COLEOPTILE

COLEOPTILE

C

SHEATH PROTECTS PLUMULE

COLEOPTILE

CORN

PERICARP

ENDOSPERM

SCUTELLUM

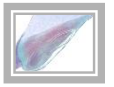
COLEOPTILE

EMBRYO

P

L.S.

PLUMULE



P

PLUMULE

MONOCOT EMBRYO
STEM

PLUMULE

CORN

PERICARP

ENDOSPERM

SCUTELLUM

COLEOPTILE

PLUMULE

EMBRYO

S

L.S.

CORN

PERICARP

ENDOSPERM

SCUTELLUM

COLEOPTILE

PLUMULE

STEM
APICAL MERISTEM

EMBRYO

M

L.S.

MESOCOTYL

MESOCOTYL

SCUTELLUM

ATTACHMENT POINT TO EMBRYO PROPER

MESOCOTYLE

CORN

PERICARP

ENDOSPERM

SCUTELLUM

COLEOPTILE

PLUMULE

STEM
APICAL MERISTEM

MESOCOTYL

R

EMBRYO

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CORN

PERICARP

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SCUTELLUM

COLEOPTILE

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STEM
APICAL MERISTEM

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EMBRYO

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COLEOPTILE

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APICAL MERISTEM

MESOCOTYL

C

EMBRYO

RADICLE

ROOT
APICAL MERISTEM

L.S.

COLEORHIZA

COLEORHIZA

C

SHEATH PROTECTS RADICLE

COLEORHIZA

CORN

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PERICARP

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PLUMULE

STEM
APICAL MERISTEM

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EMBRYO

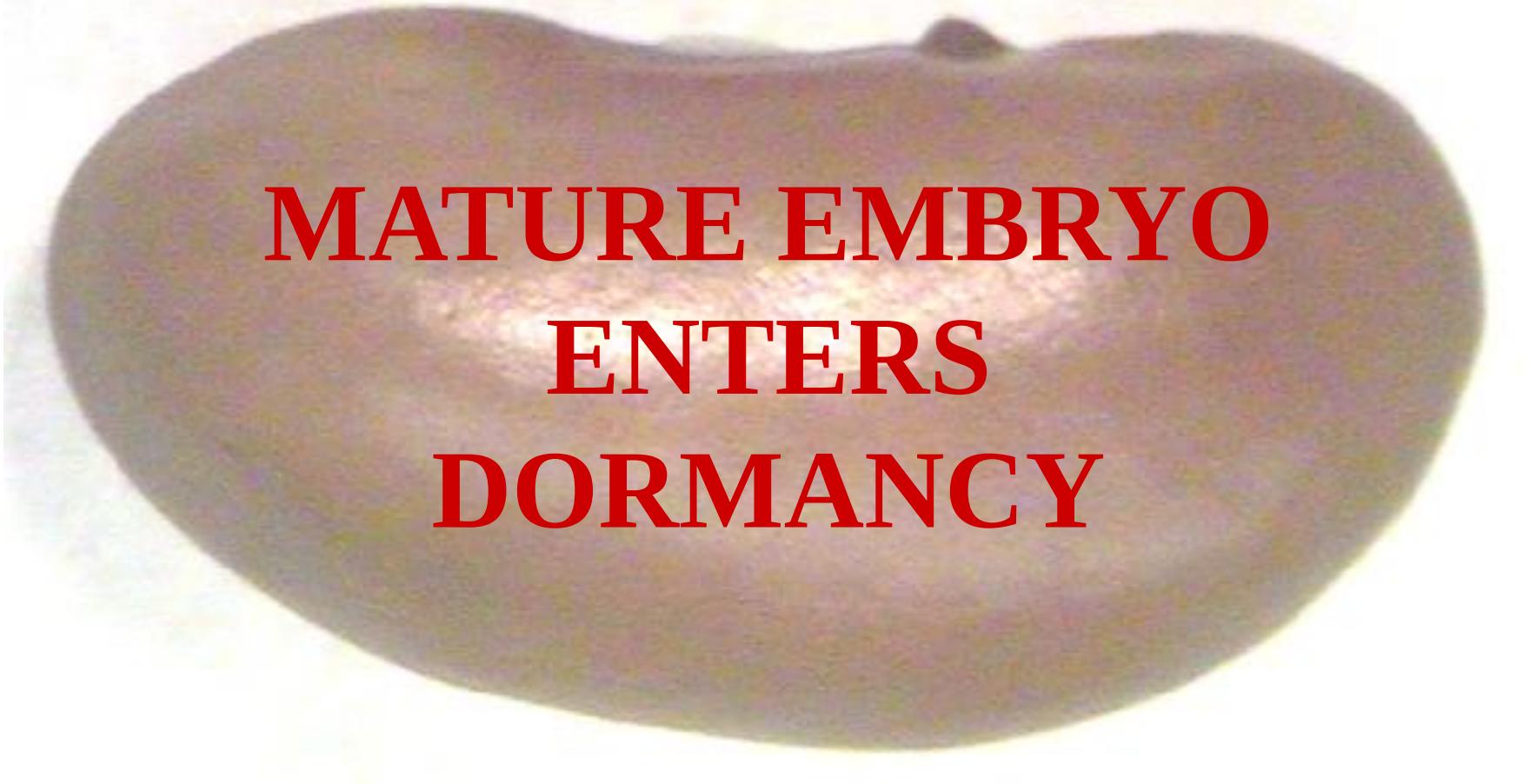
RADICLE

ROOT
APICAL MERISTEM

COLEORHIZA

L.S.

ANGIOSPERM SEED



MATURE EMBRYO ENTERS DORMANCY

D

ANGIOSPERM SEED DORMANCY

DORMANCY

SEED DORMANCY

PERIOD ARRESTED EMBRYO METABOLISM

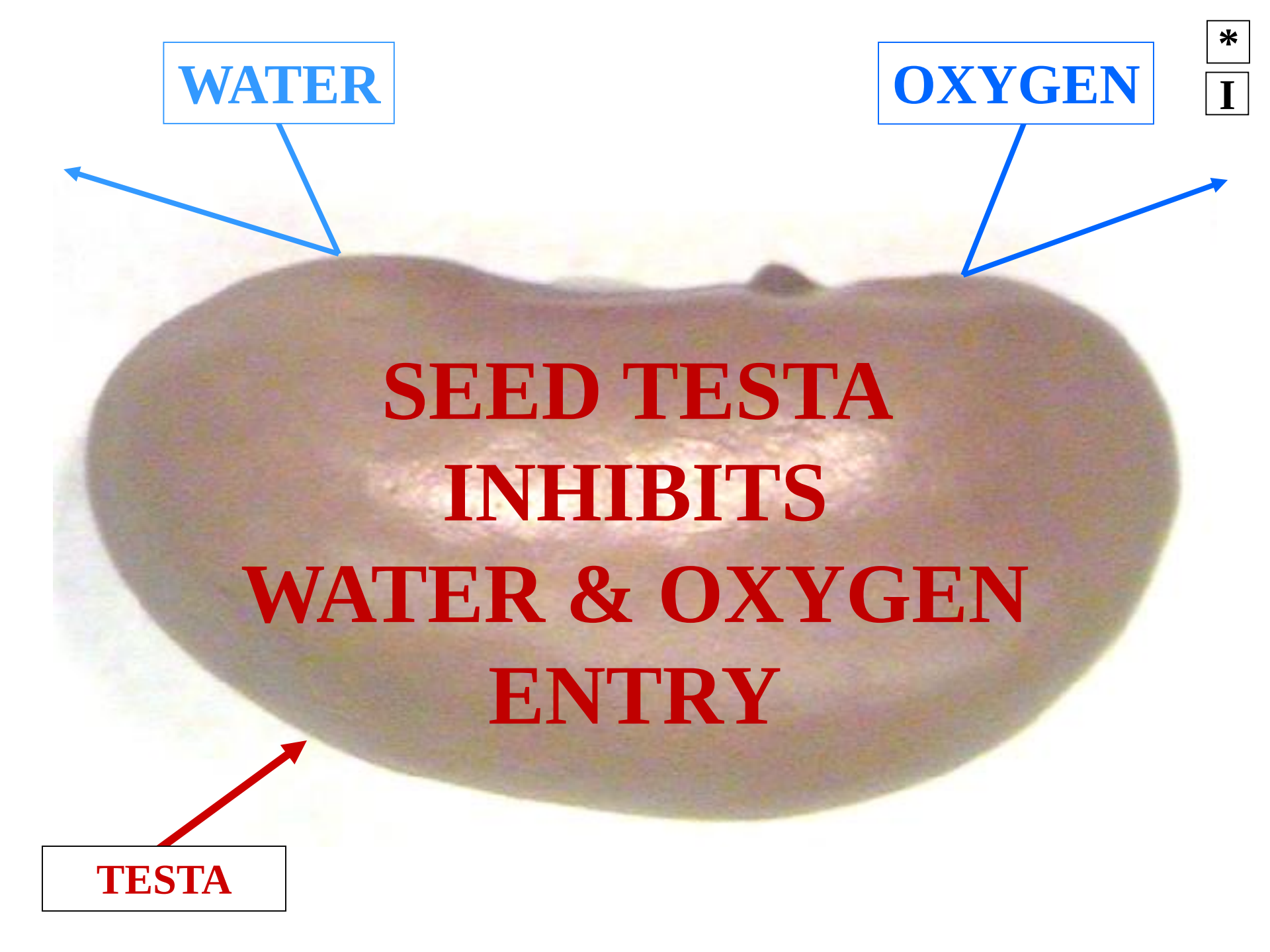
SEED DORMANCY

SEED DORMANCY INDUCED BY

W

O

SEED DORMANCY INDUCED BY TESTA

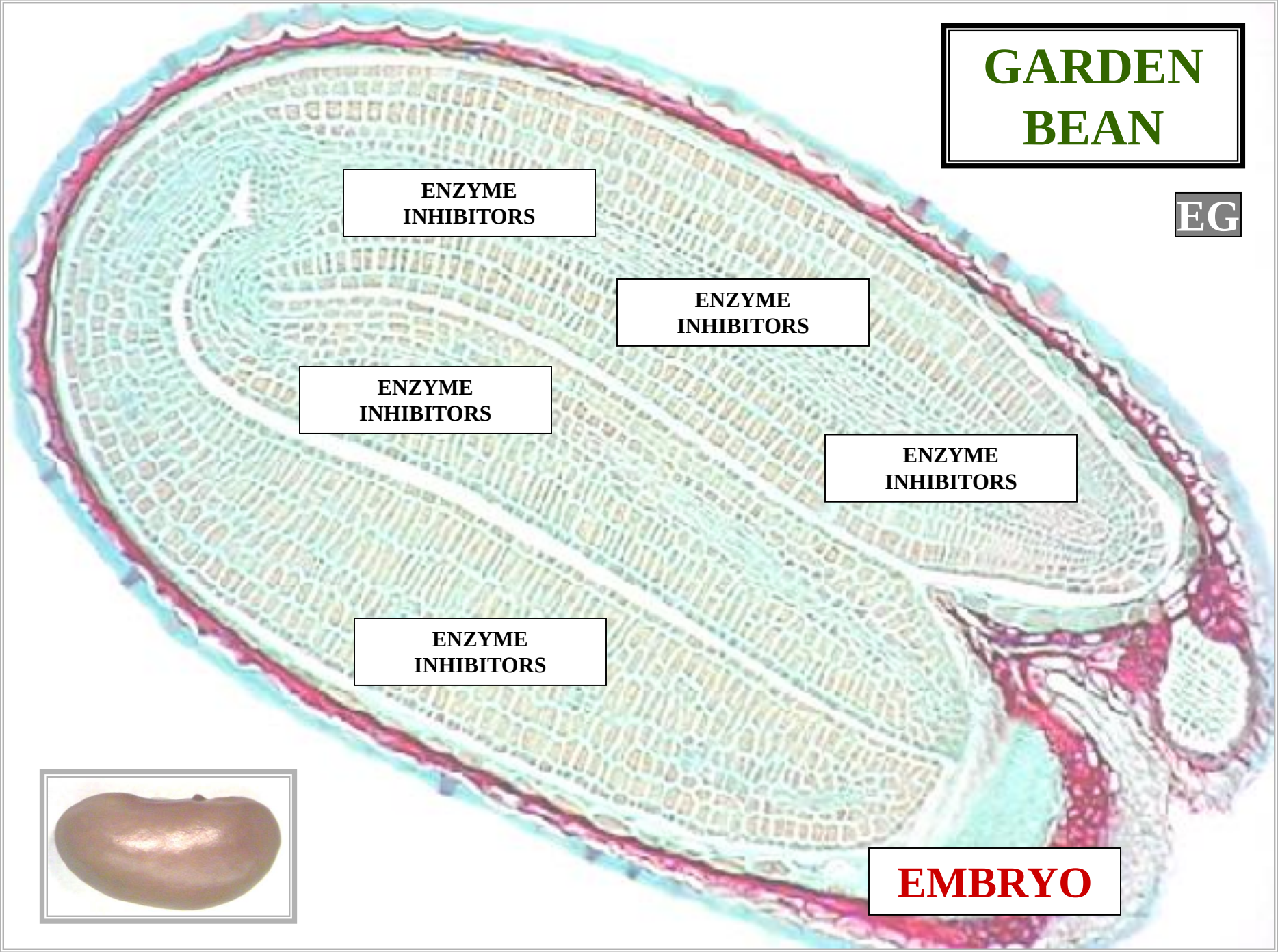

WATER
OXYGEN
*
I
SEED TESTA
INHIBITS
WATER & OXYGEN
ENTRY
TESTA

SEED DORMANCY INDUCED BY

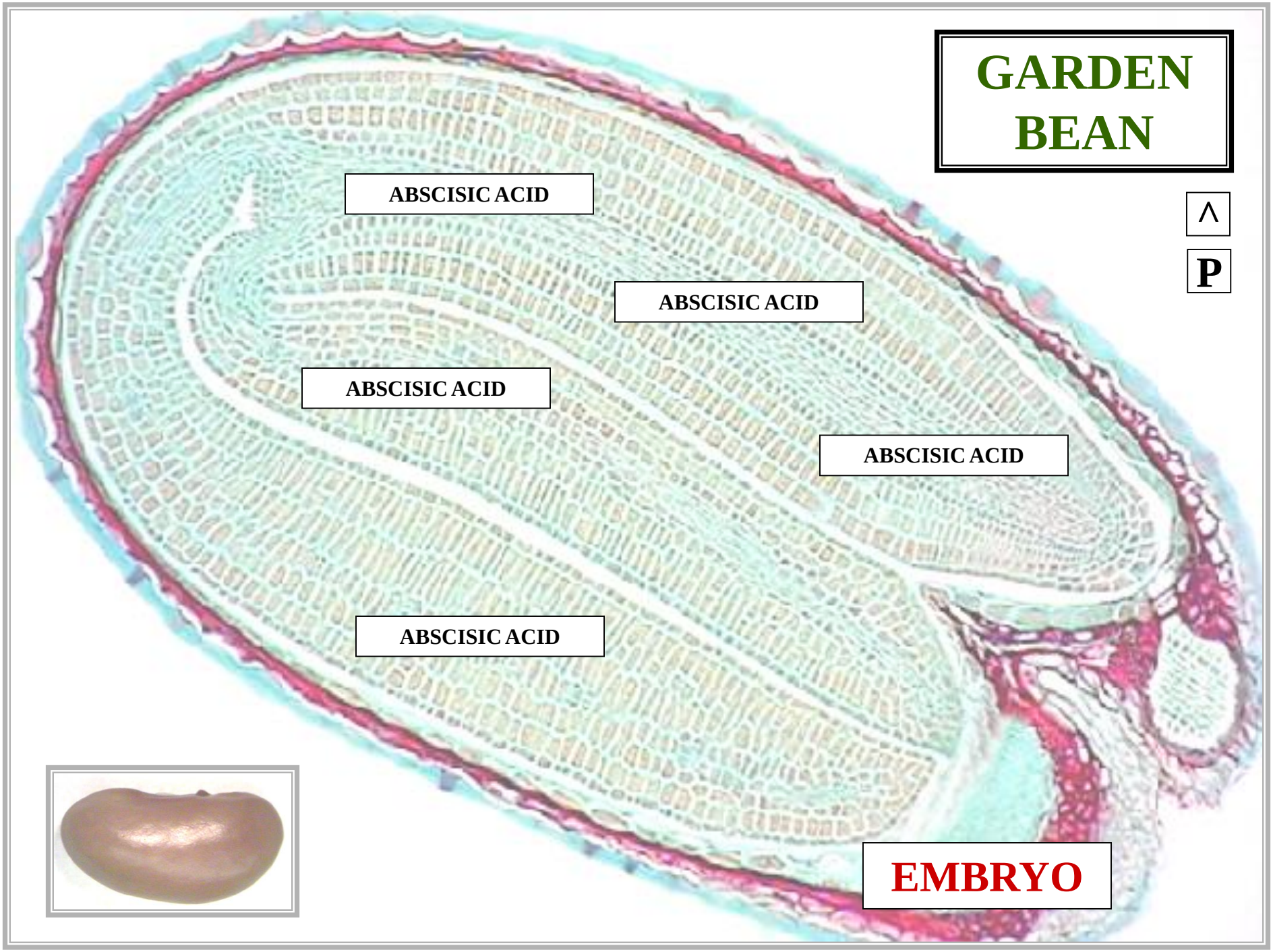
SEED DORMANCY INDUCED BY ENZYME INHIBITORS

GARDEN BEAN

EG



GARDEN BEAN



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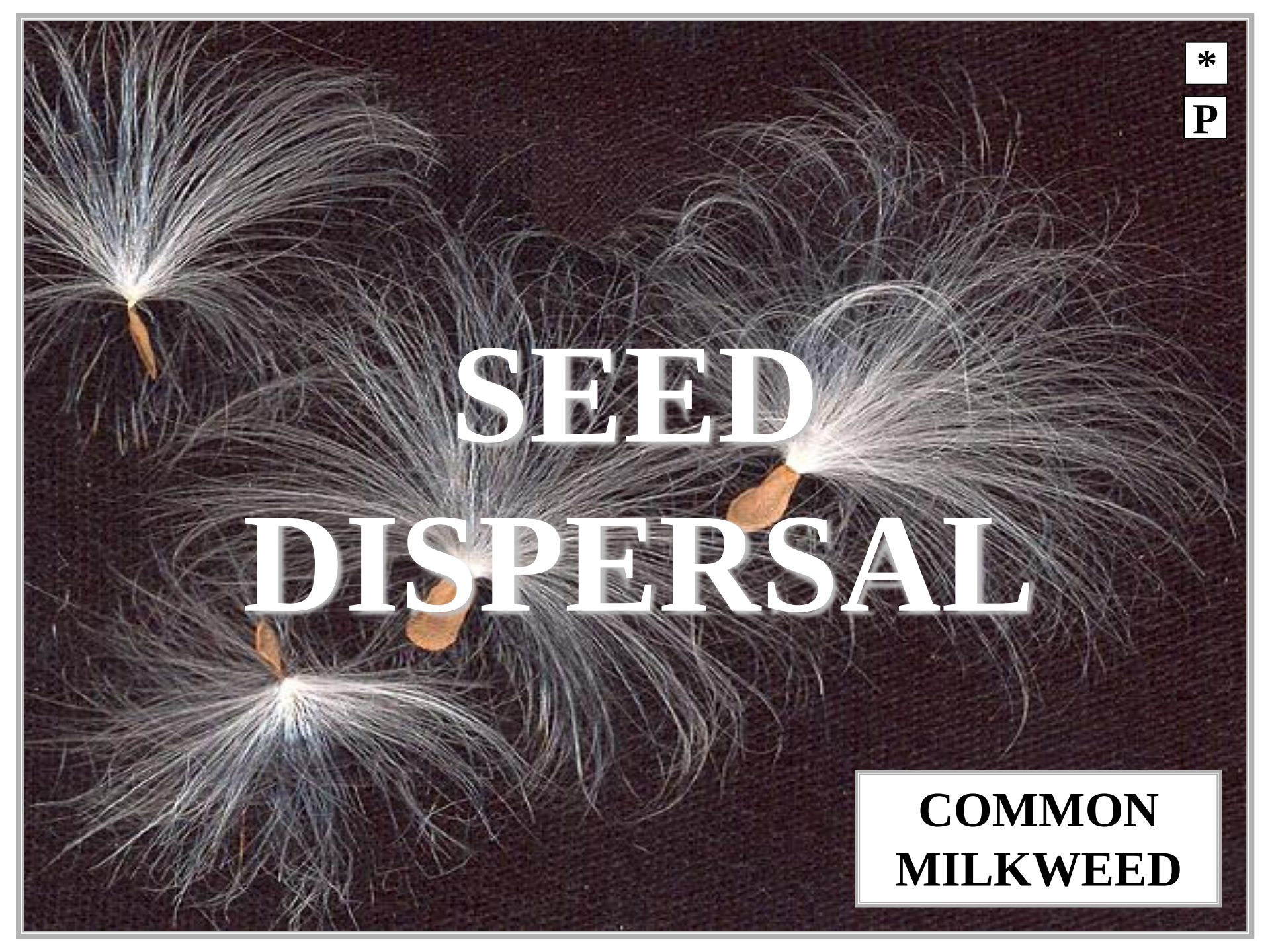
P

SEED DORMANCY PREVENTS GERMINATION DURING


COMMON MILKWEED
SEED DISPERSAL


*
P
SEED
DISPERSAL
COMMON
MILKWEED

SEED DORMANCY PREVENTS GERMINATION DURING


^
E
ADVERSE
ENVIRONMENTAL
CONDITIONS
WINTER

A

SEED DORMANCY ENSURES GERMINATION DURING


APPROPRIATE
SEASON


FAVORABLE
ENVIRONMENTAL
CONDITIONS
SPRING

ANGIOSPERM SEED

STRATIFICATION & SCARIFICATION BREAKS SEED DORMANCY

S

SEED STRATIFICATION

STRATIFICATION

SEED STRATIFICATION

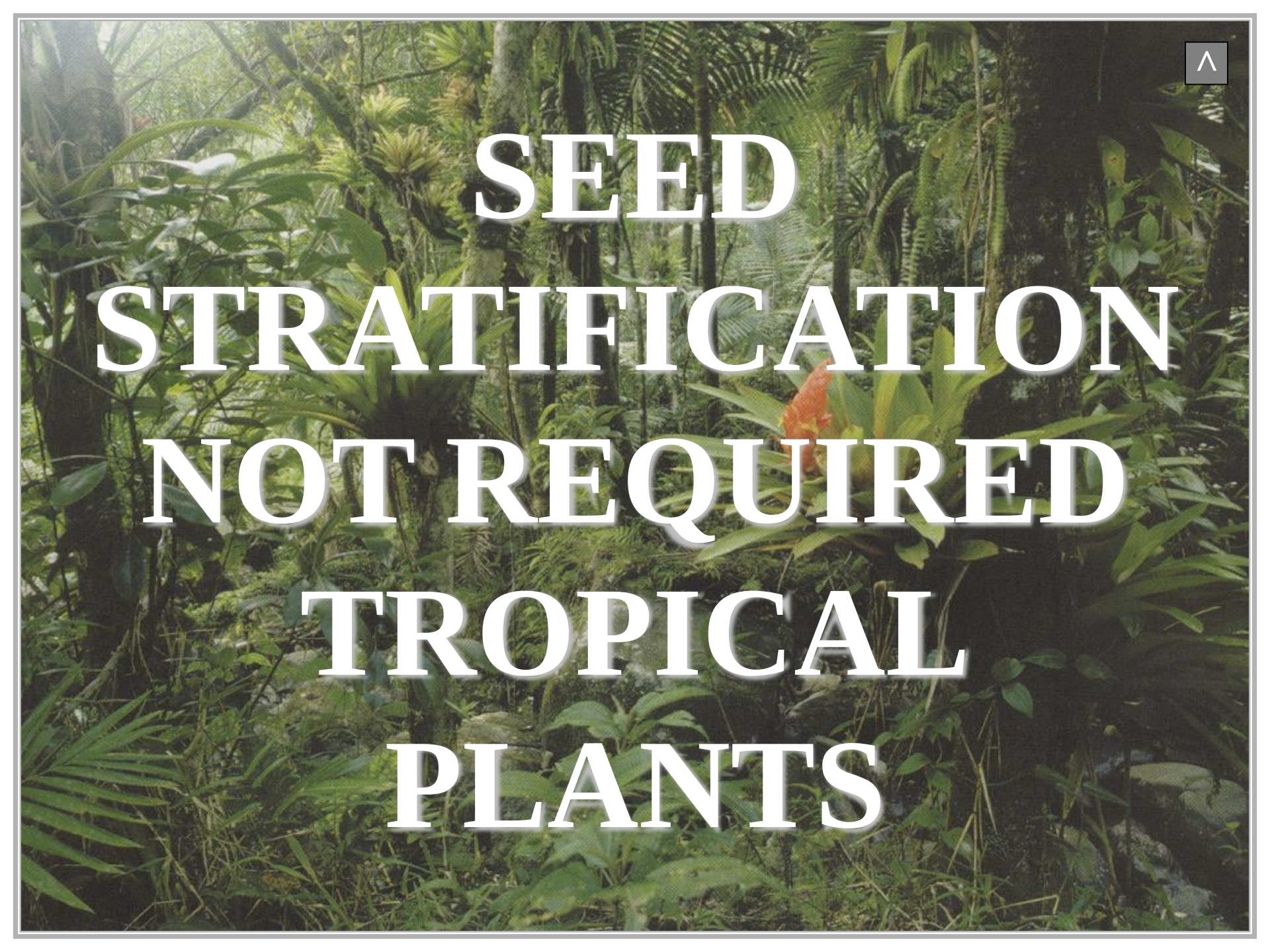
COLD PERIOD

SEED STRATIFICATION

ANGIOSPERM SEED

SEED STRATIFICATION COLD PERIOD


SEED
STRATIFICATION
REQUIRED
TEMPERATE
PLANTS

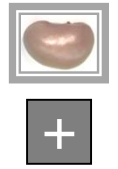

SEED
STRATIFICATION
NOT REQUIRED
TROPICAL
PLANTS

S

SEED SCARIFICATION

SCARIFICATION

SEED SCARIFICATION



TESTA RUPTURES

SEED SCARIFICATION

ANGIOSPERM SEED

SEED SCARIFICATION

TESTA RUPTURES

SCARIFICATION

INDUCED BY

SCARIFICATION

INDUCED BY MECHANICAL ABRASION

SEED SCARIFICATION

TESTA RUPTURES

MECHANICAL ABRASION

SCARIFICATION

INDUCED BY

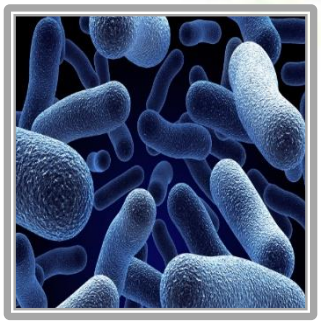
SCARIFICATION

INDUCED BY MICROBIAL ABRASION

SEED SCARIFICATION

TESTA RUPTURES

MICROBIAL ABRASION



A

SCARIFICATION

INDUCED BY

SCARIFICATION INDUCED BY ACID ABRASION

SEED SCARIFICATION

TESTA RUPTURES

ACID ABRASION

VIA

DIGESTIVE TRACT

ACID ABRASION

C

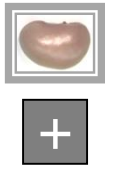
ACID ABRASION VIA DIGESTIVE TRACT

CEDAR WAXWING

Λ

S-P-E

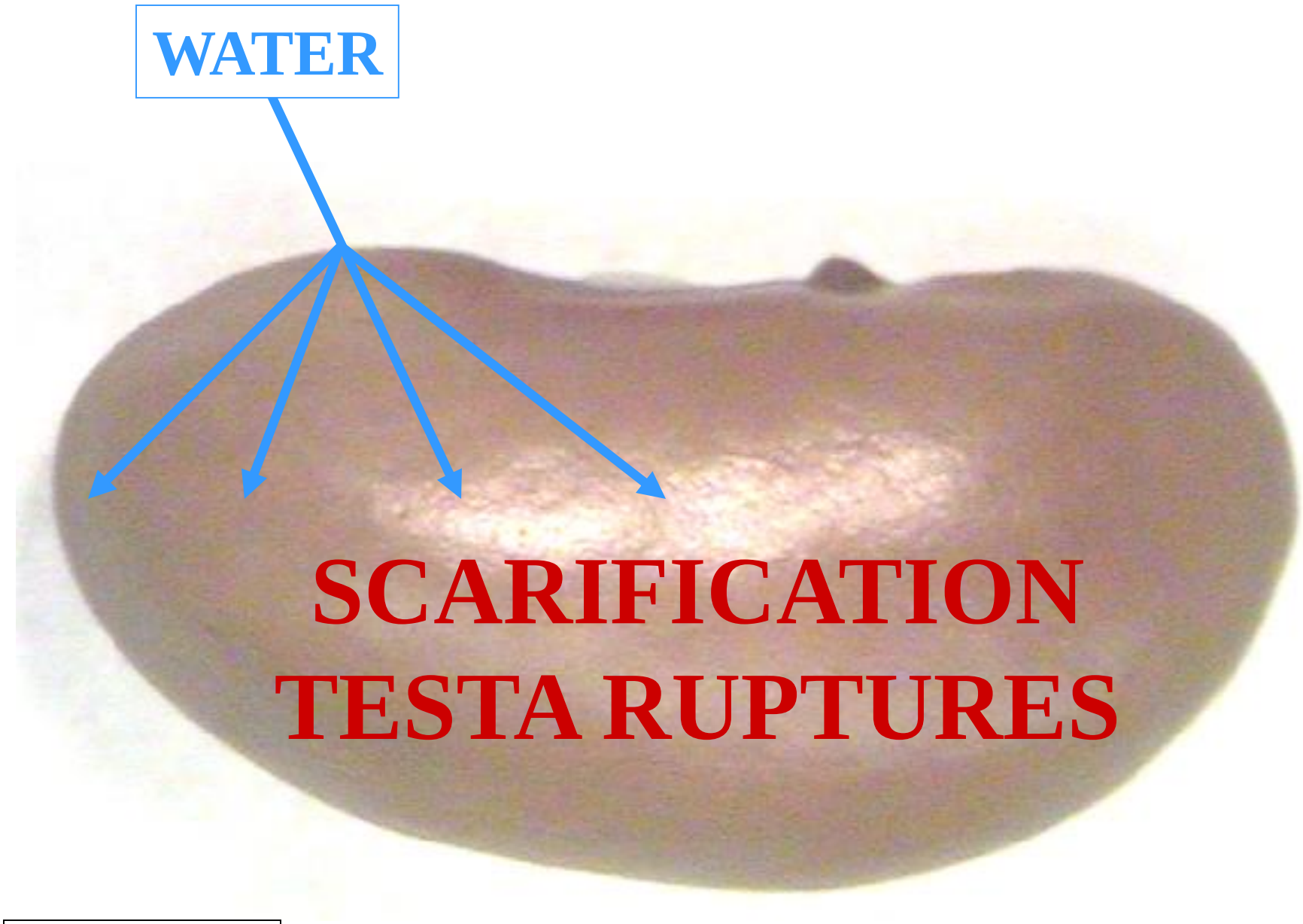
SCARIFICATION PERMITS ENTRY

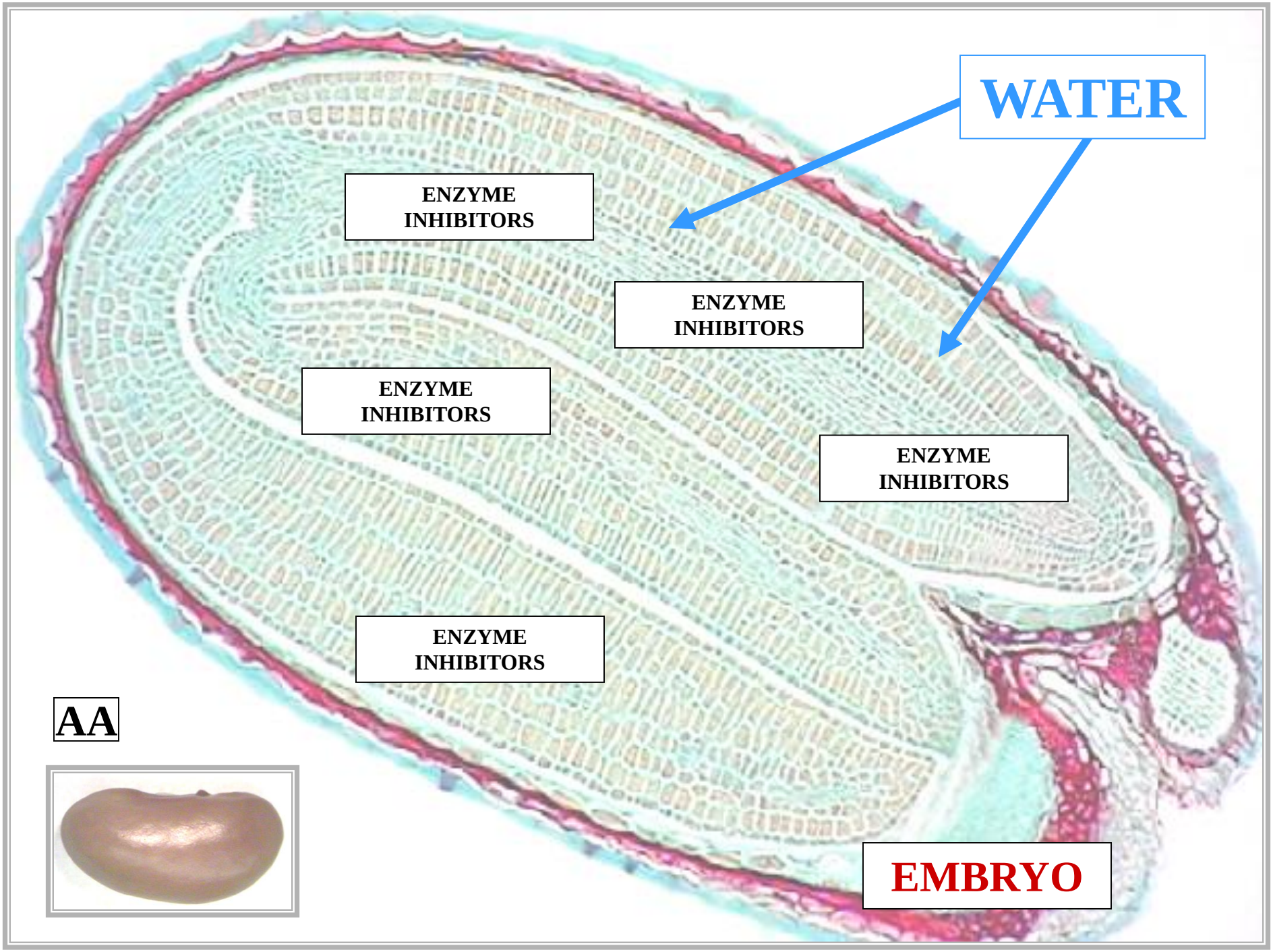


SCARIFICATION PERMITS ENTRY

WATER

SEED


WATER
SCARIFICATION
TESTA RUPTURES
SEED


WATER
ENZYME INHIBITORS
ENZYME INHIBITORS
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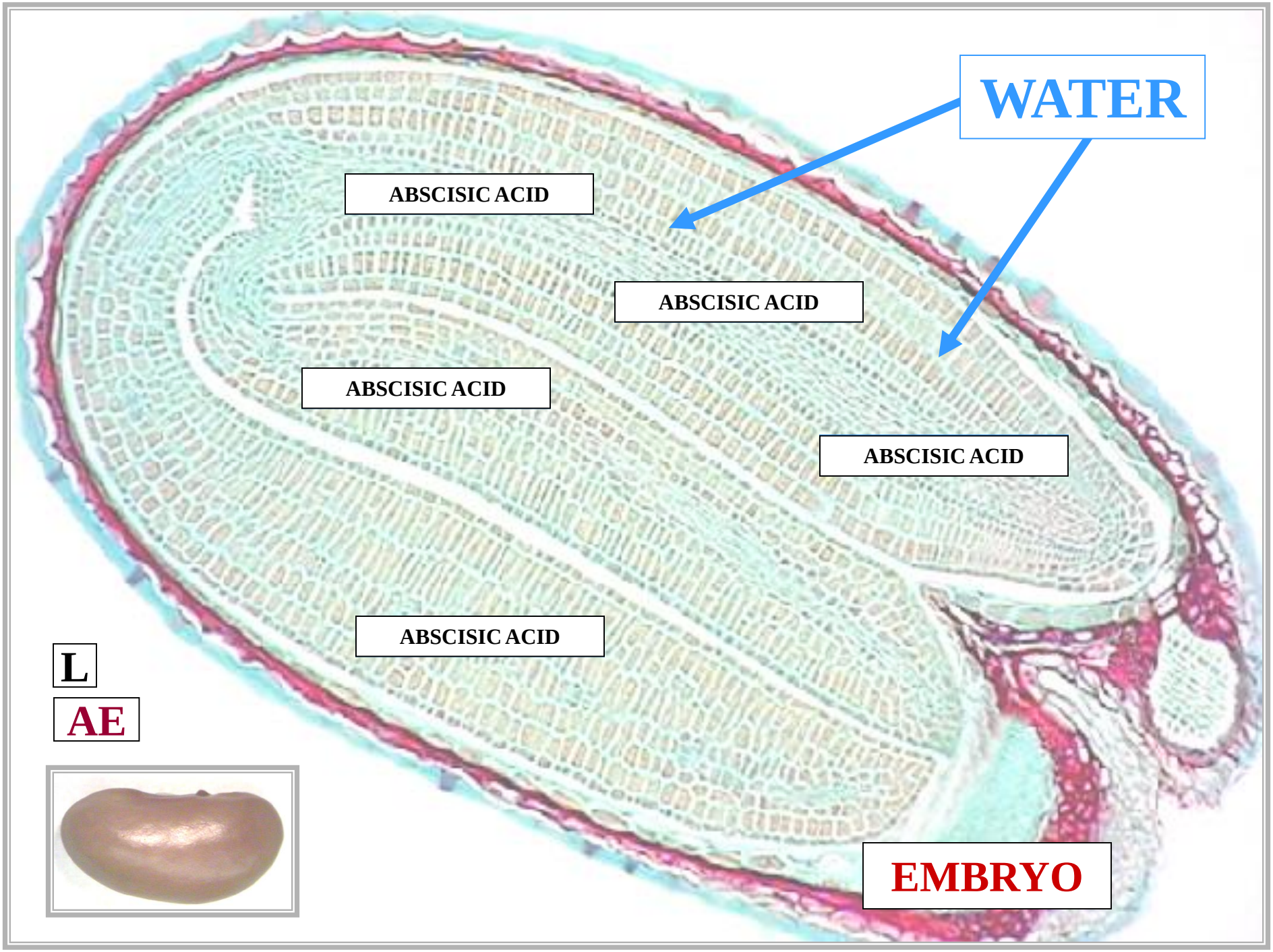
ENZYME INHIBITORS
ENZYME INHIBITORS
AA
EMBRYO


WATER
ABSCISIC ACID
ABSCISIC ACID
ABSCISIC ACID
ABSCISIC ACID
ABSCISIC ACID
L
AE
EMBRYO

WATER

ACTIVATES ENZYMES

ACTIVATES ENZYMES

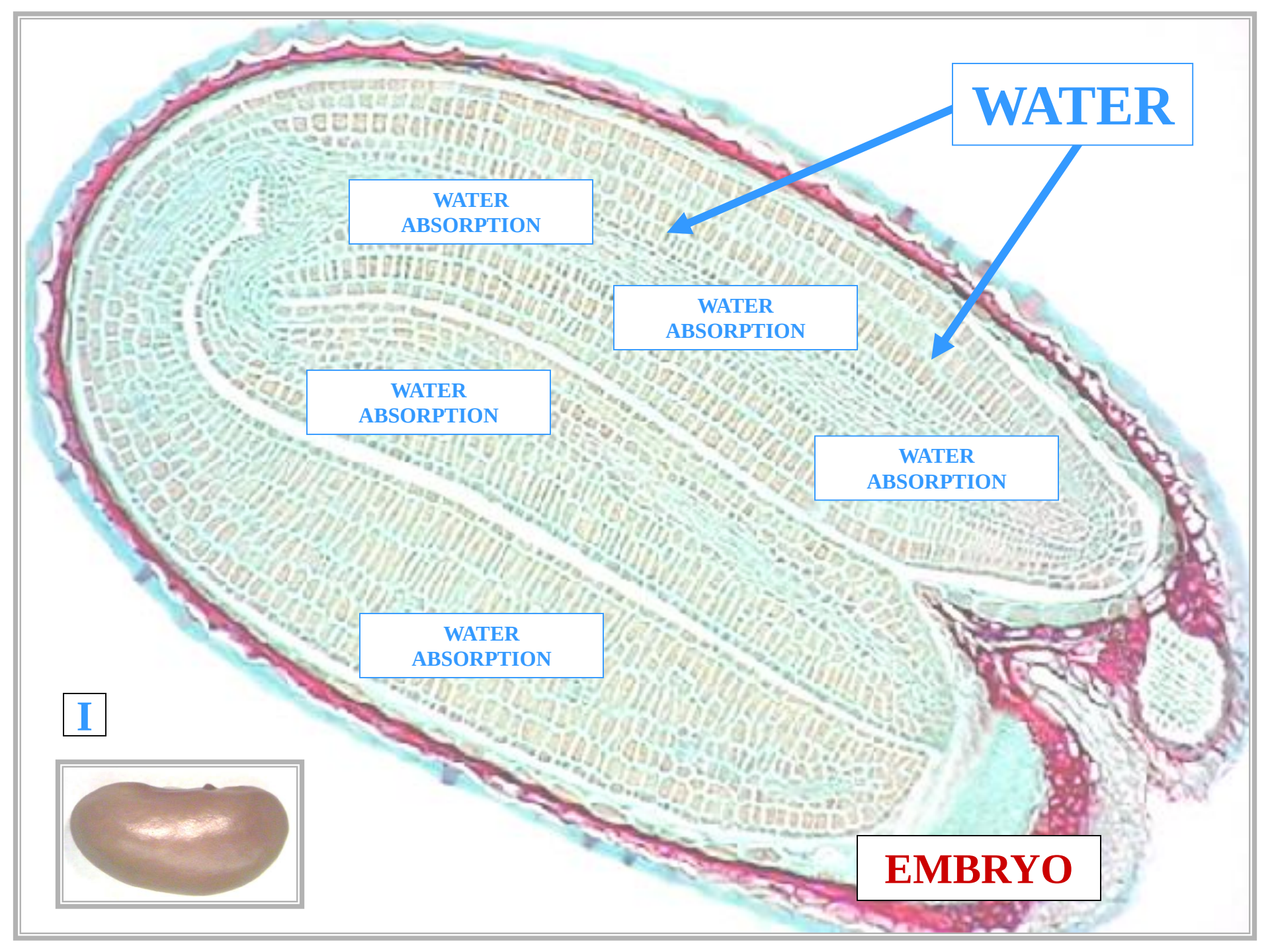
ACTIVATES ENZYMES

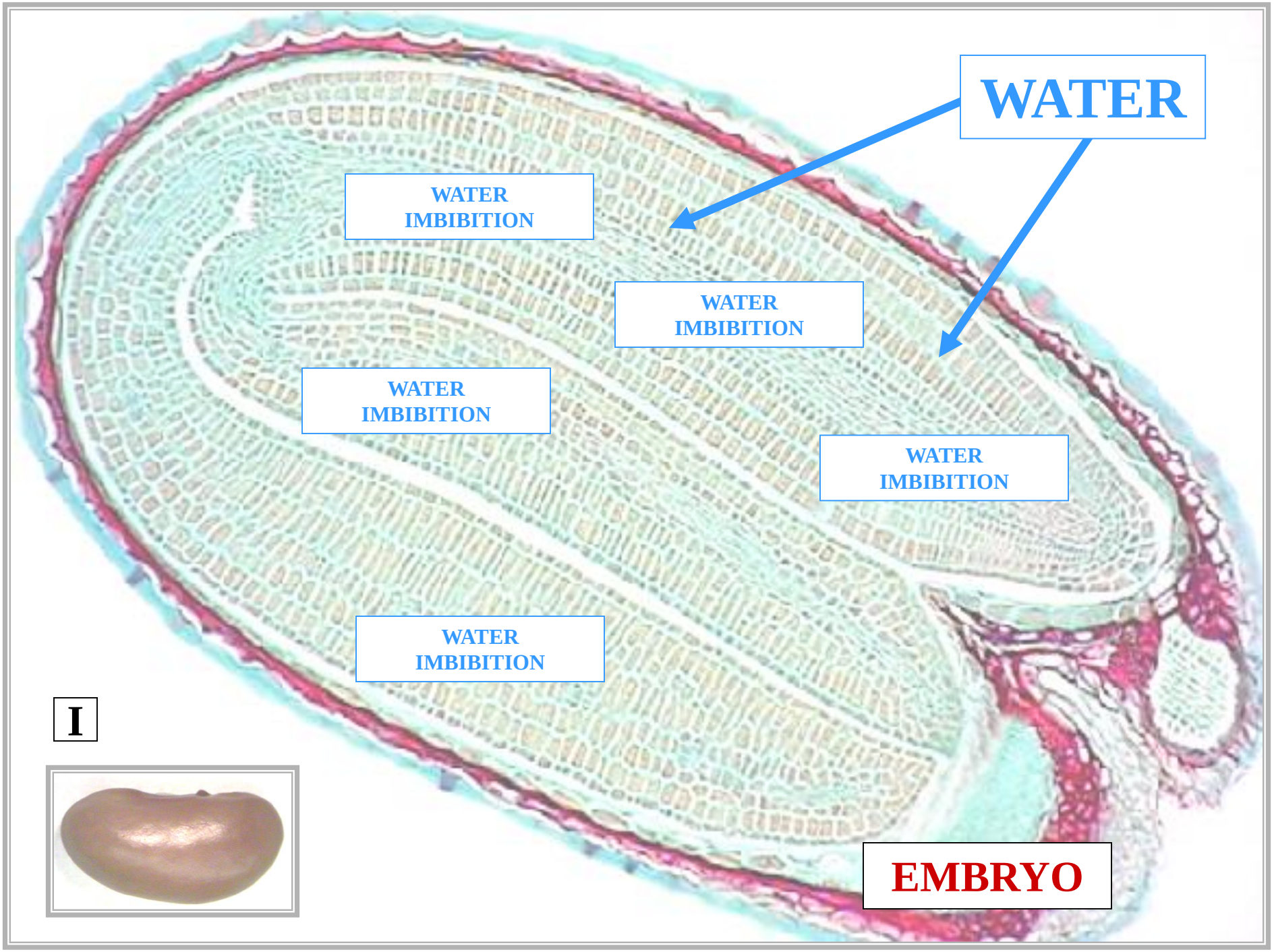
ACTIVATES ENZYMES

ACTIVATES ENZYMES

WAB

EMBRYO


WATER
WATER ABSORPTION
WATER ABSORPTION
WATER ABSORPTION
WATER ABSORPTION
WATER ABSORPTION
I
EMBRYO


WATER
WATER IMBIBITION
WATER IMBIBITION
WATER IMBIBITION
WATER IMBIBITION
WATER IMBIBITION
I
EMBRYO

IMBIBITION

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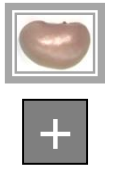
S-P-E

SEED IMBIBITION

SEED / EMBRYO WATER ABSORPTION

SEED IMBIBITION

SCARIFICATION PERMITS ENTRY

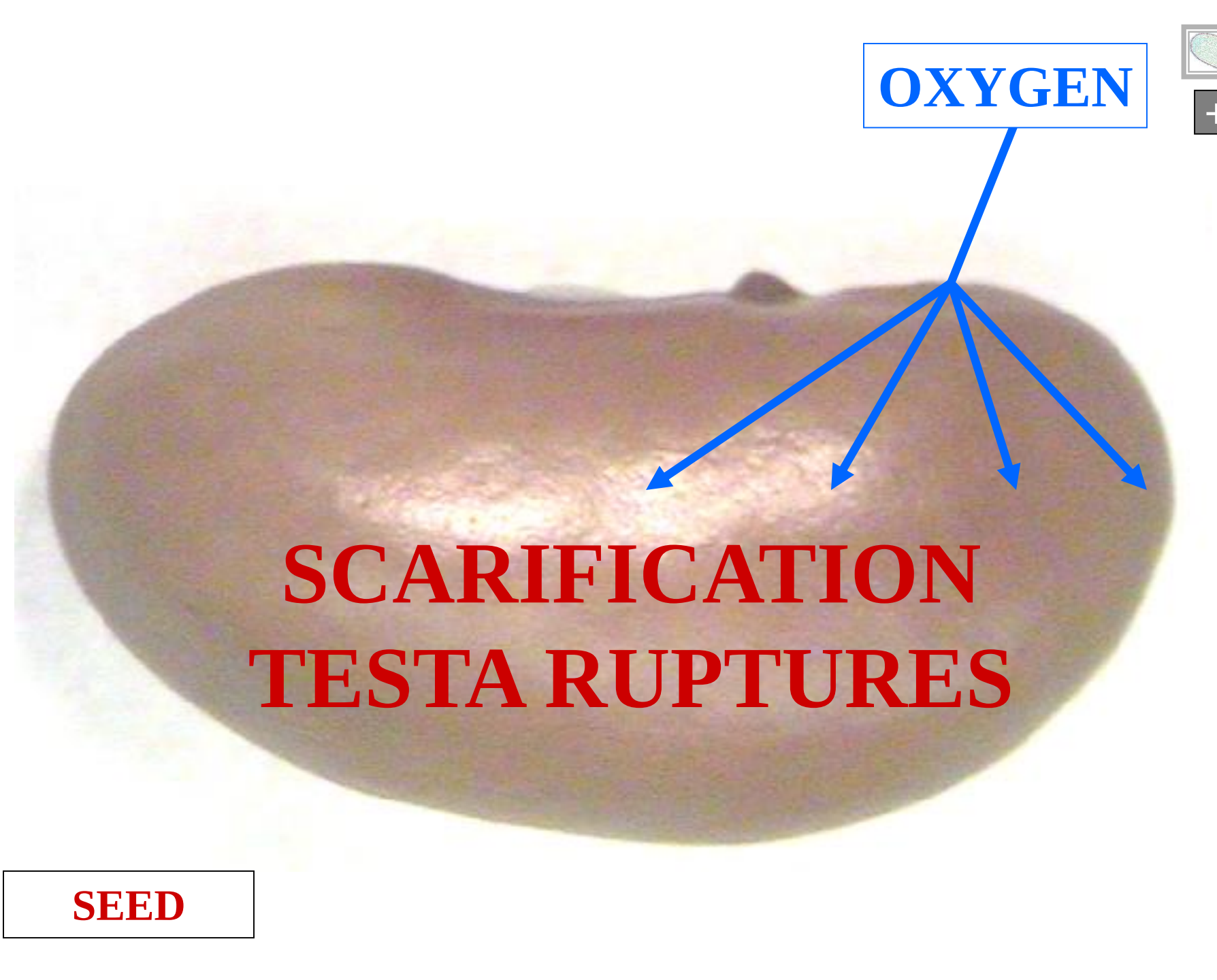


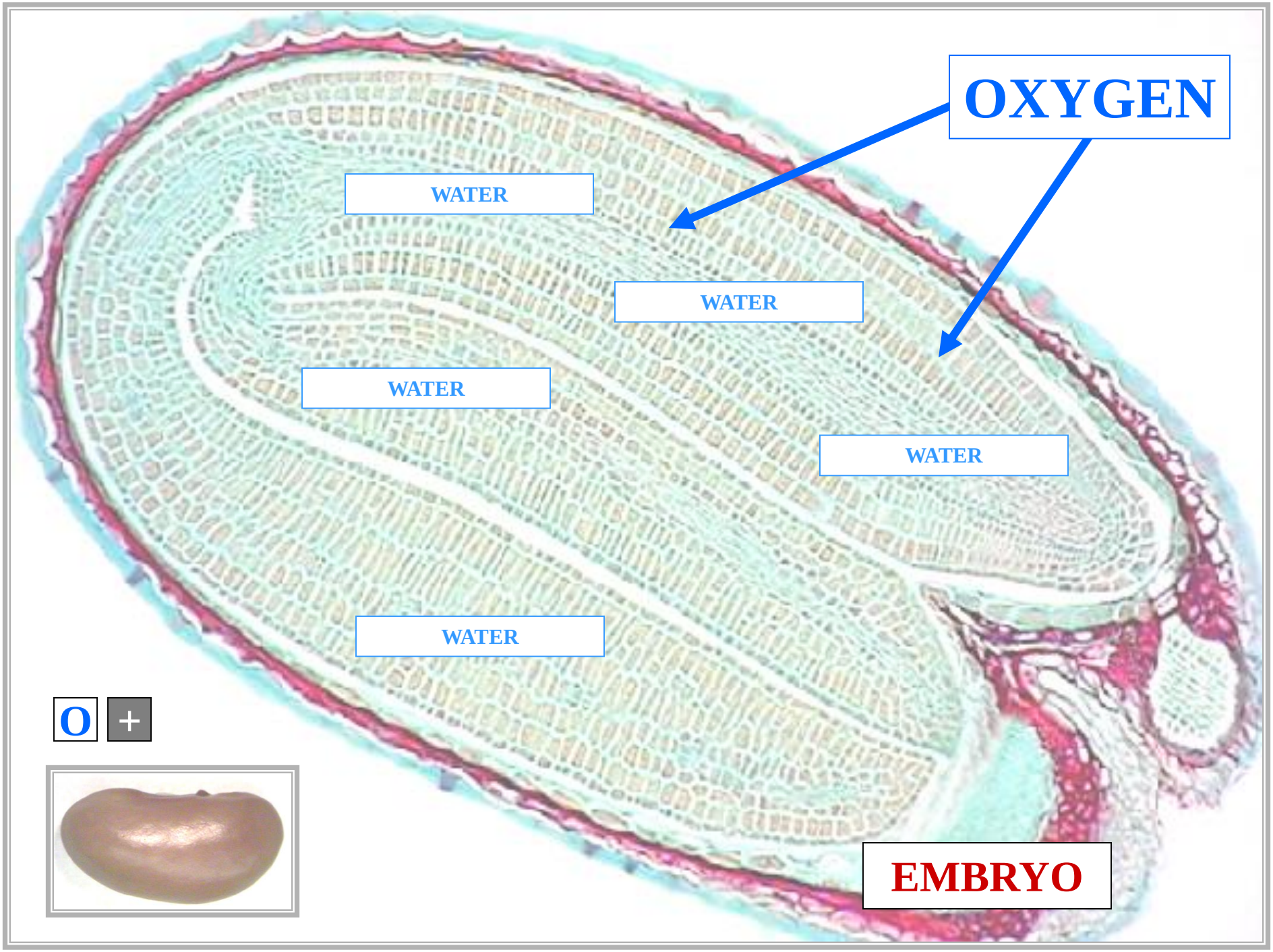
SCARIFICATION PERMITS ENTRY OXYGEN

O

SCARIFICATION
TESTA RUPTURES

SEED


OXYGEN
SCARIFICATION
TESTA RUPTURES
SEED


OXYGEN
WATER
WATER
WATER
WATER
WATER
O
+
EMBRYO

GARDEN BEAN

WATER

OXYGEN

WATER

OXYGEN

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OXYGEN

WATER

OXYGEN

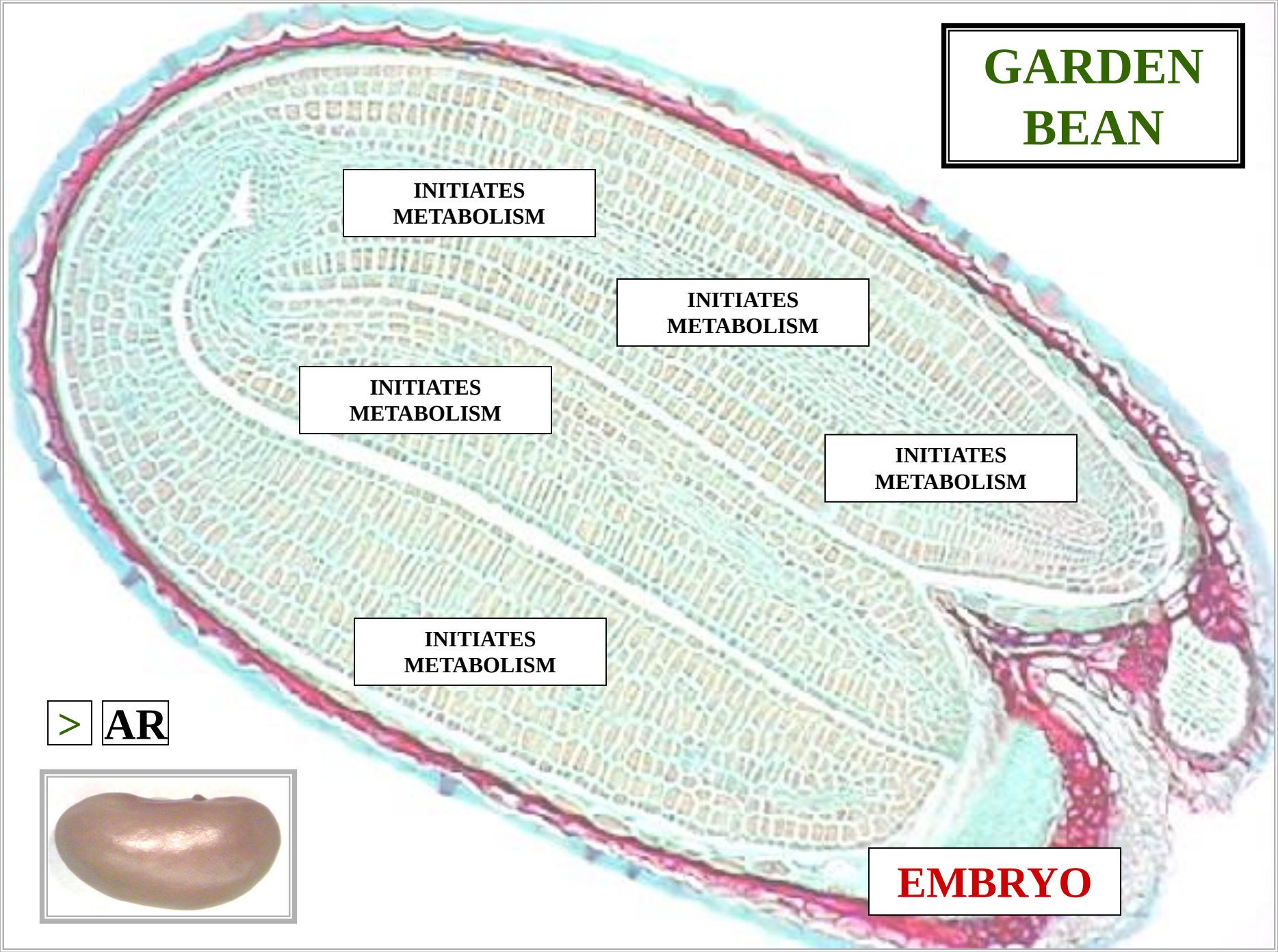
WATER

OXYGEN

IM

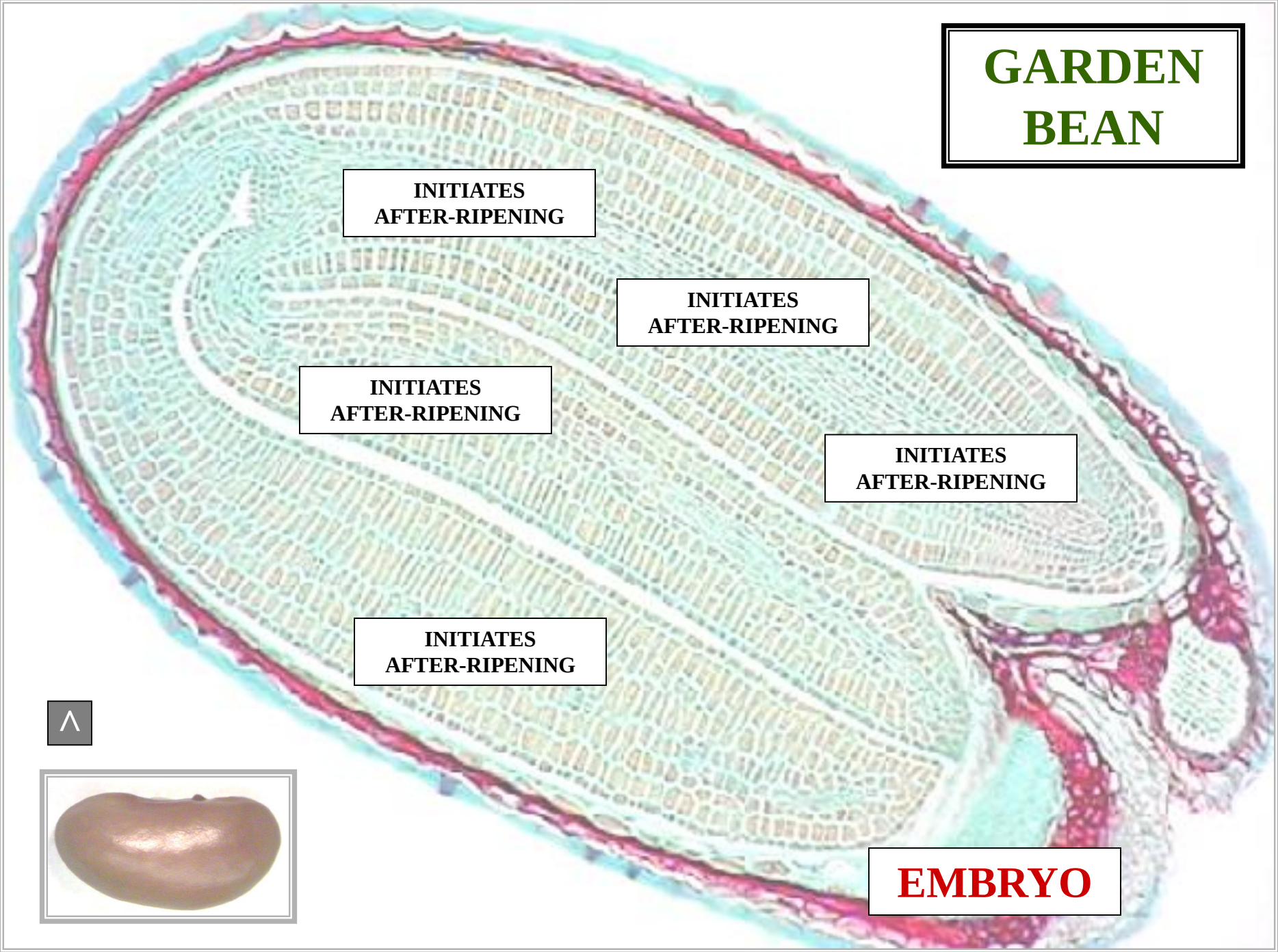
EMBRYO

GARDEN BEAN



> AR

GARDEN BEAN


INITIATES AFTER-RIPENING
INITIATES AFTER-RIPENING
INITIATES AFTER-RIPENING
INITIATES AFTER-RIPENING
INITIATES AFTER-RIPENING
EMBRYO

A

SEED
AFTER-RIPENING

AFTER-RIPENING

SEED AFTER-RIPENING

LO

SEED / EMBRYO INITIATES METABOLISM

SEED AFTER-RIPENING

GARDEN BEAN

LOW WATER

LOW OXYGEN

LOW WATER

LOW OXYGEN

LOW WATER

LOW OXYGEN

LOW WATER

LOW OXYGEN

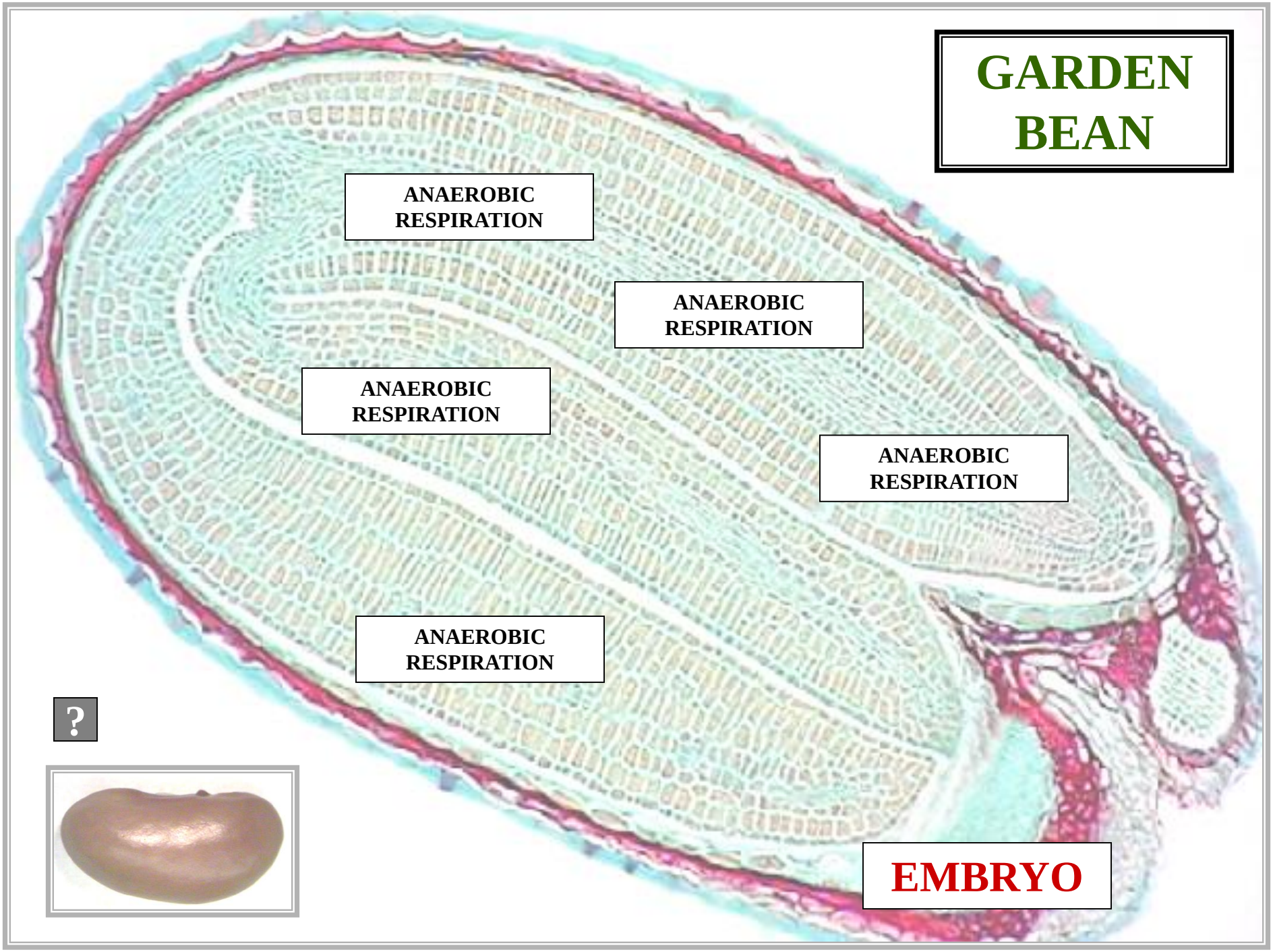
LOW WATER

LOW OXYGEN

AN

EMBRYO

GARDEN BEAN


ANAEROBIC RESPIRATION
ANAEROBIC RESPIRATION
ANAEROBIC RESPIRATION
ANAEROBIC RESPIRATION
ANAEROBIC RESPIRATION
EMBRYO

?

ANAEROBIC RESPIRATION ATP / GLUCOSE

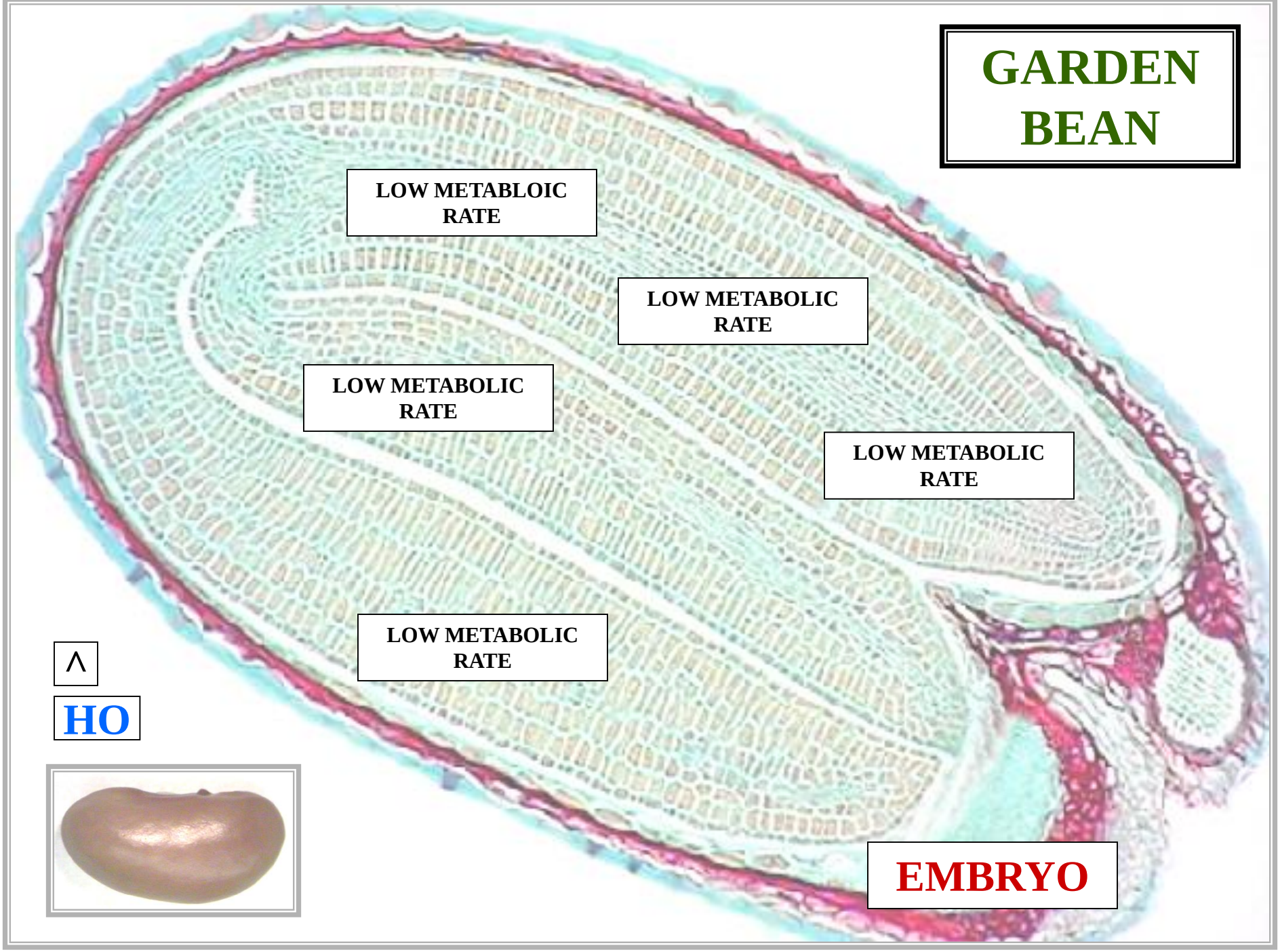
?

LM

ANAEROBIC RESPIRATION ATP / GLUCOSE

2 ATP

GARDEN BEAN



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HO

GARDEN BEAN

HIGH WATER

HIGH OXYGEN

HIGH WATER

HIGH OXYGEN

HIGH WATER

HIGH OXYGEN

HIGH WATER

HIGH OXYGEN

HIGH WATER

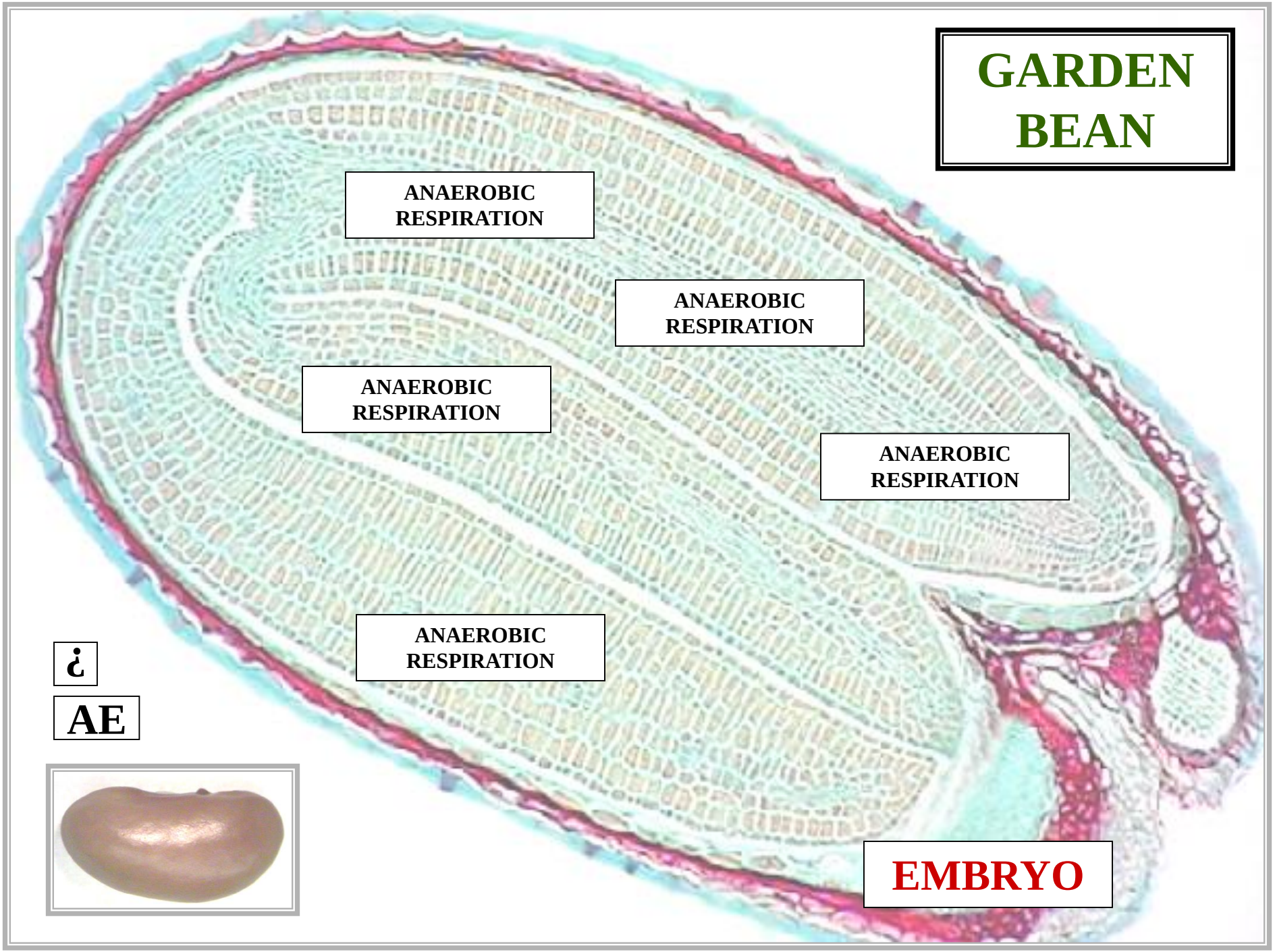
HIGH OXYGEN

!

AN

EMBRYO

GARDEN BEAN



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AE

GARDEN BEAN

AEROBIC RESPIRATION

AEROBIC RESPIRATION

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EMBRYO

AEROBIC RESPIRATION ATP / GLUCOSE ?

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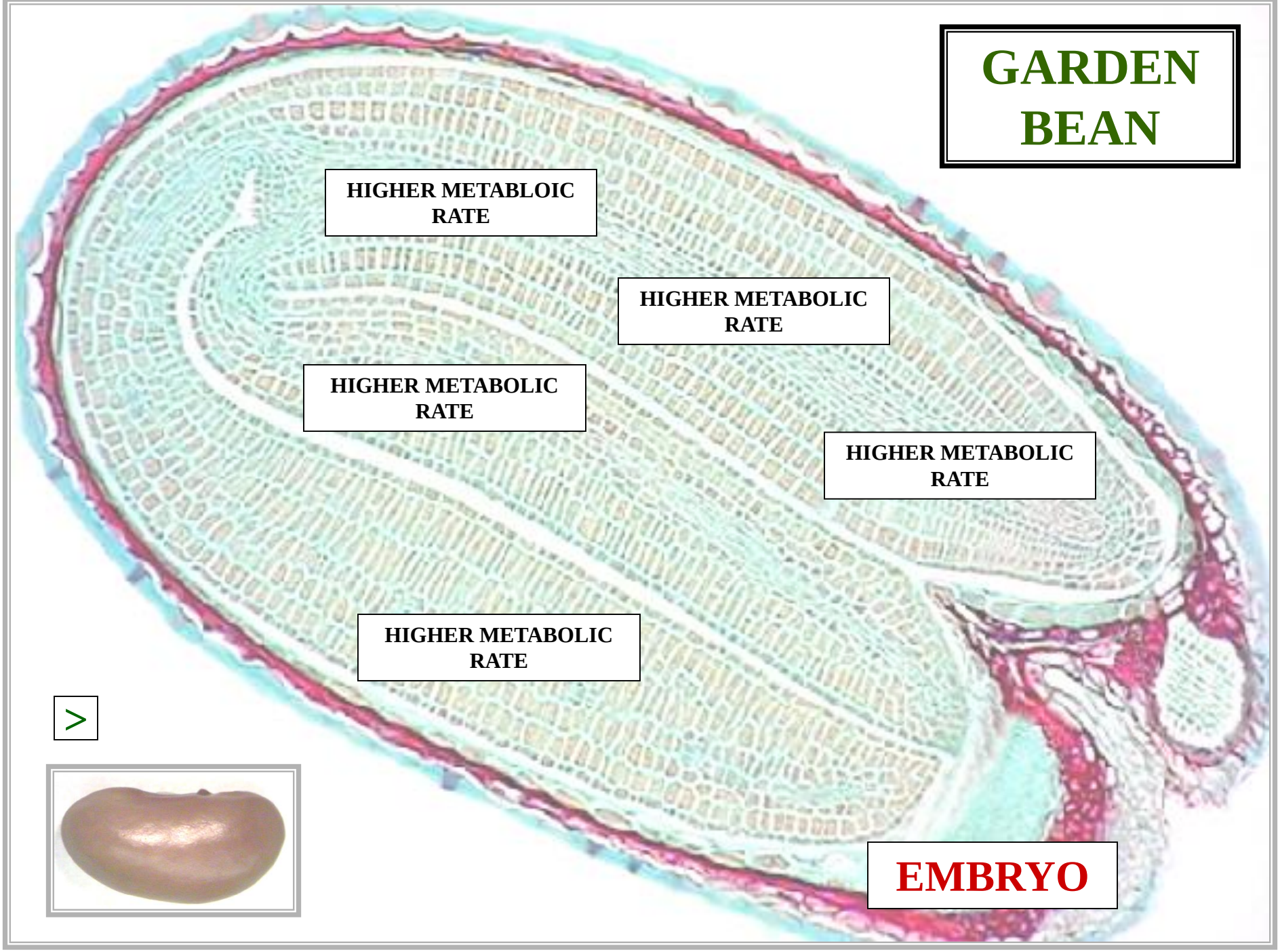
AEROBIC RESPIRATION ATP / GLUCOSE

36 ATP

GARDEN BEAN


HIGHER METABLOIC RATE
HIGHER METABOLIC RATE
HIGHER METABOLIC RATE
HIGHER METABOLIC RATE
HIGHER METABOLIC RATE
EMBRYO

>

ANGIOSPERM SEED

AFTER-RIPENING INITIATES GERMINATION

G

SEED GERMINATION

GERMINATION

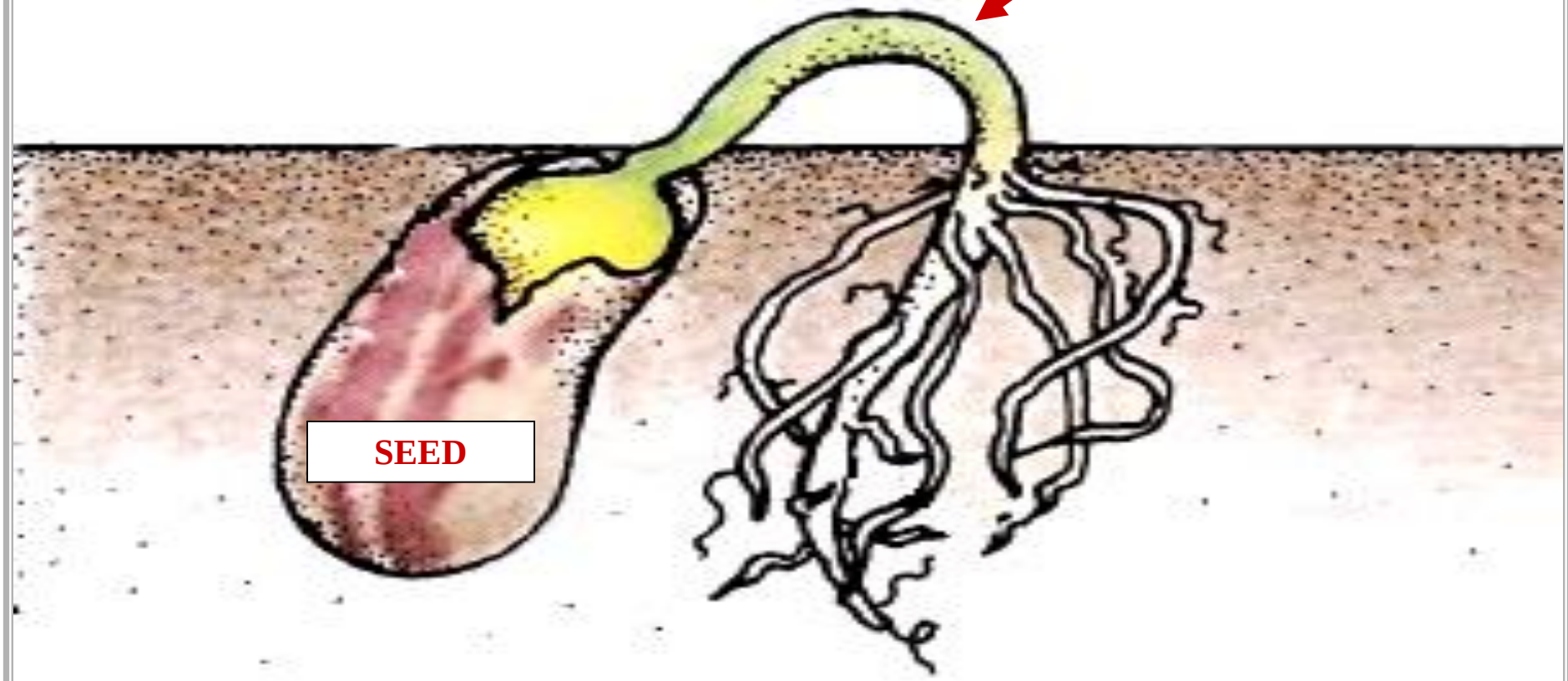
SEED GERMINATION

EMBRYO EMERGENCE FROM SEED

SEED GERMINATION

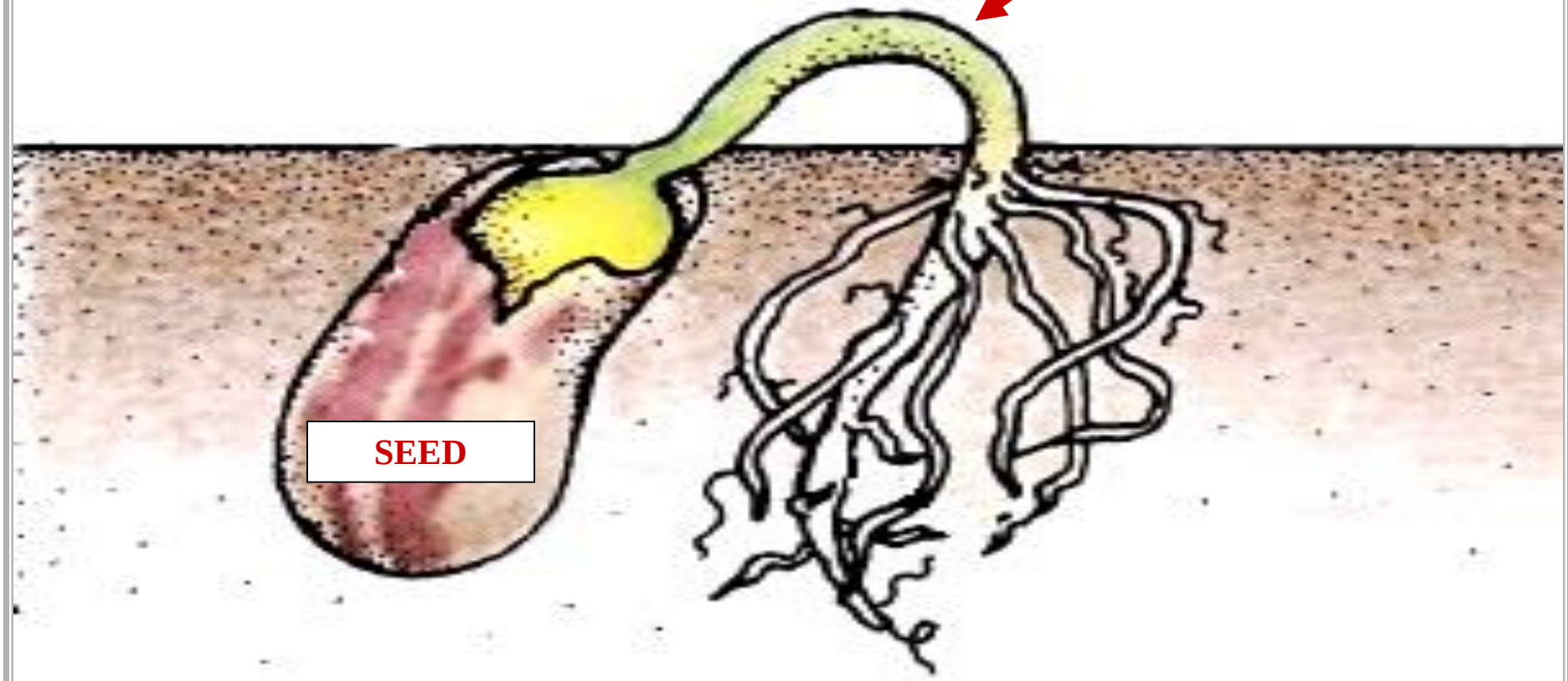
SEED GERMINATION

R

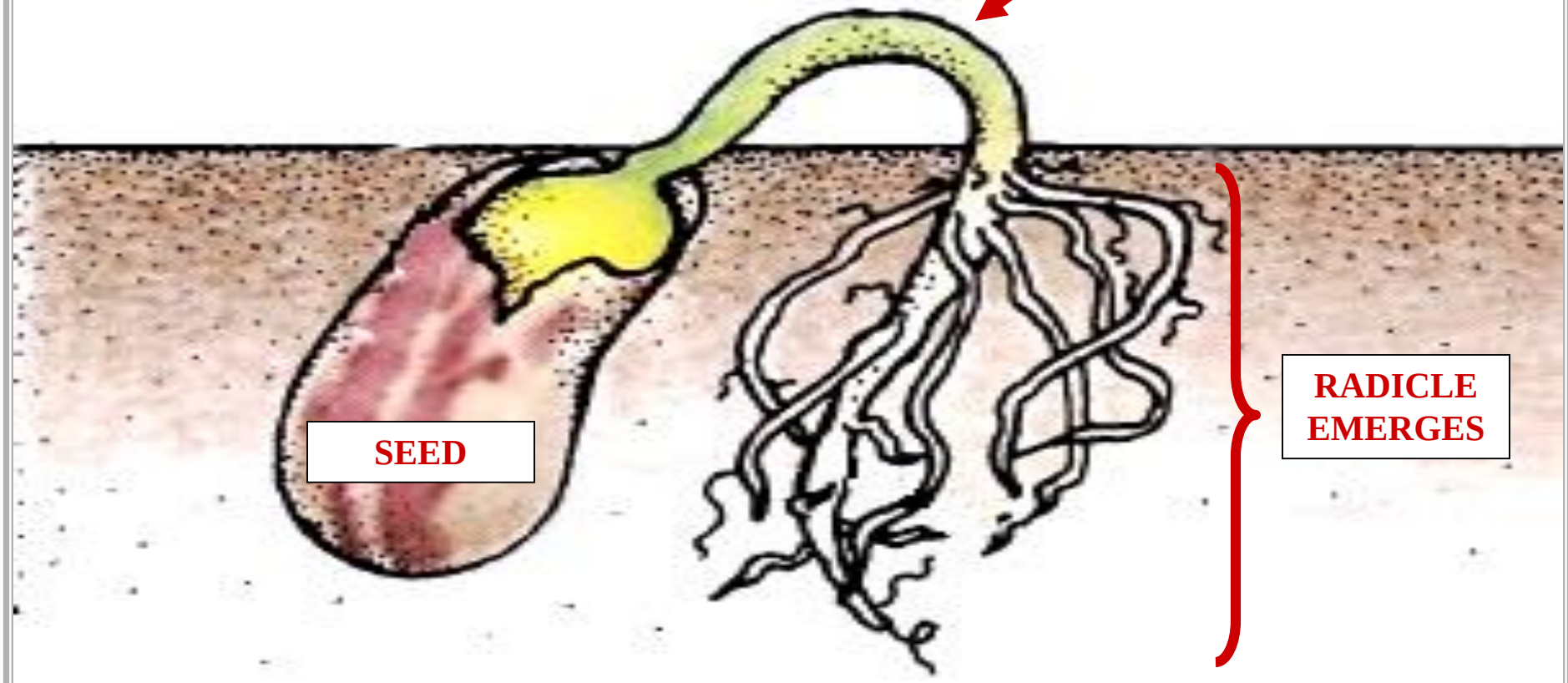


SEED GERMINATION

R

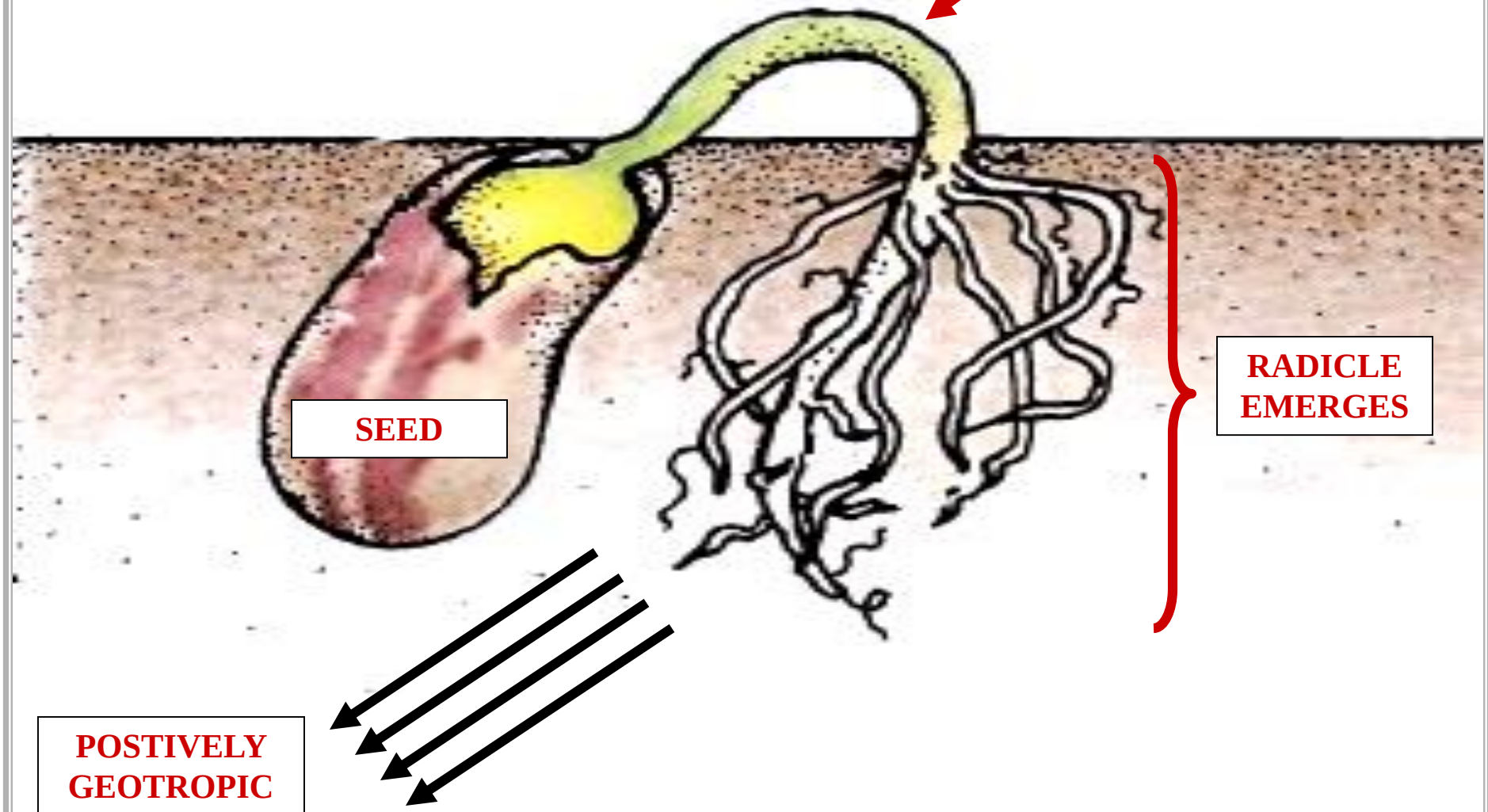


SEED GERMINATION



SEED GERMINATION

G



SEED GERMINATION

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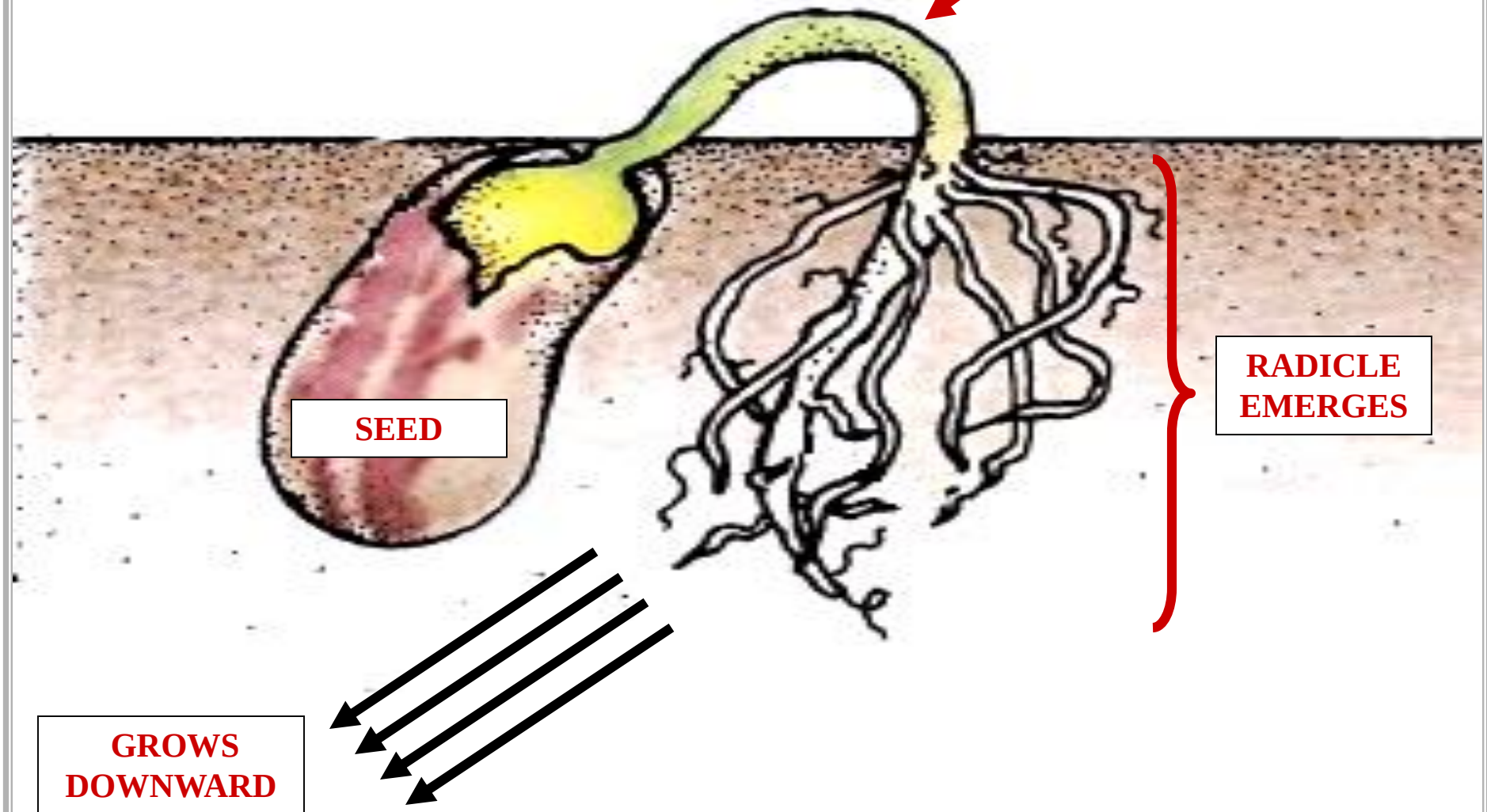
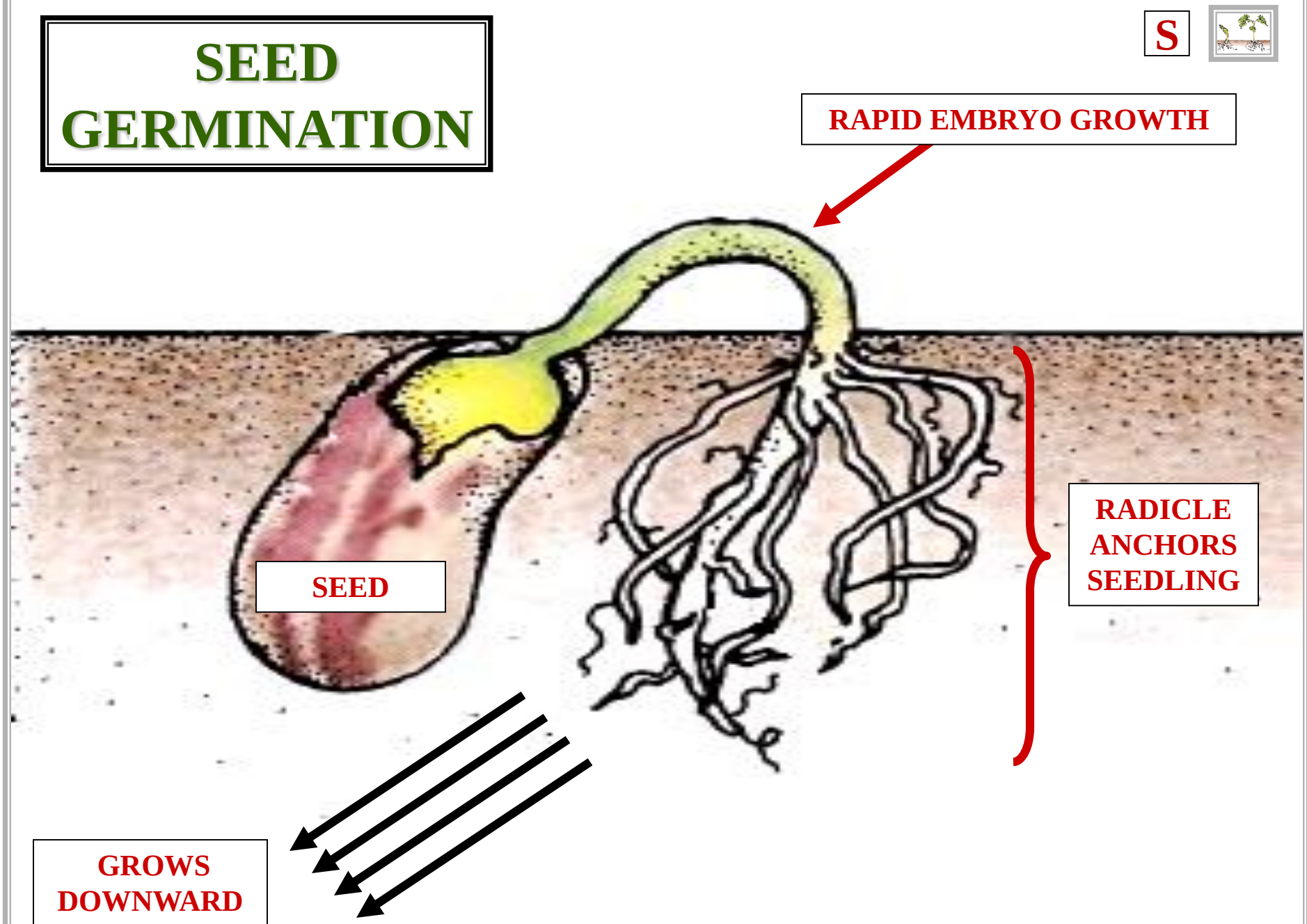


SEED GERMINATION

S



SEED GERMINATION