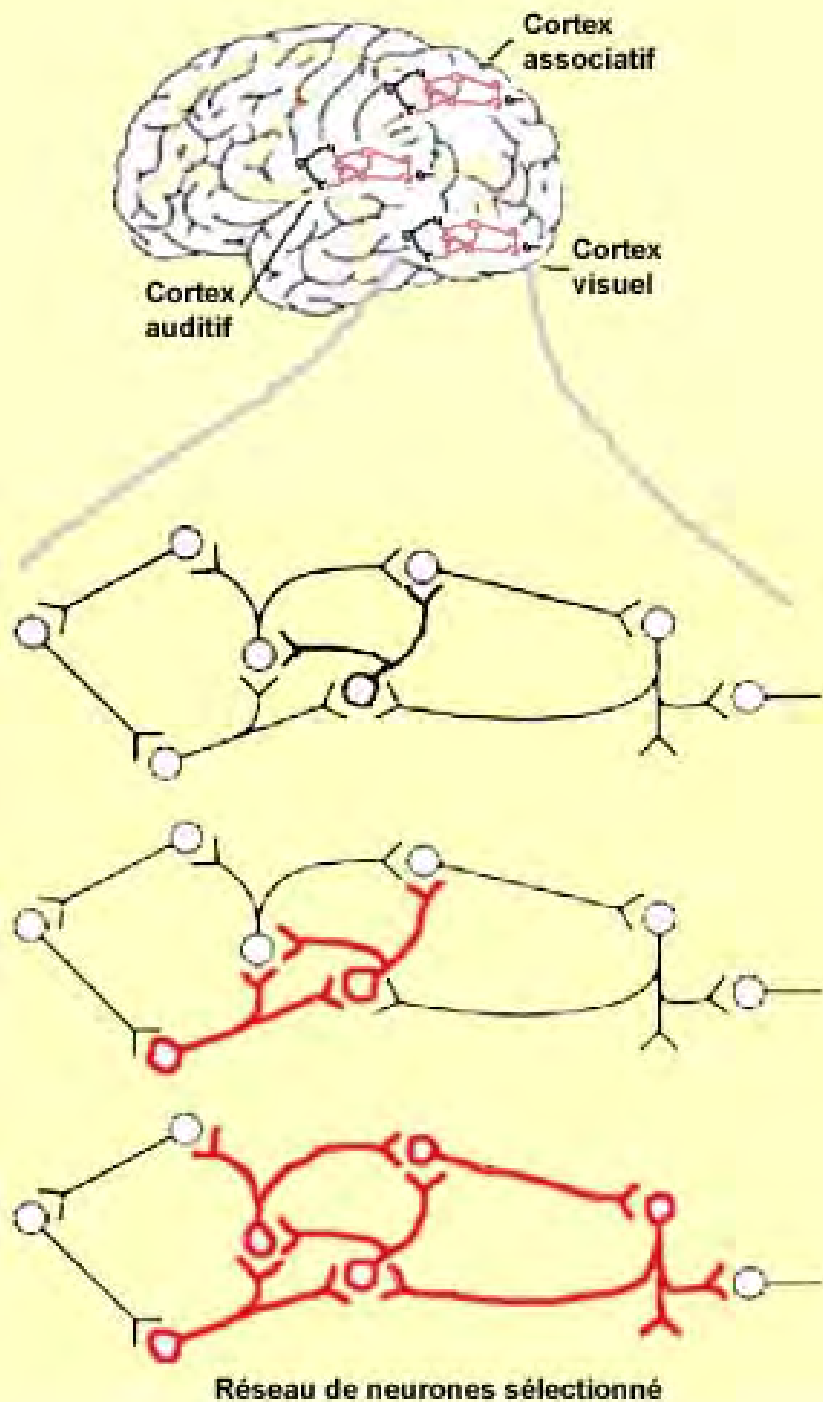


...ou renforce des liens qui étaient déjà là !

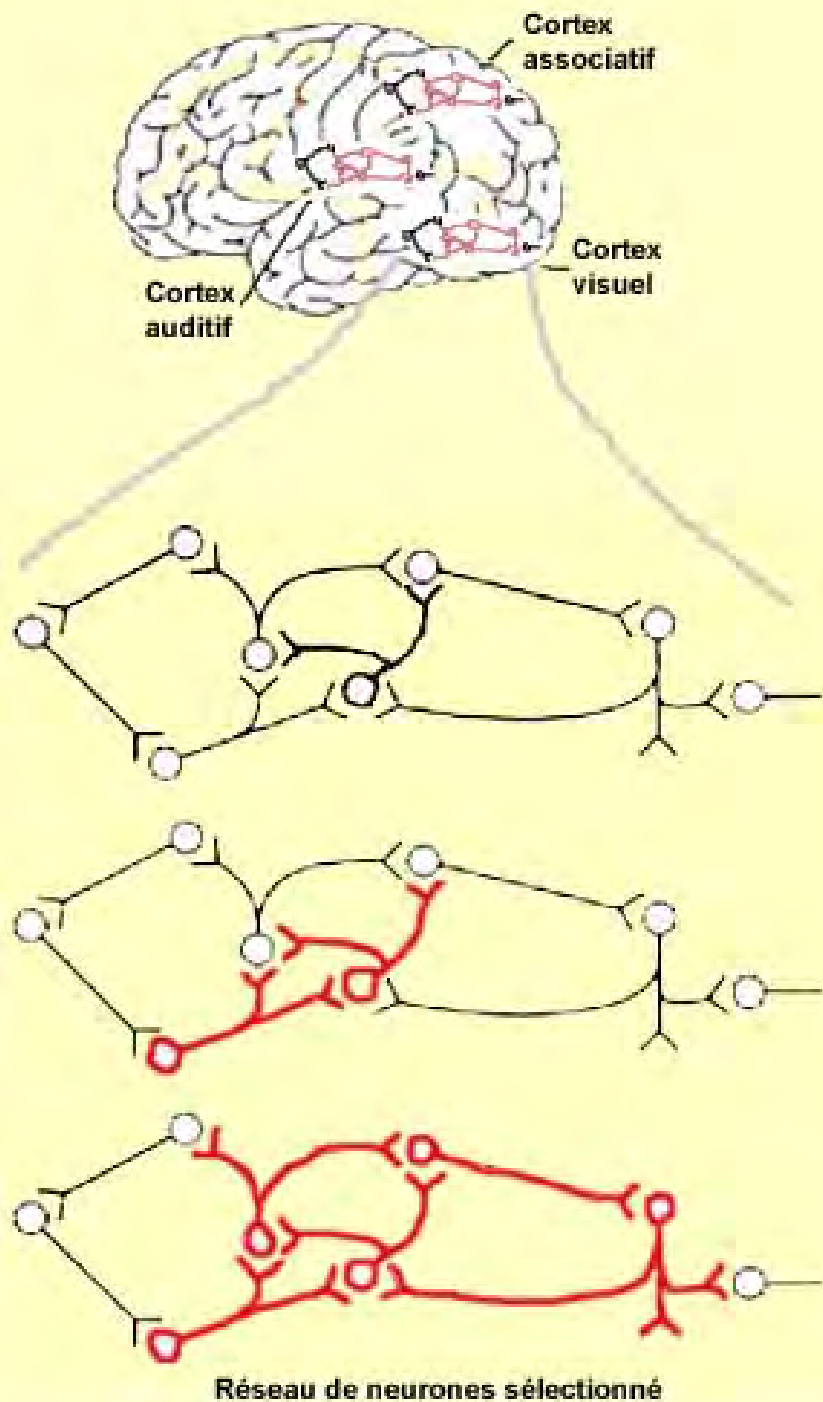


...ou renforce des liens qui étaient déjà là !

pour former des groupes de neurones qui vont devenir **habitués** de travailler ensemble.

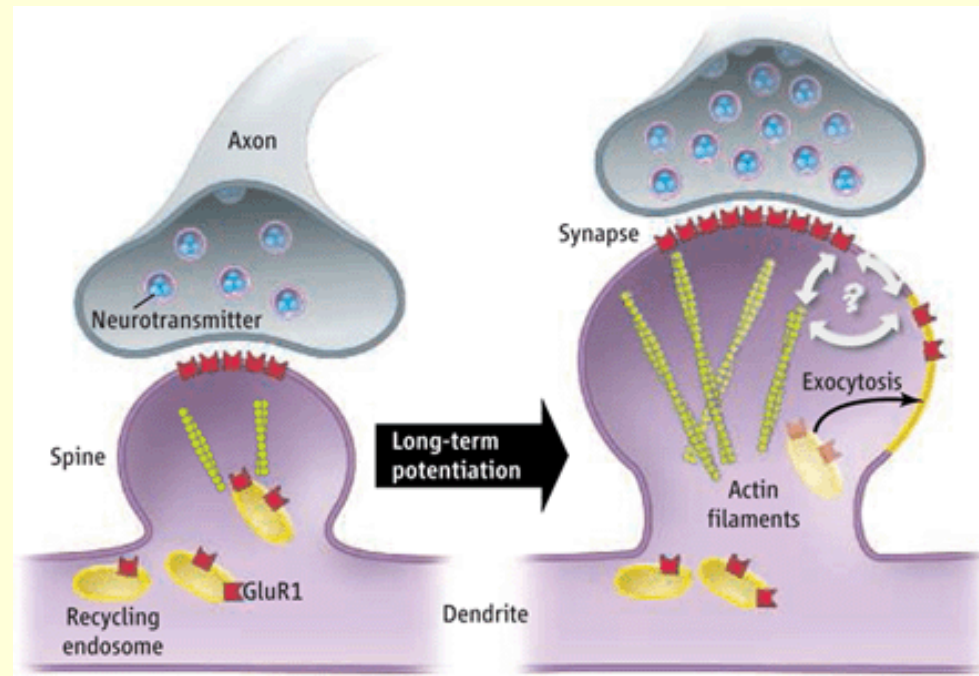


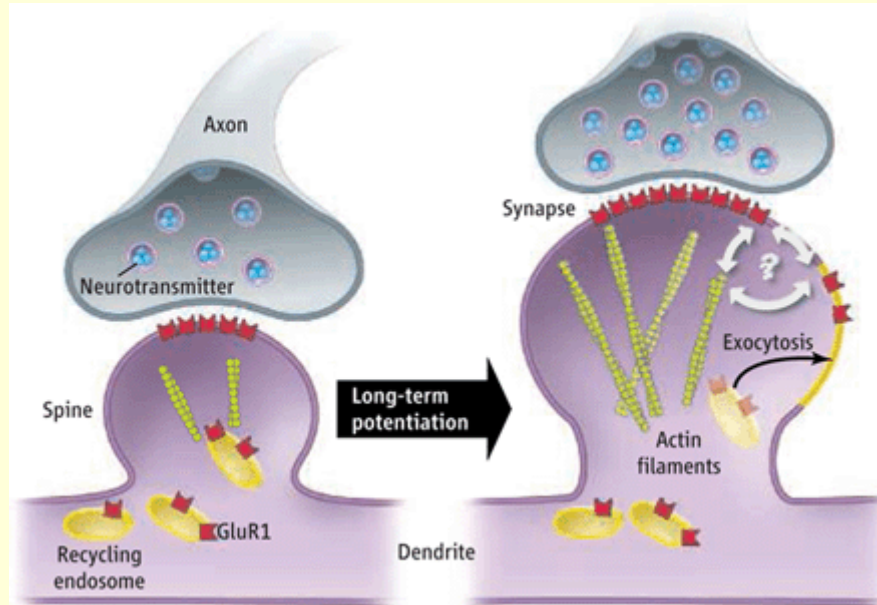
Comment ?

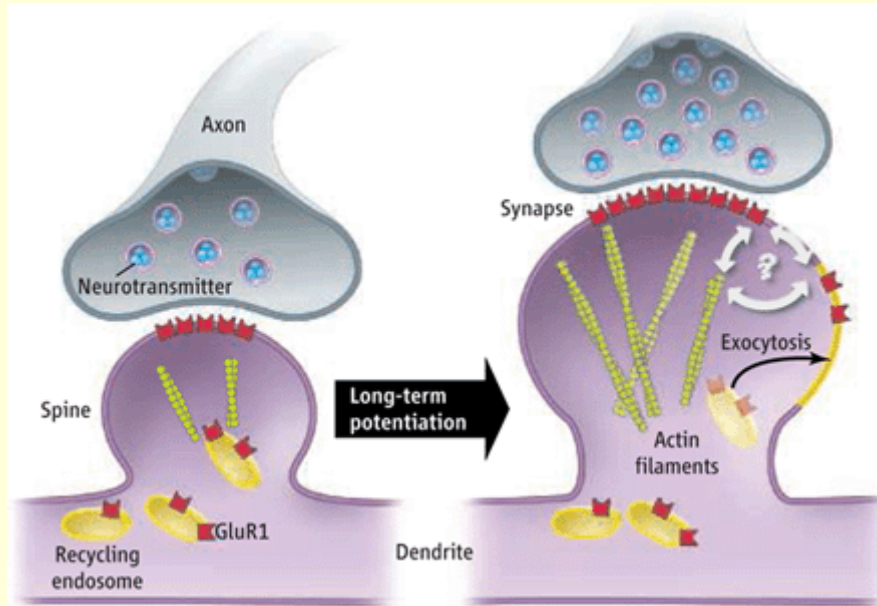


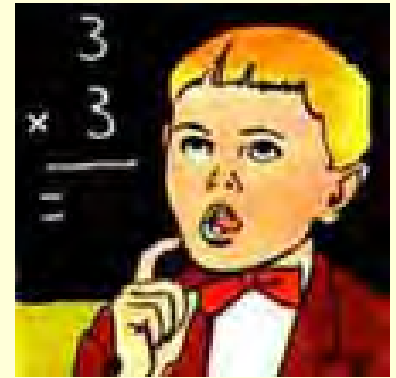
Comment ?

Grâce aux synapses qui se renforcent !

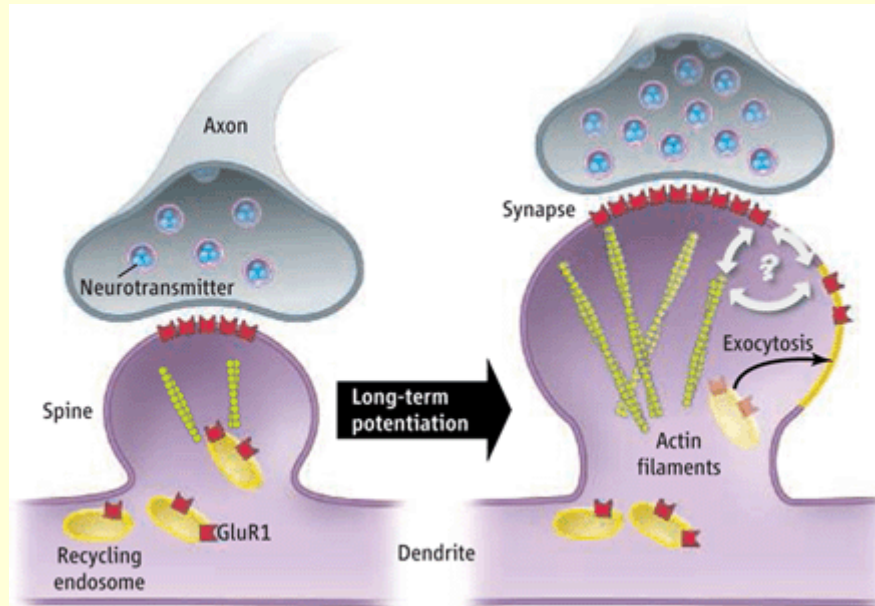


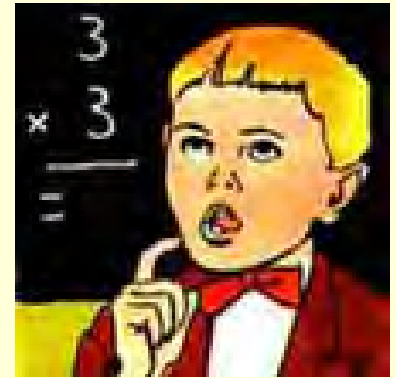




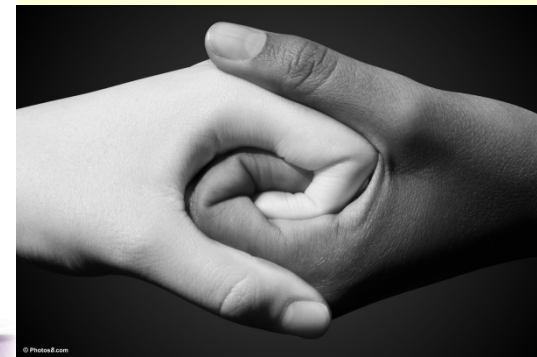
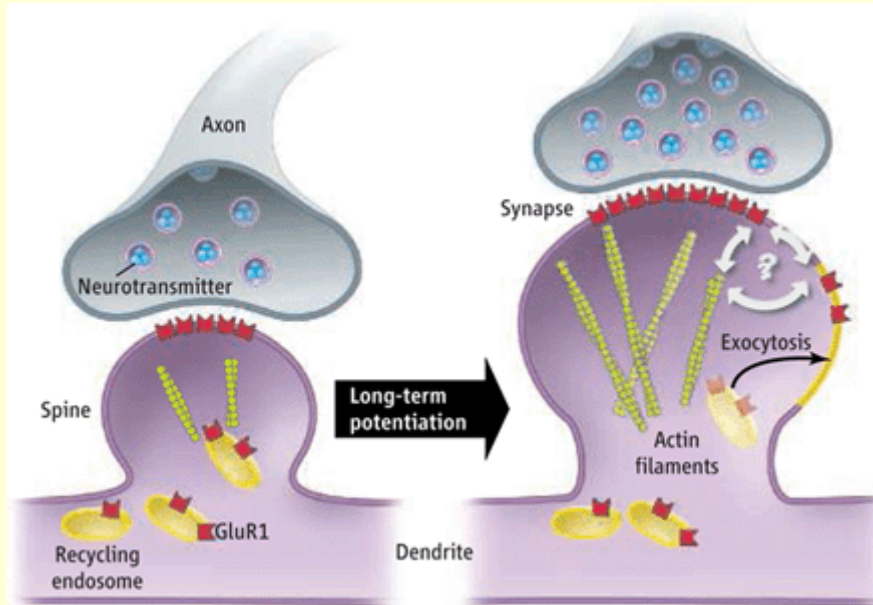


9



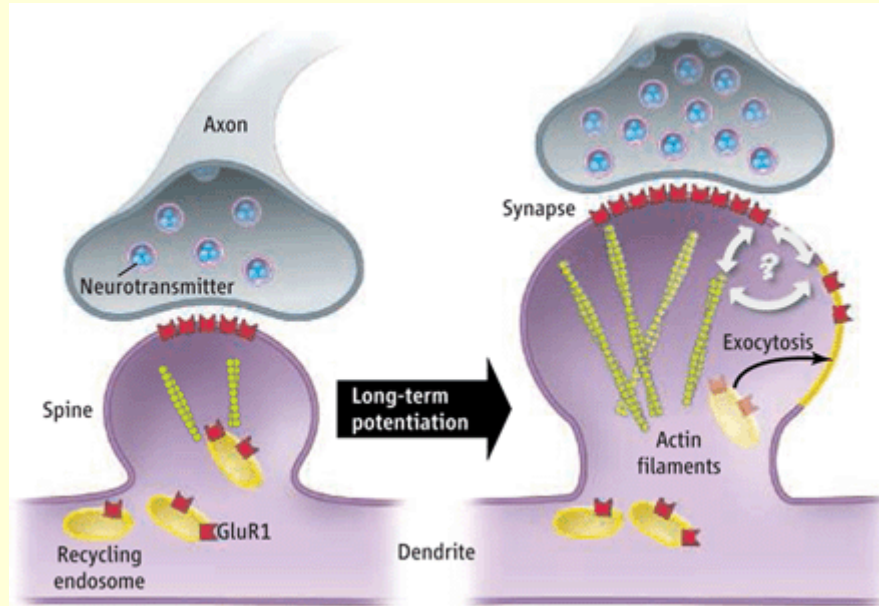
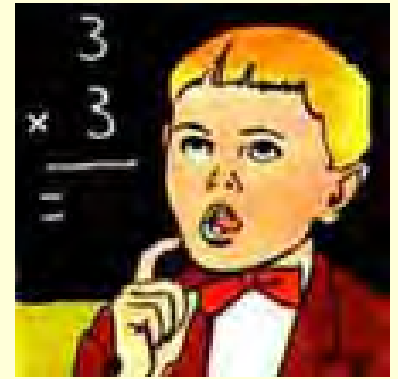


9







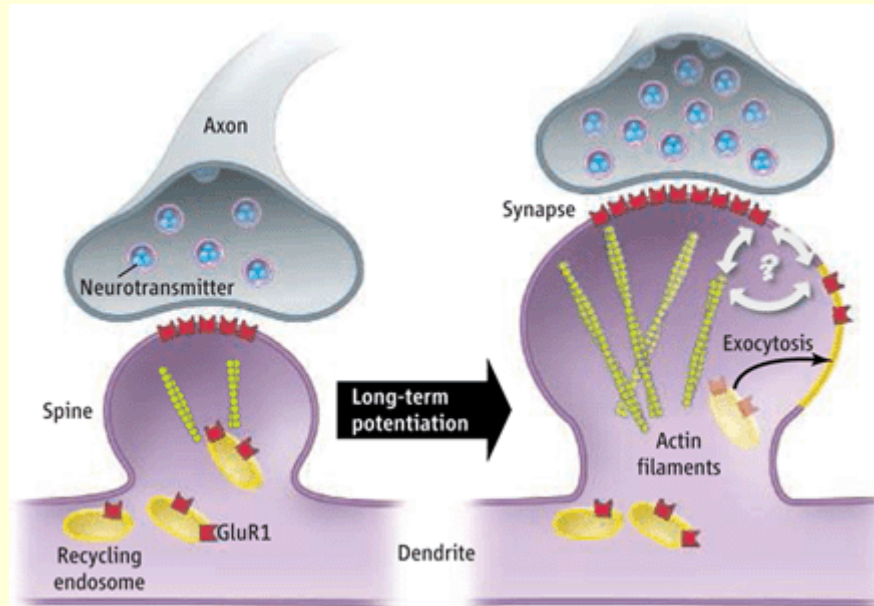
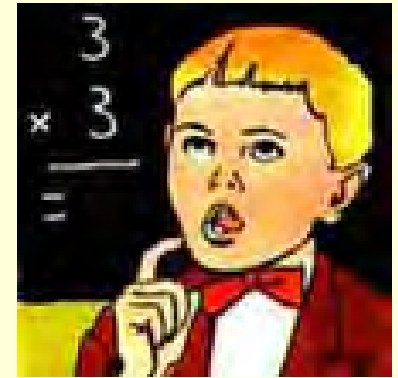


9



Cette **souplesse** de nos neurones,

ça veut dire que l'intelligence ce n'est pas quelque chose qui est fixé d'avance.

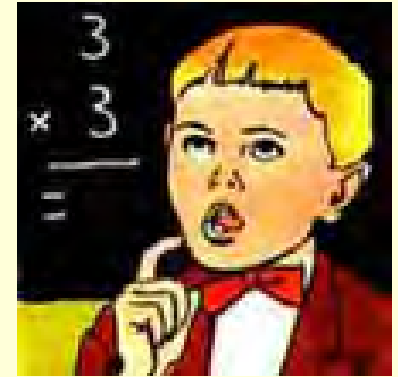


9

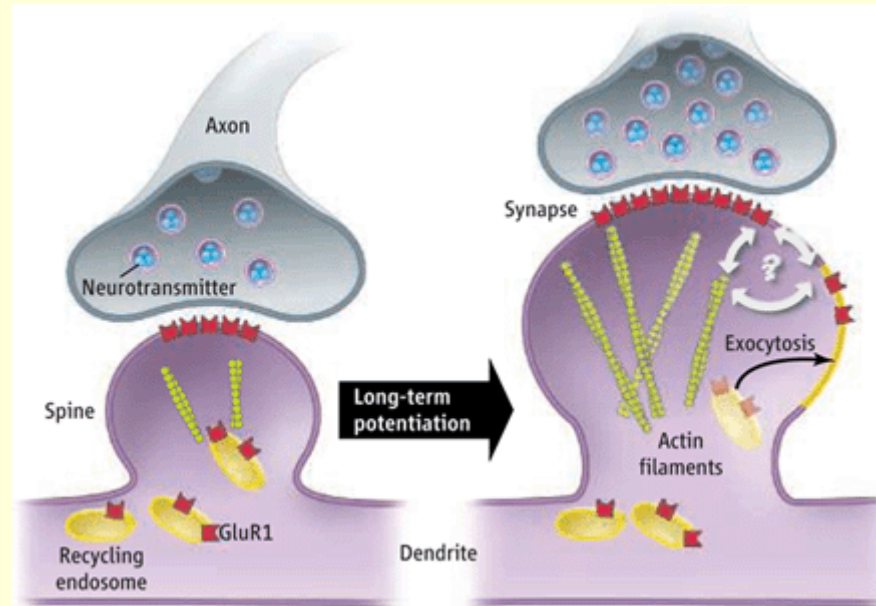


Cette **souplesse** de nos neurones,

ça veut dire que l'intelligence ce n'est pas quelque chose qui est fixé d'avance.



9

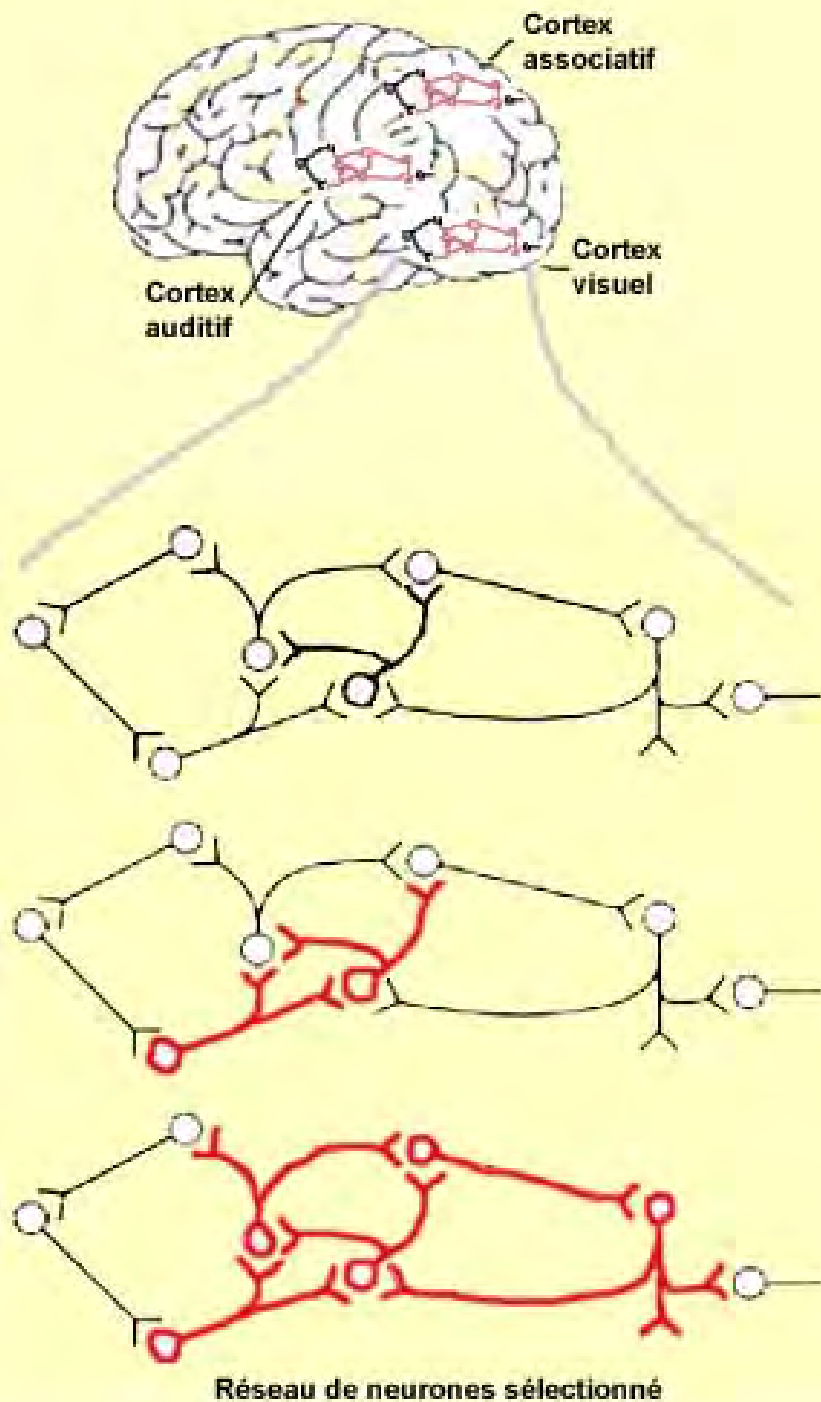


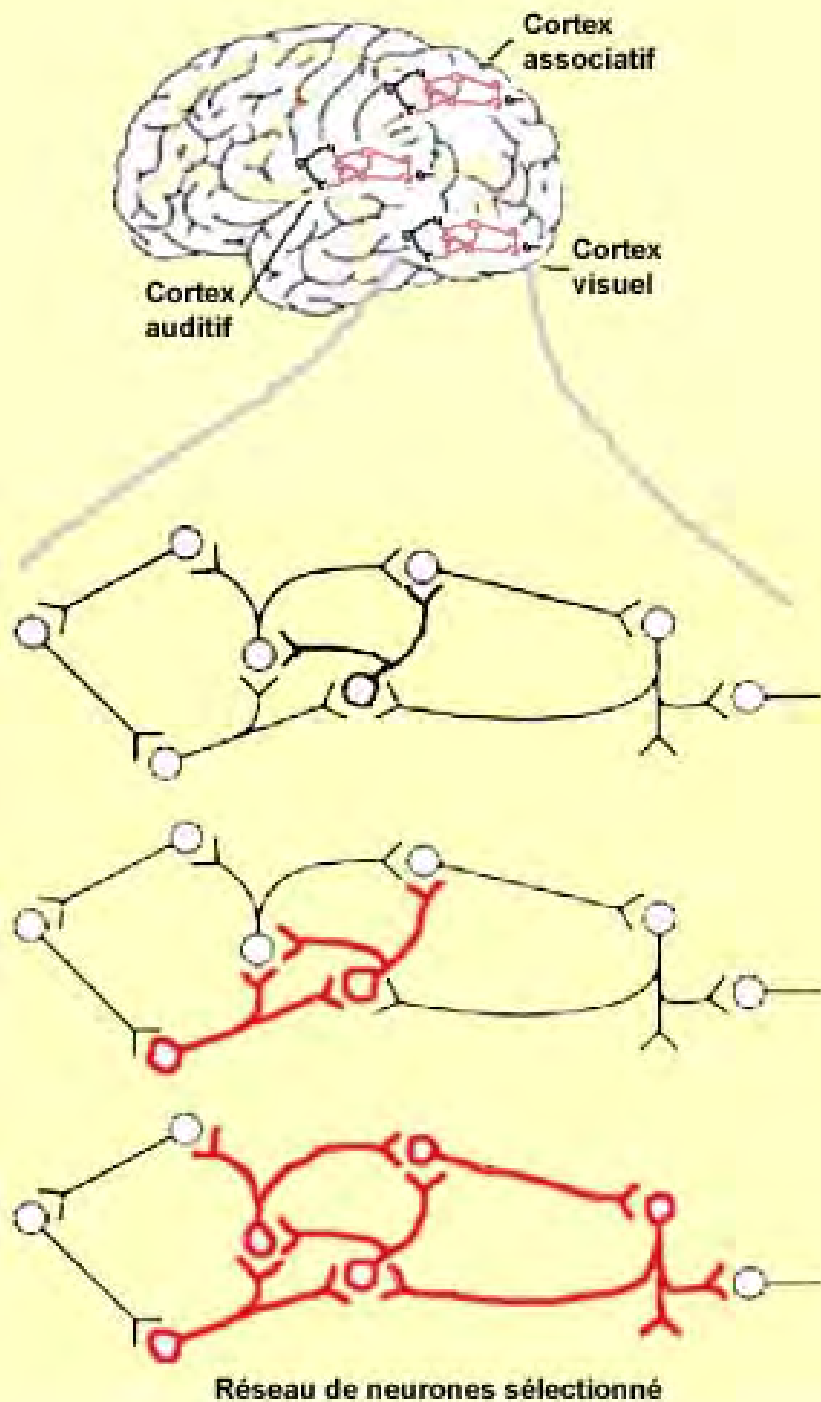
Au contraire, on peut tous **apprendre et s'améliorer** durant toute notre vie !

« **Apprendre**, c'est accueillir le **nouveau**  
dans le **déjà là.** »



Nos neurones aiment  
faire des liens,





Nos neurones aiment  
faire des liens,  
et donc notre  
mémoire aussi !



# Trucs mnémotechniques

1) Répéter :



# Trucs mnémotechniques

**1) Répéter**

**2) Combiner plusieurs éléments en un seul**

# Trucs mnémotechniques

1) Répéter

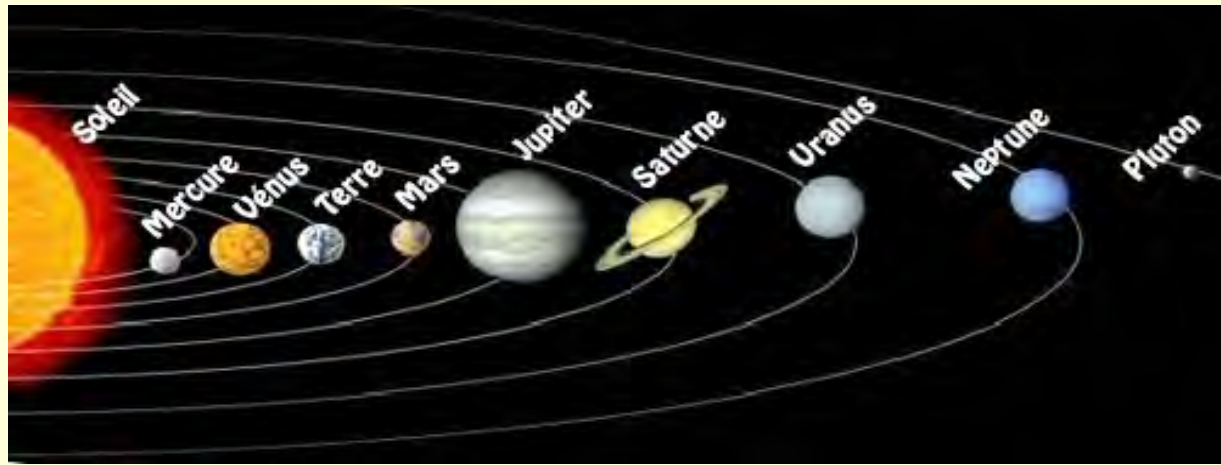
2) Combiner plusieurs éléments en un seul



# Trucs mnémotechniques

1) Répéter

2) Combiner plusieurs éléments en un seul



Ex. : "Mon Vieux Tu Me Jette Sur Une Nouvelle Planète."

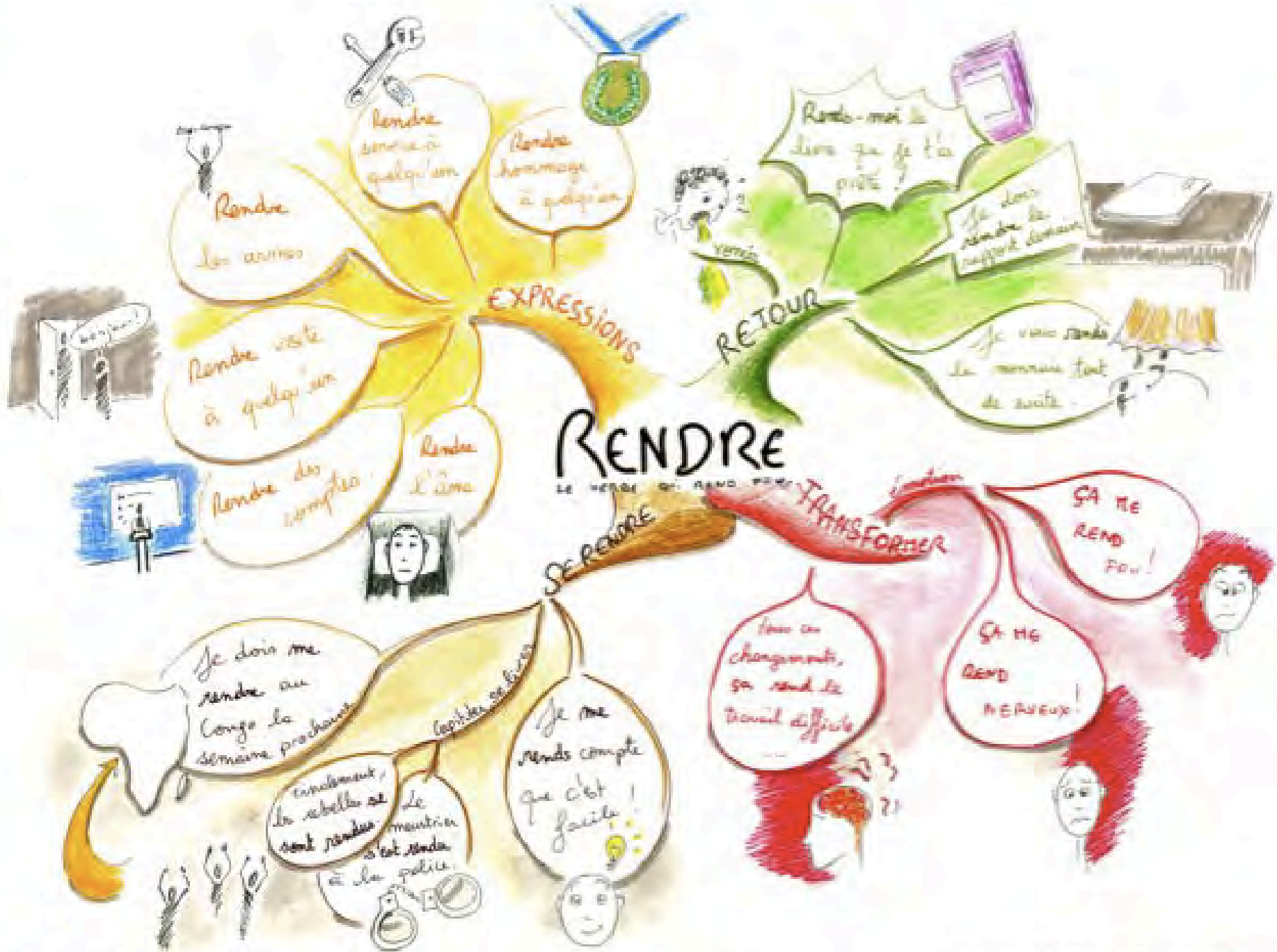
# Trucs mnémotechniques

**1) Répéter**

**2) Combiner plusieurs éléments en un seul**

**3) Organiser**

on relie l'information à retenir à  
d'autres éléments déjà mémorisés  
dans sa mémoire à long terme.



# Trucs mnémotechniques

**1) Répéter**

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# Trucs mnémotechniques

**1) Répéter**

**2) Combiner plusieurs éléments en un seul**

**3) Organiser**

on relie l'information à retenir à d'autres éléments déjà mémorisés dans sa mémoire à long terme.

**5) Associer à des lieux connus et à des images mentales drôles**

Plus l'association est surprenante, plus on a de chance de s'en souvenir





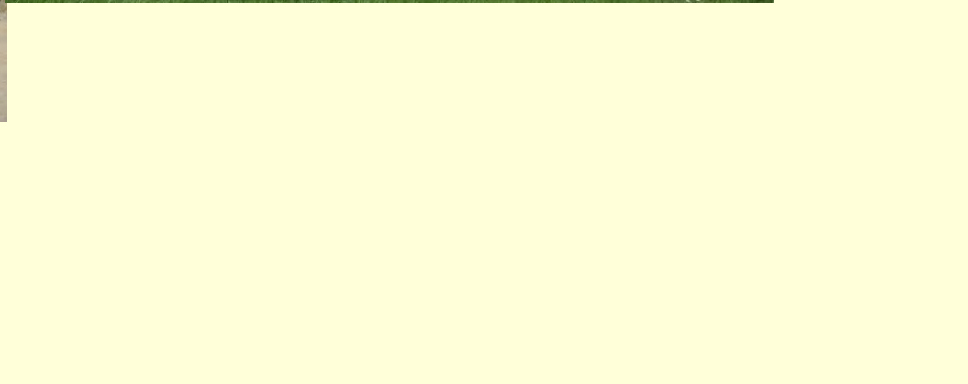
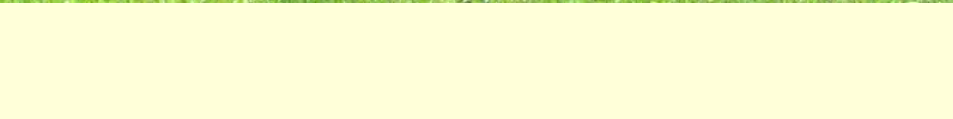
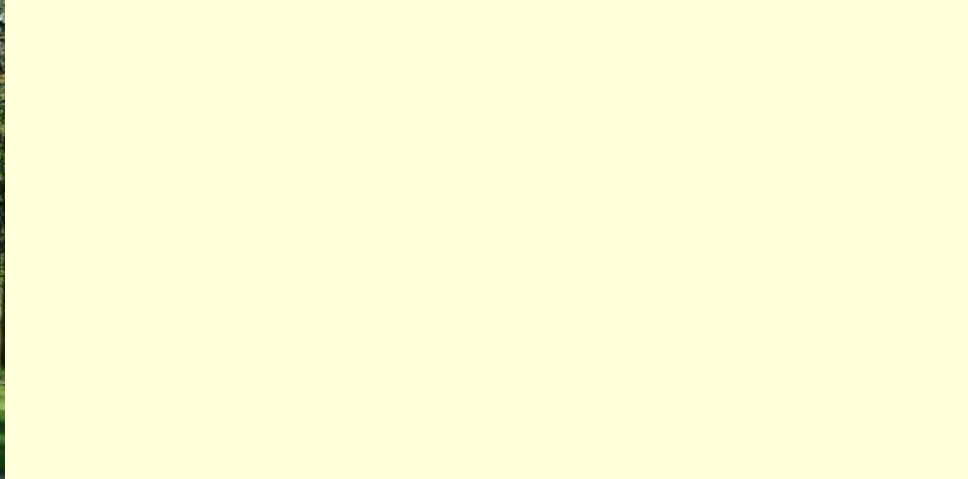


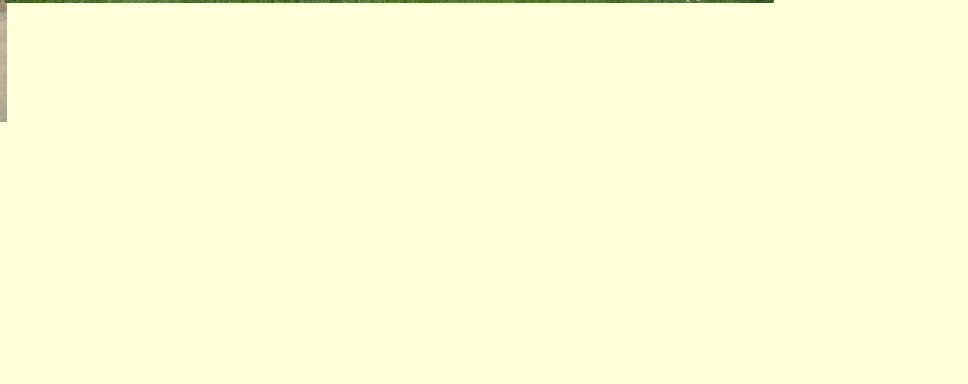














## Liste d'épicerie :

- Yogourt grec
- Bagel
- Mangue
- Jus d'orange





## Idriz Zogaj : un champion de la mémorisation



Il a commencé à s'intéresser par hasard aux techniques de mémorisation à l'âge de 25 ans.

## Idriz Zogaj : un champion de la mémorisation



Il a commencé à s'intéresser par hasard aux techniques de mémorisation à l'âge de 25 ans.

Il peut tous apprendre à mémoriser l'ordre des 52 cartes d'un paquet brassé en les regardant une fois en moins de 5 minutes.

Et il dit qu'on peut tous y arriver avec un mois d'entraînement !



**Les champions d'aujourd'hui ne font que pousser ces trucs :**



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« Il s'agit d'avoir du plaisir et de laisser son cerveau faire de fortes connexions. »



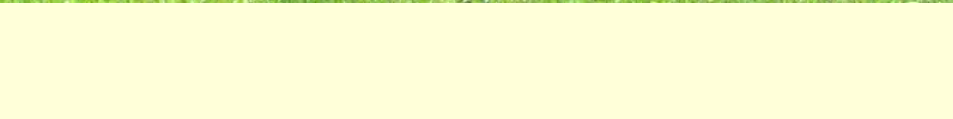
**Les champions d'aujourd'hui ne font que pousser ces trucs :**

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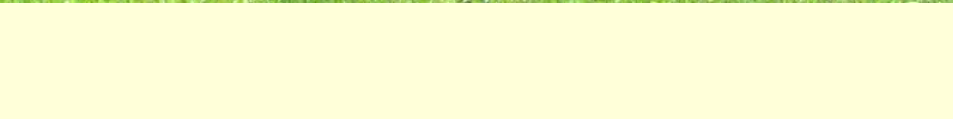
« La prochaine fois que vous voulez retenir quelque chose, faites-vous une histoire drôle avec ! »

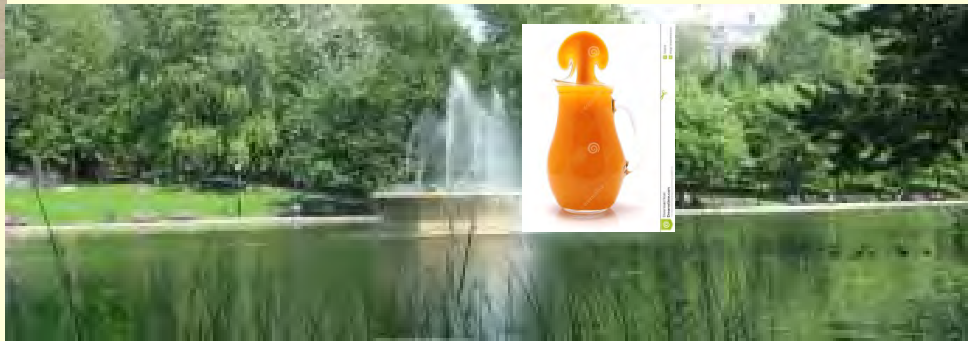




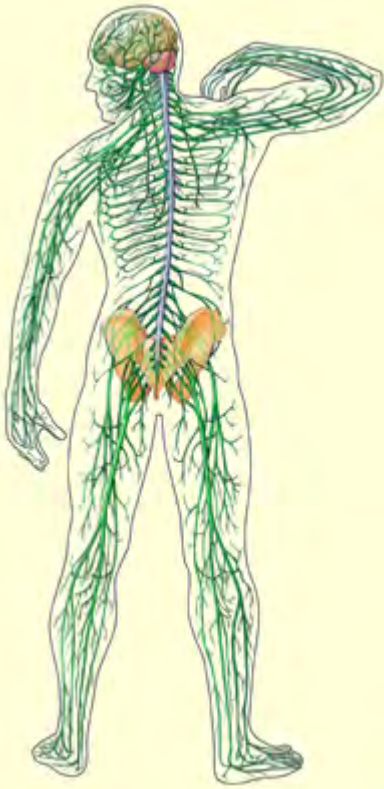


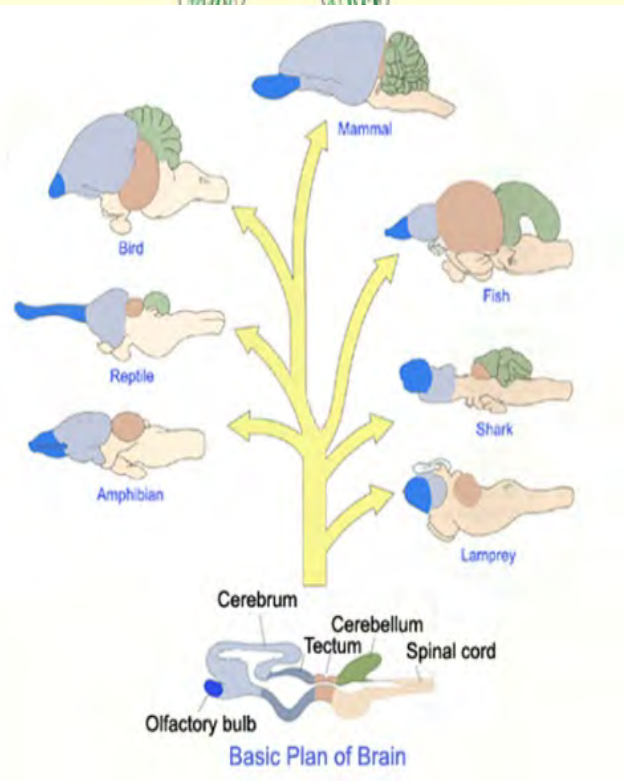


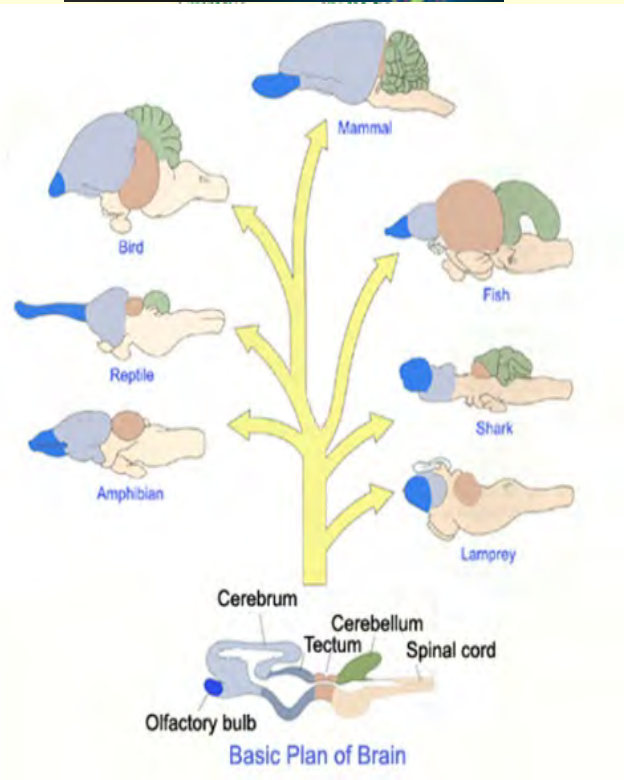
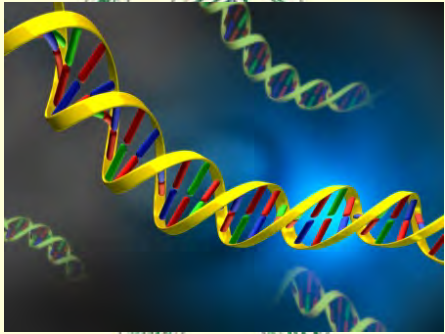


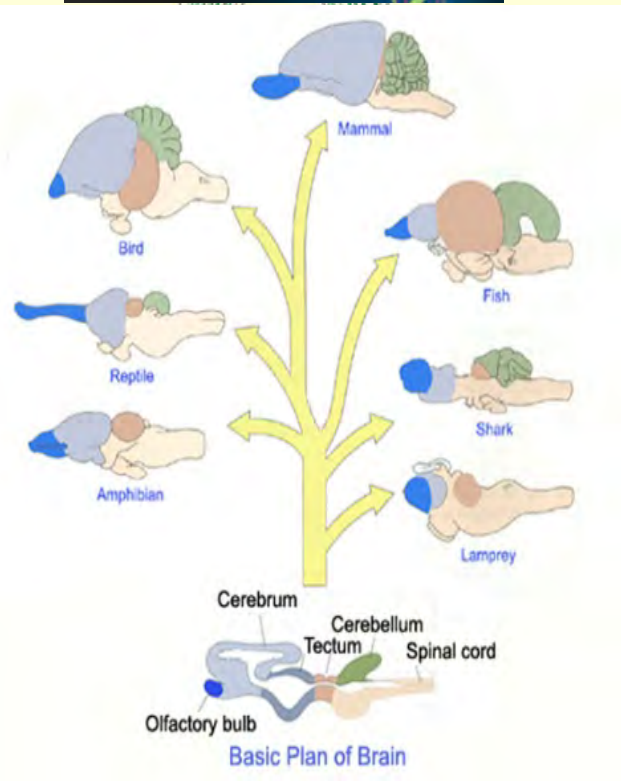


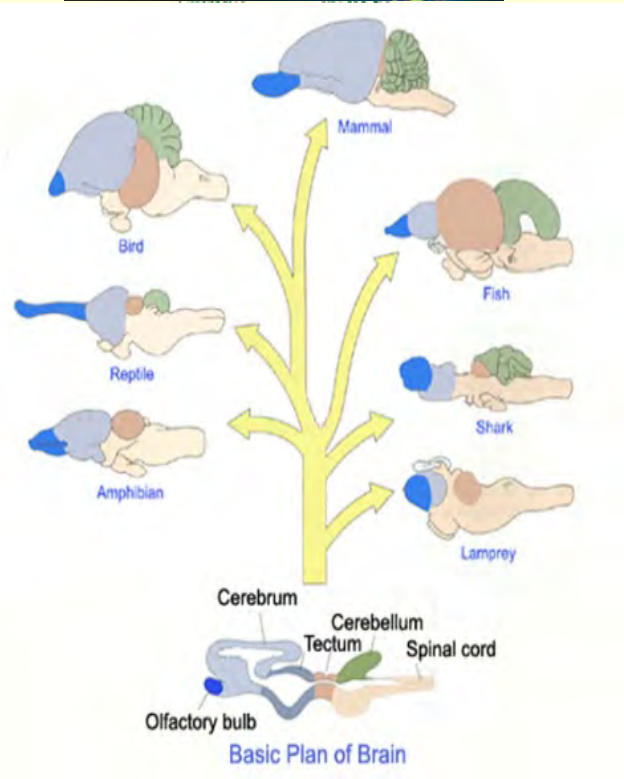




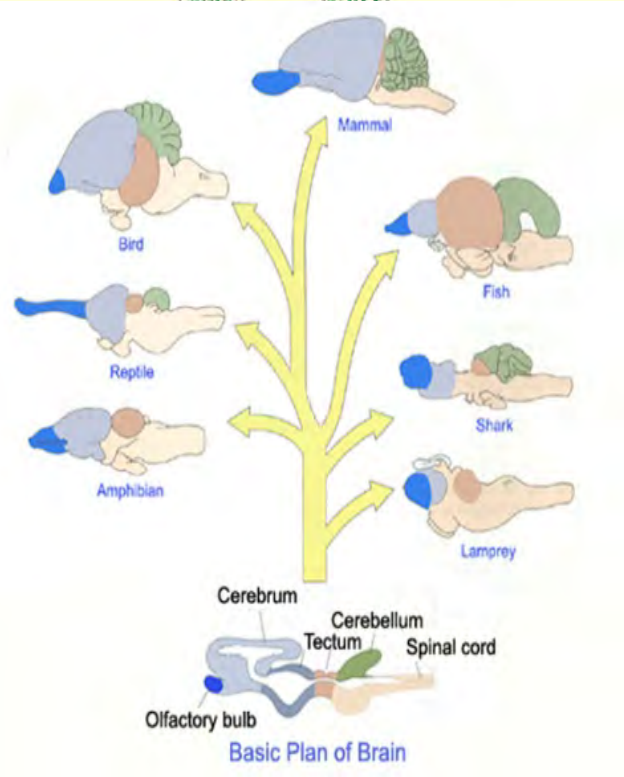


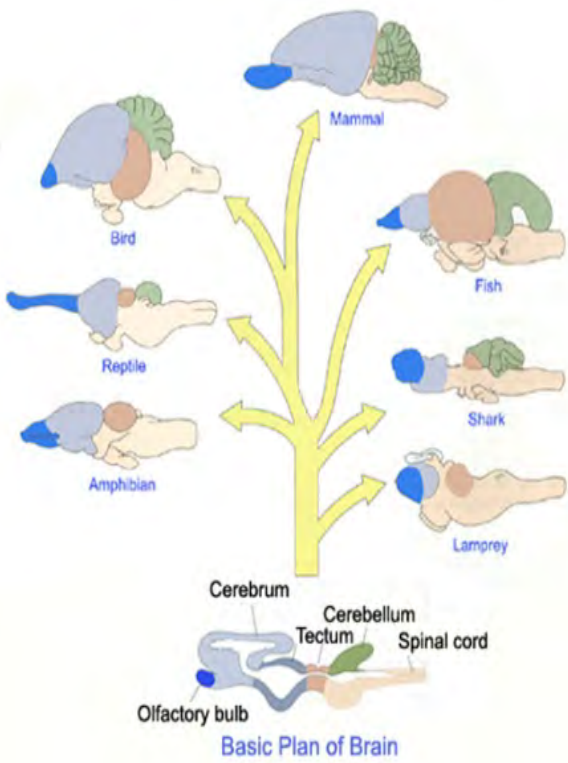


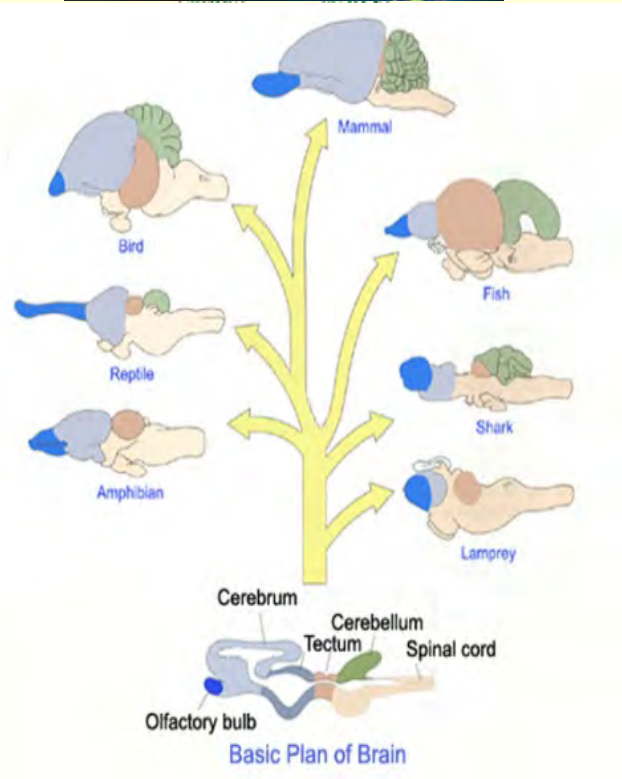
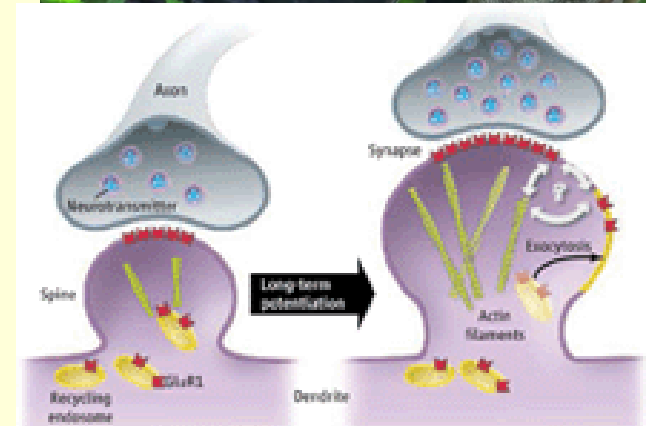
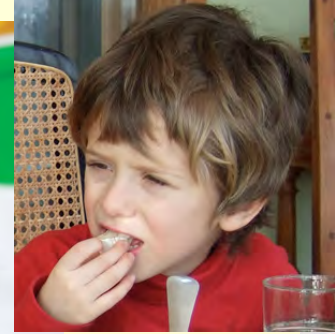
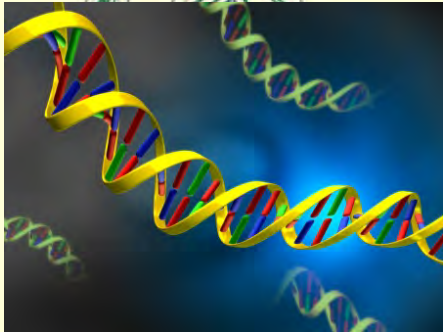










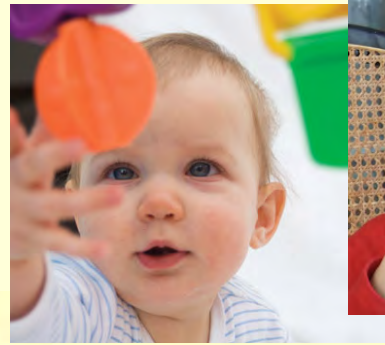




**Plans généraux  
du système nerveux  
provenant de nos gènes**

**Influence de  
l'environnement**

**Cerveau unique à l'origine  
de tous les comportements  
d'un individu**

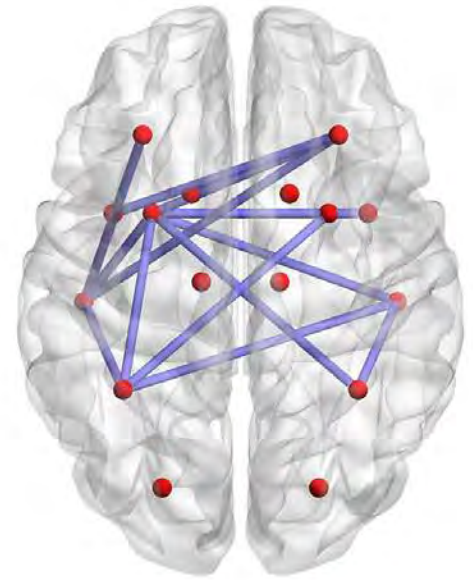
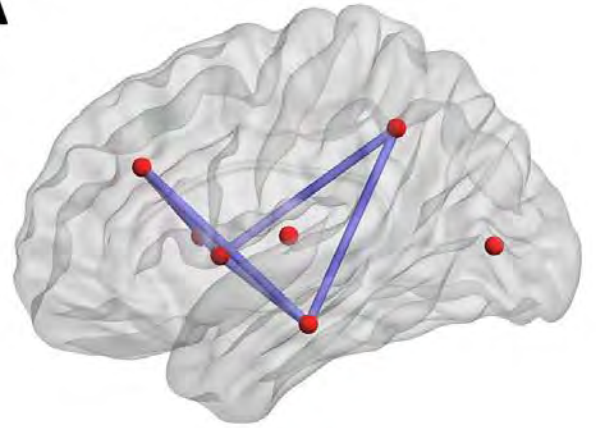








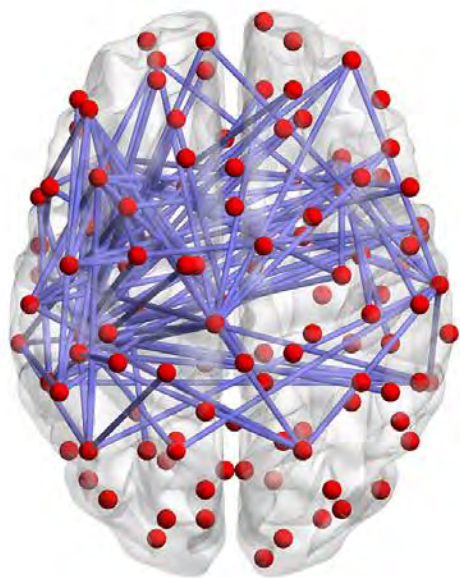
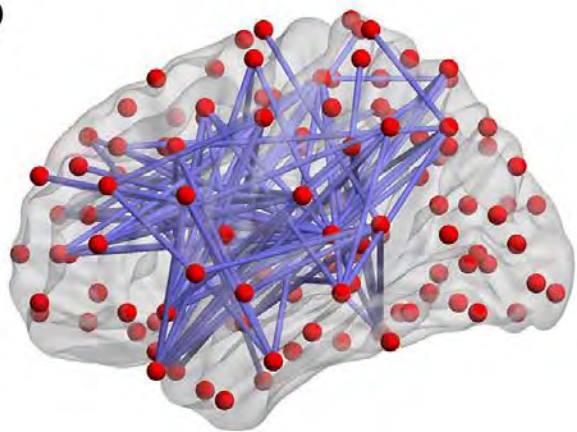
A





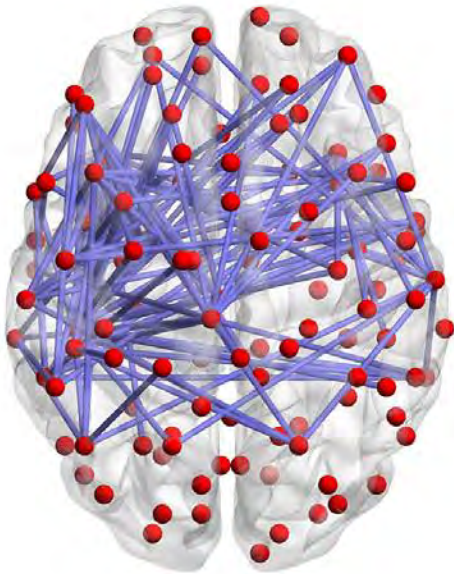
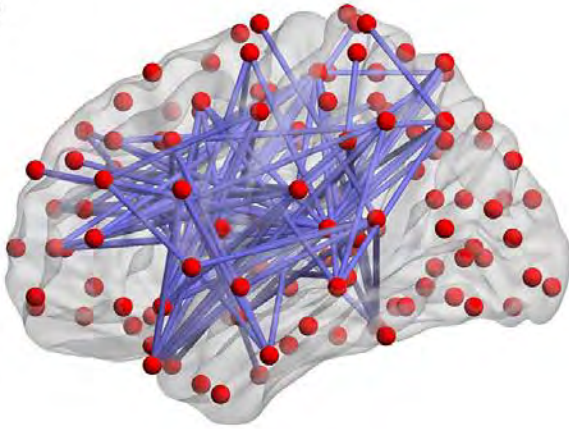


B



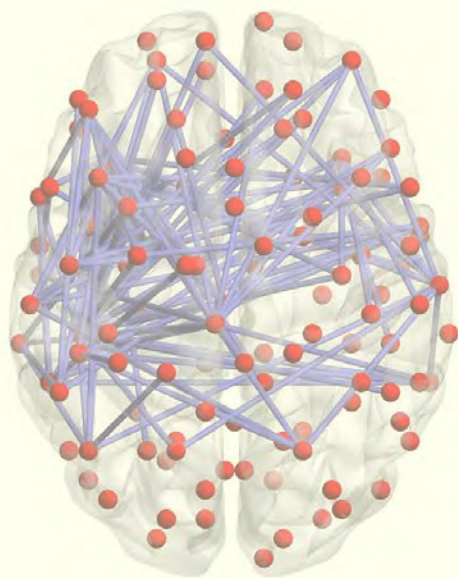
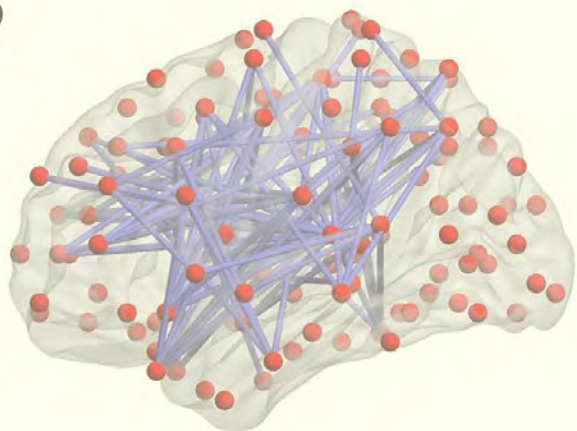
# Voir New York

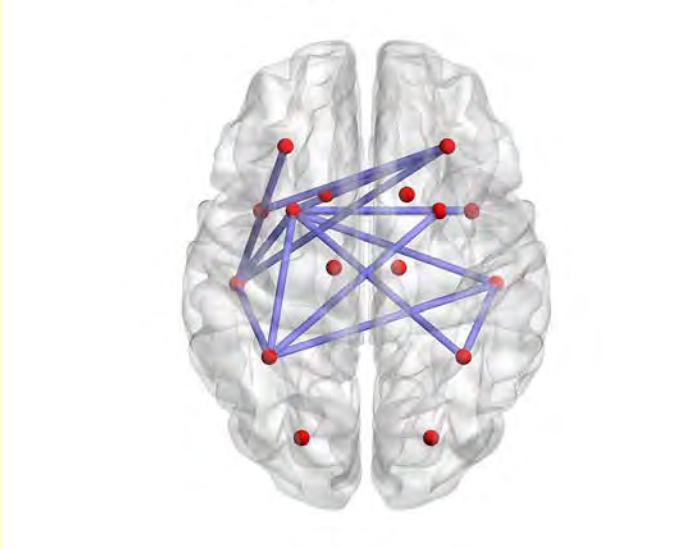
B

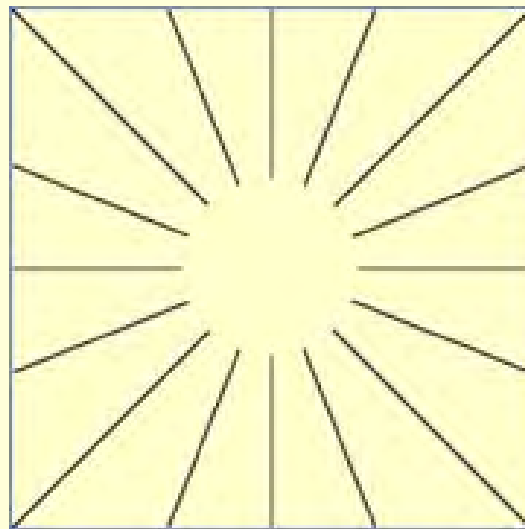
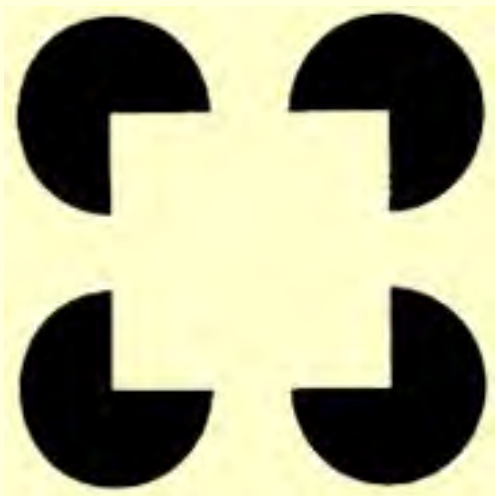
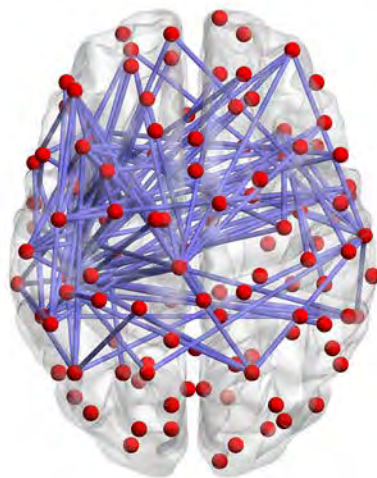
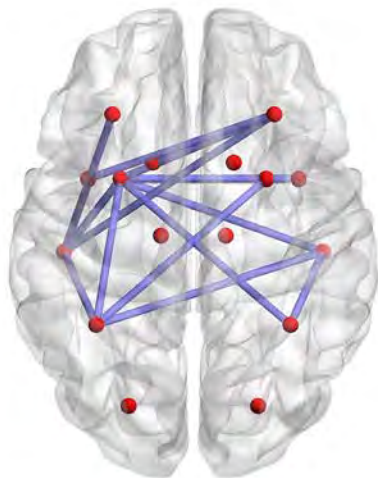


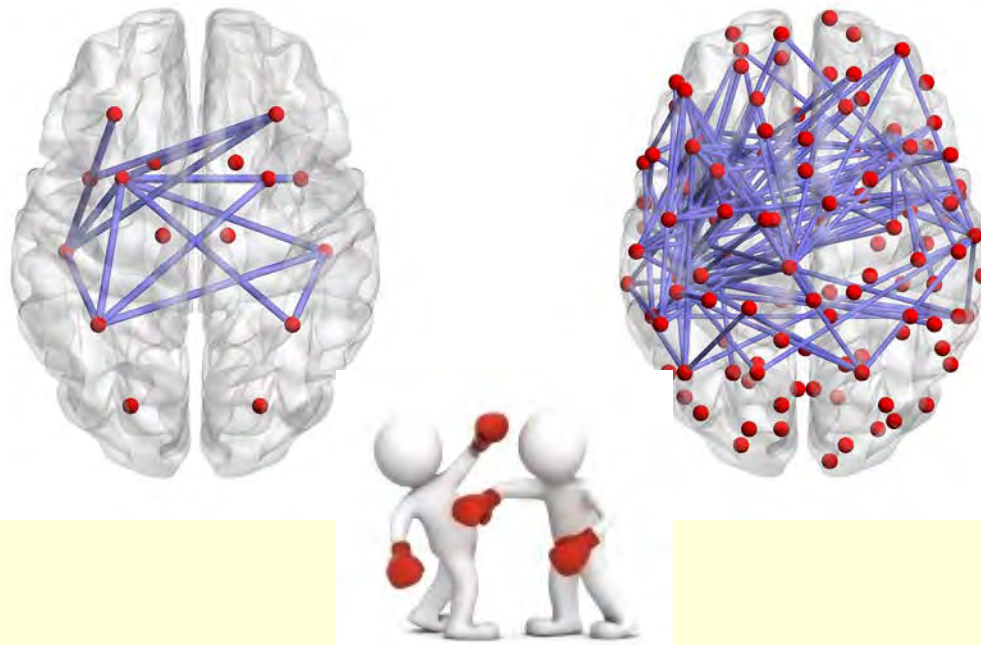
# Se souvenir de New York

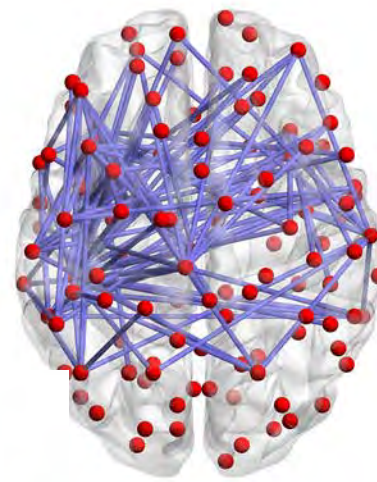
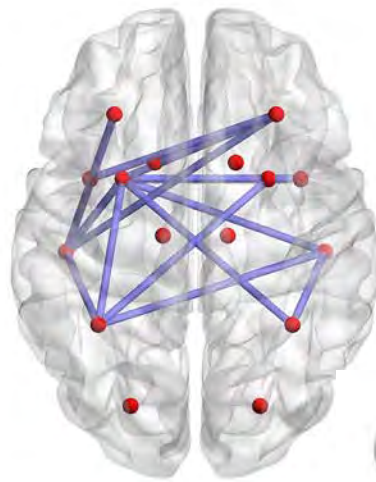
B

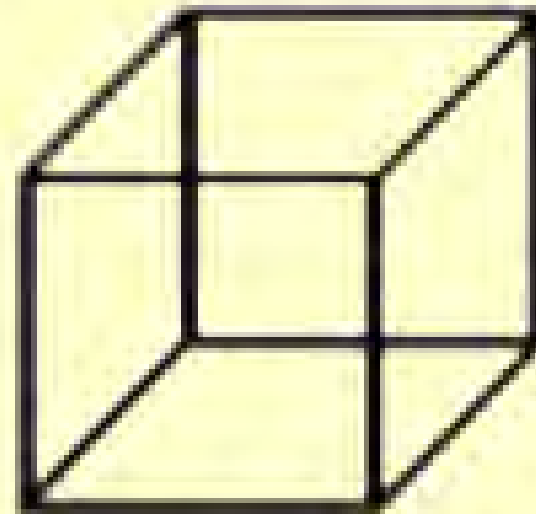
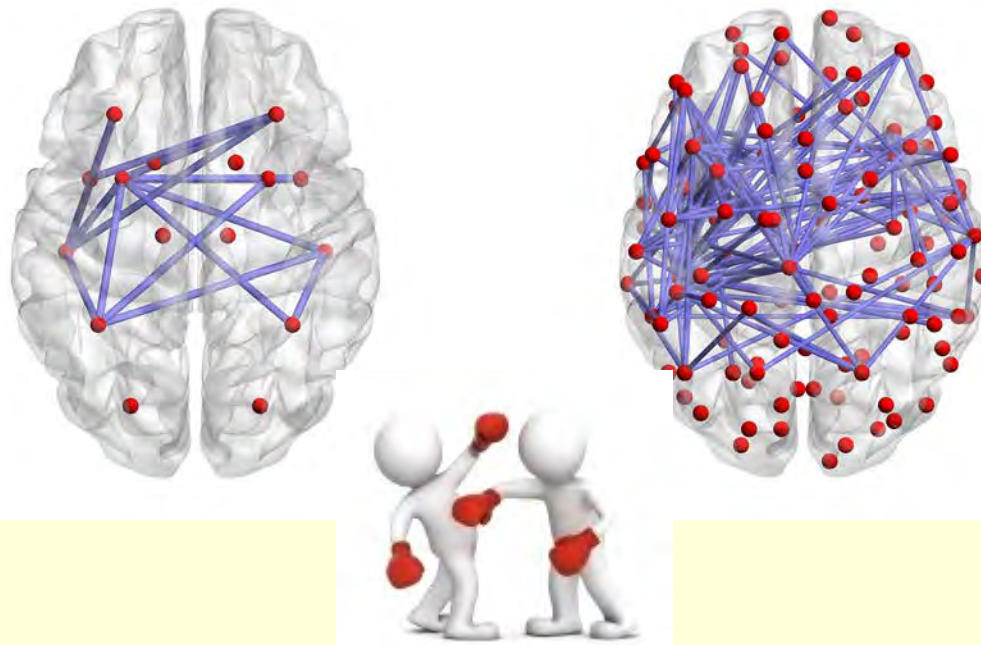
















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