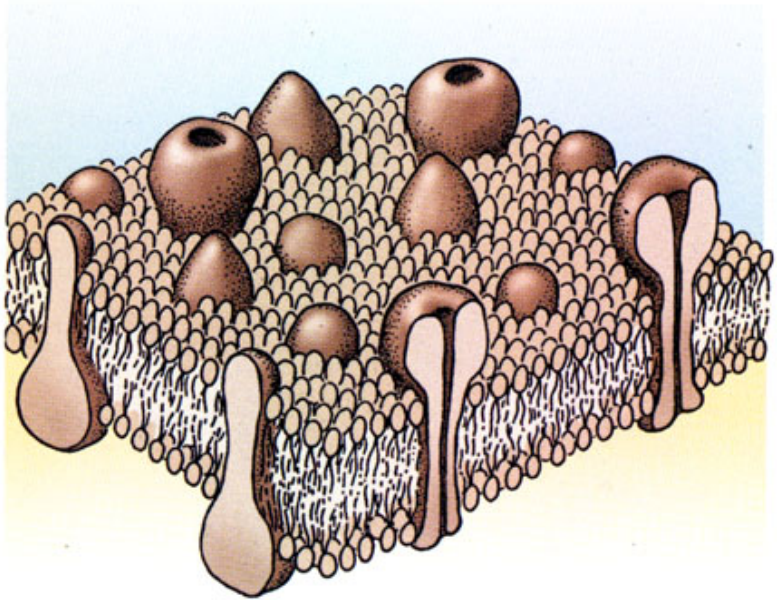
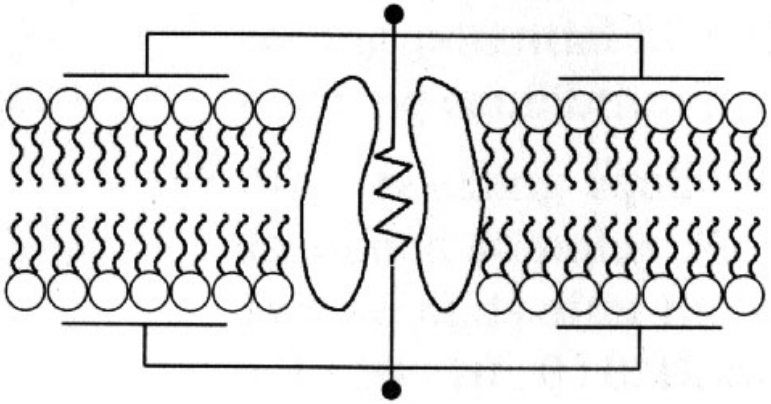
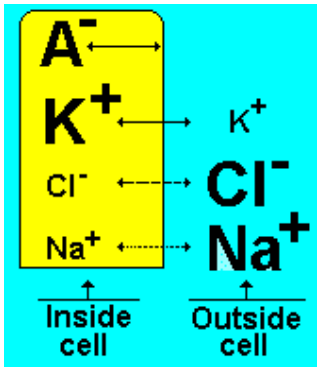
Qué estará pensando la sanguijuela en este momento?

Sergio Daicz

13 de mayo de 2005

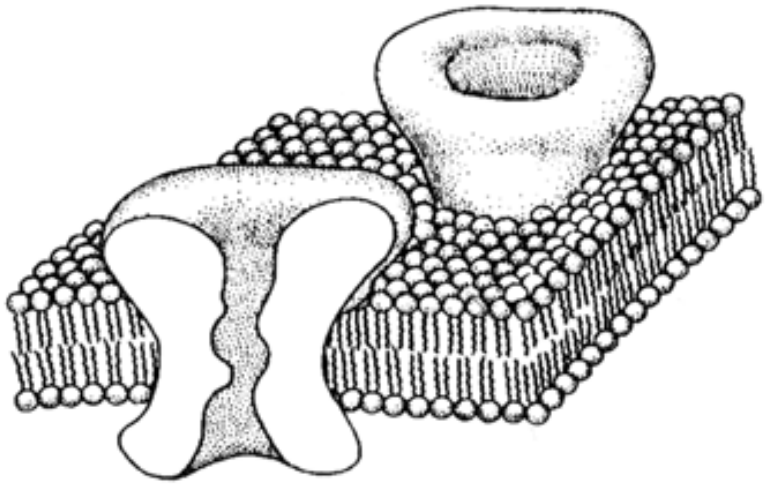


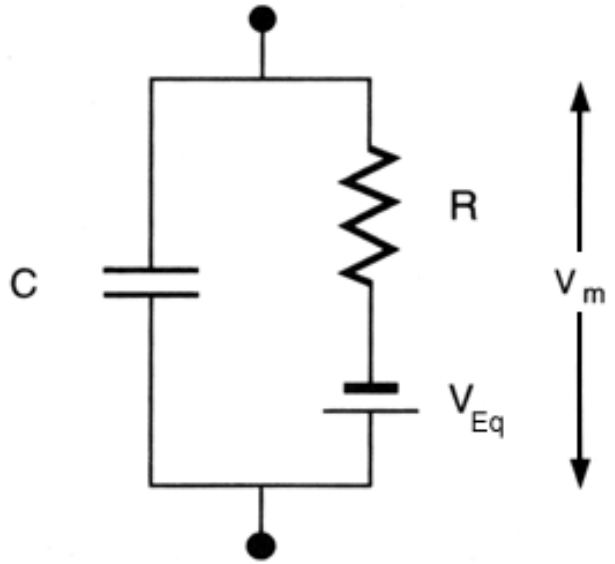




$$V_{eq} = \frac{RT}{zF} \ln \frac{[Kout]}{[Kin]}$$

	Intracelular	Extracelular	V_{eq}
K^+	400	20	-75
Na^+	50	440	55
Cl^-	60	560	-56
Ca^{2+}	0.0001	10	145





$$I_C(t) = C\frac{dV_m(t)}{dt} \quad I_R(t) = \frac{V_m(t) - V_{eq}}{R}$$

$$I_C + I_R = 0$$

$$C\frac{dV_m(t)}{dt} = -(V_m(t) - V_{eq})g$$

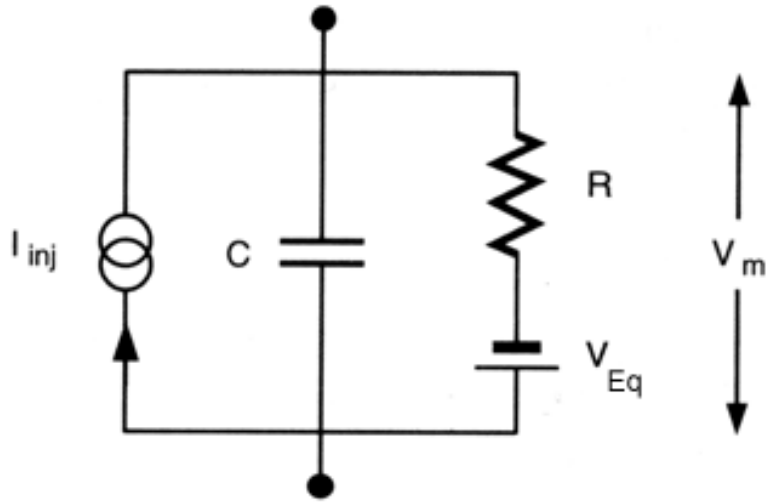
$$C\frac{dV_m(t)}{dt} = -(I_K + I_{Cl} + I_{Na} + \dots)$$

$$I_{ion} = (V_m(t) - V_{ion})g_{ion}$$

$$V_{eq} = \frac{V_K g_K + V_{Na} g_{Na} + V_{Cl} g_{Cl} + \dots}{g_K + g_{Na} + g_{Cl} + \dots}$$

$$V_{eq} = -60mV$$

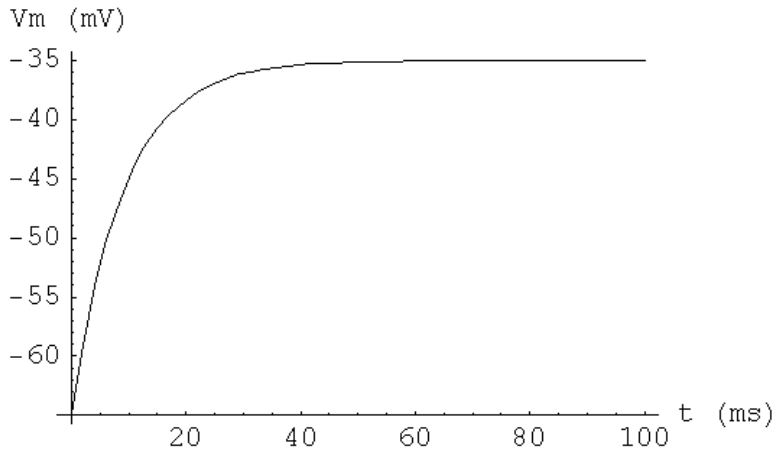
$$C\frac{dV_m(t)}{dt} = -(V_m(t) - V_{eq})g$$

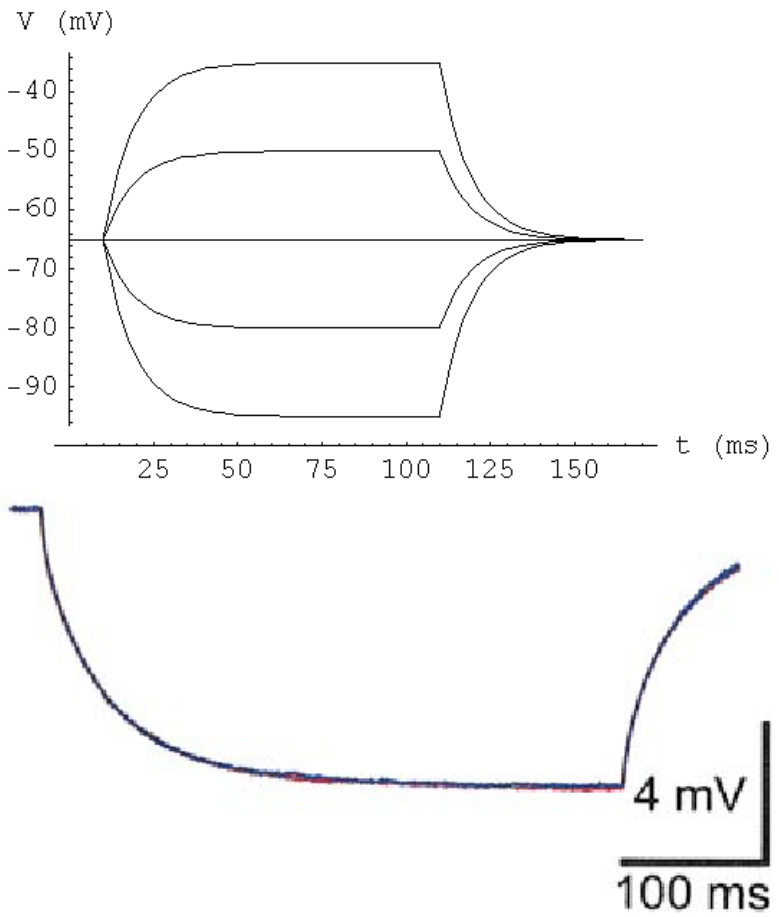


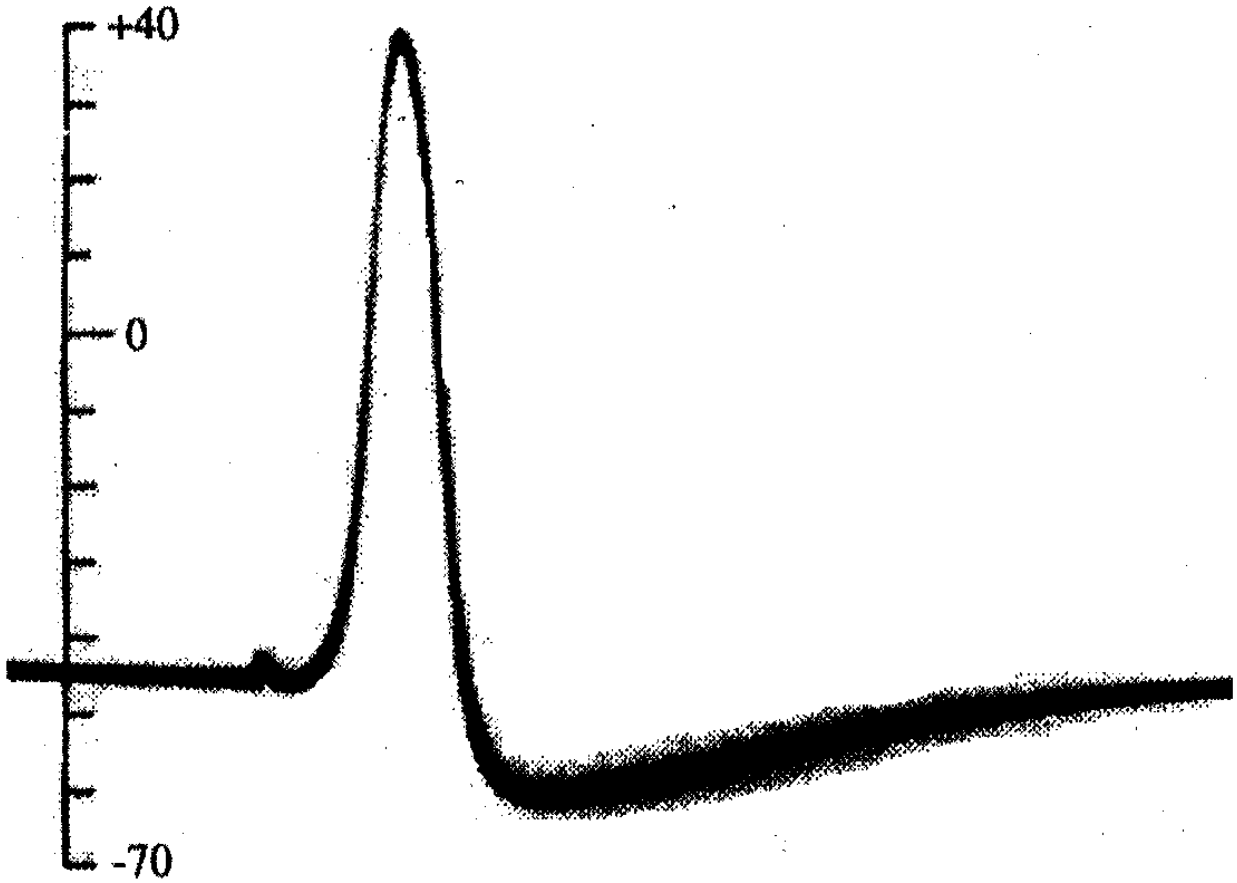
$$C\frac{dV_m(t)}{dt} = -(V_m(t) - V_{eq})g + I_{inj}$$

$$V_m(t) = V_{eq} + (1 - e^{-\frac{t}{RC}})\frac{I_{inj}}{g}$$

$$V_m(t) = V_{eq} + (1 - e^{-\frac{t}{RC}})\frac{I_{inj}}{g}$$

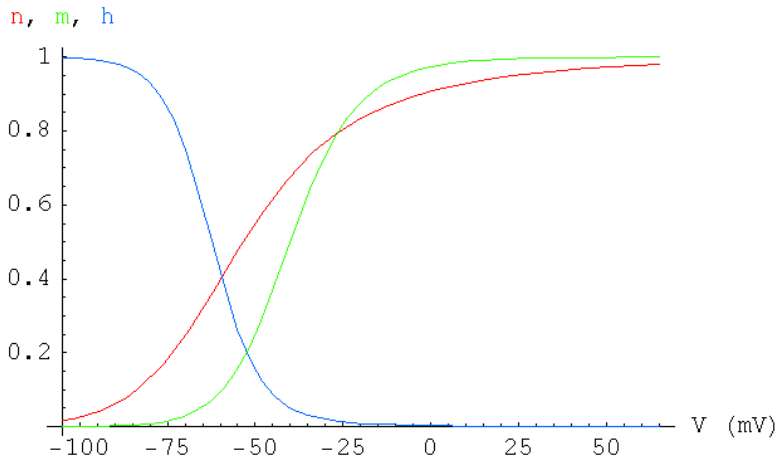


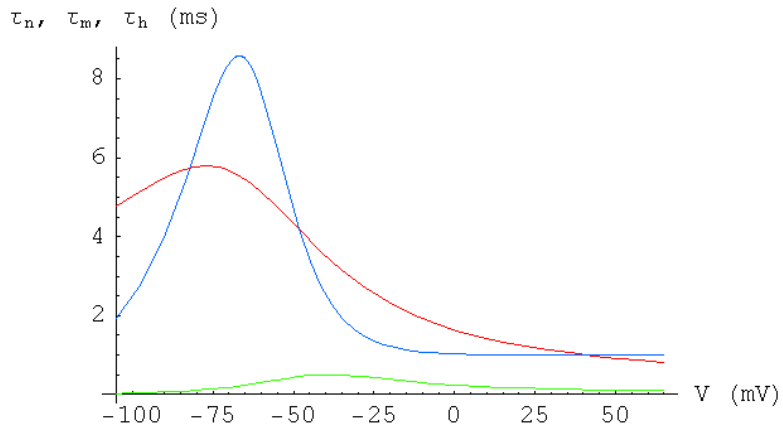

V (mV)
-40
-50
-60
-70
-80
-90
25
50
75
100
125
150
t (ms)
4 mV
100 ms


+40
0
-70

$$g_K(t) = \bar{g}_K n(t)^4$$

$$\frac{dn}{dt} = \frac{n_\infty(V_m) - n}{\tau_{n\infty}(V_m)}$$

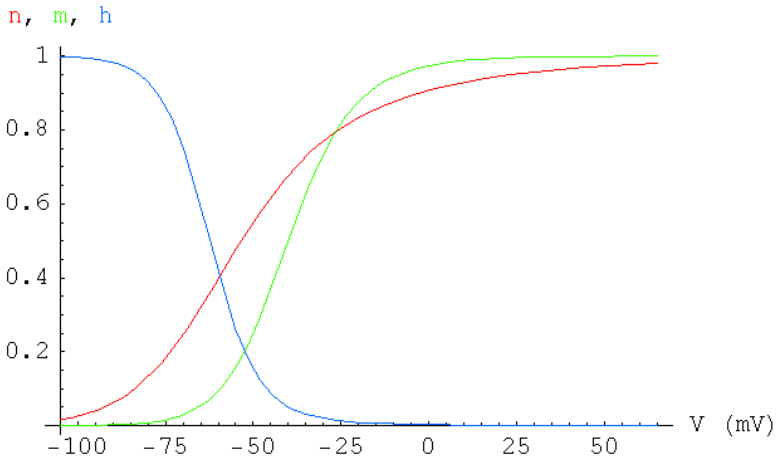


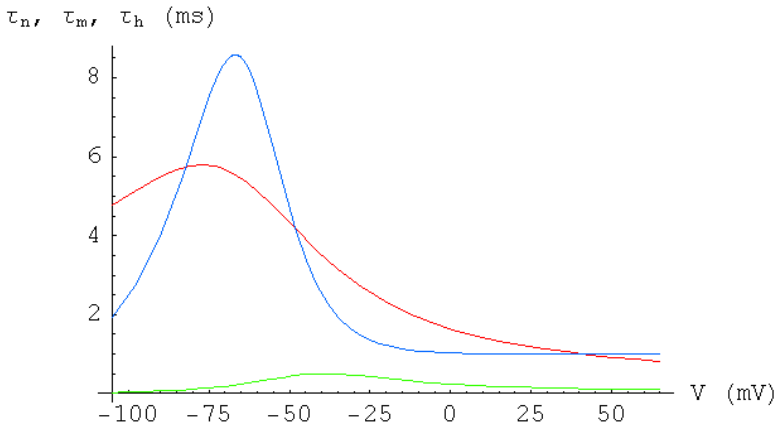


$$g_{Na}(t) = \bar{g}_{Na} m(t)^3 h(t)$$

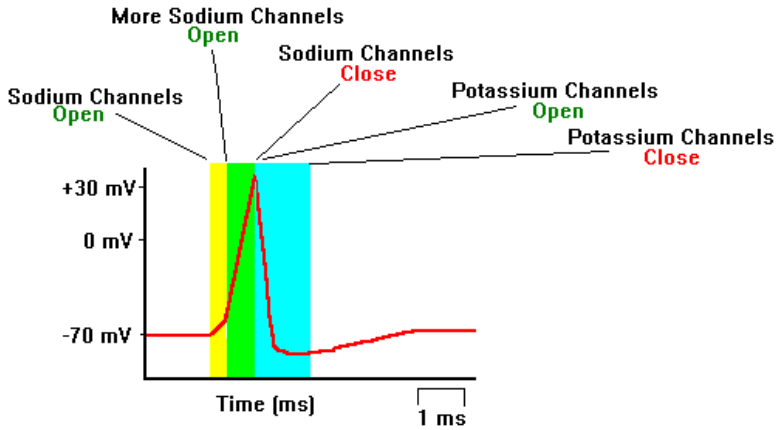
$$\frac{dm}{dt} = \frac{m_\infty(V_m) - m}{\tau_{m\infty}(V_m)} \qquad \frac{dh}{dt} = \frac{h_\infty(V_m) - h}{\tau_{h\infty}(V_m)}$$

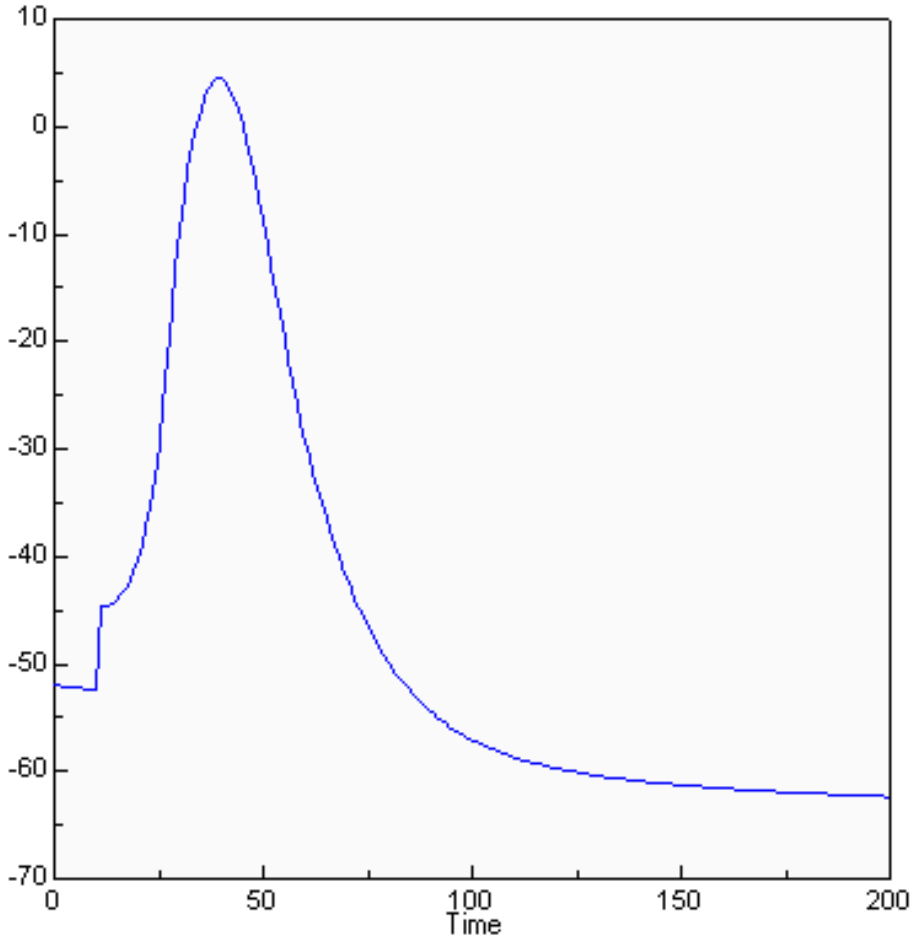
$$g_K(t) = \bar{g}_K n(t)^4$$

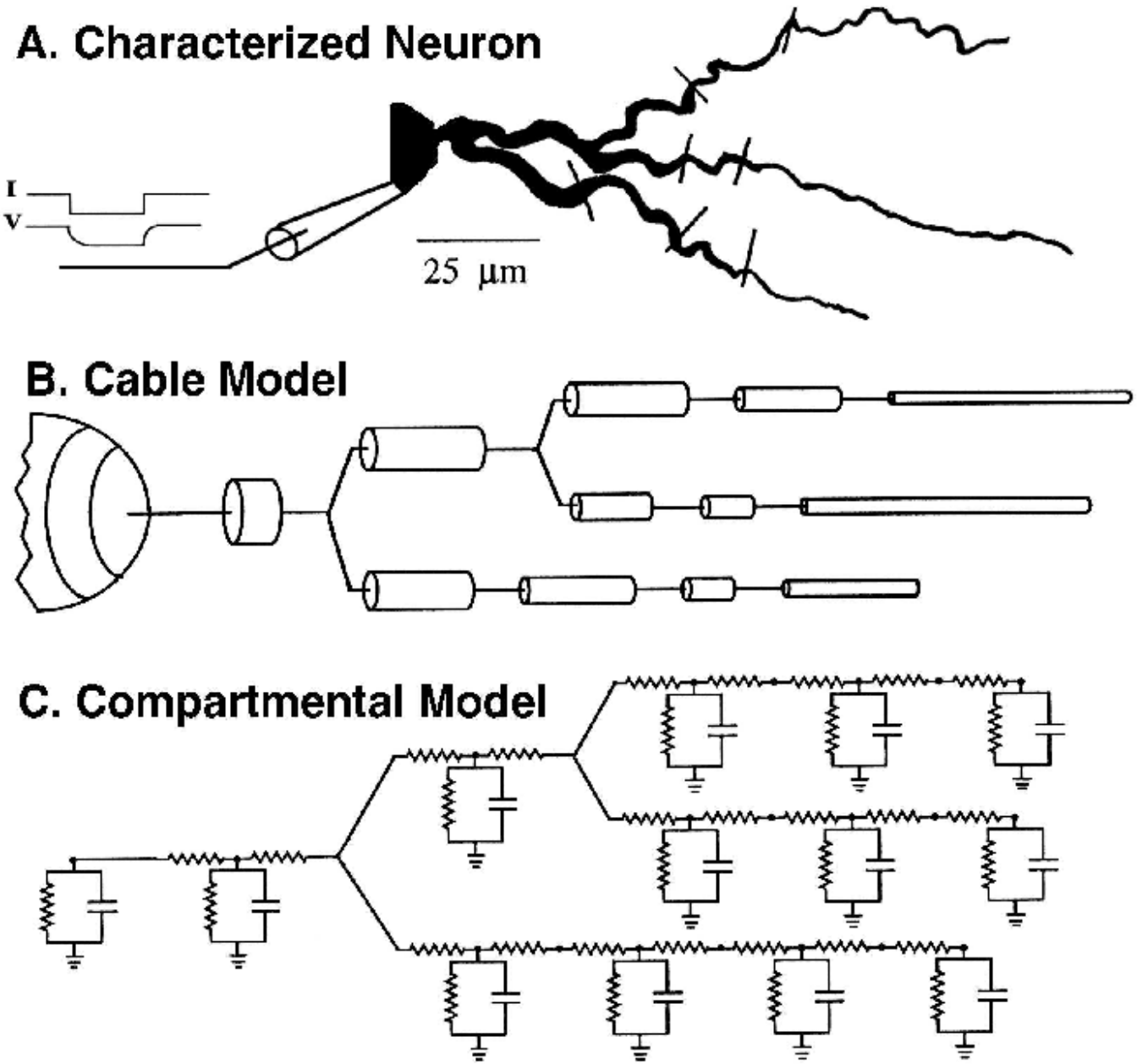


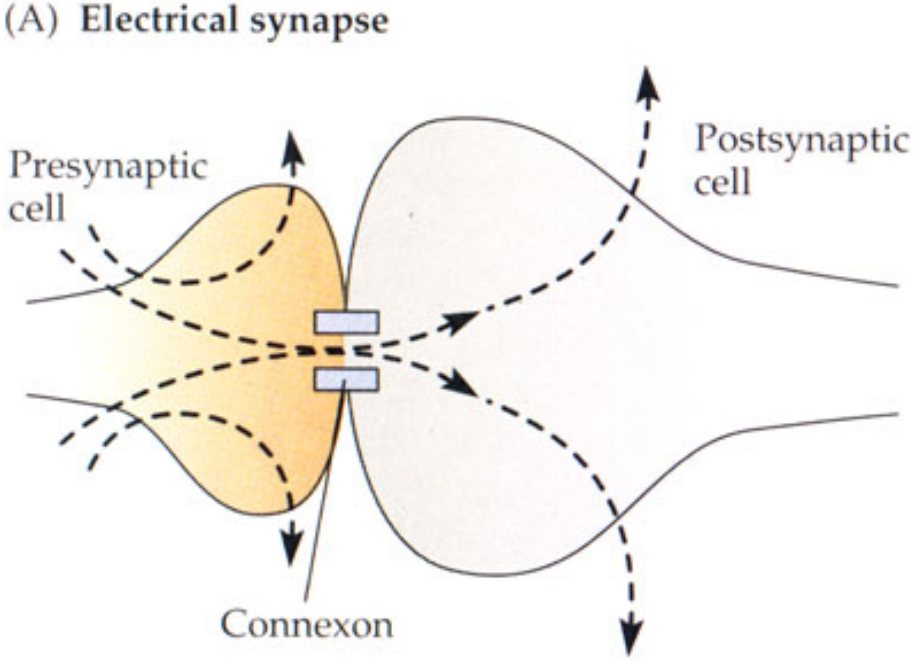


$$g_{Na}(t) = \bar{g}_{Na} m(t)^3 h(t)$$

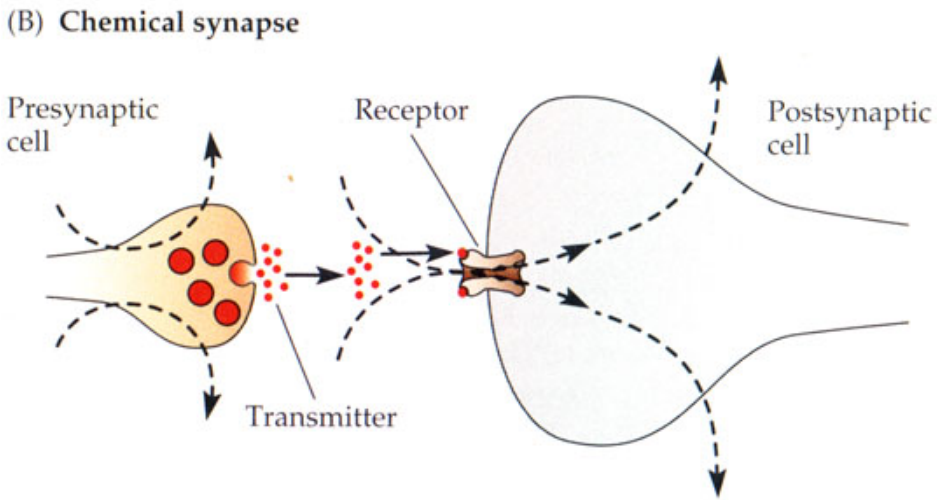



10
0
-10
-20
-30
-40
-50
-60
-70
0
50
100
150
200
Time

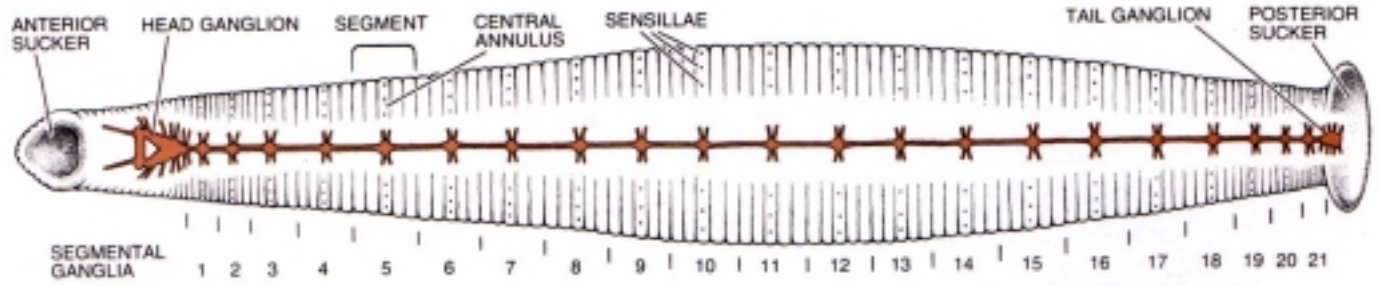

A. Characterized Neuron
I
V
25 µm
B. Cable Model
C. Compartmental Model

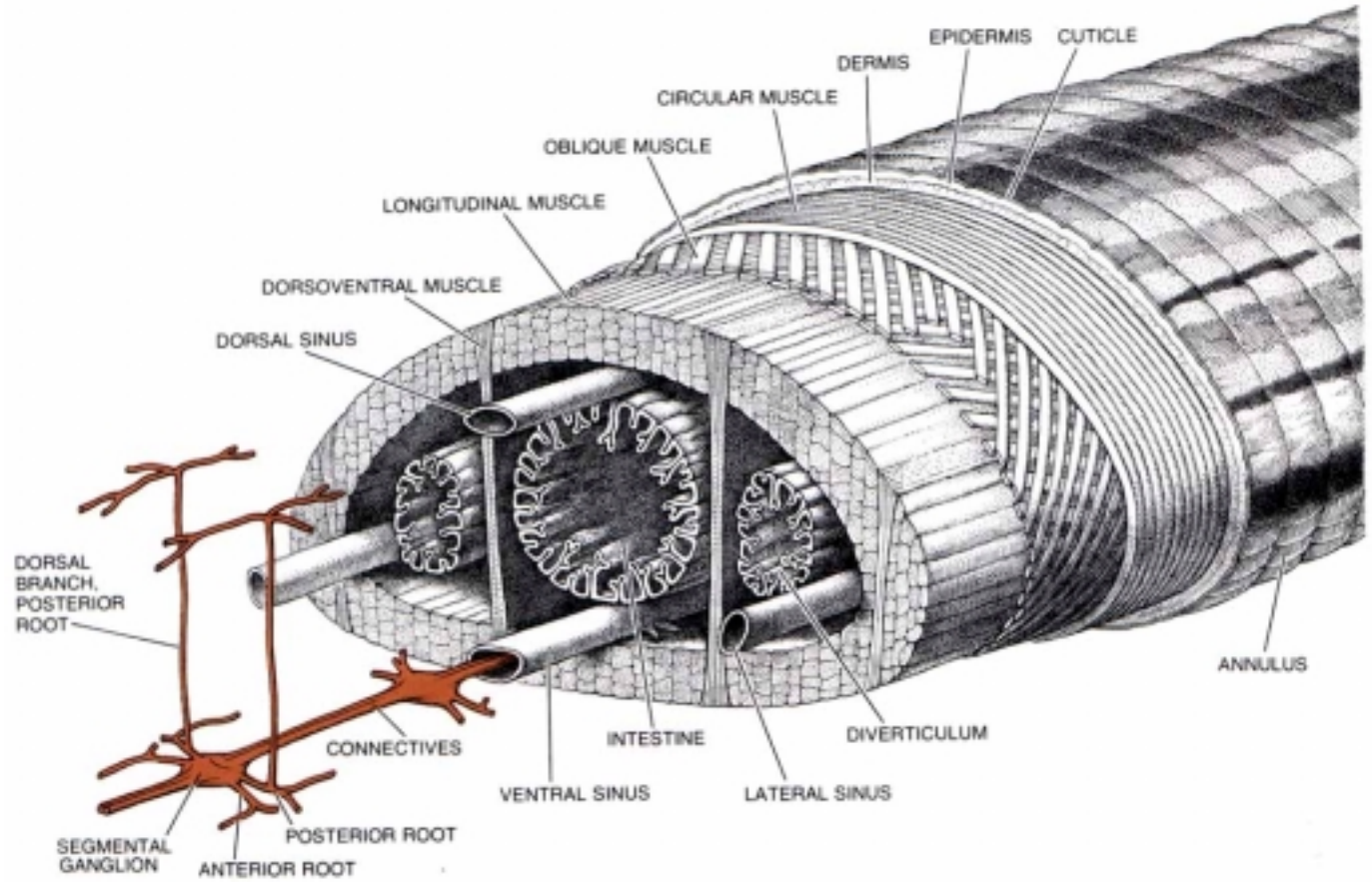


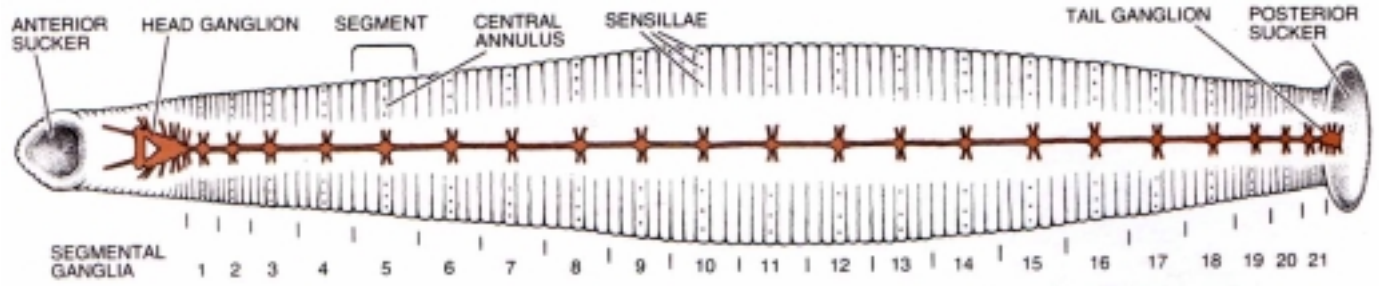
$$I_{gap} = -(V_m - V_{m_2})g_{gap}$$

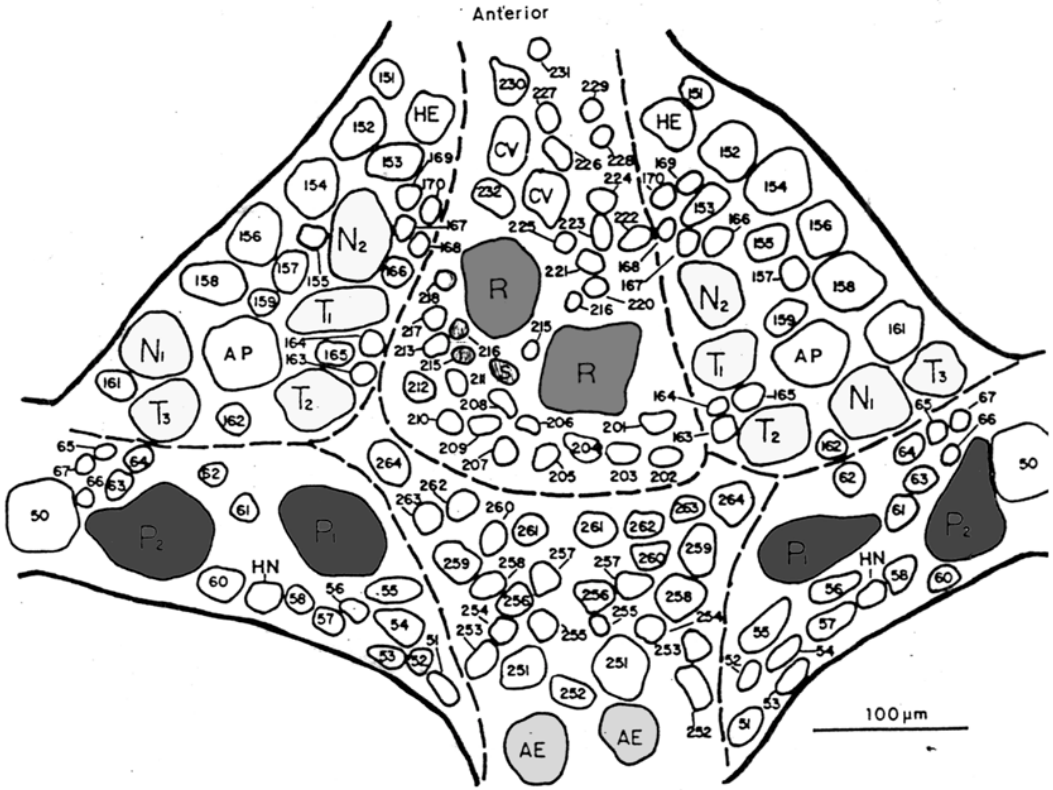


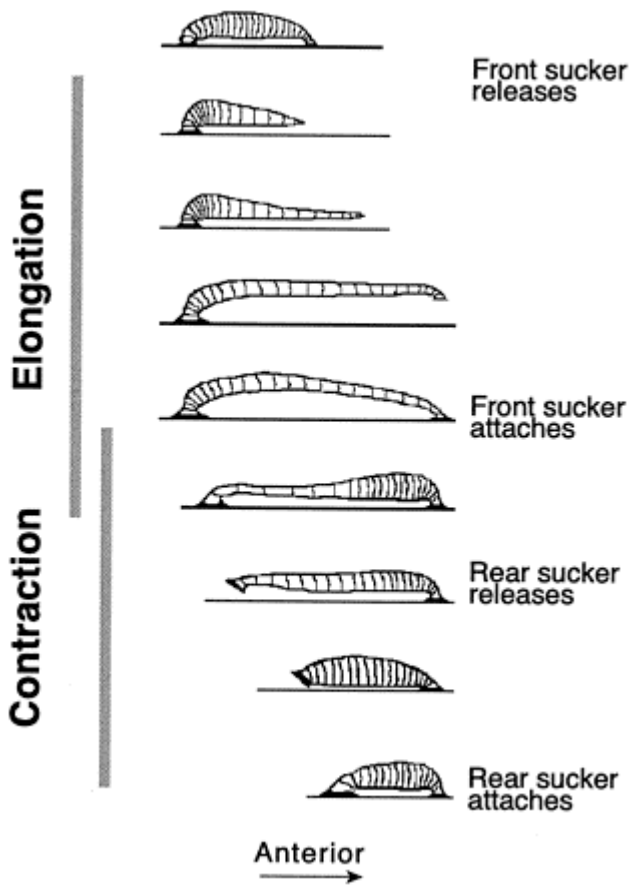
$$I_{syn} = -(V_m - V_{rev})g_{syn}(t)$$

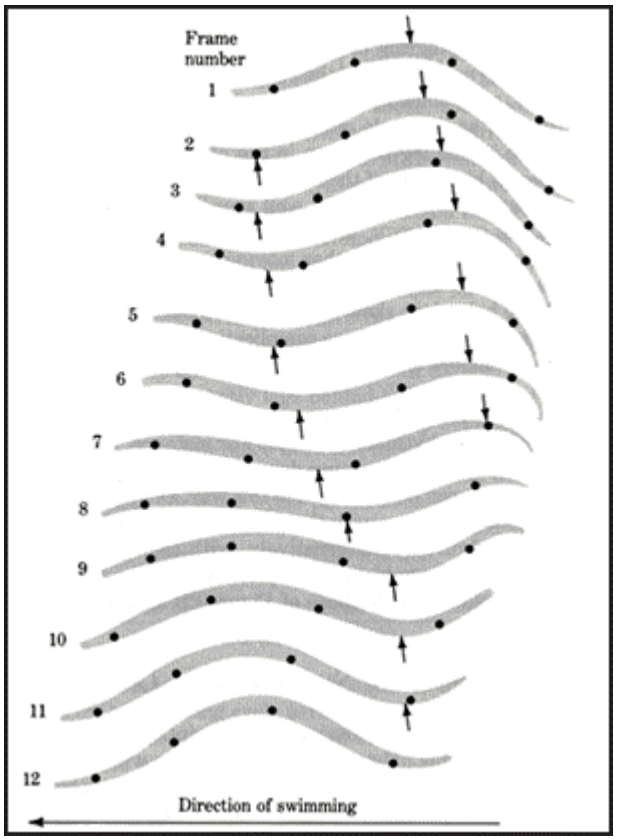

ANTERIOR SUCKER
HEAD GANGLION
SEGMENT
CENTRAL ANNULUS
SENSILLAE
TAIL GANGLION
POSTERIOR SUCKER
SEGMENTAL GANGLIA
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21

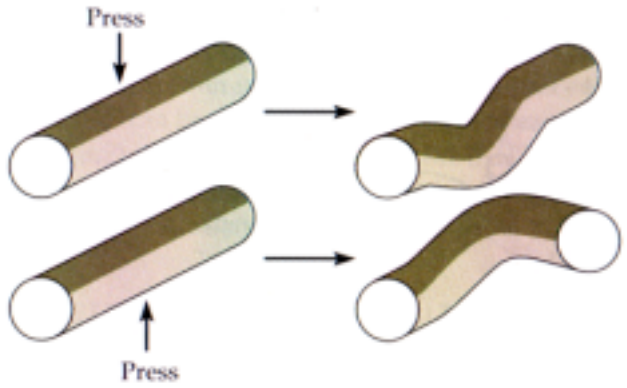

EPIDERMIS
CUTICLE
DERMIS
CIRCULAR MUSCLE
OBLIQUE MUSCLE
LONGITUDINAL MUSCLE
DORSOVENTRAL MUSCLE
DORSAL SINUS
DORSAL BRANCH, POSTERIOR ROOT
CONNECTIVES
INTESTINE
DIVERTICULUM
ANNULUS
VENTRAL SINUS
LATERAL SINUS
SEGMENTAL GANGLION
ANTERIOR ROOT
POSTERIOR ROOT

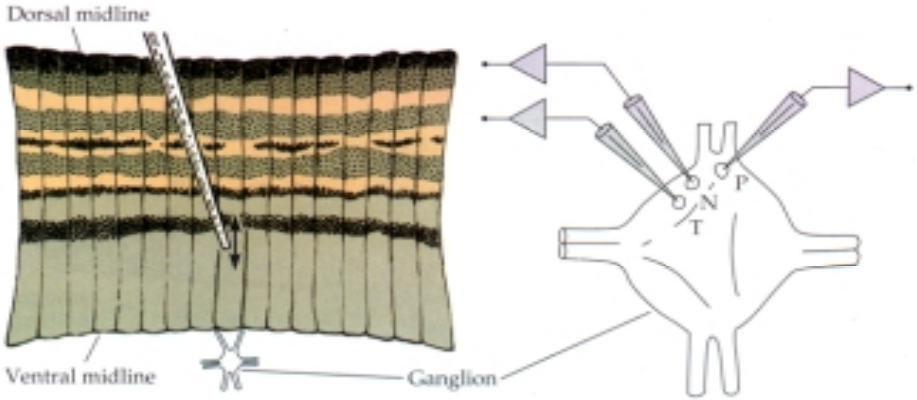

ANTERIOR SUCKER
HEAD GANGLION
SEGMENT
CENTRAL ANNULUS
SENSILLAE
TAIL GANGLION
POSTERIOR SUCKER
SEGMENTAL GANGLIA
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21

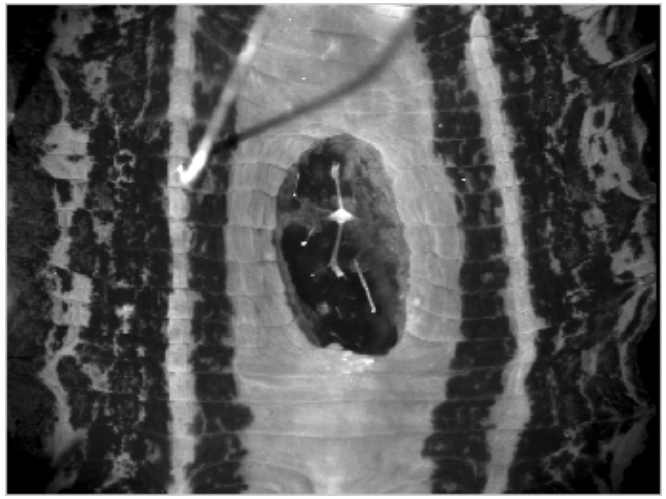

Anterior
HE
CV
R
AP
AE
HN
100 µm

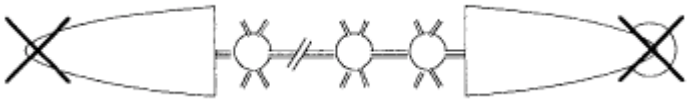

Elongation
Contraction
Front sucker releases
Front sucker attaches
Rear sucker releases
Rear sucker attaches
Anterior

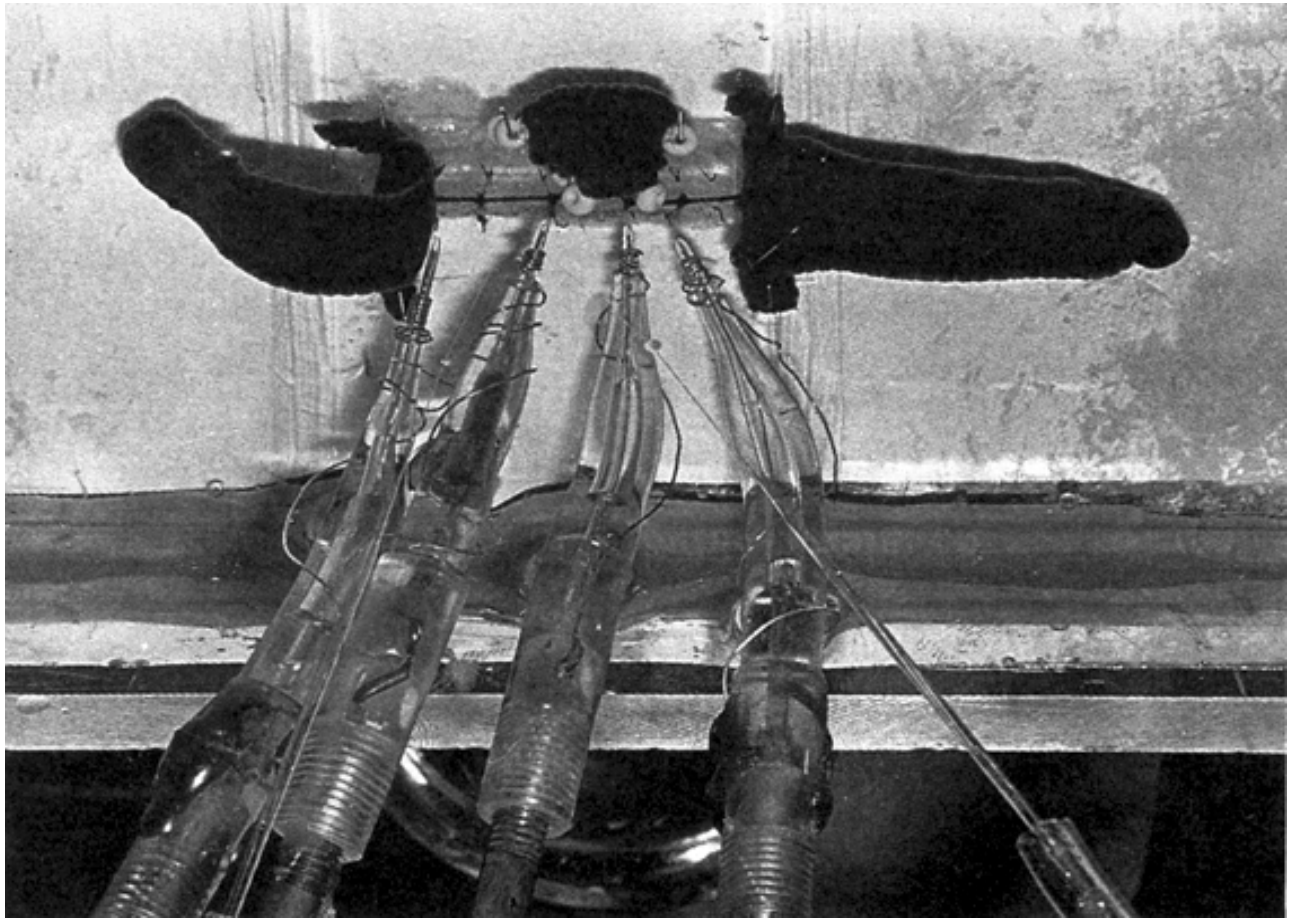

Frame number
1
2
3
4
5
6
7
8
9
10
11
12
Direction of swimming

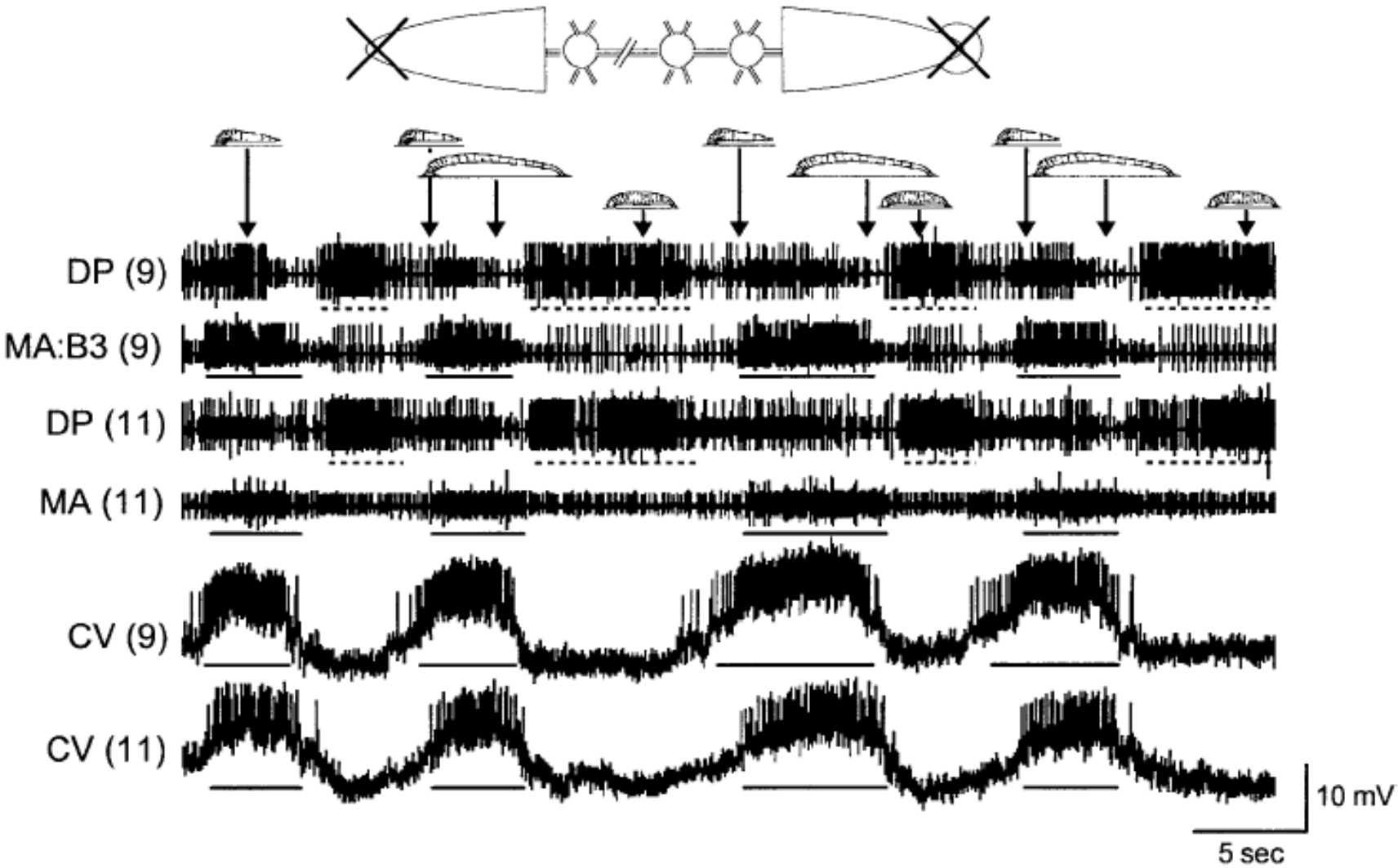

Press
Press

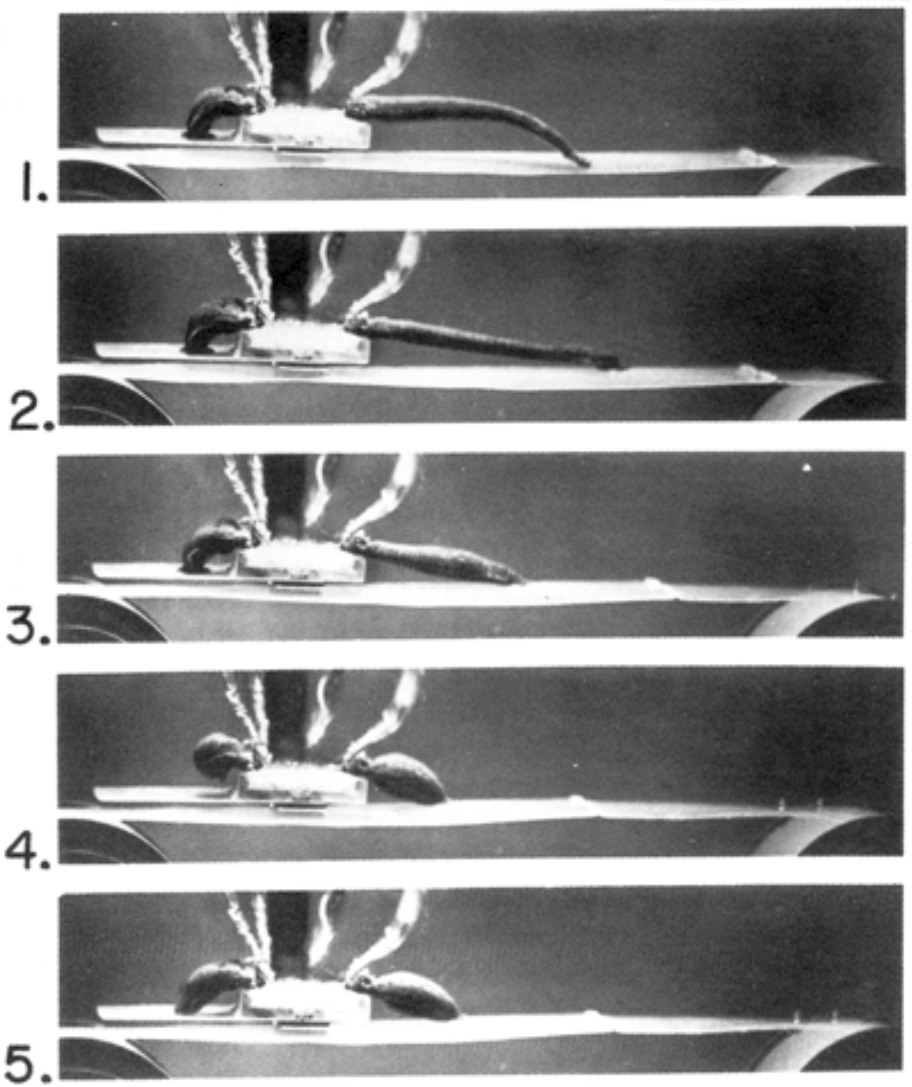

Dorsal midline
Ventral midline
Ganglion
D
N
T
P

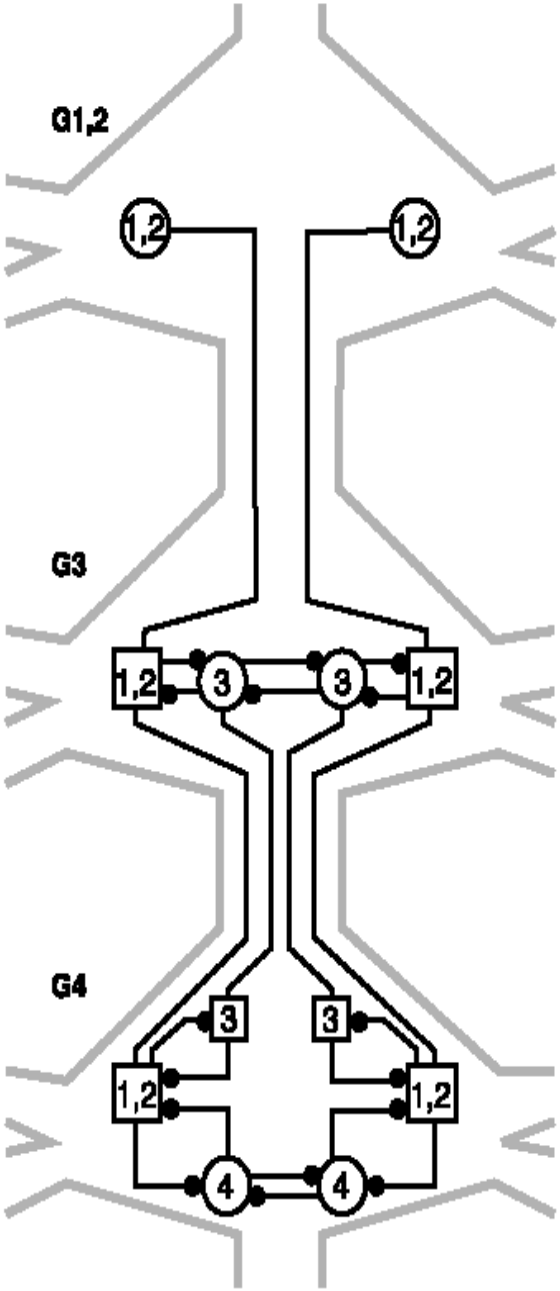


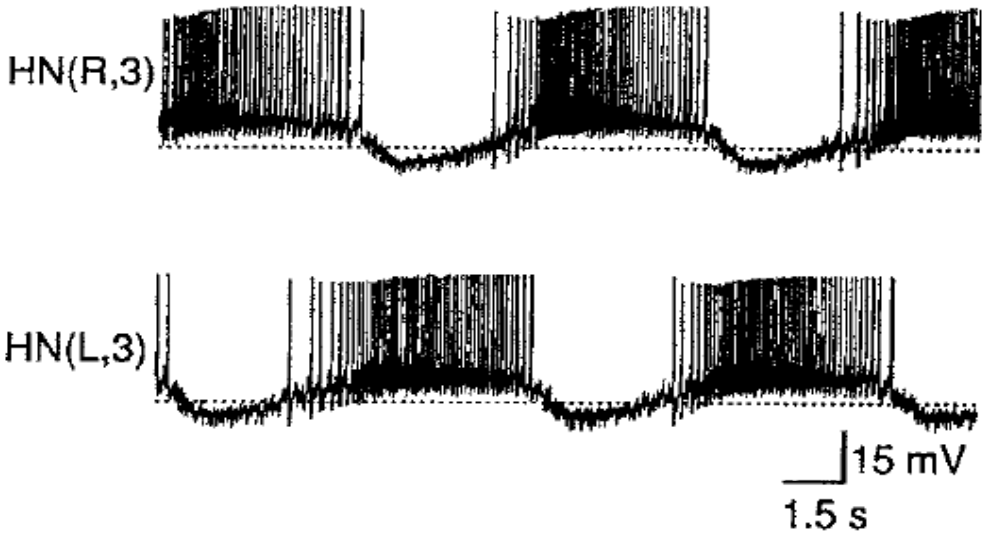




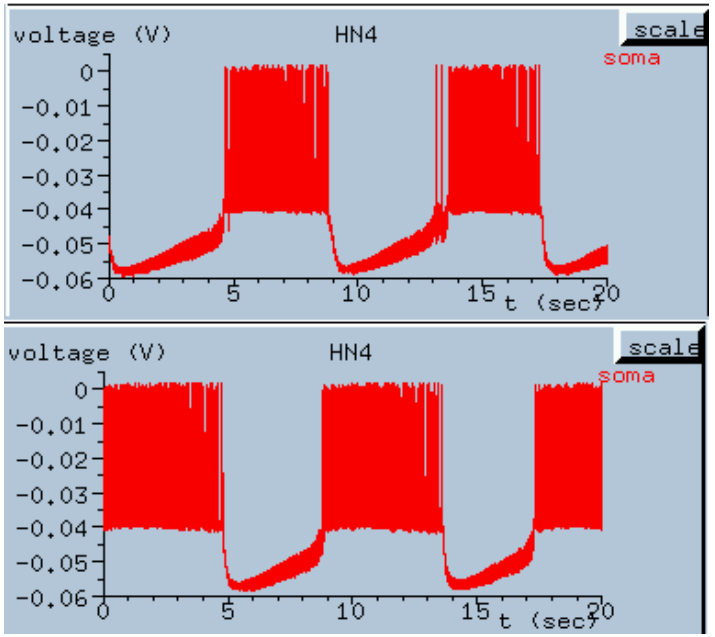

DP (9)
MA:B3 (9)
DP (11)
MA (11)
CV (9)
CV (11)
10 mV
5 sec

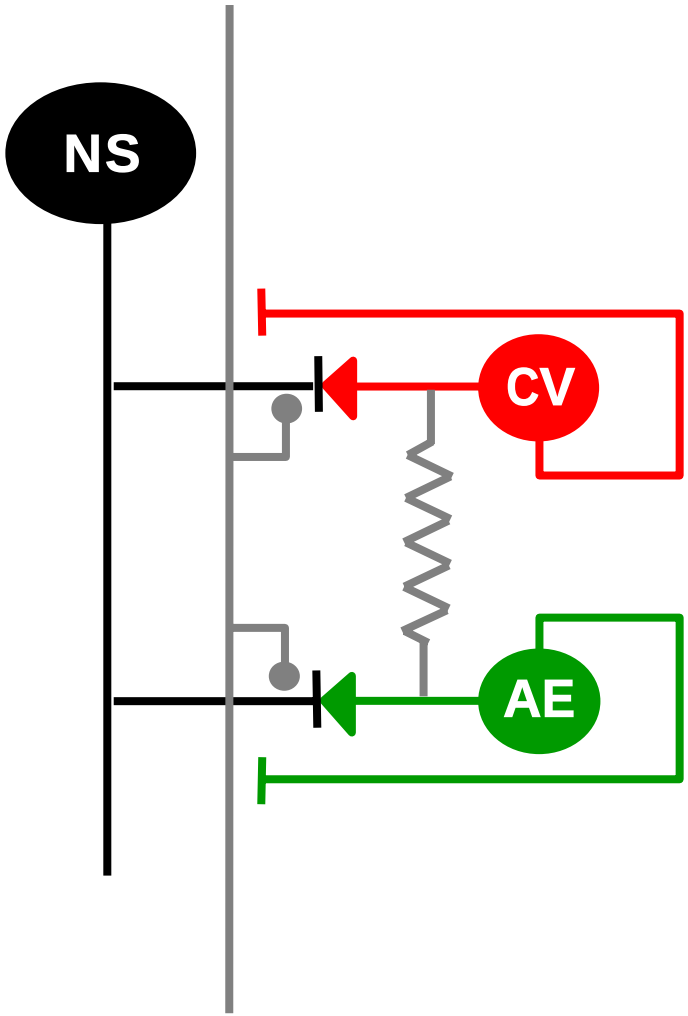

1.
2.
3.
4.
5.

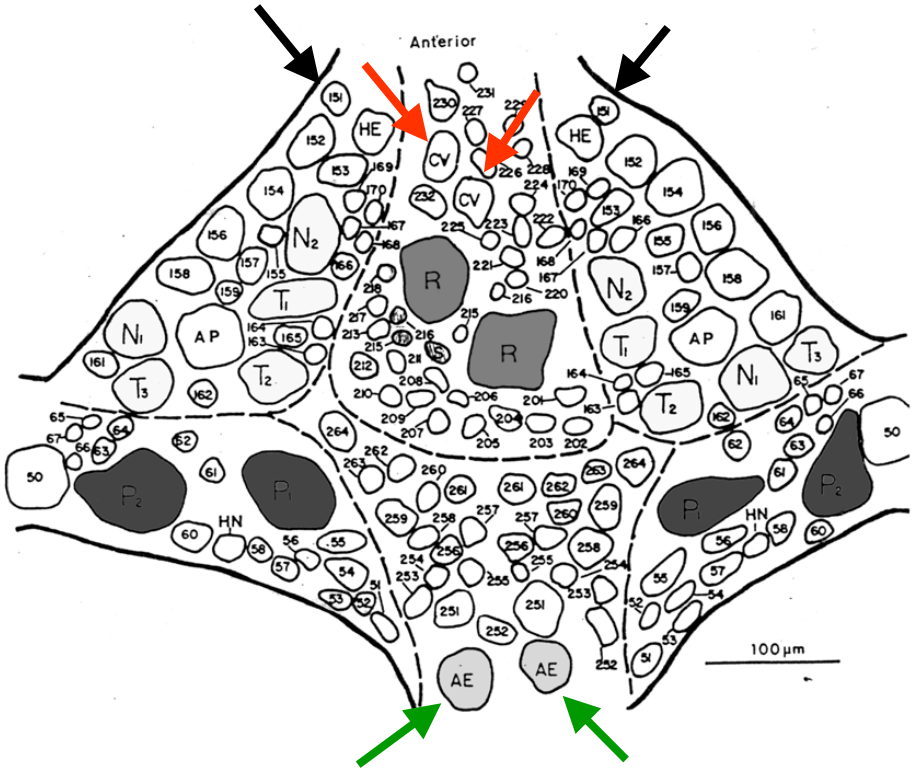


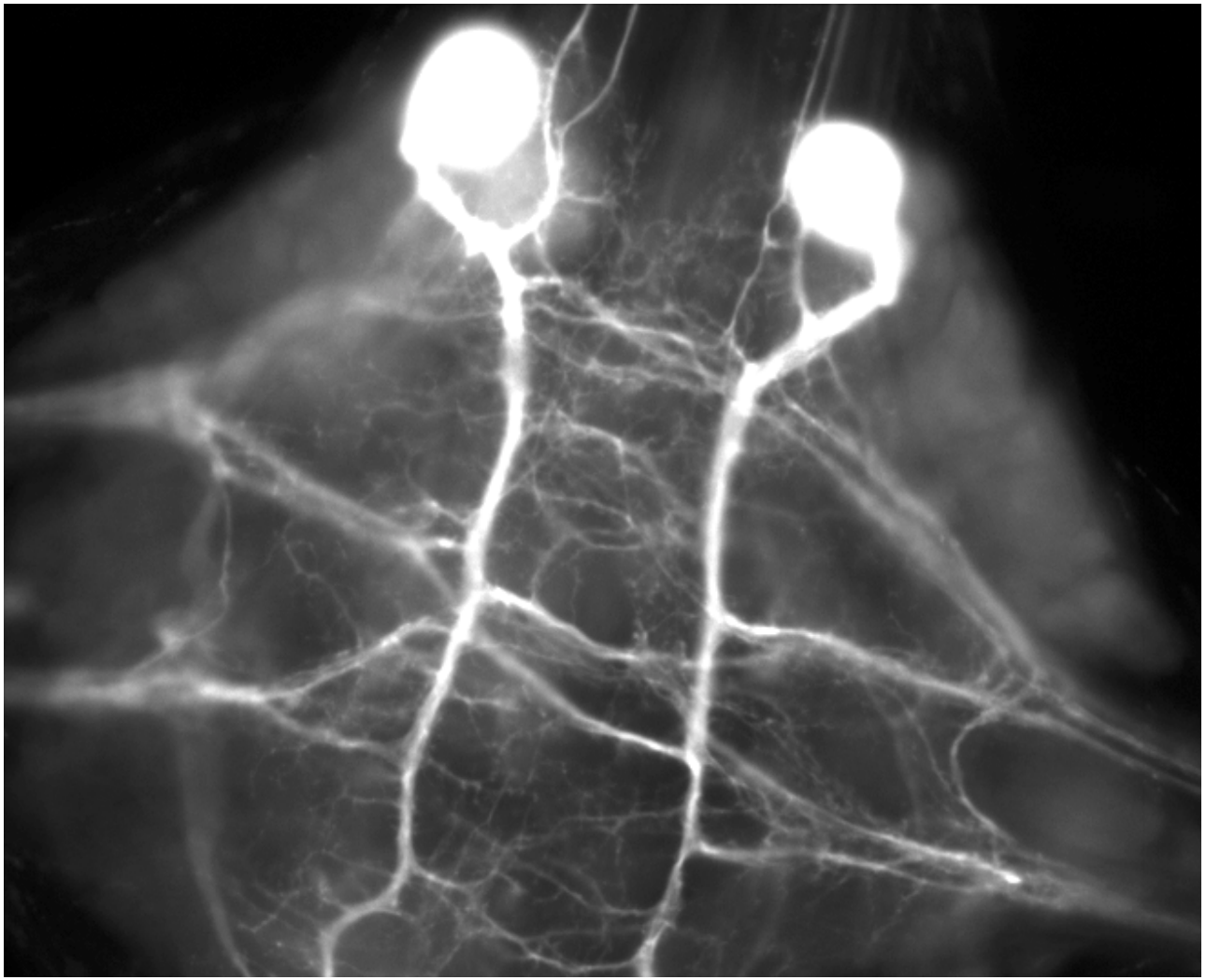


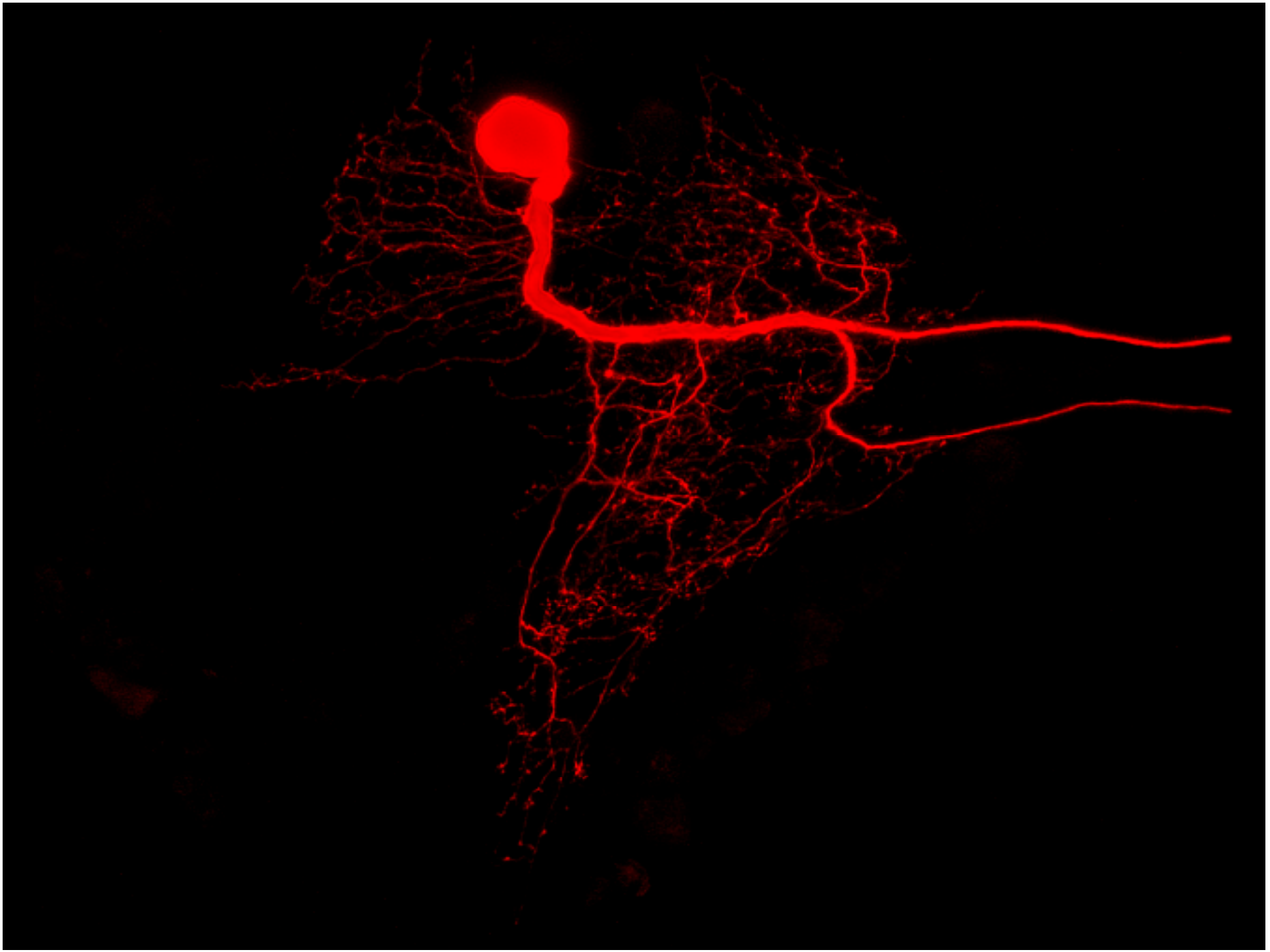
$$C\frac{dv}{dt} = -(I_{Na} + I_P + I_{CaF} + I_{CaS} + I_h + I_{K1} + I_{K2} + I_{KA} + I_L + I_{SynG} + I_{SynS} - I_{inject})$$

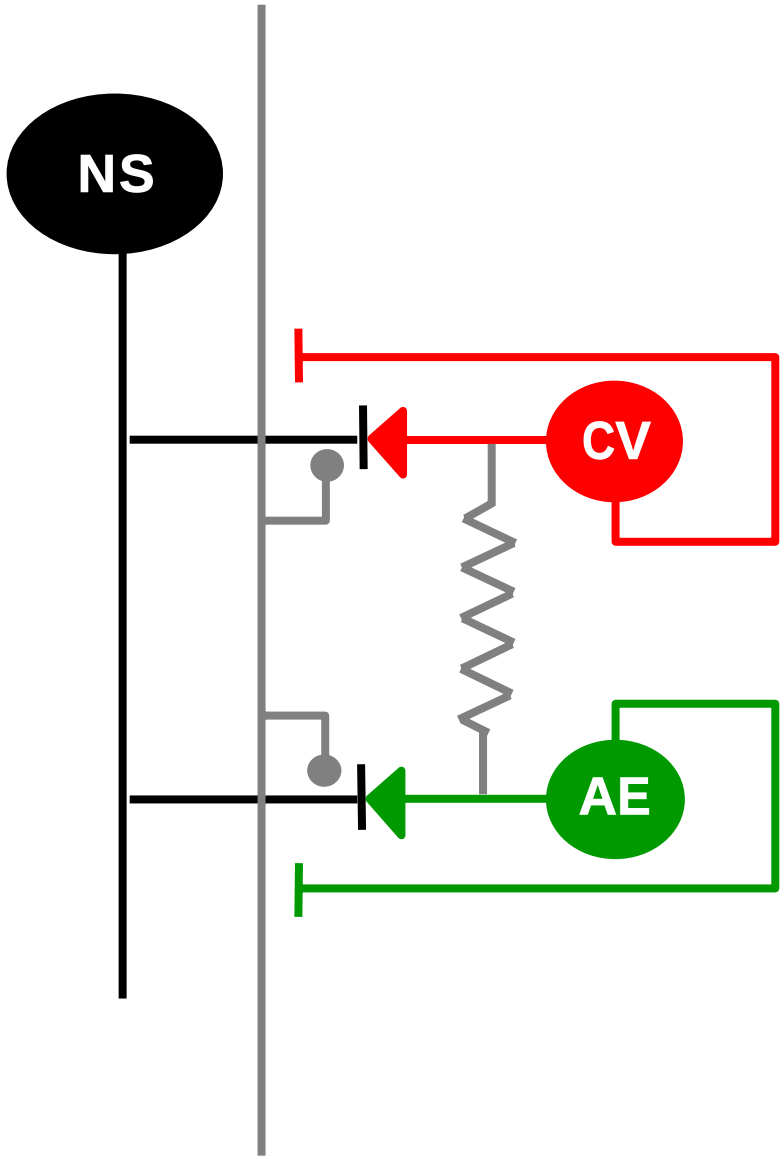


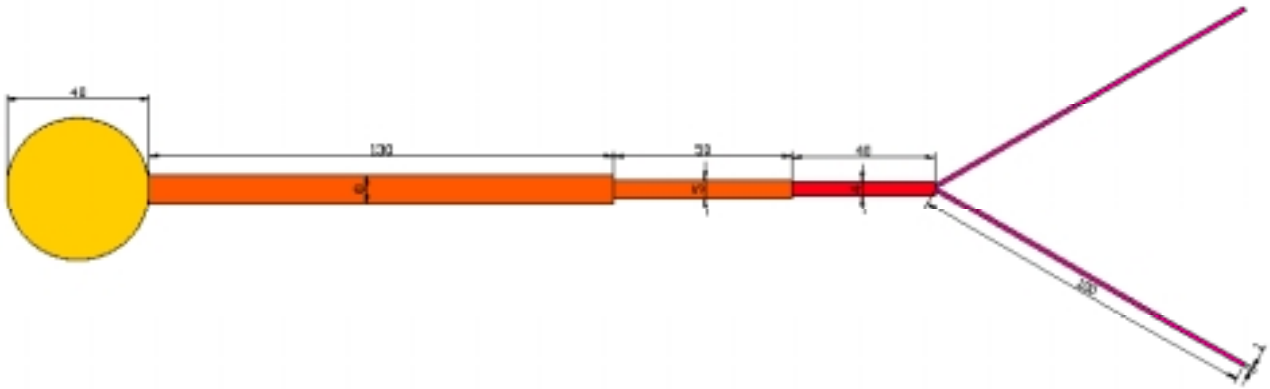

NS
CV
AE

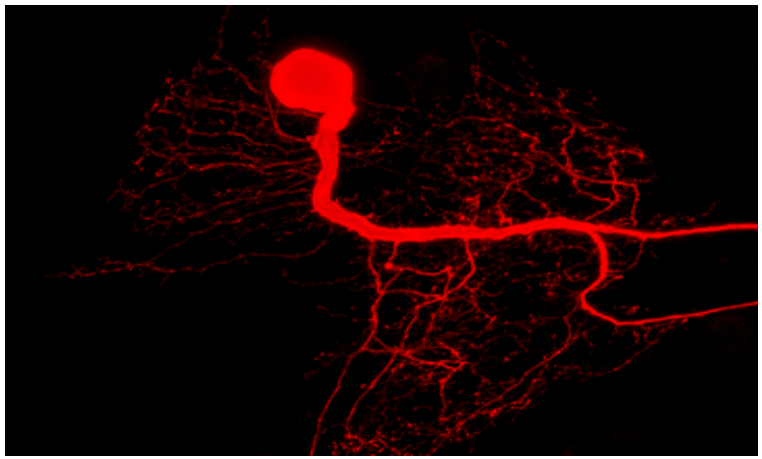

Anterior
HE
CV
R
AP
HN
AE
100 µm

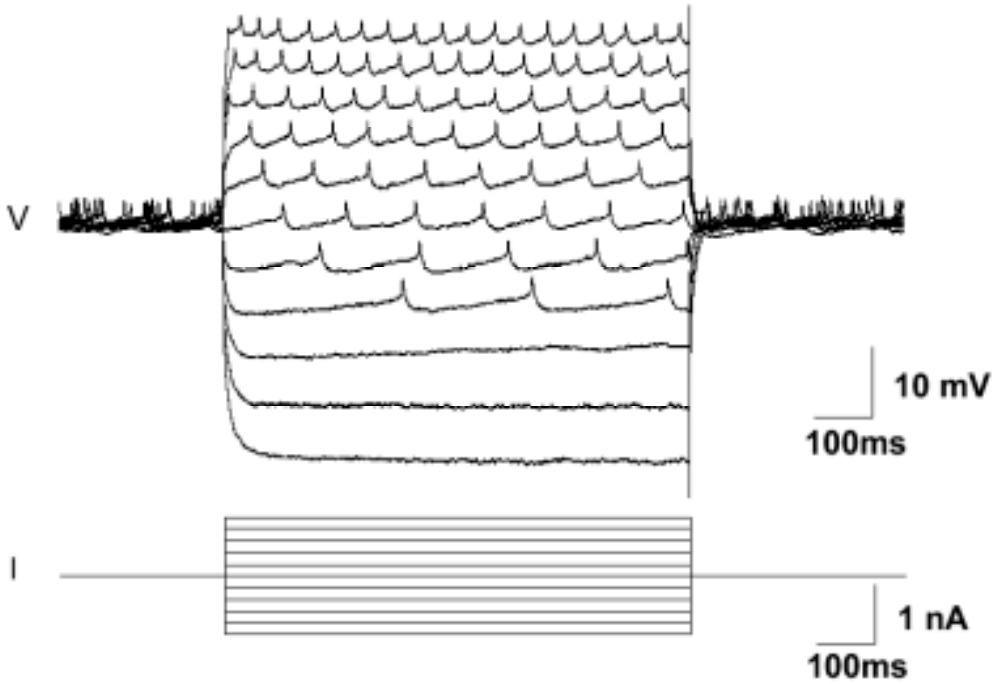




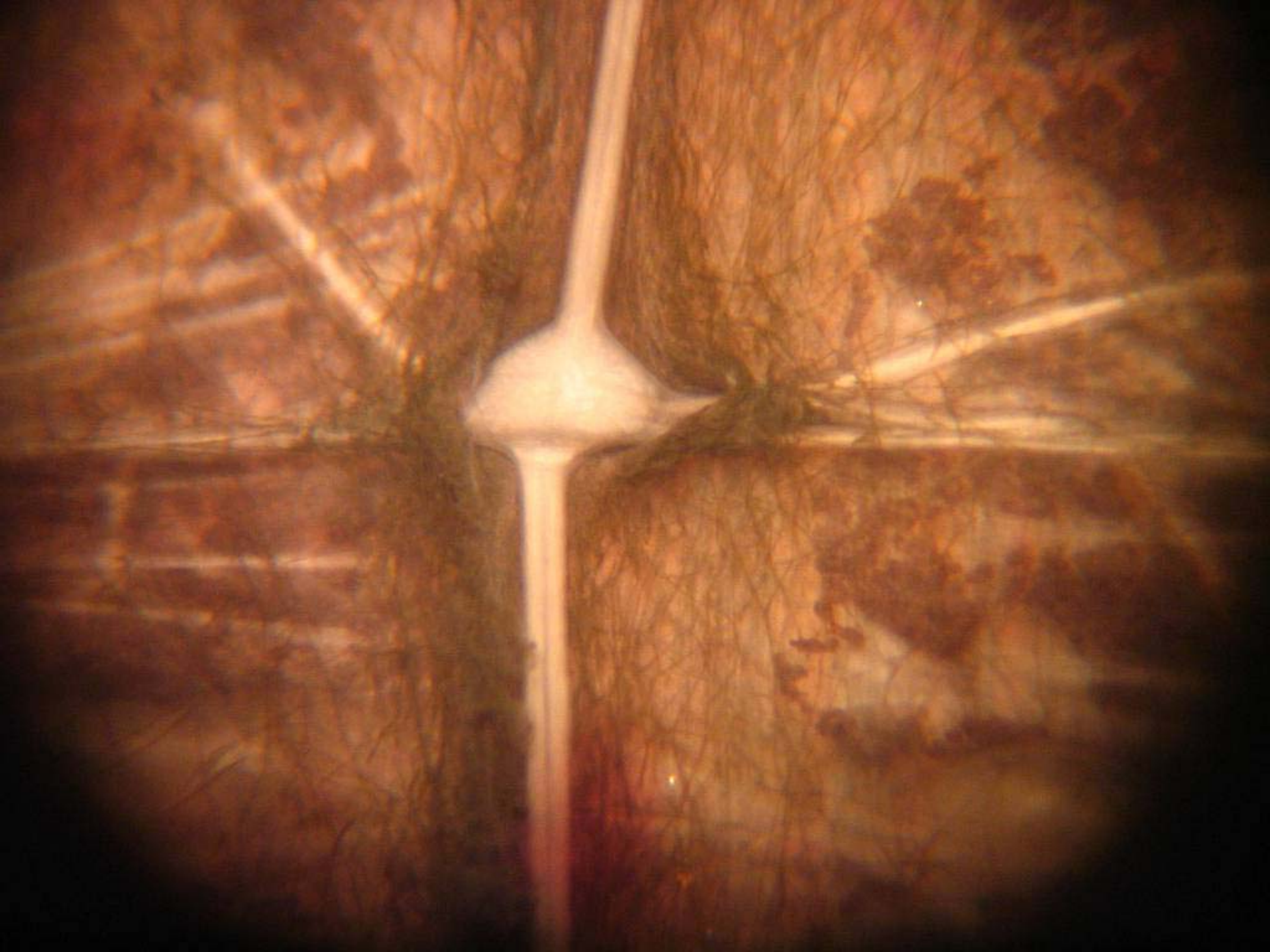

NS
CV
AE

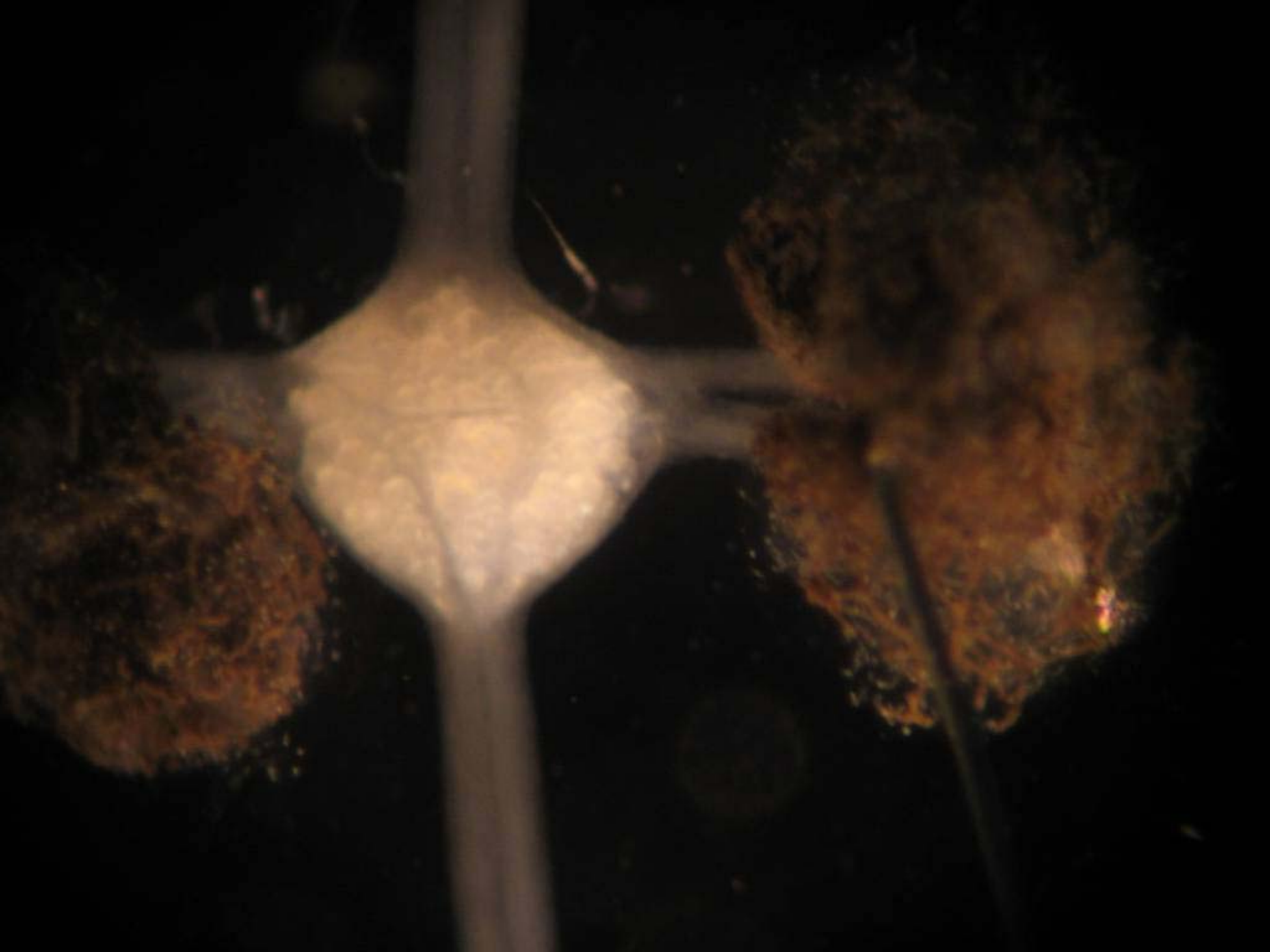

48
130
32
48
d
d
d
600




V
10 mV
100ms
I
1 nA
100ms


7/12/04
OUT NO
PLEASE






SZ60