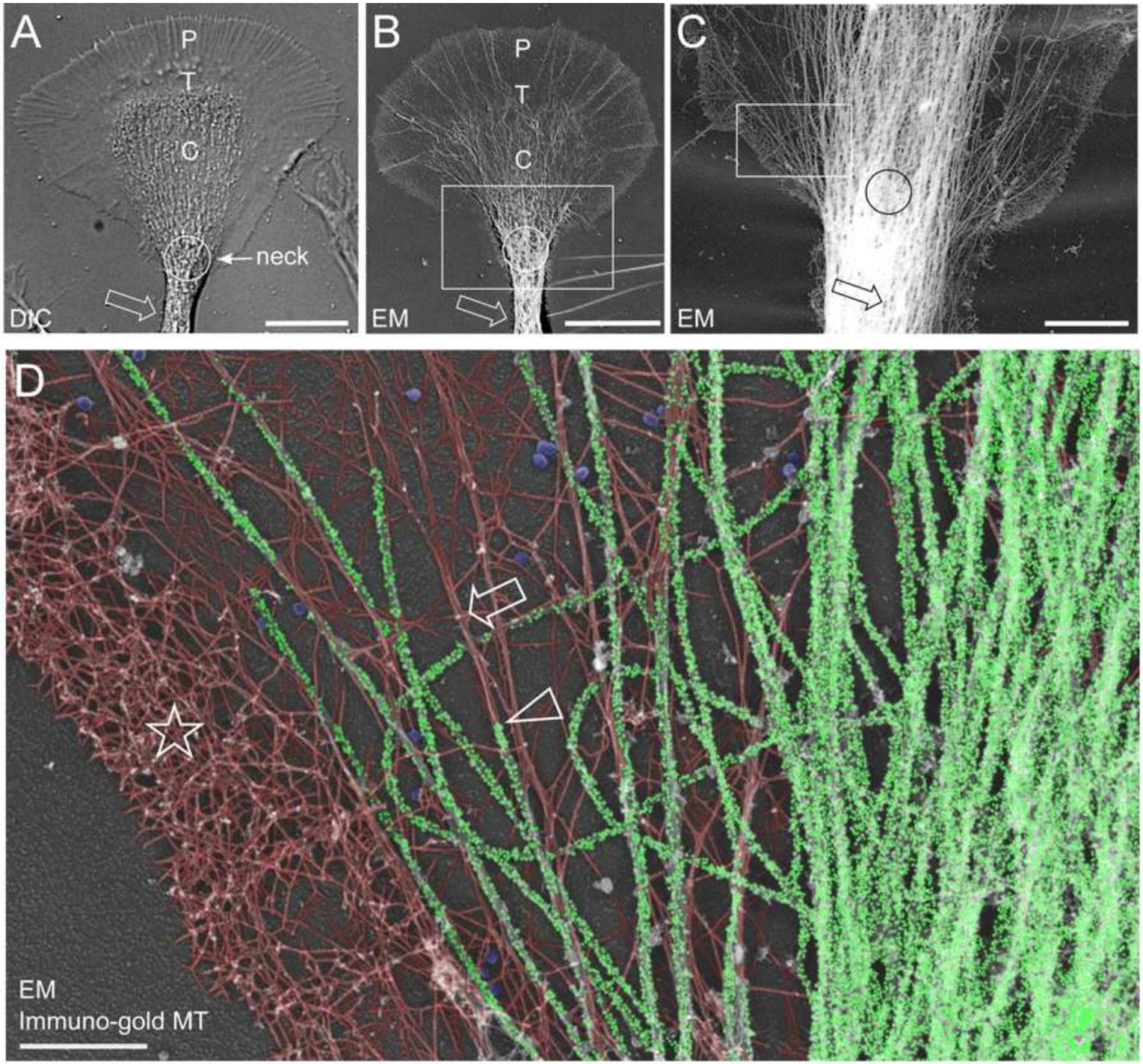
Idegi nyúlványok növekedése

1. Nyúlvány-kinövés – az idegsejt-polaritás kialakulása
2. Nyúlvány-növekedés (elongáció)
3. Irányválasztás – „aktivitás-független” benövés
   - attraktív, repulzív, permisszív felületek
   - Kötegelődés
4. Aktivitás-függő nyúlvány-szelekció



Burnette et al., 2008 Cell

Pattern generátor

Taricha torosa

TTX

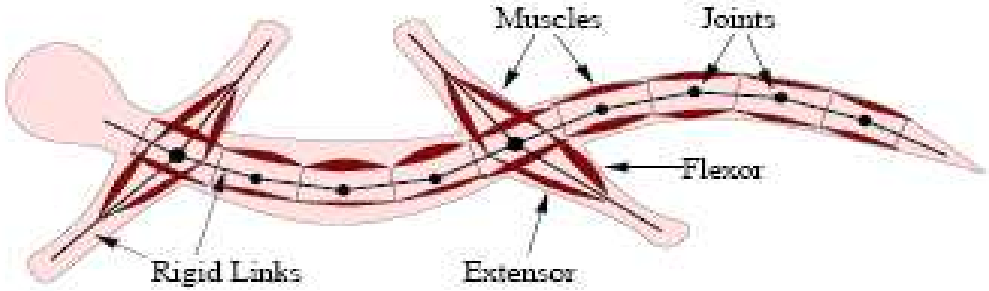
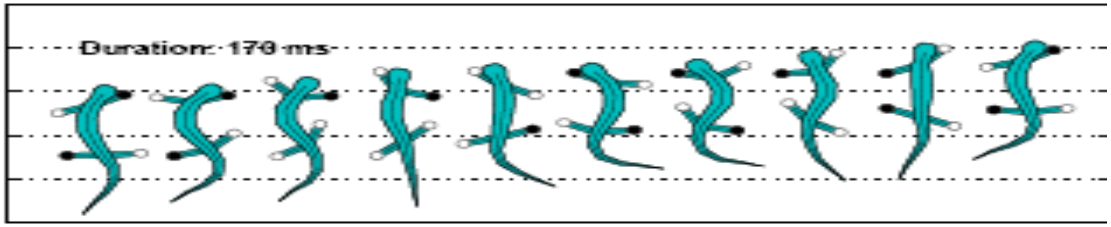
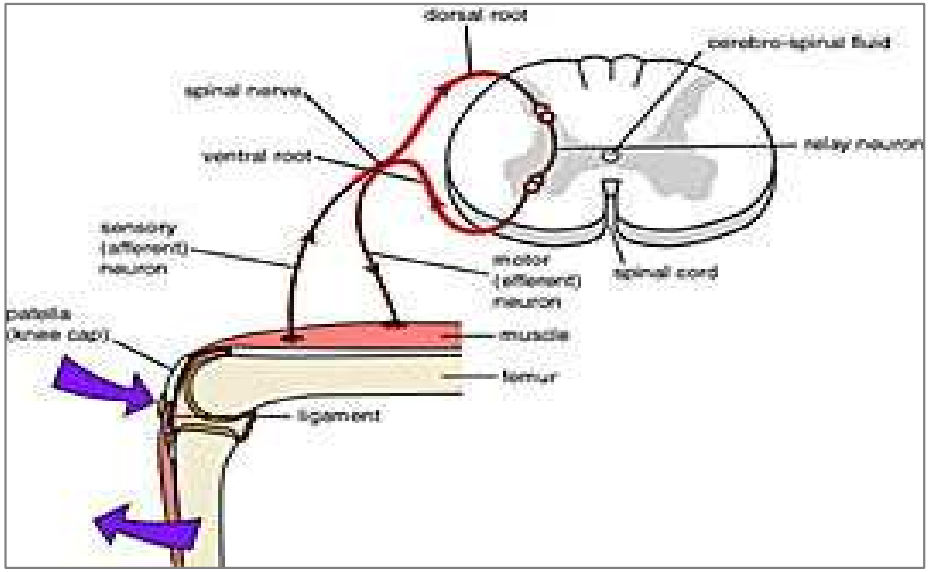
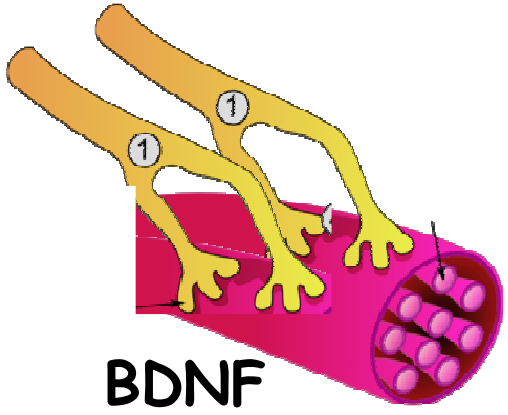


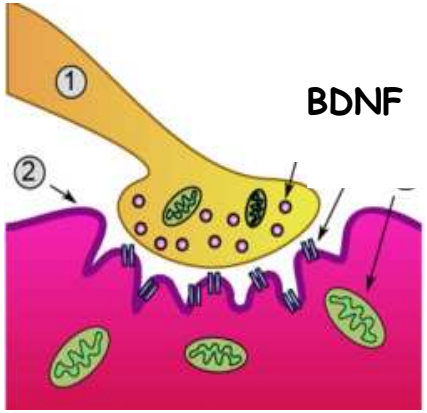
Figure 1: Mechanical configuration of the salamander-like animat.



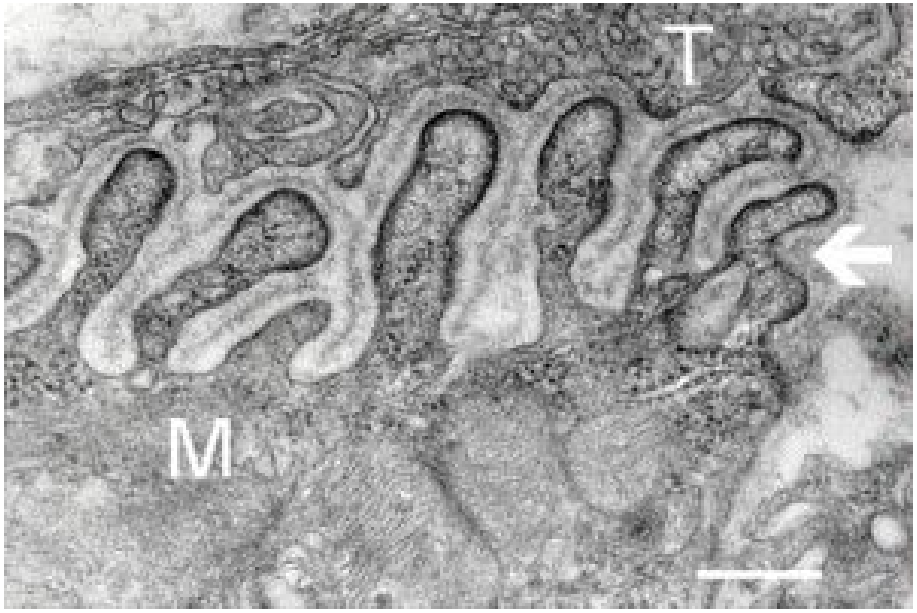


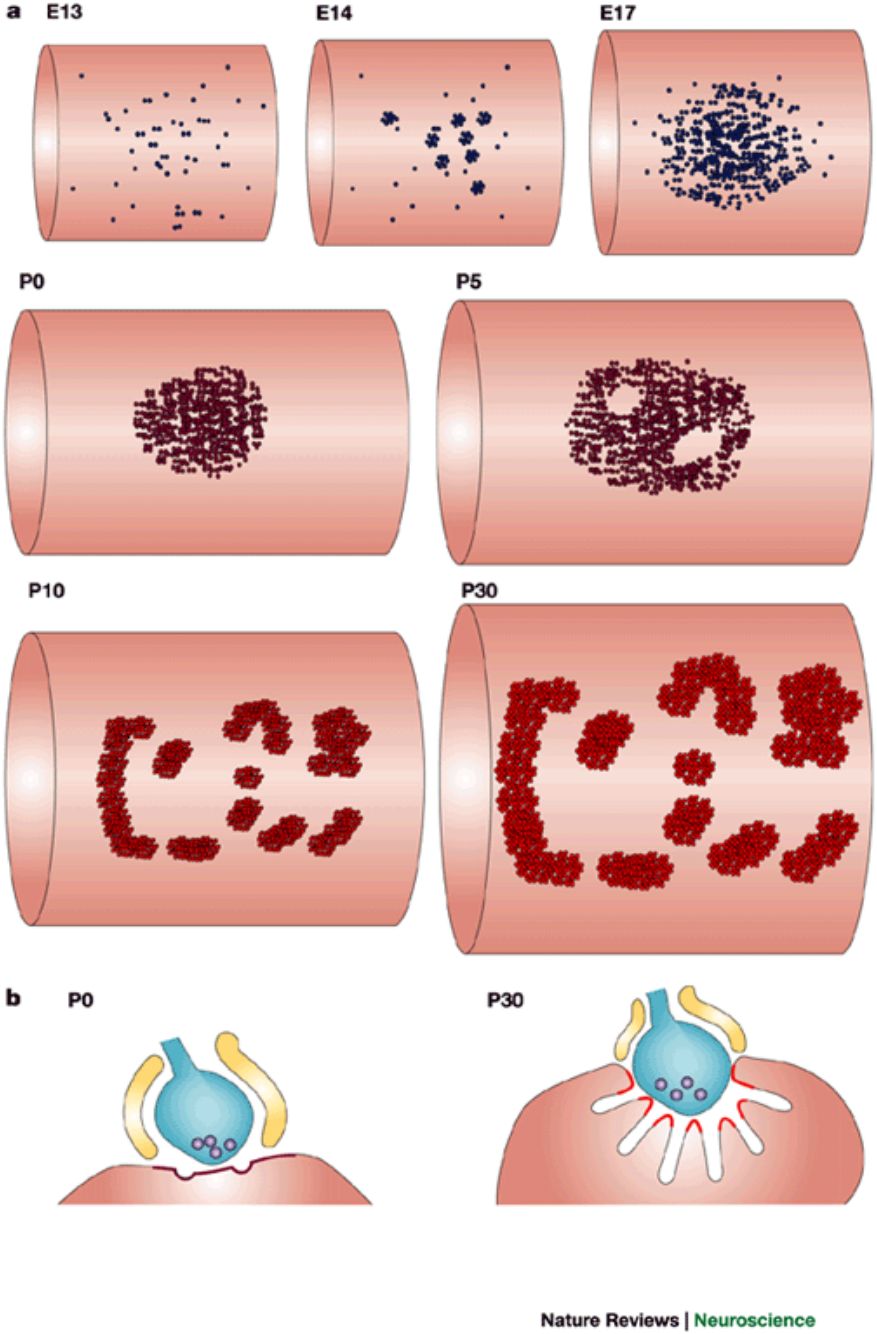
I. „Poli-innerváció” ⟶ specifikus szinapszisok

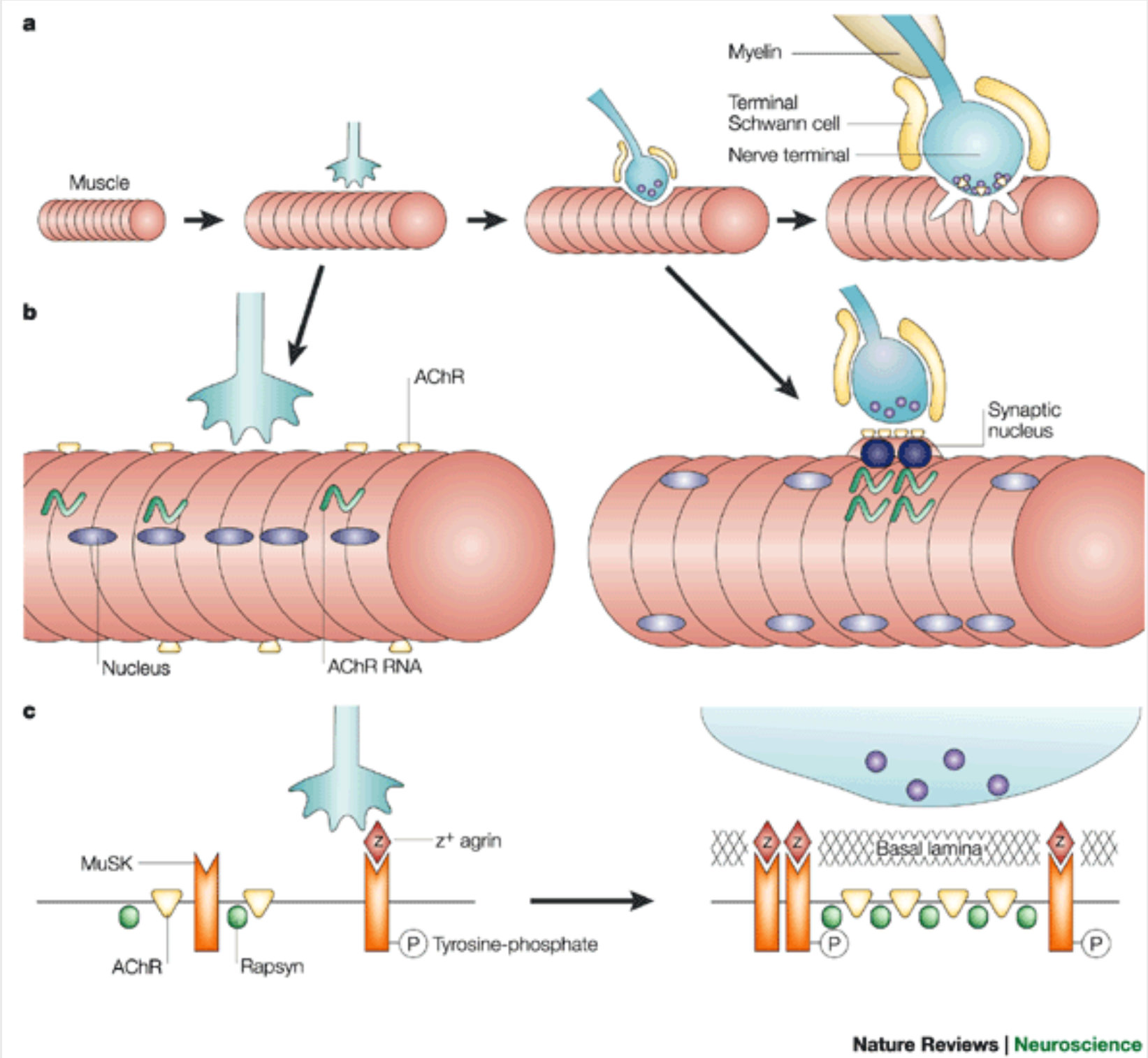


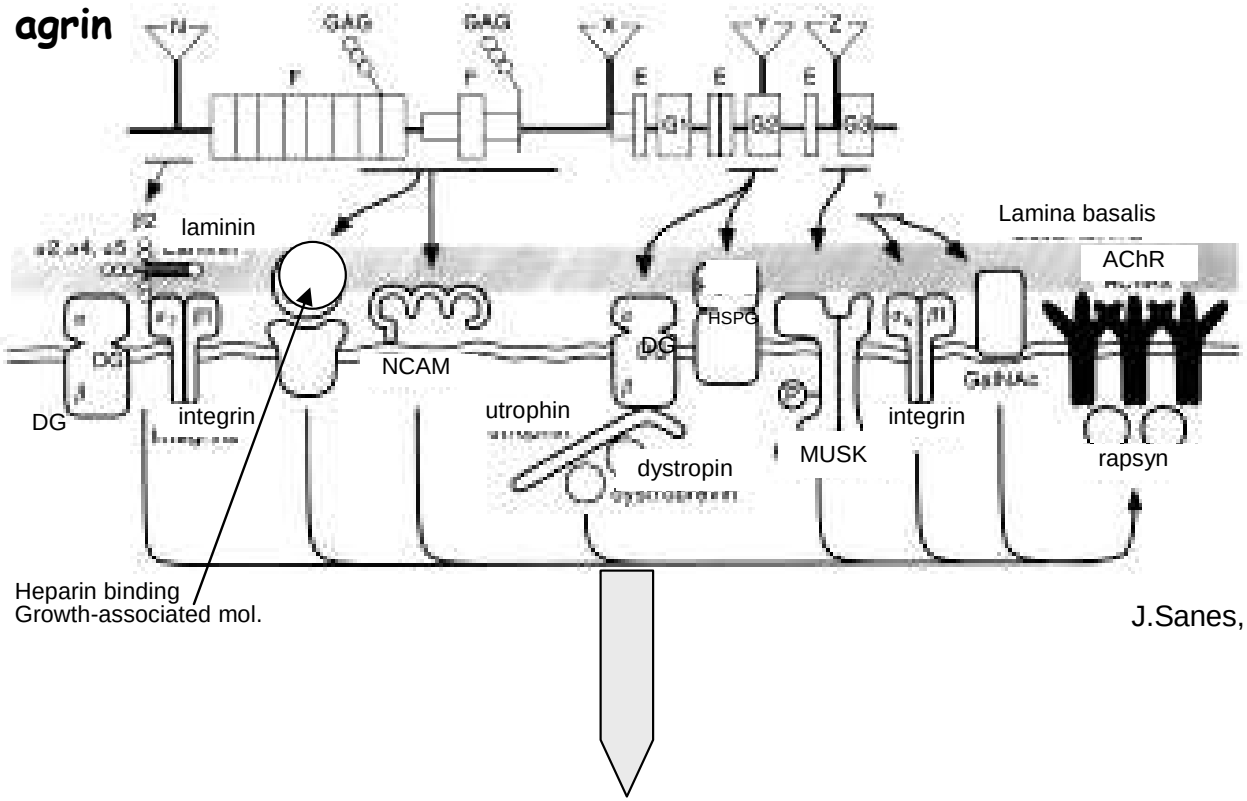


II. Az izom véglemez „érése”: nAchR-ok eloszlása






a
Muscle
Myelin
Terminal
Schwann cell
Nerve terminal
b
AChR
Synaptic
nucleus
Nucleus
AChR RNA
c
MuSK
z+ agrin
AChR
Rapsyn
P Tyrosine-phosphate
Basal lamina
P
P
Nature Reviews | Neuroscience

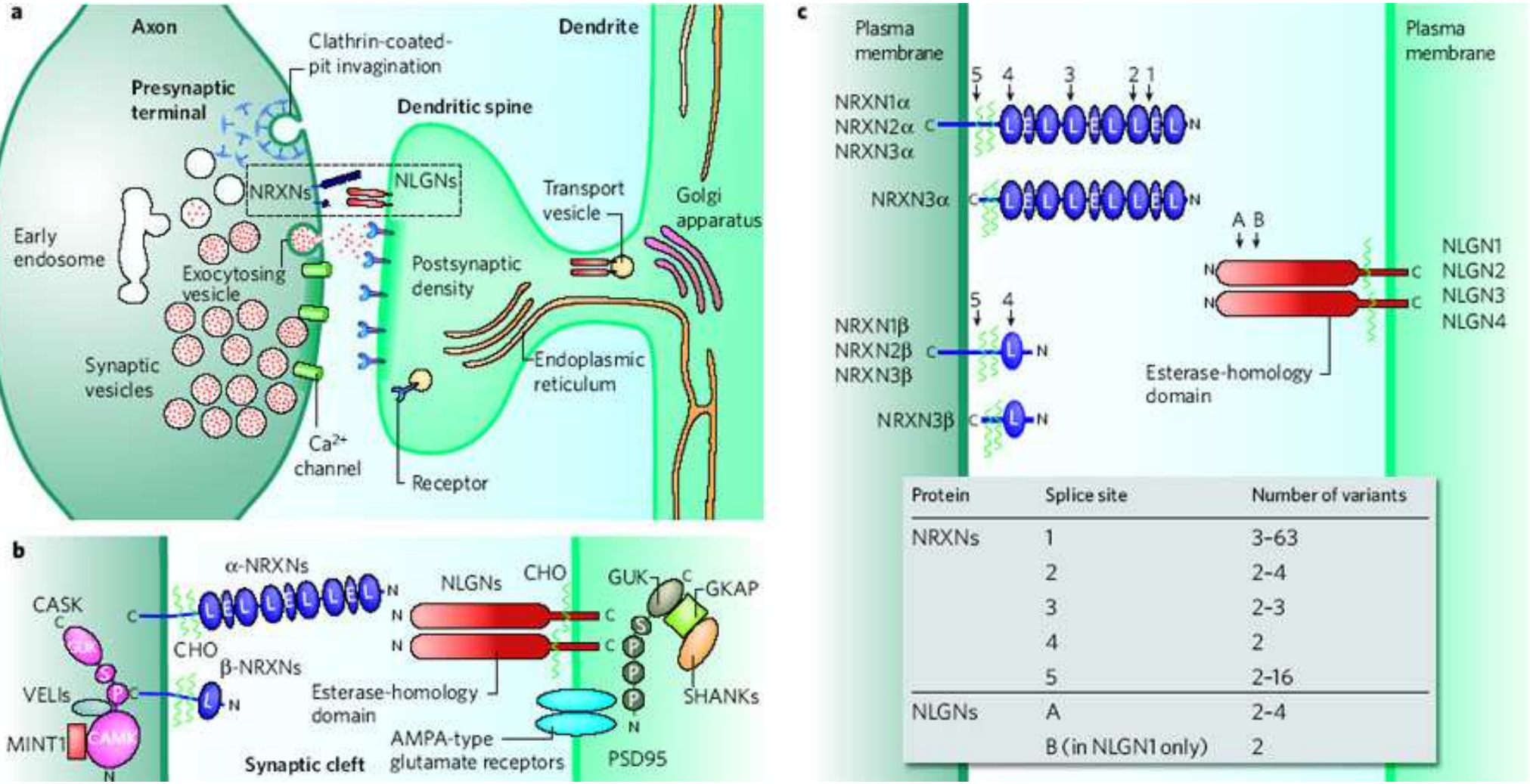


J.Sanes, 1995

„Szinaptikus” magokban eltérő génaktiváció

Extra szinaptikus régió		Szinaptikus régió
$10/\mu^2$	**ACh receptorok**	$10^4/\mu^2$
$\alpha^2\beta\gamma\delta$		$\alpha^2\beta\varepsilon\delta$

Egy serkentő szinapszis szerkezete; neurexin-ek (NRXNs) és neuroligin-ek (NLGNs) feltételezett helye a szinapszisban.



Protein	Splice site	Number of variants
NRXNs	1	3–63
	2	2–4
	3	2–3
	4	2
	5	2–16
NLGNs	A	2–4
	B (in NLGN1 only)	2

***Südhof, T.C., Nature* 455**, 903-911(16 October 2008

NRXN–NLGN junction, + néhány preszinaptikus és posztszinaptikus kötő fehérje

preszinaptikus oldalon: **CASK, VELIs, MINT**;

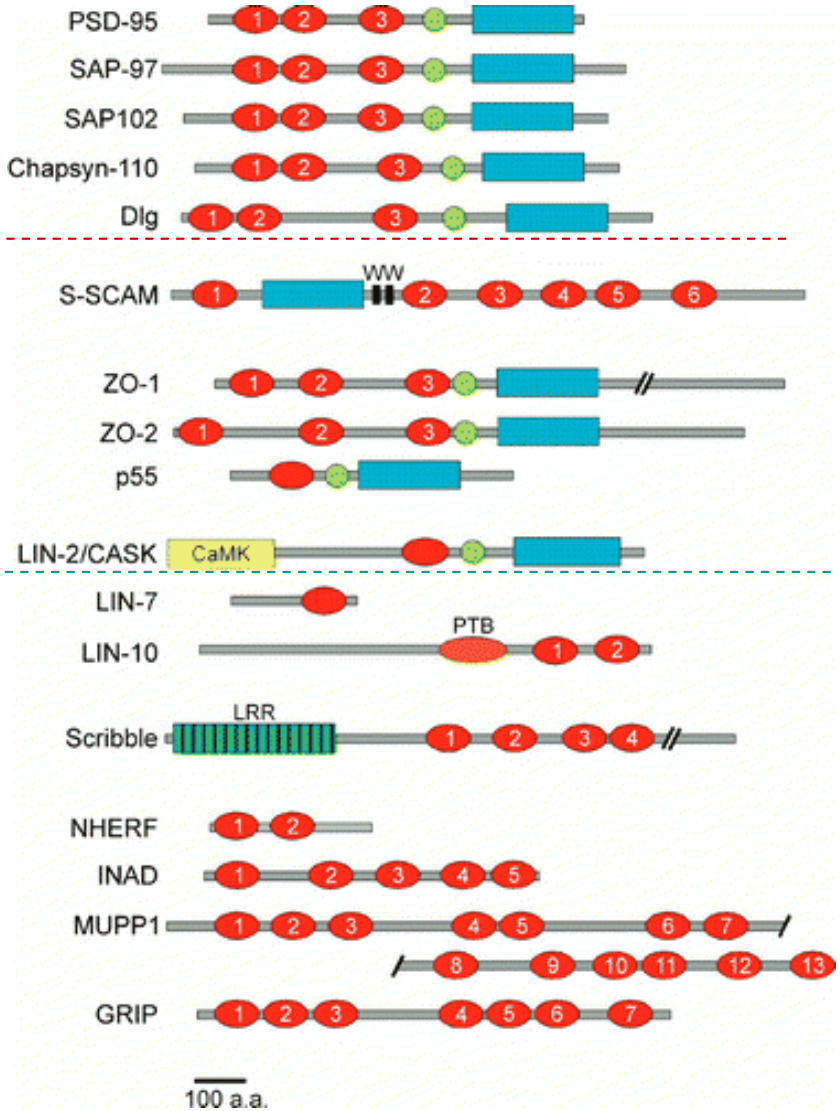
posztszinaptikus oldalon: **PSD95** (köti az AMPA-típusú glutamat receptorokat az 1. PDZ domain-jével, és NLGN-eket a 3. PDZ domain-jével), **GKAP és SHANK**.

C, carboxyl terminus; CAMK, Ca2+/calmodulin-dependent protein kinase domain of CASK; CHO, carbohydrate-attachment sequence; E, epidermal growth factor (EGF)-like domain; GUK, guanylate-kinase domain; L, LNS (laminin, NRXN, sex-hormone-binding globulin) domain; N, amino terminus; P, PDZ domain; S, SH3 domain.

PSD-95 család /alcsaládja a MAGUK fehérjéknek

PSD-95

neuroligin, NMDA receptors, AMPA receptors, and potassium channels



PDZ-containing proteins

mammalian **PSD-95 subfamily** of MAGUKs PSD-95/SAP90, SAP97, PSD-93/chapsyn-110 and SAP102.

Discs large (Dlg) is the Drosophila homologue of PSD-95.

S-SCAM (also known as WWP3/MAGI-1) contains two WW domains in addition to GK and PDZ domains (Dobrosotskaya et al 1997, Hirao et al 1998).

ZO-1 and **ZO-2** at tight junctions of epithelial cells. p55 the cell membrane of erythrocytes.

LIN-2/CASK with a calmodulin-dependent protein kinase (CaMK)-like domain.

LIN-2 : a ternary complex with **LIN-7** and **LIN-10**.

Scribble : leucine-rich repeats (LRR); required for epithelial cell polarity (Bilder & Perrimon 2000). NHERF, INAD, GRIP and MUPP1 (Ullmer et al 1998) **multi-PDZ proteins**.

PDZ domains

SH3 domains;

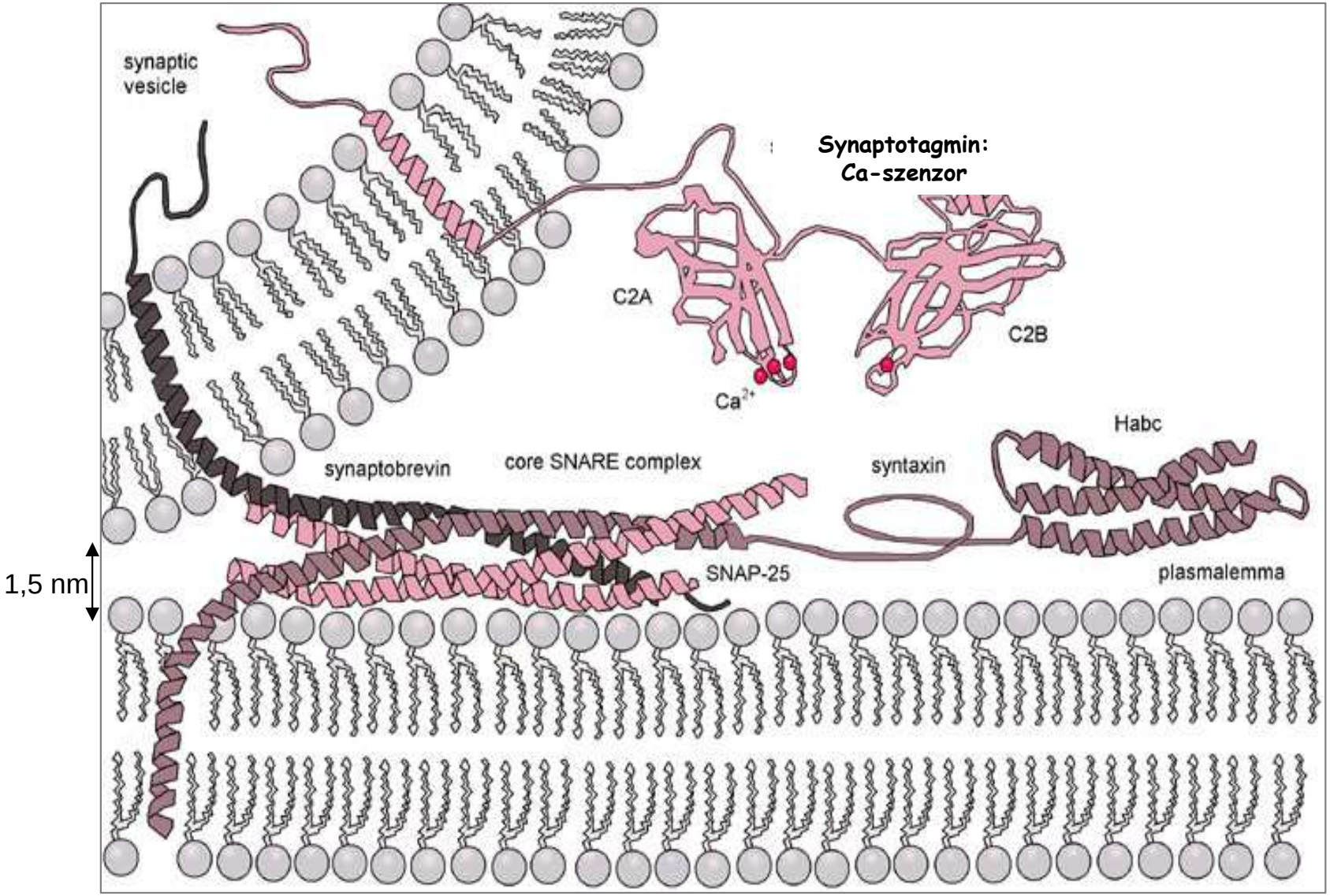
GK domains.

PTB, phosphotyrosine kötő domain.

SNARE proteins ("SNAP and NSF attachment receptors")

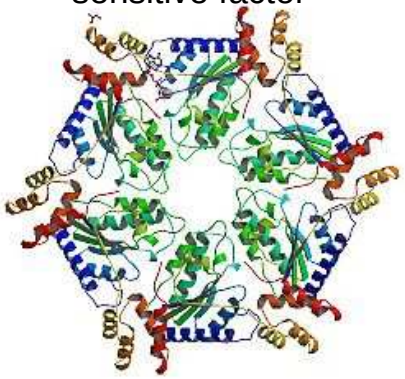
IC vezikula fúzió plazmamembránhoz, lizoszóma membránhoz, stb

SNARE motif : 60-70 amino sav ; reverzibilis kapcsolódás : szoros, négyszeres helix köteggé:
"trans"-SNARE complexum.
syntaxin 1 and **SNAP-25** sejt membránon, kluszterekben;
synaptobrevin (vesicle-associated membrane protein or VAMP) a vezikula membránban.

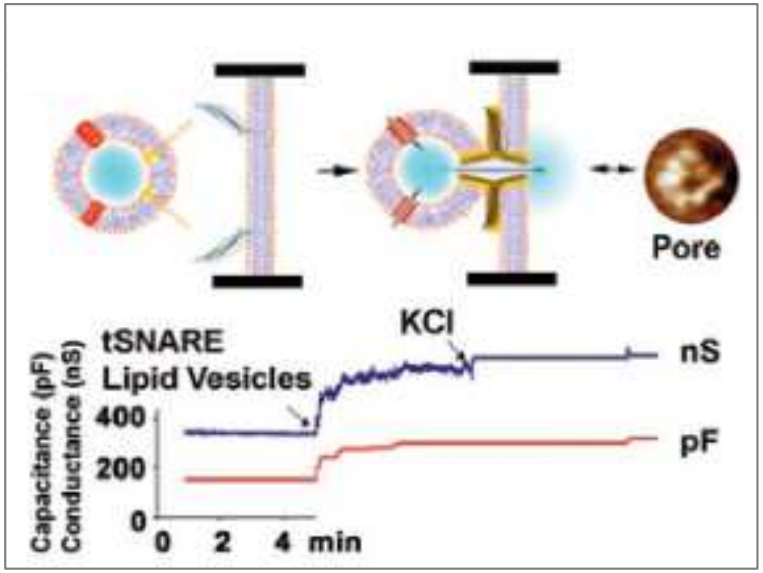


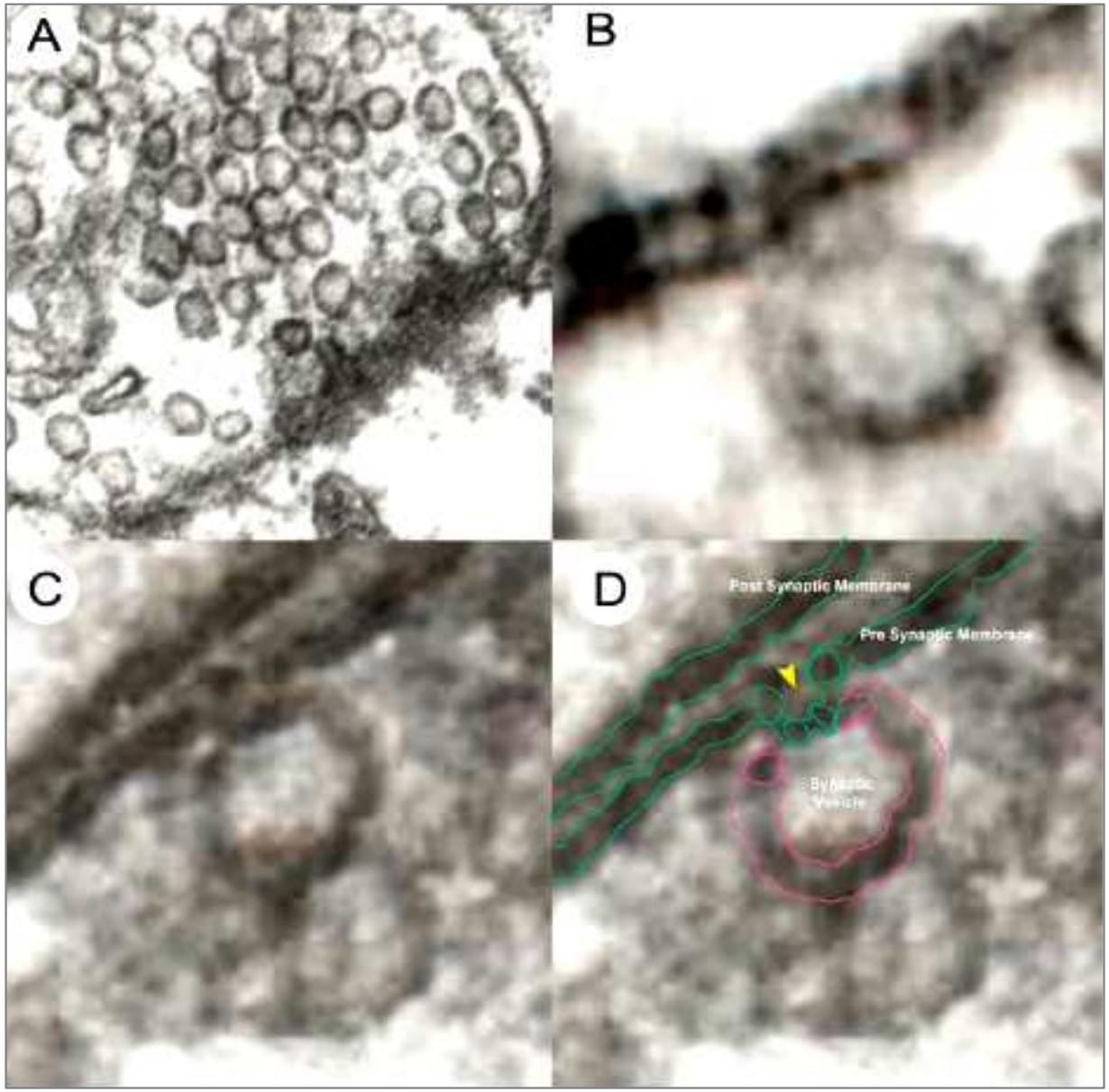
Georgiev DD, 2007

N-ethylmaleimide-sensitive factor

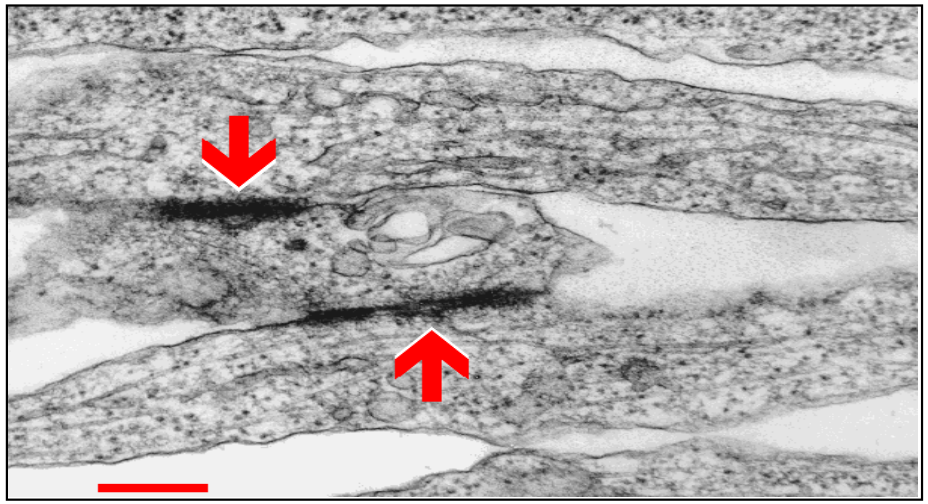


J.Rothman, 1979

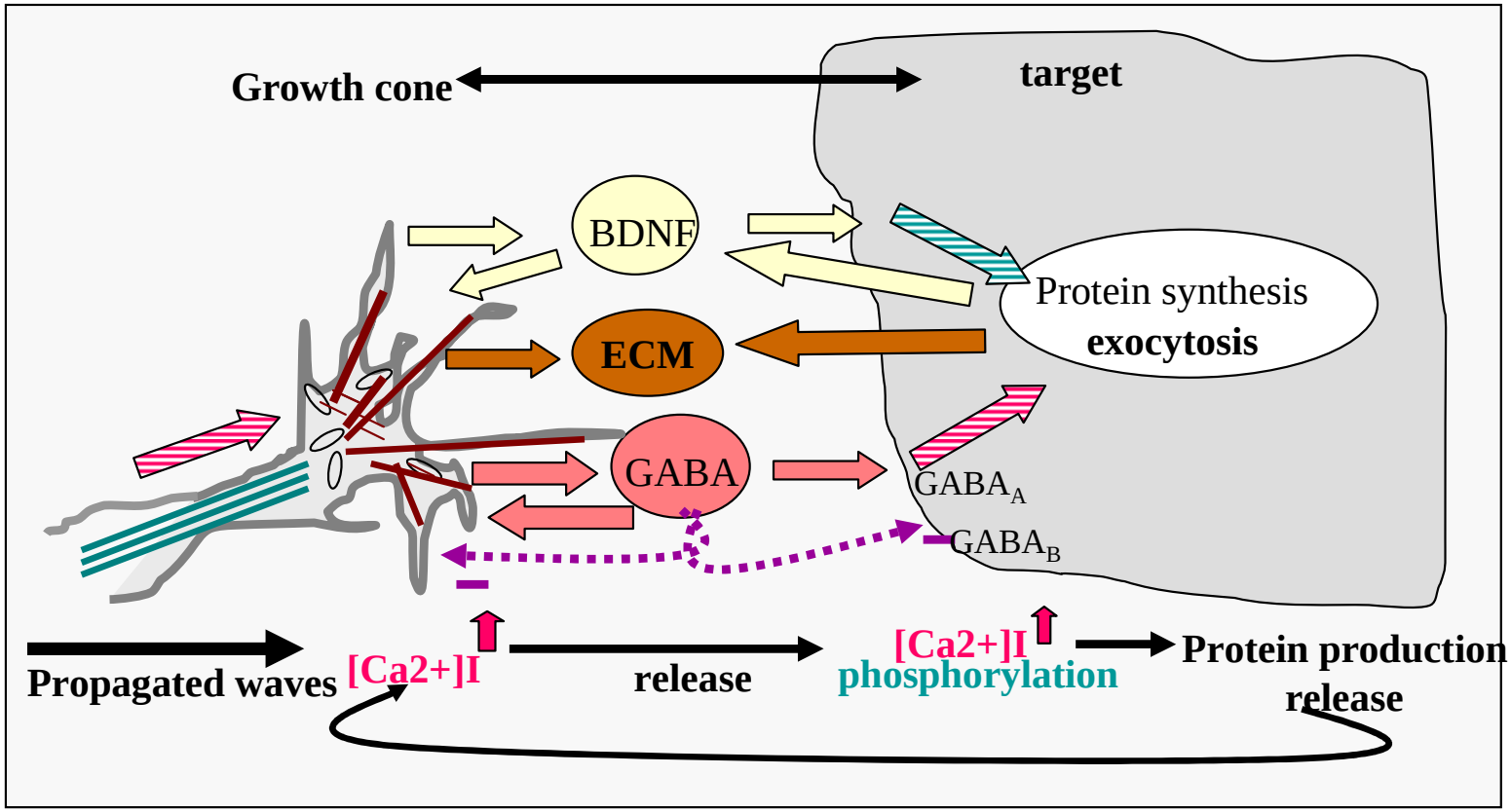




Jena, B.J., J. Cell. Mol. Med. Vol 8, No 1, 2004

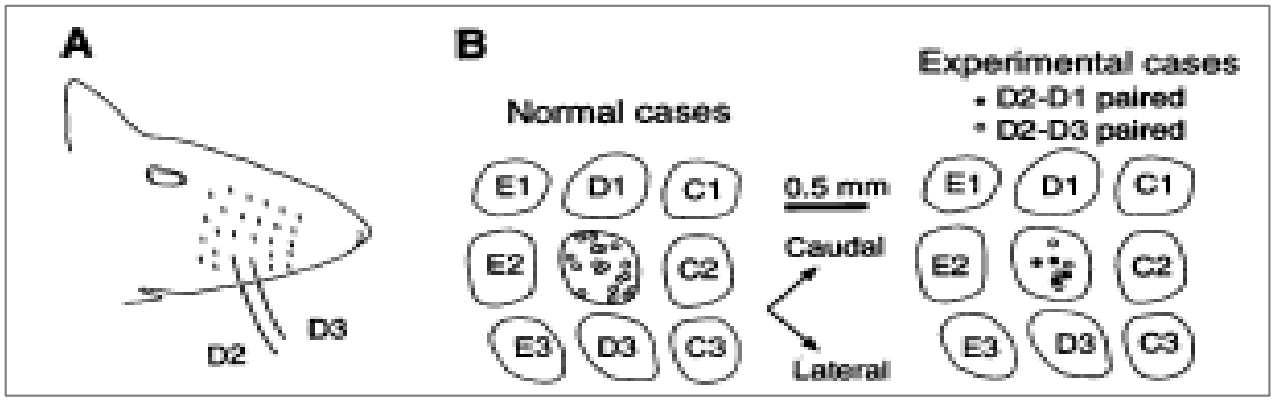


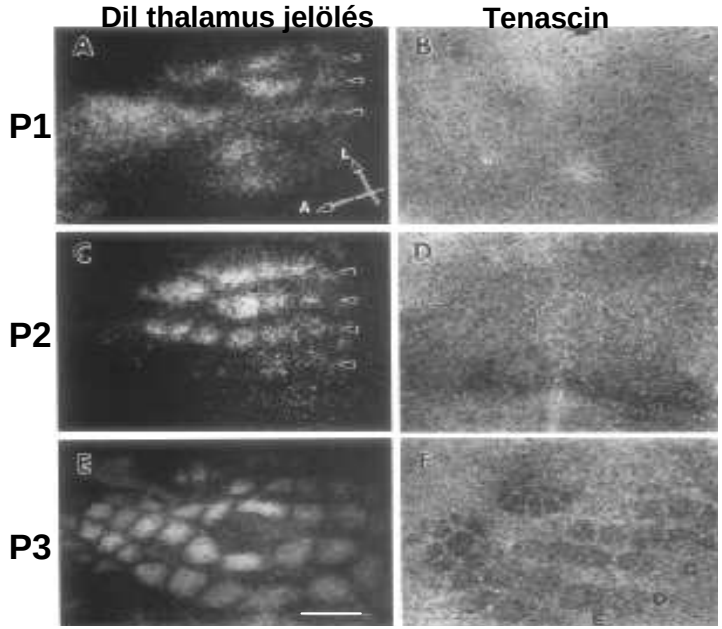
J. Spacek; http://synapses.mcg.edu/atlas/



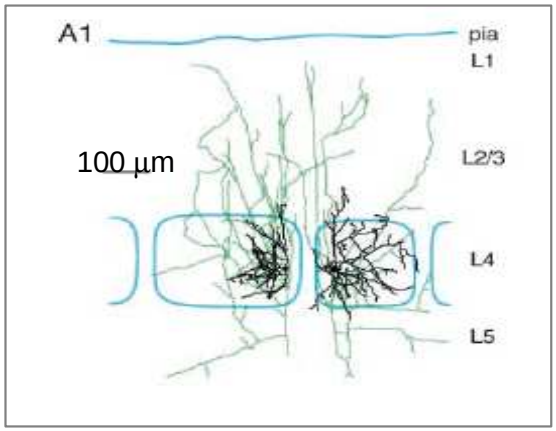
Jelitai, Madarasz; Int.Rev.Neurobiol. 2006

Barrel mező a szomatoszenzoros (1) area 4. rétegében





Jhaveri, 1991. PNAS



Peteresen, Sakmann; J.Neurosci. 2000