Le Neurone

I- **Introduction :** le système nerveux

II- **Le neurone:** cytophysiologie générale

III- **Classification histofonctionnelle**

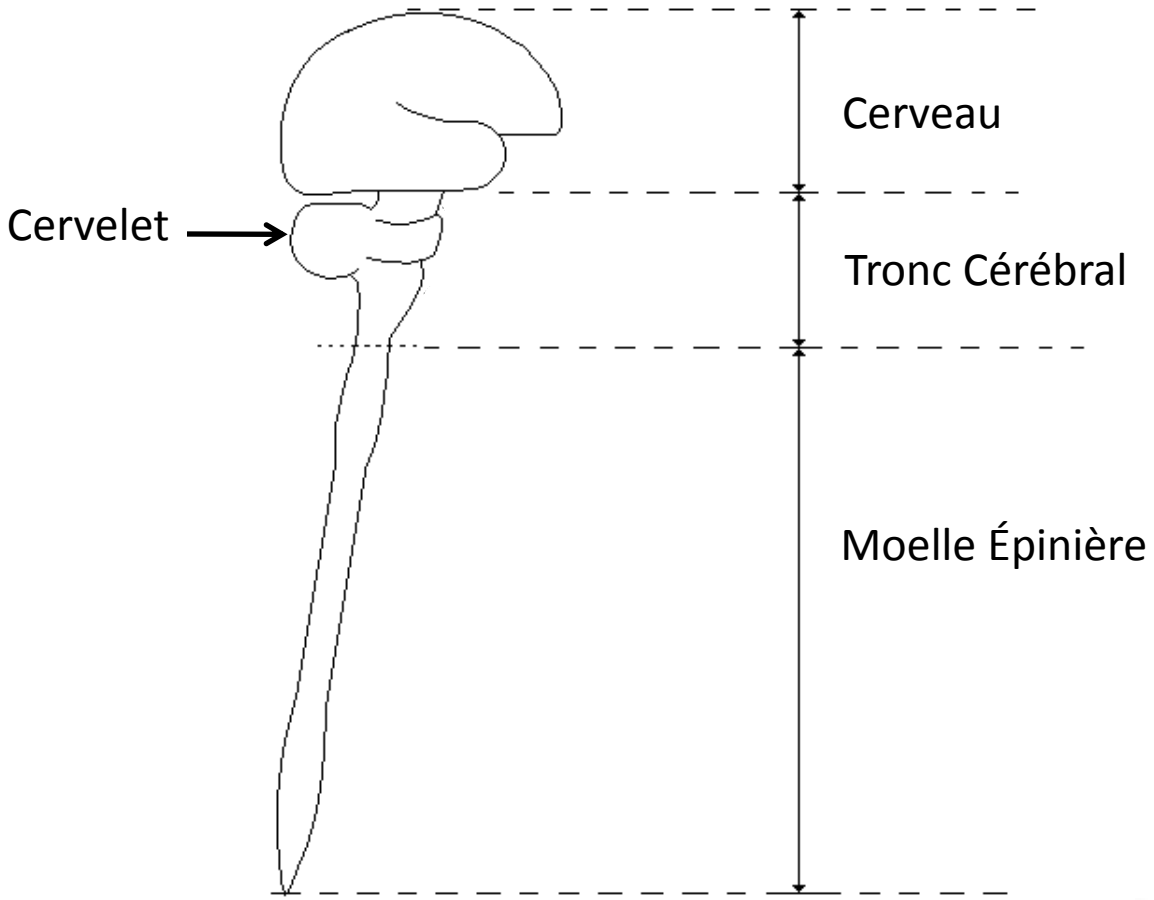
IV- **Le cytosquelette neuronal**

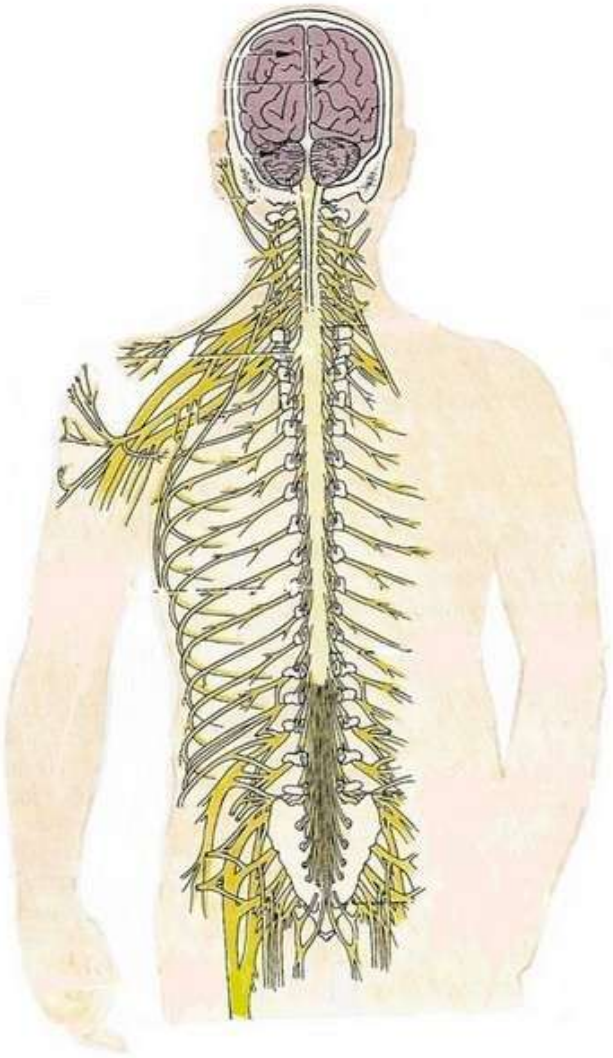
1- éléments constitutifs

2- fonctions

V- **La synapse interneuronale**

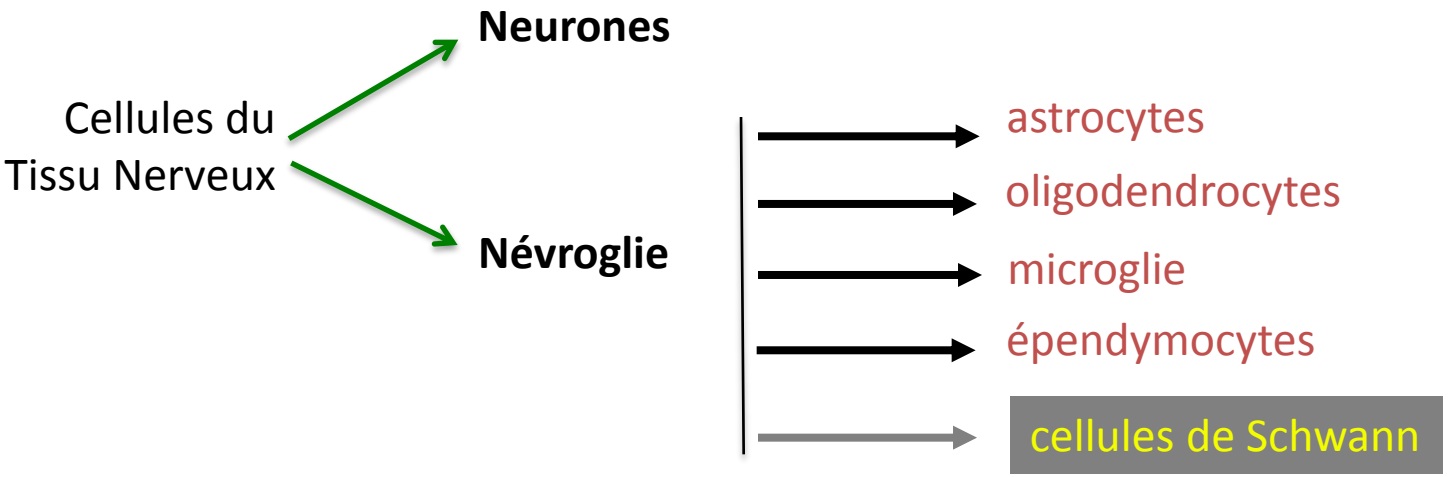
I- **Introduction :** le système nerveux





* capter, véhiculer et intégrer les informations sensitives et sensorielles
* émettre et véhiculer des informations motrices
* élaborer des activités cognitives
* contrôler l'état de veille et de sommeil

I- **Introduction :** le système nerveux



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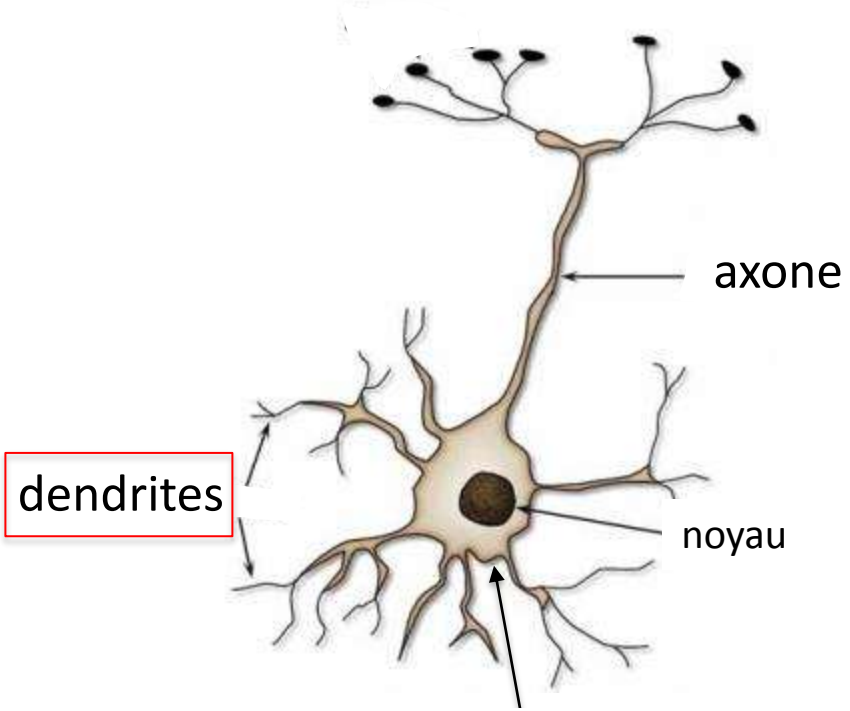
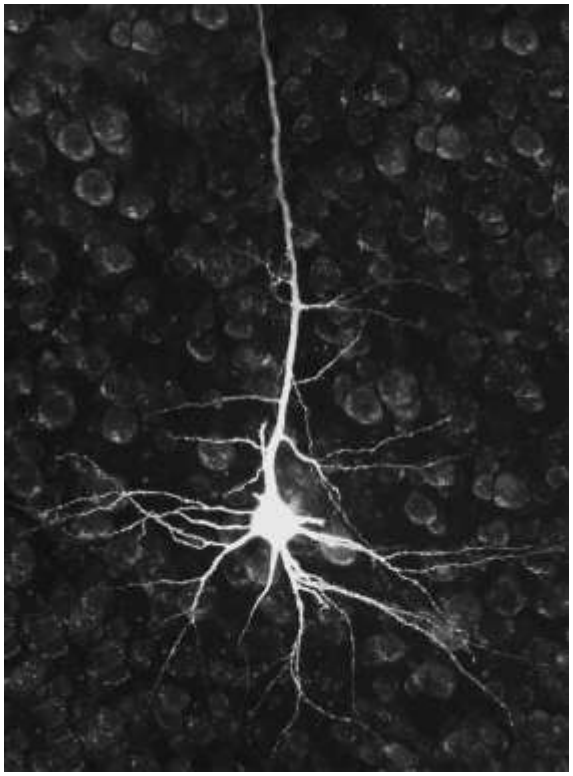
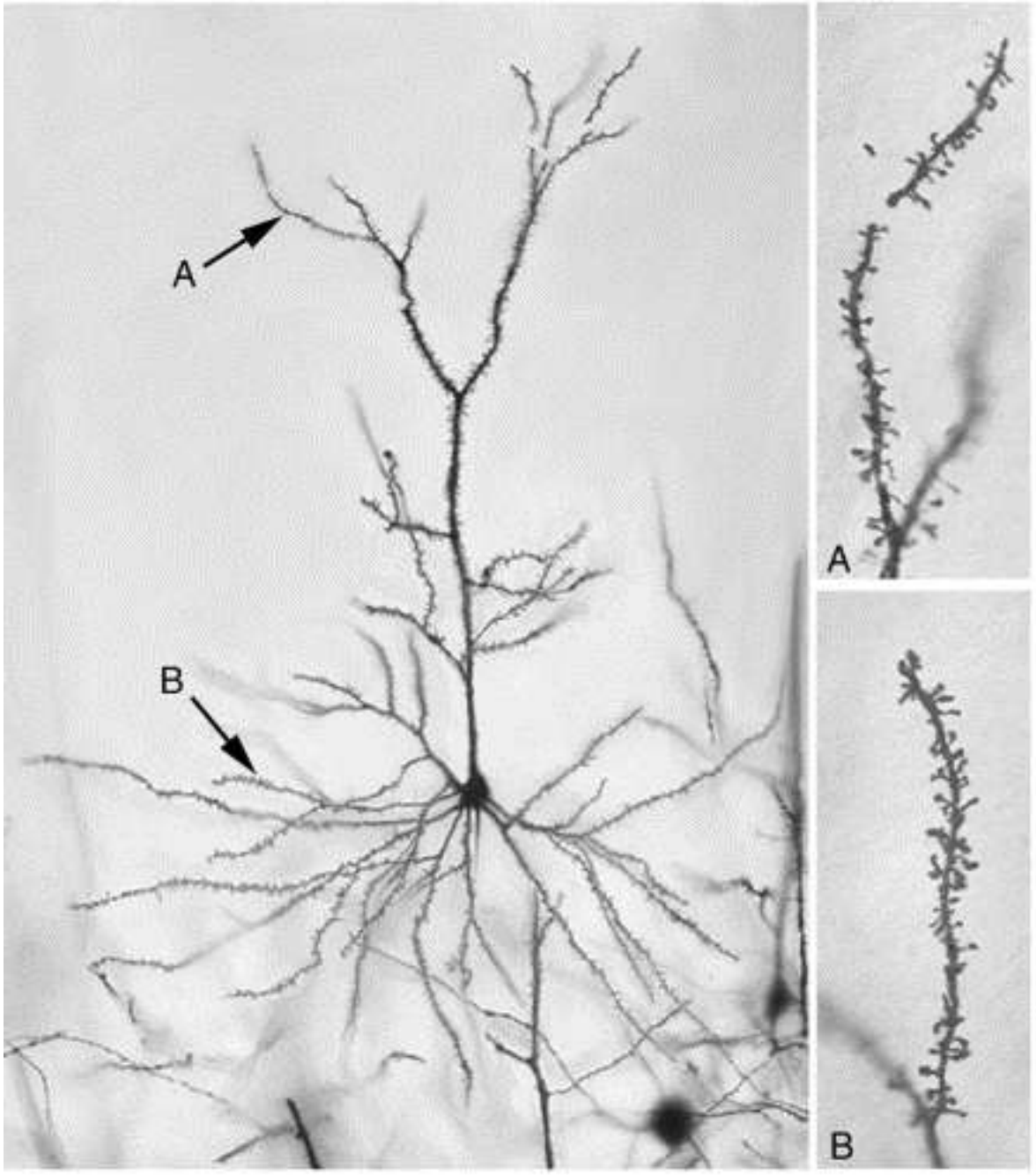
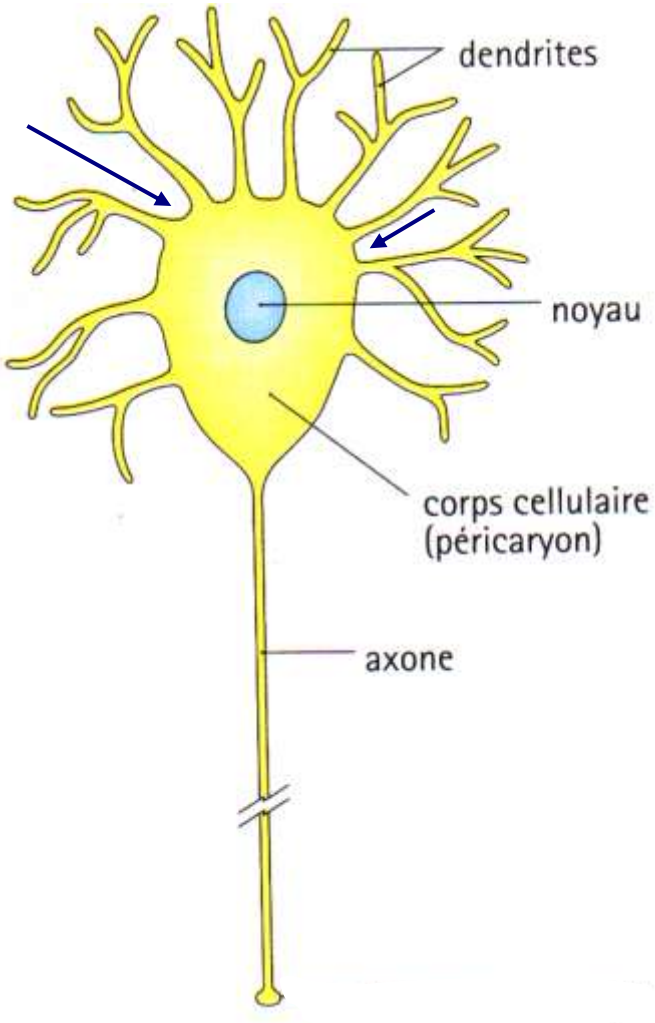





A
B
A
B

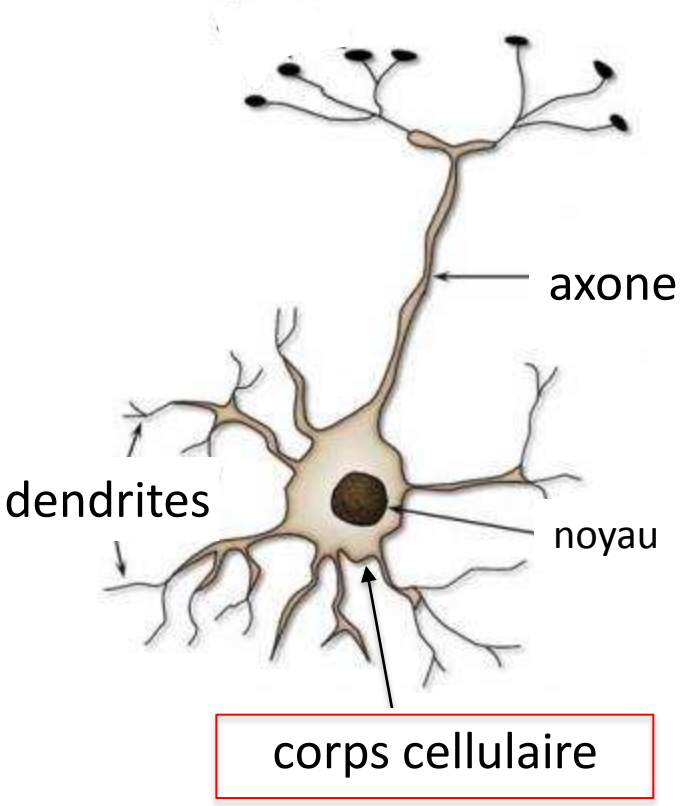
II- **Le neurone :** cytophysiologie générale

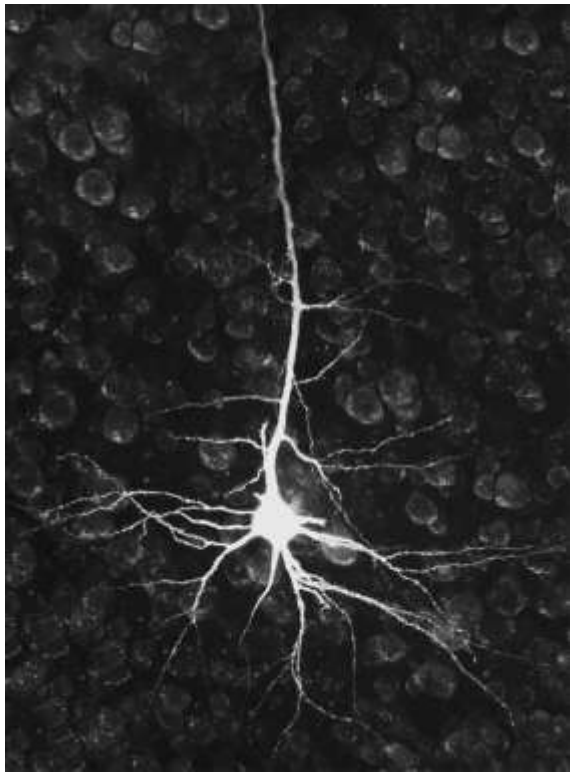


Potentiels post-synaptiques inhibiteurs (PPSI)

Potentiels post-synaptiques excitateurs (PPSE)

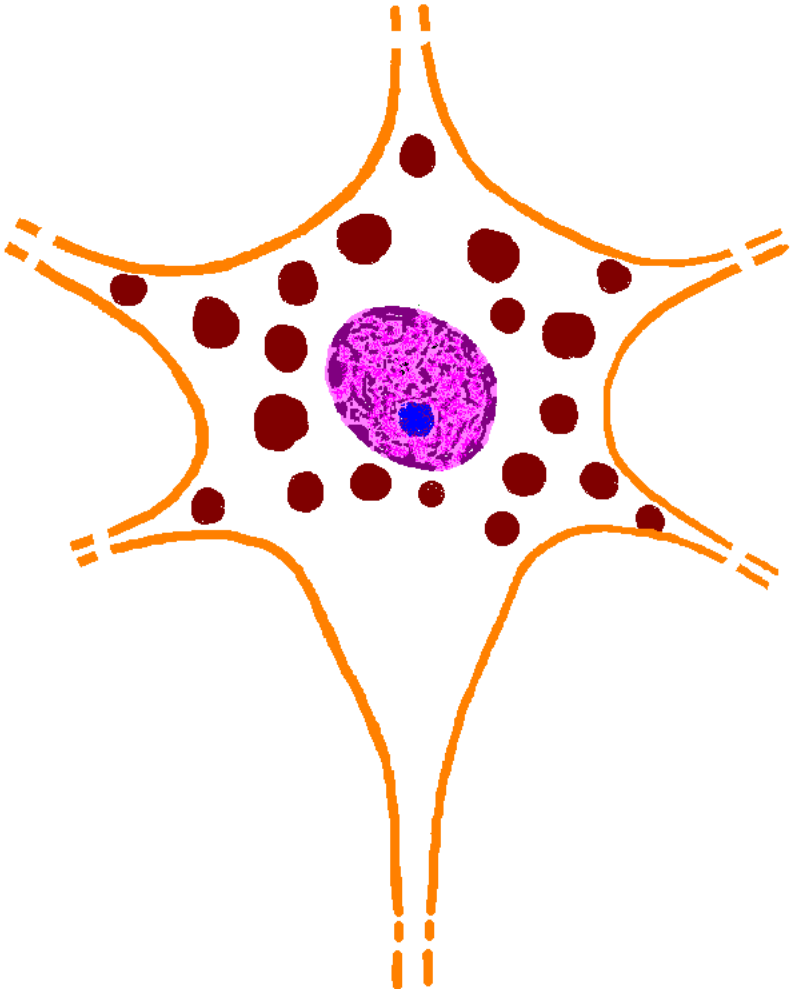
II- **Le neurone :** cytophysiologie générale



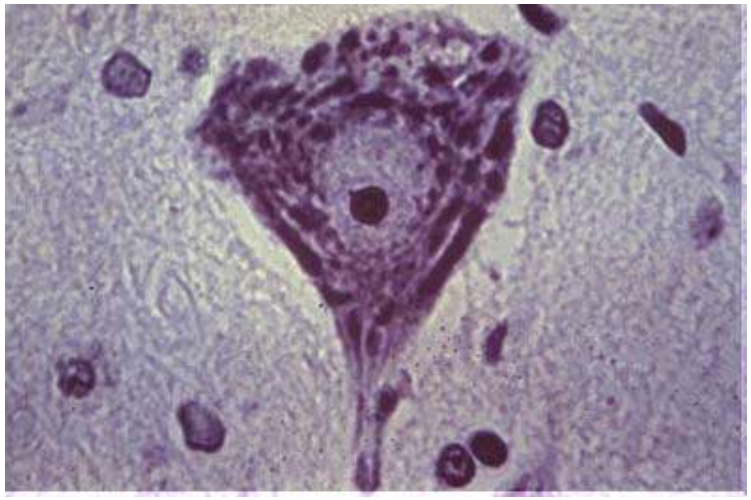


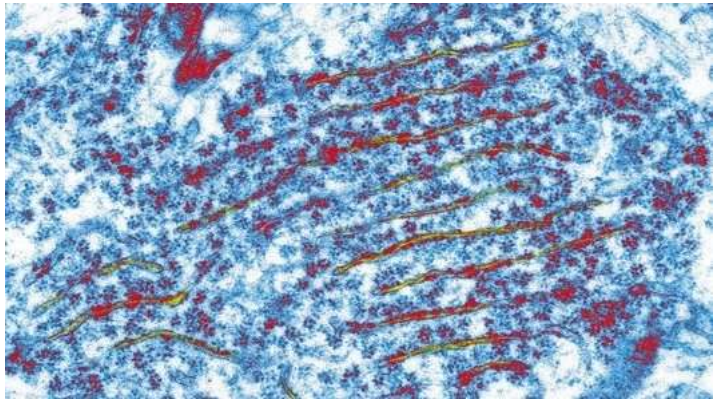
II- **Le neurone :** cytophysiologie générale

corps de Nissl

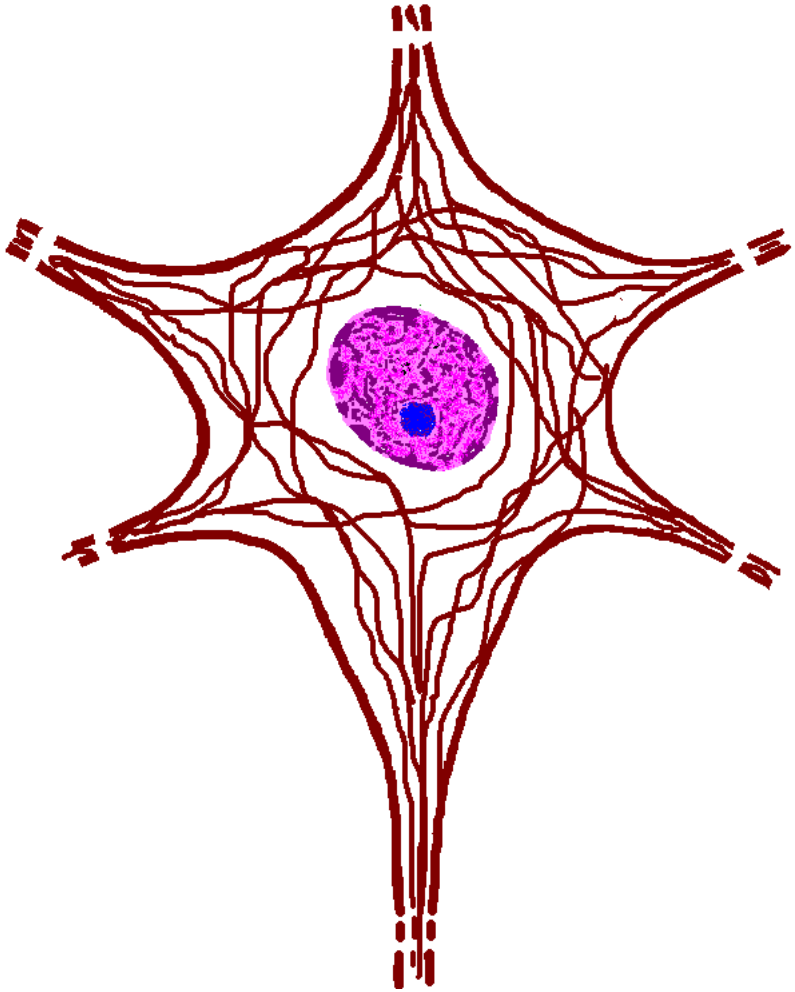


Bleu de Toluidine

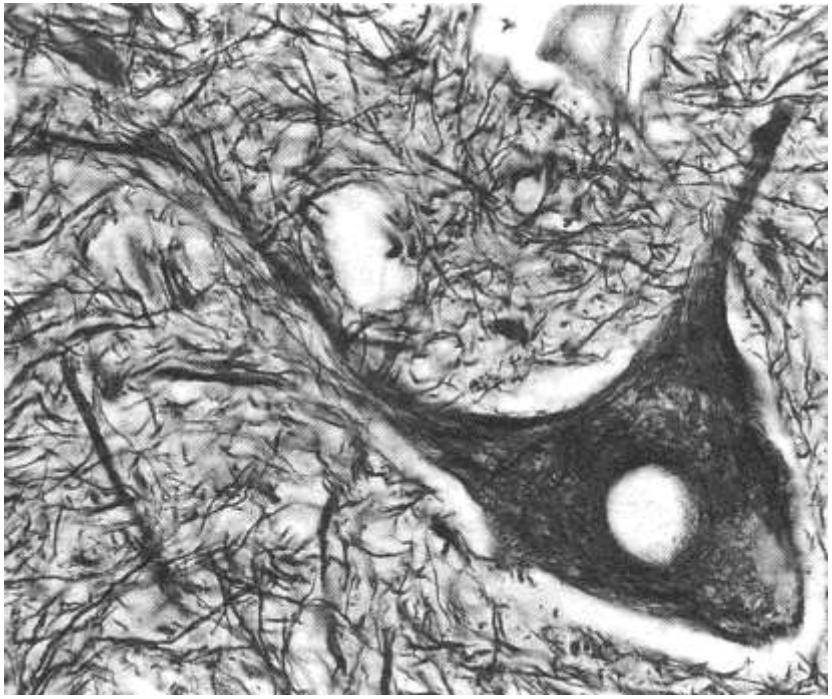




Neurofibrilles



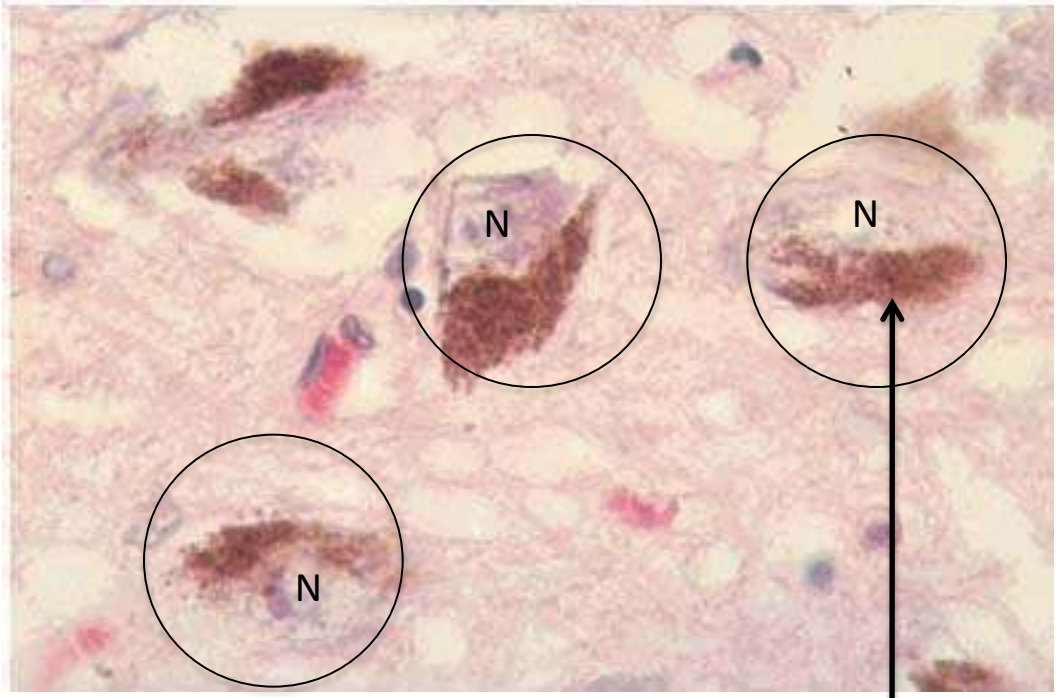
Imprégnation argentique



II- **Le neurone :** cytophysiologie générale

substance noire

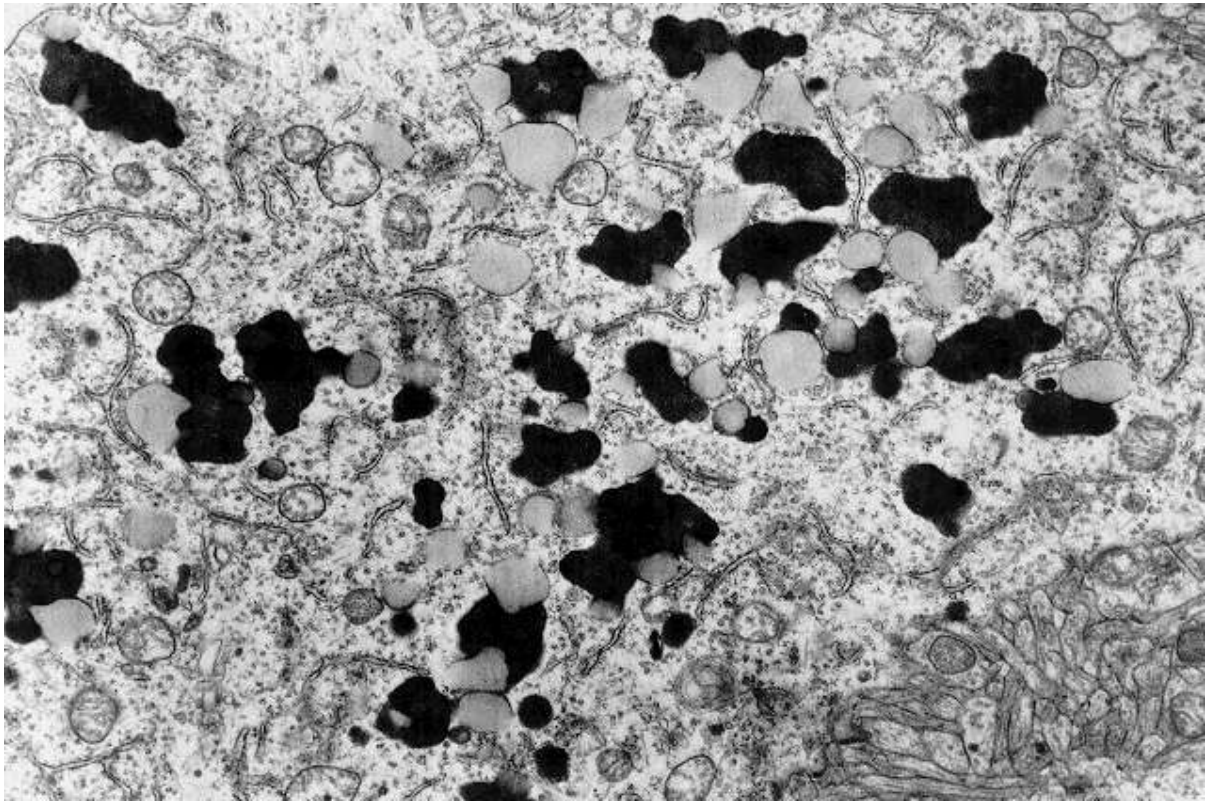
neurones dopaminergiques
de la substance noire



N = noyau

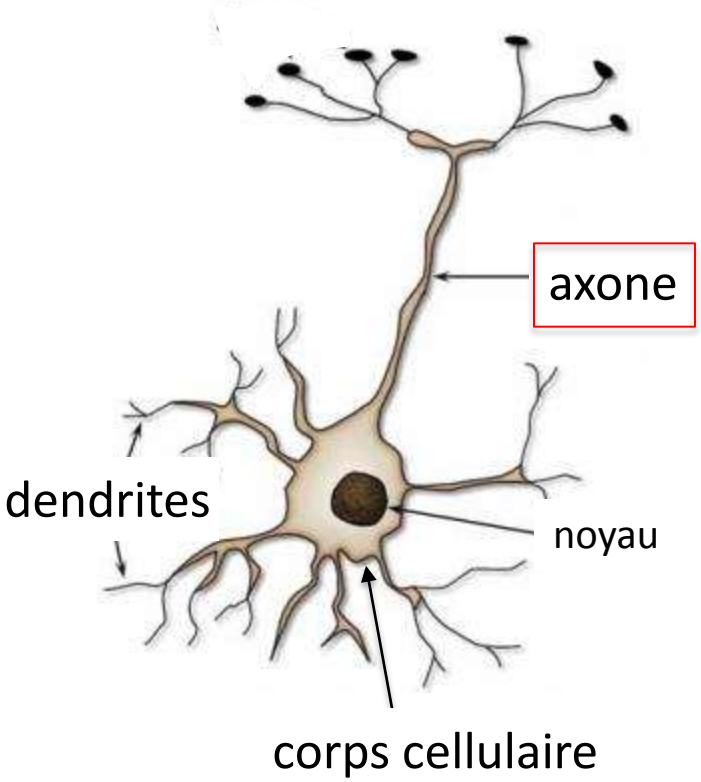
grains de neuromélanine

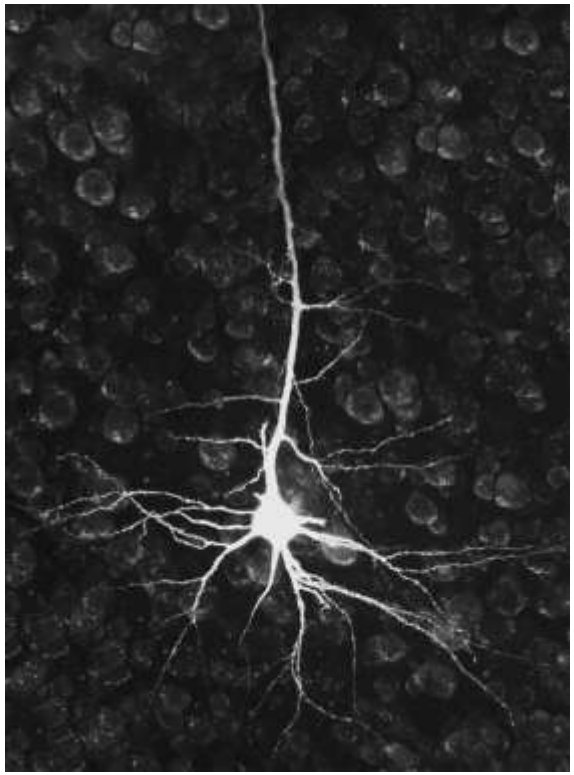
II- **Le neurone :** cytophysiologie générale



grains de lipofuscine

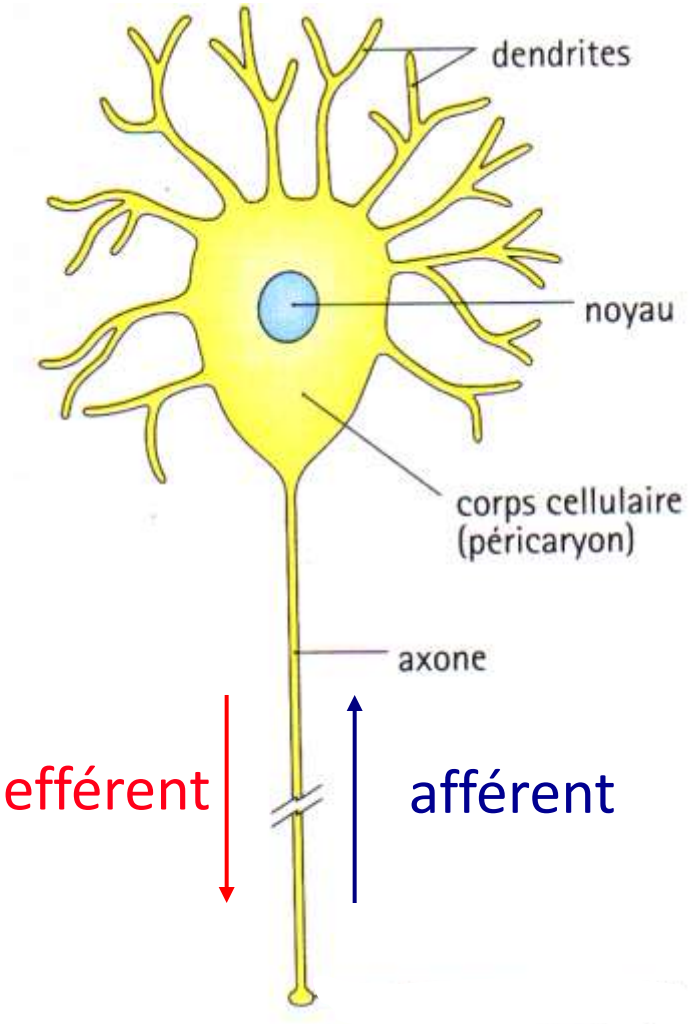
II- **Le neurone:** cytophysiologie générale





II- **Le neurone :** cytophysiologie générale

potentiel d'action



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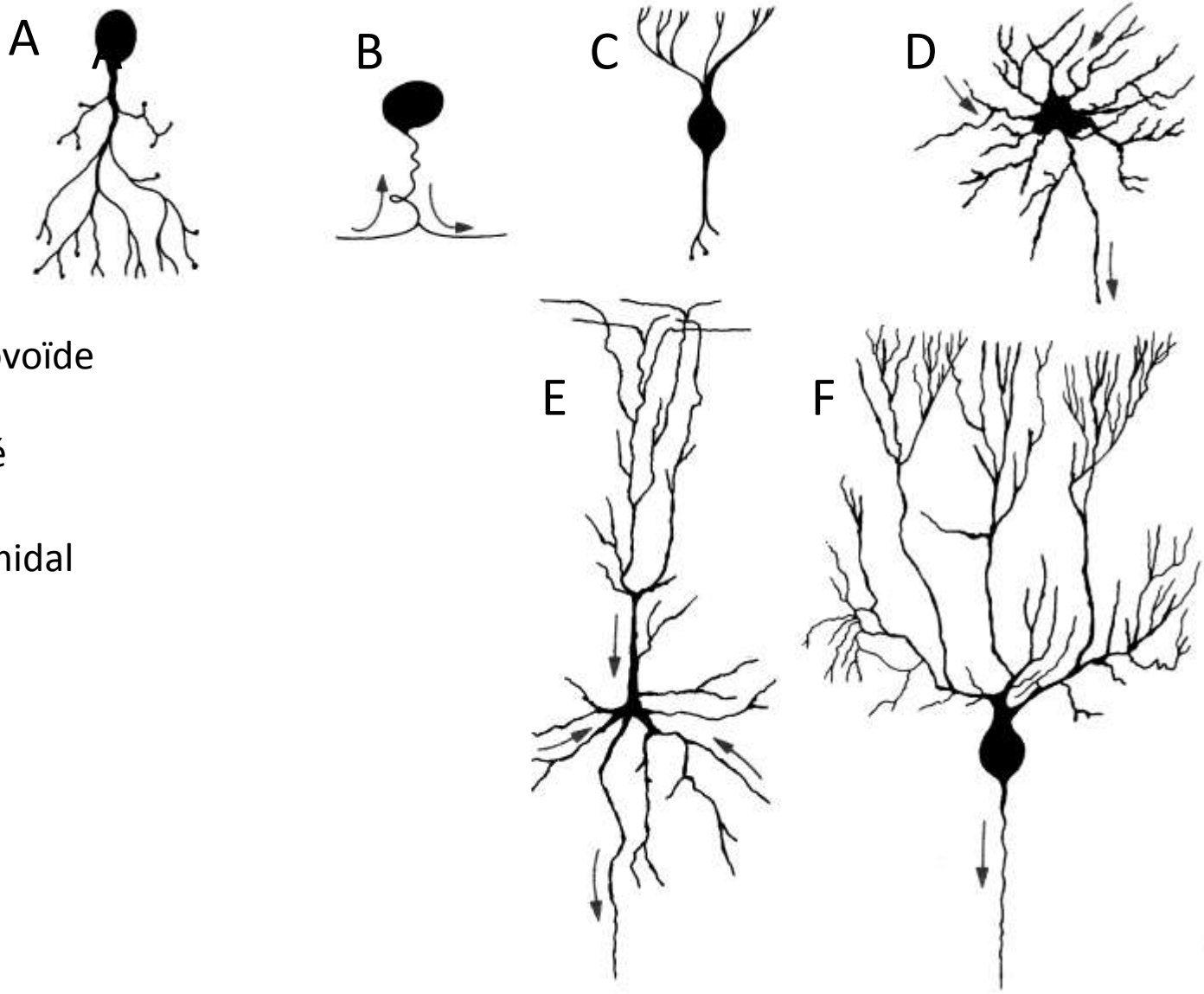
III- Classification histofonctionnelle

critère N°1 : forme du corps cellulaire



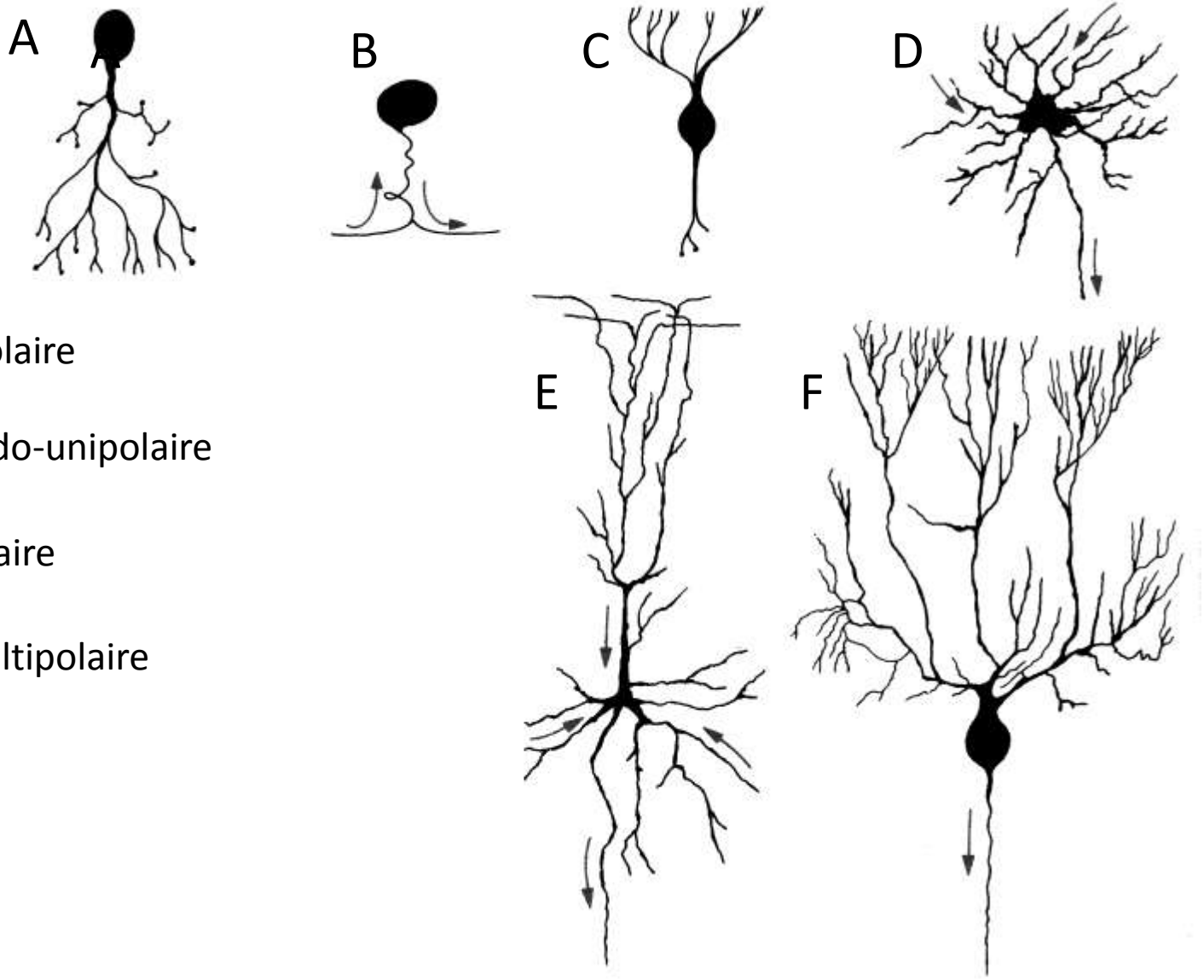
A-C, F : ovoïde

D : étoilé

E : pyramidal

III- Classification histofonctionnelle

critère N°2 : polarité des neurites



A : unipolaire

B : pseudo-unipolaire

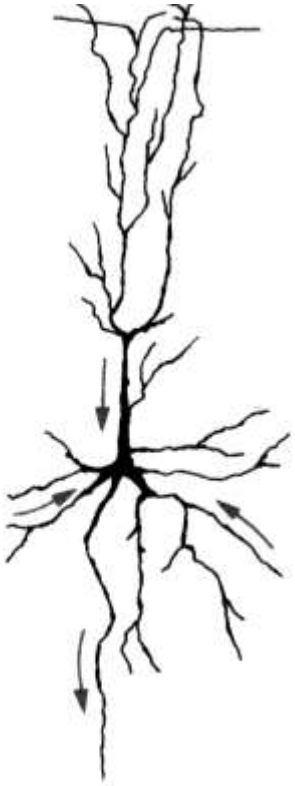
C : bipolaire

D-F : multipolaire

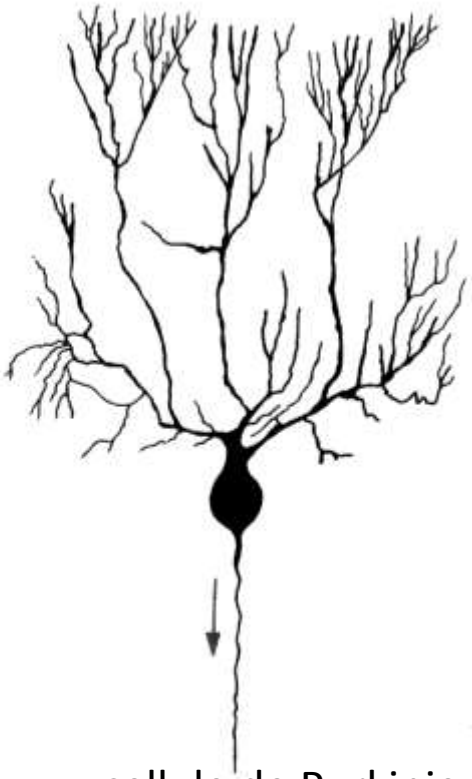
III- Classification histofonctionnelle

critère N°3 : taille de l'axone

neurones de projection



cellule pyramidale
du cortex moteur
(cellules géantes de Betz)



cellule de Purkinje

neurones d'association

III- Classification histofonctionnelle

critère N°4 : synthèse de neuroransmetteurs

* neurones glutamatergiques	→ glutamate
* neurones gabaergiques	→ GABA
* neurones cholinergiques	→ acétylcholine
* neurones dopaminergiques	→ dopamine
* neurones sérotoninergiques	→ sérotonine
* neurones noradrénergiques	→ noradrénaline

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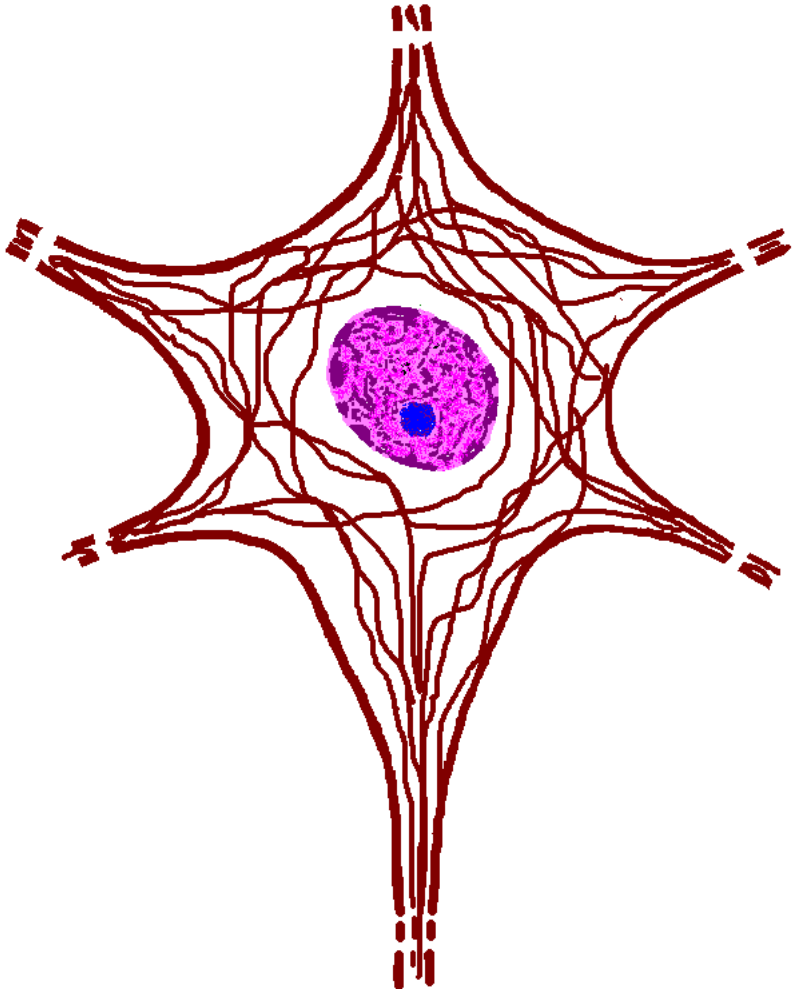
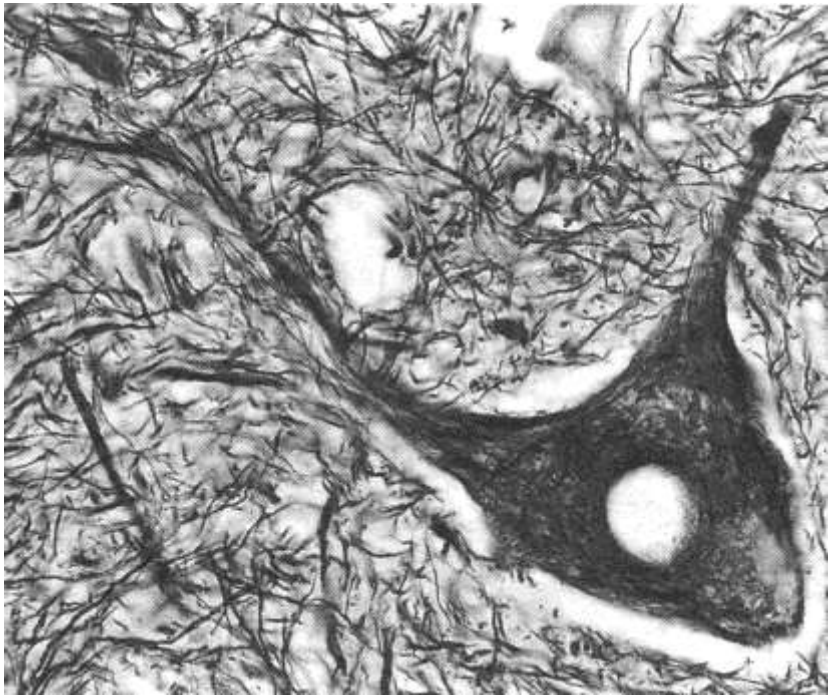
1- éléments constitutifs

IV- **Le cytosquelette neuronal :** 1- éléments constitutifs

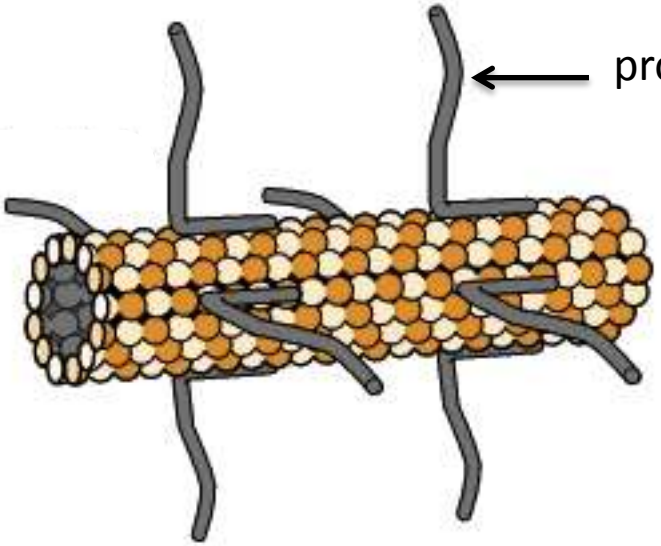
Neurofibrilles





IV- **Le cytosquelette neuronal :** 1- éléments constitutifs

microfilaments d'actine

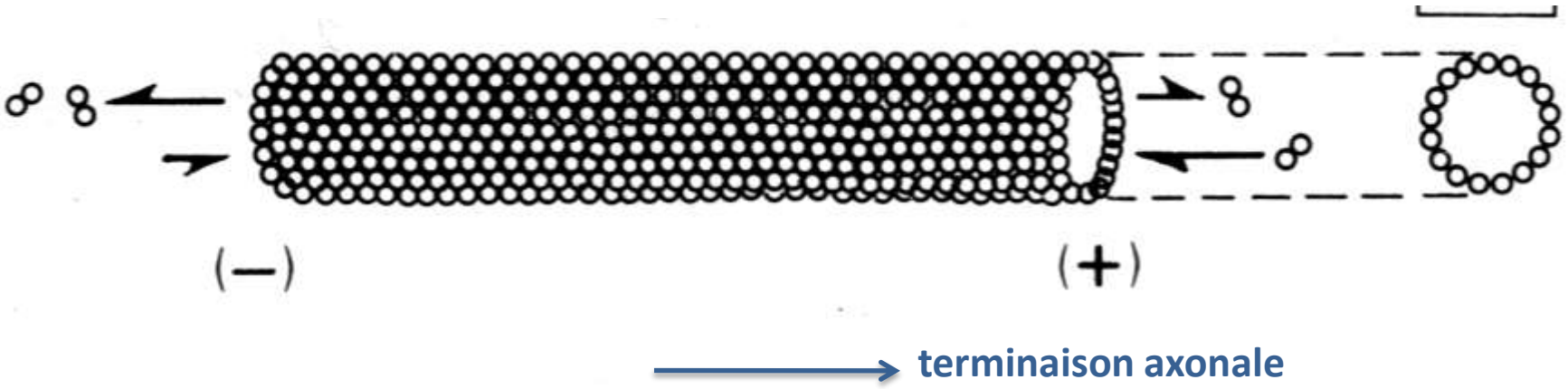


protéine liée aux microtubules

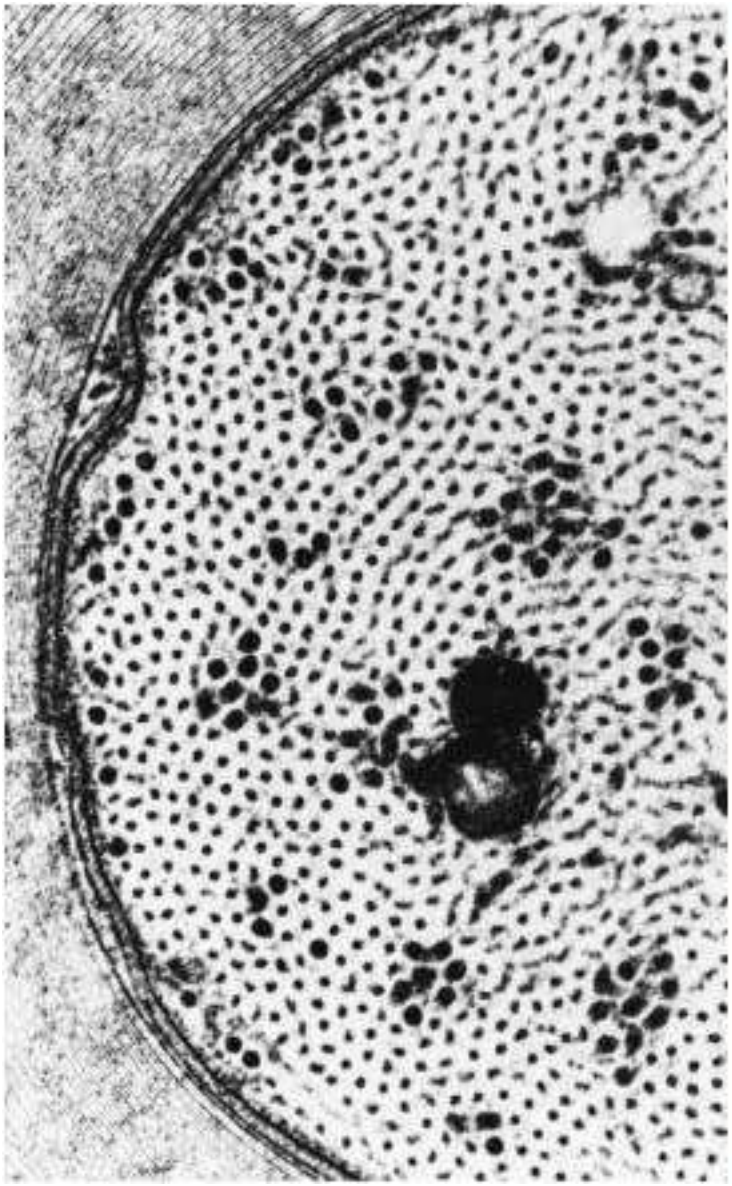
microtubules (neurotubules)

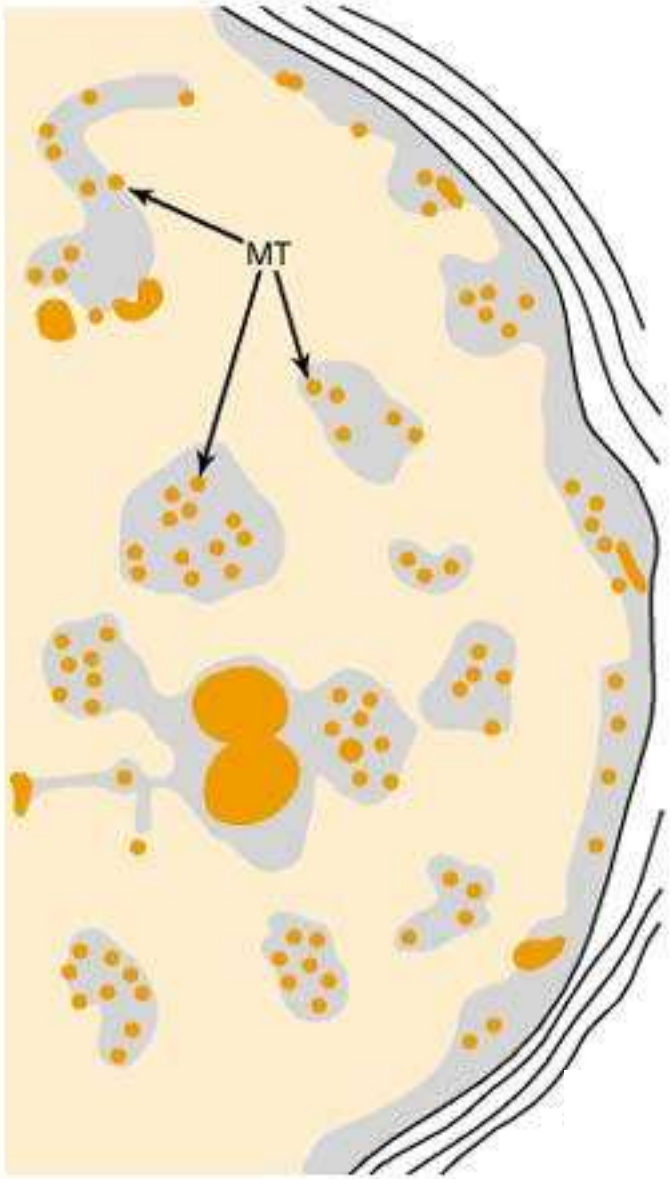
IV- **Le cytosquelette neuronal :** 1- éléments constitutifs

microtubules = polymères de tubuline α et β



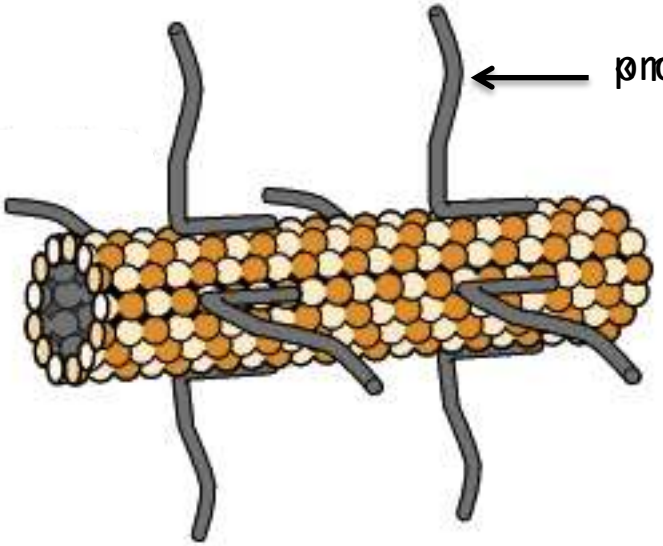
IV- **Le cytosquelette neuronal :** 1- éléments constitutifs





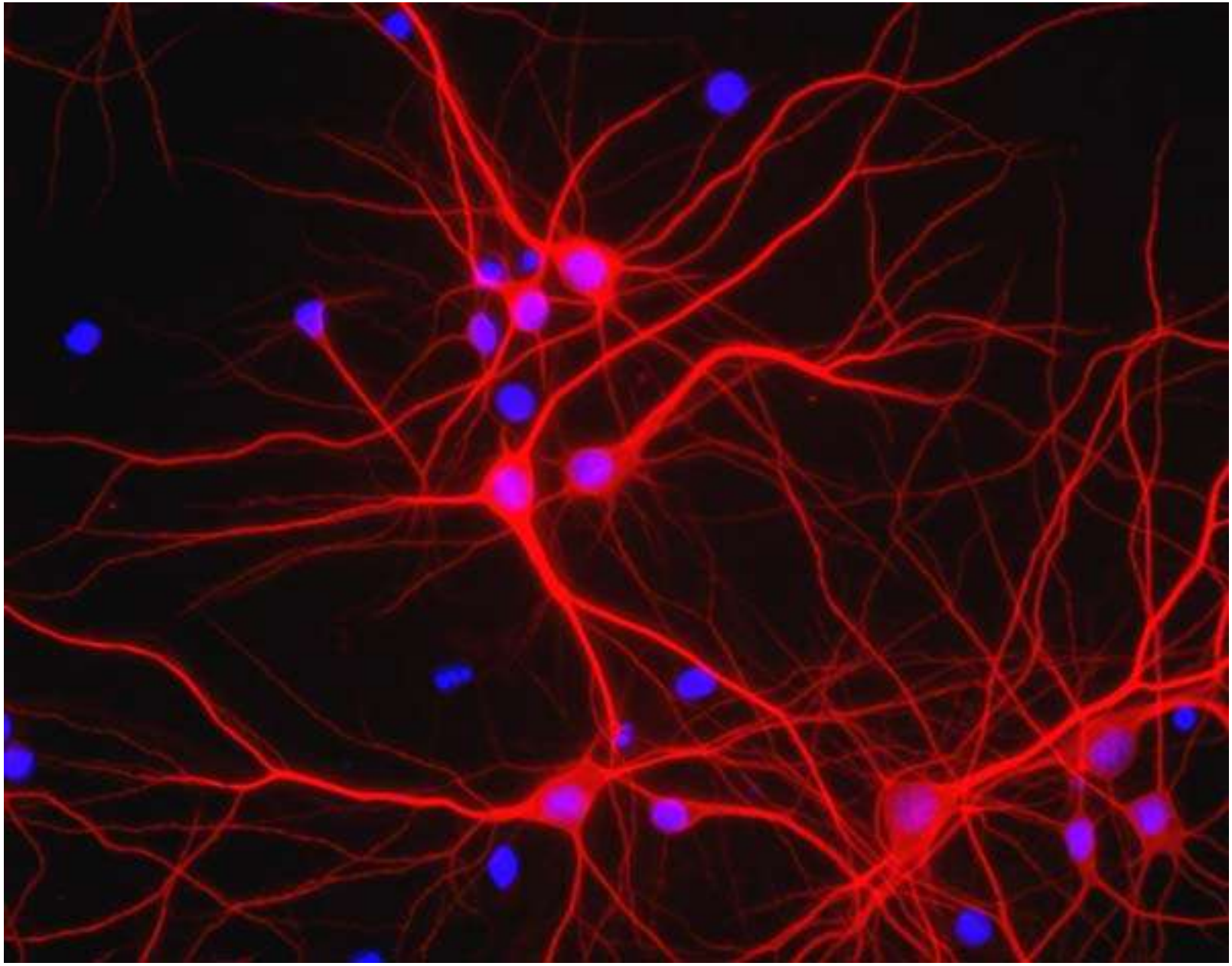
IV- **Le cytosquelette neuronal :** 1- éléments constitutifs

microfilaments d'actine



protéine liée aux microtubules « microtubule-associated protein »(MAP)

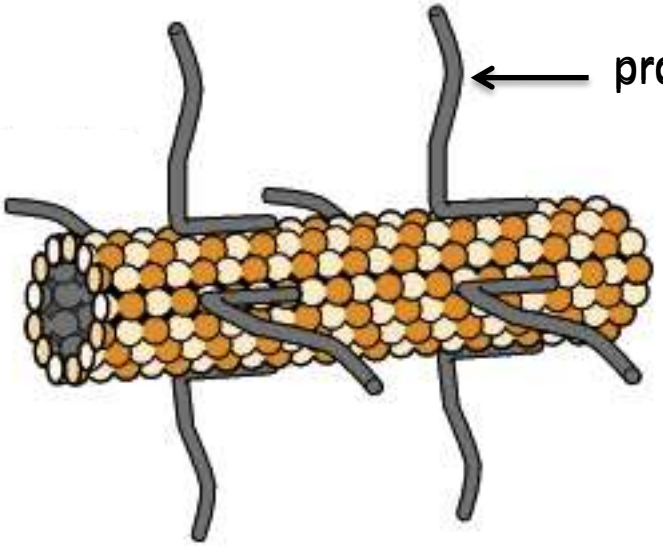
microtubules (neurotubules)



Immunocytofluorescence protéine MAP

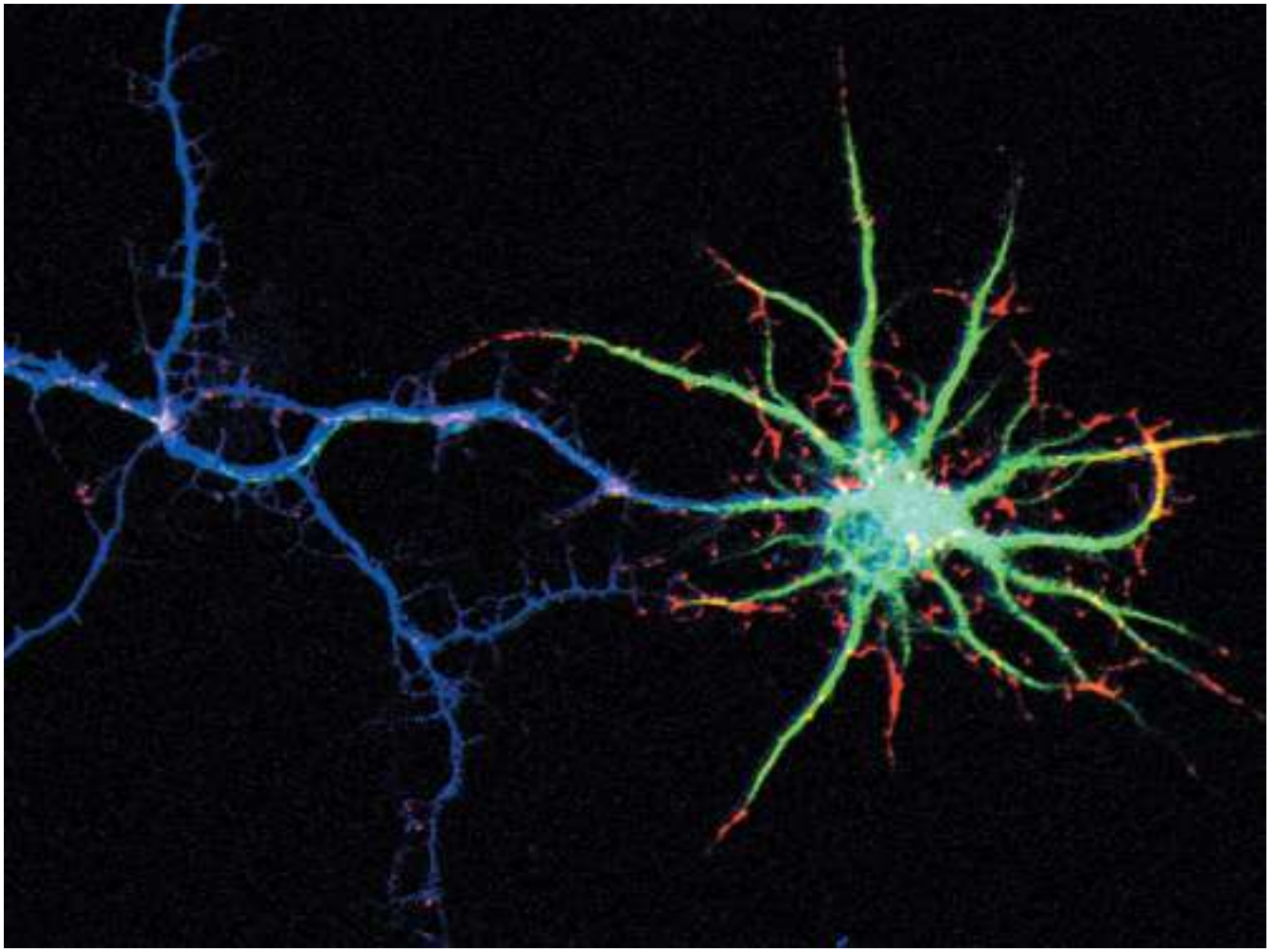
IV- **Le cytosquelette neuronal :** 1- éléments constitutifs

microfilaments d'actine



protéine liée aux microtubules

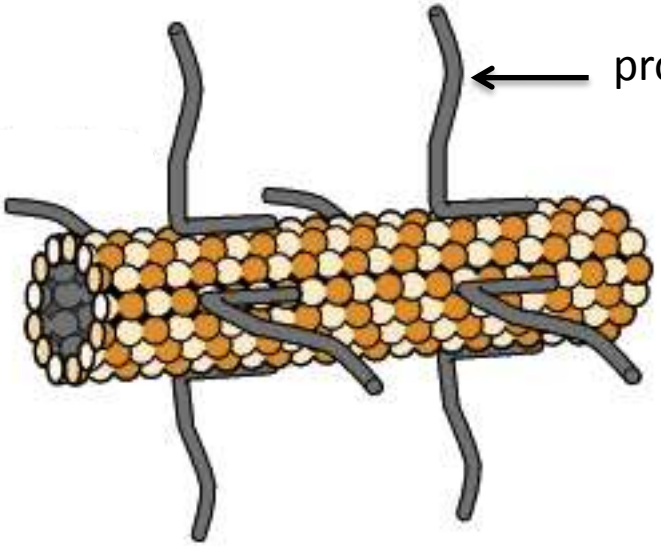
microtubules



Immunocytofluorescence
Tau (bleu)/MAP (vert)/synapse (rouge)

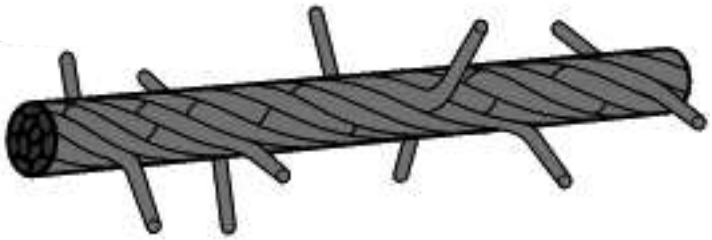
IV- **Le cytosquelette neuronal :** 1- éléments constitutifs

microfilaments d'actine



protéine liée aux microtubules

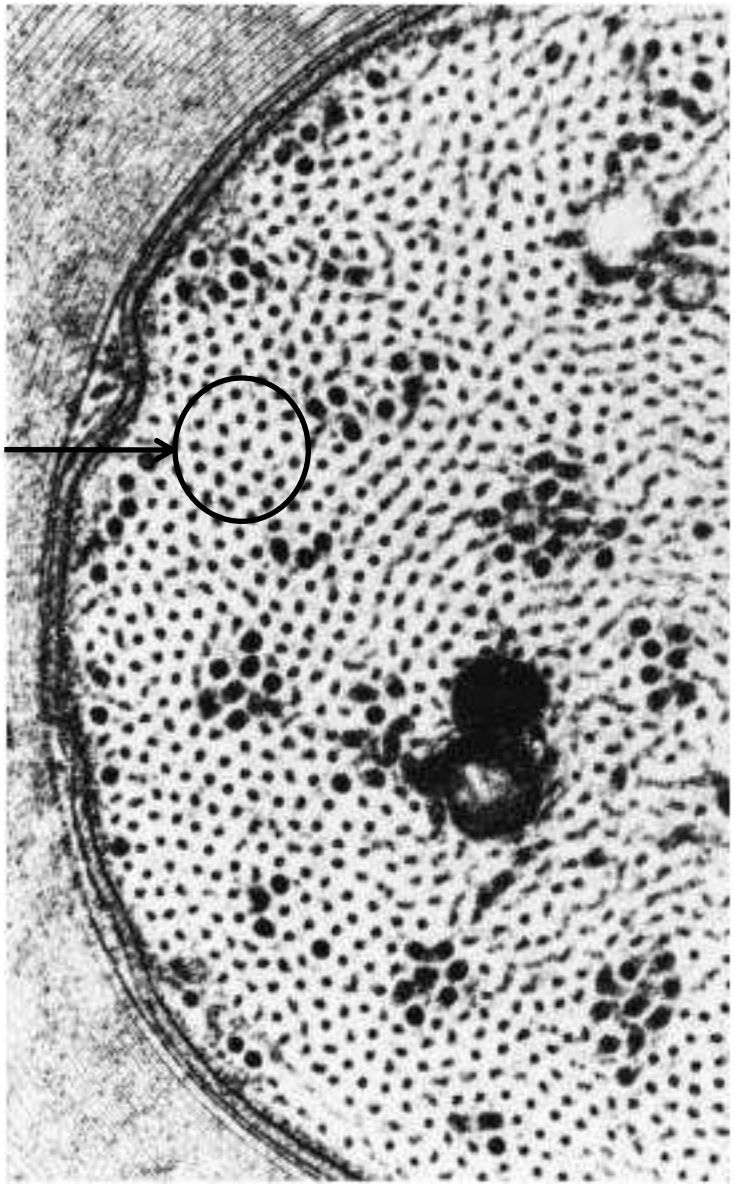
microtubules

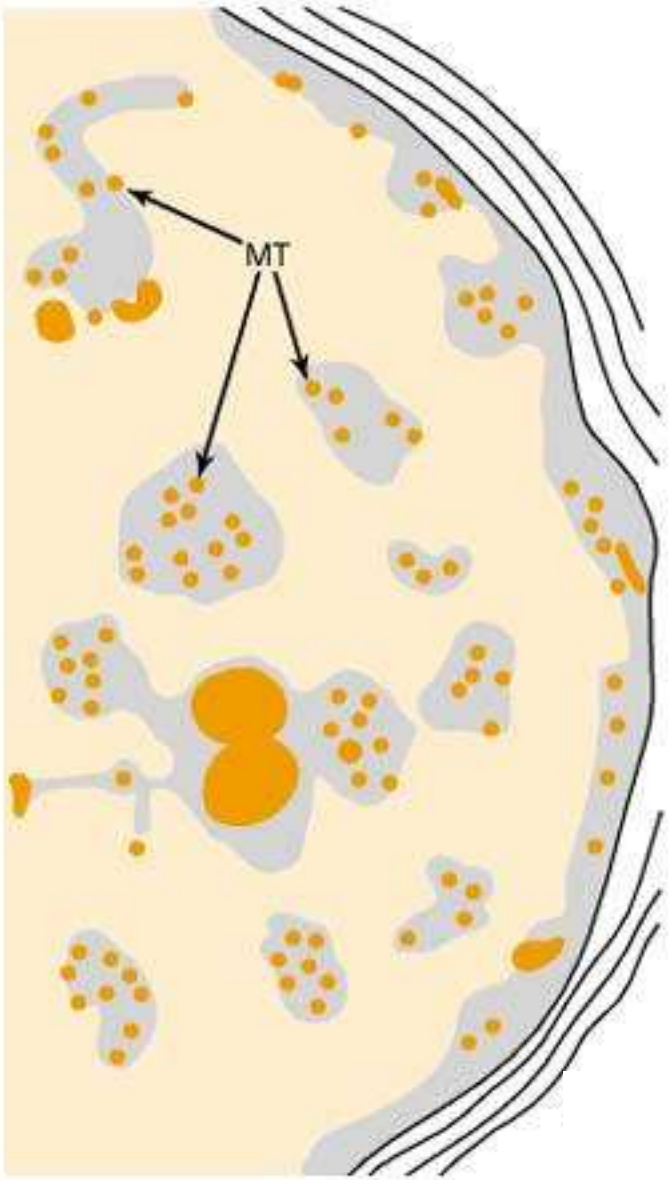


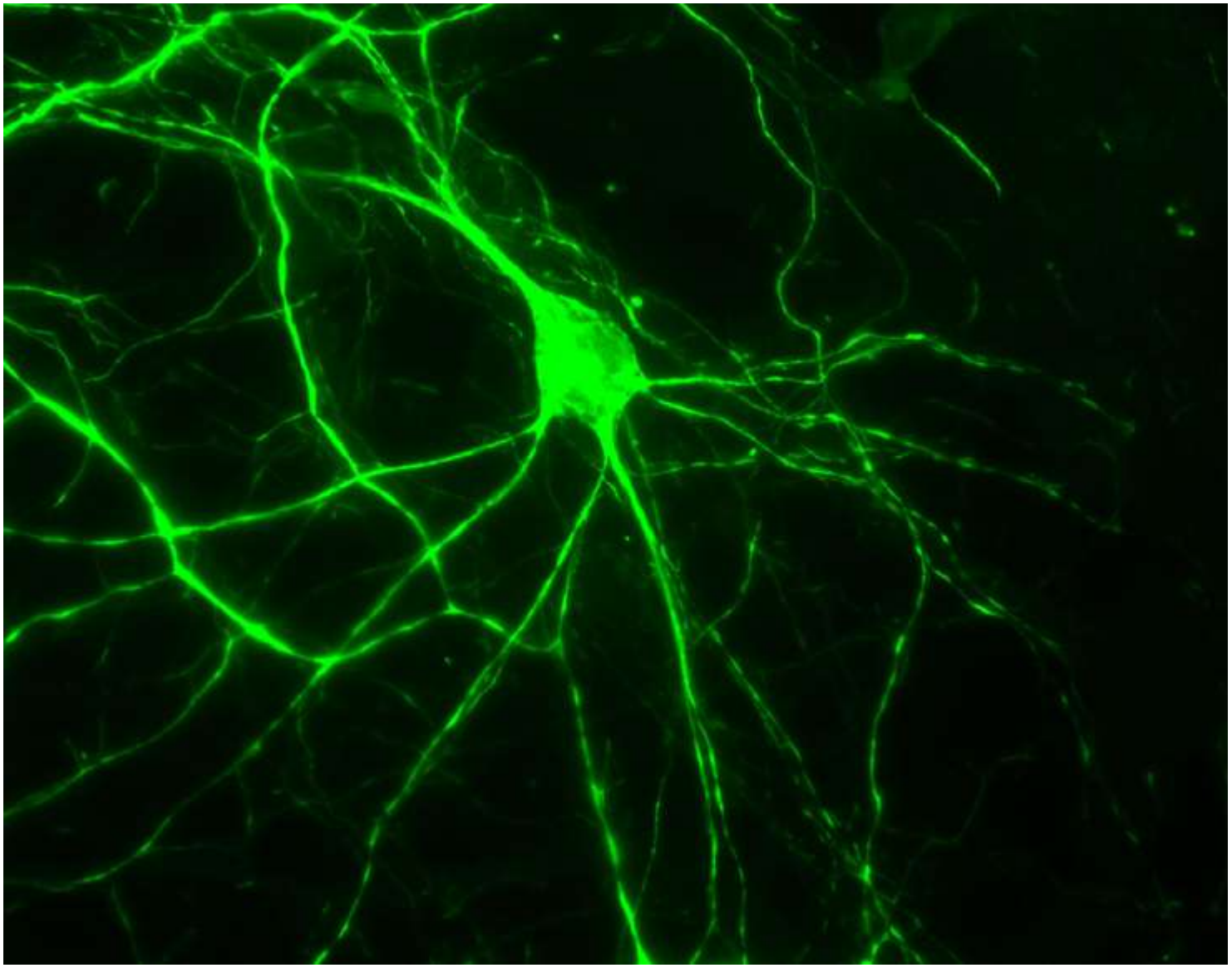
neurofilaments

IV- **Le cytosquelette neuronal :** 1- éléments constitutifs

neurofilaments







Immunocytofluorescence protéines Neurofilament

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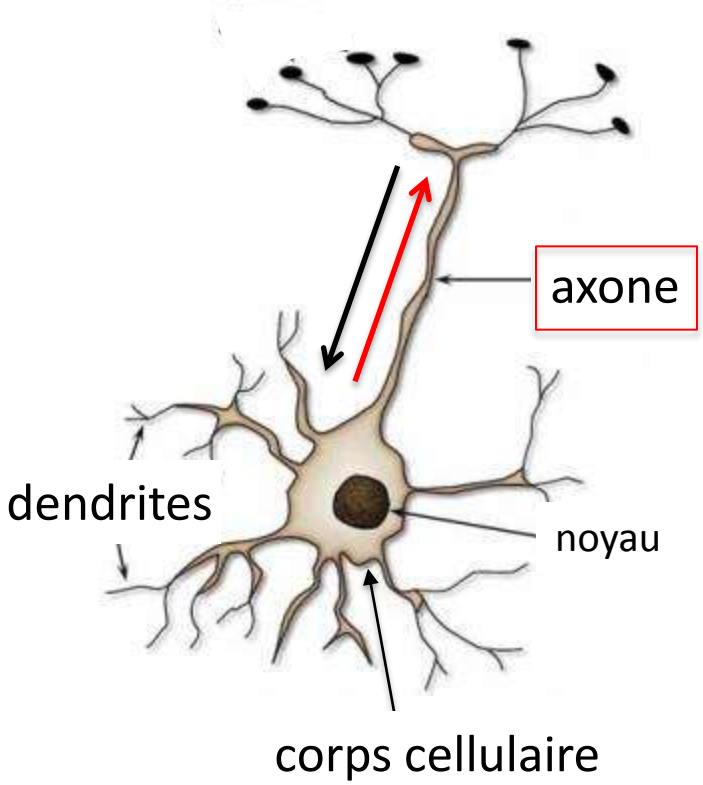
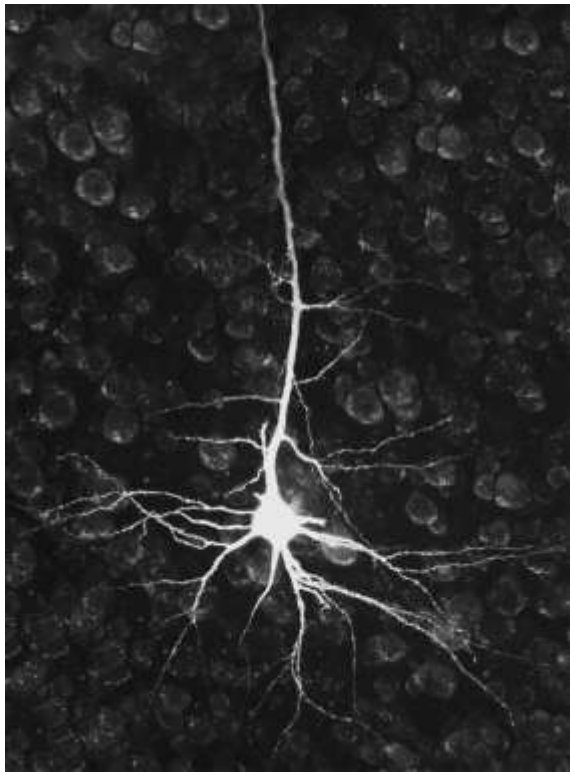
2- fonctions

IV- **Le cytosquelette neuronal :** 2- fonctions

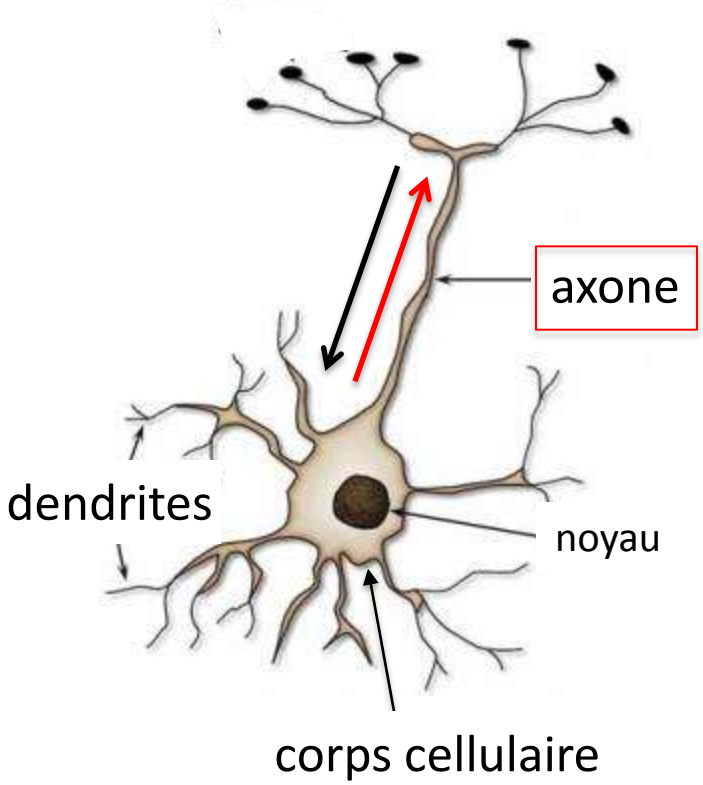
transport axonal

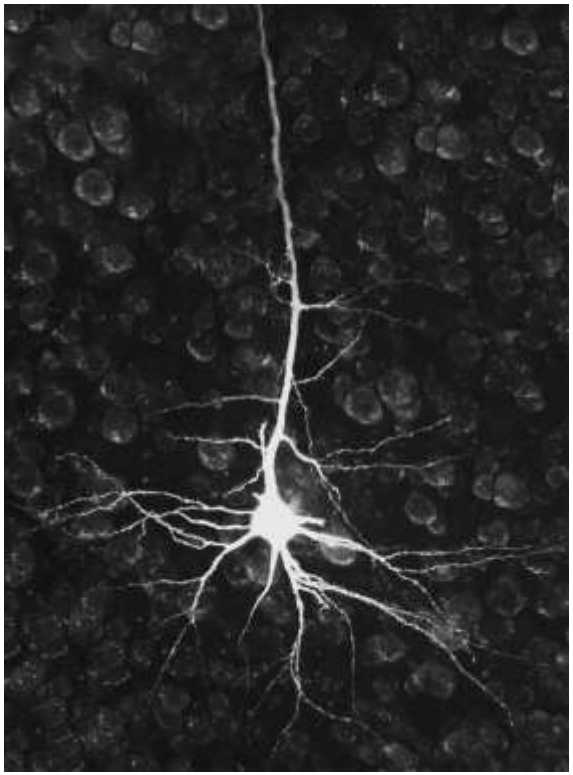




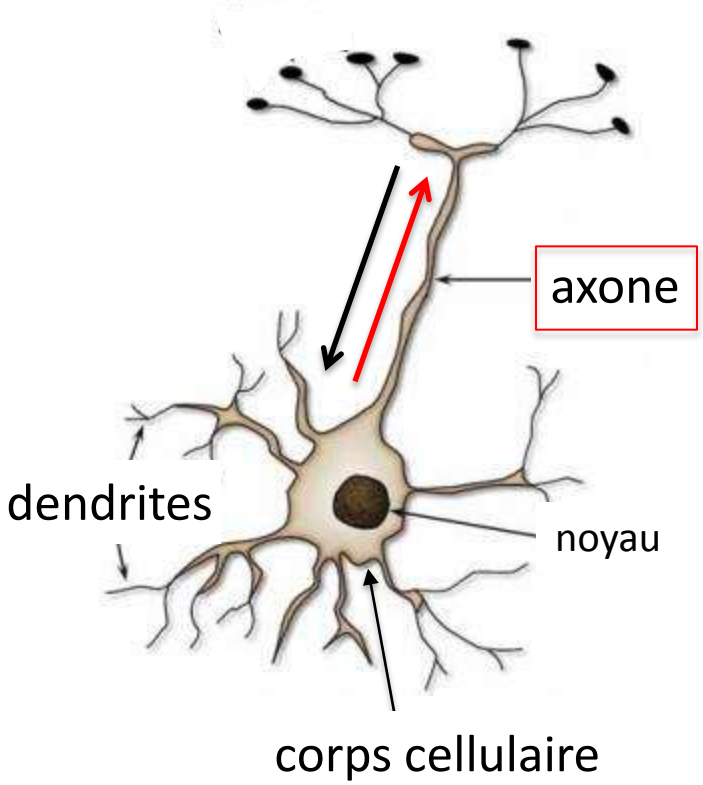
IV- **Le cytosquelette neuronal :** 2- fonctions

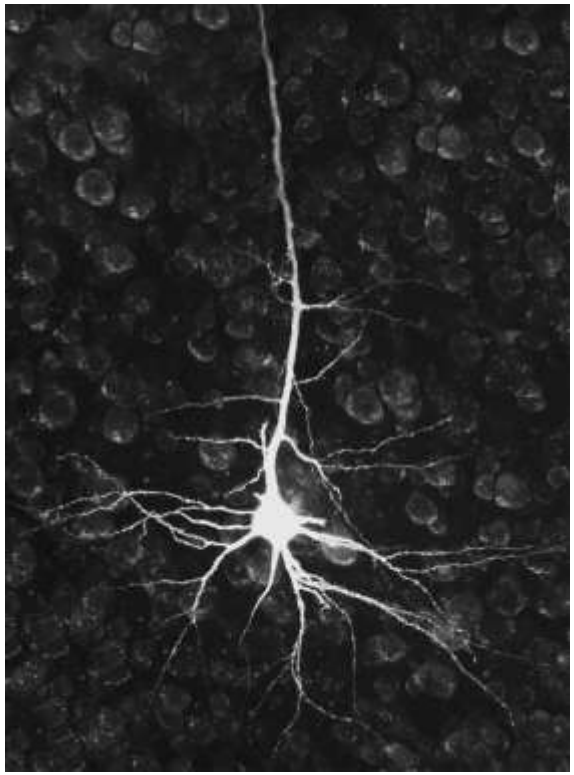
a) transport axonal lent



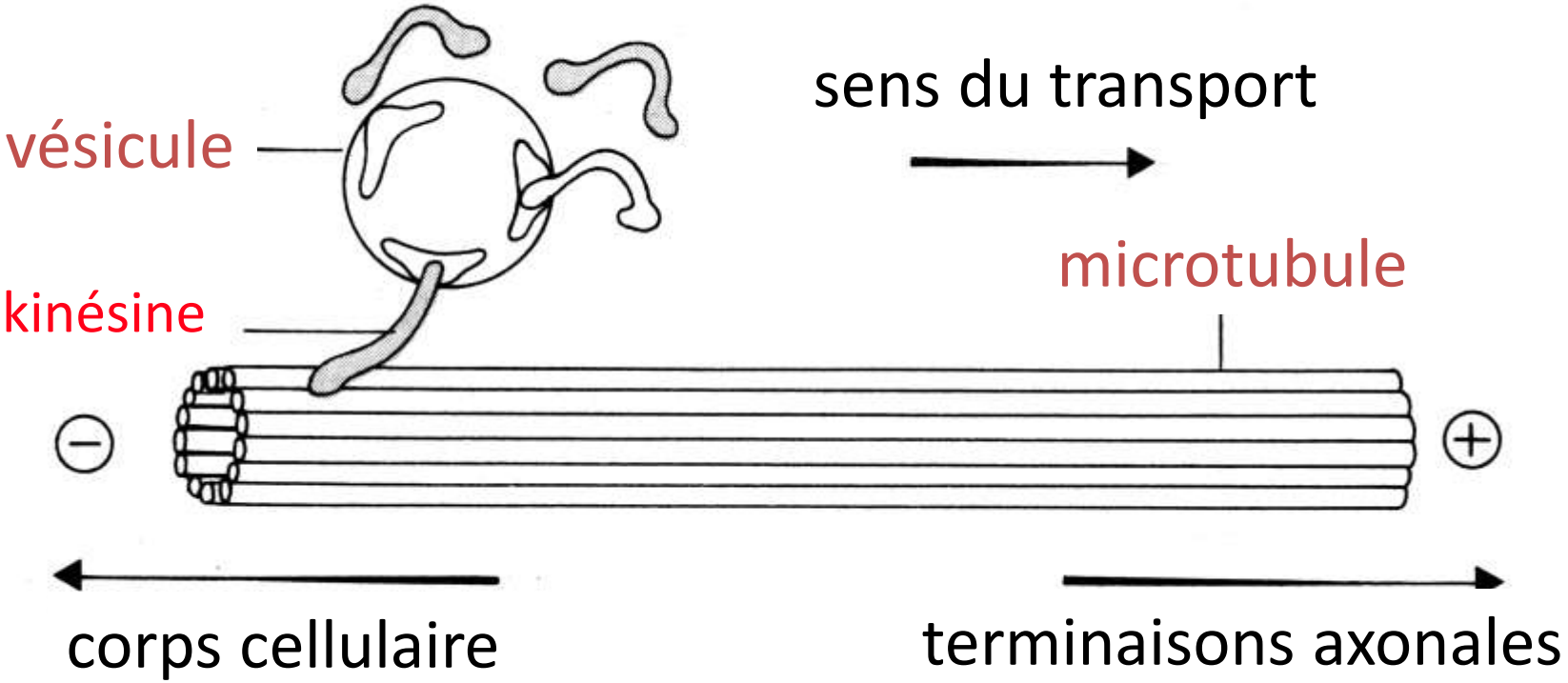


b) transport axonal rapide

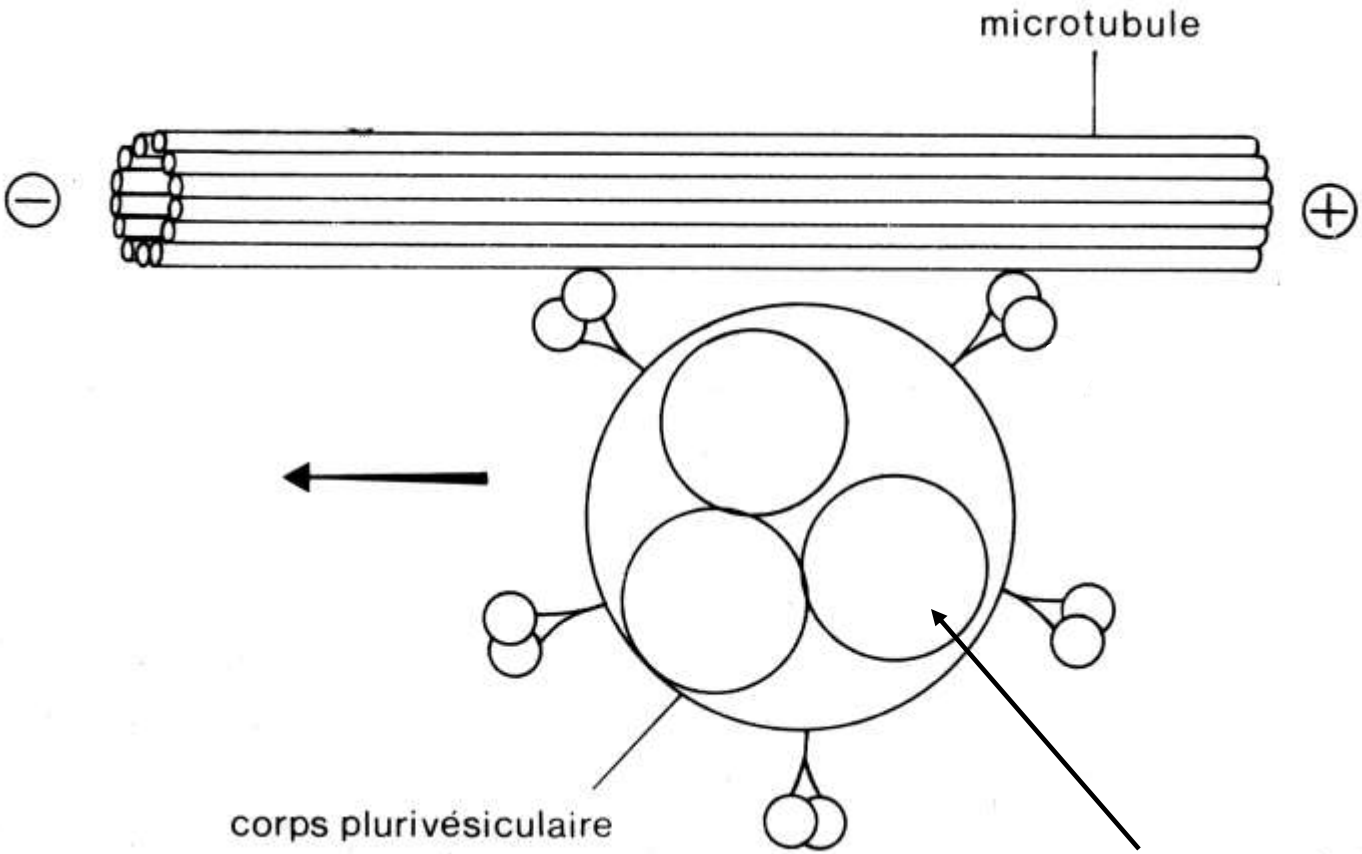




flux antérograde

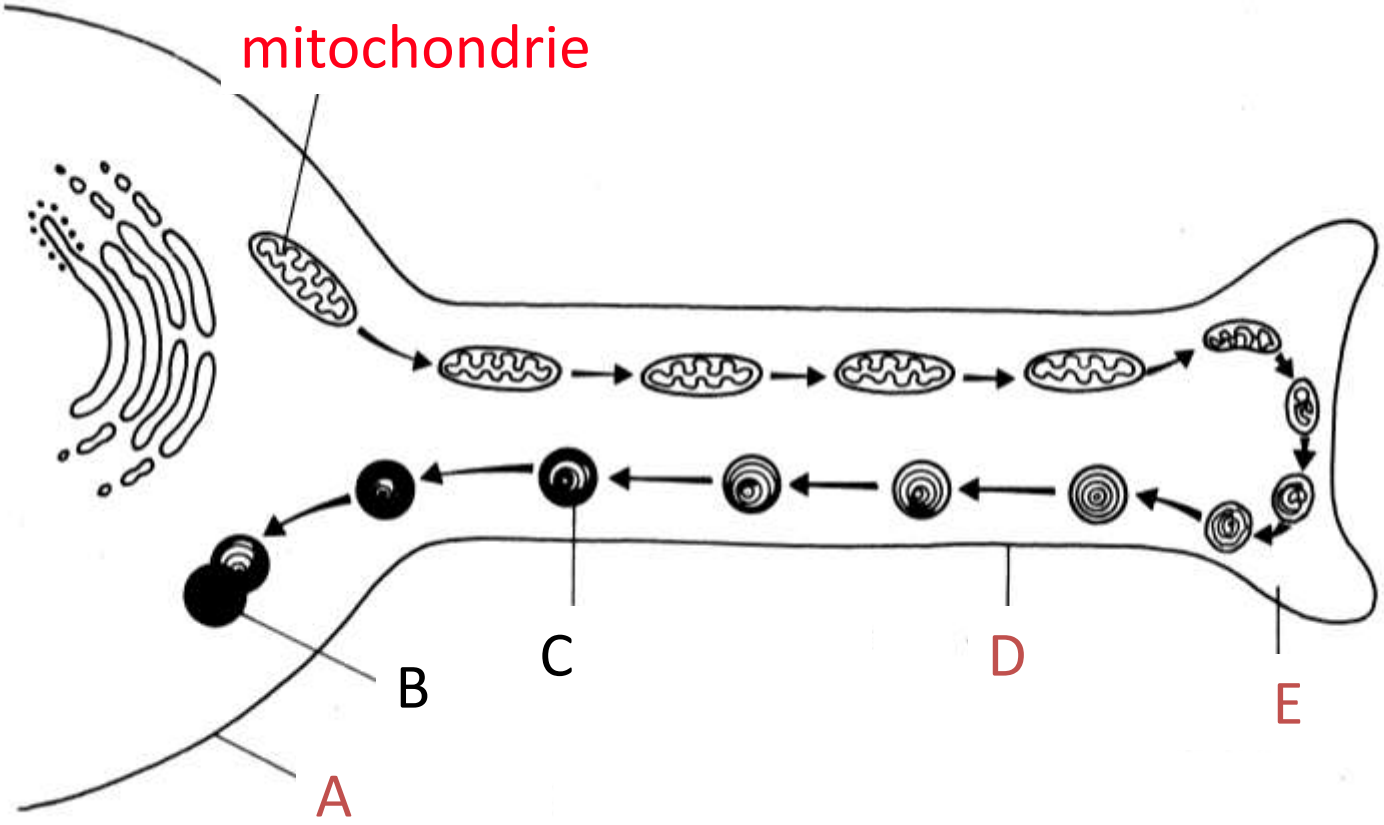


flux rétrograde



NGF (Nerve Growth factor)
+ récepteur au NGF

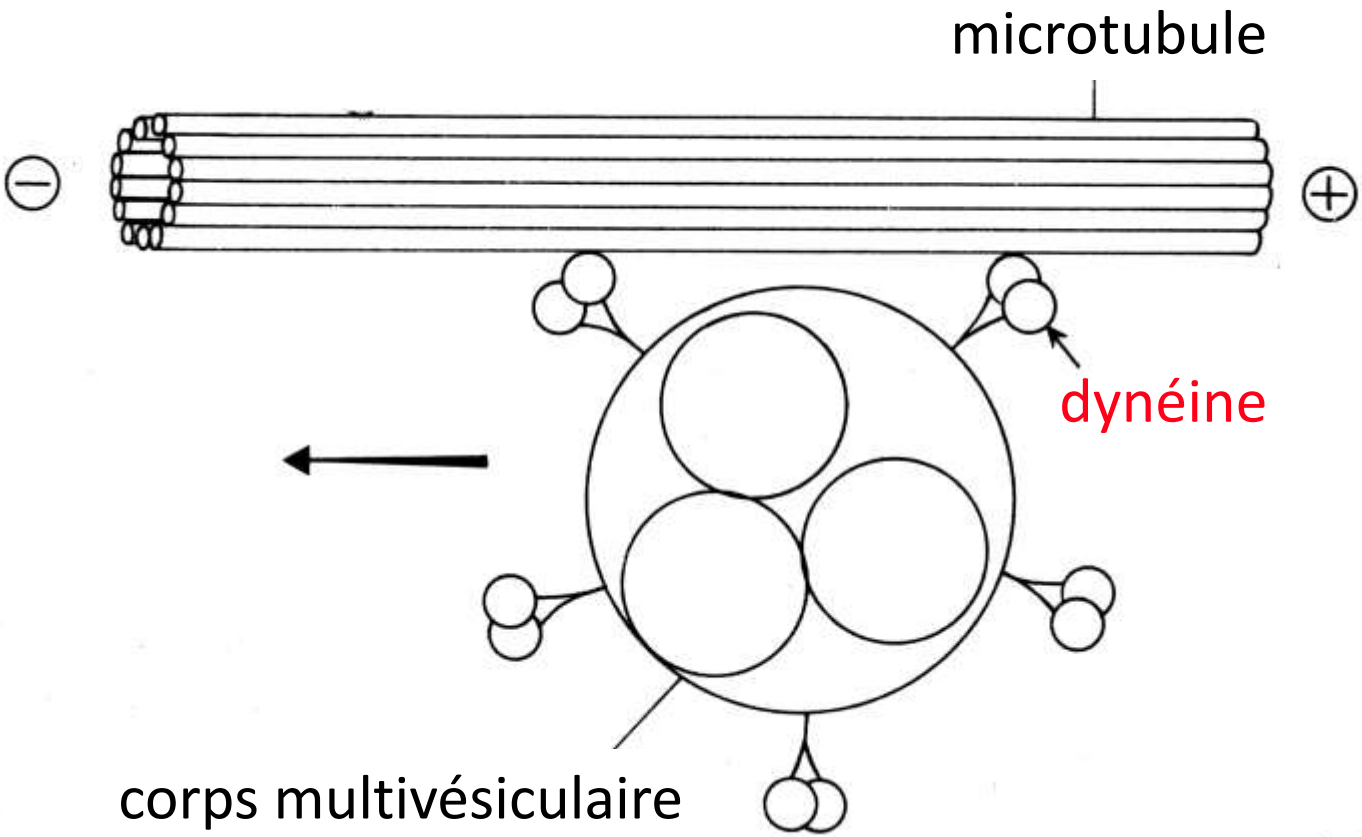
transport axonal des mitochondries



A : corps cellulaire
D : axone
E : terminaison axonale

B : lysosome
C : corps multilamellaire

flux rétrograde



Maladie d'Alzheimer

aspect normal

dégénérescence neurofibrillaire

Le Neurone

I- **Introduction :** le système nerveux

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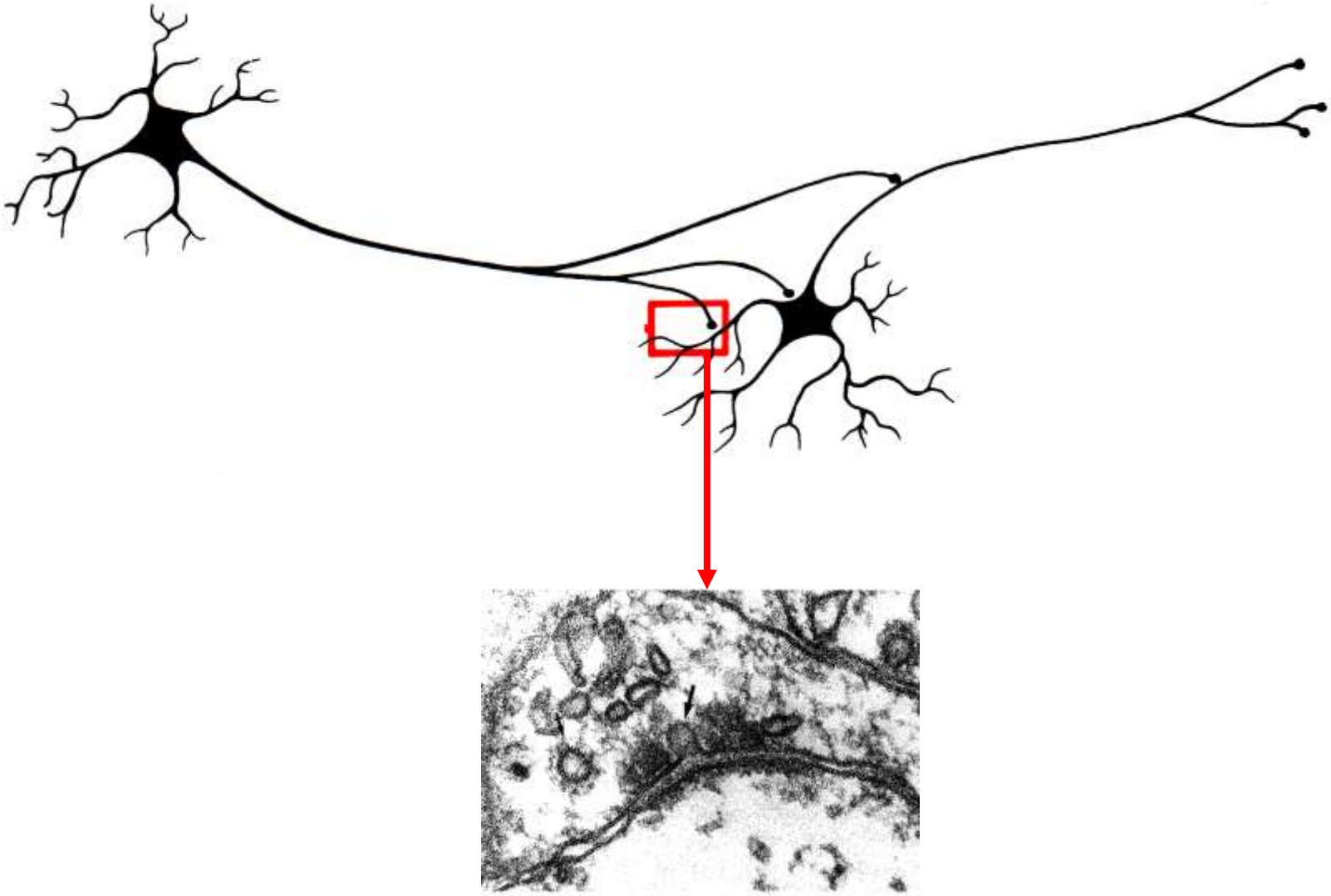
1- éléments constitutifs

2- fonctions

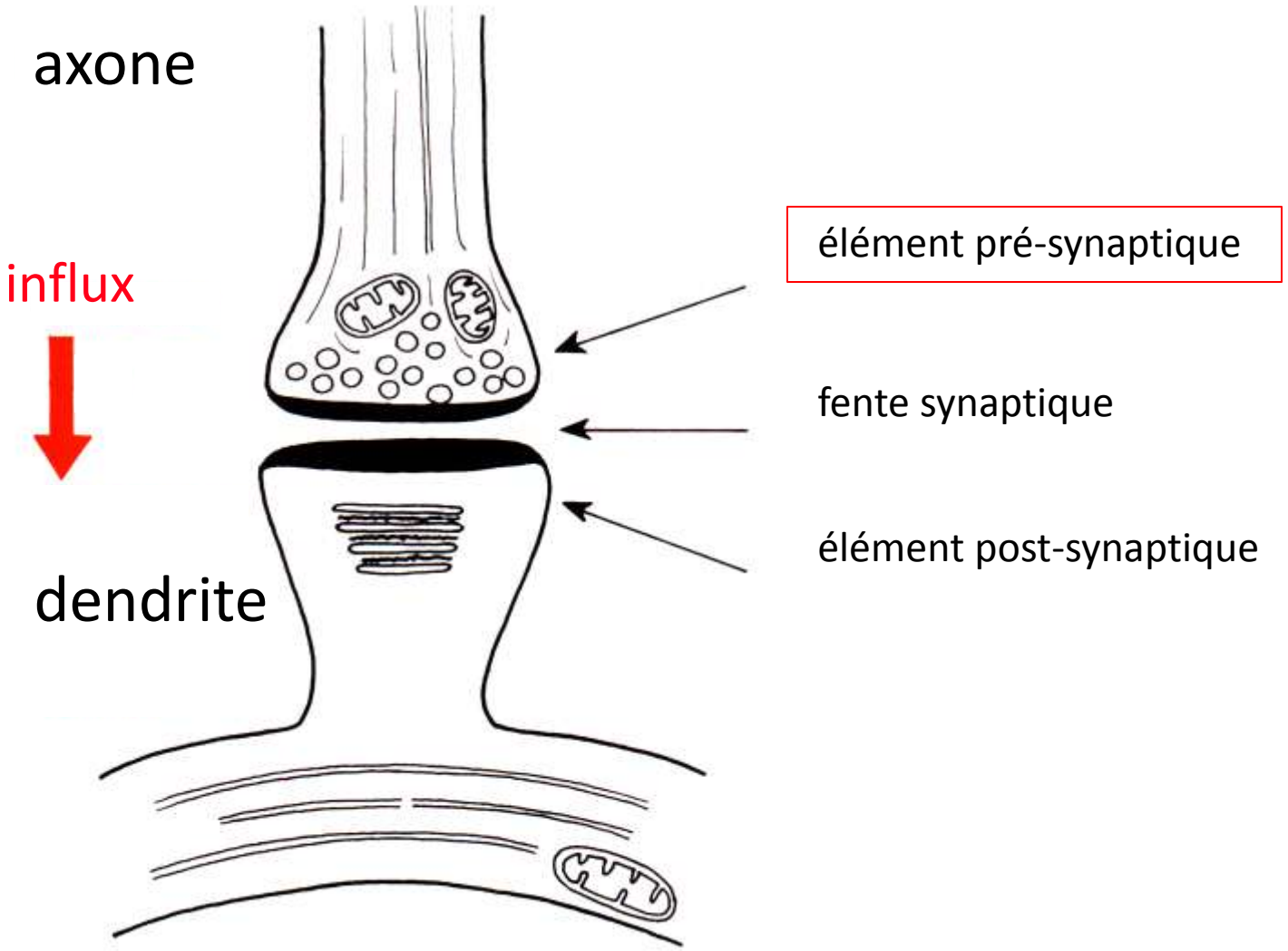
V- **La synapse interneuronale**

1- Ultrastructure de la synapse

synapse axo-dendritique



1- Ultrastructure de la synapse



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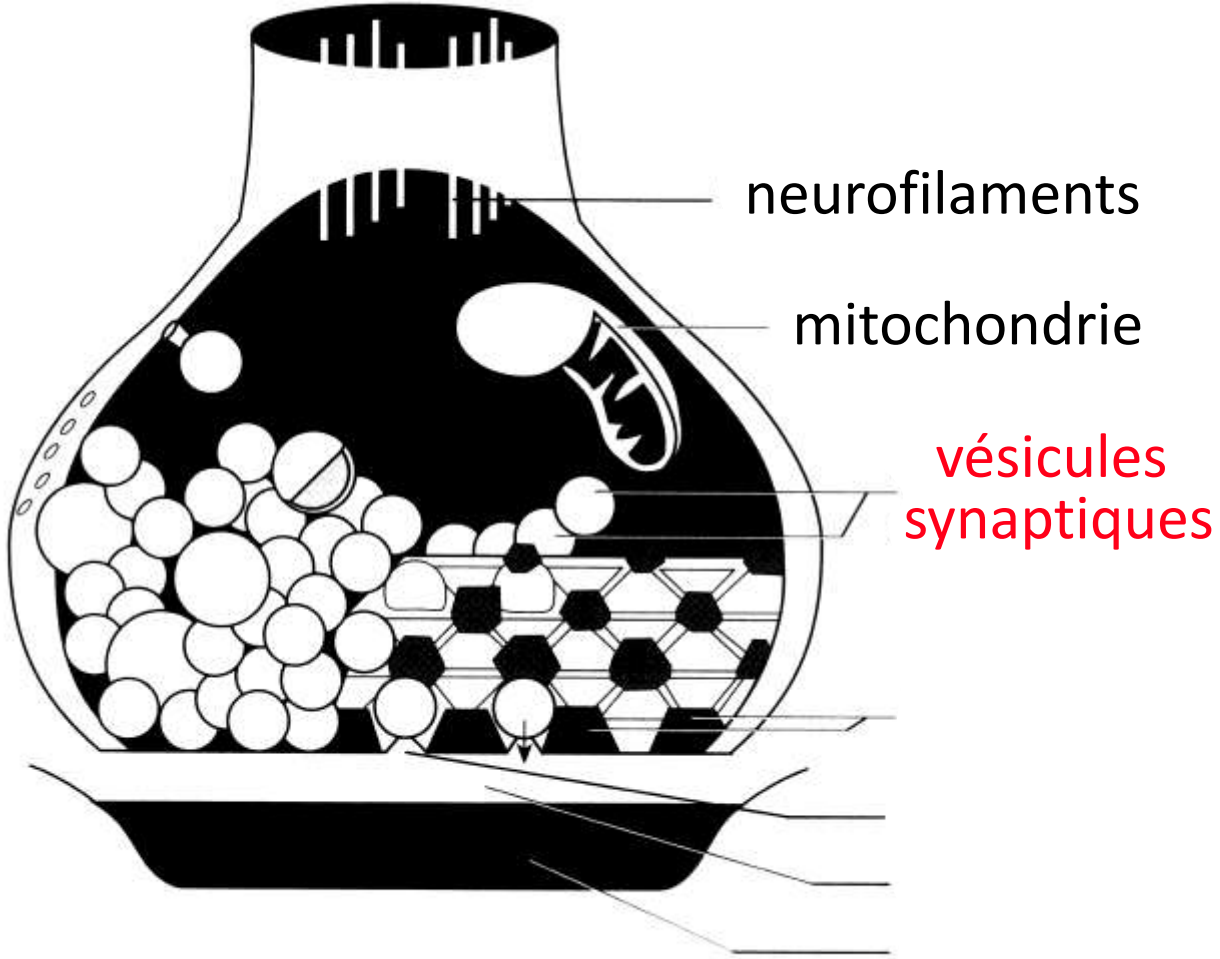
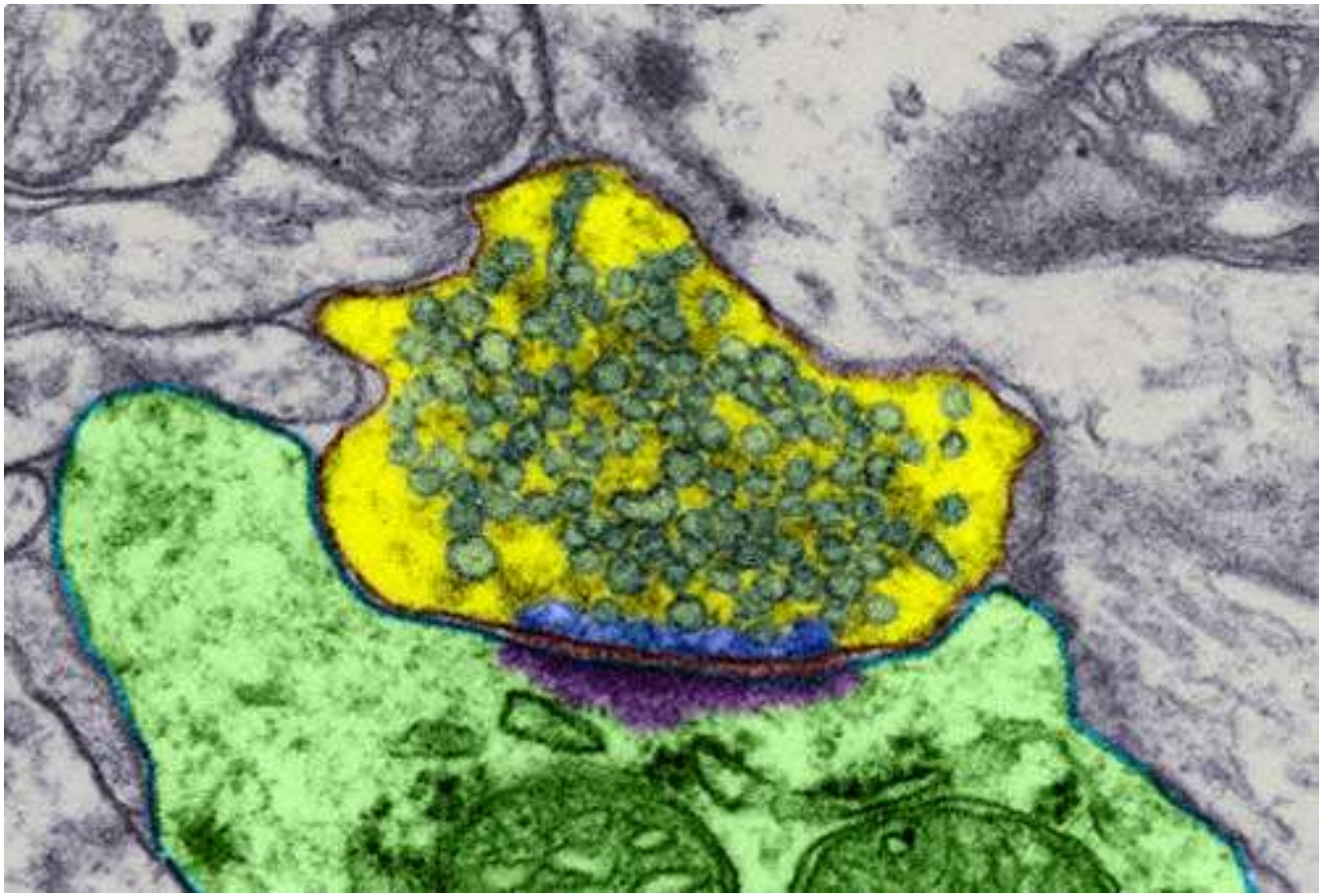
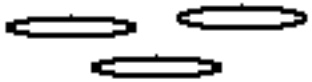


II- Ultrastructure de la synapse



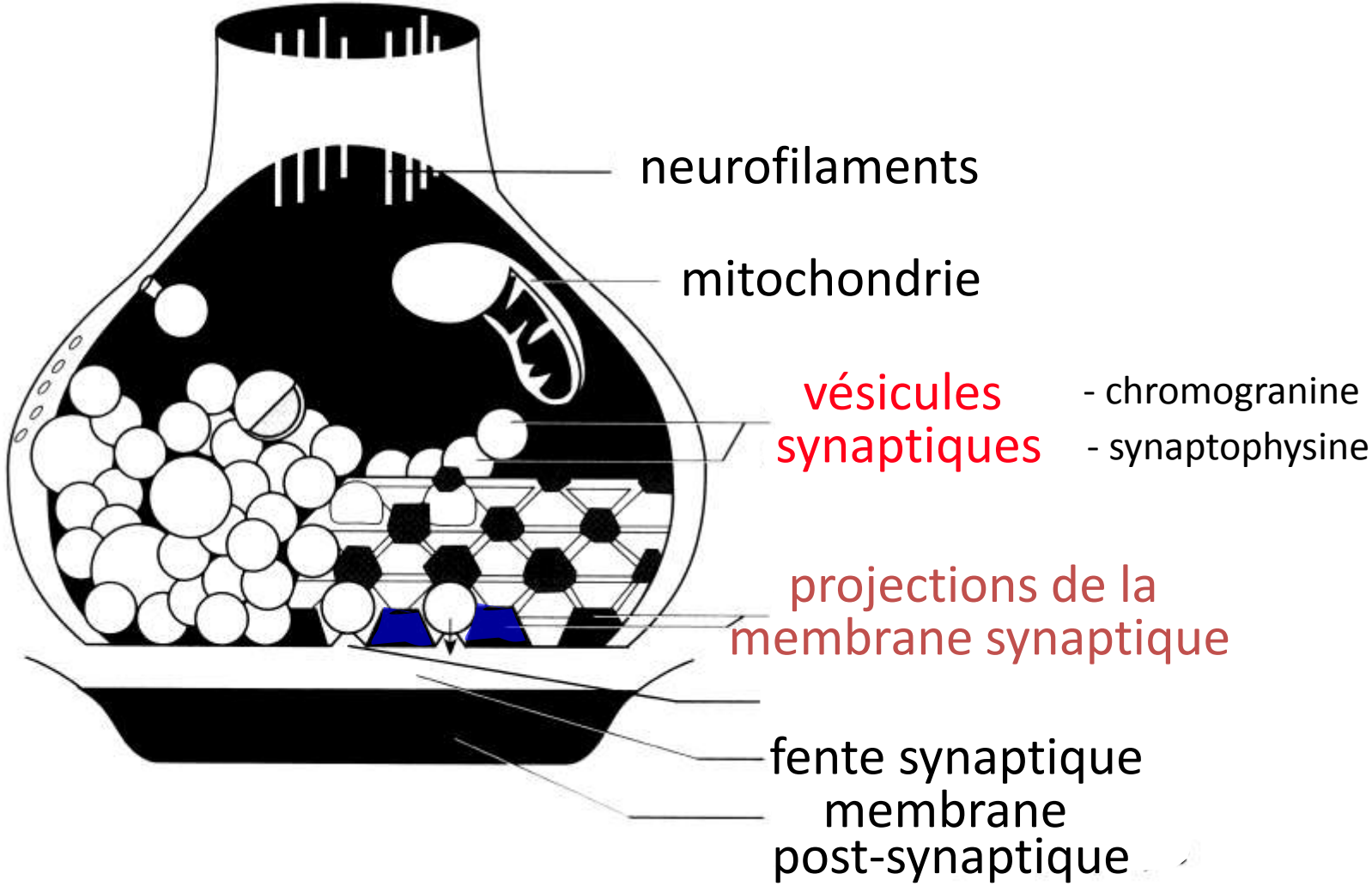
vésicules applaties



vésicules claires

vésicules à coeur dense

1- Ultrastructure de la synapse



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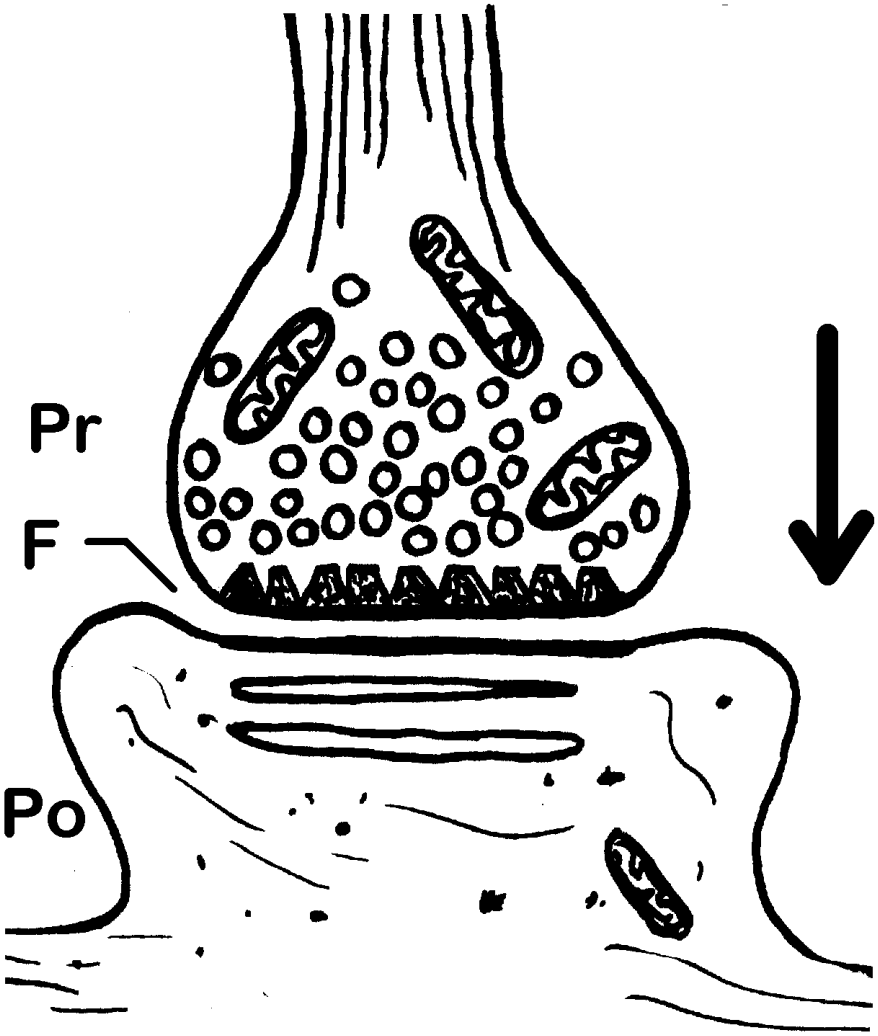

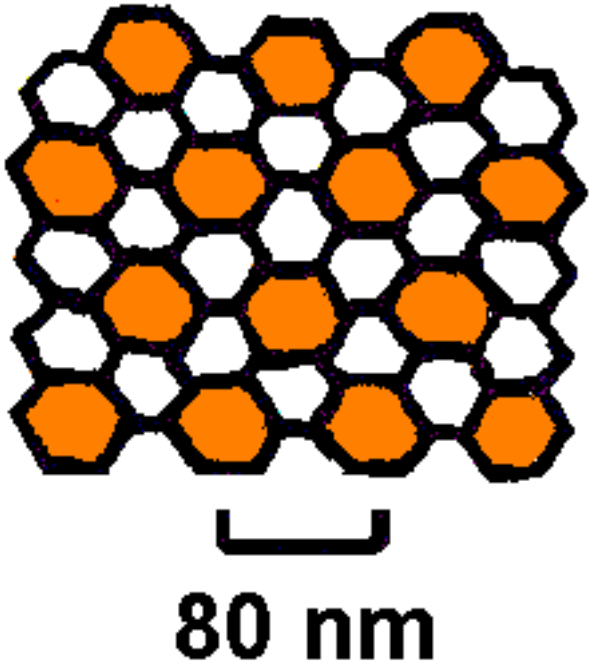

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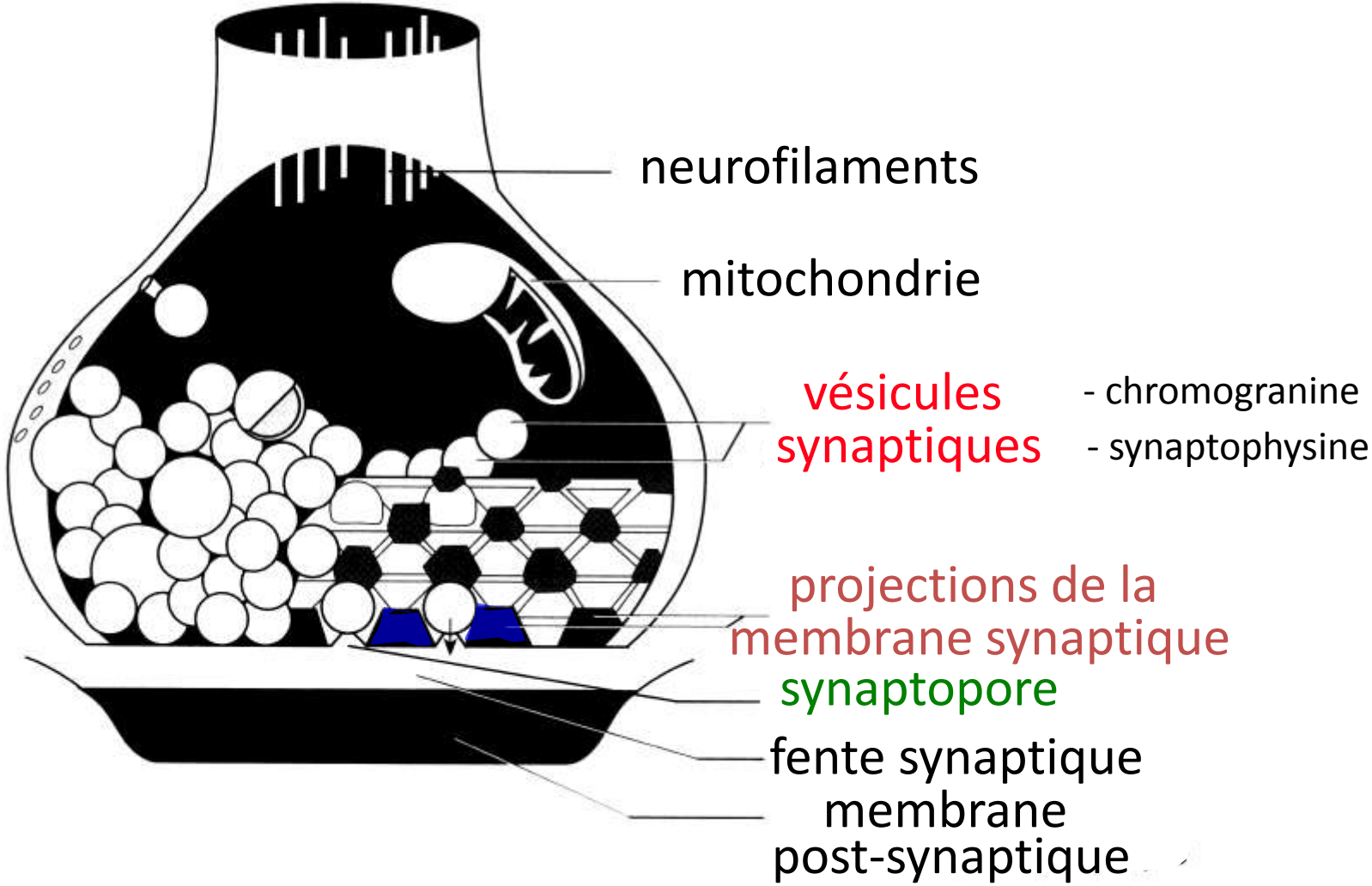

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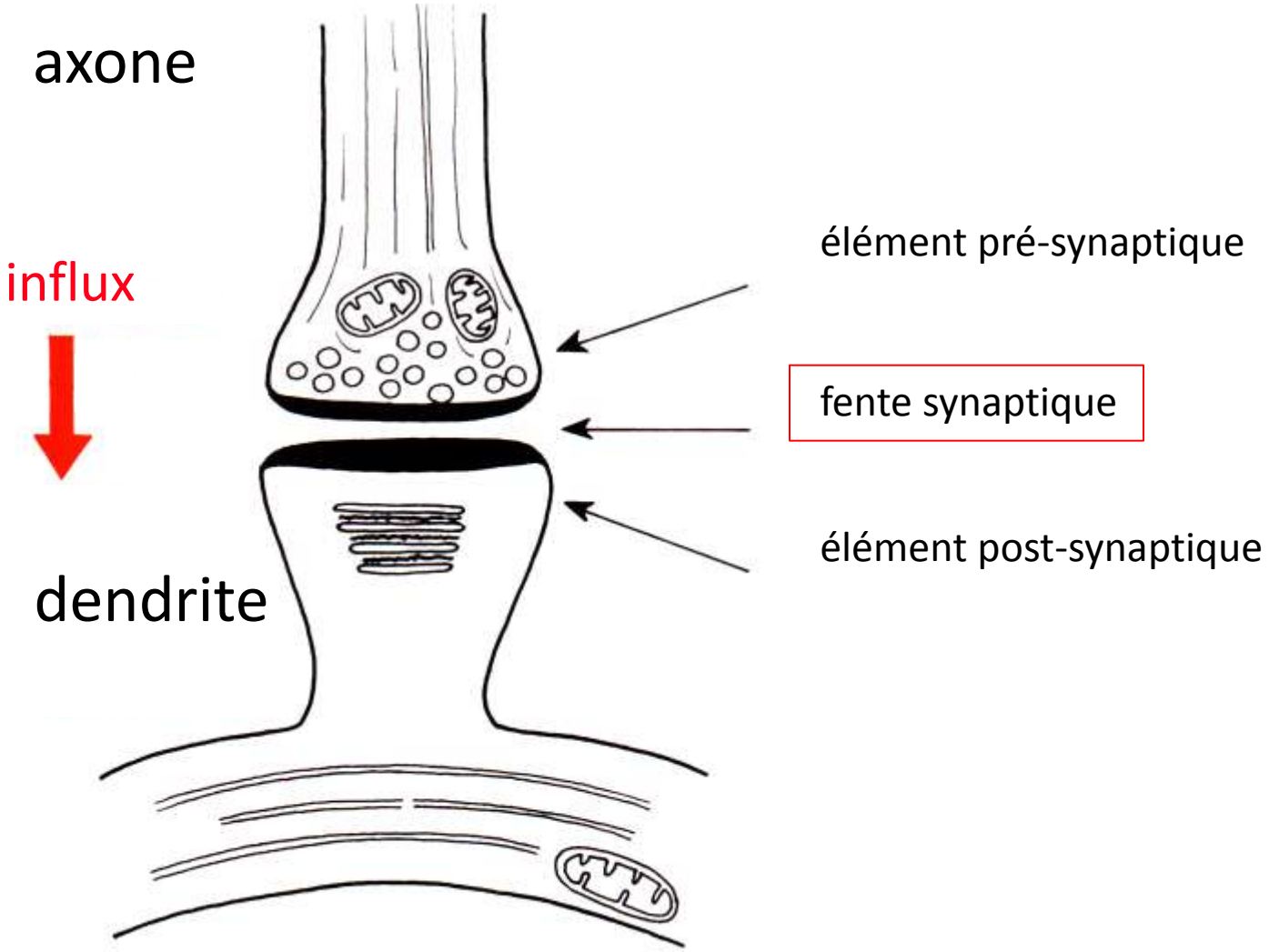

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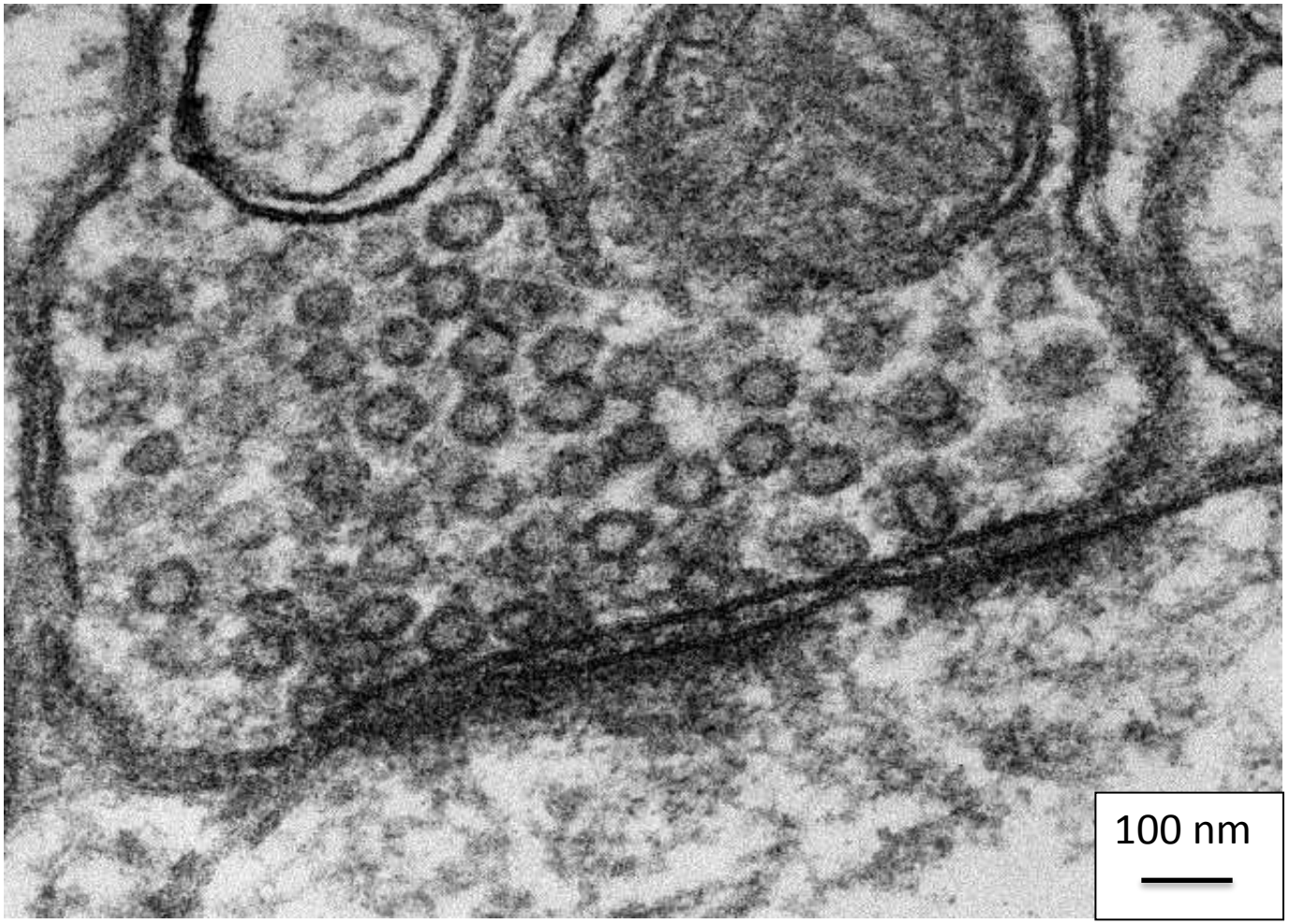

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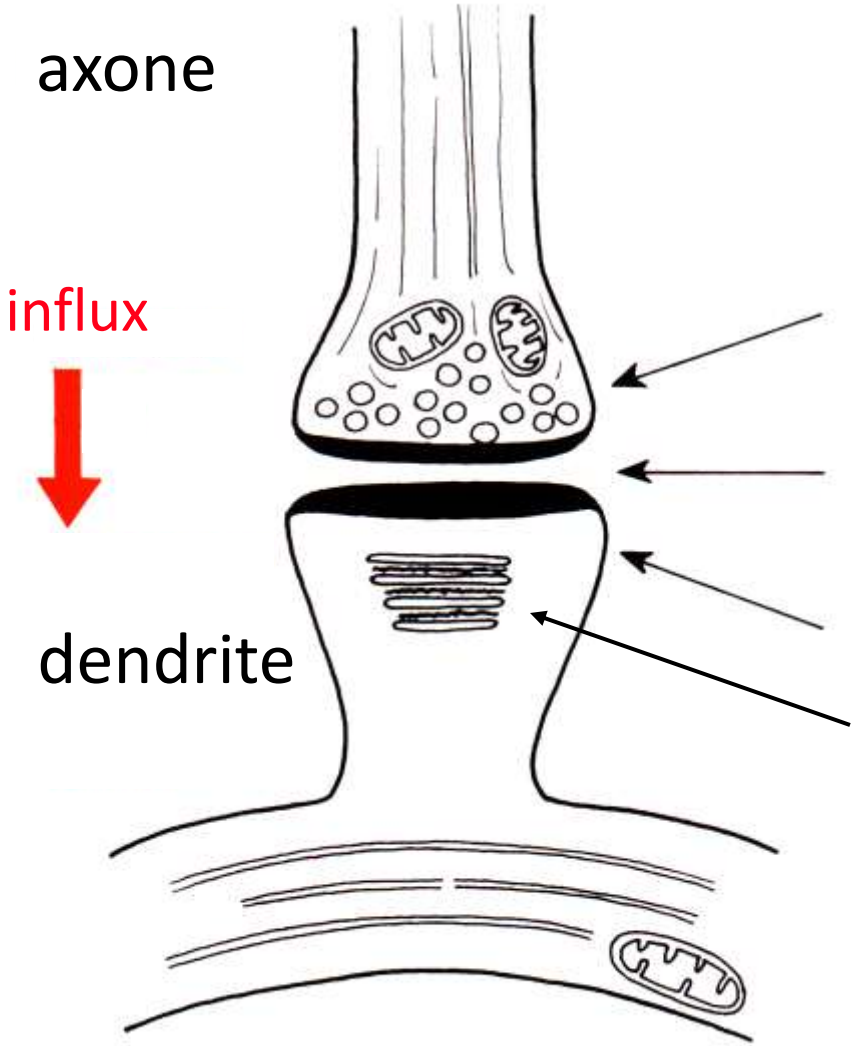


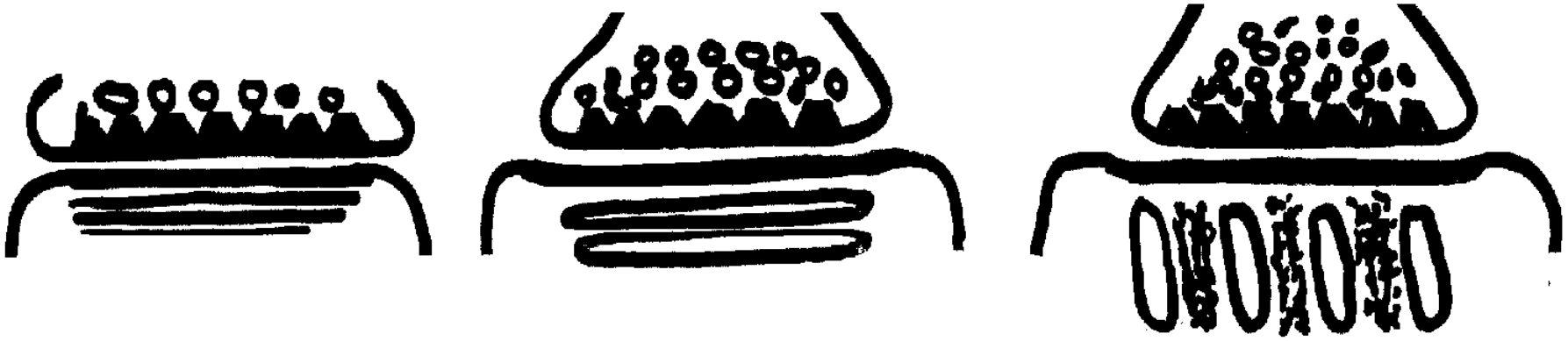
élément pré-synaptique

fente synaptique

élément post-synaptique

appareil post-synaptique

1- Ultrastructure de la synapse



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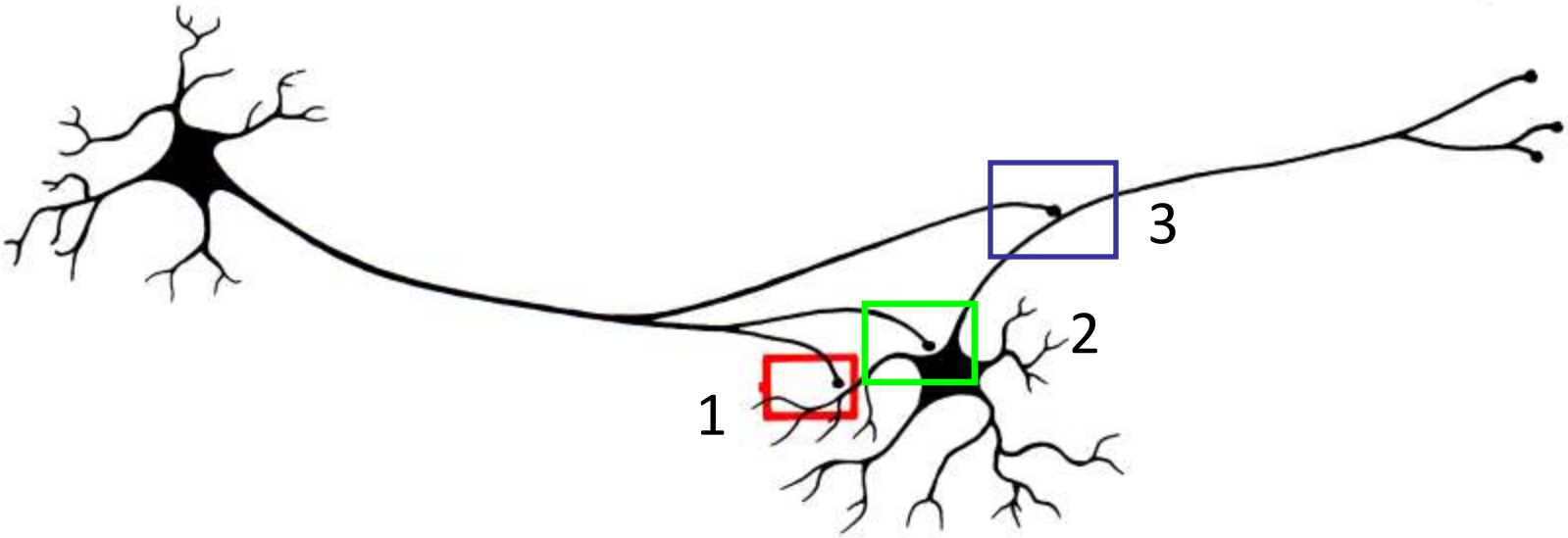
1- ultrastructure

2- classification

2- Classification

critère N°1 : localisation



1 : synapse axo-dendritique

2 : synapse axo-somatique

3 : synapse axo-axonale

2- Classification

critère N°2 : type de neurotransmetteur

* neurones glutamatergiques → glutamate
* neurones gabaergiques → GABA
* neurones cholinergiques → acétylcholine
* neurones dopaminergiques → dopamine
* neurones sérotoninergiques → sérotonine
* neurones noradrénergiques → noradrénaline

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3- transmission synaptique

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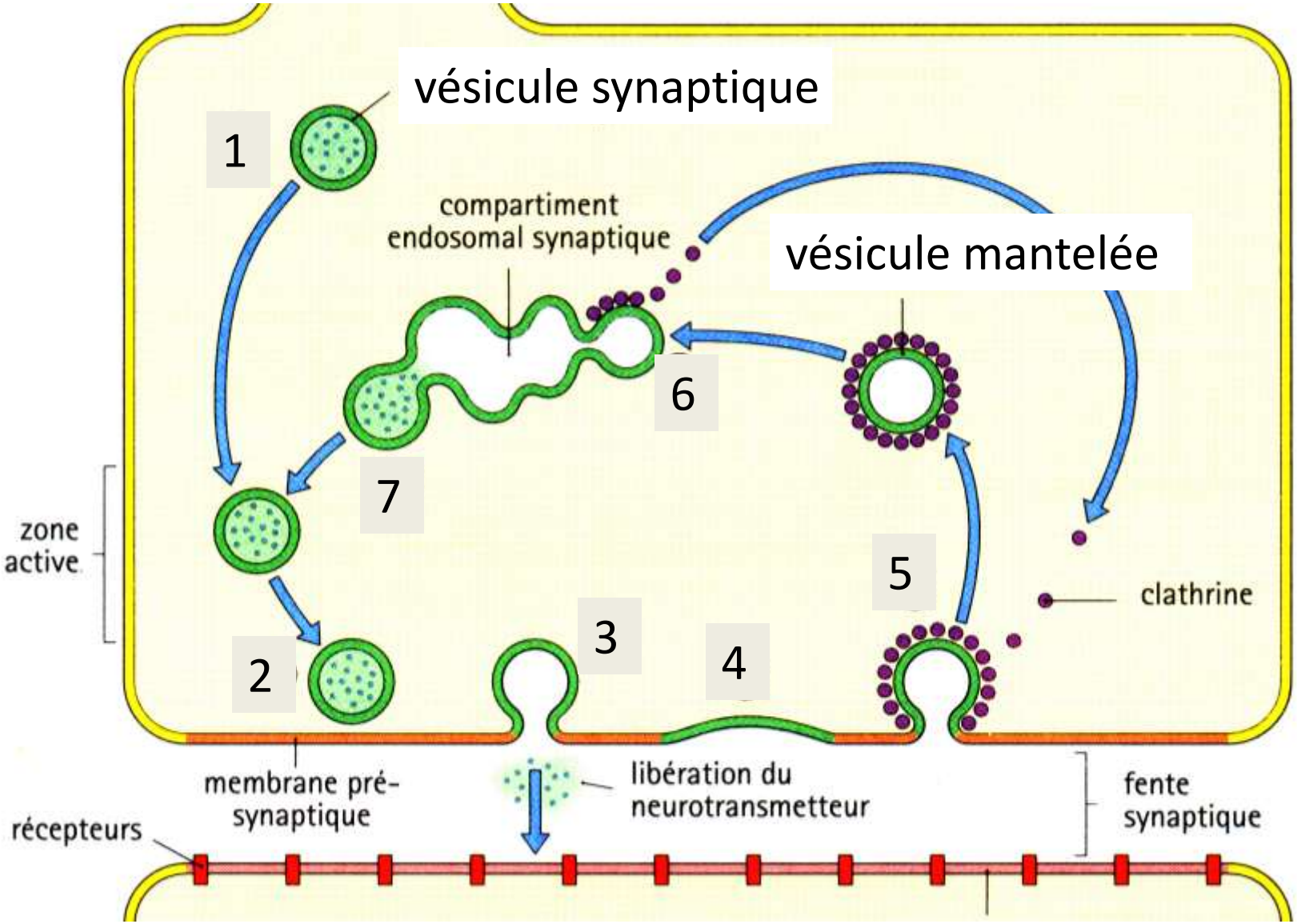
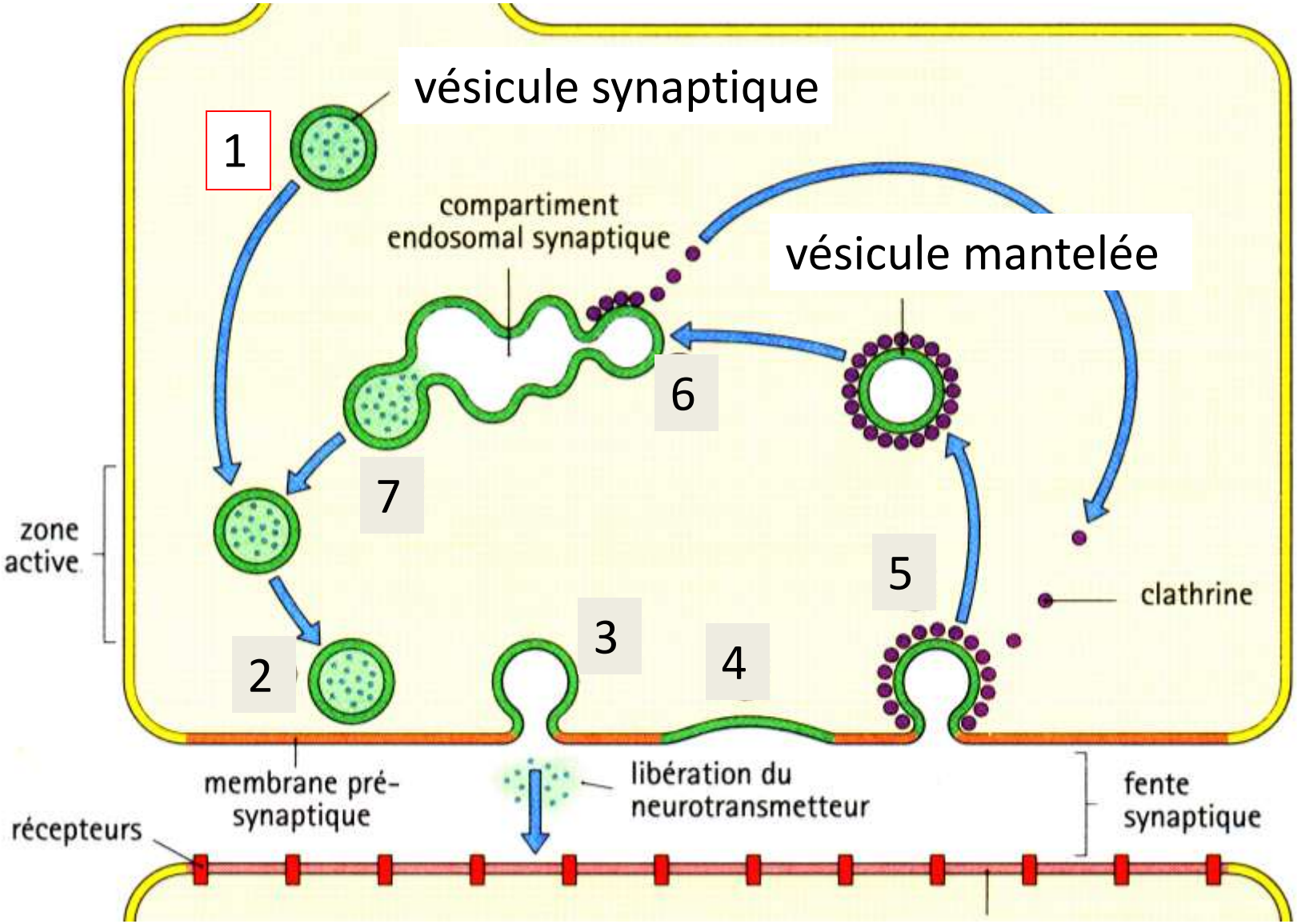


3- transmission synaptique



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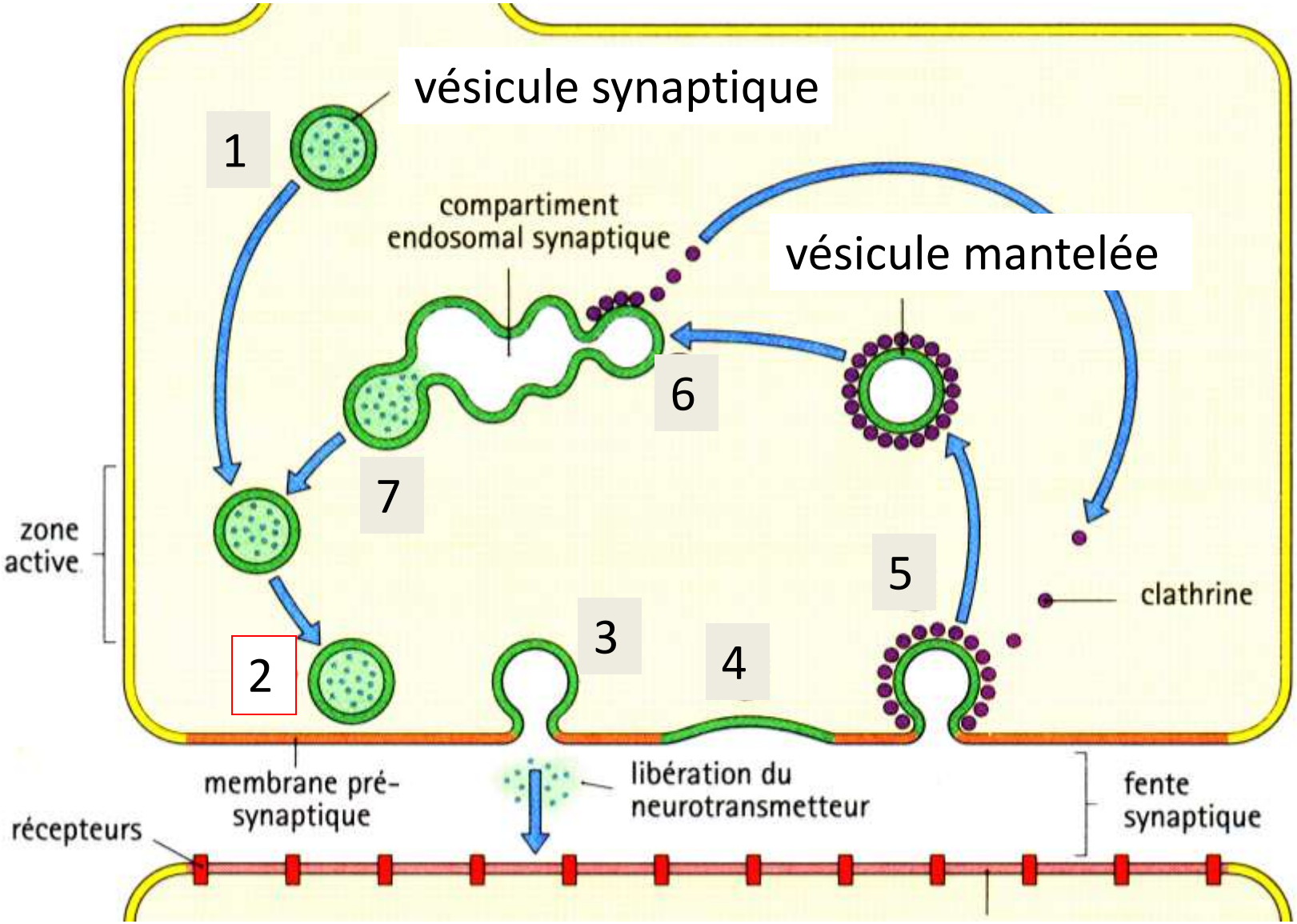

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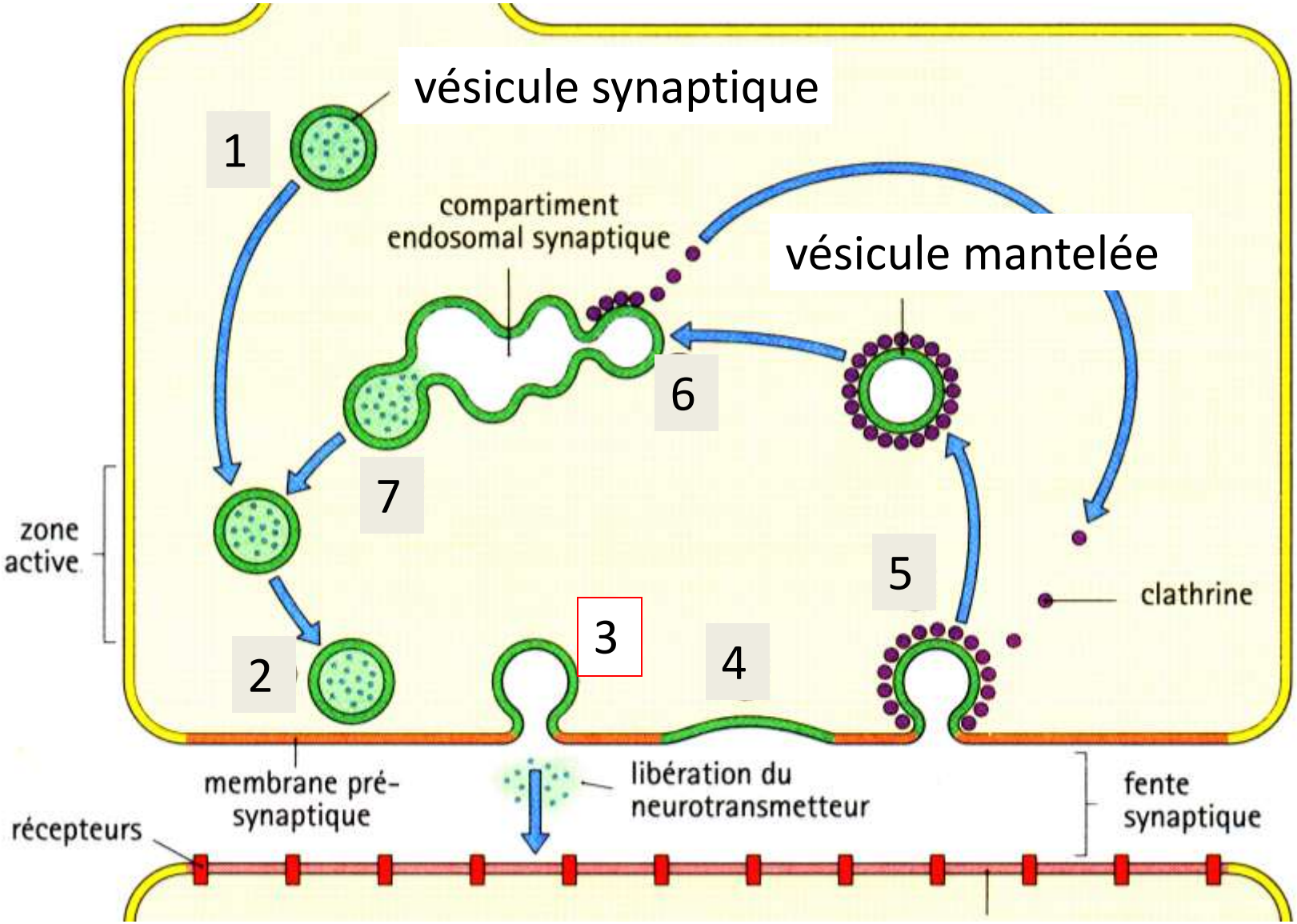

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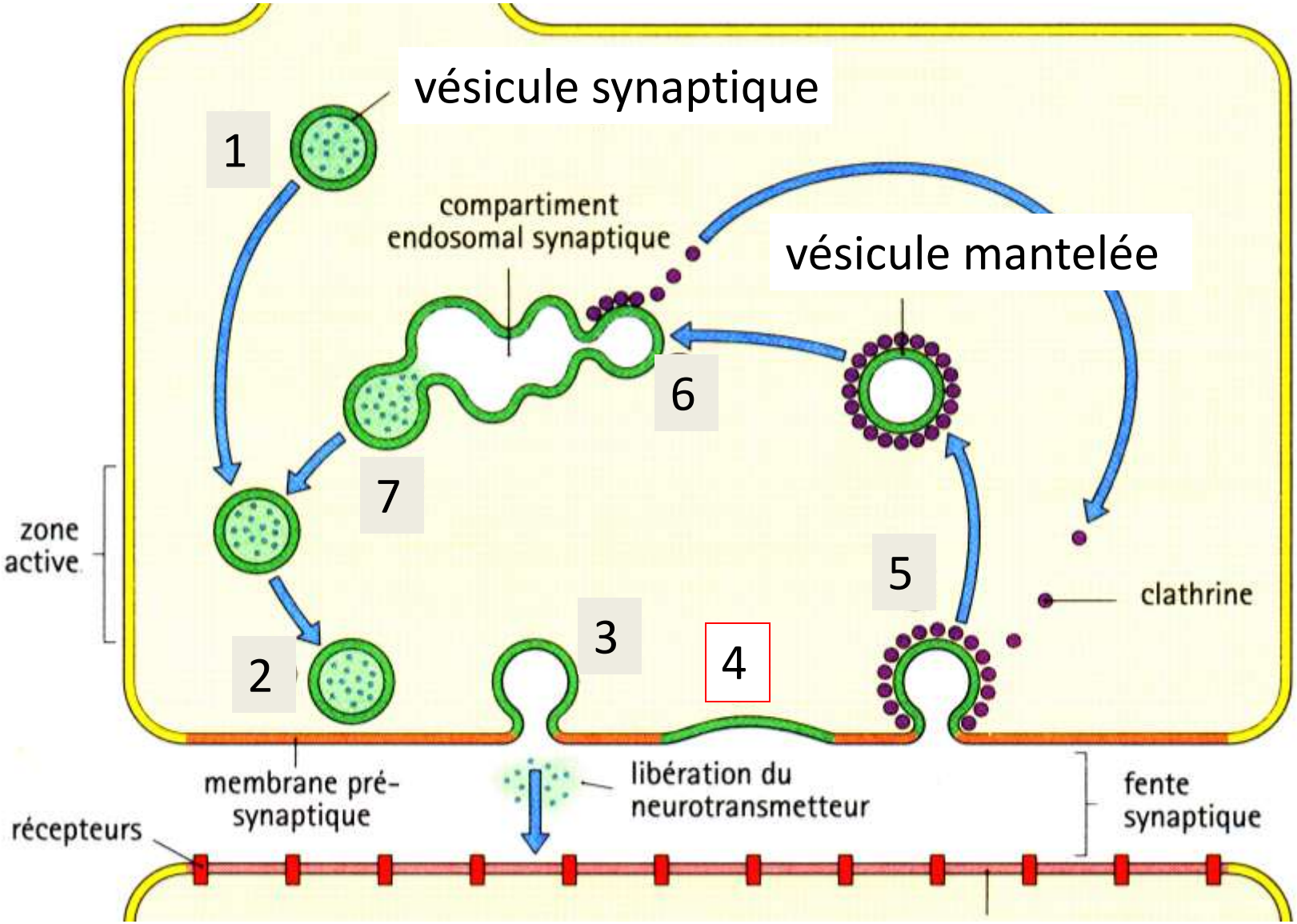

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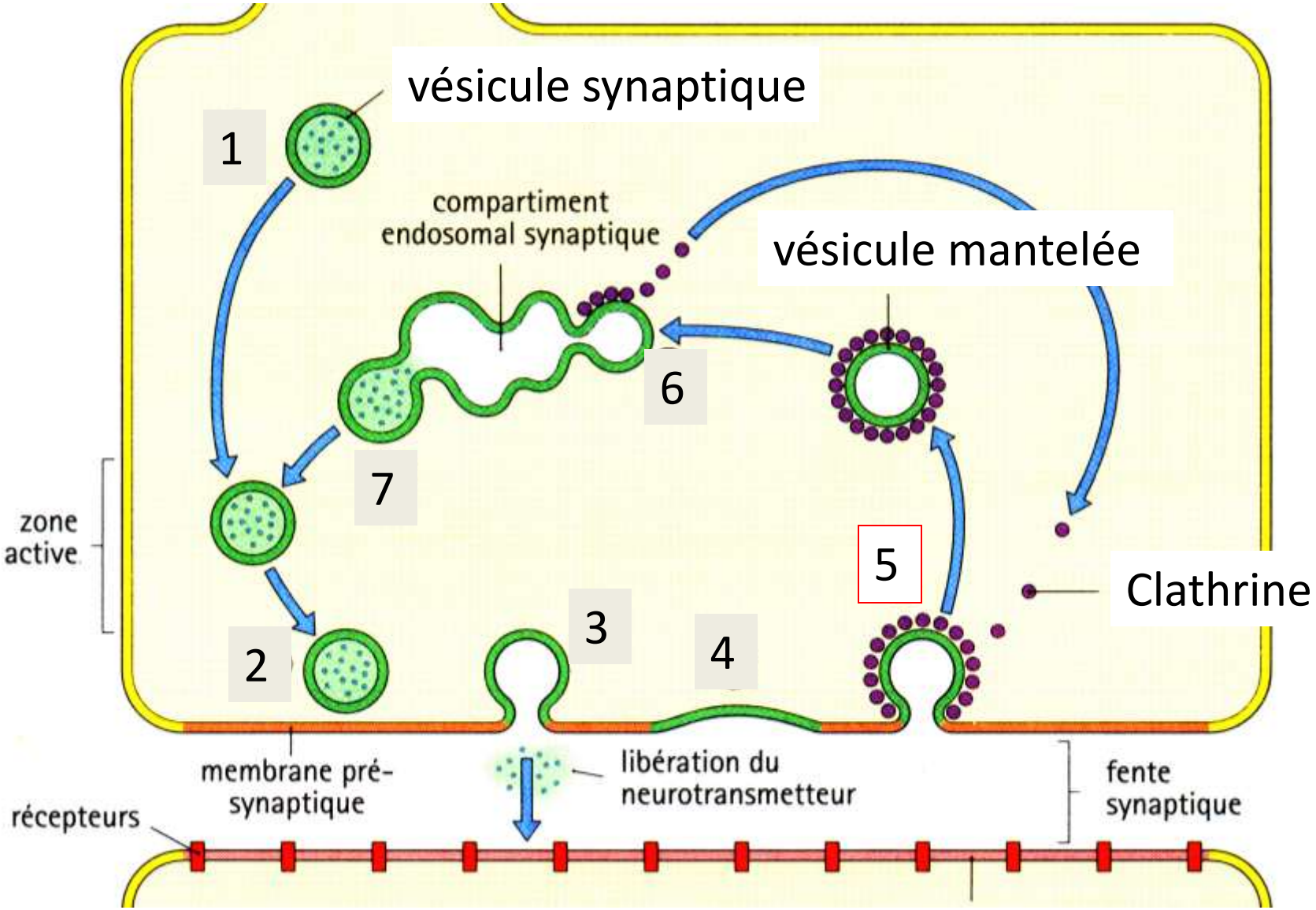

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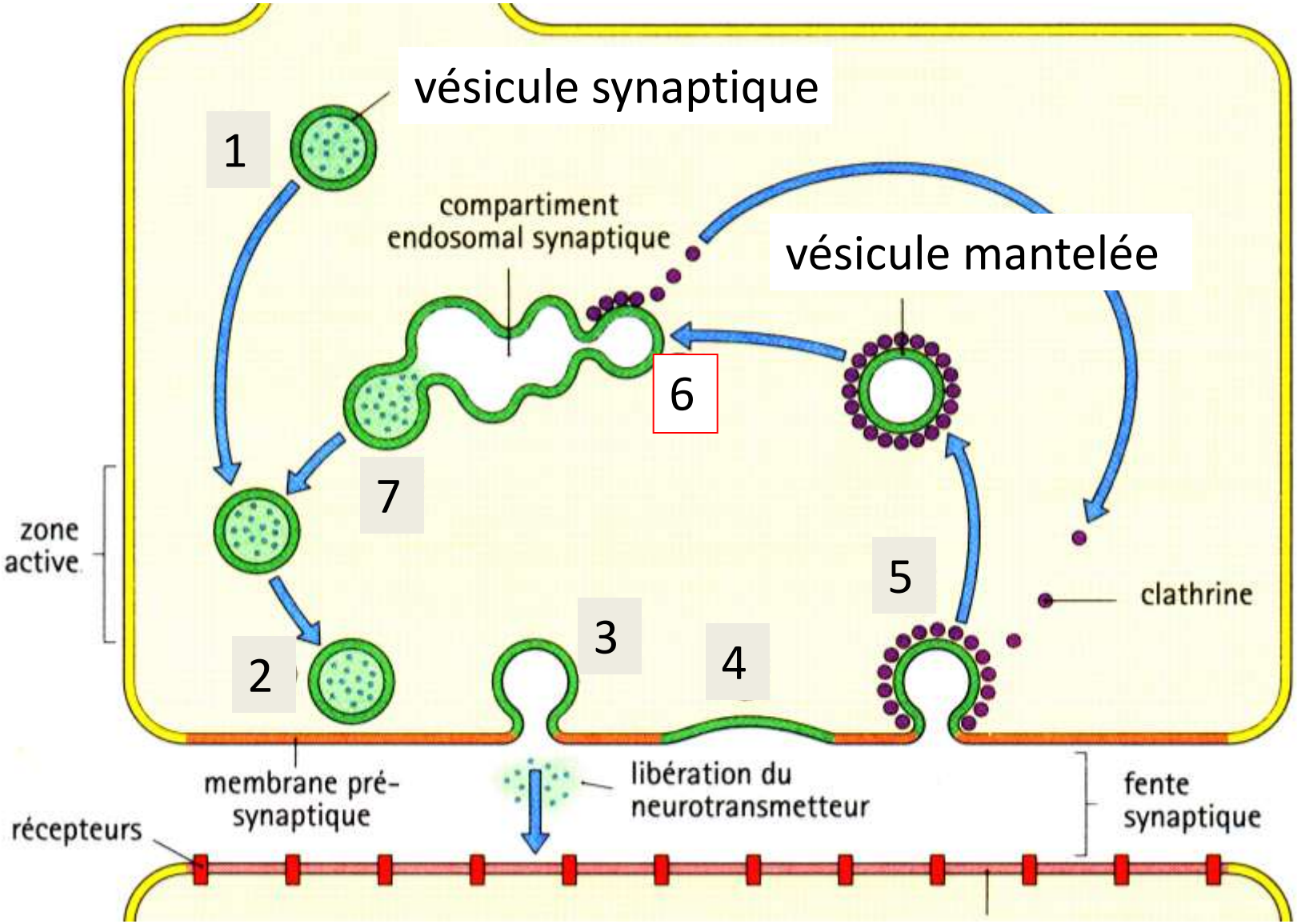

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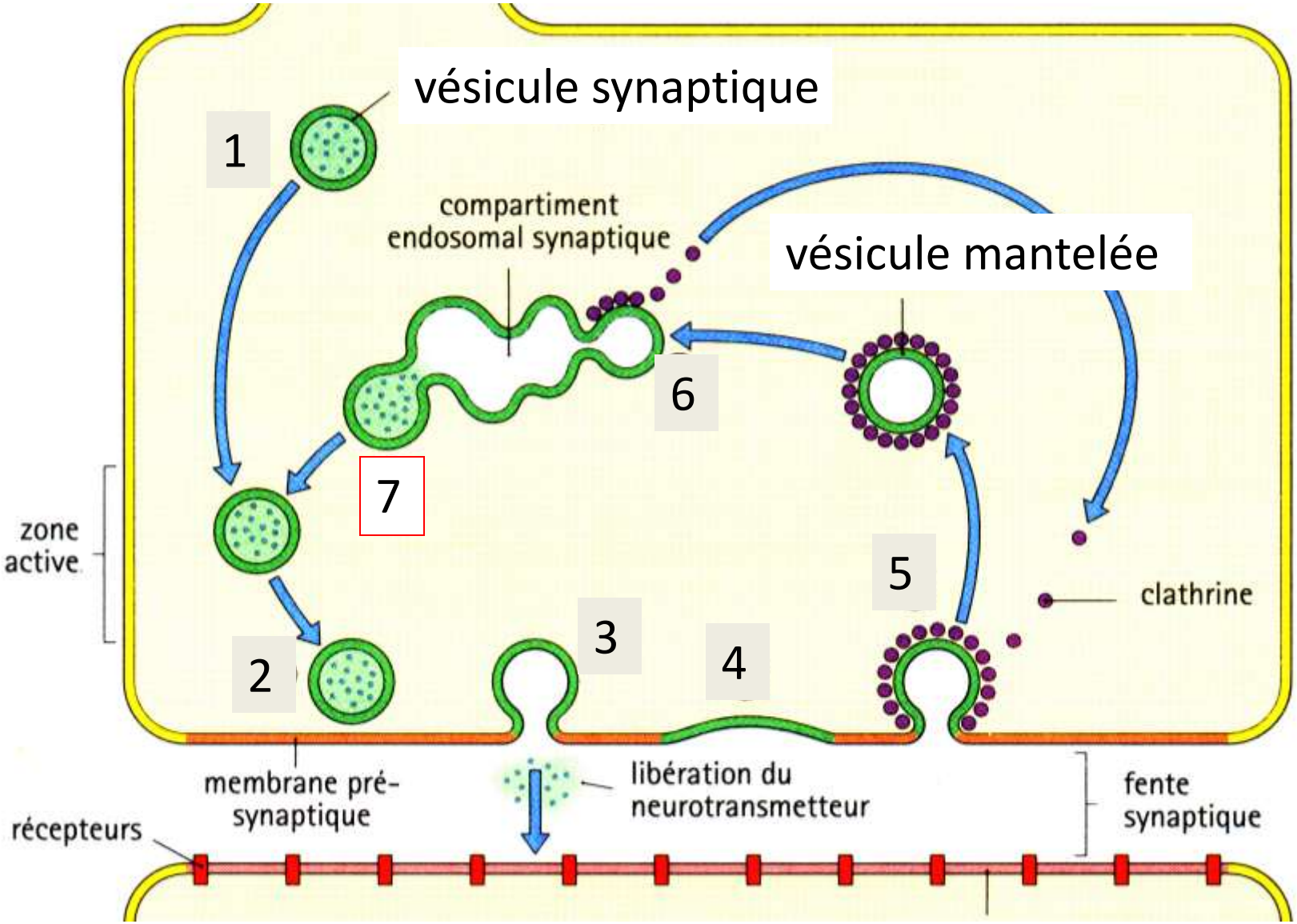
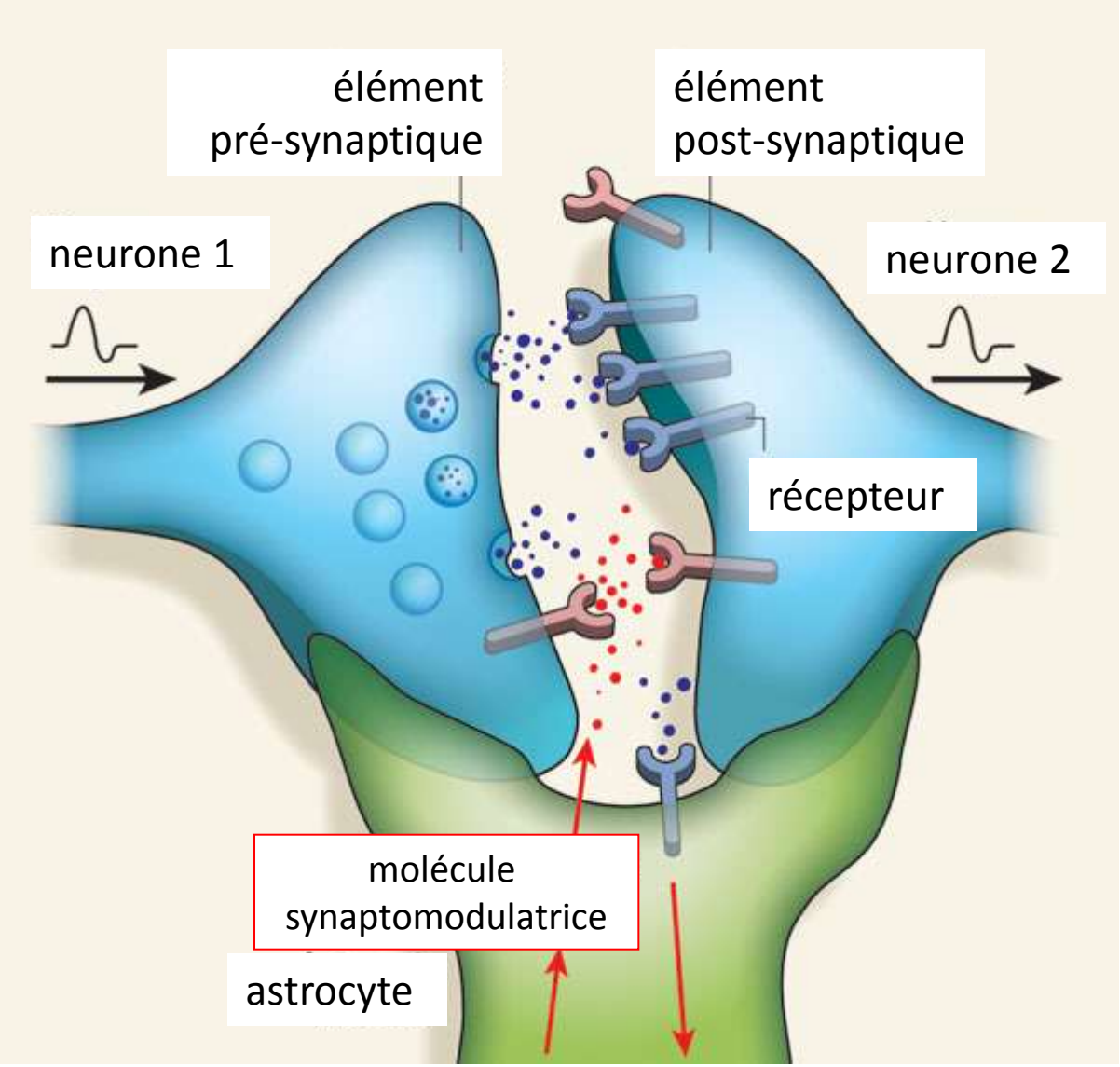
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