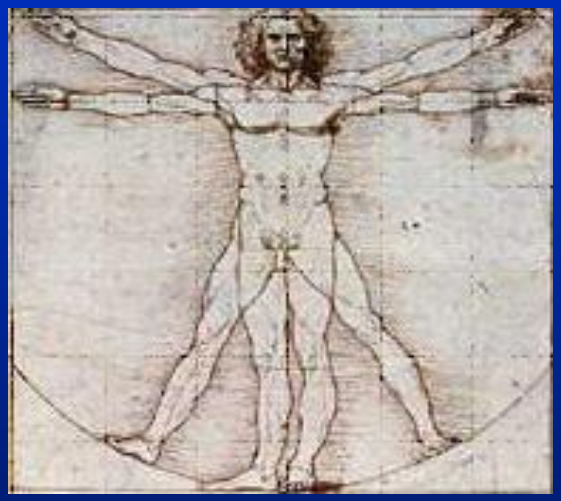
# Esercitazione V
# *Drosophila melanogaster*

# GLI STUDI SUI GENI DI ORGANISMI PIU' SEMPLICI FORNISCONO IMPORTANTI INFORMAZIONI PER LO STUDIO DEI GENI UMANI

*Escherichia coli*

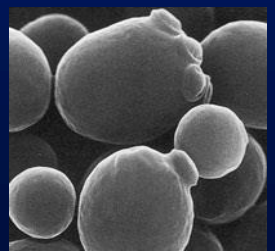
*Drosophila melanogaster*



*Arabidopsis thaliana*

*Mus musculus*

*Caenorhabditis elegans*



*Saccharomyces cerevisiae*

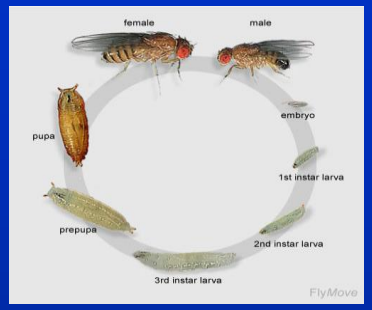
# ESPERIENZA 1:
# La *Drosophila melanogaster*
# (il moscerino della frutta)

## Classificazione tassonomica

| | |
|---|---|
| REGNO | Animalia |
| PHYLUM | Arthropoda |
| CLASSE | Insecta |
| ORDINE | Diptera |
| FAMIGLIA | Drosophilidae |
| SUBFAMIGLIA | Drosophilinae |
| GENERE | Drosophila |
| SPECIE | melanogaster |

Etimologia: drosos (rugiada) + philos (amante) = amante della rugiada

# LA *Drosophila melanogaster* COME ORGANISMO MODELLO




Ciclo vitale breve

Progenie numerosa

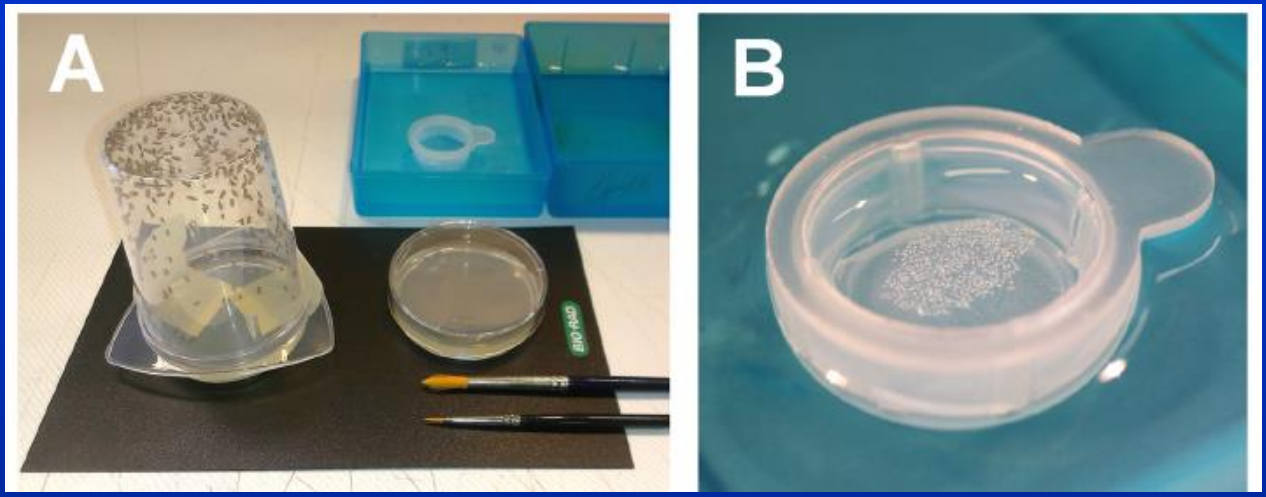
Costi contenuti

Semplicità di mantenimento

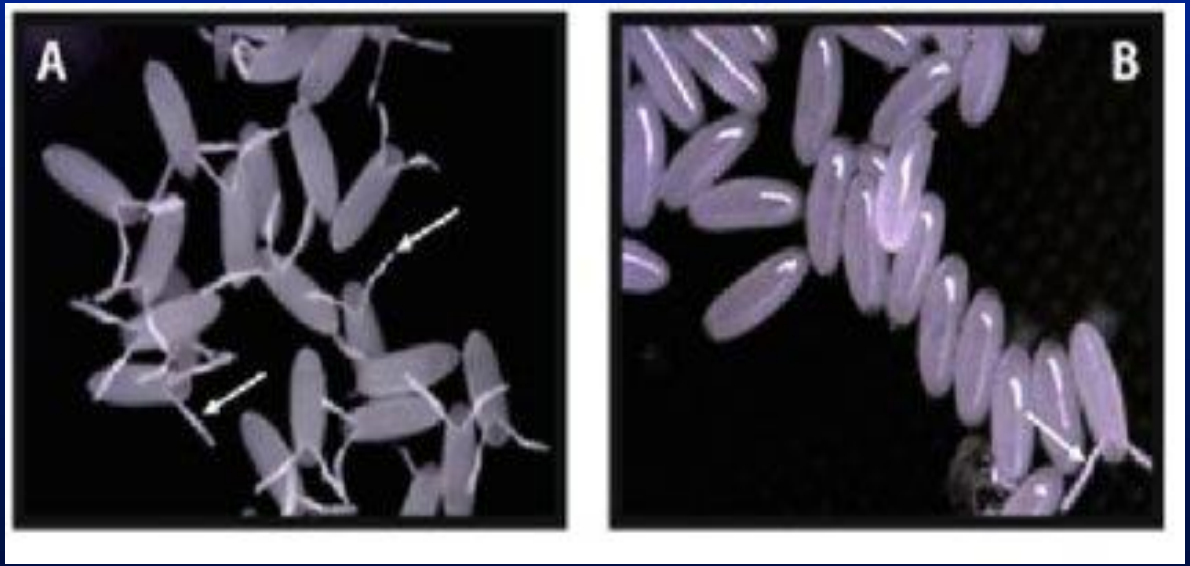
Genoma interamente sequenziato

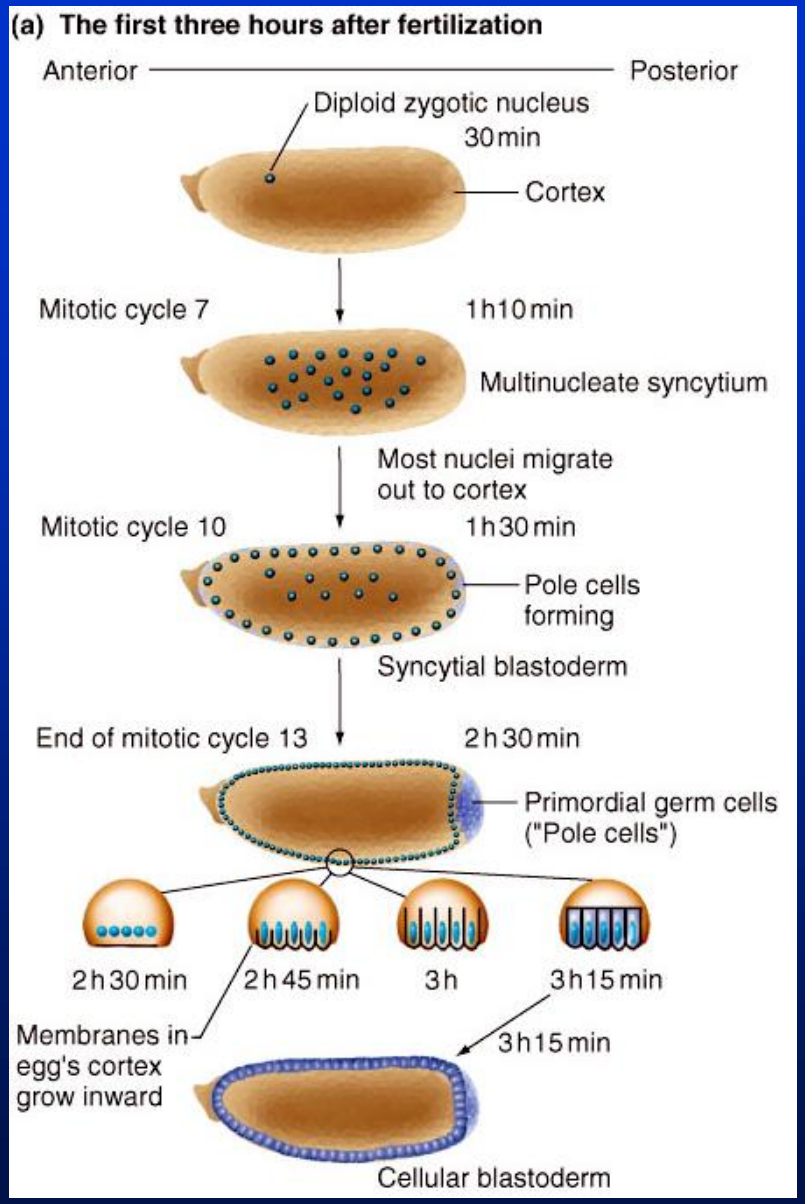
# Embrione deposto

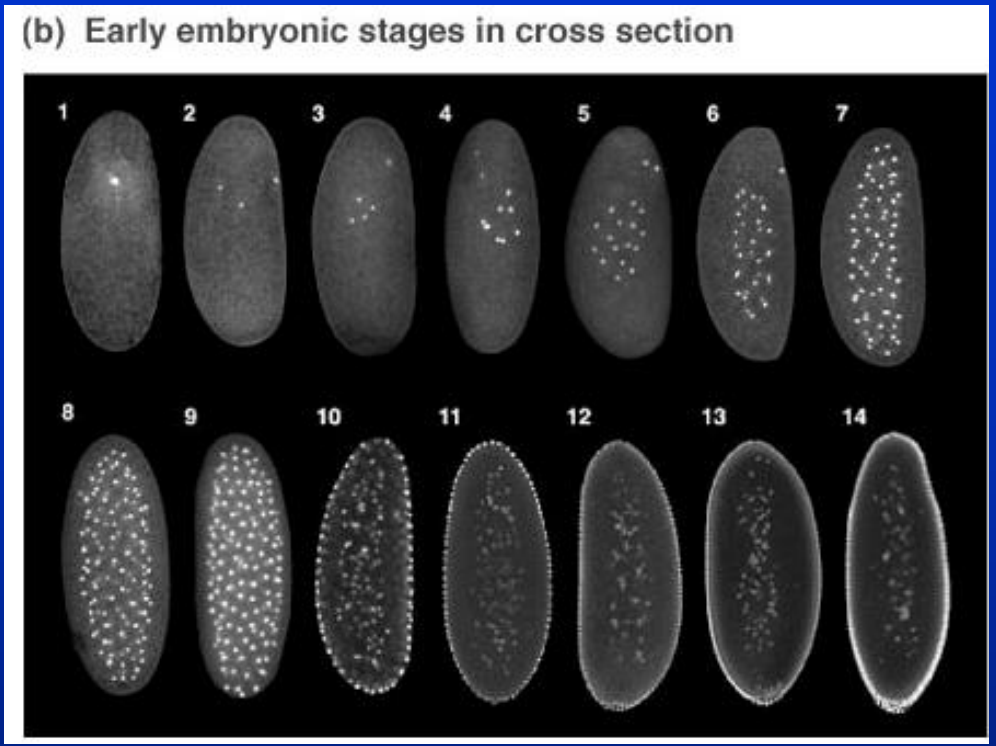
# Decorionamento

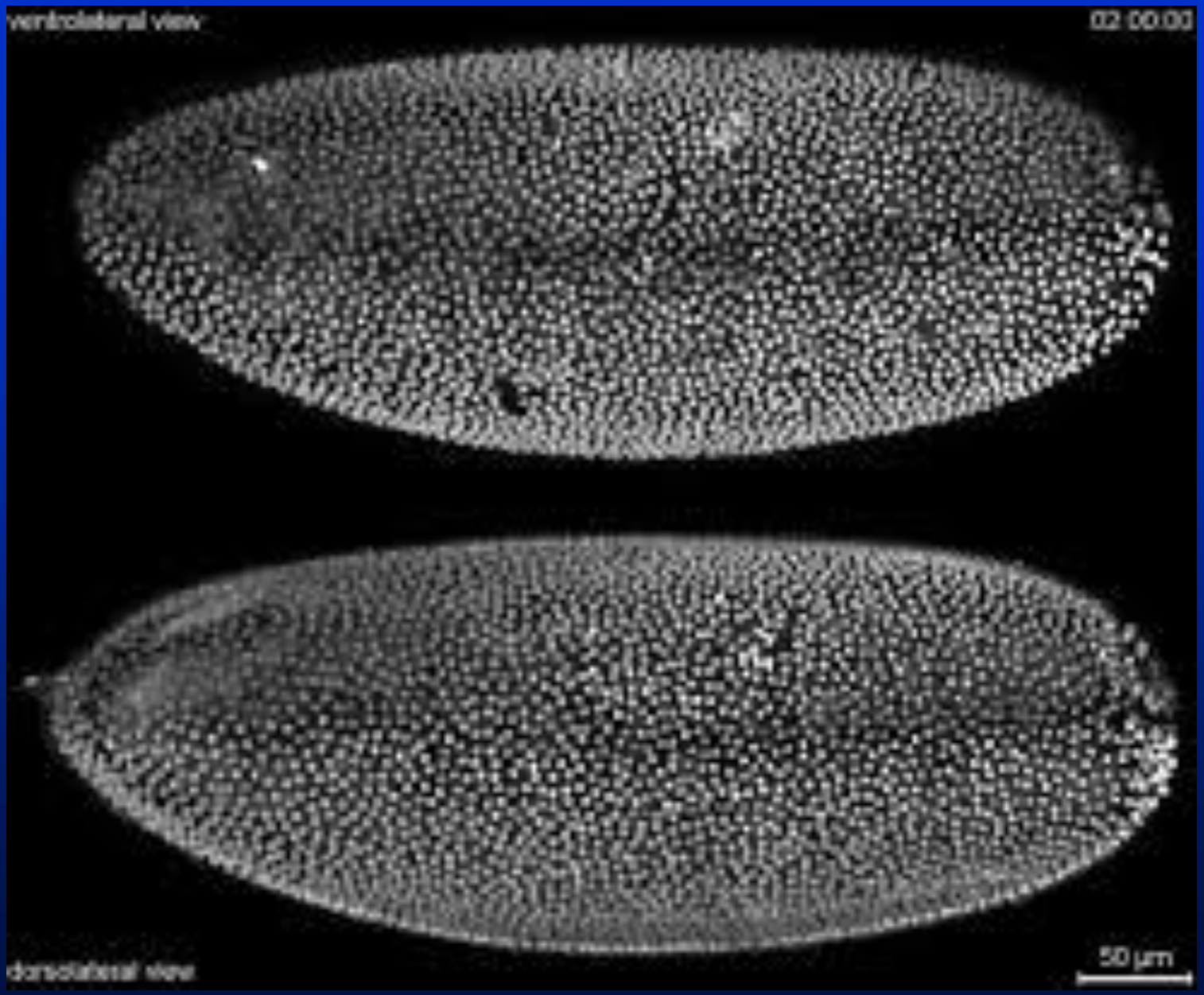


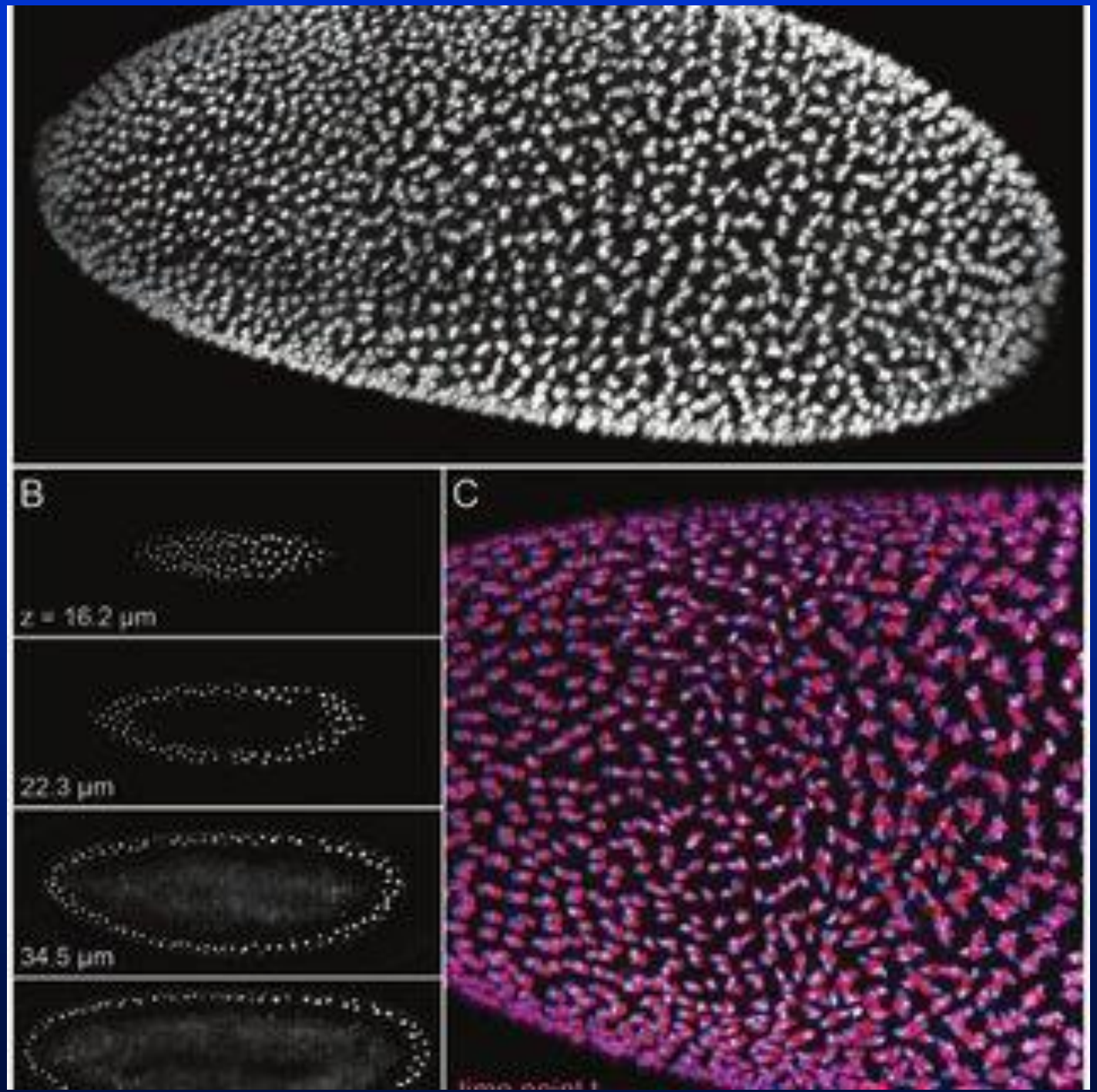

Ipoclorito : H20 (1:1)

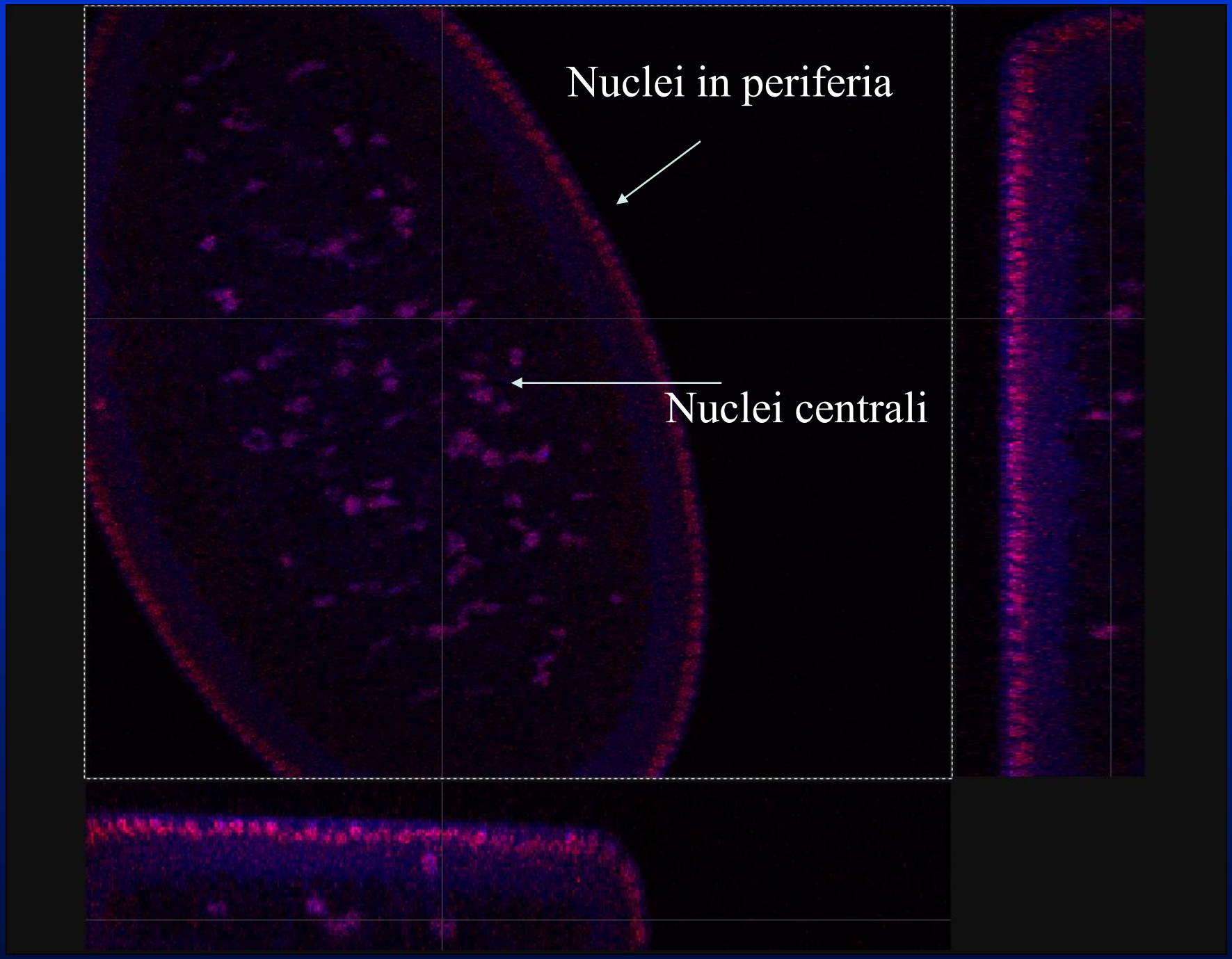


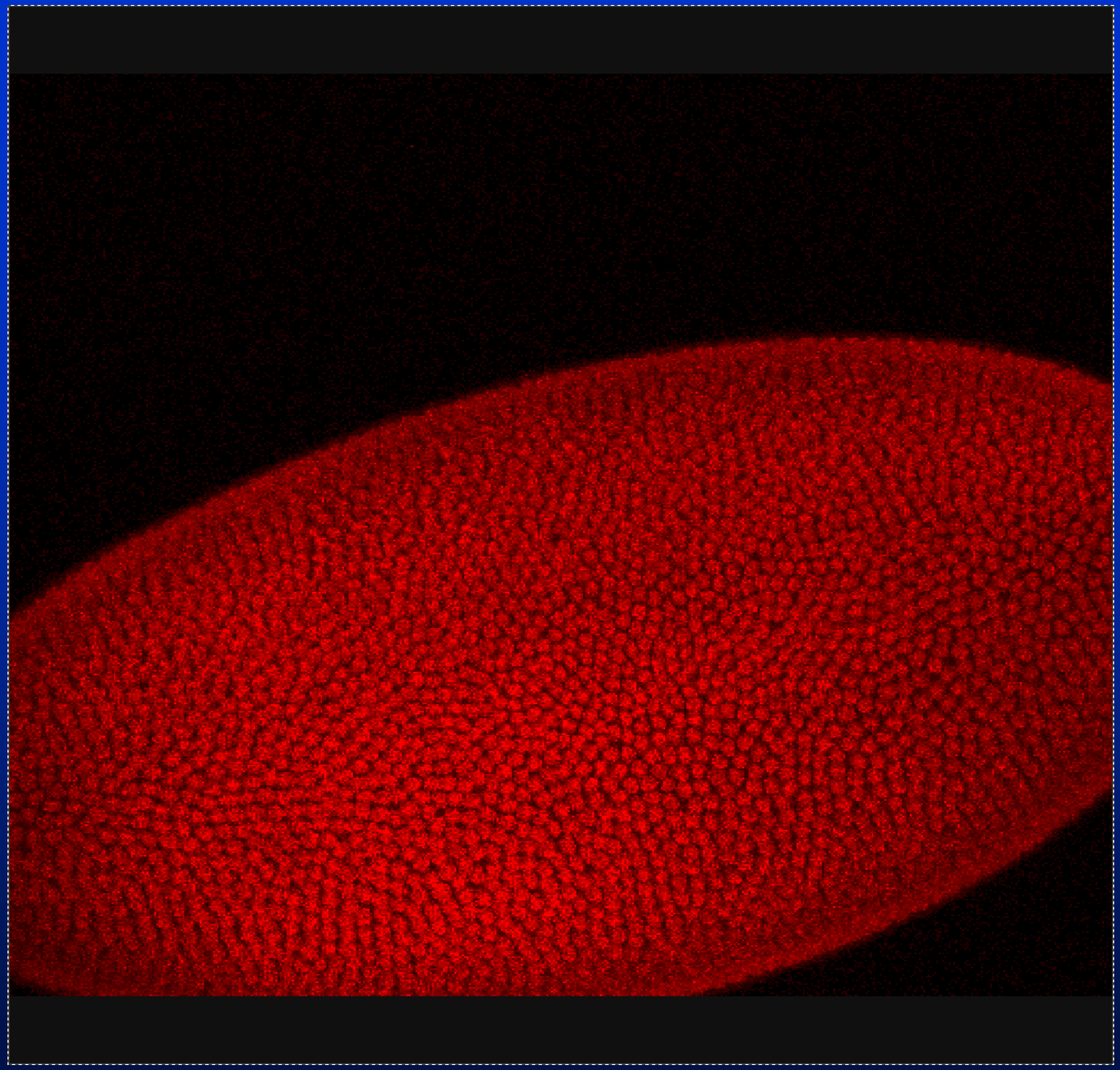

(a) The first three hours after fertilization
Anterior
Posterior
Diploid zygotic nucleus
30 min
Cortex
Mitotic cycle 7
1 h 10 min
Multinucleate syncytium
Most nuclei migrate
out to cortex
Mitotic cycle 10
1 h 30 min
Pole cells
forming
Syncytial blastoderm
End of mitotic cycle 13
2 h 30 min
Primordial germ cells
("Pole cells")
2 h 30 min
2 h 45 min
3 h
3 h 15 min
Membranes in
egg's cortex
grow inward
3 h 15 min
Cellular blastoderm

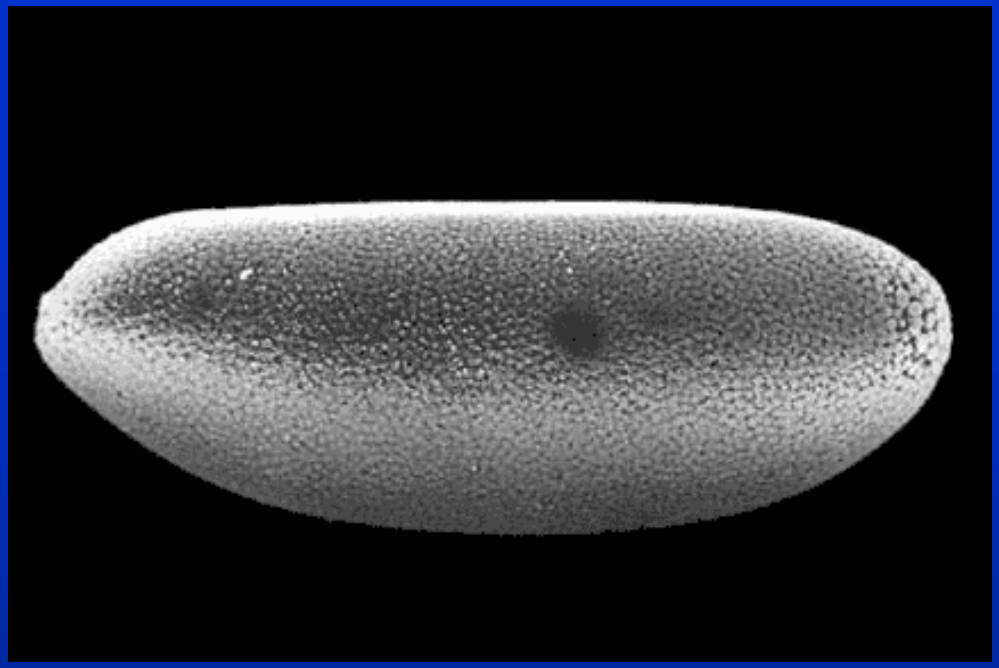

(b) Early embryonic stages in cross section
1
2
3
4
5
6
7
8
9
10
11
12
13
14

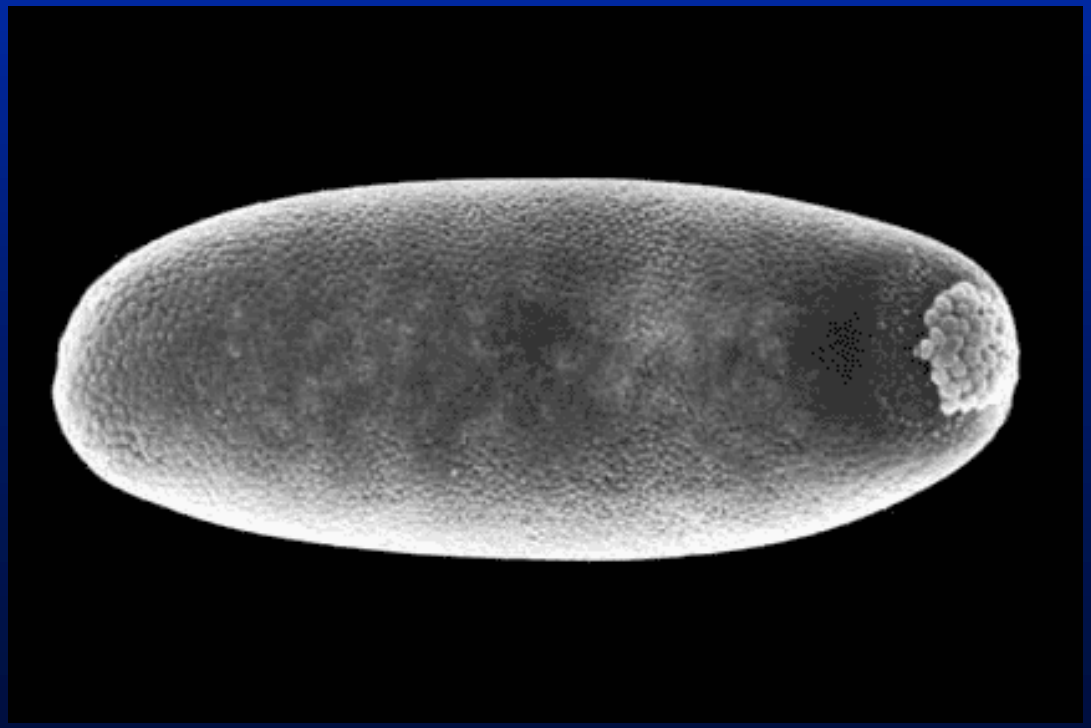

ventrolateral view
02:00:00
dorsolateral view
50 µm


B
z = 16.2 µm
22.3 µm
34.5 µm
C

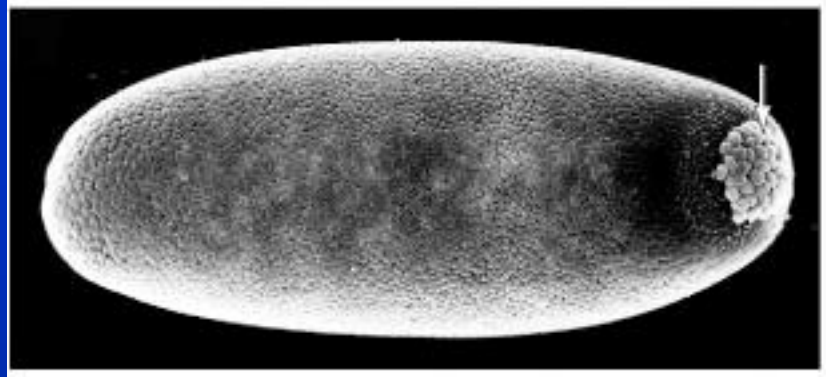

Nuclei in periferia
Nuclei centrali



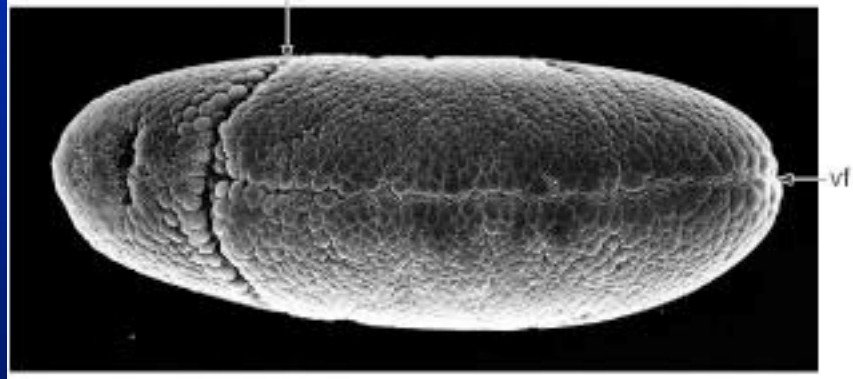




(a) Cellular blastoderm

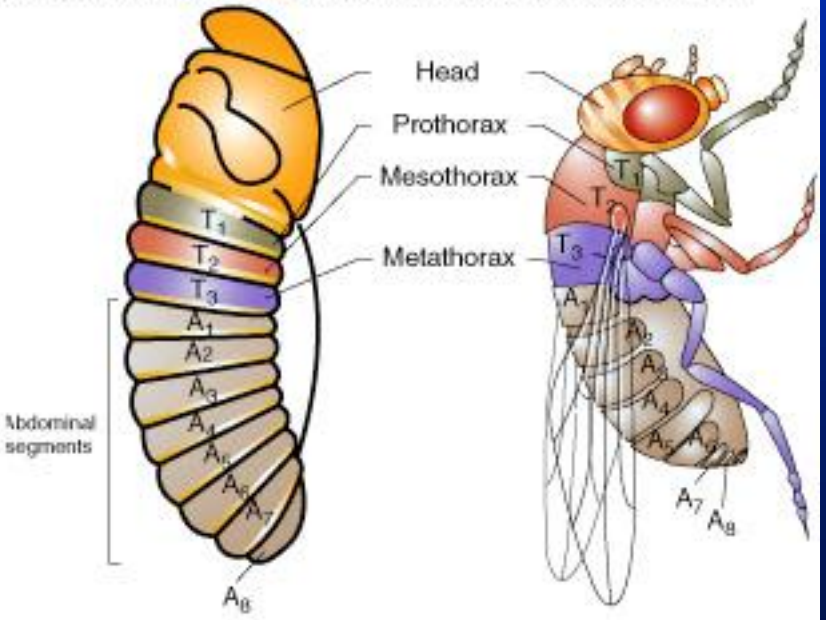


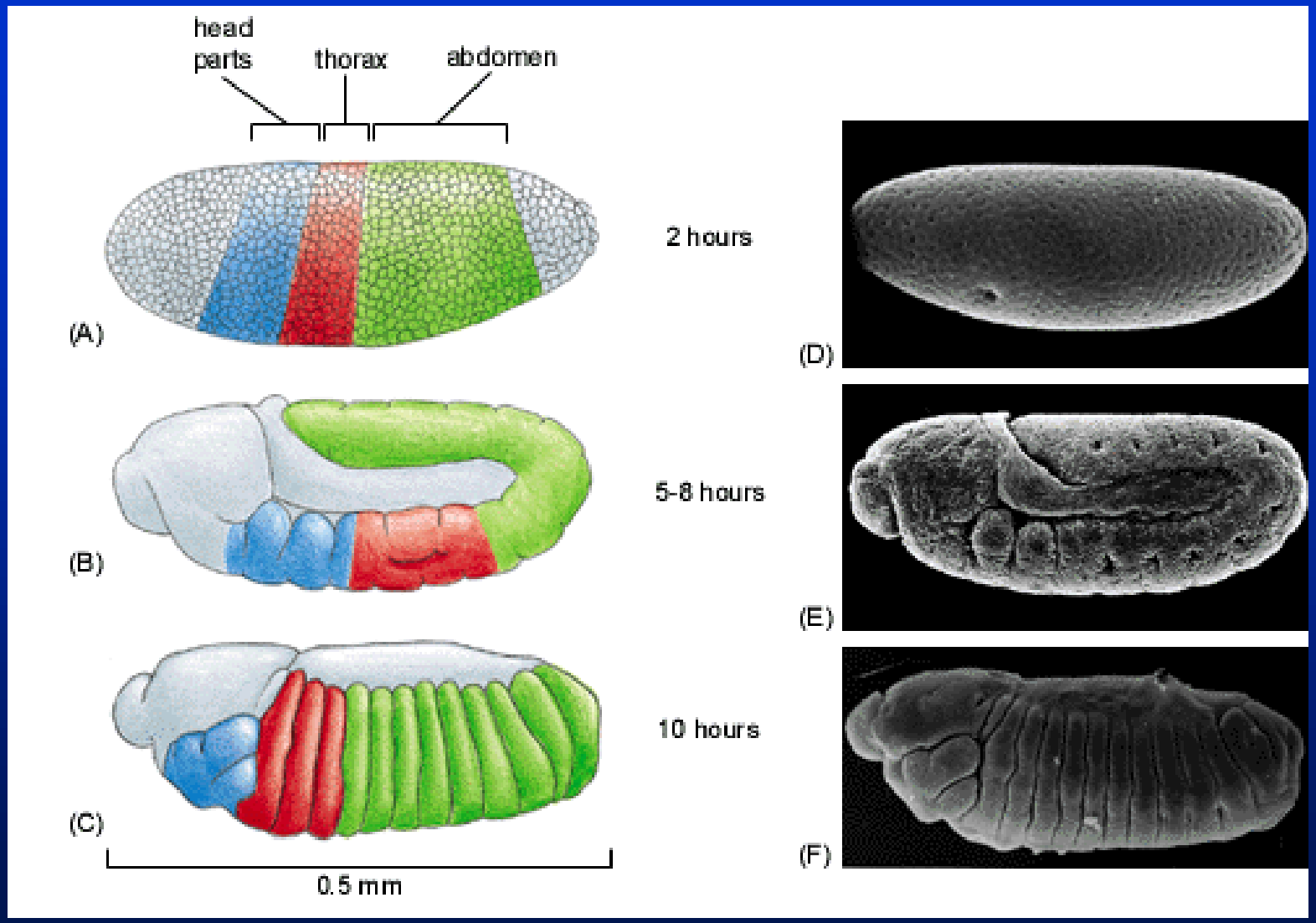
(b) Gastrulation

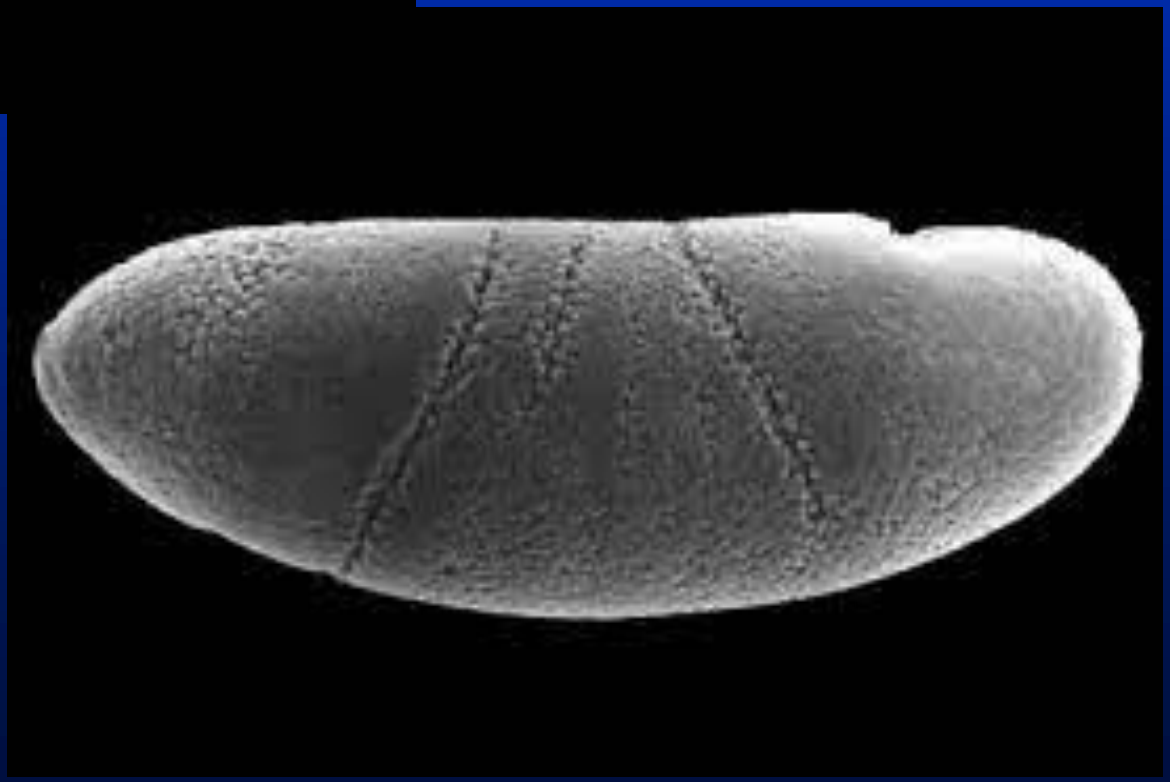


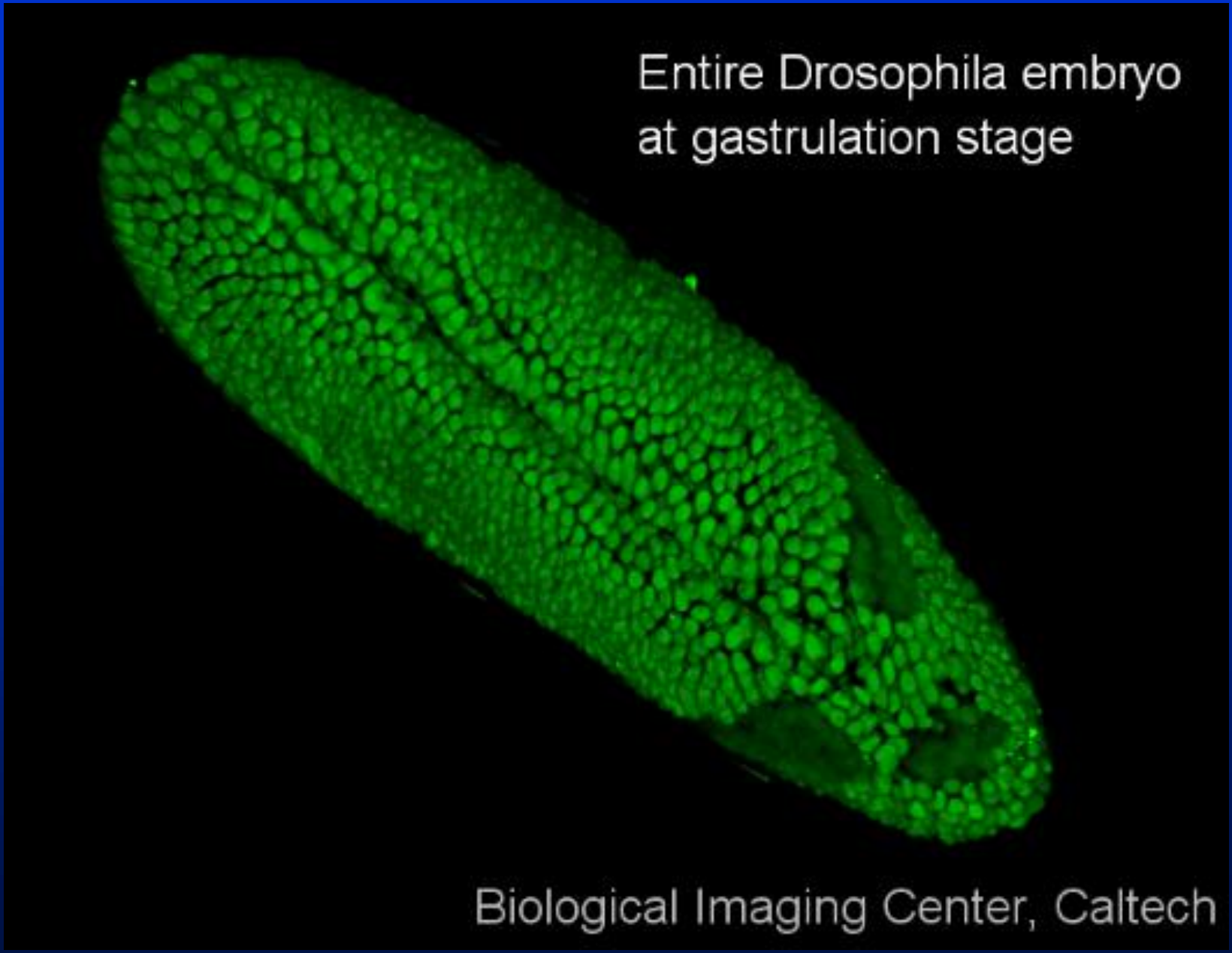

(c) Segmentation

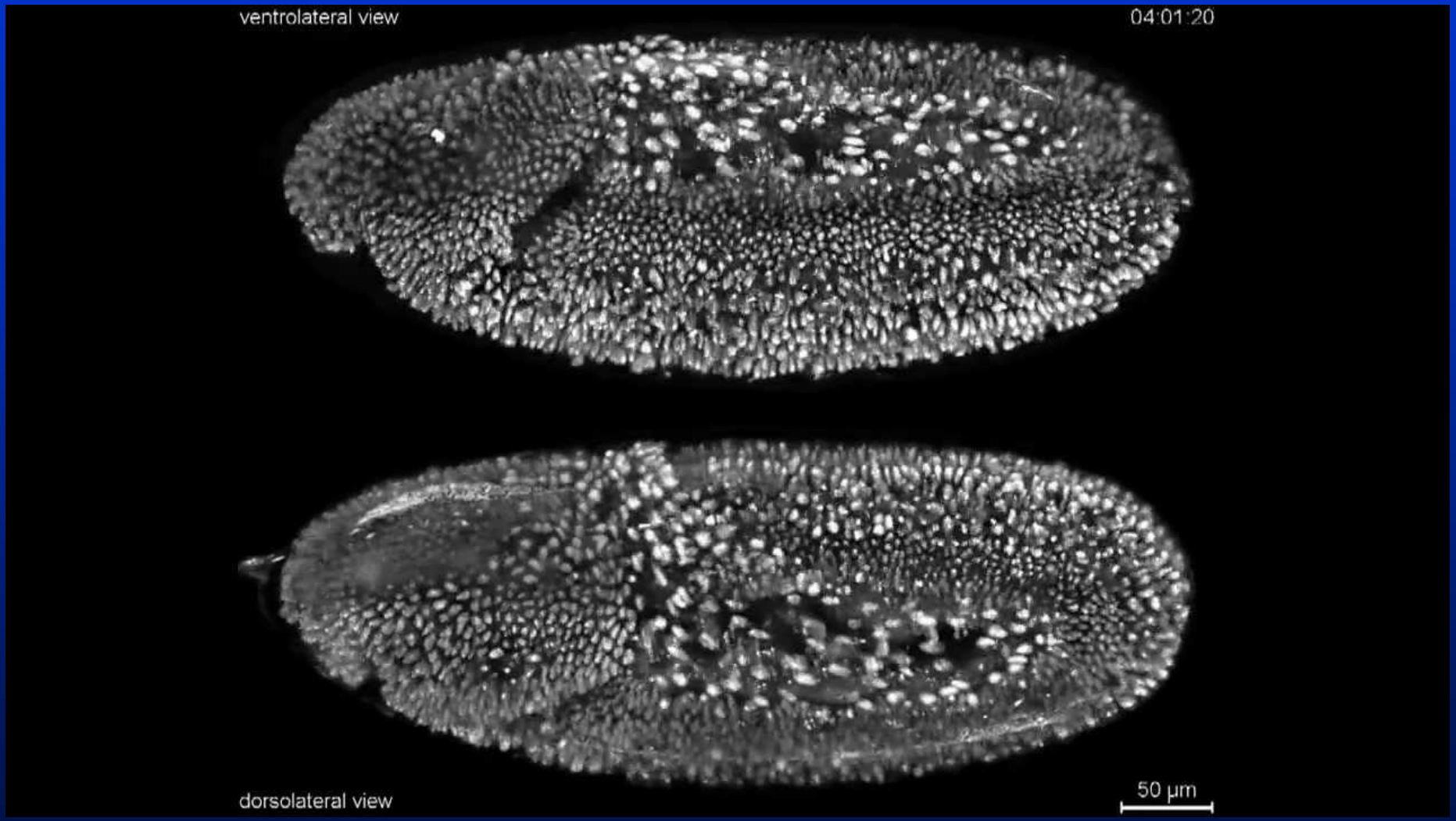
(d) Segment identity is preserved throughout development.

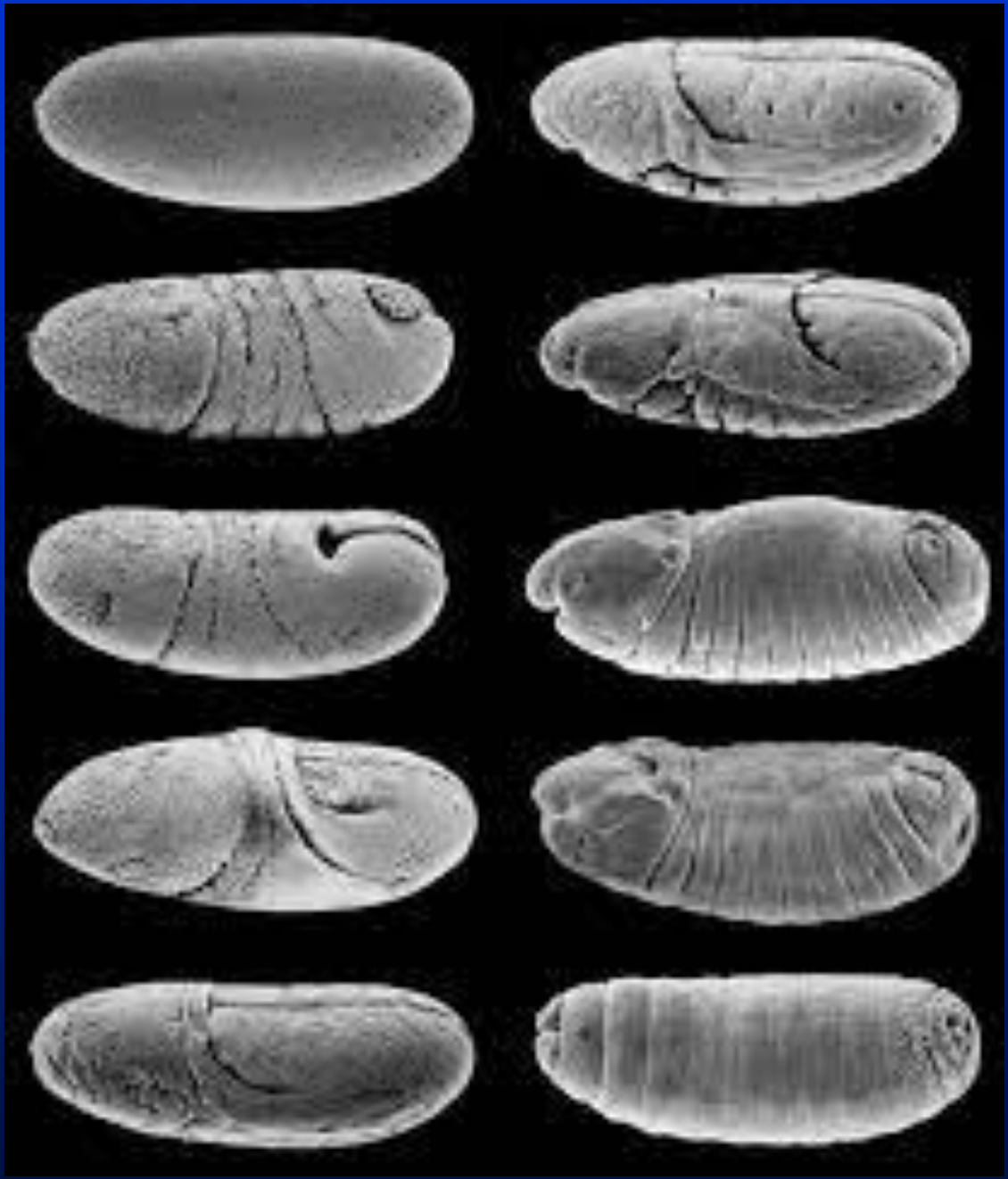



head parts
thorax
abdomen
2 hours
5-8 hours
10 hours
(A)
(B)
(C)
(D)
(E)
(F)
0.5 mm



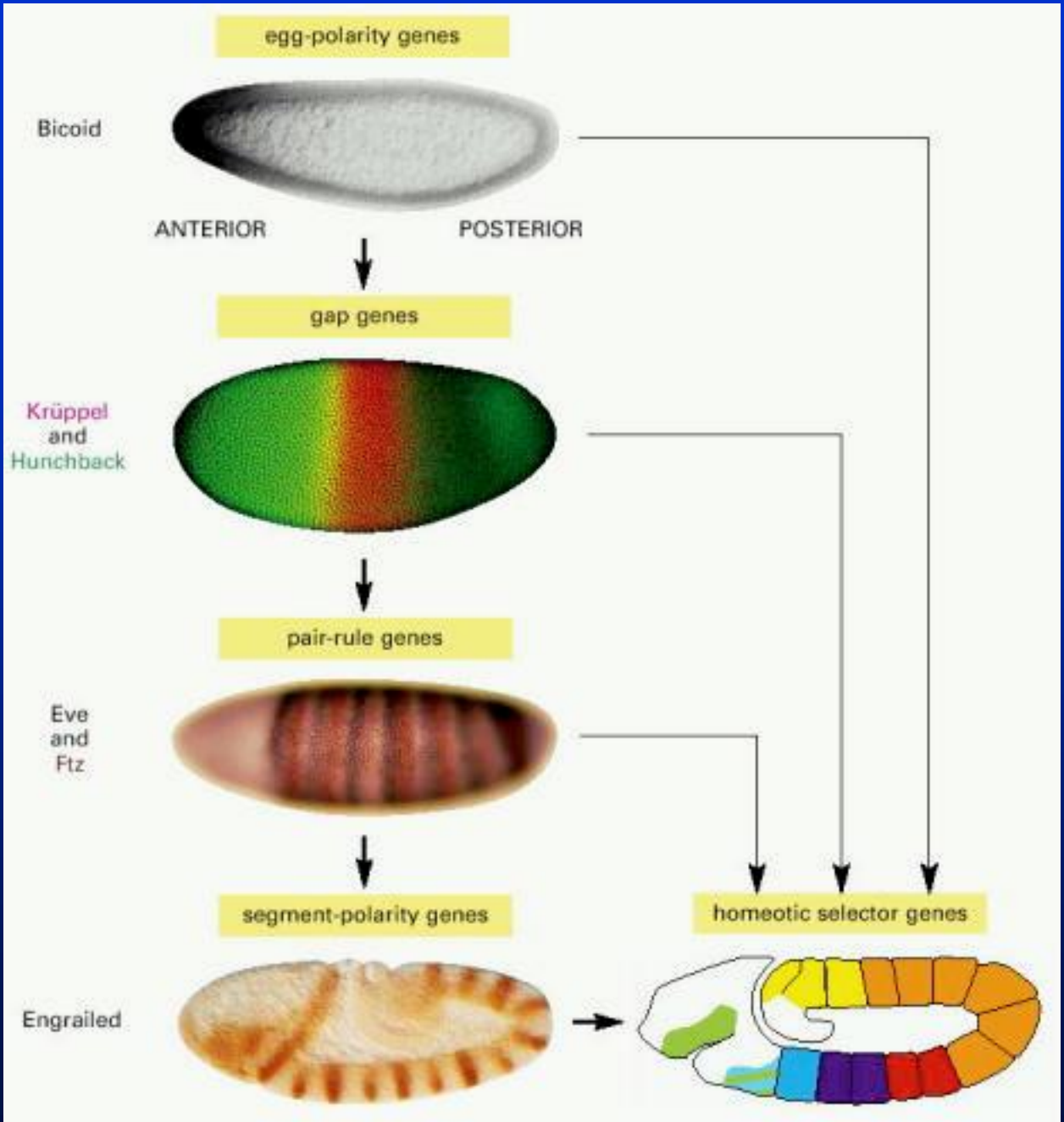

Entire Drosophila embryo
at gastrulation stage
Biological Imaging Center, Caltech


ventrolateral view
04:01:20
dorsolateral view
50 µm

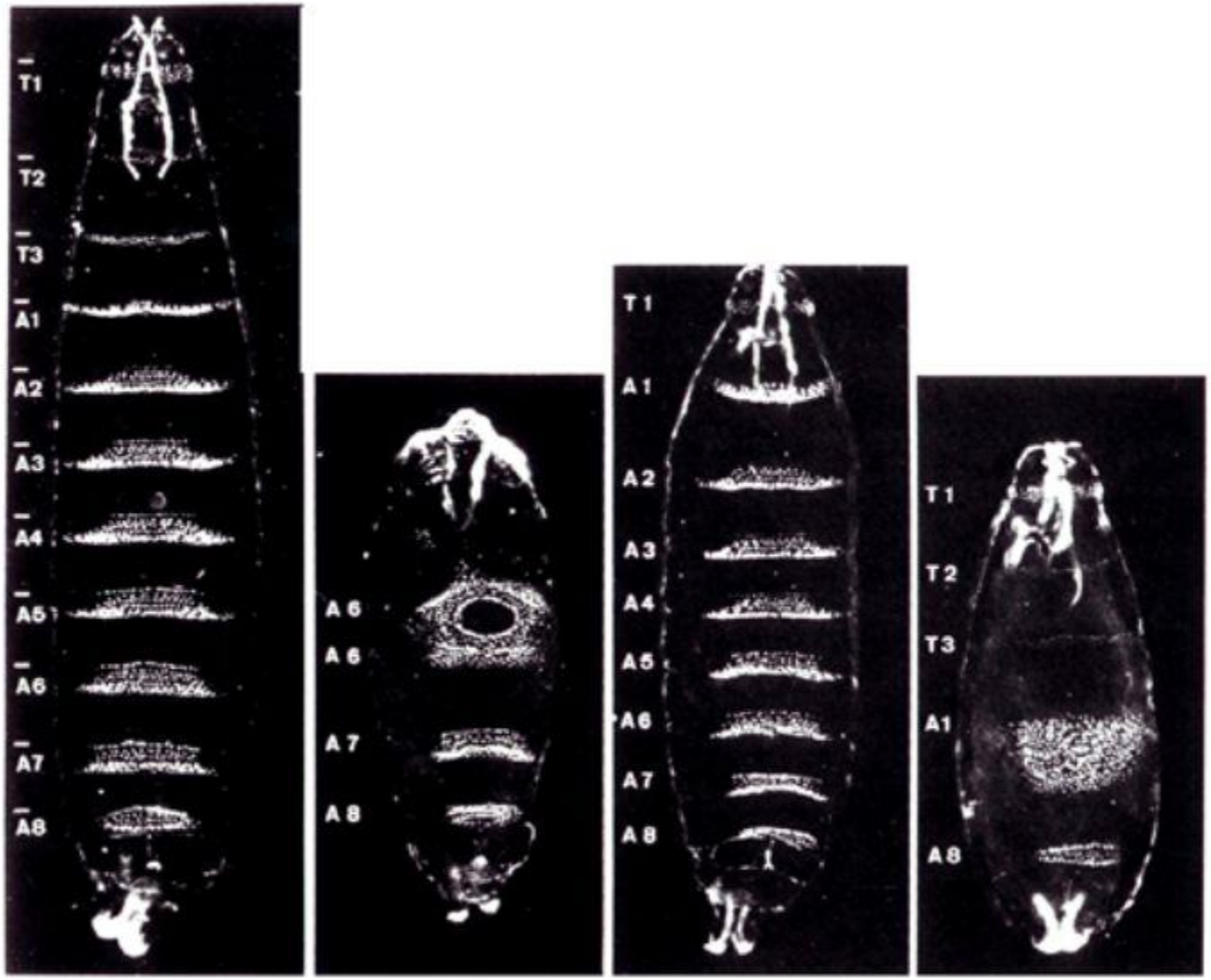


Video embriogenesi

https://www.youtube.com/watch?v=h9RfeU5u85k
https://www.youtube.com/watch?v=gFkZRfAG21Q
https://www.youtube.com/watch?v=SDMFsKrUCvA
https://www.youtube.com/watch?v=YMrlSRts5Ts

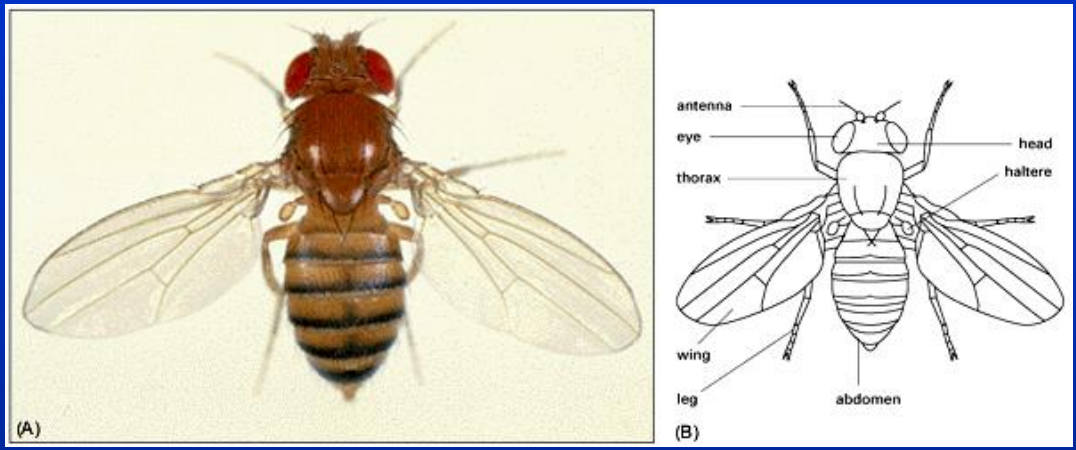

egg-polarity genes
Bicoid
ANTERIOR
POSTERIOR
gap genes
Krüppel
and
Hunchback
pair-rule genes
Eve
and
Ftz
segment-polarity genes
homeotic selector genes
Engrailed

# *Gap* gene mutants lack different body regions




**Wild type** ***Krüppel*** ***hunchback*** ***knirps***

# Examples of Homeotic Mutations

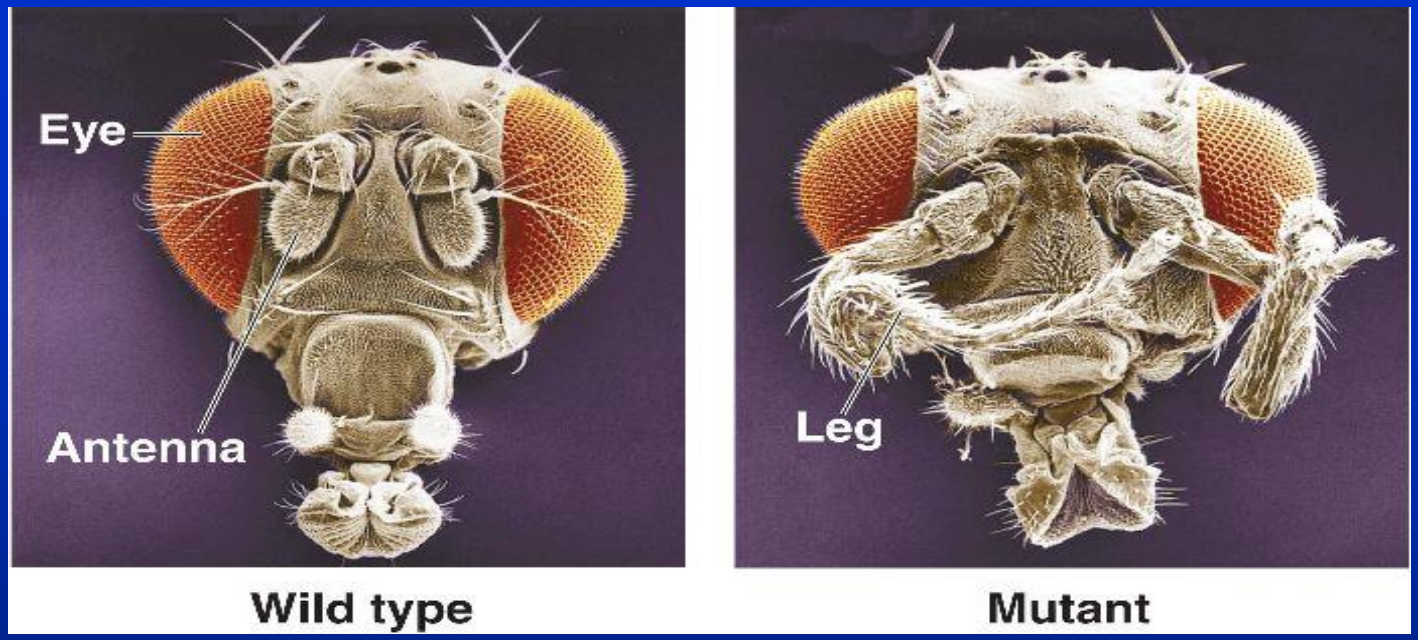



Normal adult fly

*Antennapedia* mutant

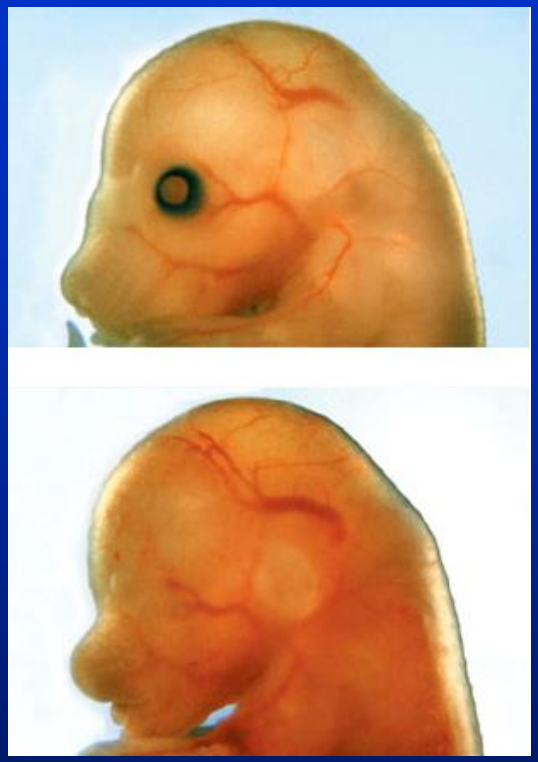
*Bithorax* mutant

# *Antennapedia* Mutations

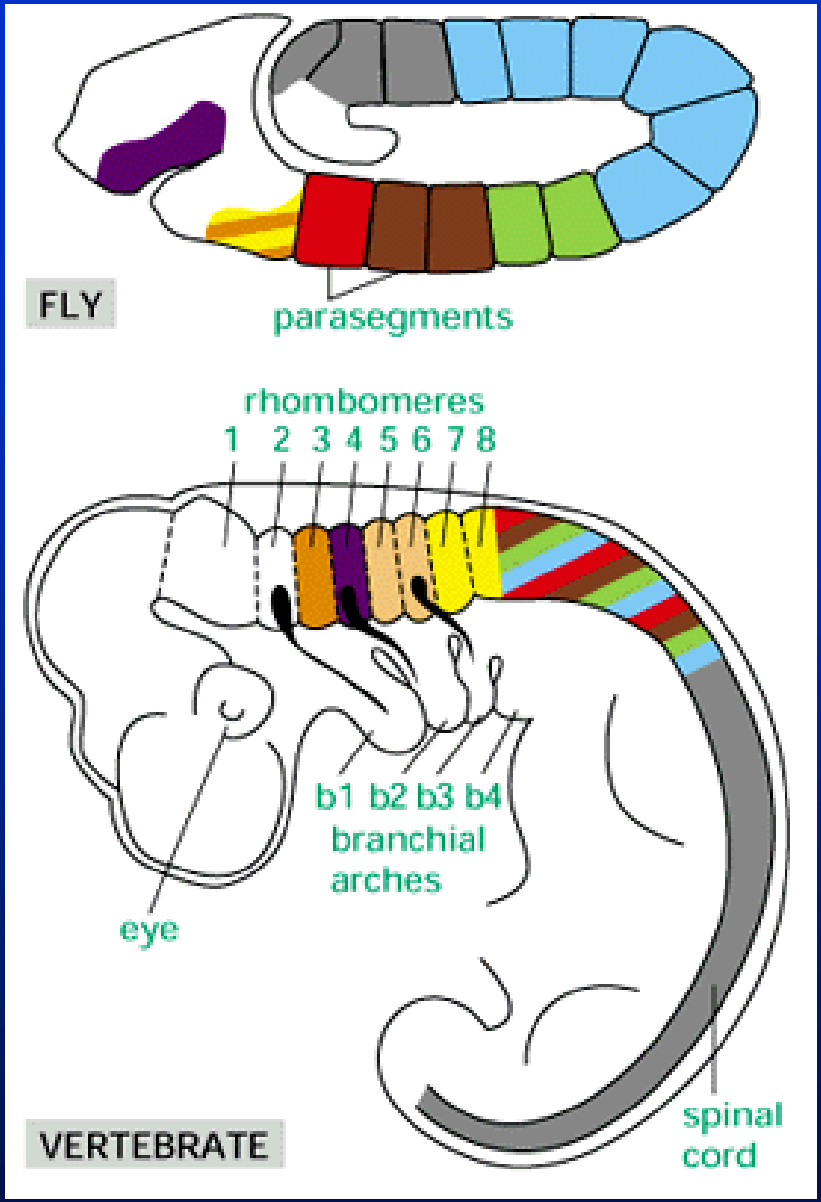


# Geni associati allo sviluppo dell'occhio

Eyeless -/-



Pax 6-/-


FLY
parasegments
rhombomeres
1 2 3 4 5 6 7 8
b1 b2 b3 b4
branchial
arches
eye
spinal
cord
VERTEBRATE