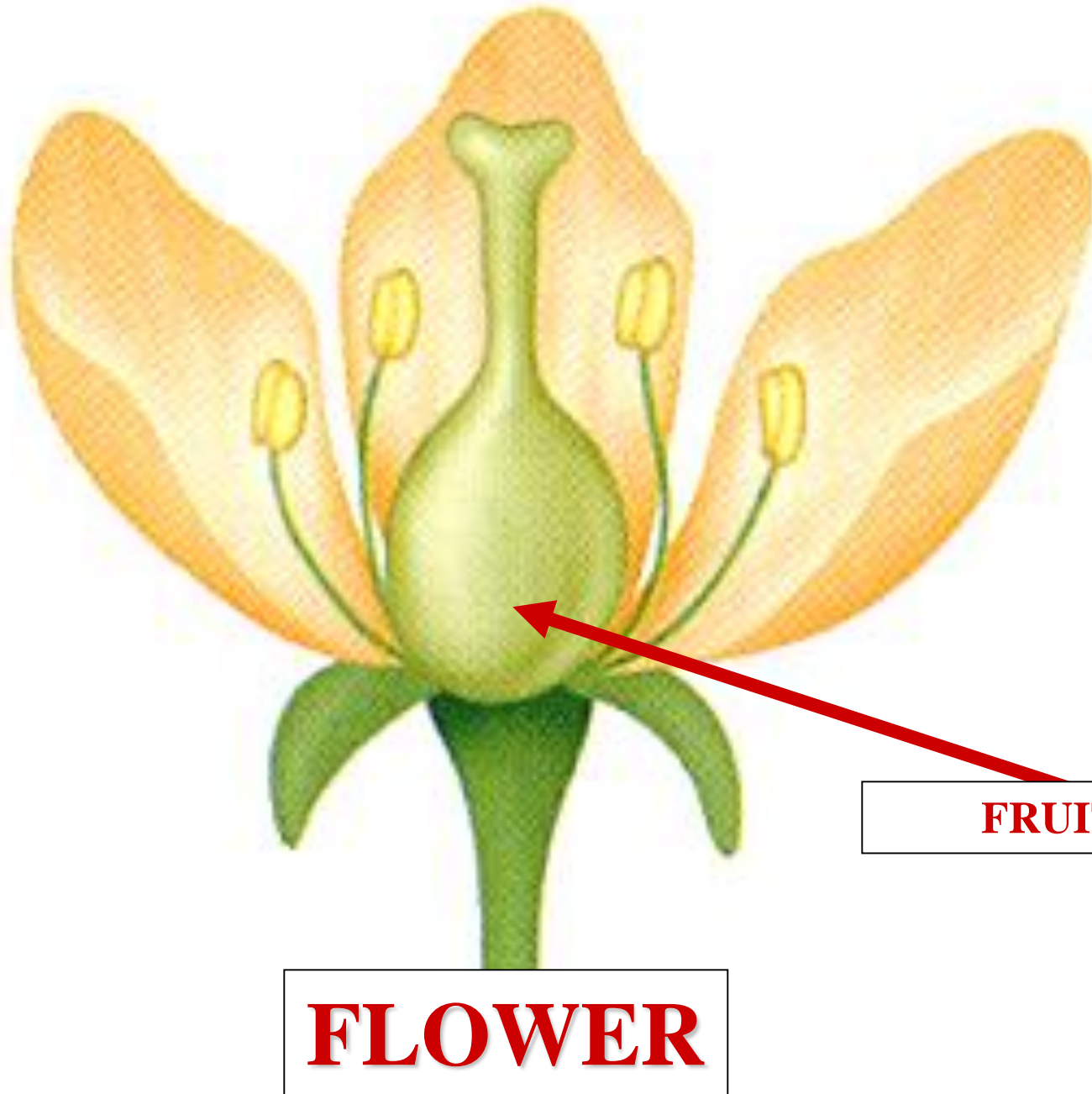


**FLOWER**

**OVARY**



**FRUIT**

**FLOWER**



**FRUIT / SEED  
DISSEMINATED**

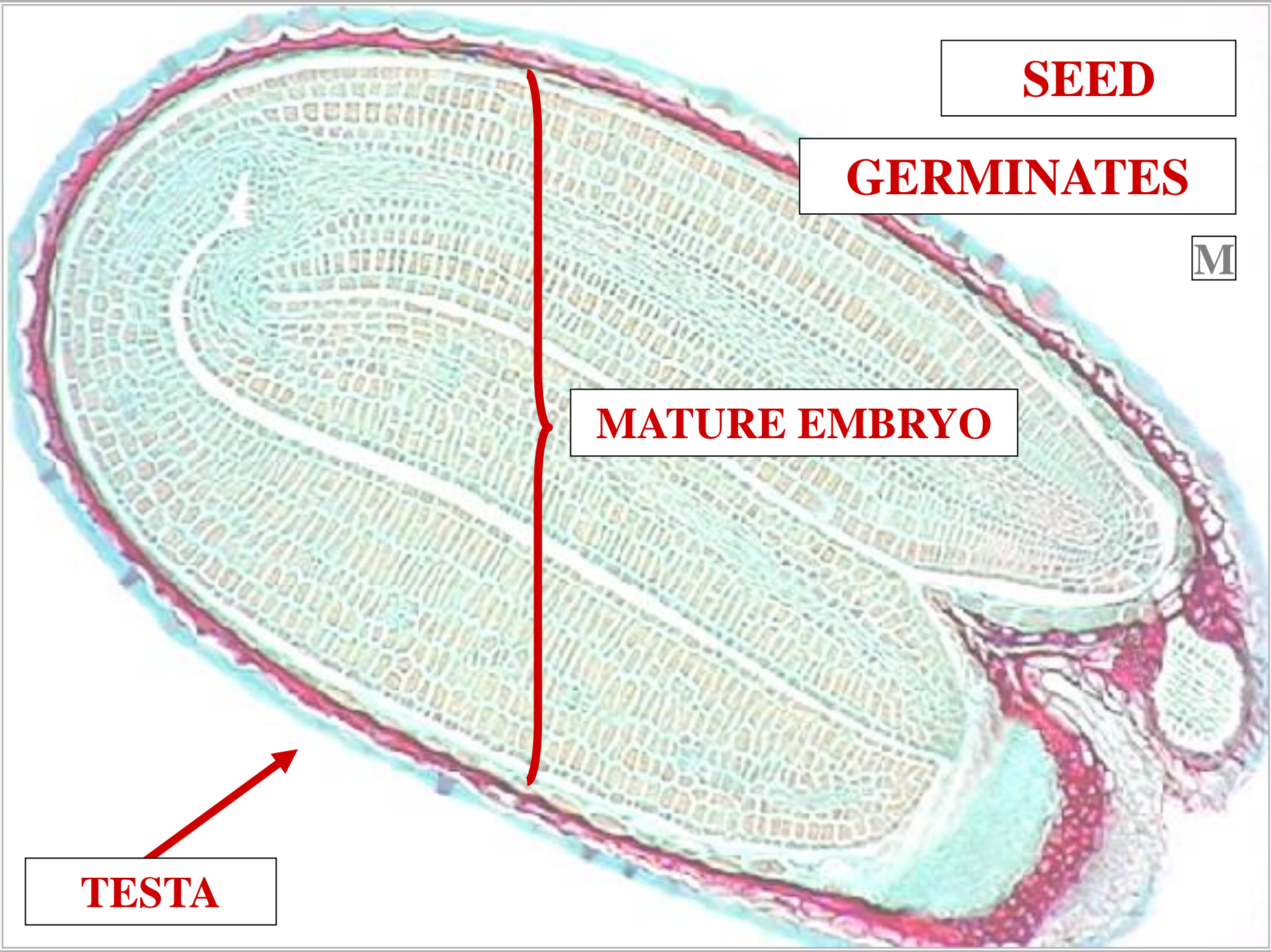
**SEED**

**GERMINATES**

**M**

**MATURE EMBRYO**

**TESTA**



**SEED**

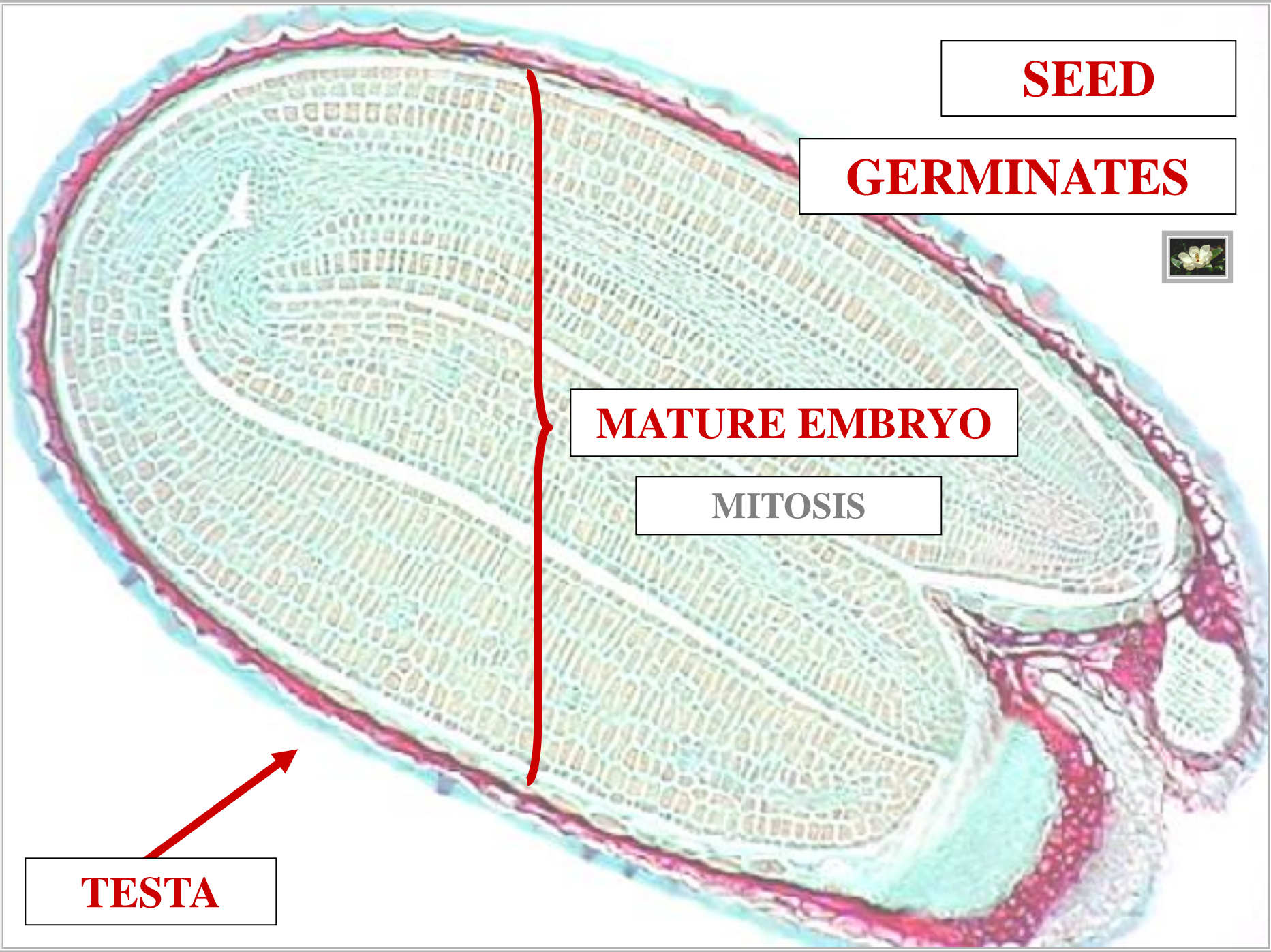
**GERMINATES**



**MATURE EMBRYO**

**MITOSIS**

**TESTA**



A close-up photograph of a large, white magnolia flower with a prominent yellow stamen and a red pistil. The flower is surrounded by dark green, glossy leaves. The background is dark and out of focus.

**MATURE  
ANGIOSPERM  
SPOROPHYTE**

# **DOUBLE FERTILIZATION**



**OVULE**



**EMBRYO SAC**

**TUBE CELL**

**POLLEN TUBE**

**GENERATIVE CELL**

**SPERM CELL**

**ENDOSPERM**

**ZYGOTE**

**DOUBLE FERTILIZATION**

**OVULE**

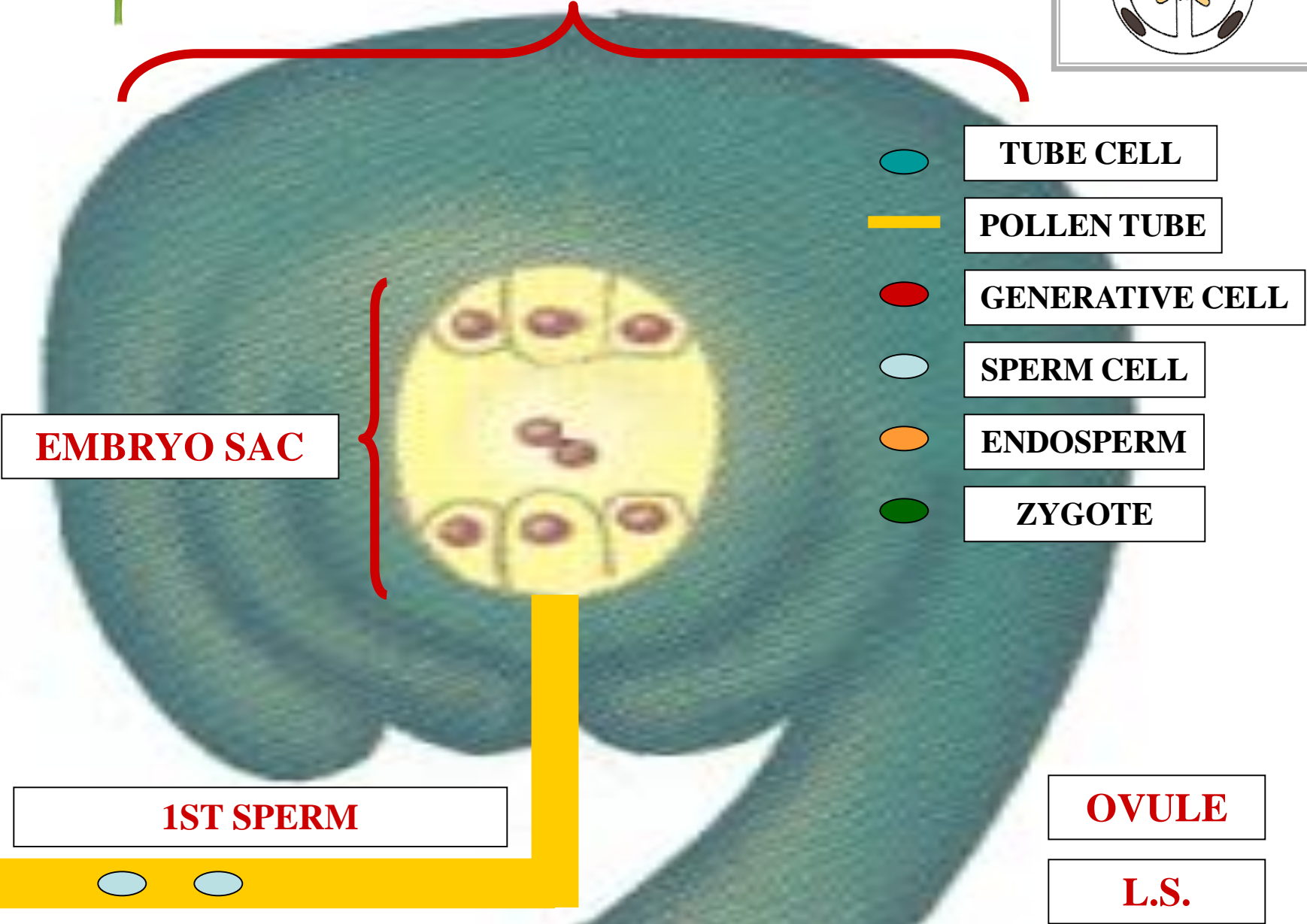
**L.S.**







**OVULE**



**TUBE CELL**

**POLLEN TUBE**

**GENERATIVE CELL**

**SPERM CELL**

**ENDOSPERM**

**ZYGOTE**

**EMBRYO SAC**

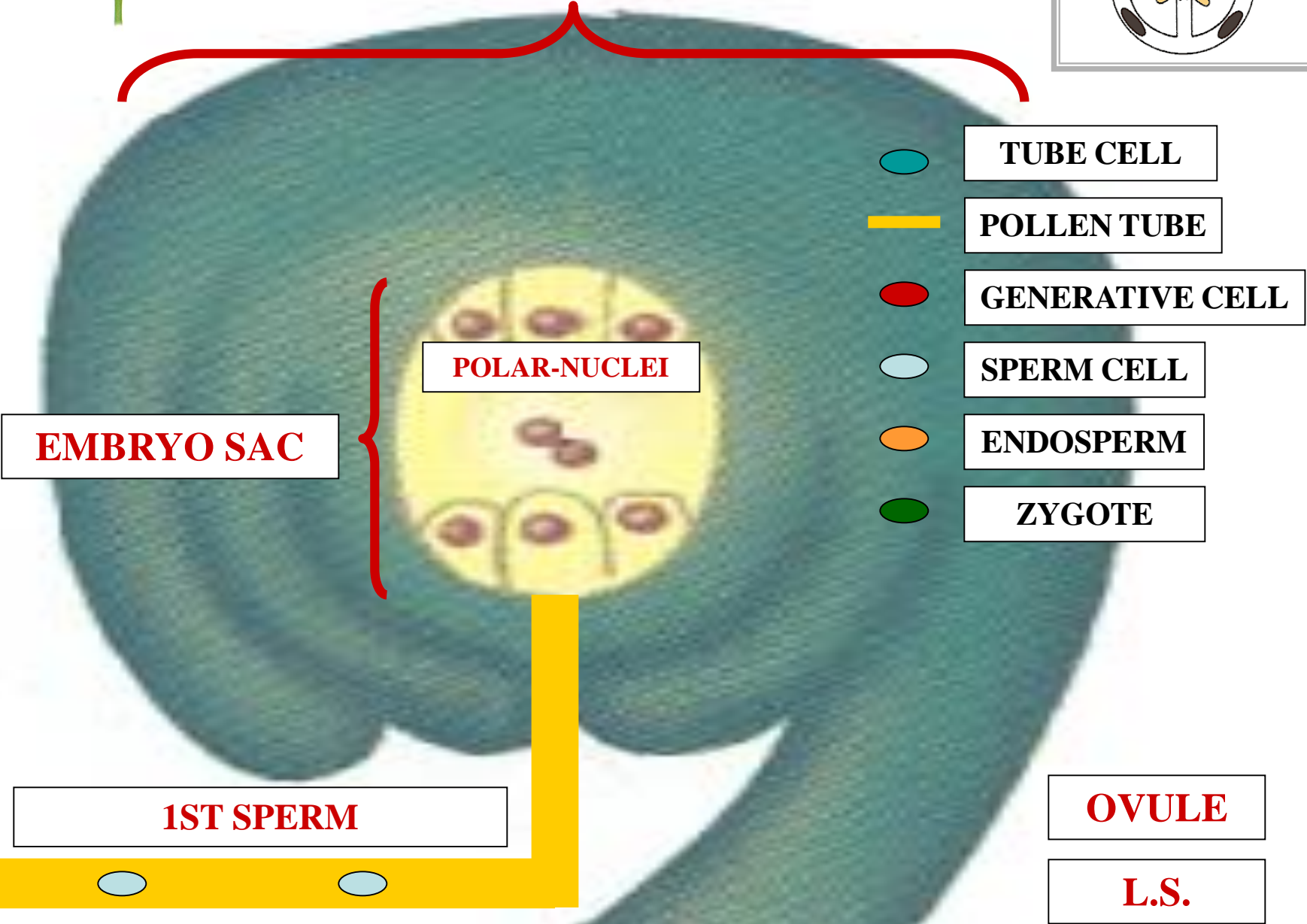
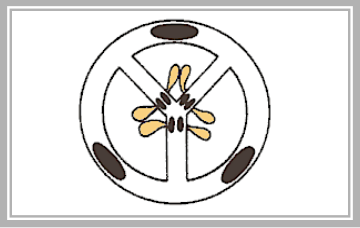
**1ST SPERM**

**OVULE**

**L.S.**



**OVULE**



**TUBE CELL**

**POLLEN TUBE**

**GENERATIVE CELL**

**SPERM CELL**

**ENDOSPERM**

**ZYGOTE**

**EMBRYO SAC**

**POLAR-NUCLEI**

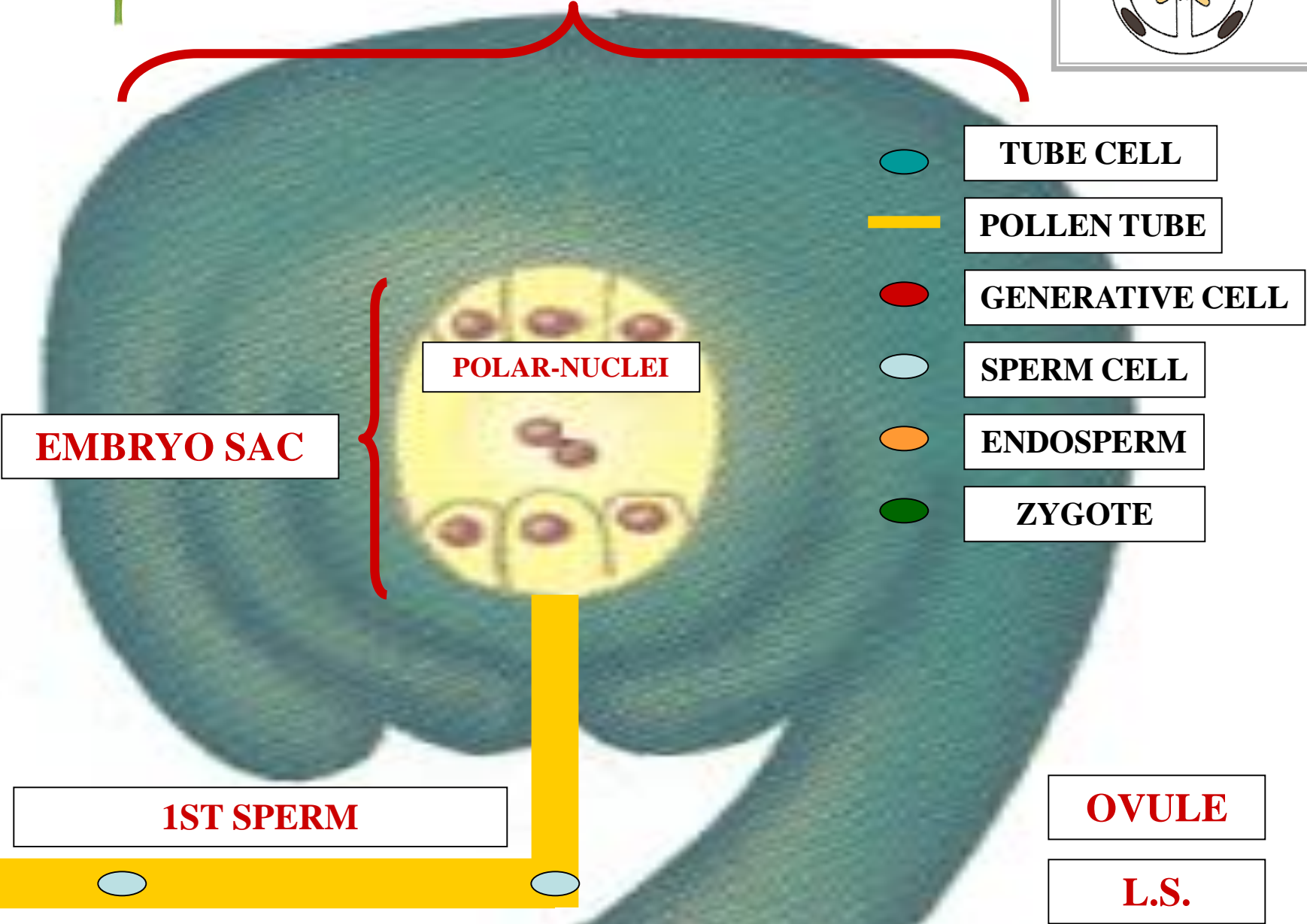
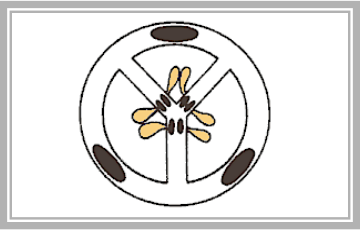
**1ST SPERM**

**OVULE**

**L.S.**



**OVULE**



**TUBE CELL**

**POLLEN TUBE**

**GENERATIVE CELL**

**SPERM CELL**

**ENDOSPERM**

**ZYGOTE**

**POLAR-NUCLEI**

**EMBRYO SAC**

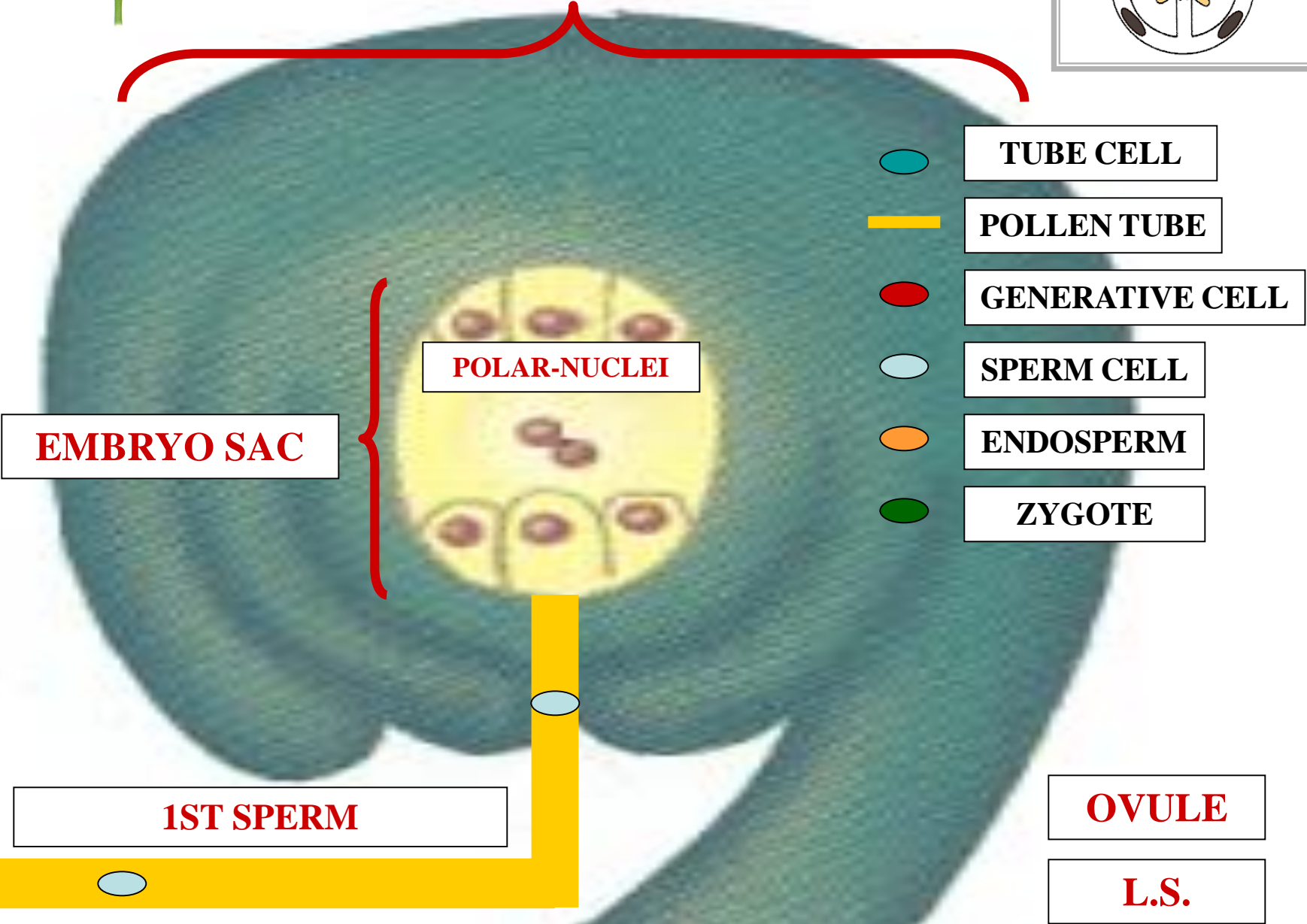
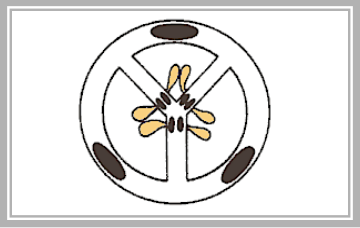
**1ST SPERM**

**OVULE**

**L.S.**



**OVULE**



**TUBE CELL**

**POLLEN TUBE**

**GENERATIVE CELL**

**SPERM CELL**

**ENDOSPERM**

**ZYGOTE**

**EMBRYO SAC**

**POLAR-NUCLEI**

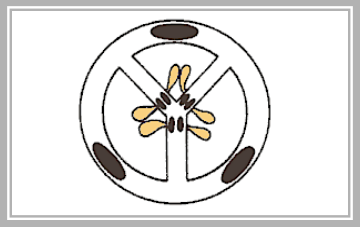
**1ST SPERM**

**OVULE**

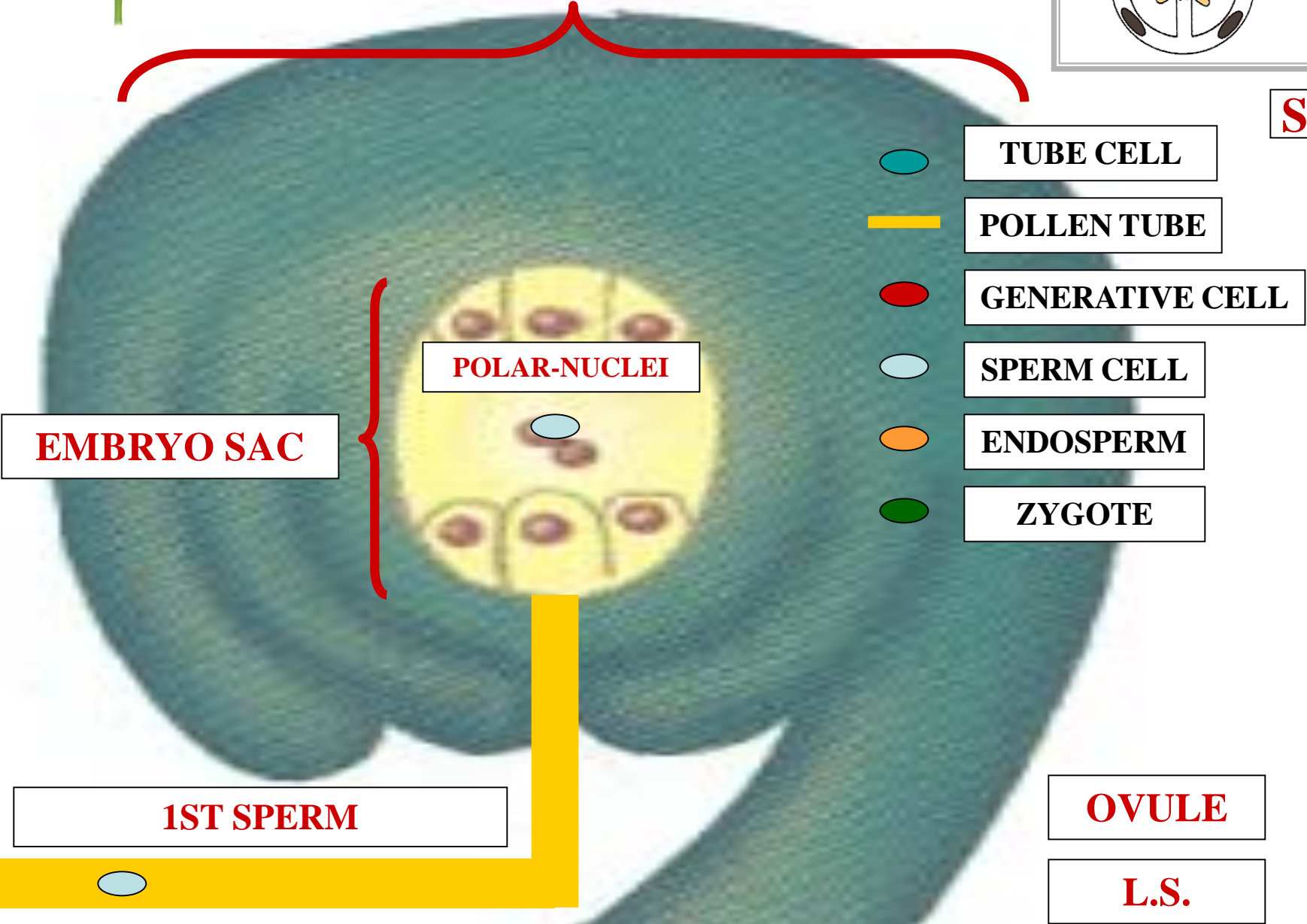
**L.S.**



**OVULE**



**S**



**TUBE CELL**

**POLLEN TUBE**

**GENERATIVE CELL**

**SPERM CELL**

**ENDOSPERM**

**ZYGOTE**

**POLAR-NUCLEI**

**EMBRYO SAC**

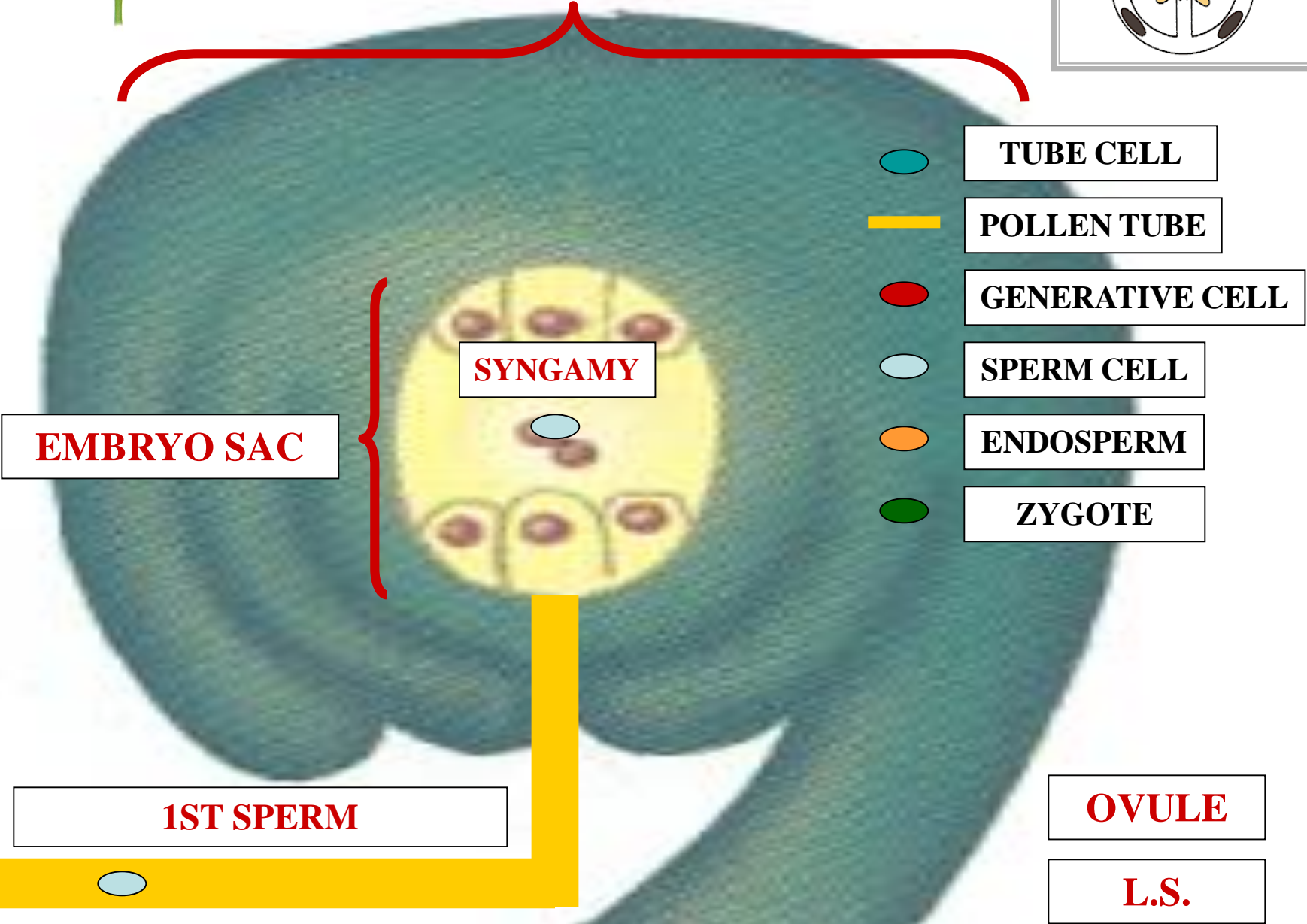
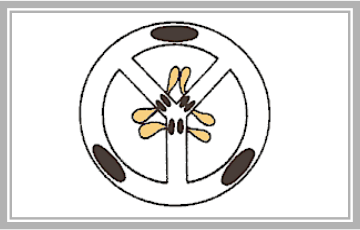
**1ST SPERM**

**OVULE**

**L.S.**

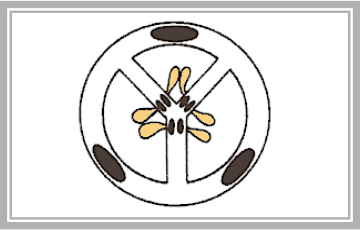


**OVULE**

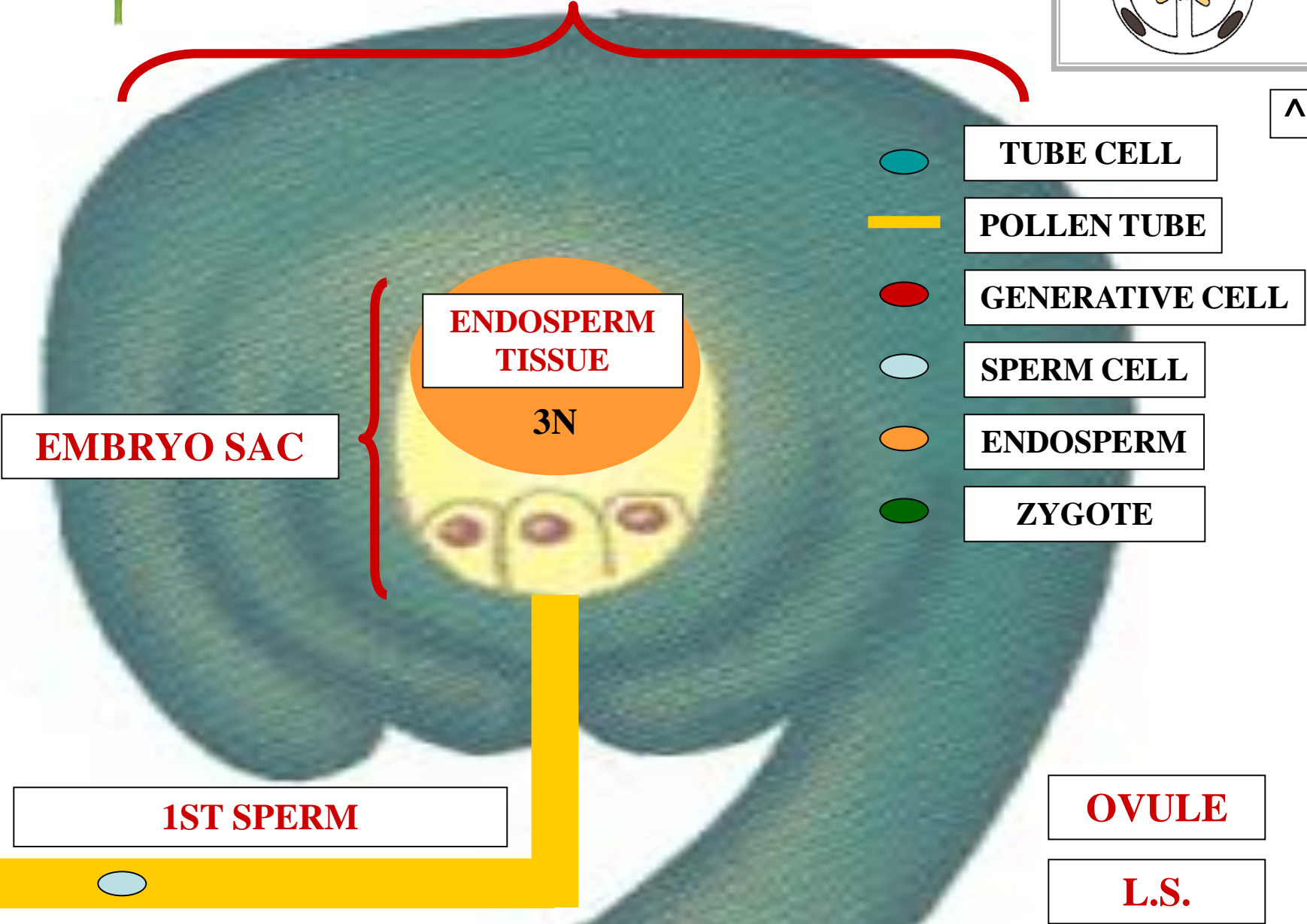




**OVULE**



^



**TUBE CELL**

**POLLEN TUBE**

**GENERATIVE CELL**

**SPERM CELL**

**ENDOSPERM**

**ZYGOTE**

**ENDOSPERM TISSUE**

**3N**

**EMBRYO SAC**

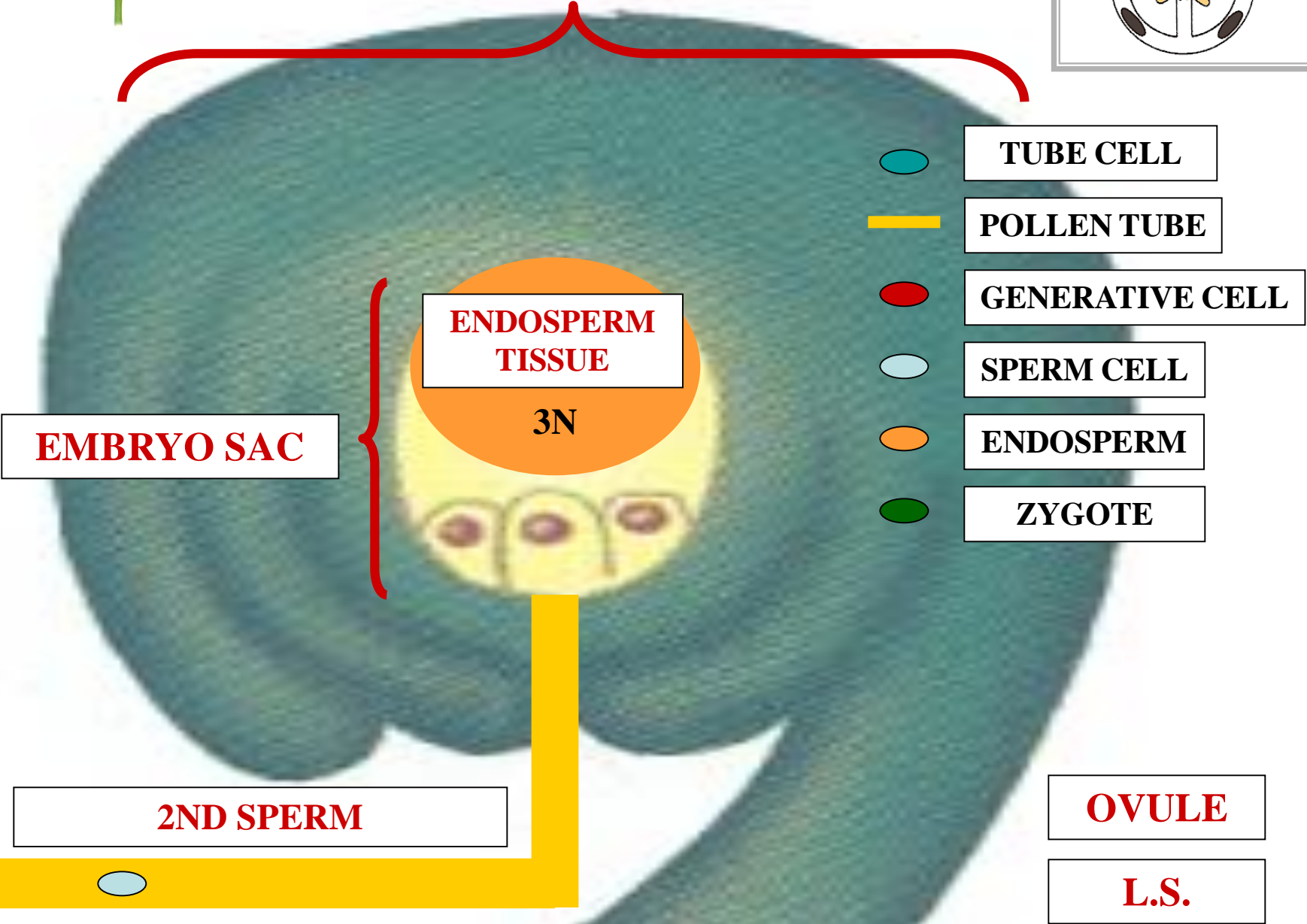
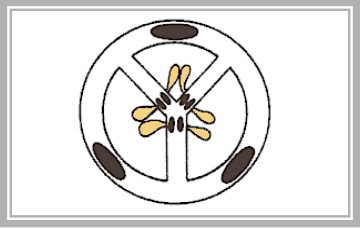
**1ST SPERM**

**OVULE**

**L.S.**



**OVULE**



**TUBE CELL**

**POLLEN TUBE**

**GENERATIVE CELL**

**SPERM CELL**

**ENDOSPERM**

**ZYGOTE**

**ENDOSPERM TISSUE**

**3N**

**EMBRYO SAC**

**2ND SPERM**

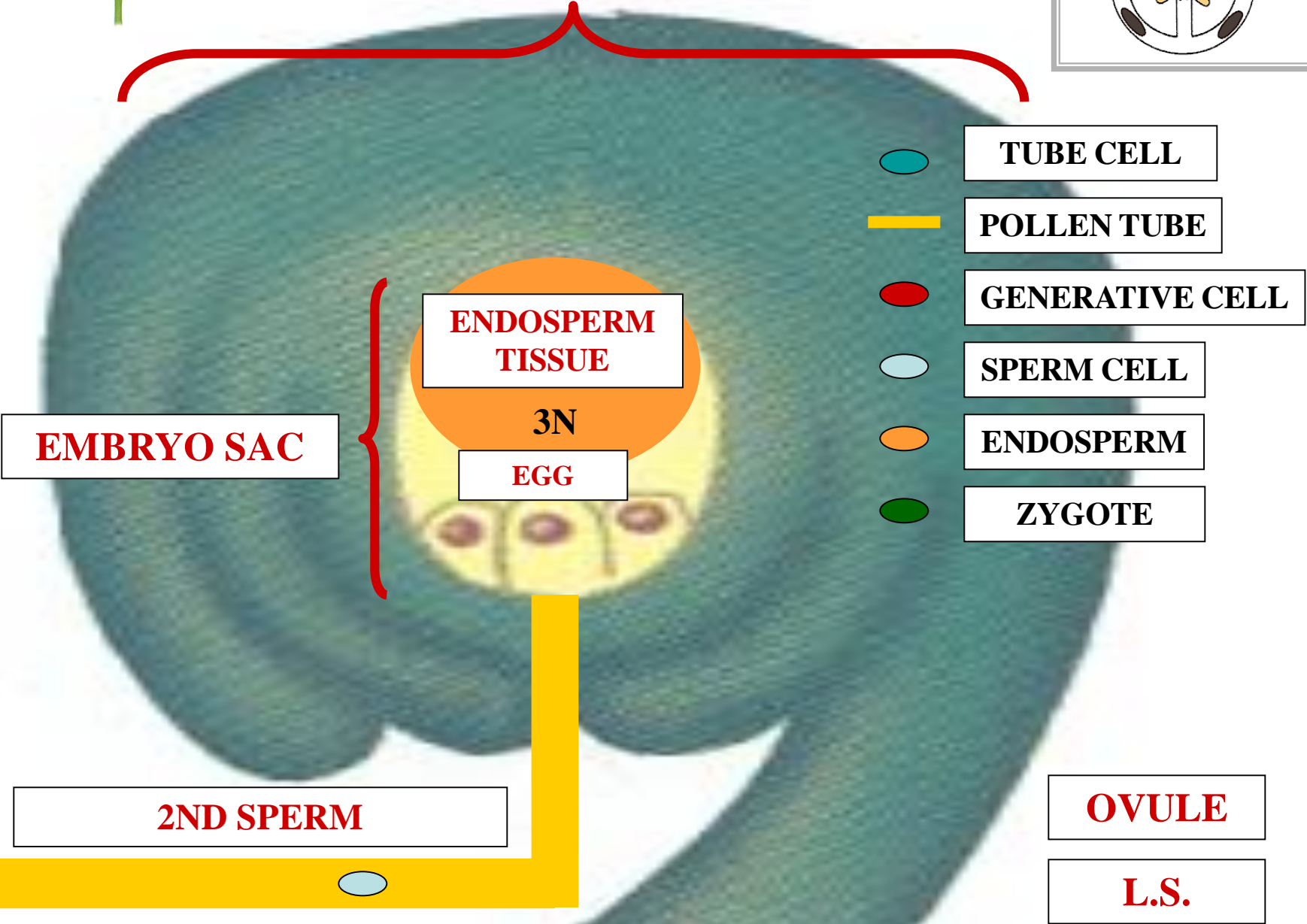
**OVULE**

**L.S.**





**OVULE**



**TUBE CELL**

**POLLEN TUBE**

**GENERATIVE CELL**

**SPERM CELL**

**ENDOSPERM**

**ZYGOTE**

**ENDOSPERM TISSUE**

**3N**

**EGG**

**EMBRYO SAC**

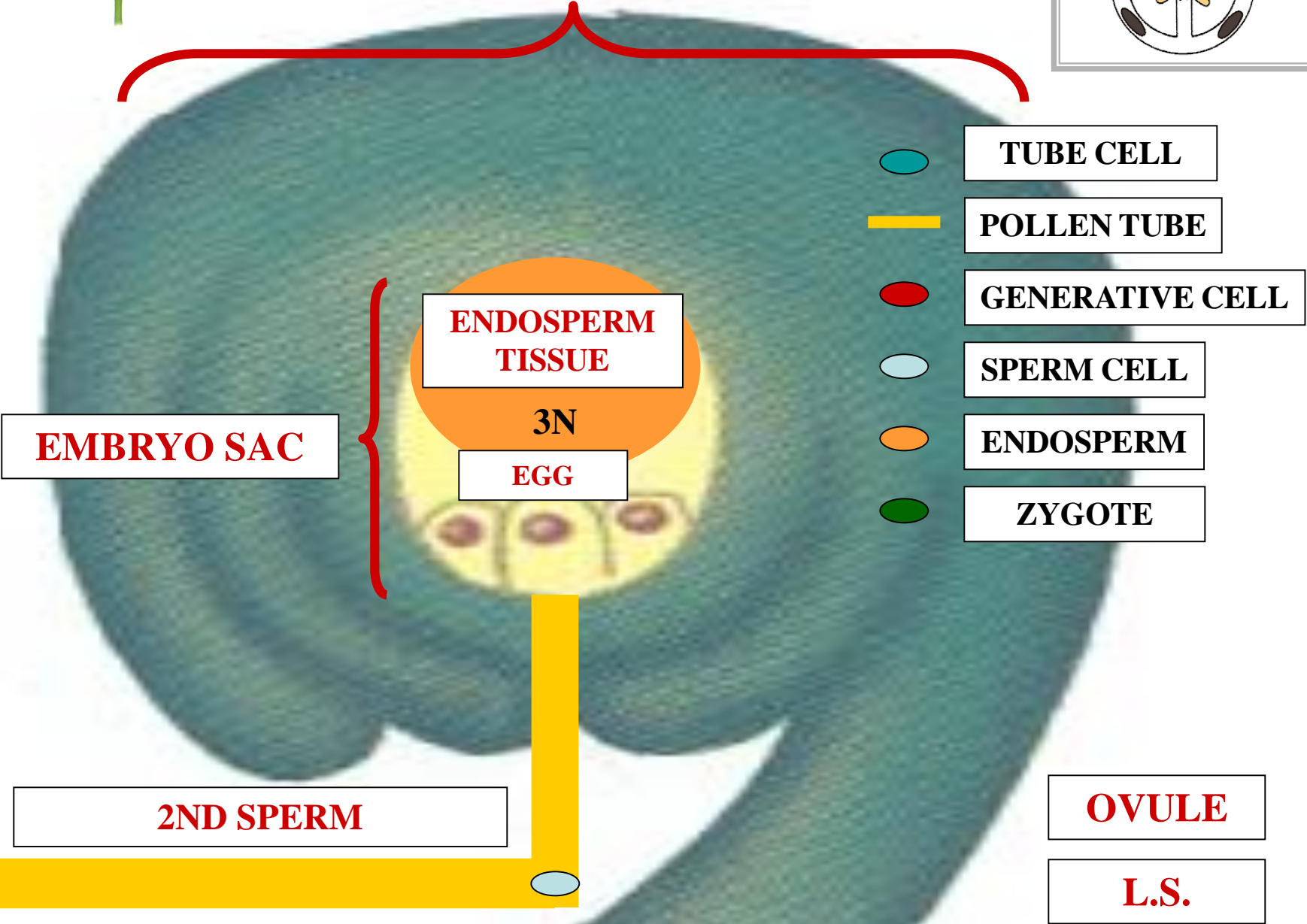
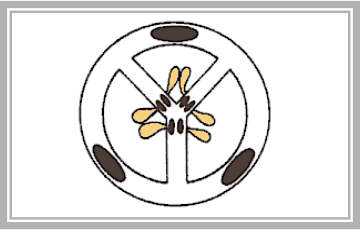
**2ND SPERM**

**OVULE**

**L.S.**



**OVULE**



**TUBE CELL**

**POLLEN TUBE**

**GENERATIVE CELL**

**SPERM CELL**

**ENDOSPERM**

**ZYGOTE**

**ENDOSPERM TISSUE**

**3N**

**EGG**

**EMBRYO SAC**

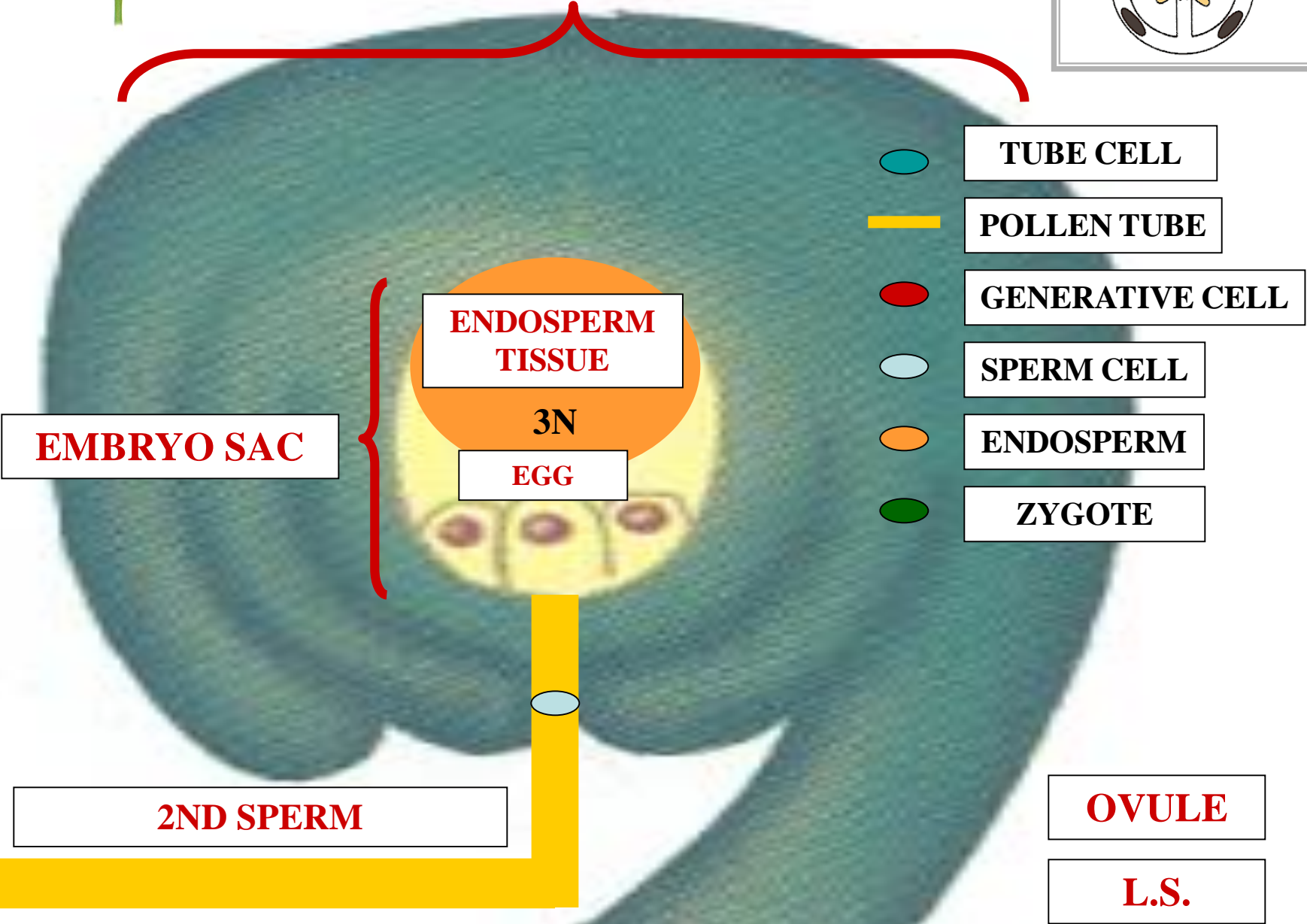
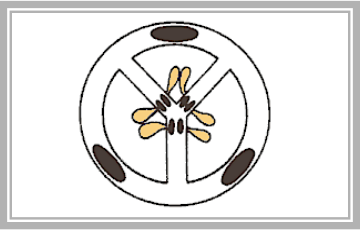
**2ND SPERM**

**OVULE**

**L.S.**

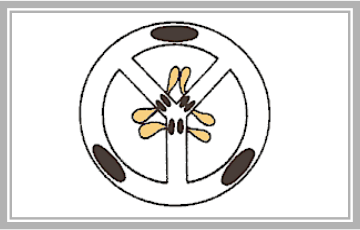


**OVULE**

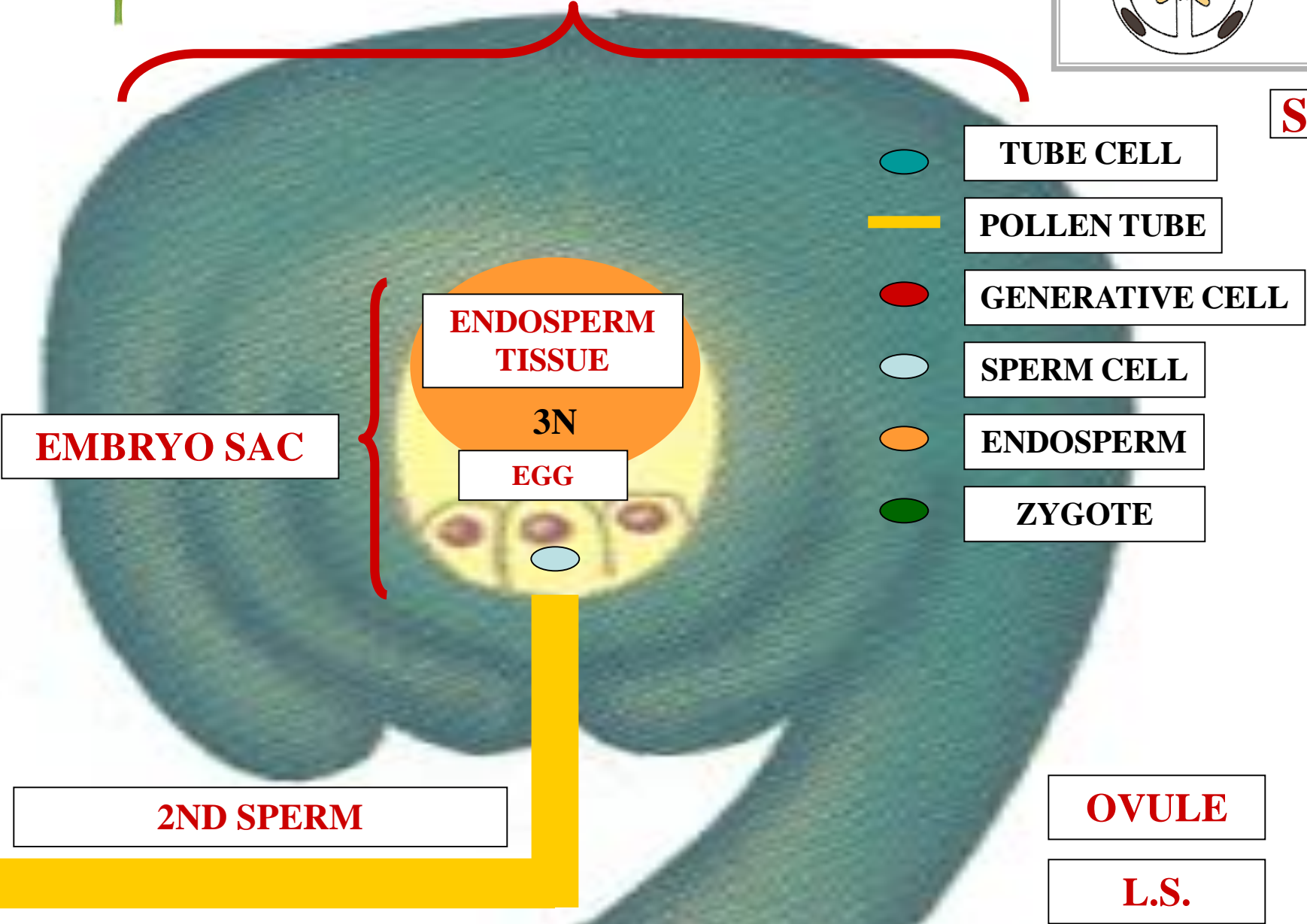




**OVULE**



**S**



**TUBE CELL**

**POLLEN TUBE**

**GENERATIVE CELL**

**SPERM CELL**

**ENDOSPERM**

**ZYGOTE**

**EMBRYO SAC**

**ENDOSPERM TISSUE**

**3N**  
**EGG**

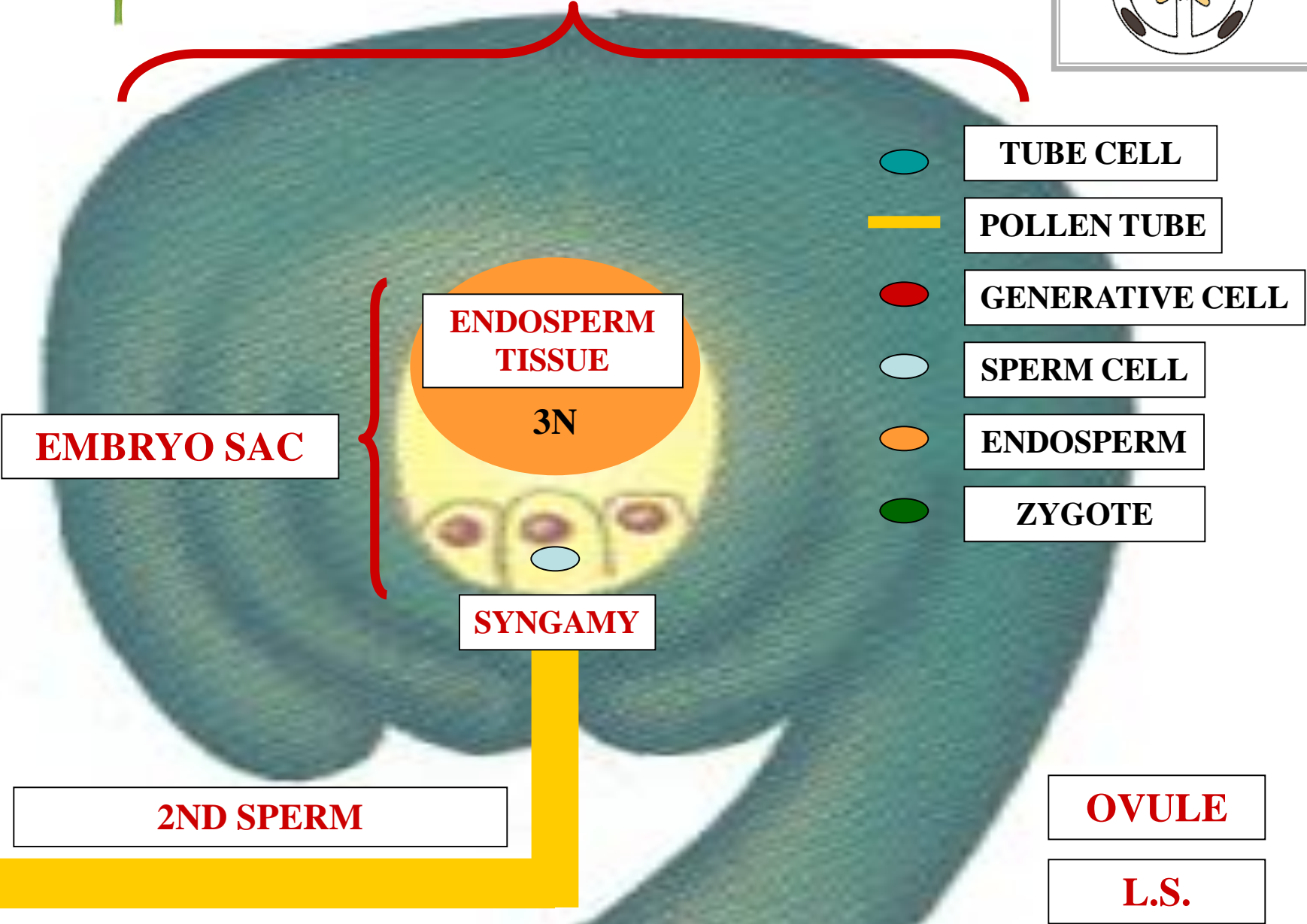
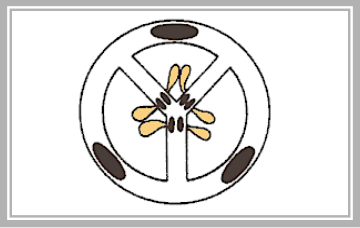
**2ND SPERM**







**OVULE**

**L.S.**



**OVULE**



-  **TUBE CELL**
-  **POLLEN TUBE**
-  **GENERATIVE CELL**
-  **SPERM CELL**
-  **ENDOSPERM**
-  **ZYGOTE**

**EMBRYO SAC**

**ENDOSPERM TISSUE**

**3N**

**SYNGAMY**

**2ND SPERM**

**OVULE**

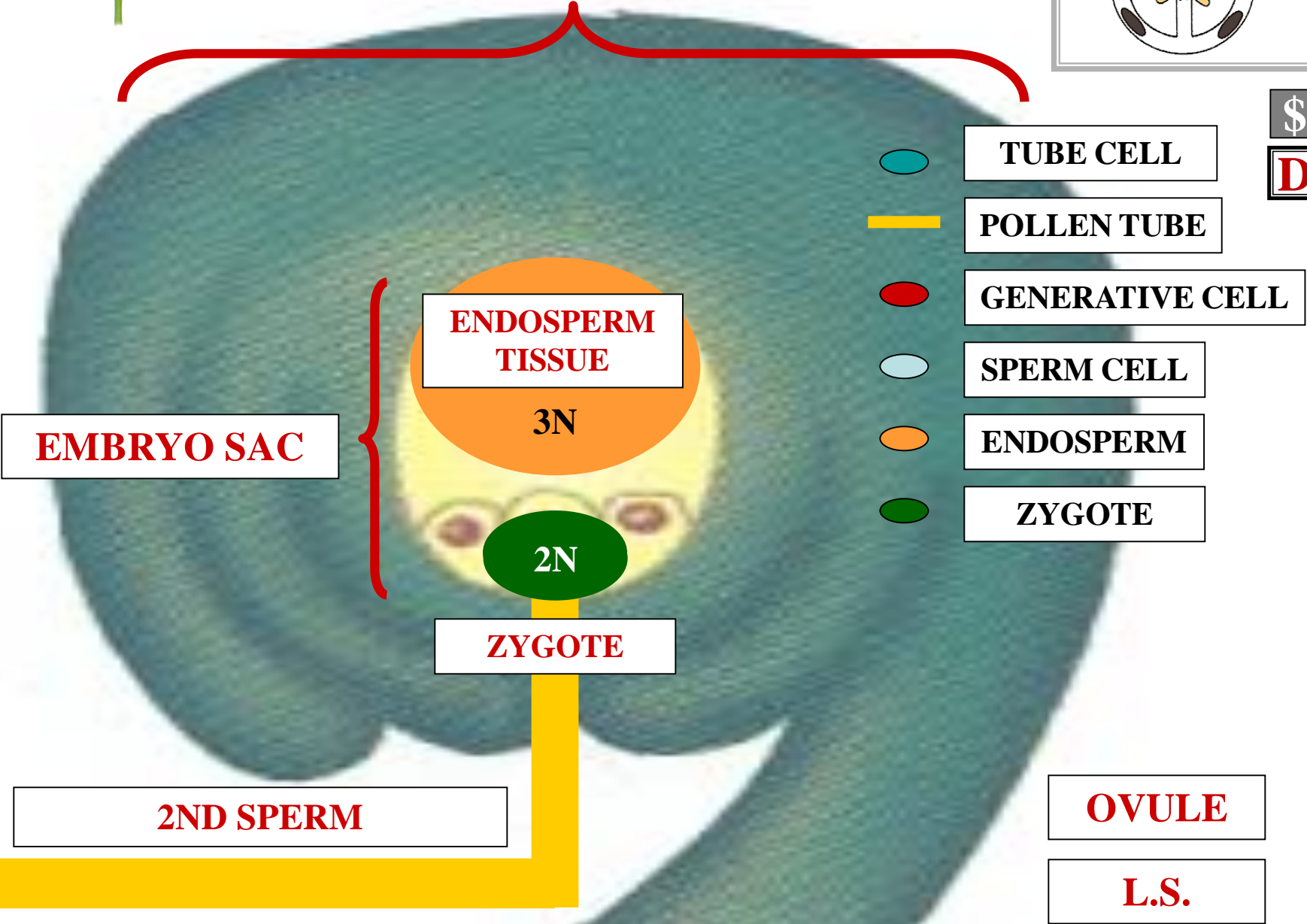
**L.S.**



**OVULE**



**\$**  
**D**



**TUBE CELL**

**POLLEN TUBE**

**GENERATIVE CELL**

**SPERM CELL**

**ENDOSPERM**

**ZYGOTE**

**EMBRYO SAC**

**ENDOSPERM TISSUE**

**3N**

**2N**

**ZYGOTE**

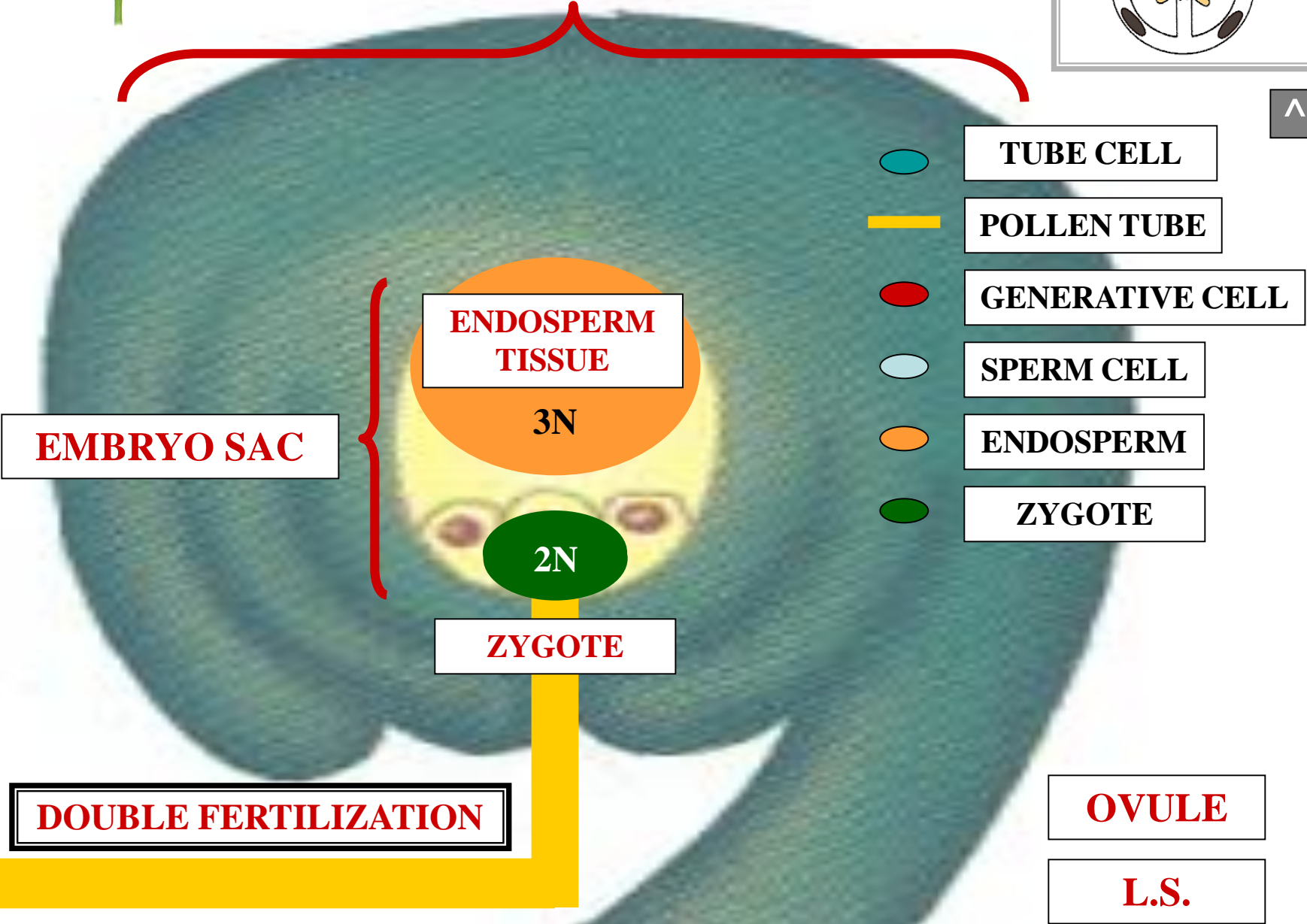
**2ND SPERM**

**OVULE**

**L.S.**



**OVULE**



**TUBE CELL**

**POLLEN TUBE**

**GENERATIVE CELL**

**SPERM CELL**

**ENDOSPERM**

**ZYGOTE**

**ENDOSPERM TISSUE**

**3N**

**EMBRYO SAC**

**2N**

**ZYGOTE**

**DOUBLE FERTILIZATION**

**OVULE**

**L.S.**

# ANGIOSPERM FRUIT



**FRUIT**

**ANGIOSPERM  
FRUIT**



**MATURE OVARY  
WITH SEEDS**

**ANGIOSPERM  
FRUIT**

# GENERAL FRUIT TYPES

# **SIMPLE FRUIT**

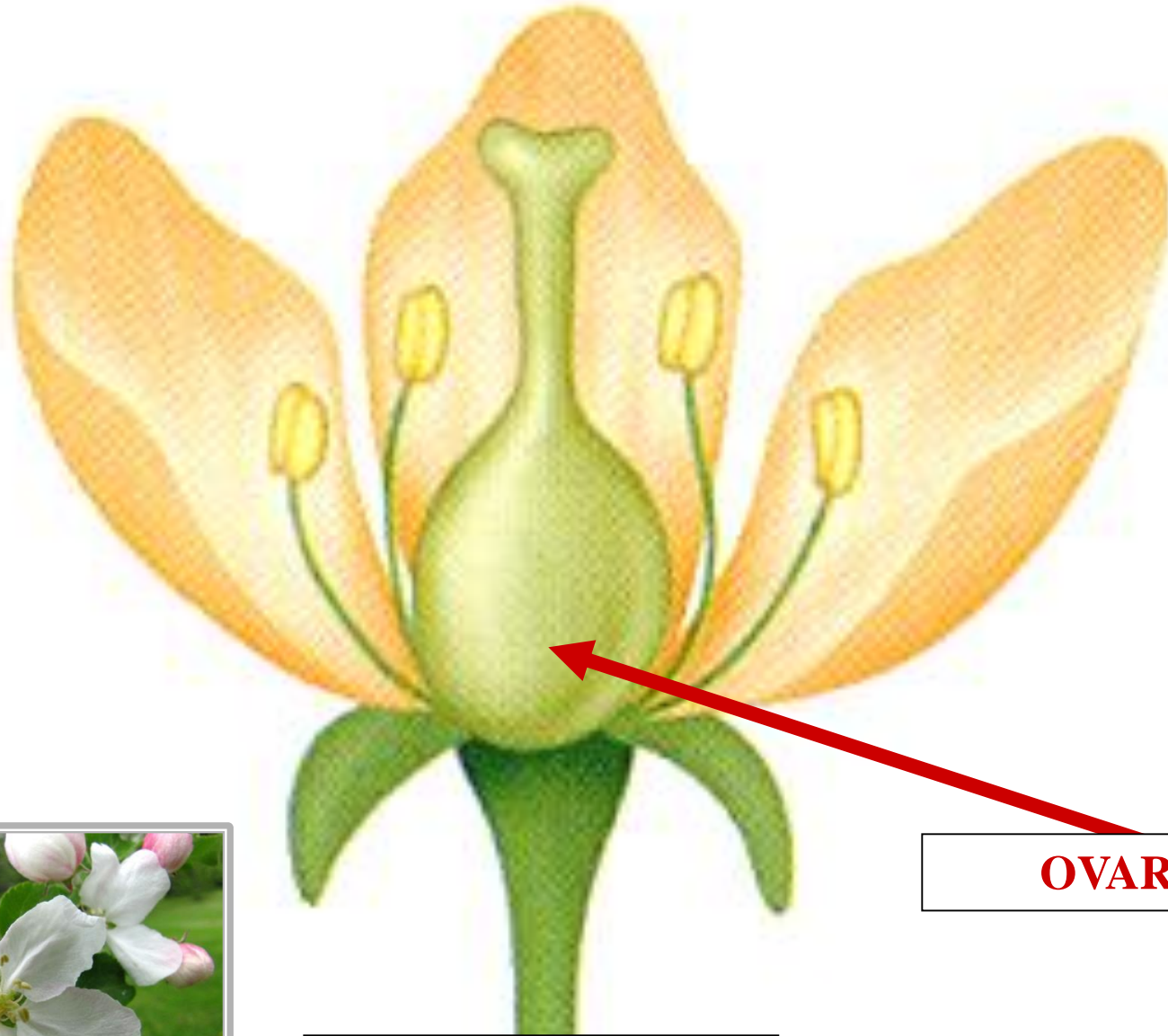


**ANGIOSPERM  
SIMPLE FRUIT**

**DERIVED FROM  
1 OVARY  
FROM 1 FLOWER**

**ANGIOSPERM  
SIMPLE FRUIT**





**OVARY**

**FLOWER**



A



**SIMPLE FRUIT**

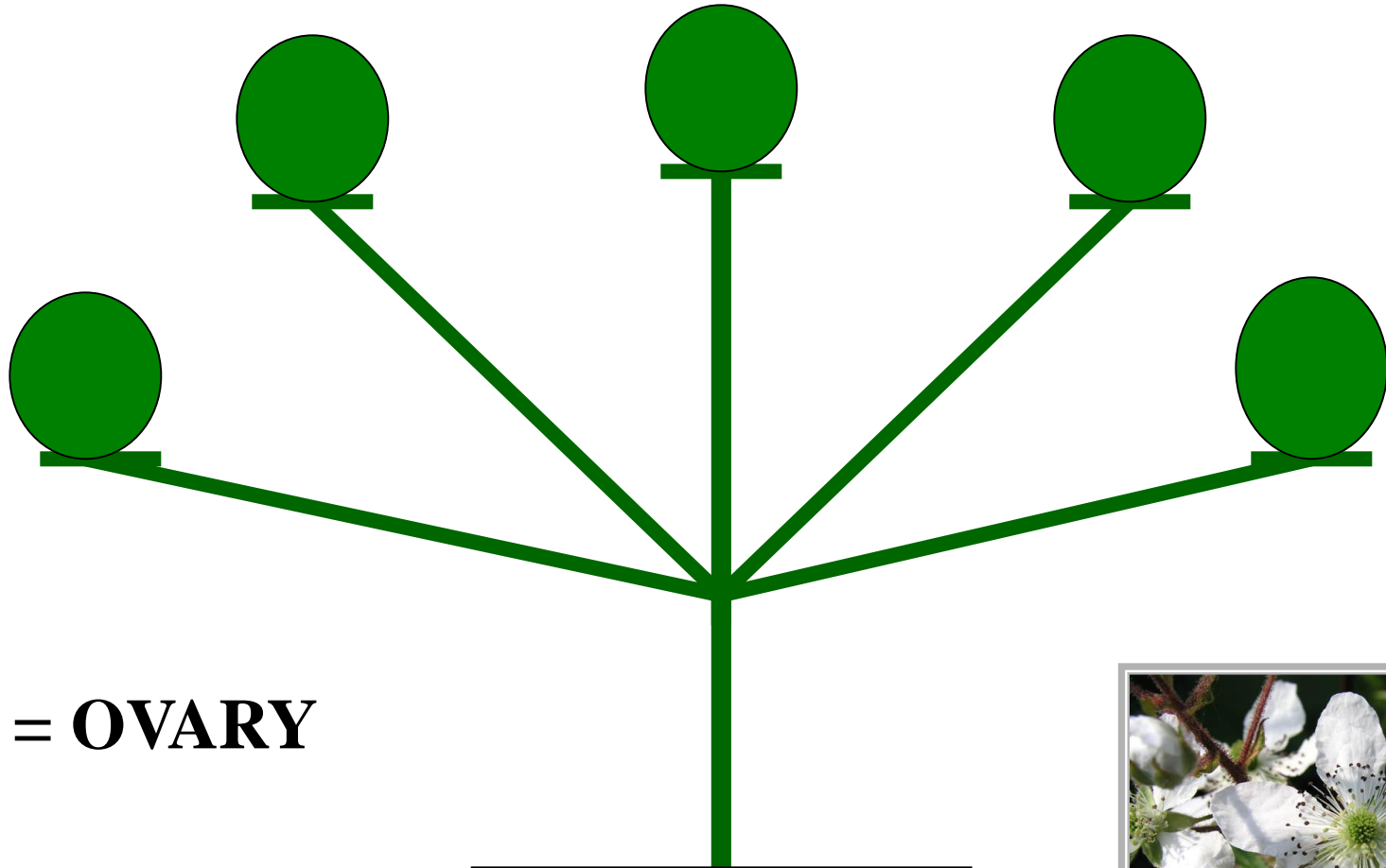


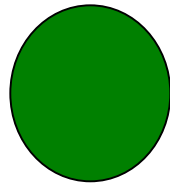
**AGGREGATE FRUIT**



**ANGIOSPERM**  
**AGGREGATE FRUIT**  
**DERIVED FROM**  
**SEVERAL**  
**UNFUSED OVARIES**  
**FROM 1 FLOWER**  
**ANGIOSPERM**  
**AGGREGATE FRUIT**

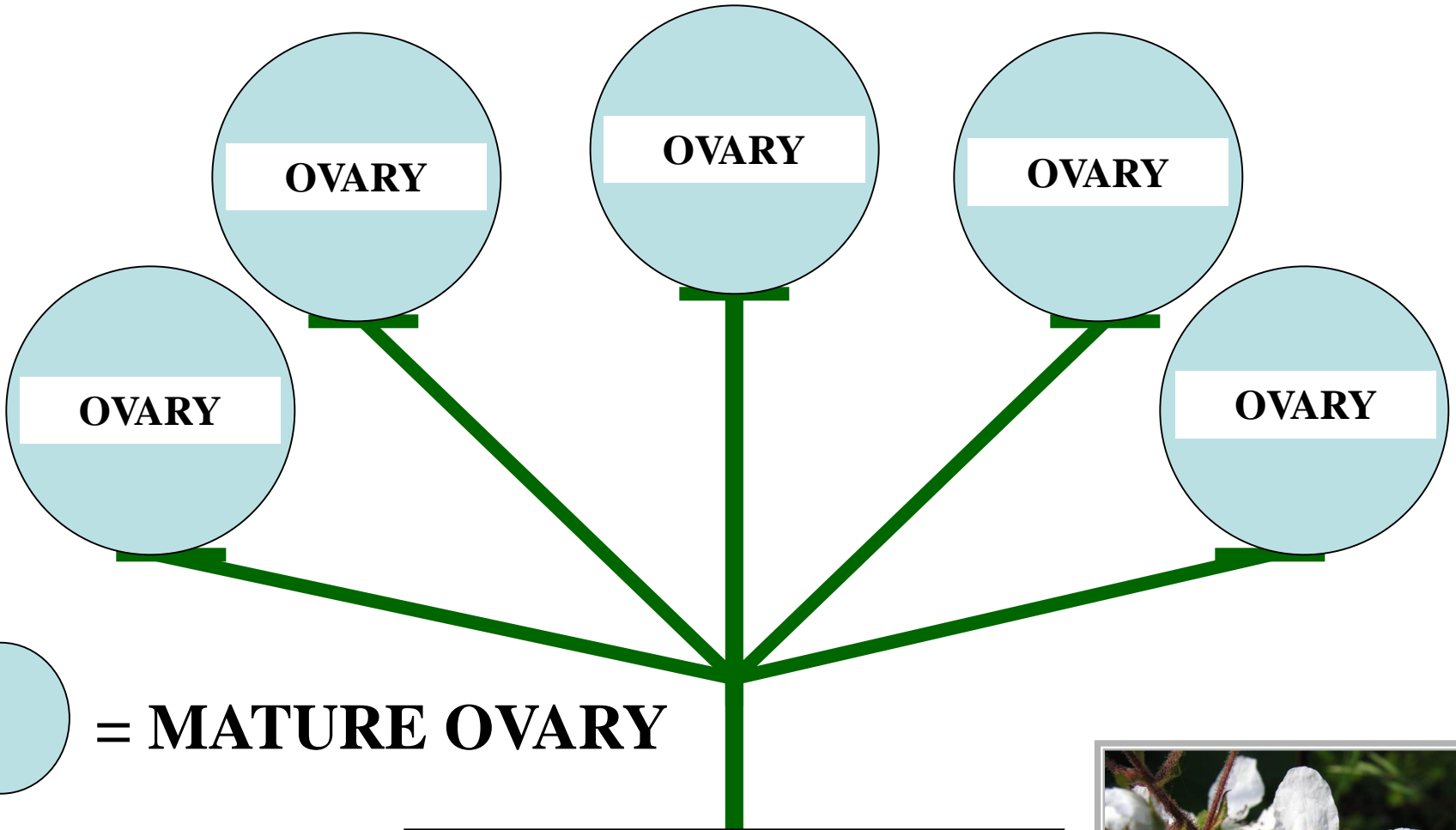




 = OVARY

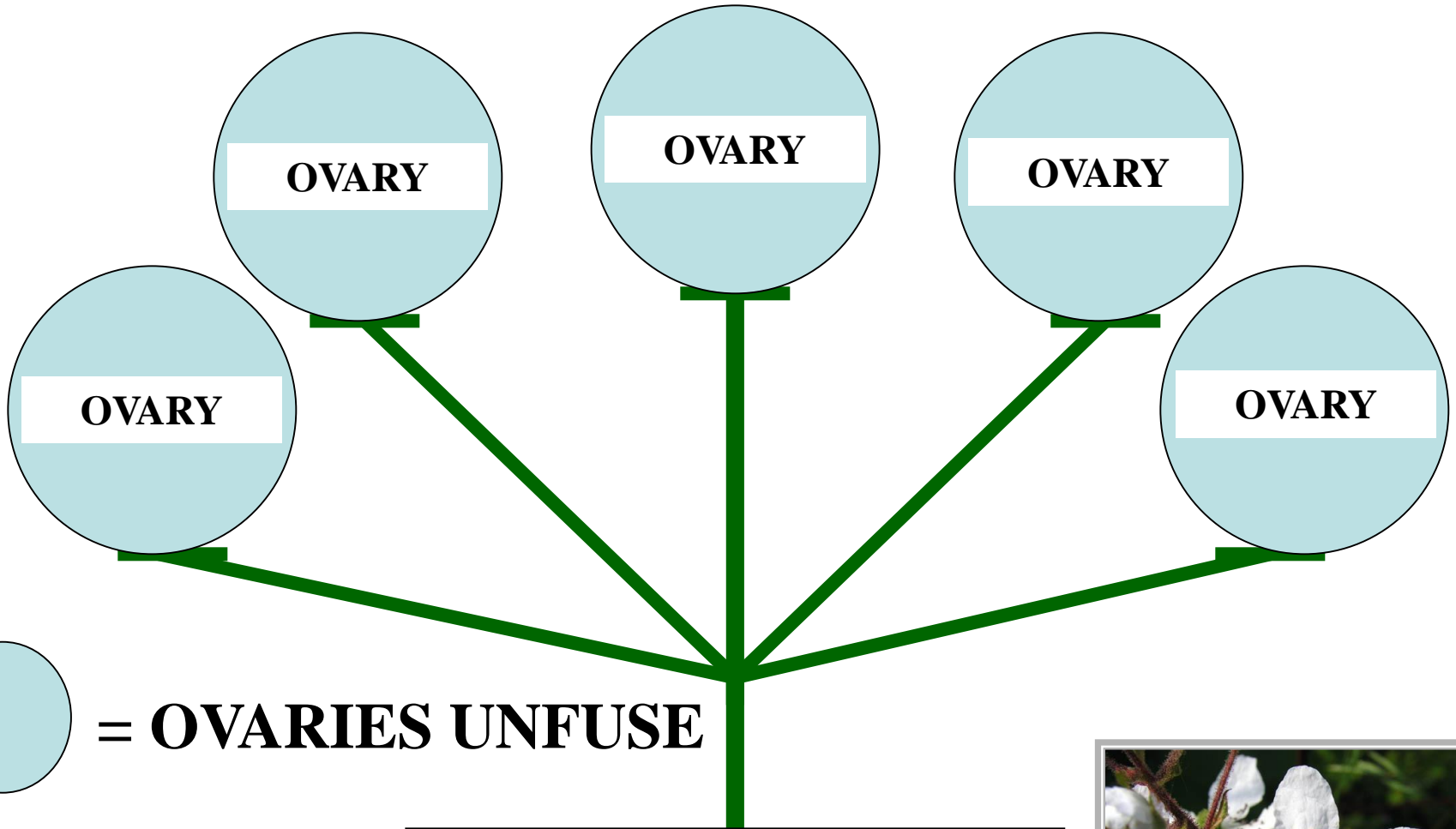
**FLOWER**





**AGGREGATE  
FRUIT**





= OVARIES UNFUSE

**AGGREGATE  
FRUIT**





M

**AGGREGATE FRUIT**



# **MULTIPLE FRUIT**



**ANGIOSPERM  
MULTIPLE FRUIT**

**DERIVED FROM  
SEVERAL  
FUSED OVARIES**

**ANGIOSPERM  
MULTIPLE FRUIT**

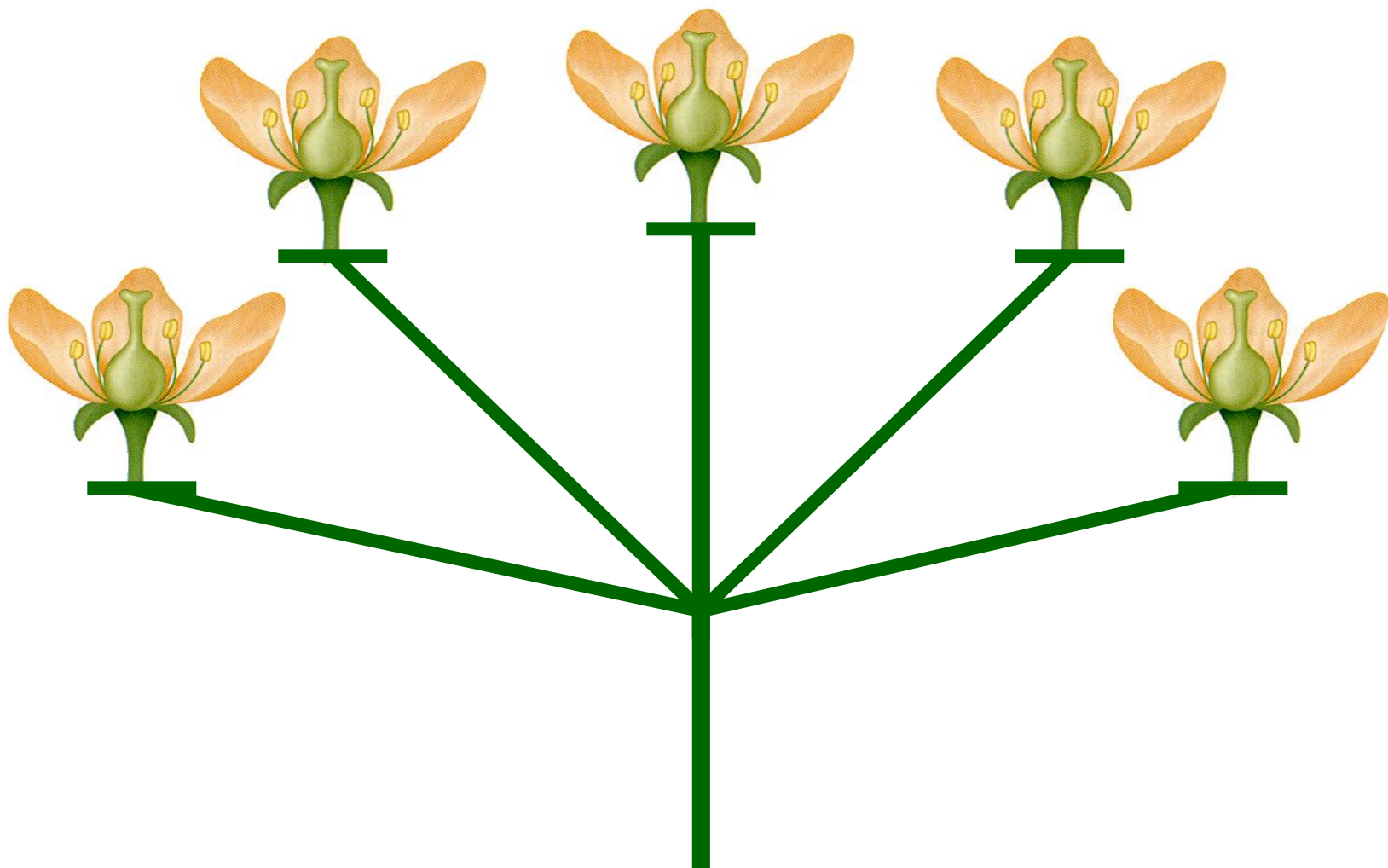


**ANGIOSPERM**  
**MULTIPLE FRUIT**  
**FROM SEVERAL**  
**FLOWERS**

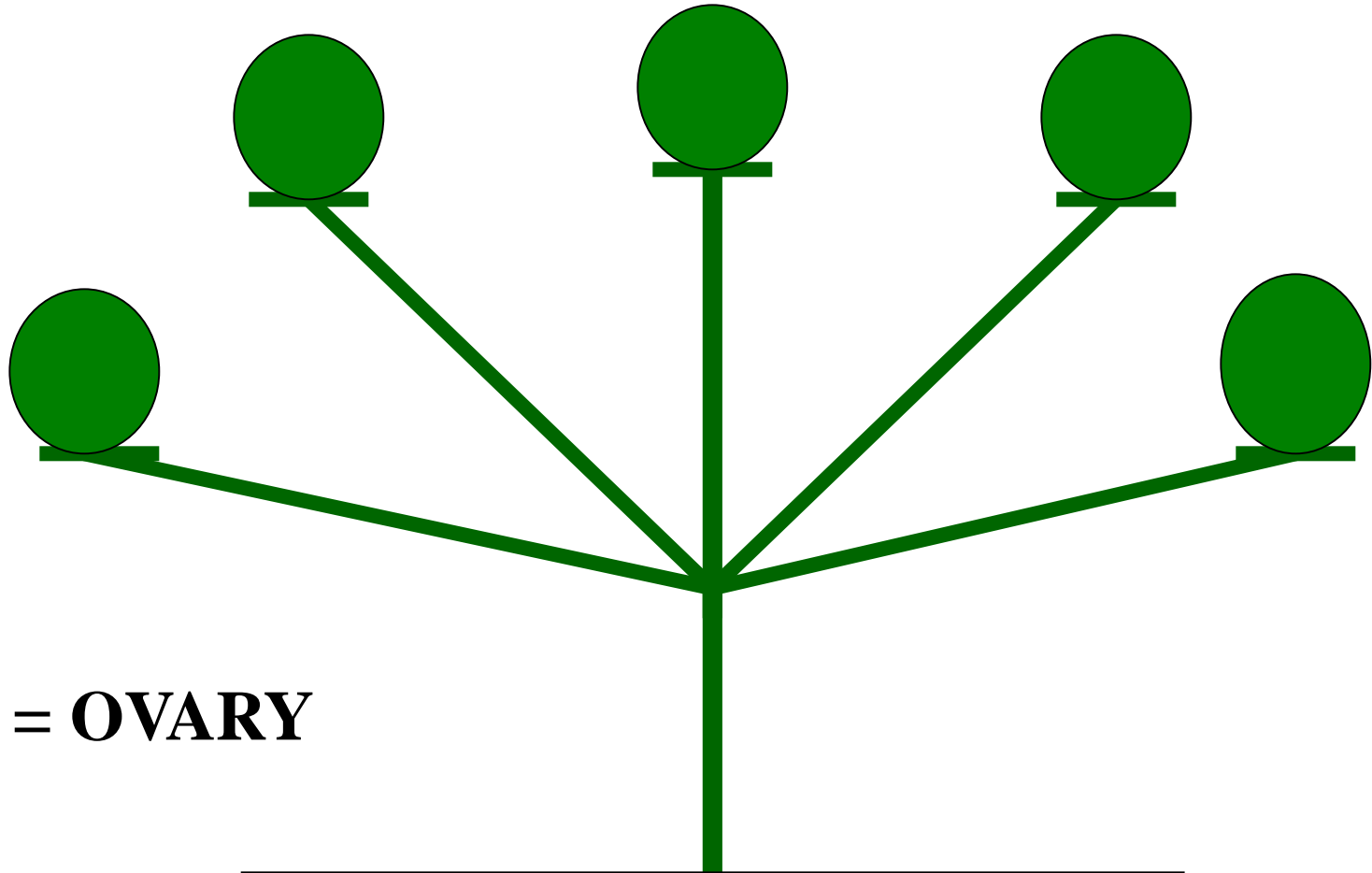
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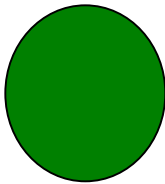
**INFLORESCENCE**

**ANGIOSPERM**  
**MULTIPLE FRUIT**



**INFLORESCENCE**

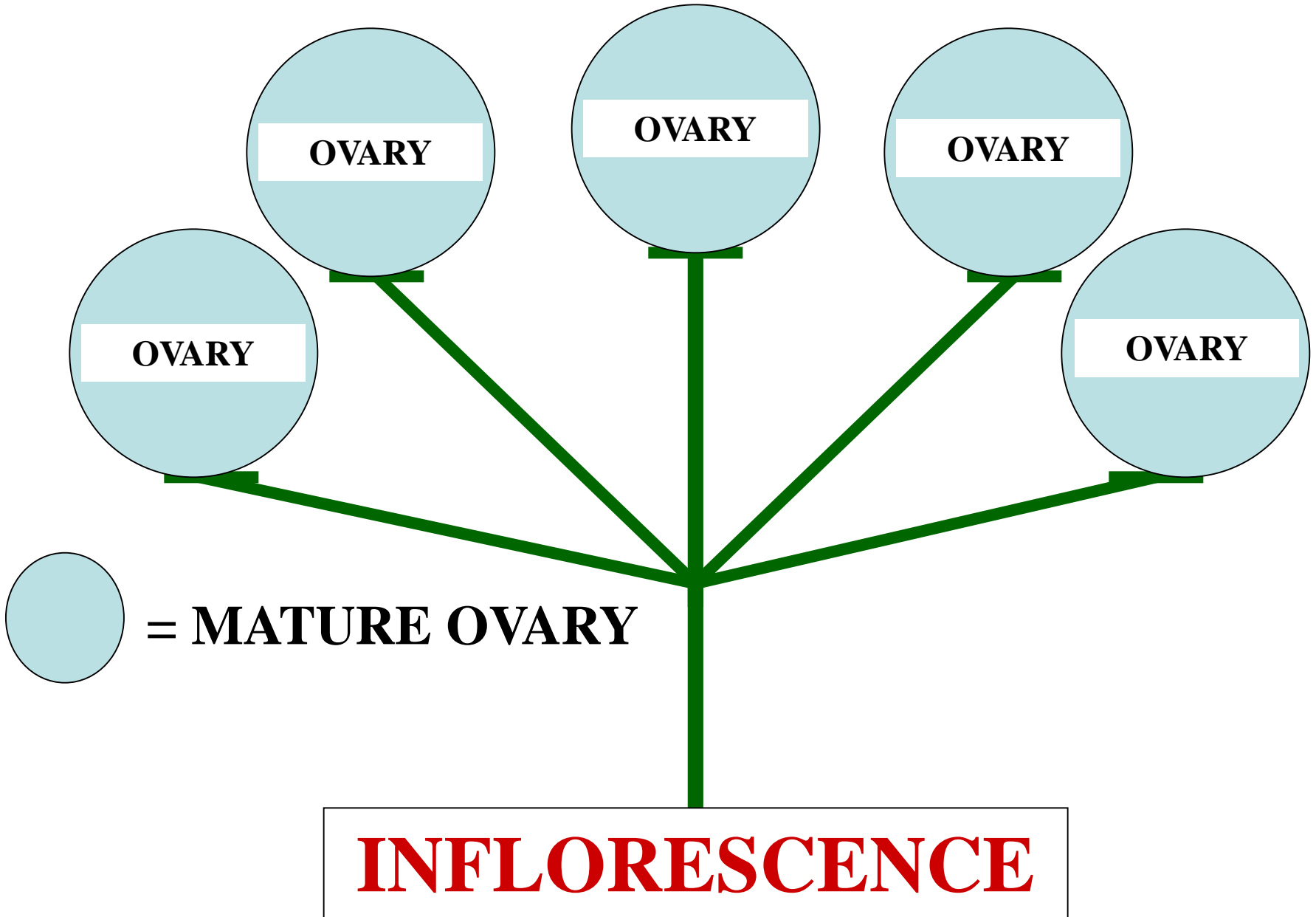


 = OVARY

**INFLORESCENCE**



**F**









**MULTIPLE FRUIT**





# FRUIT ANATOMY

# PERICARP

**PERICARP**

**ANGIOSPERM  
FRUIT PERICARP**

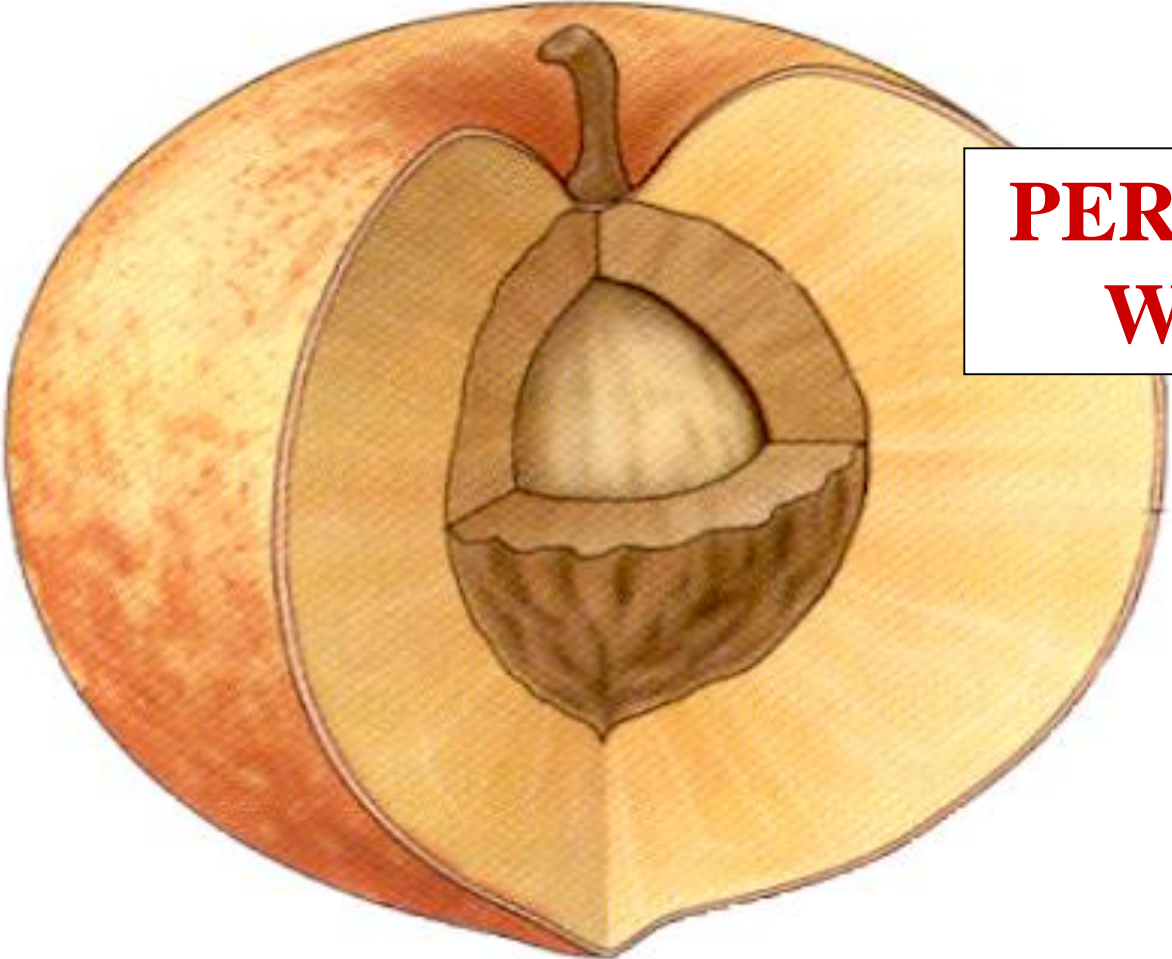


**MATURE  
OVARY WALL**

**ANGIOSPERM  
FRUIT PERICARP**



**ANGIOSPERM FRUIT**



**PERICARP  
WALL**

**ANGIOSPERM FRUIT**

# PERICARP LAYERS

**EXOCARP**



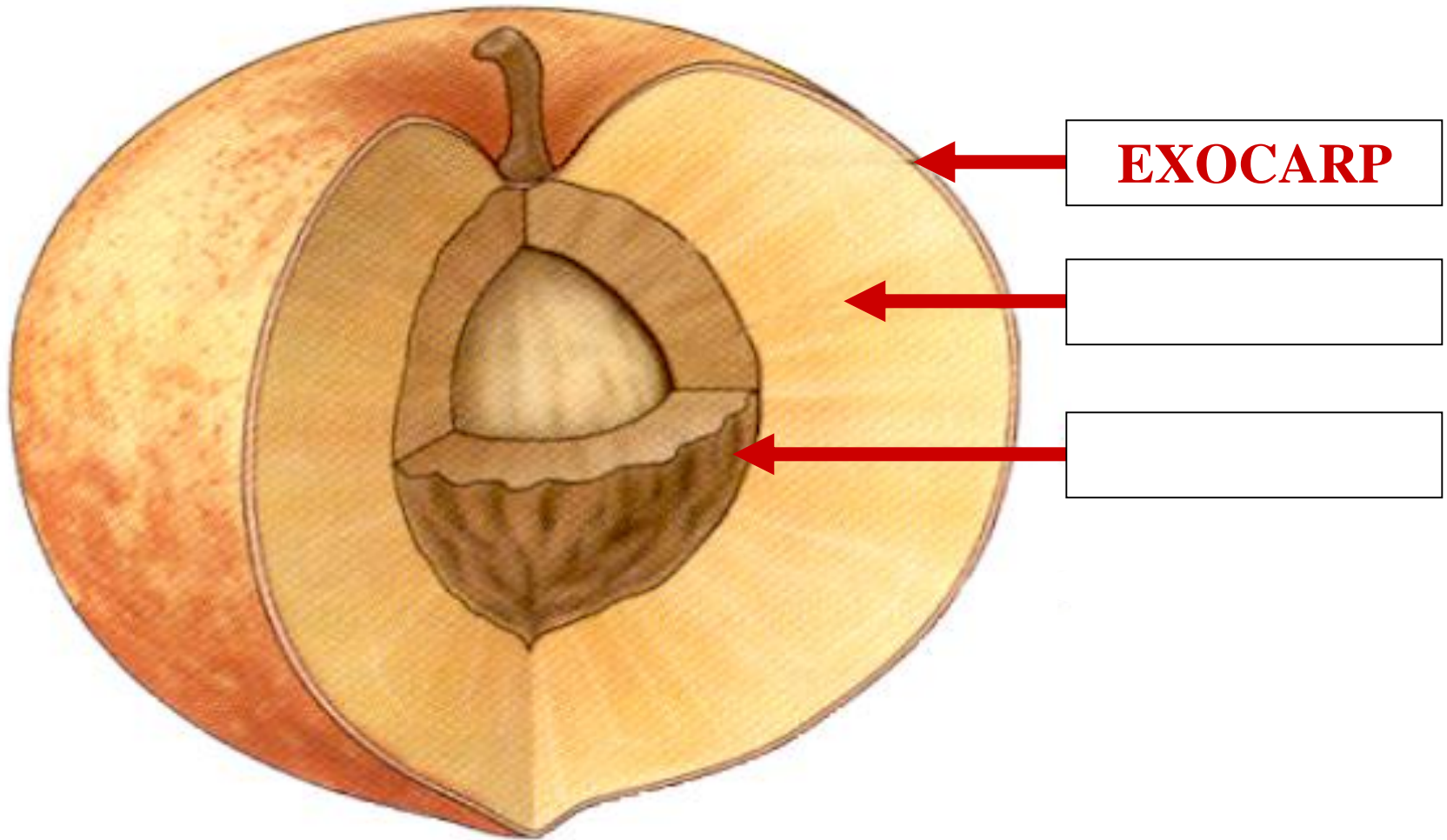
**ANGIOSPERM  
PERICARP EXOCARP**

**OUTER  
PERICARP LAYER**

**ANGIOSPERM  
PERICARP EXOCARP**



# ANGIOSPERM FRUIT



# PERICARP

**MESOCARP**

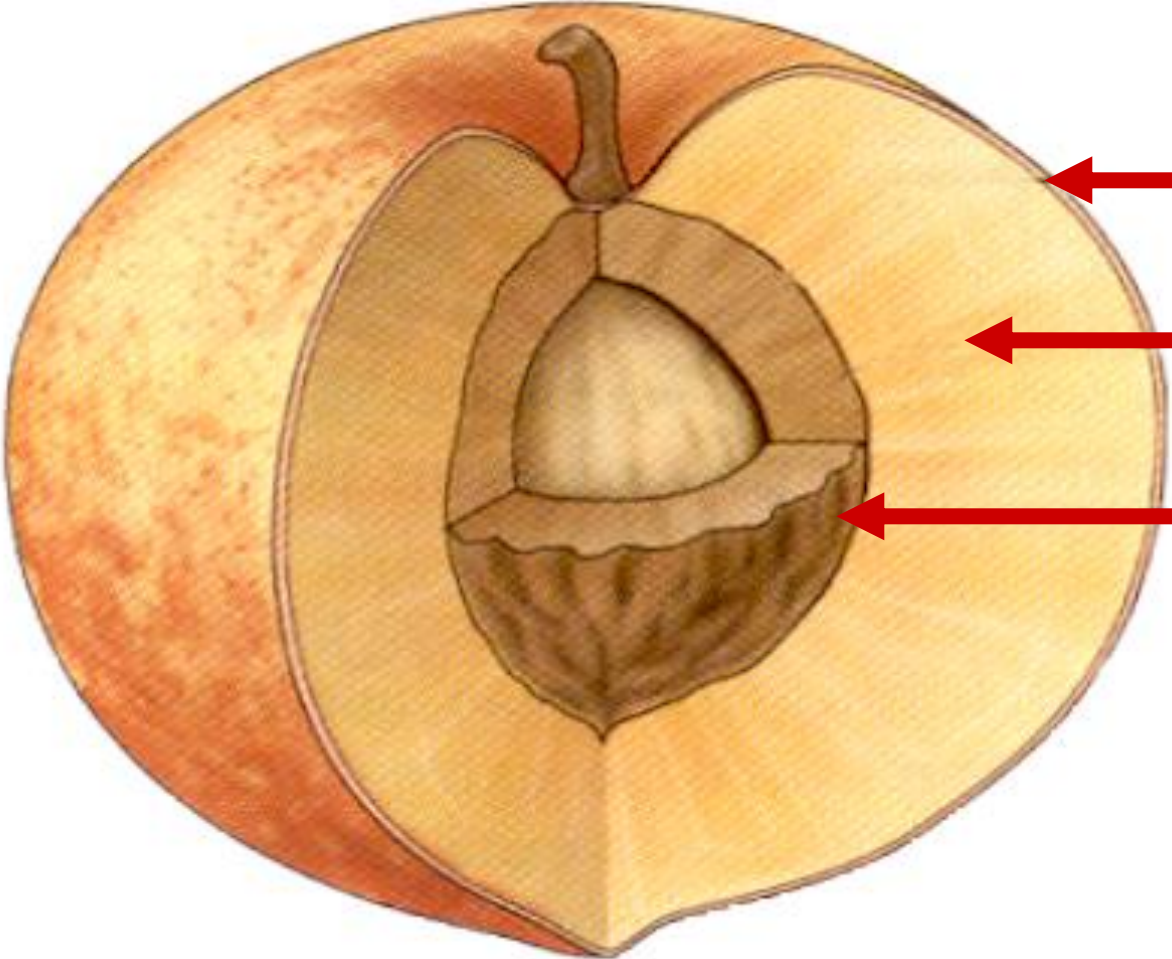


**ANGIOSPERM  
PERICARP MESOCARP**

**MIDDLE  
PERICARP LAYER**

**ANGIOSPERM  
PERICARP MESOCARP**

**ANGIOSPERM FRUIT**



**EXOCARP**

**MESOCARP**

**PERICARP**

**ENDOCARP**

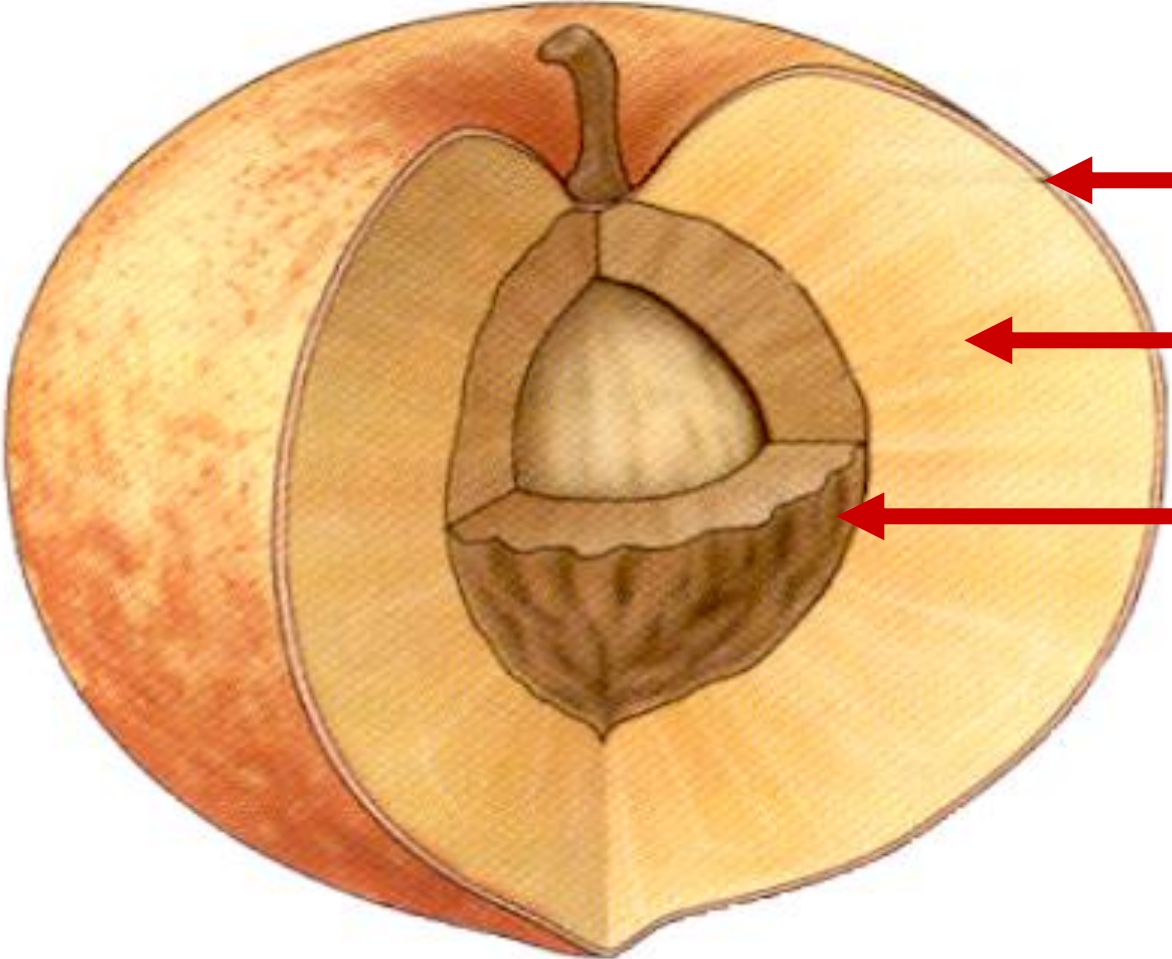


**ANGIOSPERM  
PERICARP ENDOCARP**

**INNER  
PERICARP LAYER**

**ANGIOSPERM  
PERICARP ENDOCARP**

# ANGIOSPERM FRUIT



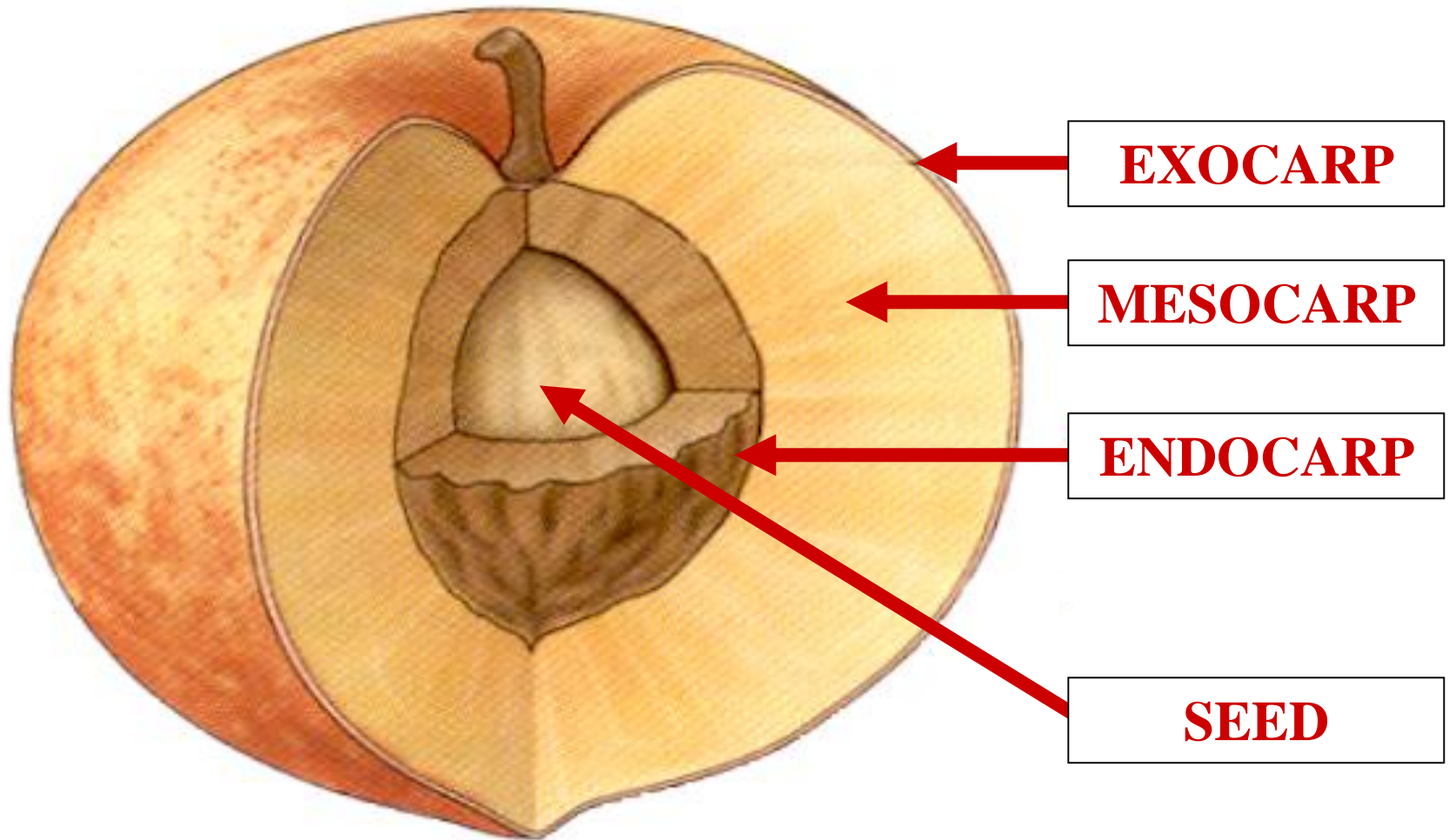
**EXOCARP**

**MESOCARP**

**ENDOCARP**

**PERICARP**

# ANGIOSPERM FRUIT



**EXOCARP**

**MESOCARP**

**ENDOCARP**

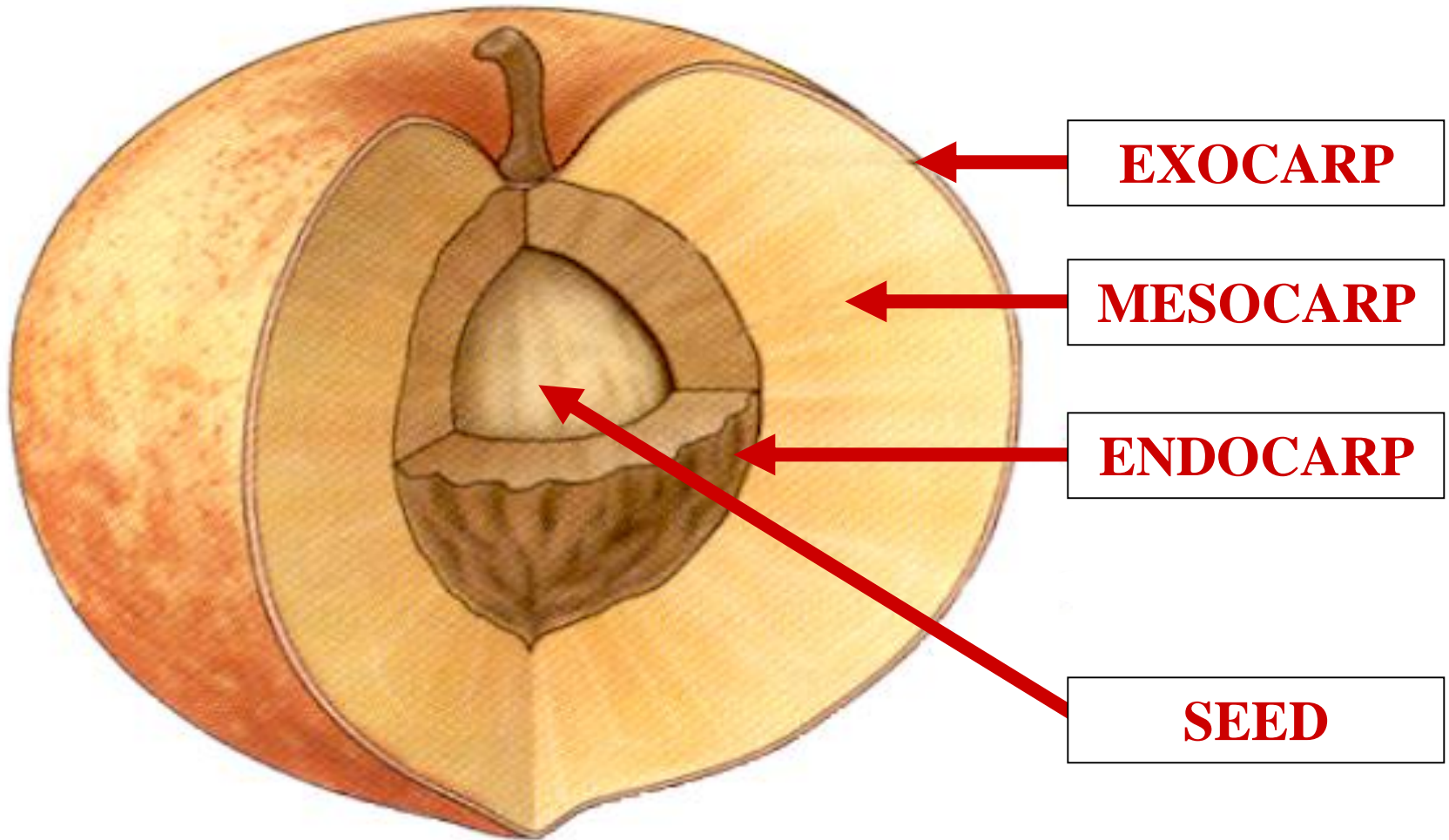
**SEED**

**PERICARP**





# ANGIOSPERM FRUIT



**PREICARP LAYERS  
NOT ALWAYS DISCERNIBLE**



**SEED**



# SEED MORPHOLOGY

**SEED**

**T**



**TESTA**

**ANGIOSPERM  
SEED MORPHOLOGY**



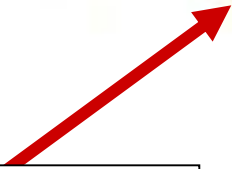
**MATURE  
INTEGUMENT**

**ANGIOSPERM  
SEED MORPHOLOGY**

**SEED**



**TESTA**





**TESTA**



**SEED**

**R**



**RAPHIE**

**ANGIOSPERM  
SEED MORPHOLOGY**



**INTEGUMENT  
RIDGE**

**ANGIOSPERM  
SEED MORPHOLOGY**



**TESTA**



**SEED**

**H**

**RAPHE**

**RAPHE**

**HILUM SCAR**



# **ANGIOSPERM SEED MORPHOLOGY**

**HILUM SCAR**

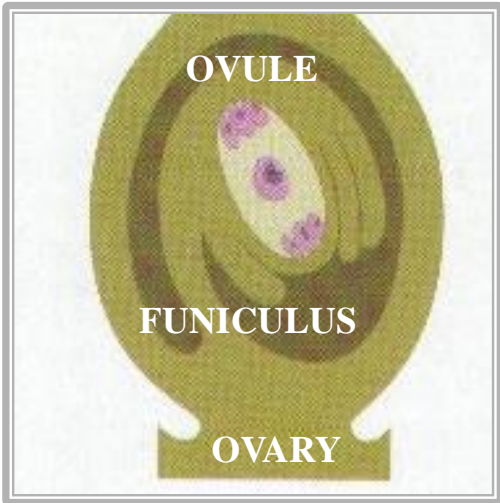
**=**

**FUNICULUS SCAR**

**ANGIOSPERM  
SEED MORPHOLOGY**



**TESTA**



**SEED**

**M**

**RAPHE**

**HILUM SCAR**

**RAPHE**

**MICROPYLE SCAR**



# **ANGIOSPERM SEED MORPHOLOGY**

**POLLEN TUBE  
SCAR**

**ANGIOSPERM  
SEED MORPHOLOGY**





**TESTA**

**SEED**

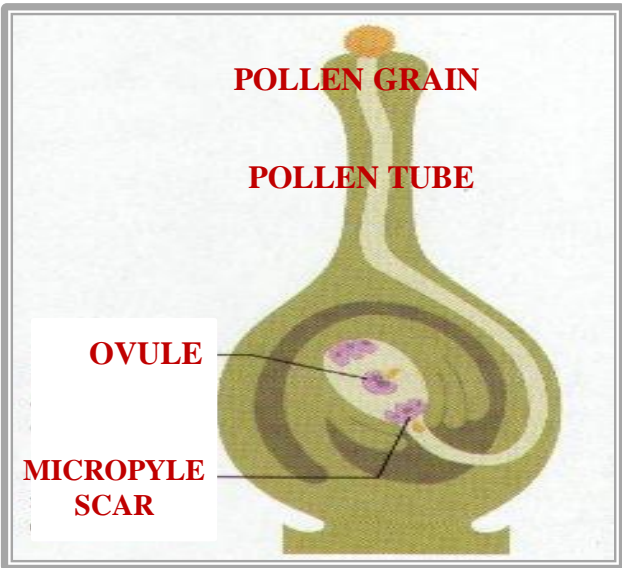


**RAPHE**

**MICROPYLE SCAR**

**HILUM SCAR**

**RAPHE**



**POLLEN GRAIN**

**POLLEN TUBE**

**OVULE**

**MICROPYLE SCAR**



# SEED ANATOMY

# DICOT SEED ANATOMY

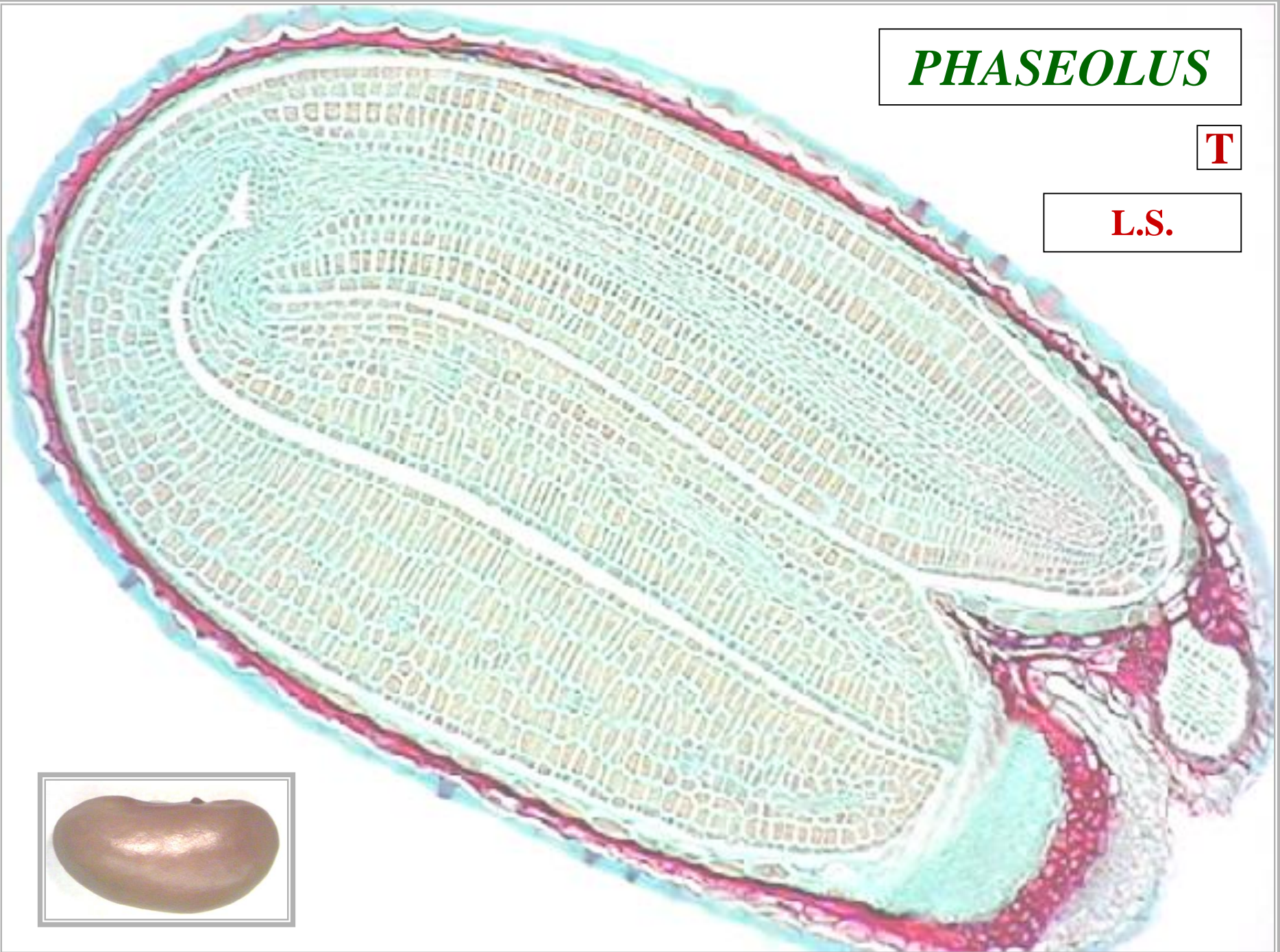


***PHASEOLUS***

# *PHASEOLUS*

**T**

**L.S.**

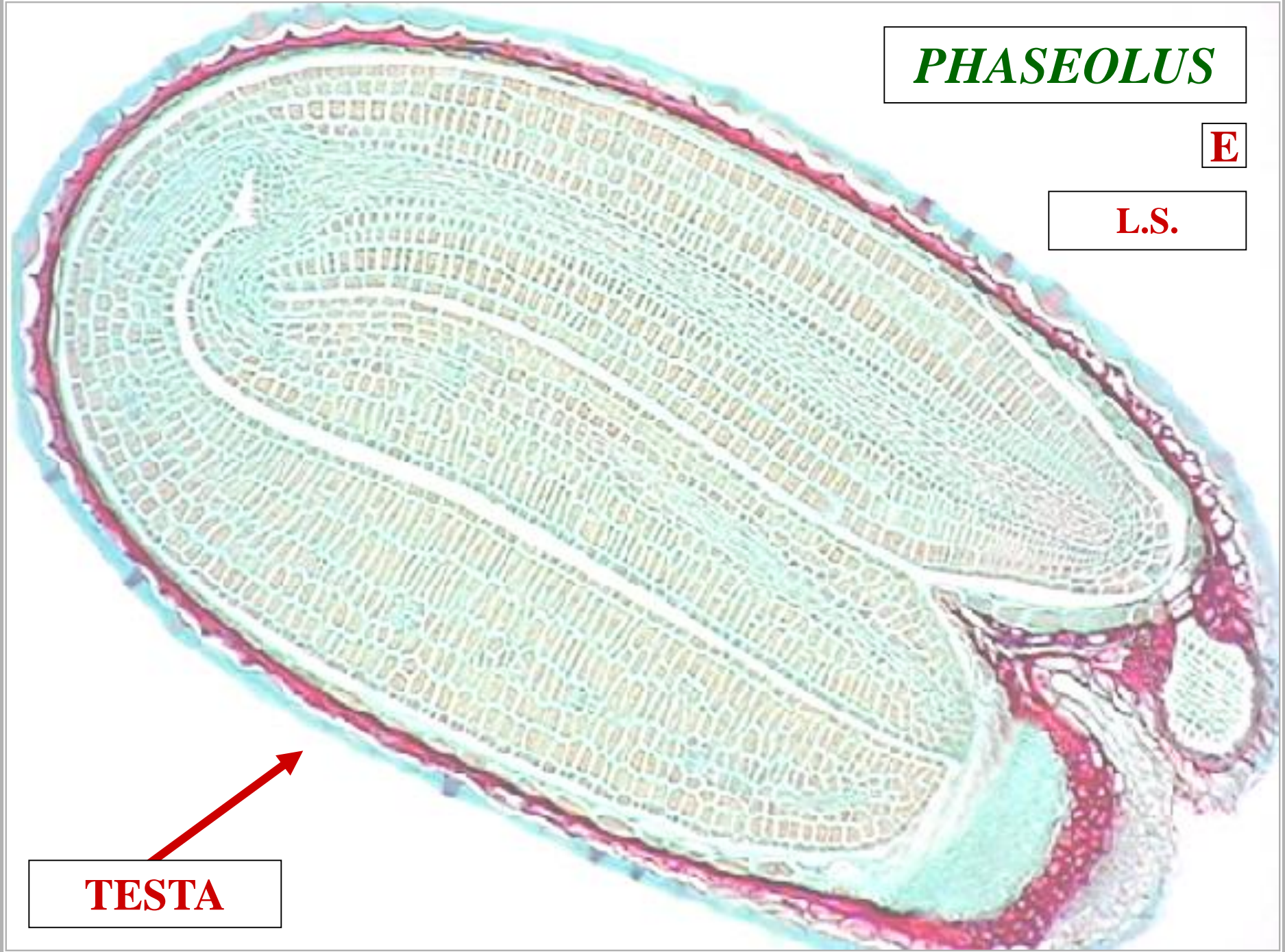


*PHASEOLUS*

**E**

**L.S.**

**TESTA**



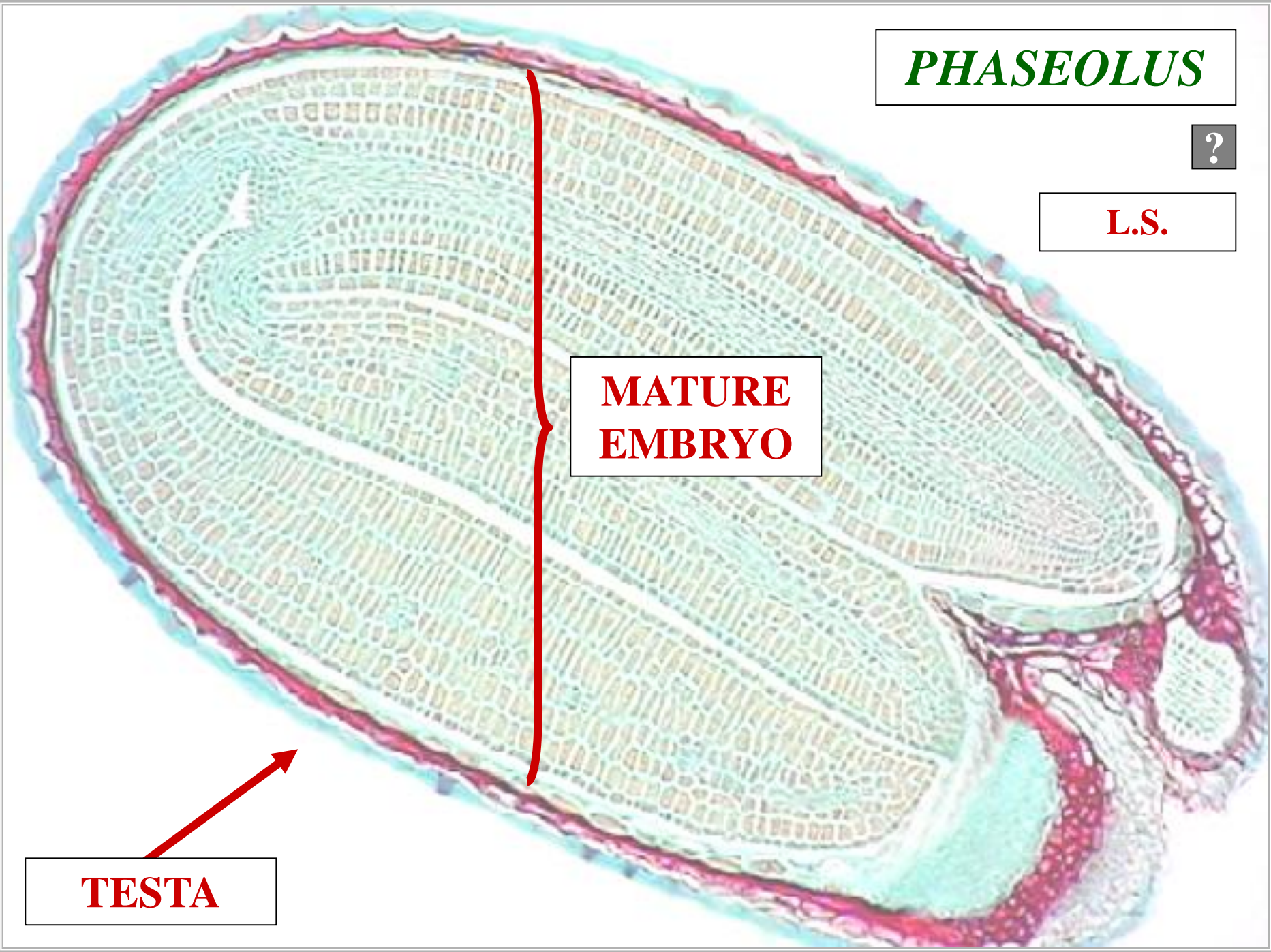
***PHASEOLUS***

?

**L.S.**

**MATURE  
EMBRYO**

**TESTA**

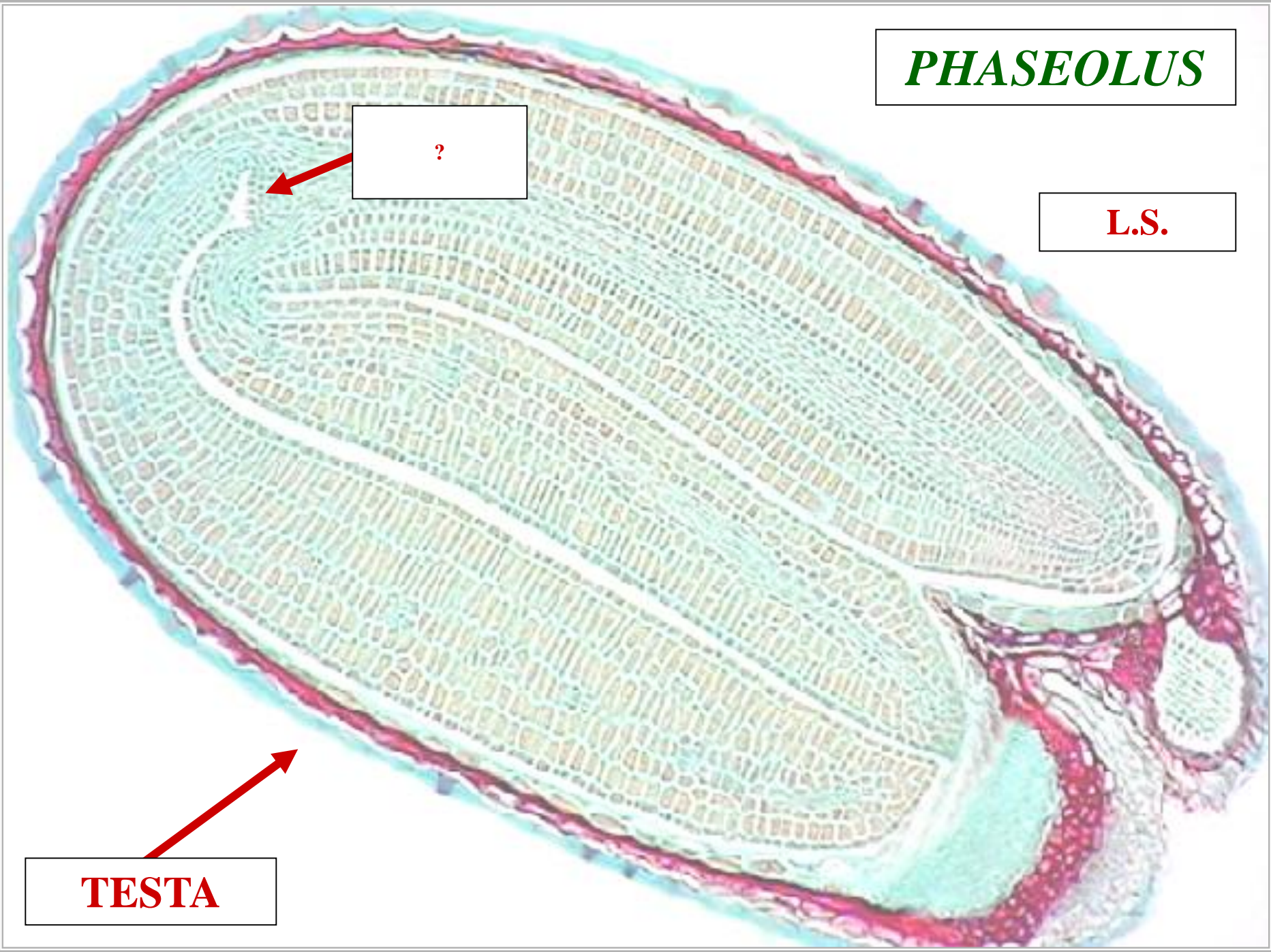


***PHASEOLUS***

**L.S.**

?

**TESTA**





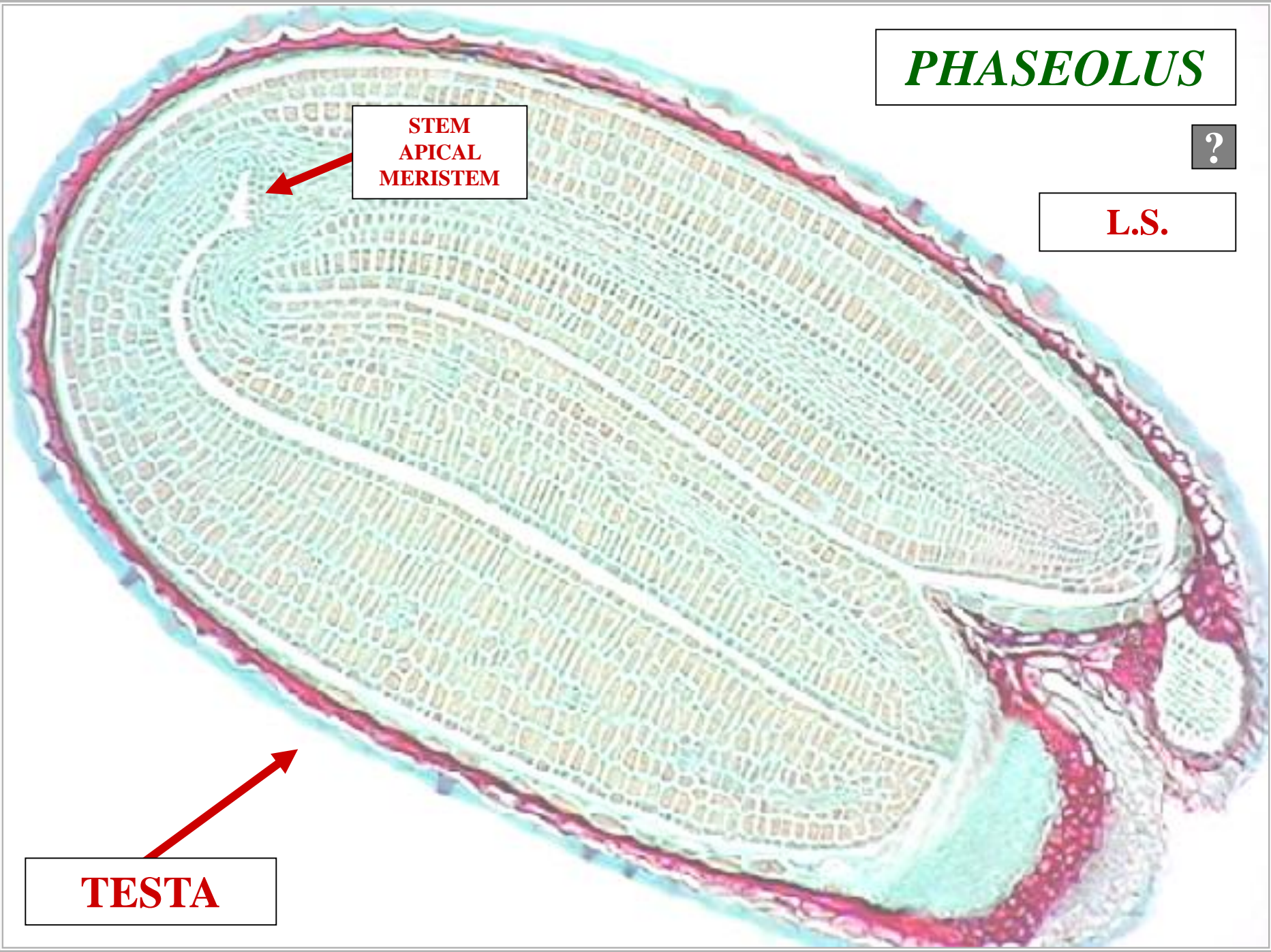
# *PHASEOLUS*

?

**L.S.**

**STEM  
APICAL  
MERISTEM**

**TESTA**



# *PHASEOLUS*

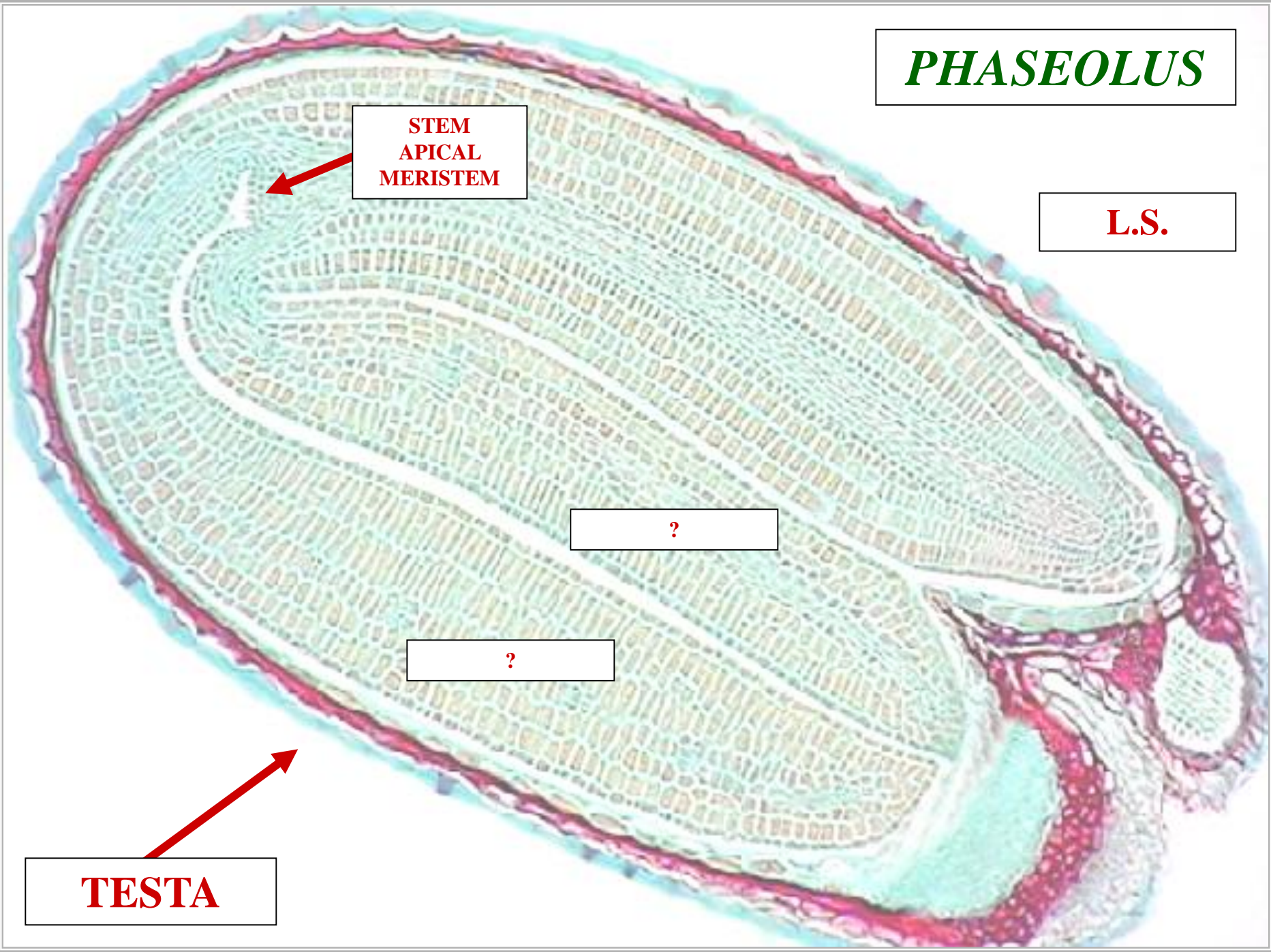
**STEM  
APICAL  
MERISTEM**

**L.S.**

?

?

**TESTA**



# *PHASEOLUS*

?

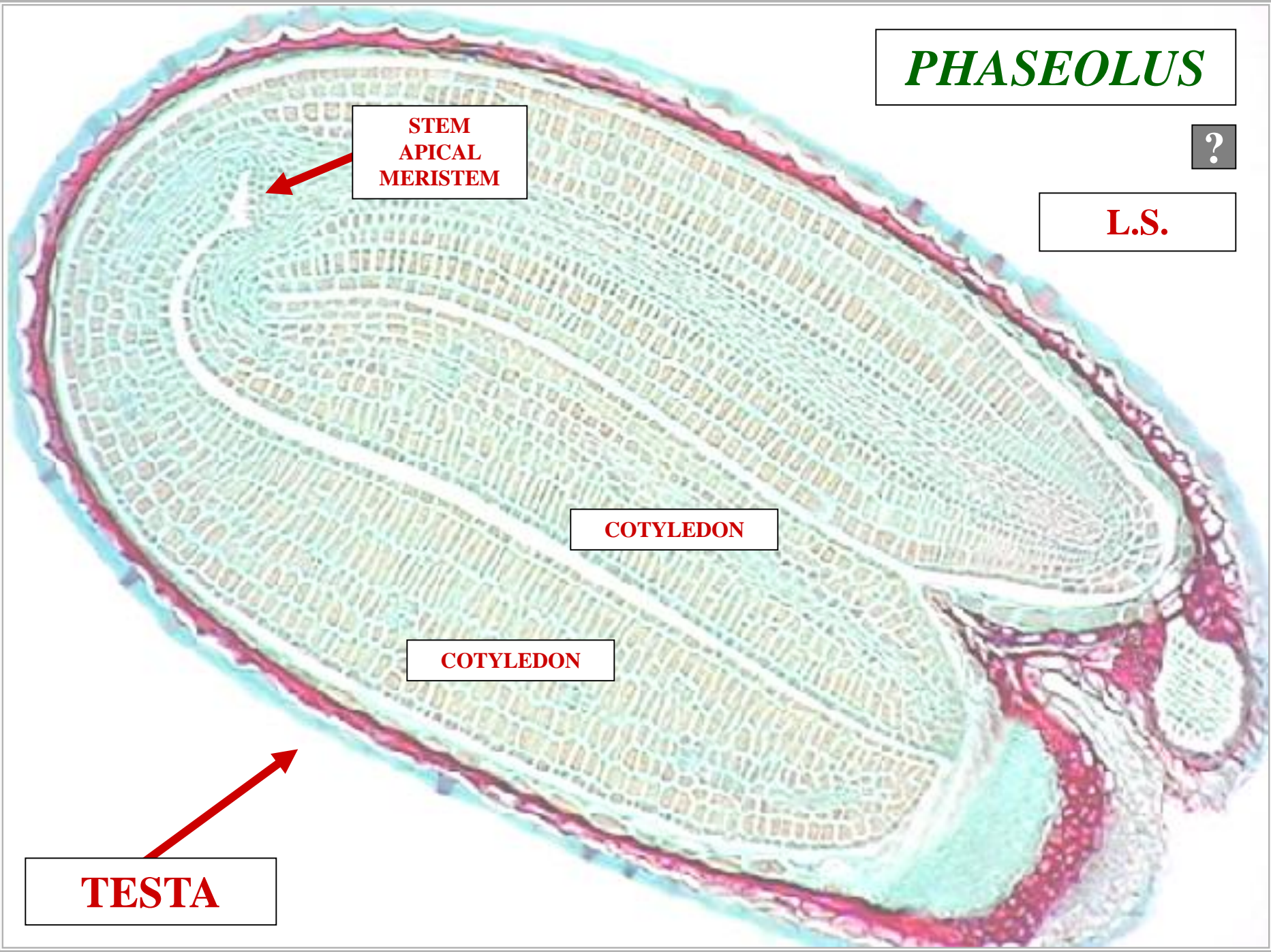
**L.S.**

**STEM  
APICAL  
MERISTEM**

**COTYLEDON**

**COTYLEDON**

**TESTA**



# *PHASEOLUS*

STEM  
APICAL  
MERISTEM

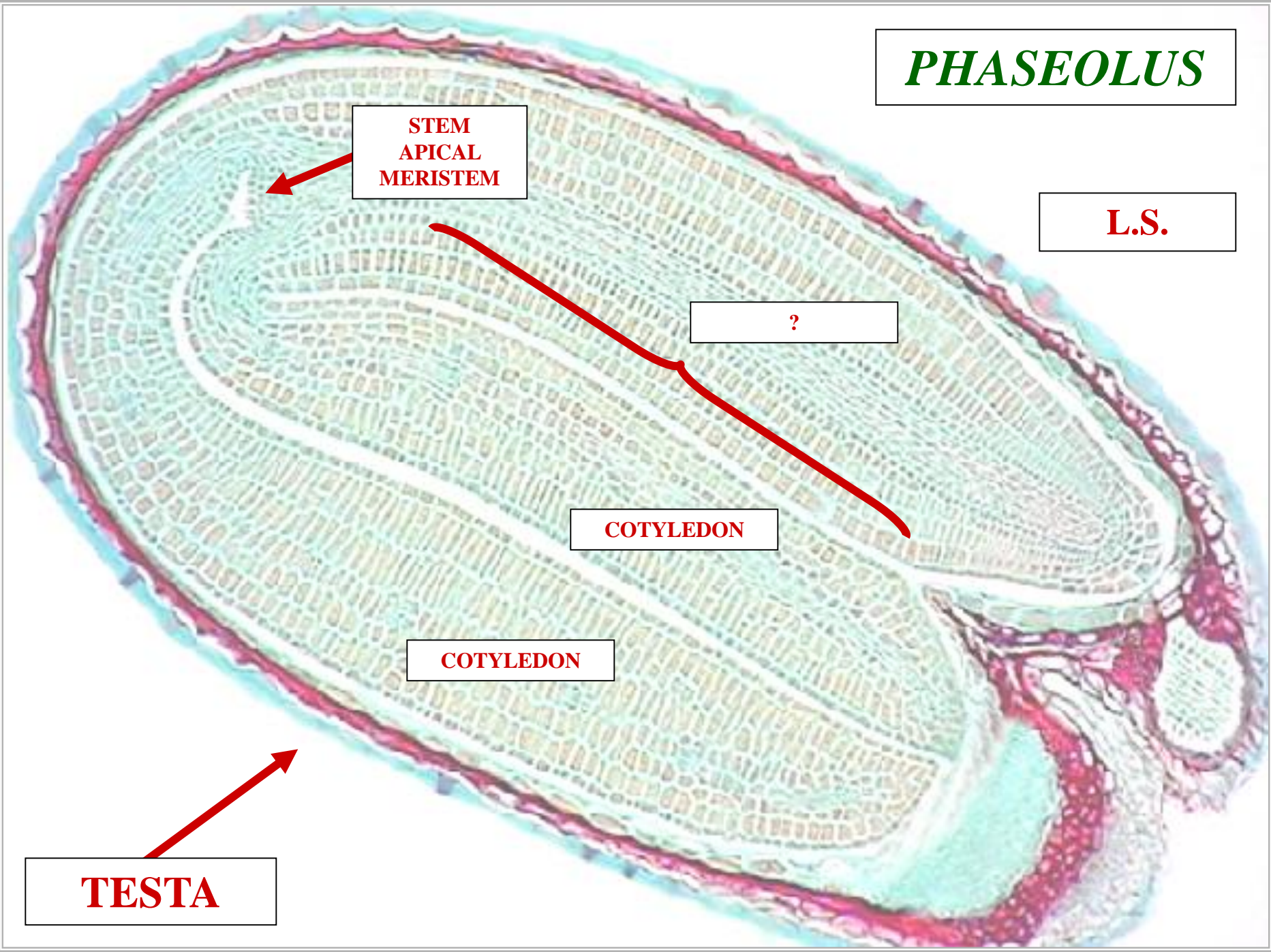
L.S.

?

COTYLEDON

COTYLEDON

TESTA



# *PHASEOLUS*

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L.S.

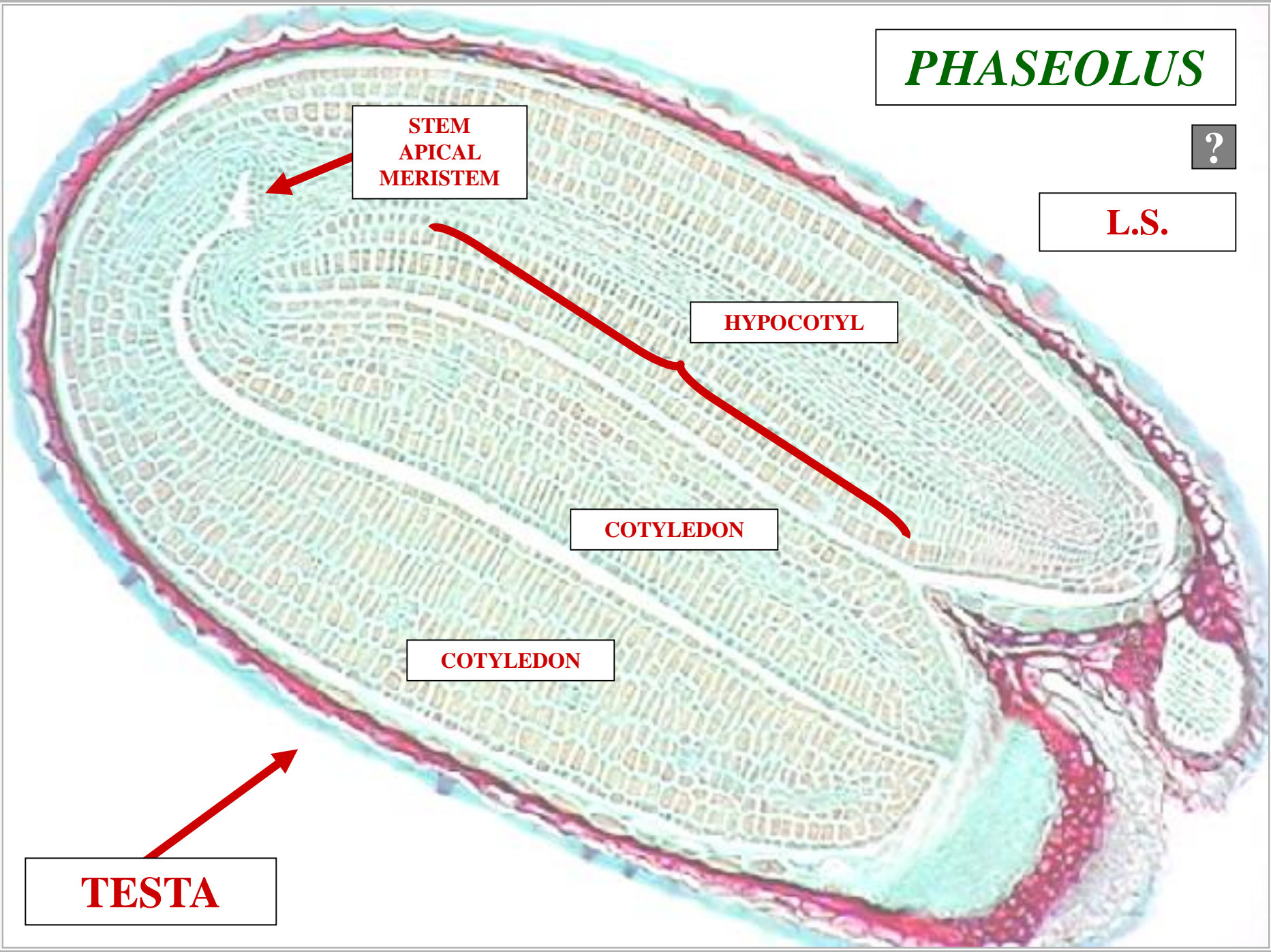
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APICAL  
MERISTEM

HYPOCOTYL

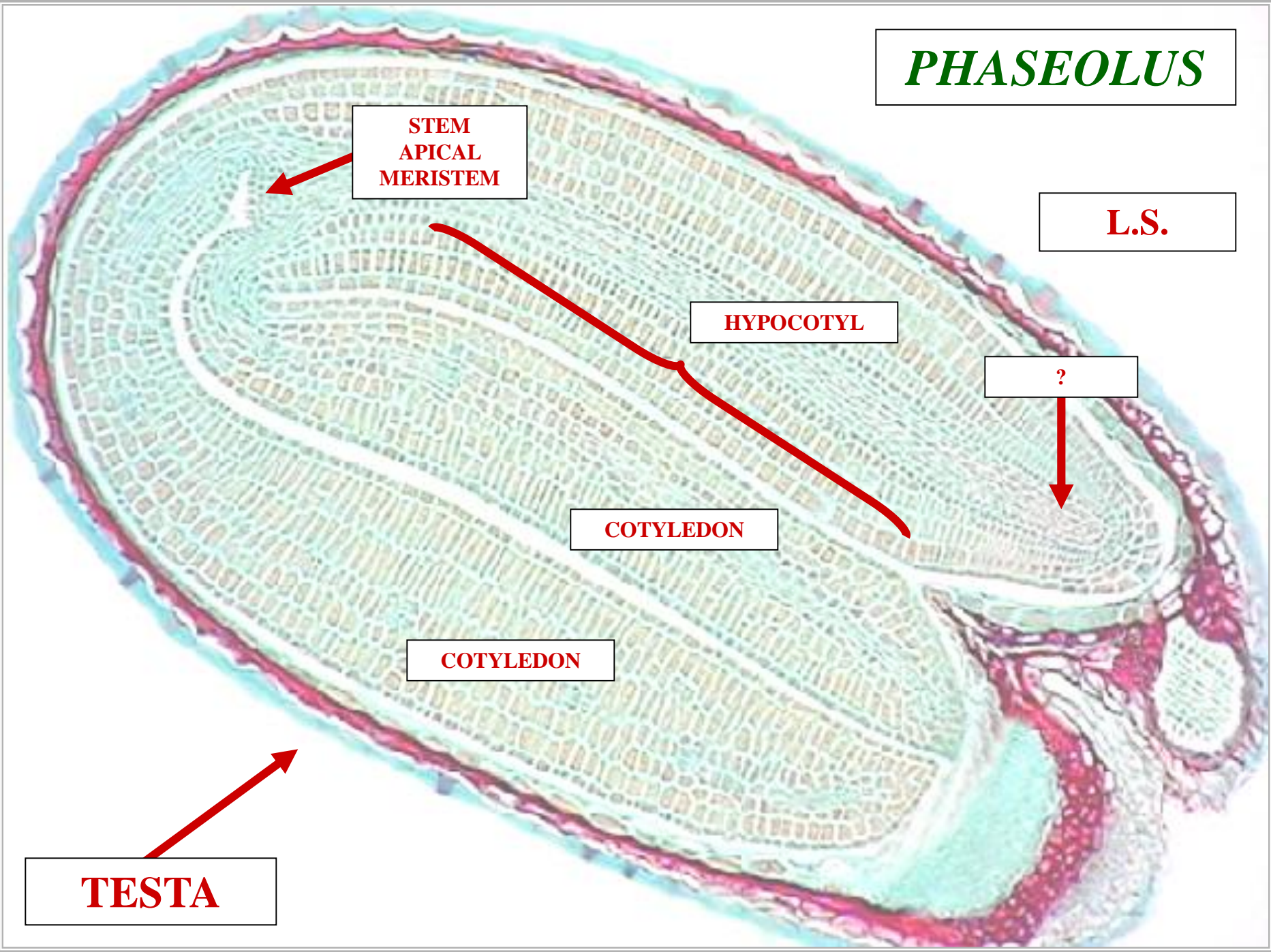
COTYLEDON

COTYLEDON

TESTA



# *PHASEOLUS*



STEM  
APICAL  
MERISTEM

L.S.

HYPOCOTYL

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COTYLEDON

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TESTA

# *PHASEOLUS*

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STEM  
APICAL  
MERISTEM

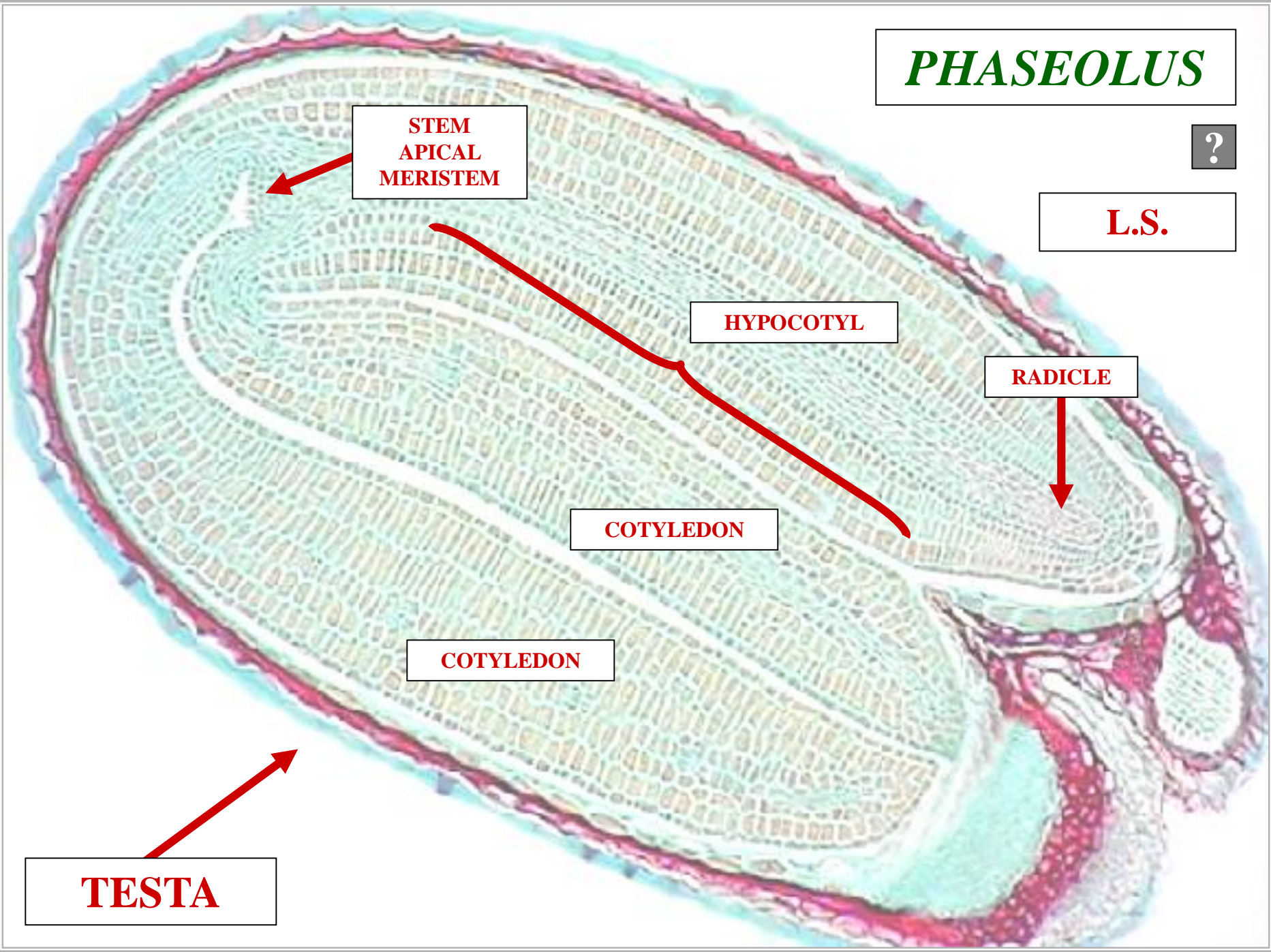
HYPOCOTYL

RADICLE

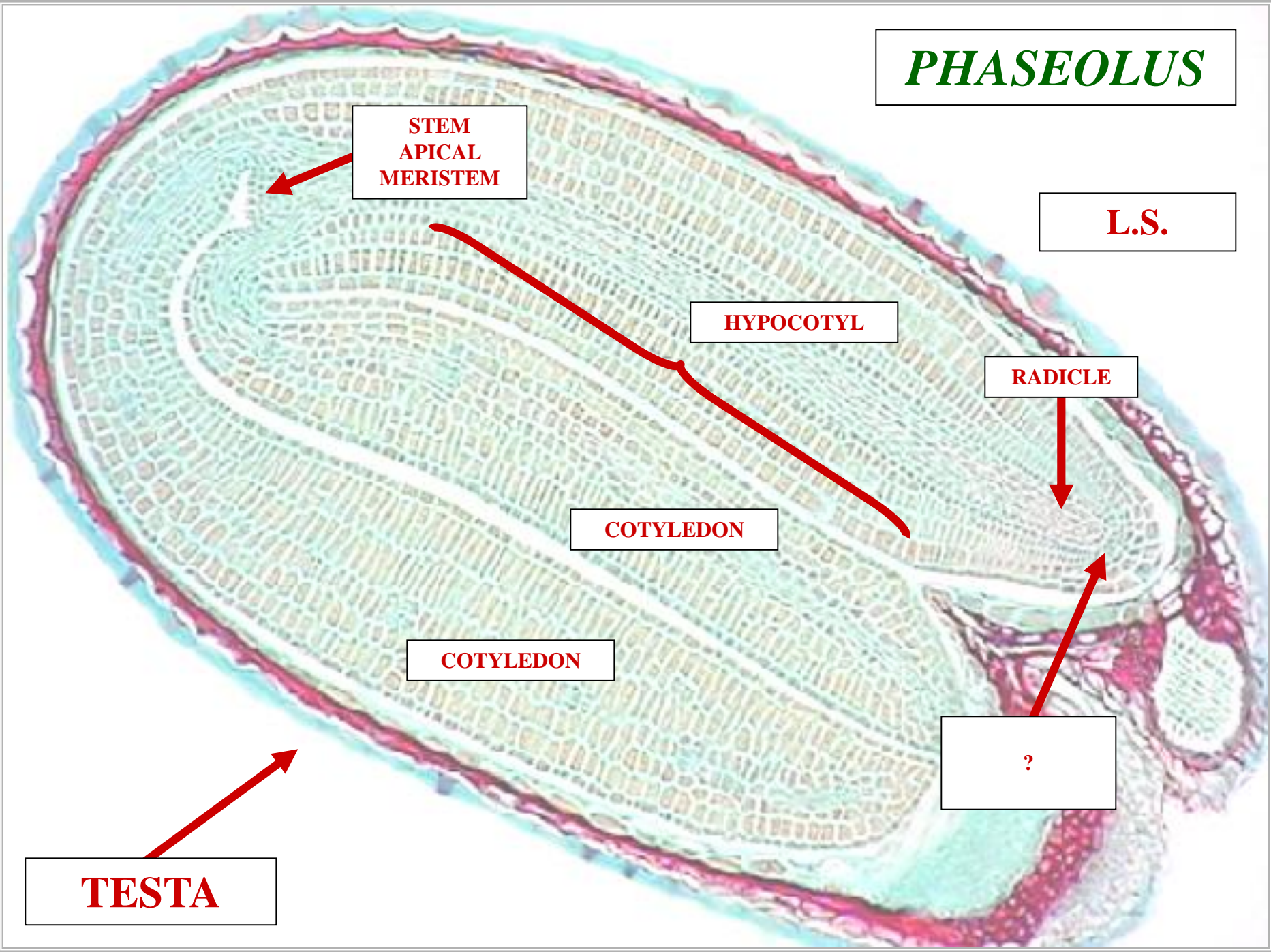
COTYLEDON

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TESTA



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STEM  
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MERISTEM

L.S.

HYPOCOTYL

RADICLE

COTYLEDON

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TESTA



# *PHASEOLUS*



**L.S.**

**STEM  
APICAL  
MERISTEM**

**HYPOCOTYL**

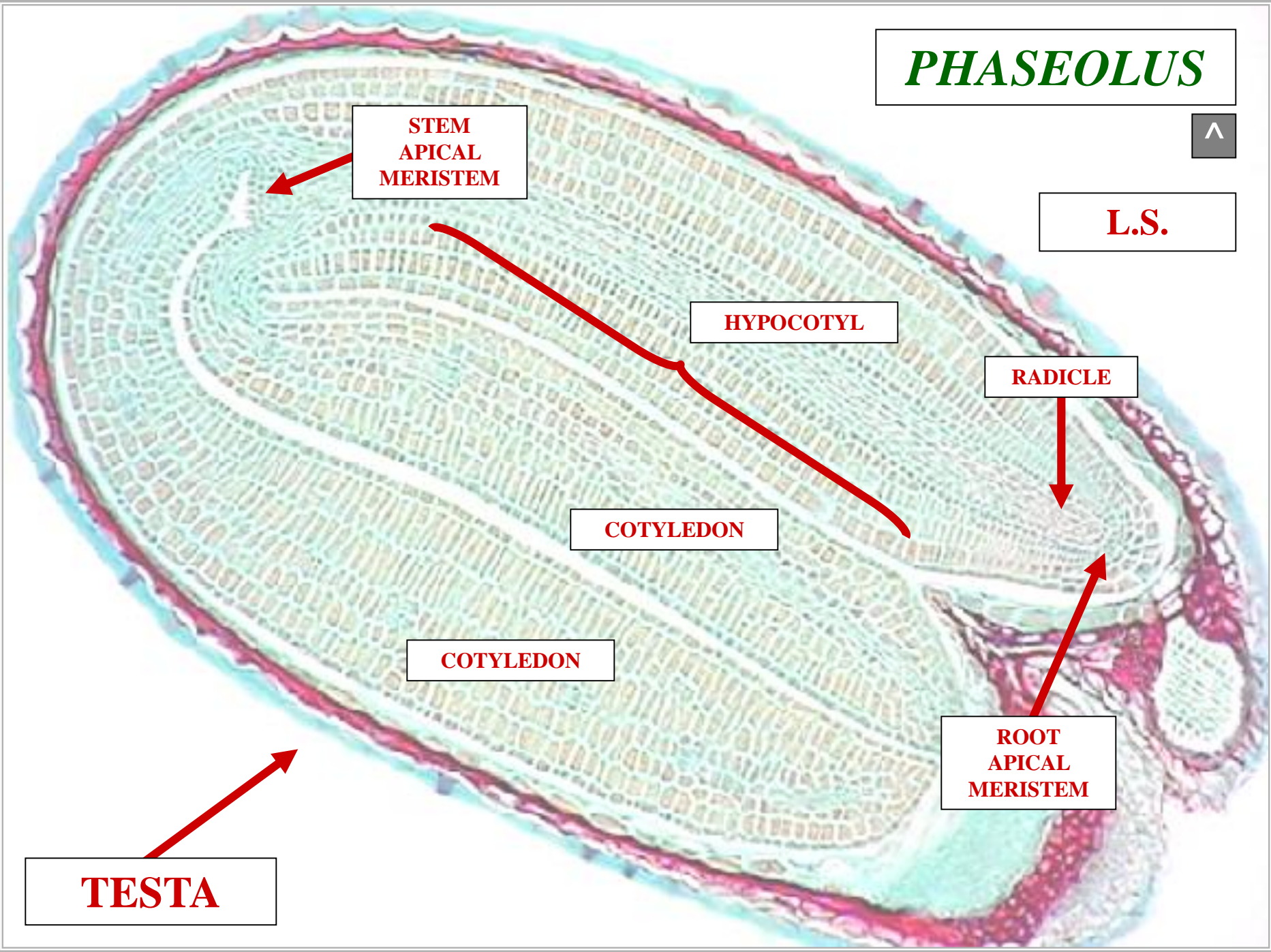
**RADICLE**

**COTYLEDON**

**COTYLEDON**

**ROOT  
APICAL  
MERISTEM**

**TESTA**





# **MONOCOT SEED ANATOMY**



*ZEA*



***ZEA***