CHEMOTAXONOMY

&

MOLECULAR TAXONOMY

C

CHEMOTAXONOMY

CHEMOTAXONOMY

CHEMOTAXONOMY

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UTILIZES MICRO-COMPOUND CHARACTERS

CHEMOTAXONOMY

C

MICRO-COMPOUNDS

MICRO-COMPOUNDS

MICRO-COMPOUNDS

SMALL MOLECULAR BIO-CHEM-CMPS

MICRO-COMPOUNDS

MICRO-COMPOUNDS

SMALL MOLECULAR
BIO-CHEM-CMPS
EG FLAVONOIDS

MICRO-COMPOUNDS

MICRO-COMPOUNDS

SMALL MOLECULAR
BIO-CHEM-CMPS
EG FLAVONOIDS
VERY DIVERSE COMPOUNDS

MICRO-COMPOUNDS

MICRO-COMPOUNDS

EG
F

SMALL MOLECULAR
BIO-CHEM-CMPS
EG FLAVONOIDS
VERY DIVERSE COMPOUNDS
KNOWN ALL TRACHEOPHYTES

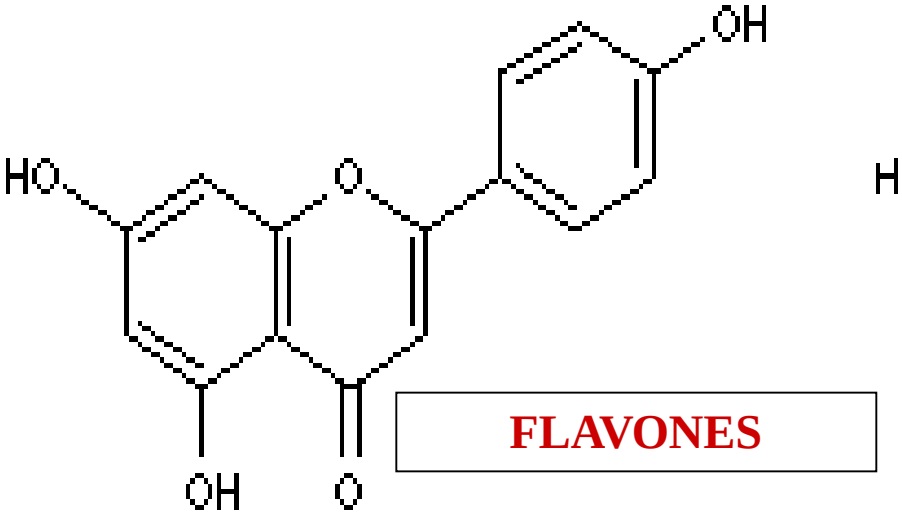
MICRO-COMPOUNDS

EXAMPLE MICRO-COMPOUNDS

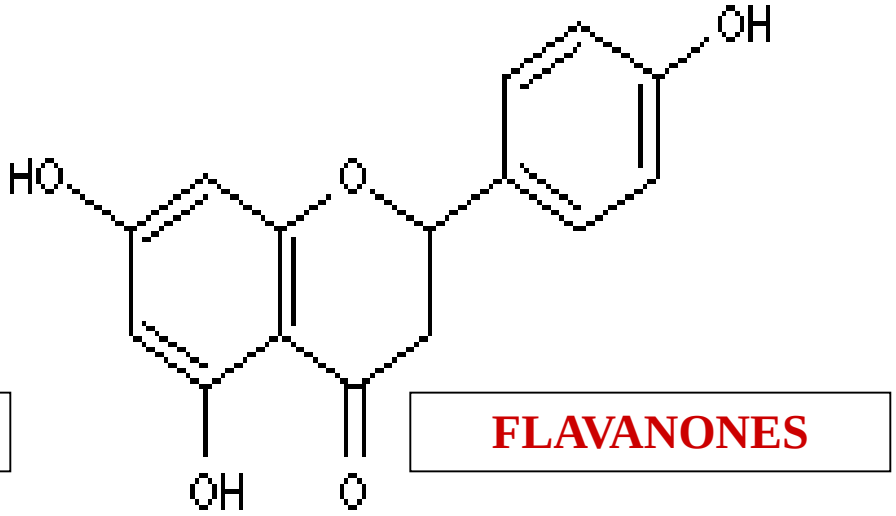
FLAVONOID CLASSES

FLAVONOID CLASSES

VERY DIVERSE COMPOUNDS



FLAVONES



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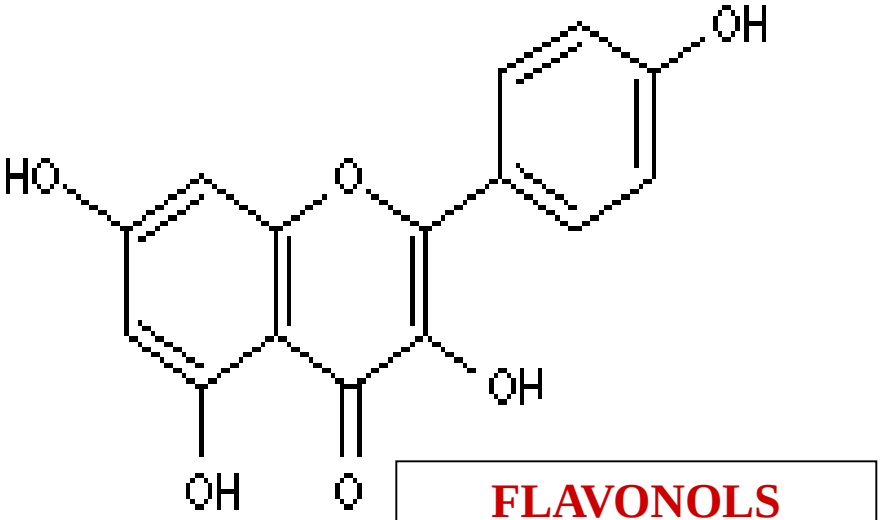

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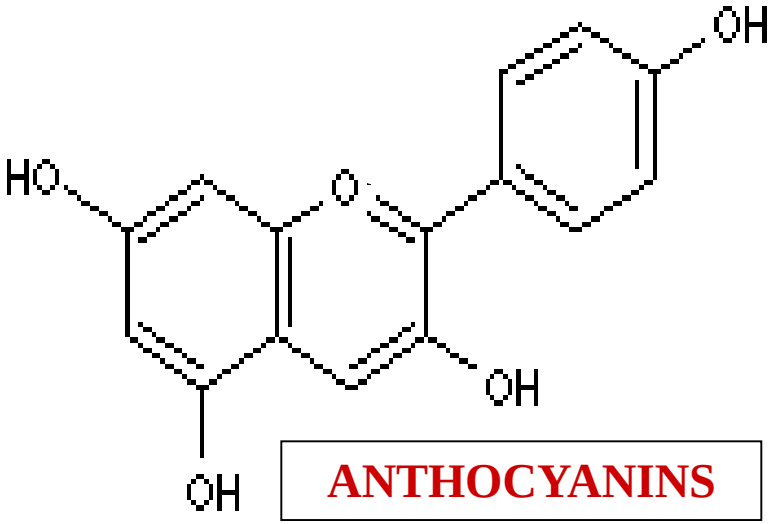
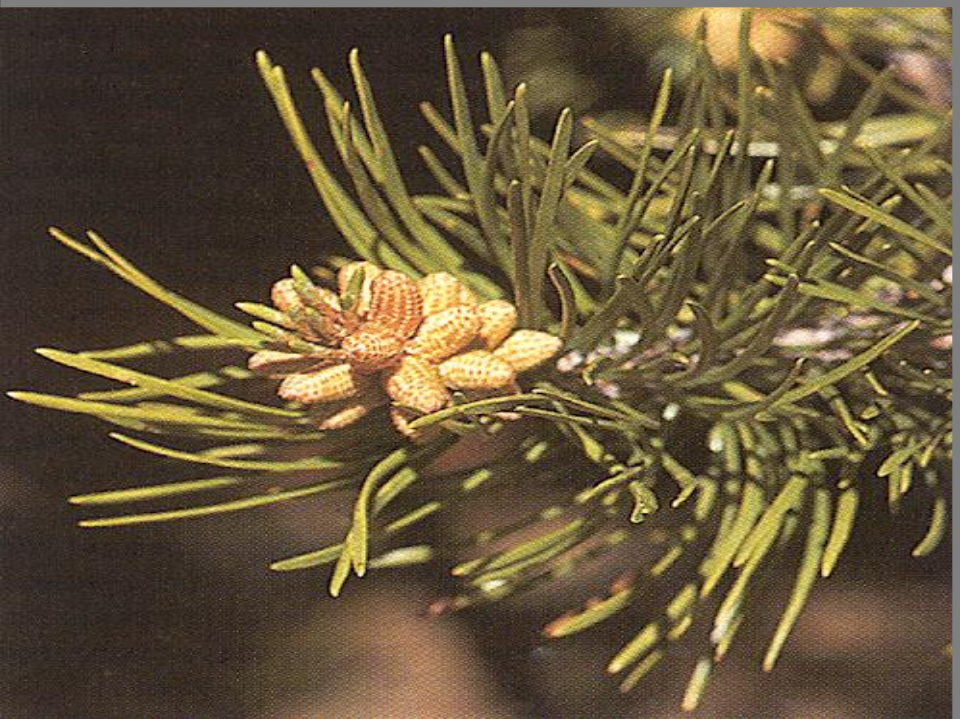
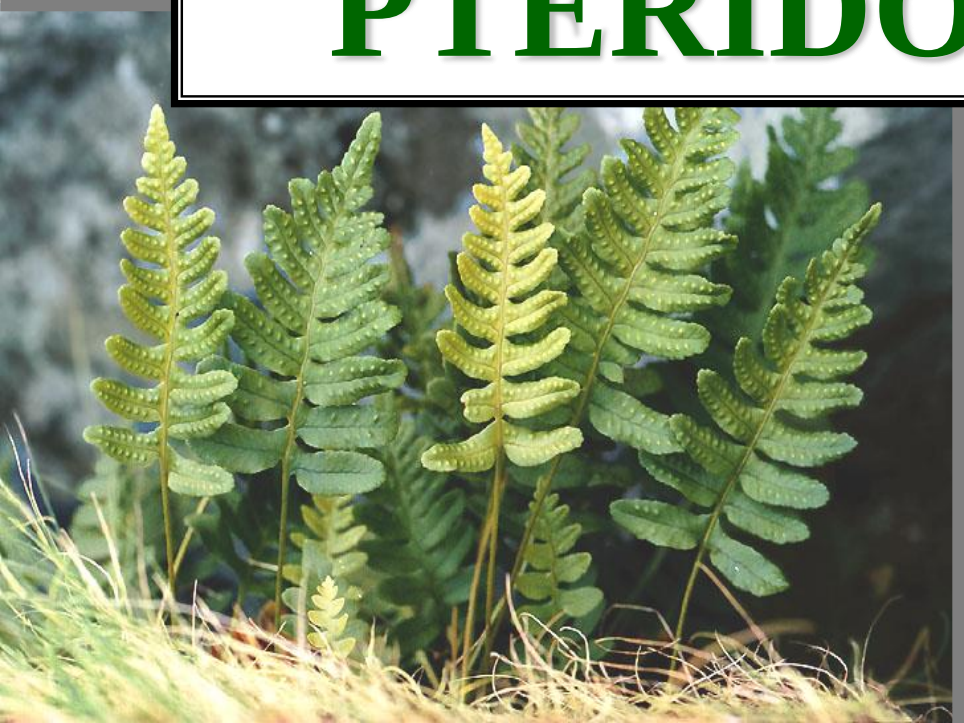


ANTHOCYANINS

FLAVONOIDS KNOWN TO ALL TRACHEOPHYTES



PTERIDOPHYTES



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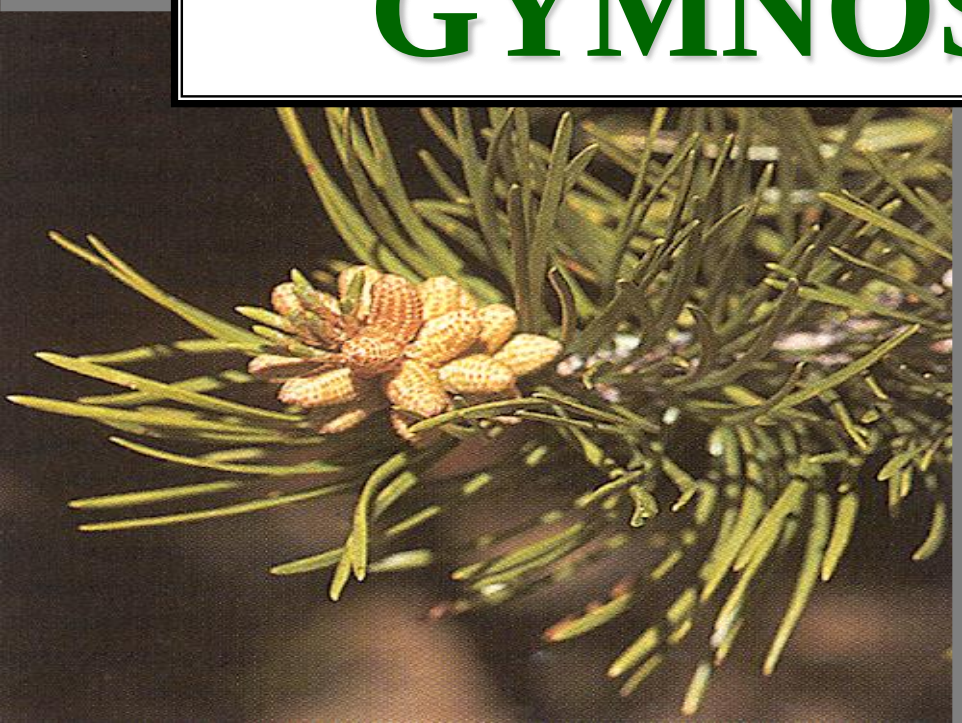
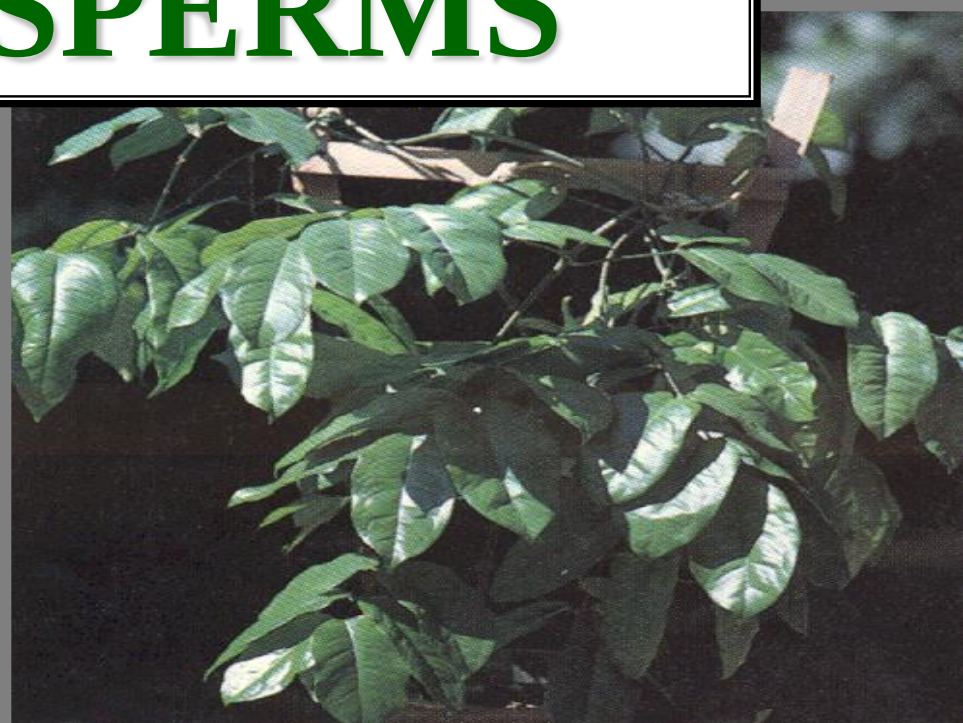
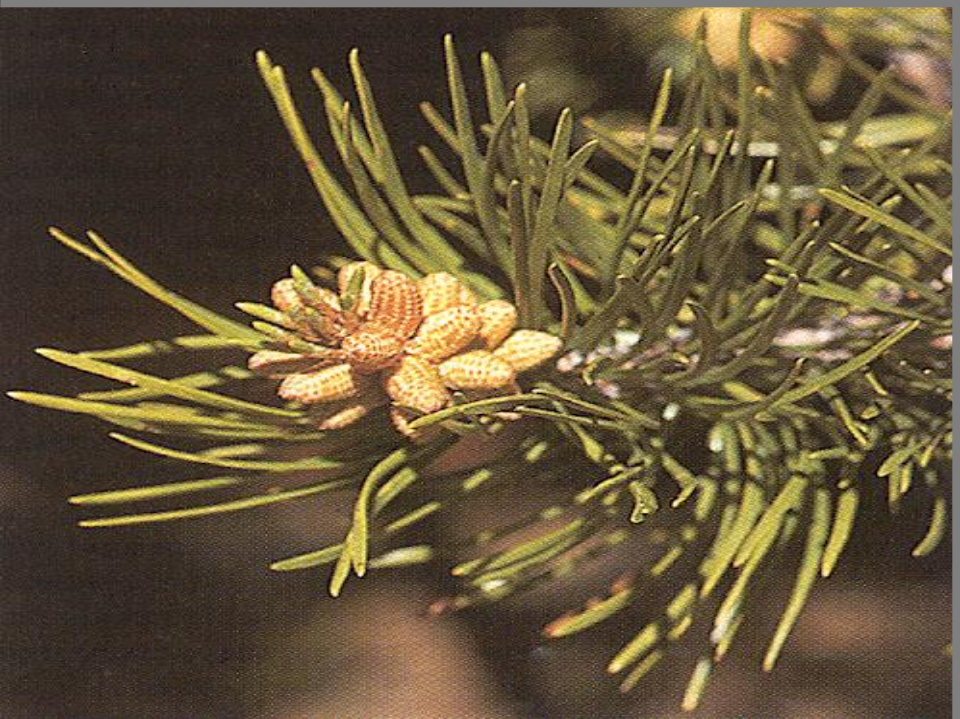




ANGIOSPERMS

FLAVONOIDS KNOWN TO ALL TRACHEOPHYTES

USEFUL FOR CHEMOTAXONOMY



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CHEMOTAXONOMY METHOD TOOLS

CHROMATOGRAPHY

CHROMATOGRAPHY

MICRO-COMPOUND ISOLATION & IDENTIFICATION

CHROMATOGRAPHY

CHROMATOGRAPHY

EXAMPLE PAPER CHROMATOGRAPHY

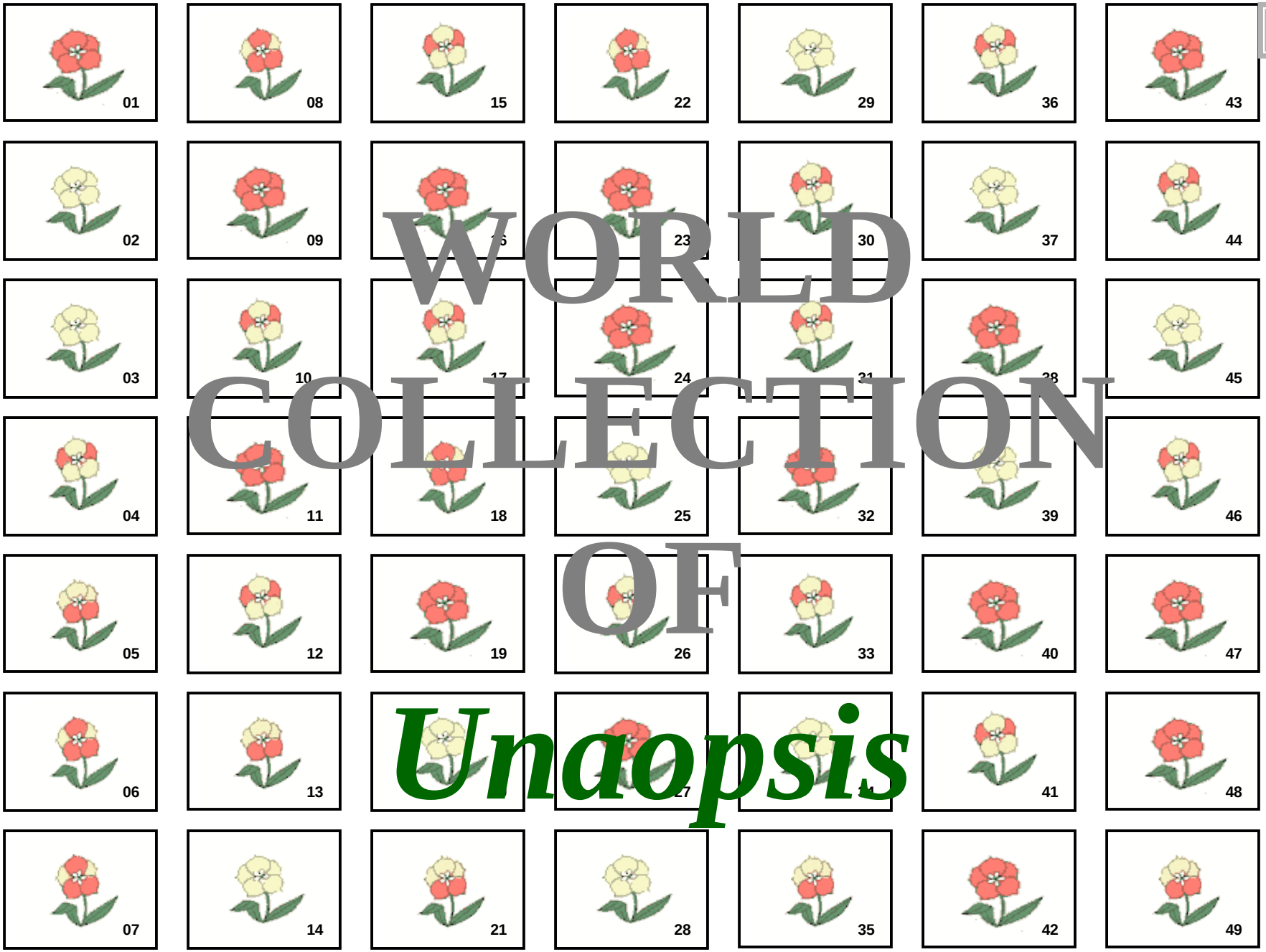
CHROMATOGRAPHY

CHROMATOGRAPHY

EXAMPLE
HPLC
CHROMATOGRAPHY

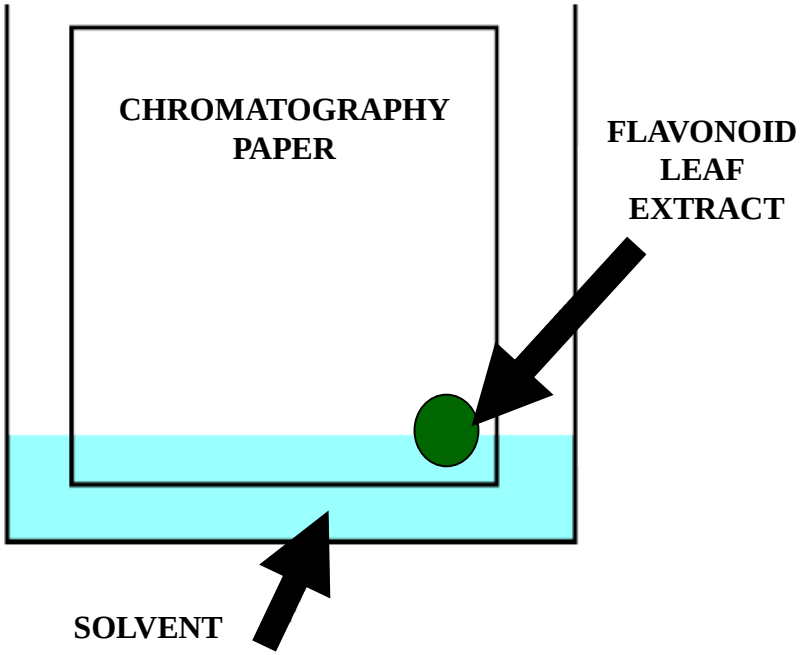
CHROMATOGRAPHY

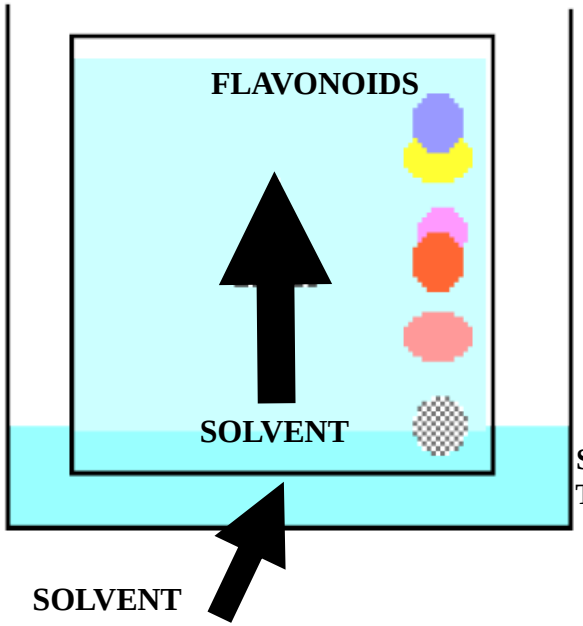
PAPER CHROMATOGRAPHY


01 08 15 22 29 36 43
02 09 16 23 30 37 44
03 10 17 24 31 38 45
04 11 18 25 32 39 46
05 12 19 26 33 40 47
06 13 27 41 48
07 14 21 28 35 42 49
WORLD
COLLECTION
OF
Unaopsis

LEAF EXTRACT

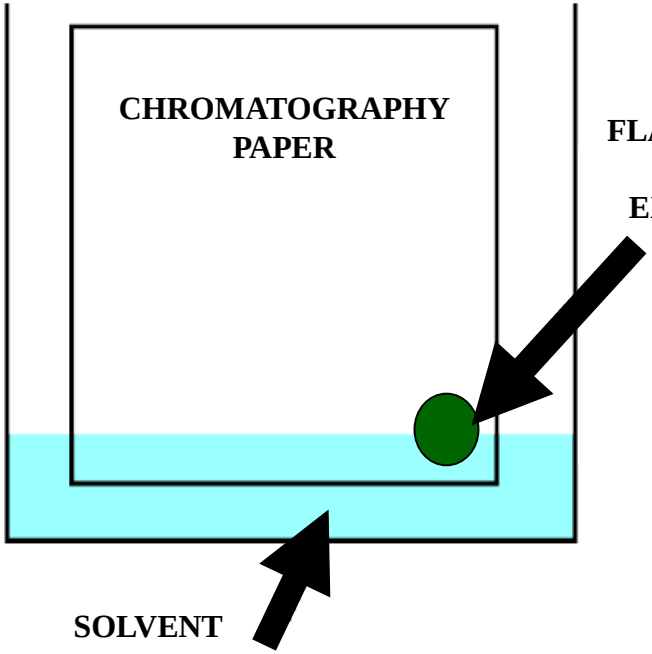
LEAF EXTRACT





HOURS LATER FLAVONOIDS SEPARATED

SOLVENT PASSES THROUGH PAPER

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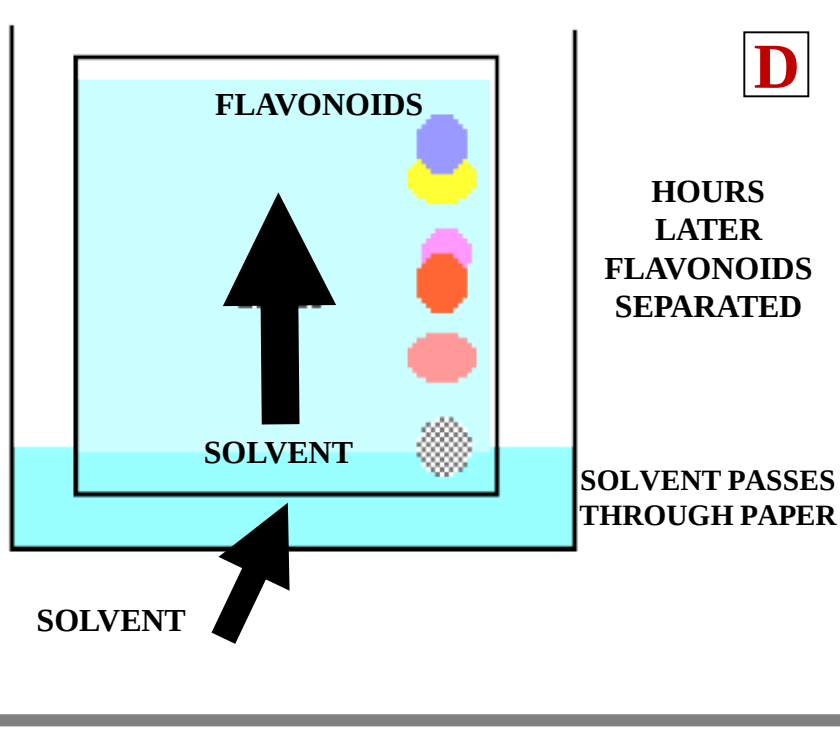
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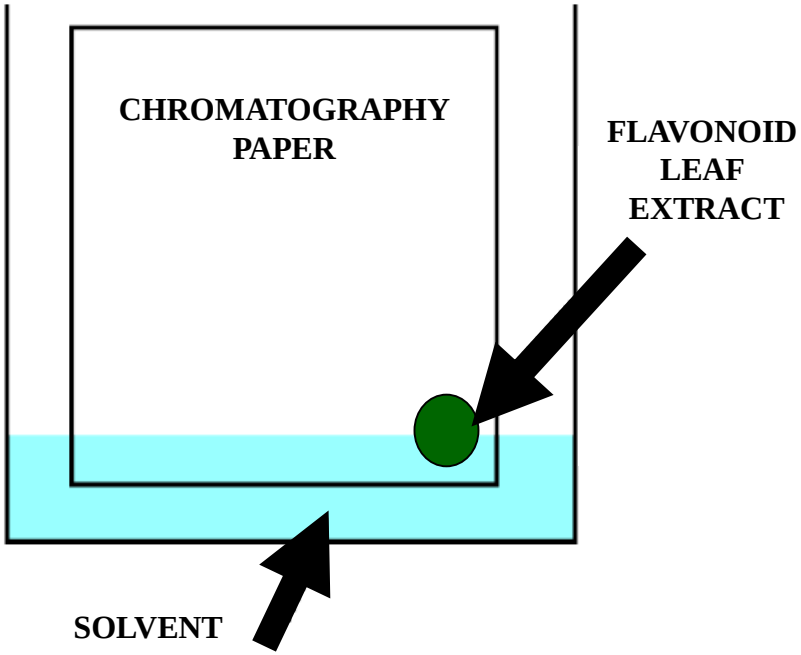
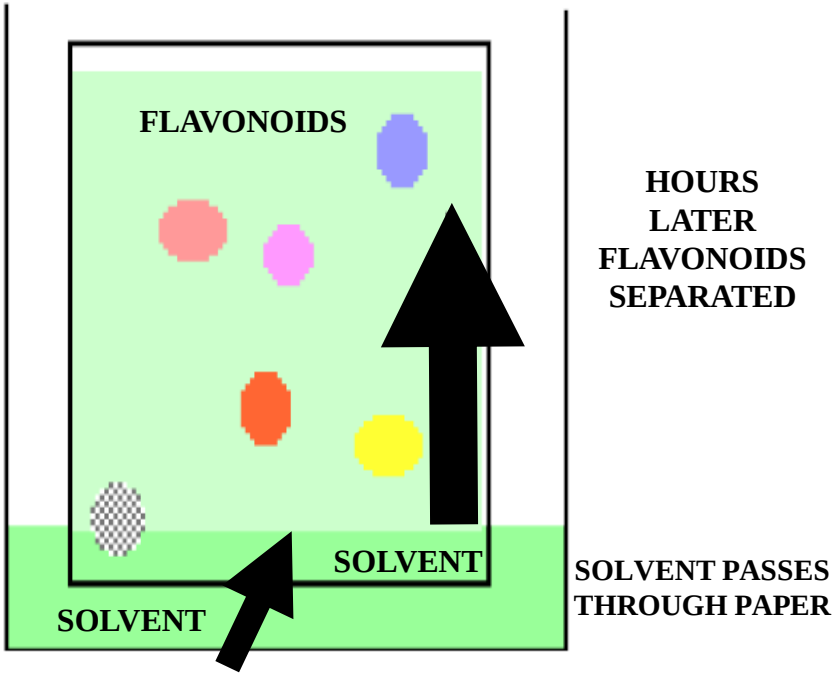
FLAVONOIDS
SOLVENT
SOLVENT
HOURS
LATER
FLAVONOIDS
SEPARATED
SOLVENT PASSES
THROUGH PAPER


CHROMATOGRAPHY
PAPER
FLAVONOID
LEAF
EXTRACT
SOLVENT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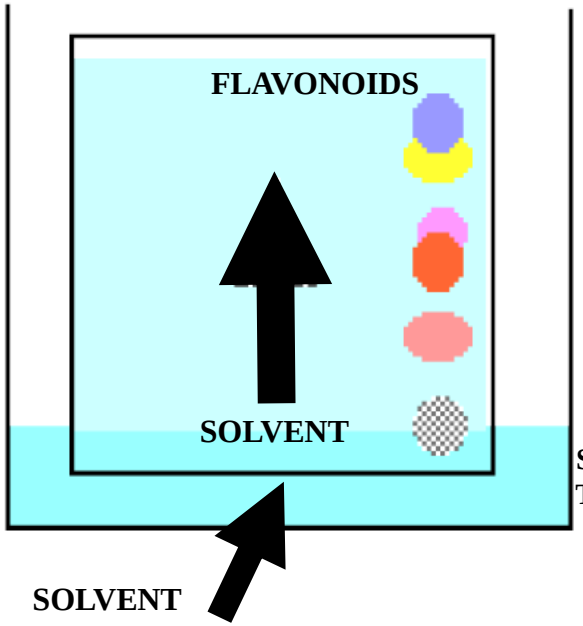
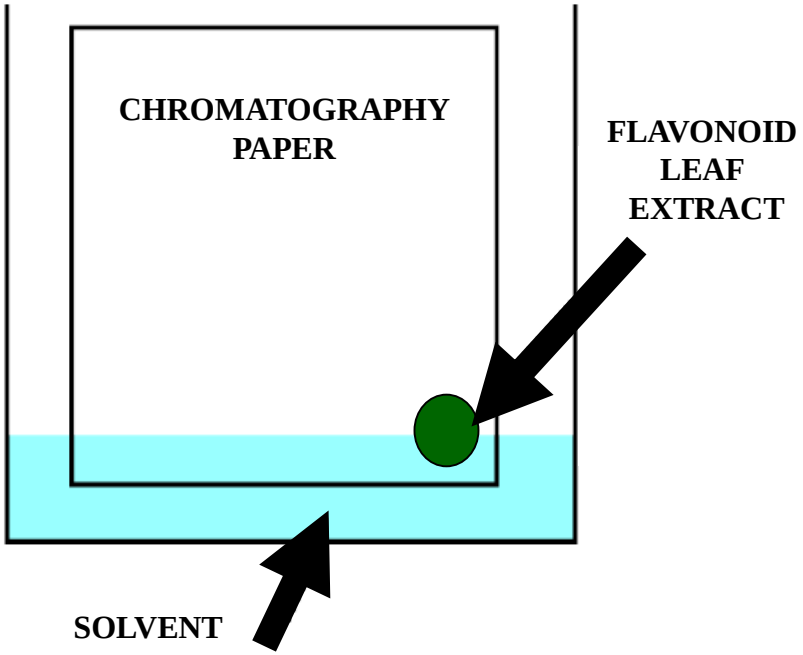
SOLVENT
SOLVENT
HOURS
LATER
FLAVONOIDS
SEPARATED
SOLVENT PASSES
THROUGH PAPER

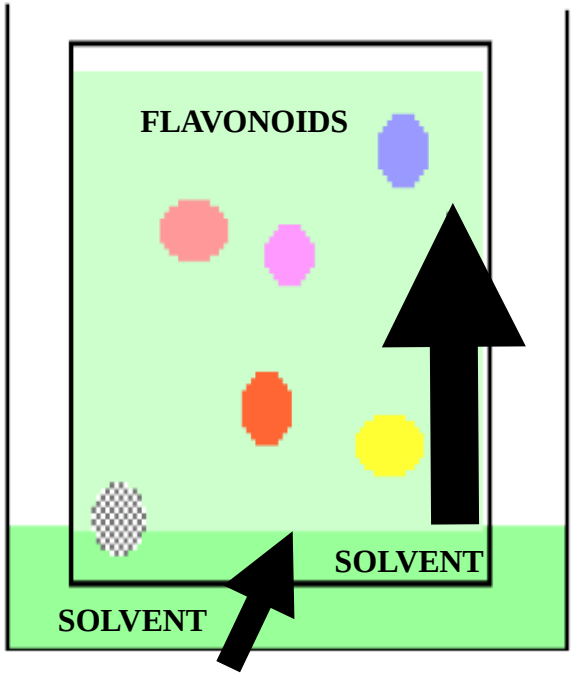
D



HOURS LATER FLAVONOIDS SEPARATED

SOLVENT PASSES THROUGH PAPER





DIFFERENT SPECIES

HOURS LATER FLAVONOIDS SEPARATED

SOLVENT PASSES THROUGH PAPER

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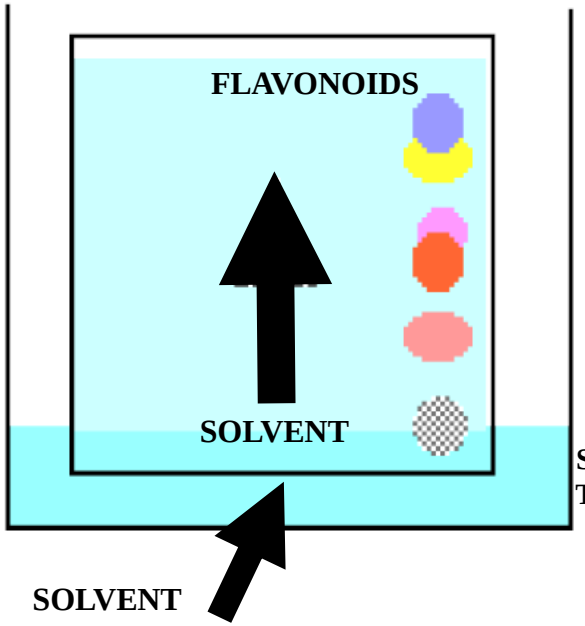
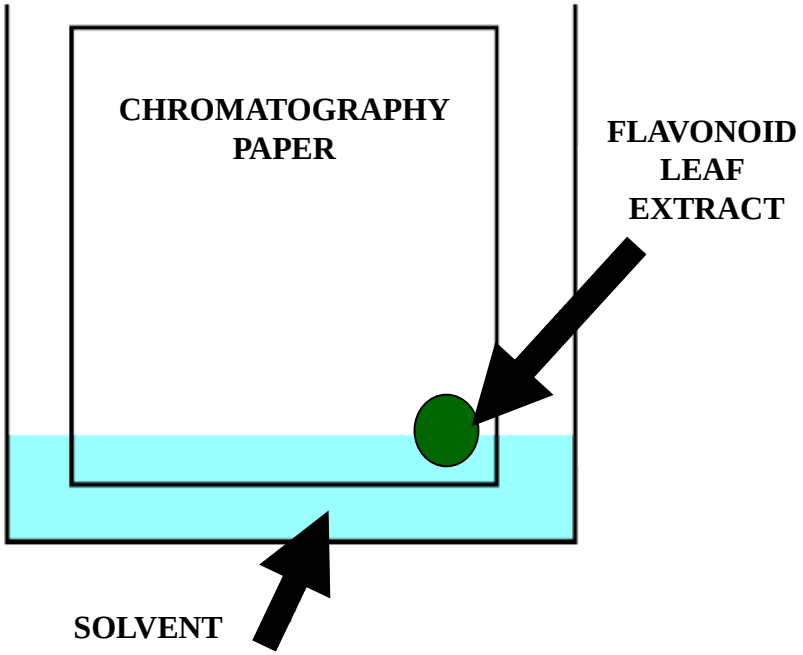
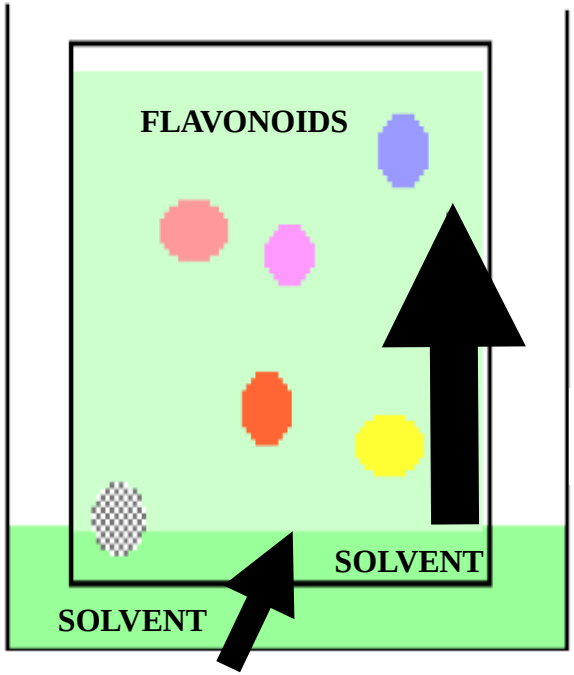


HOURS LATER FLAVONOIDS SEPARATED

SOLVENT PASSES THROUGH PAPER



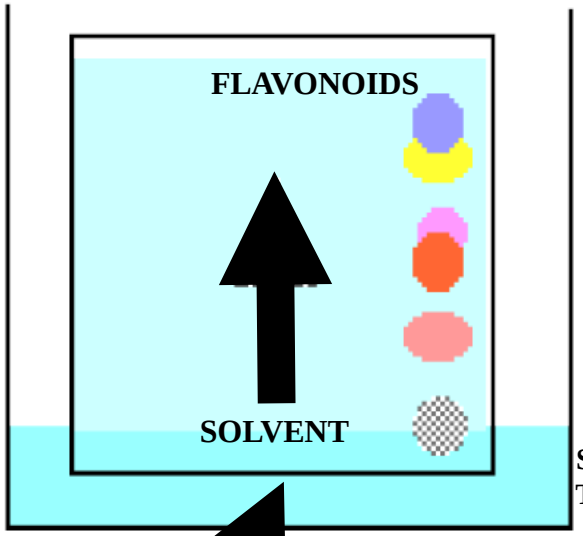


DIFFERENT SPECIES

HOURS LATER FLAVONOIDS SEPARATED

DIFFERENT FLAVONOIDS

SOLVENT PASSES THROUGH PAPER



HOURS LATER FLAVONOIDS SEPARATED

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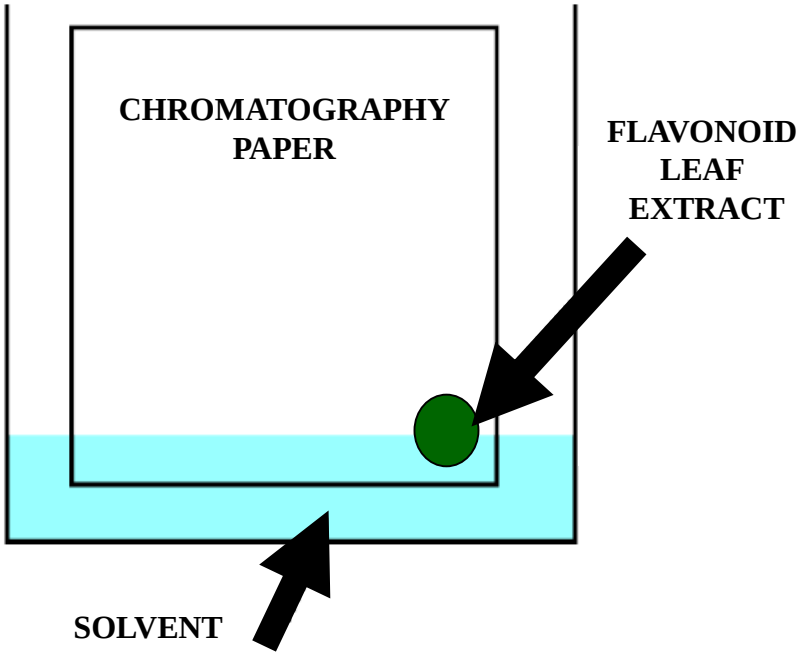
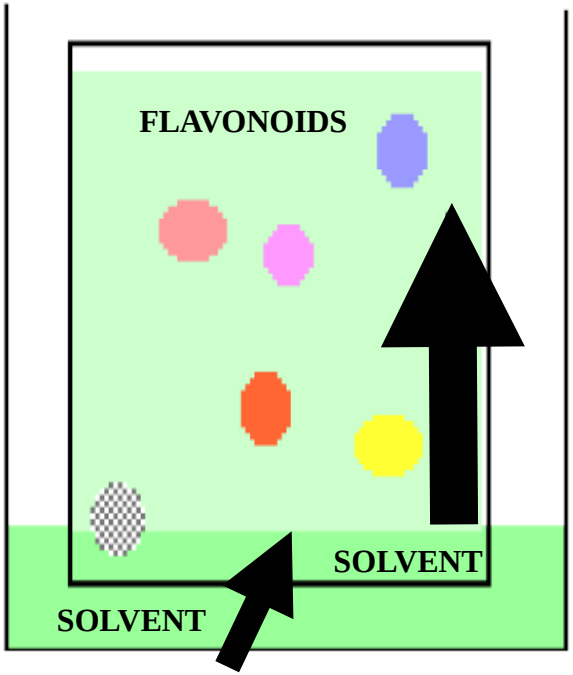


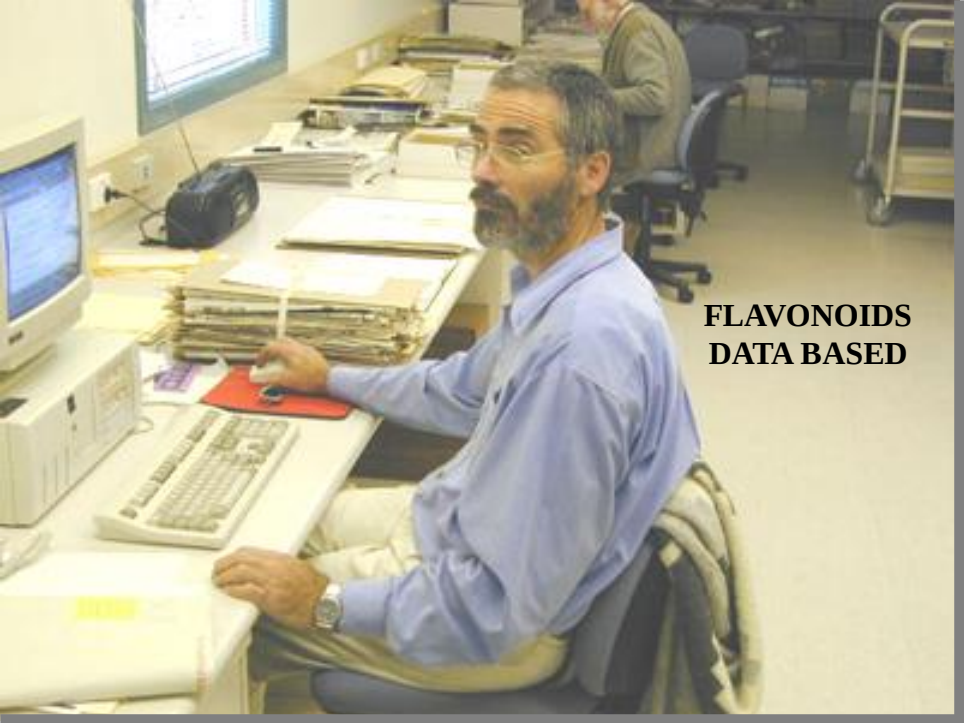


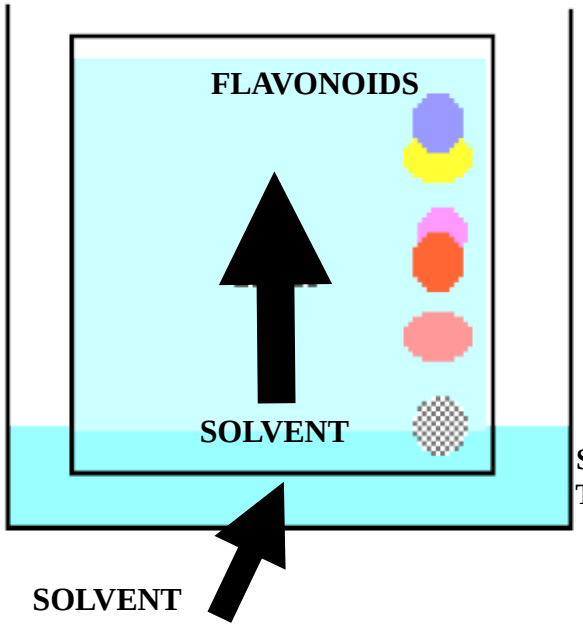
DIFFERENT SPECIES

HOURS LATER FLAVONOIDS SEPARATED

DIFFERENT FLAVONOIDS ID VIA PAPER POSITION

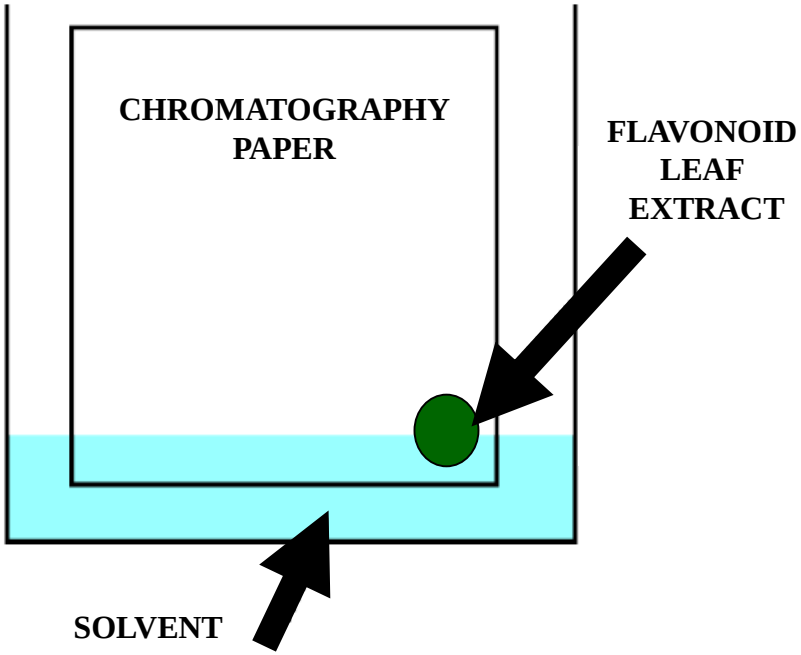
SOLVENT PASSES THROUGH PAPER

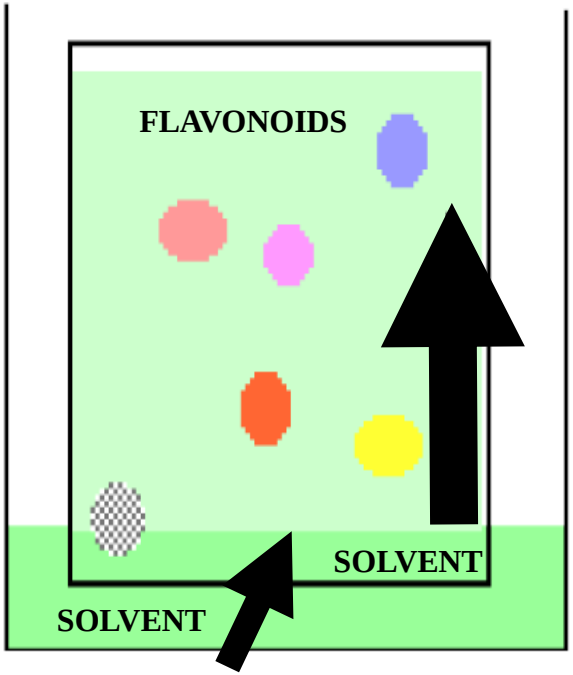




HOURS
LATER
FLAVONOIDS
SEPARATED

SOLVENT PASSES
THROUGH PAPER





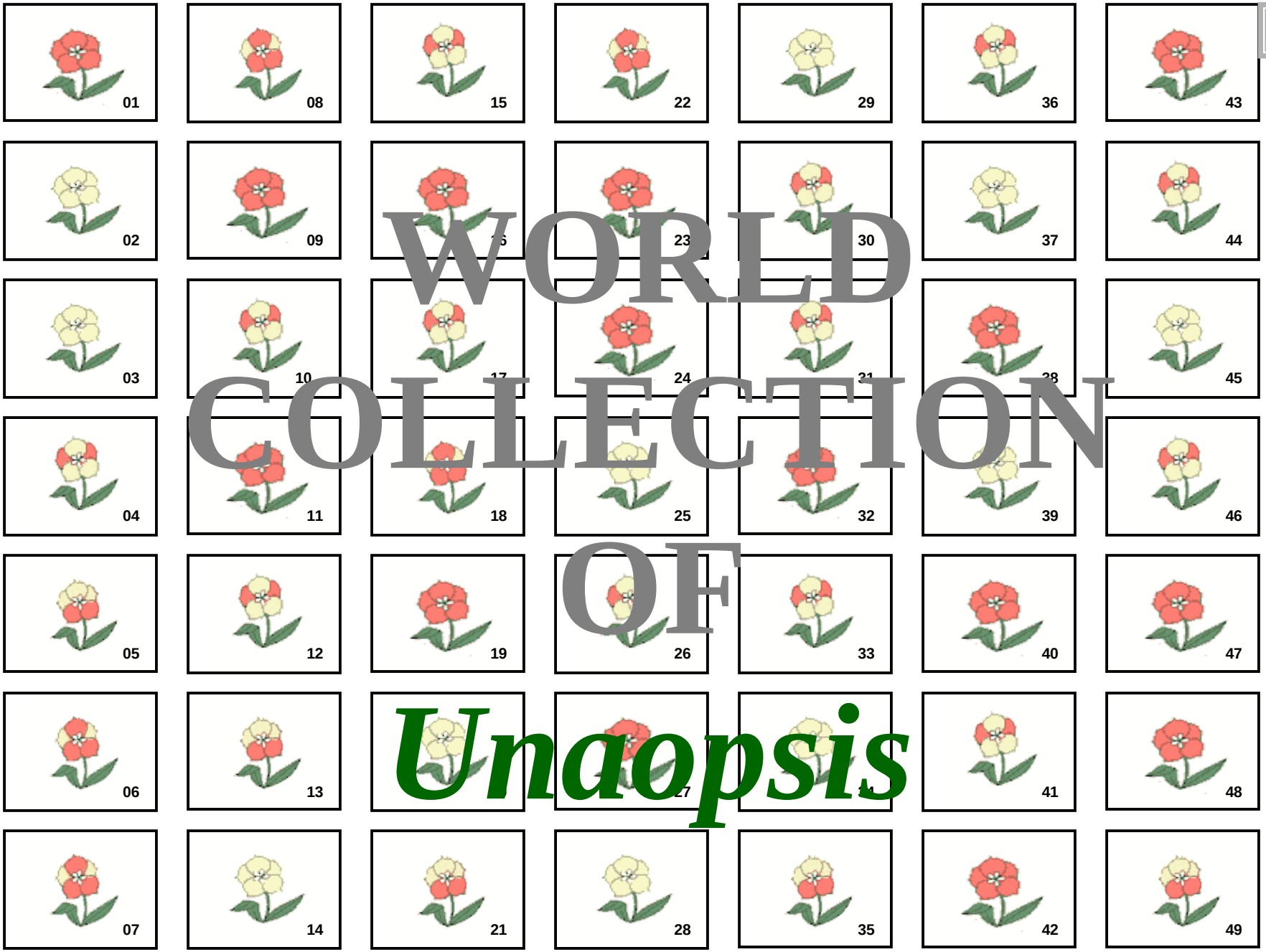
DIFFERENT
SPECIES

HOURS
LATER
FLAVONOIDS
SEPARATED

DIFFERENT
FLAVONOIDS
ID VIA
PAPER
POSITION

SOLVENT PASSES
THROUGH PAPER

HIGH PRESSURE LIQUID CHROMATOGRAPHY HPLC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WORLD
COLLECTION
OF
Unaopsis

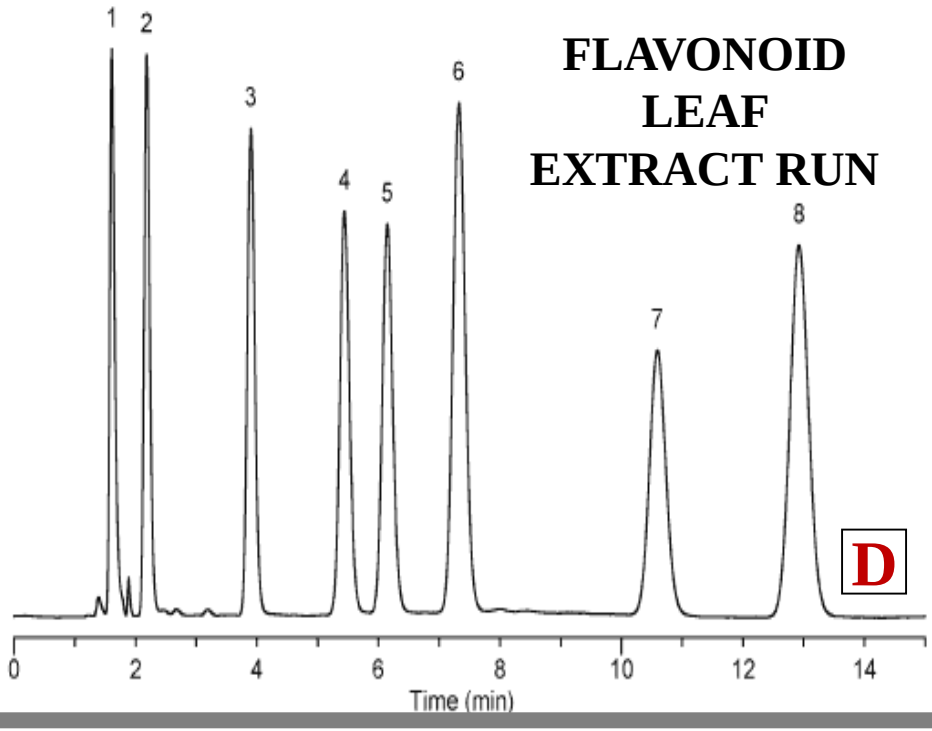
LEAF EXTRACT

LEAF EXTRACT

HPLC MACHINE

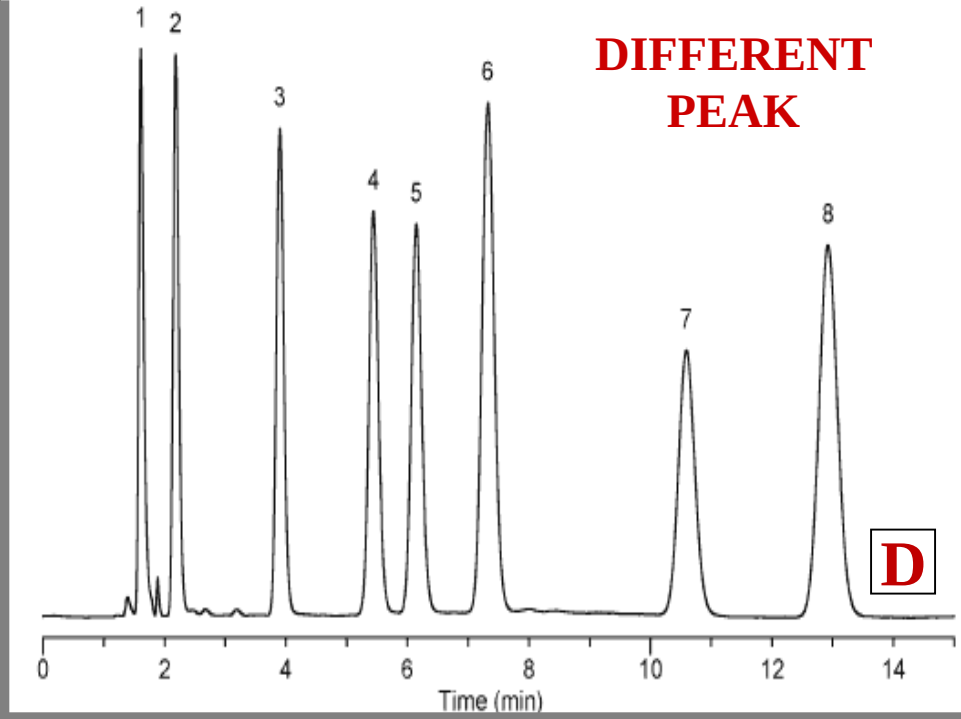
LEAF EXTRACT

FLAVONOID LEAF EXTRACT RUN



HPLC MACHINE

LEAF EXTRACT



DIFFERENT PEAK

HPLC MACHINE

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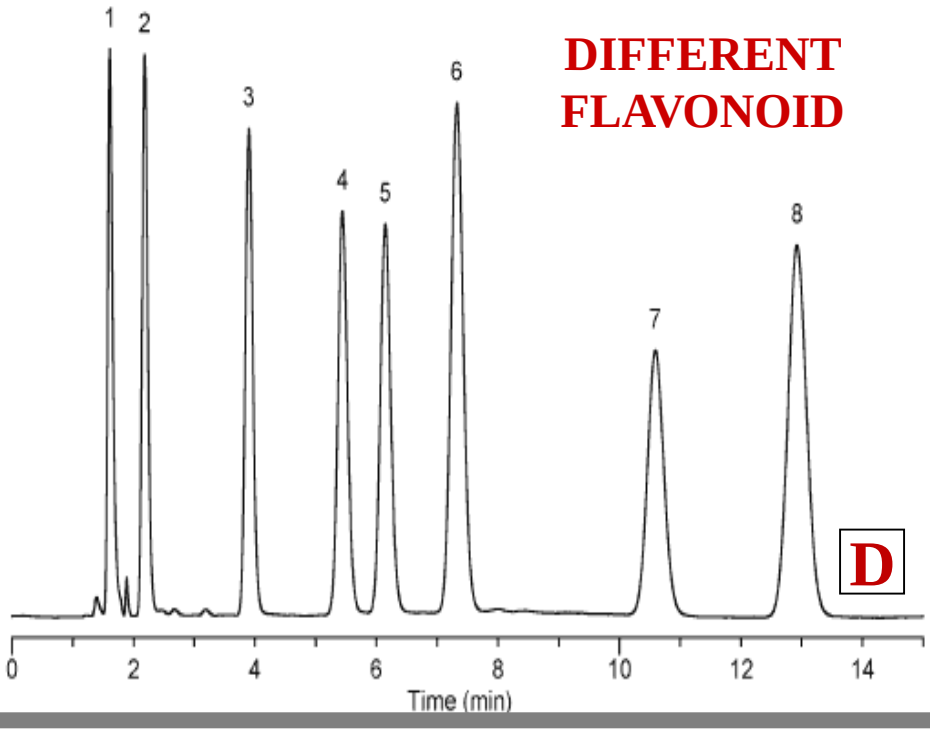
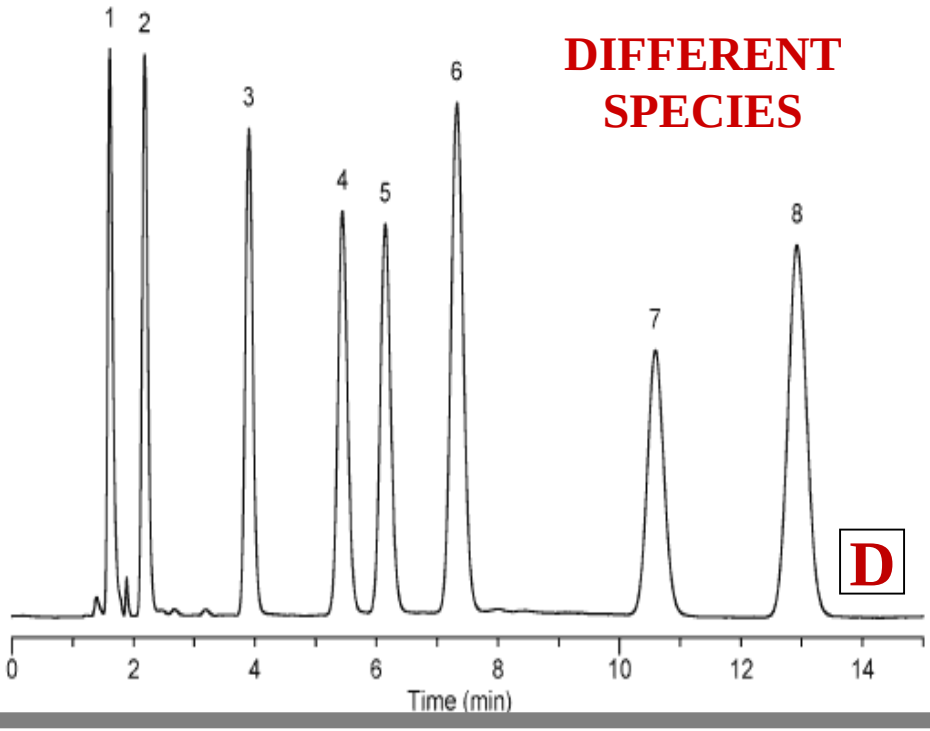
DIFFERENT FLAVONOID



HPLC MACHINE

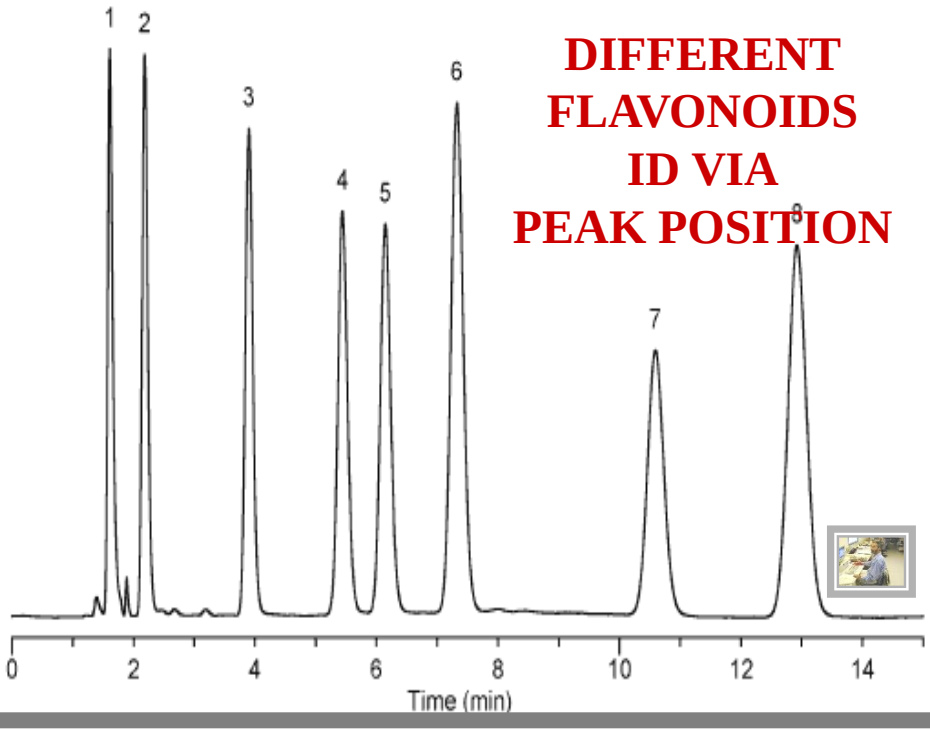
LEAF EXTRACT

DIFFERENT SPECIES



HPLC MACHINE

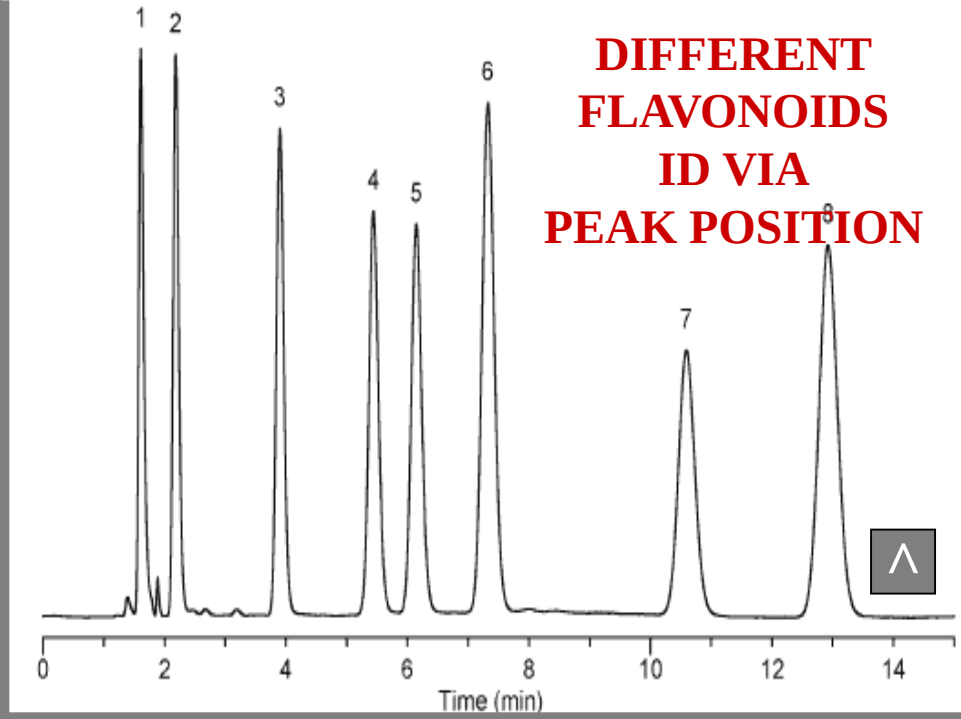
LEAF EXTRACT



DIFFERENT FLAVONOIDS ID VIA PEAK POSITION

HPLC MACHINE

LEAF EXTRACT



DIFFERENT FLAVONOIDS ID VIA PEAK POSITION

HPLC MACHINE

FLAVONOIDS DATA BASED

MOLECULAR TAXONOMY

MOLECULAR TAXONOMY

MOLECULAR TAXONOMY

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UTILIZES MACRO-COMPOUND CHARACTERS

MOLECULAR TAXONOMY

M

MACRO-COMPOUNDS

MACRO-COMPOUNDS

MACRO-COMPOUNDS

LARGE MOLECULAR BIO-CHEM-CMPS

MACRO-COMPOUNDS

MACRO-COMPOUNDS

LARGE MOLECULAR BIO-CHEM-CMPS EG NUCLEIC ACIDS

MACRO-COMPOUNDS

MACRO-COMPOUNDS

LARGE MOLECULAR
BIO-CHEM-CMPS
EG NUCLEIC ACIDS
DNA & RNA

MACRO-COMPOUNDS

MACRO-COMPOUNDS

EG
N

LARGE MOLECULAR
BIO-CHEM-CMPS
EG NUCLEIC ACIDS
DNA & RNA
KNOWN ALL TRACHEOPHYTES

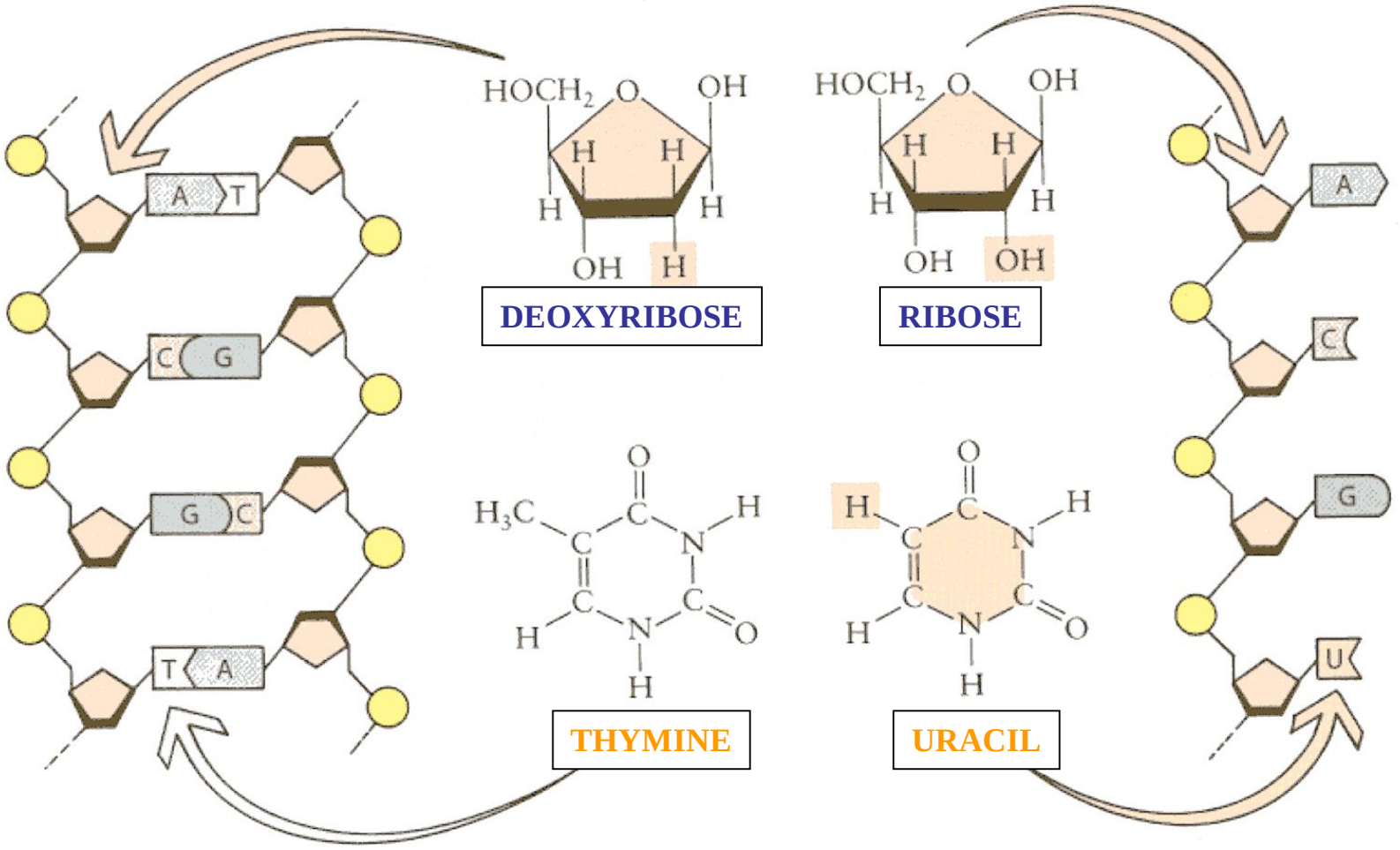
MACRO-COMPOUNDS

EXAMPLE
MACRO-COMPOUNDS
NUCLEIC ACIDS

NUCLEIC ACIDS

DNA

RNA



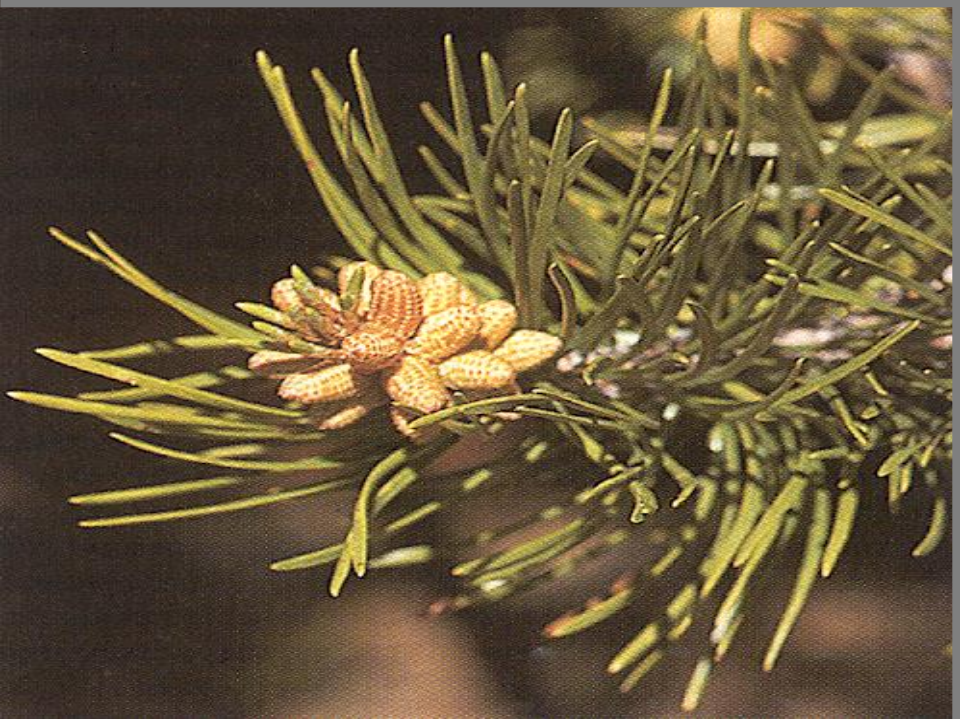
DEOXYRIBOSE

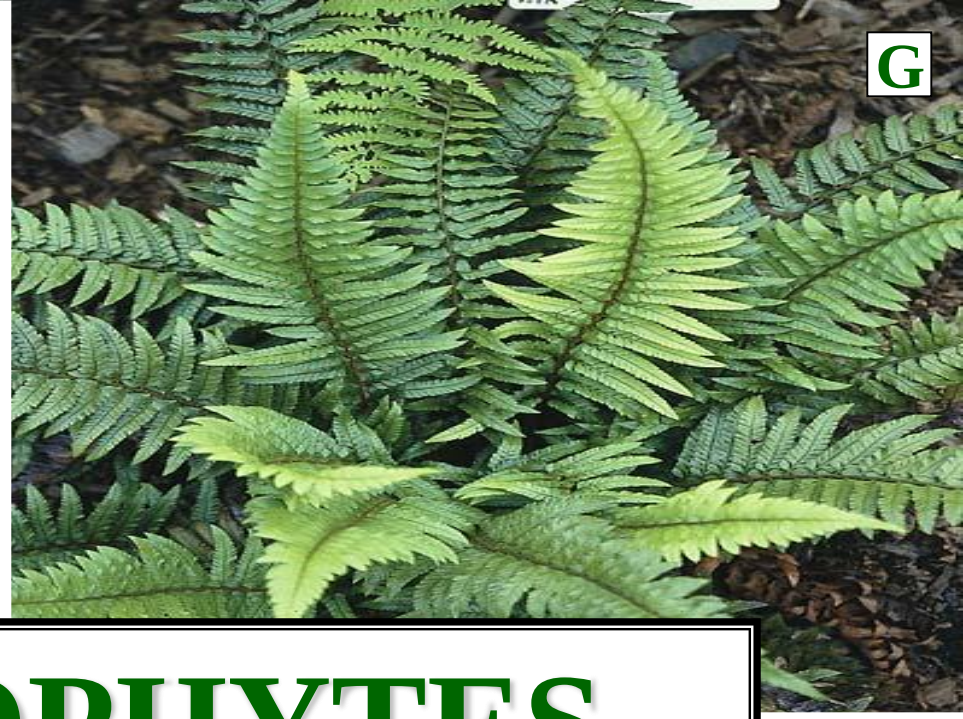
RIBOSE

THYMINE

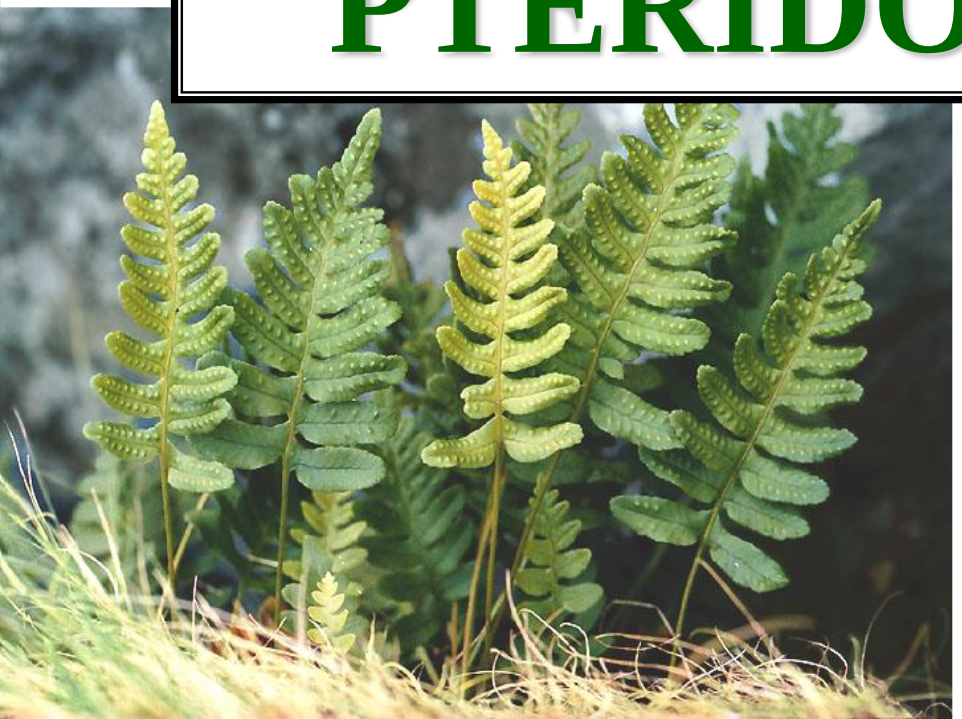
URACIL

NUCLEIC ACIDS KNOWN TO ALL TRACHEOPHYTES





PTERIDOPHYTES



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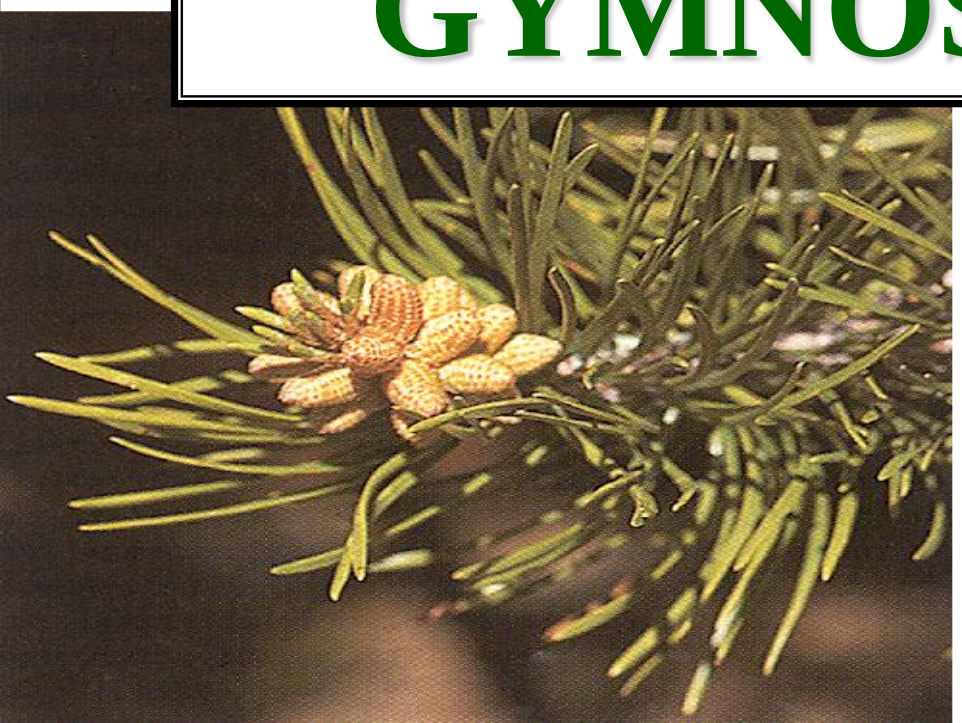
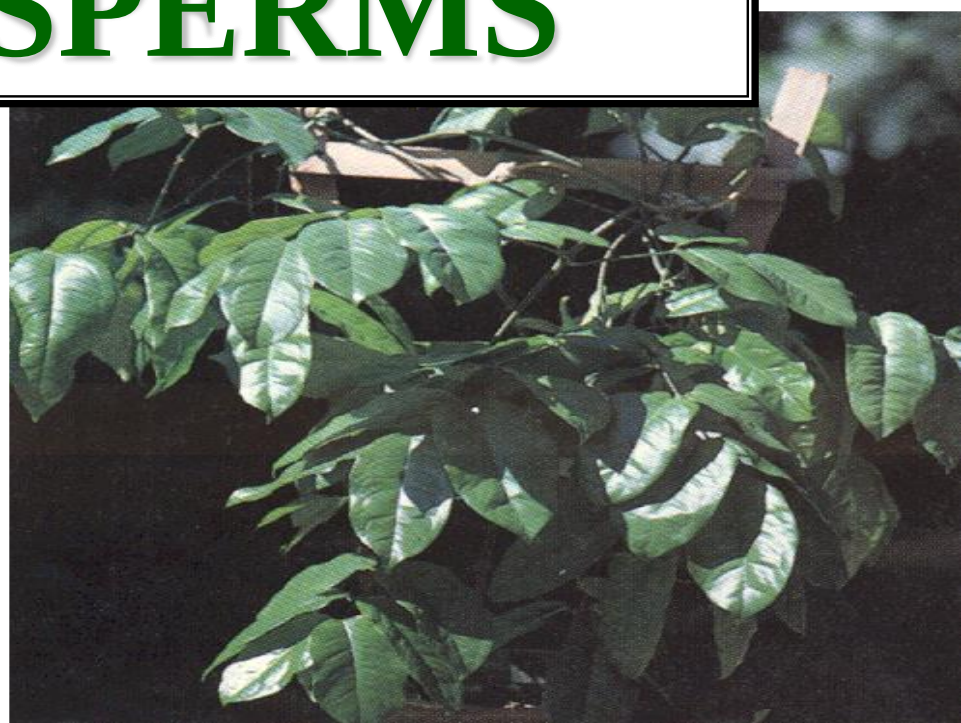
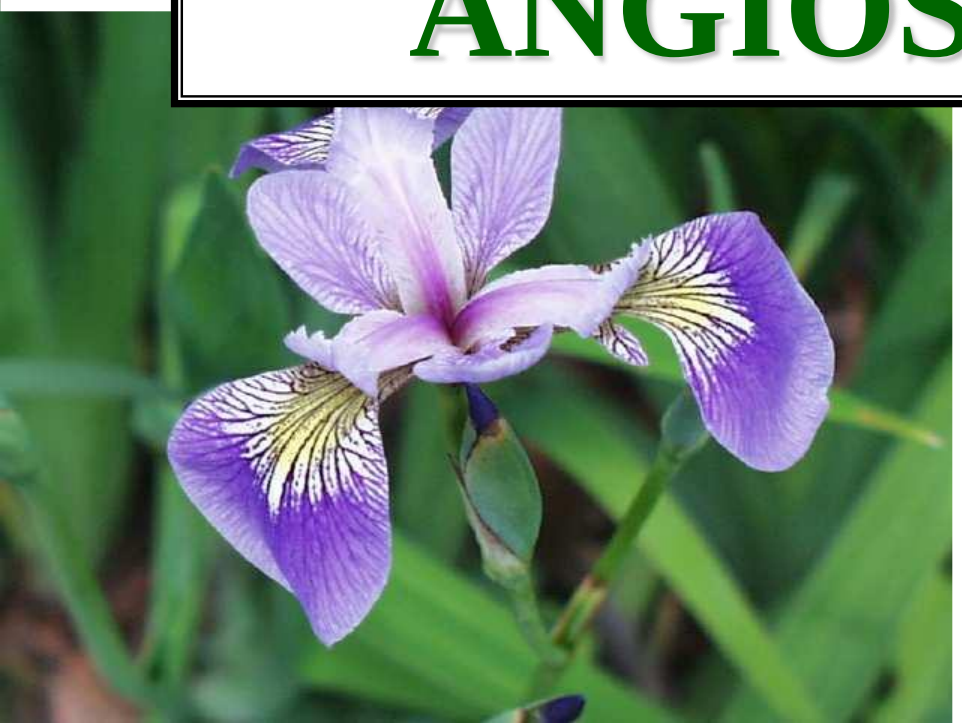


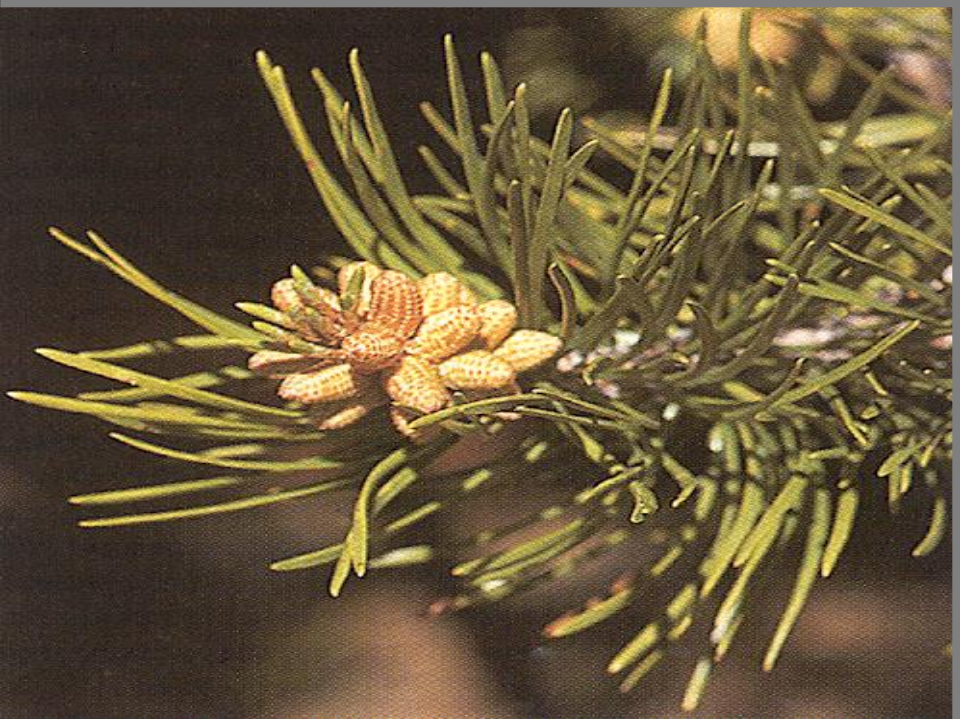


ANGIOSPERMS



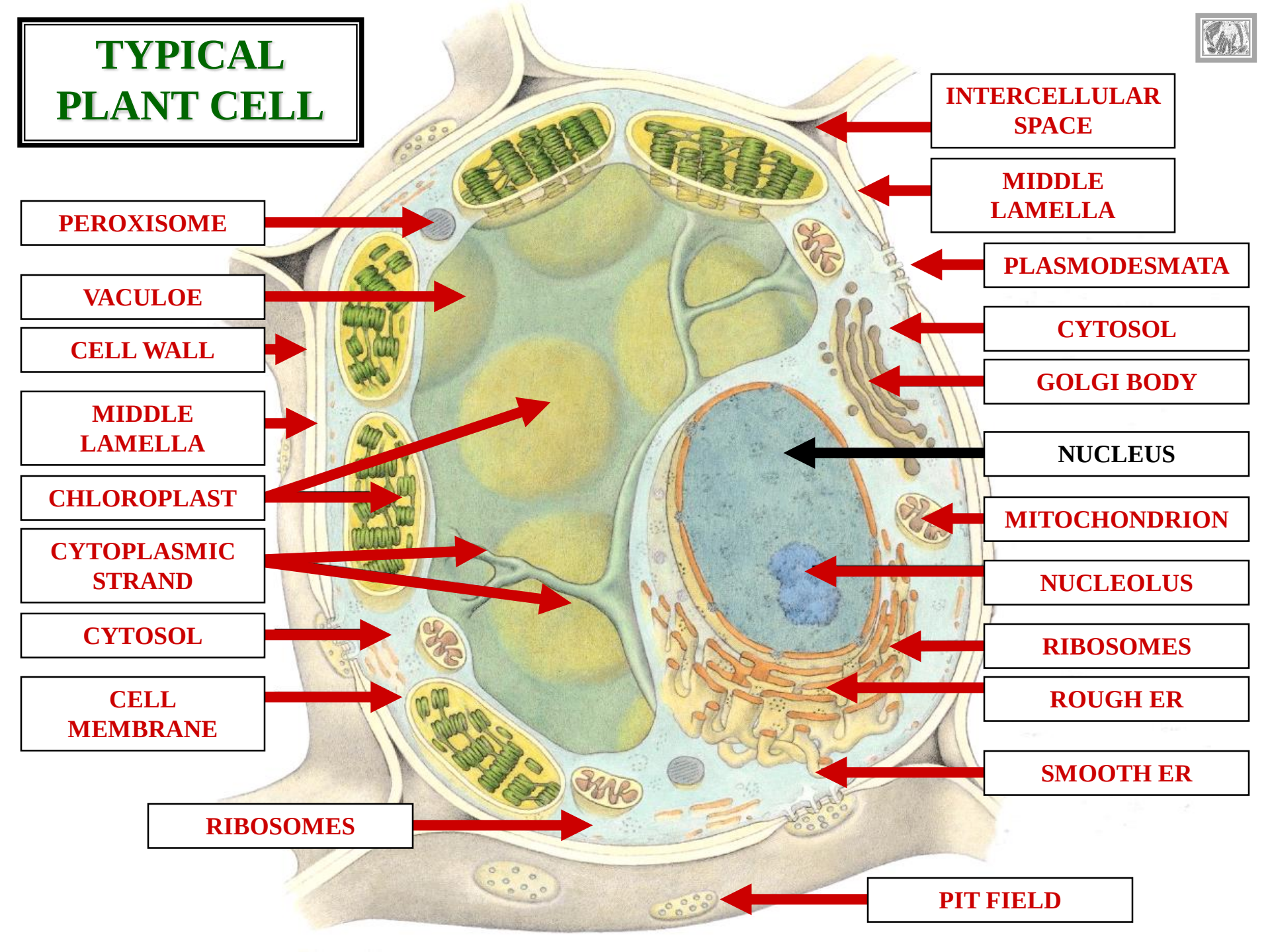
NUCLEIC ACIDS KNOWN TO ALL TRACHEOPHYTES

USEFUL FOR MOLECULAR TAXONOMY

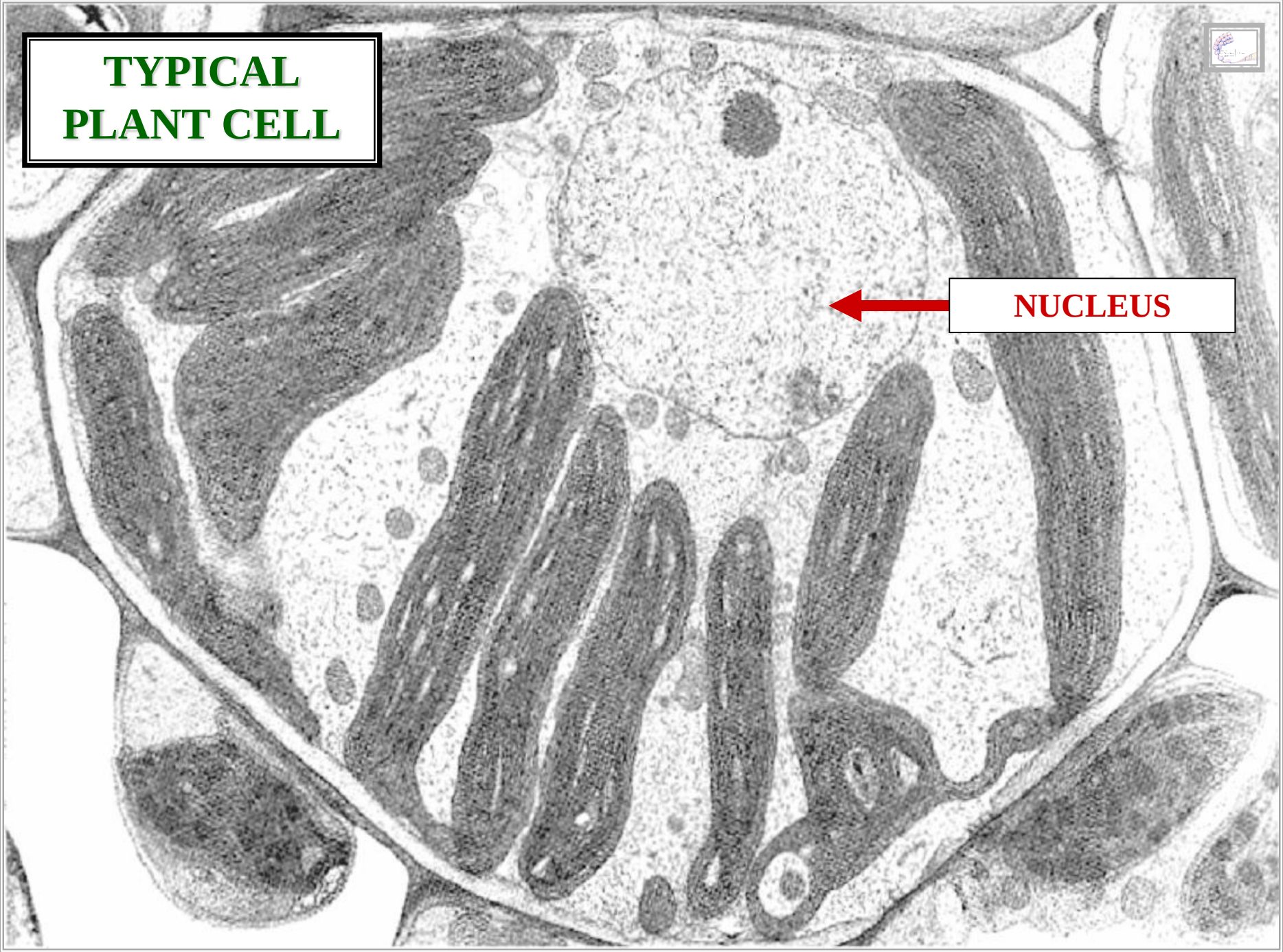


CHROMOSOME DNA

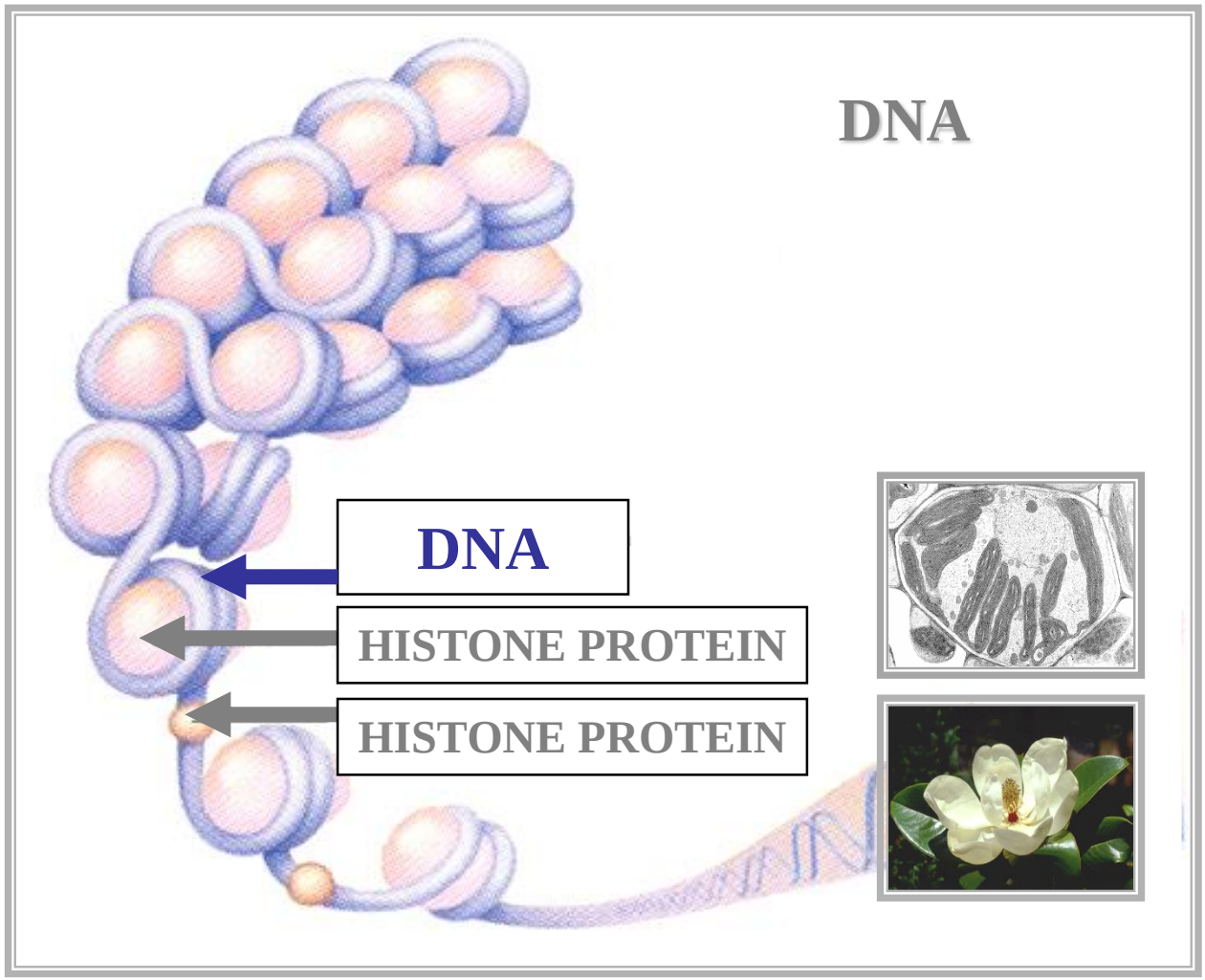
TYPICAL PLANT CELL



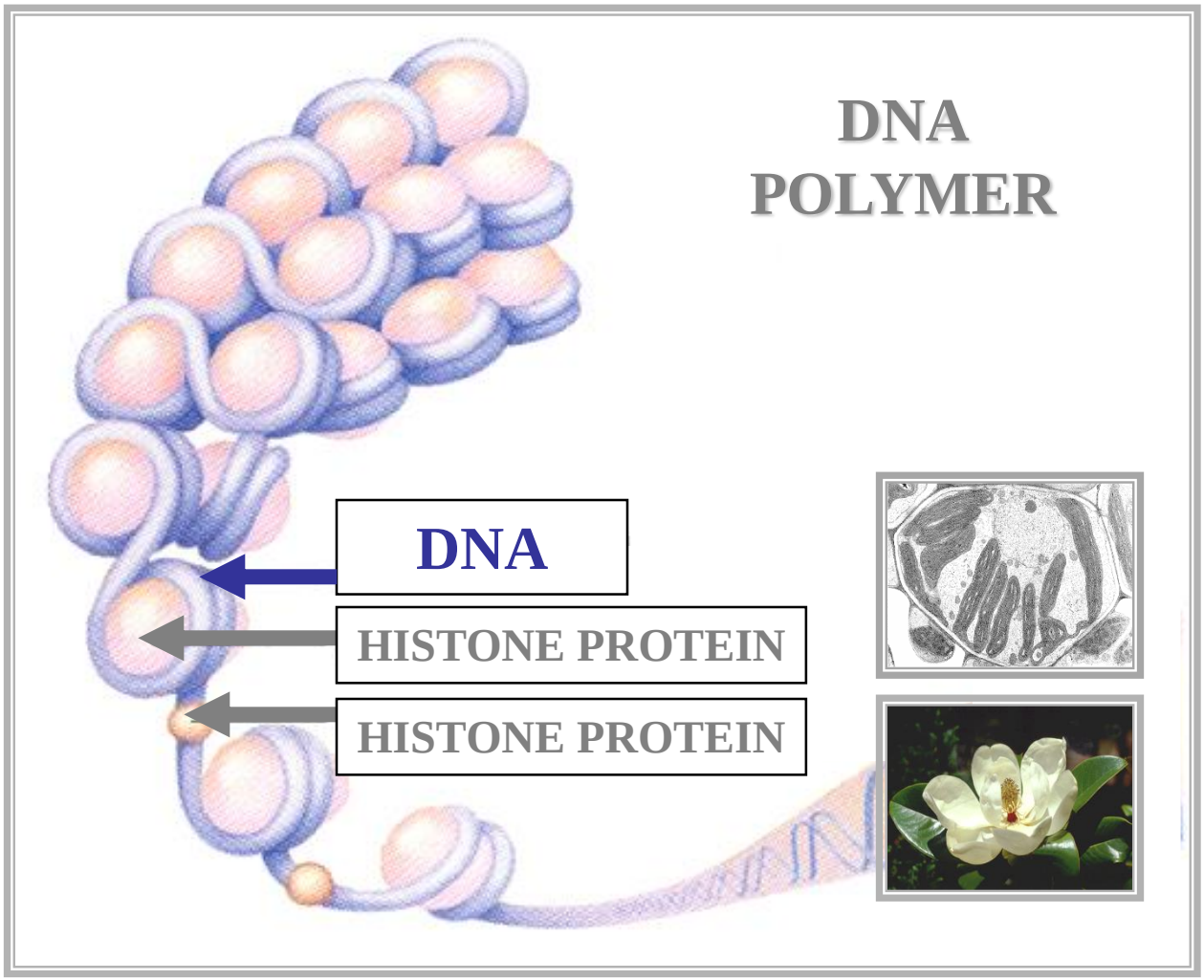
TYPICAL PLANT CELL



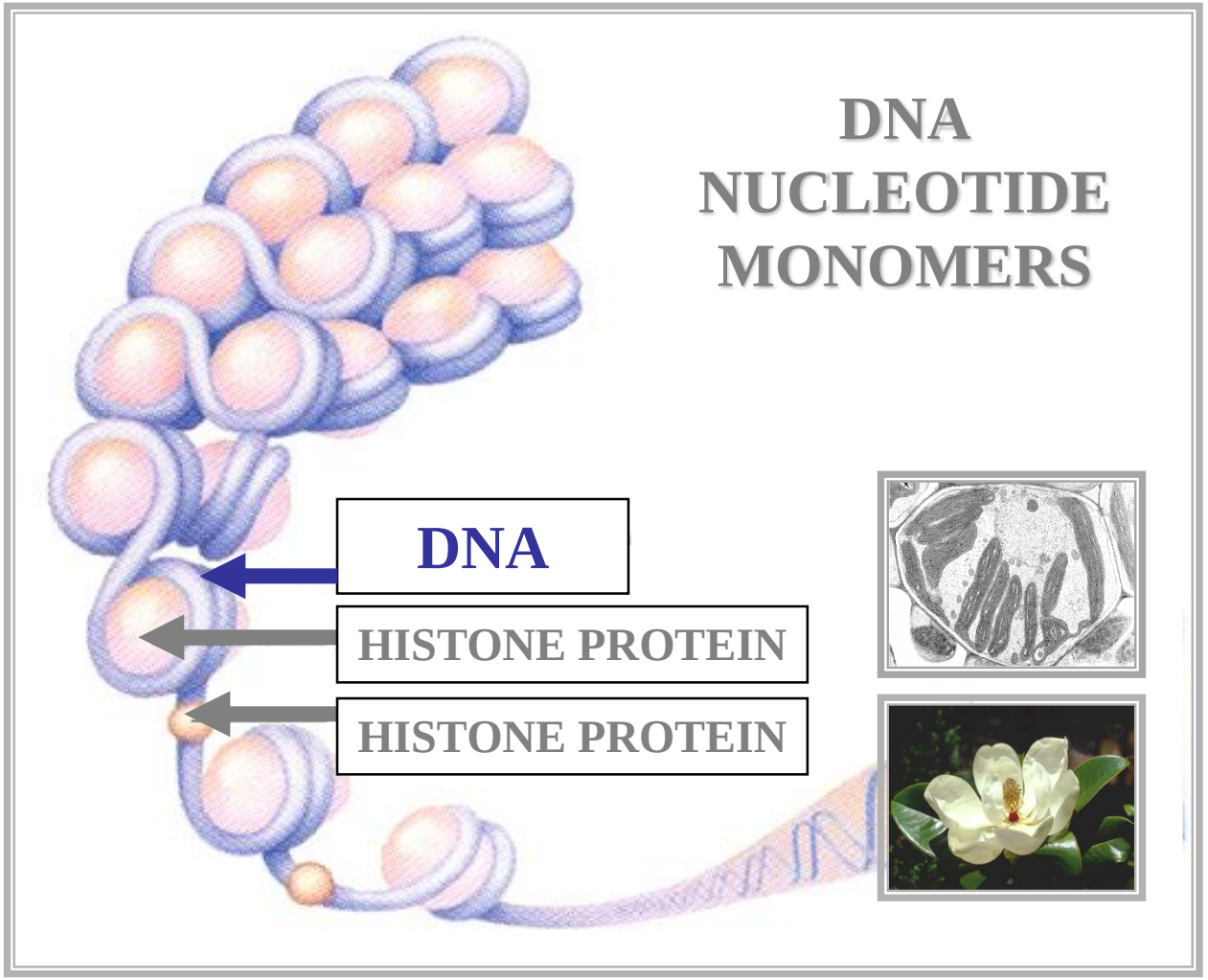
PLANT CHROMOSOME



PLANT CHROMOSOME



PLANT CHROMOSOME



DNA
NUCLEOTIDES

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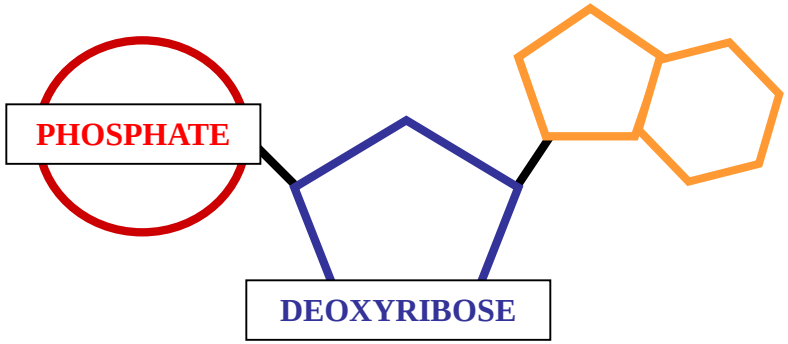

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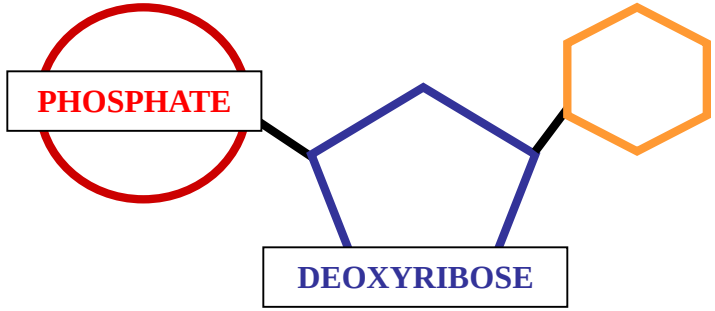

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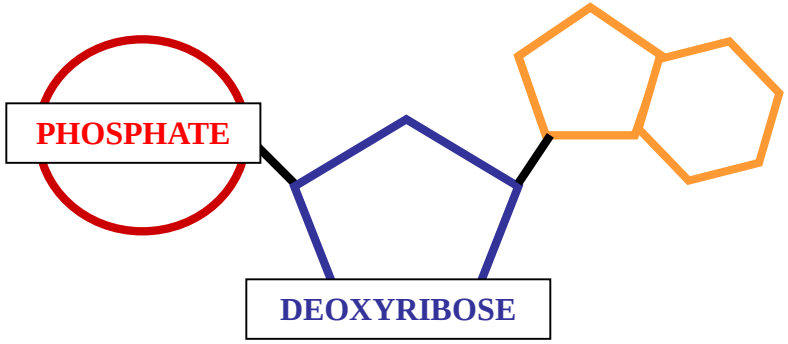

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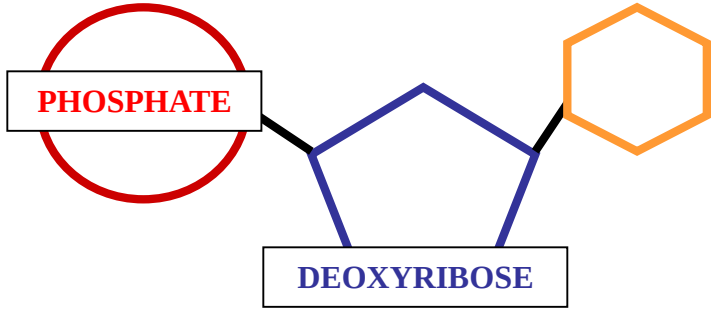

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DNA
NUCLEOTIDES

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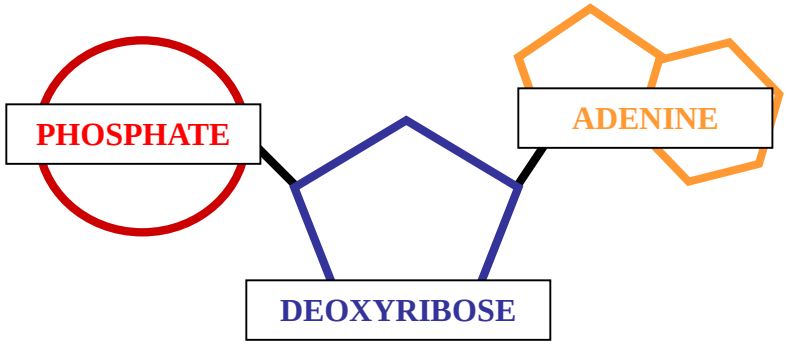
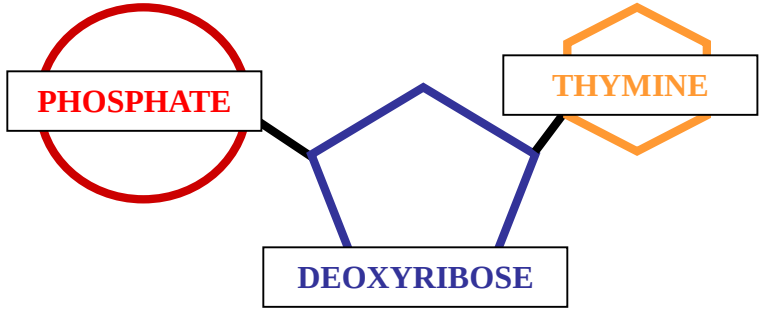
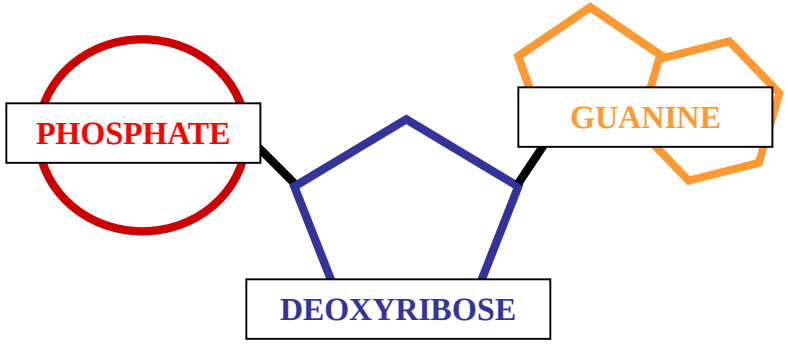


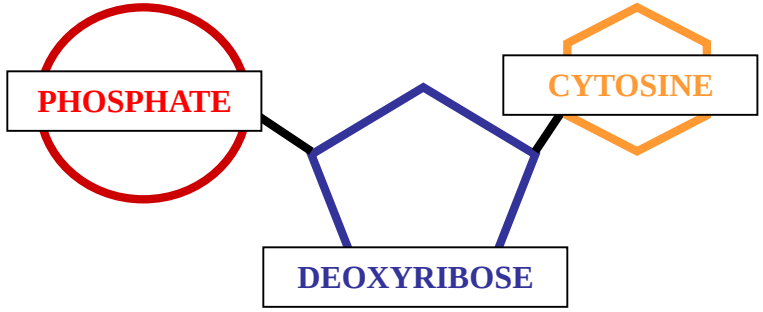
ADENINE



THYMINE



GUANINE



CYTOSINE

QUESTION

WHO WHERE THE BIOLOGISTS THAT DISCOVERED DNA STUCUTURE?

QUESTION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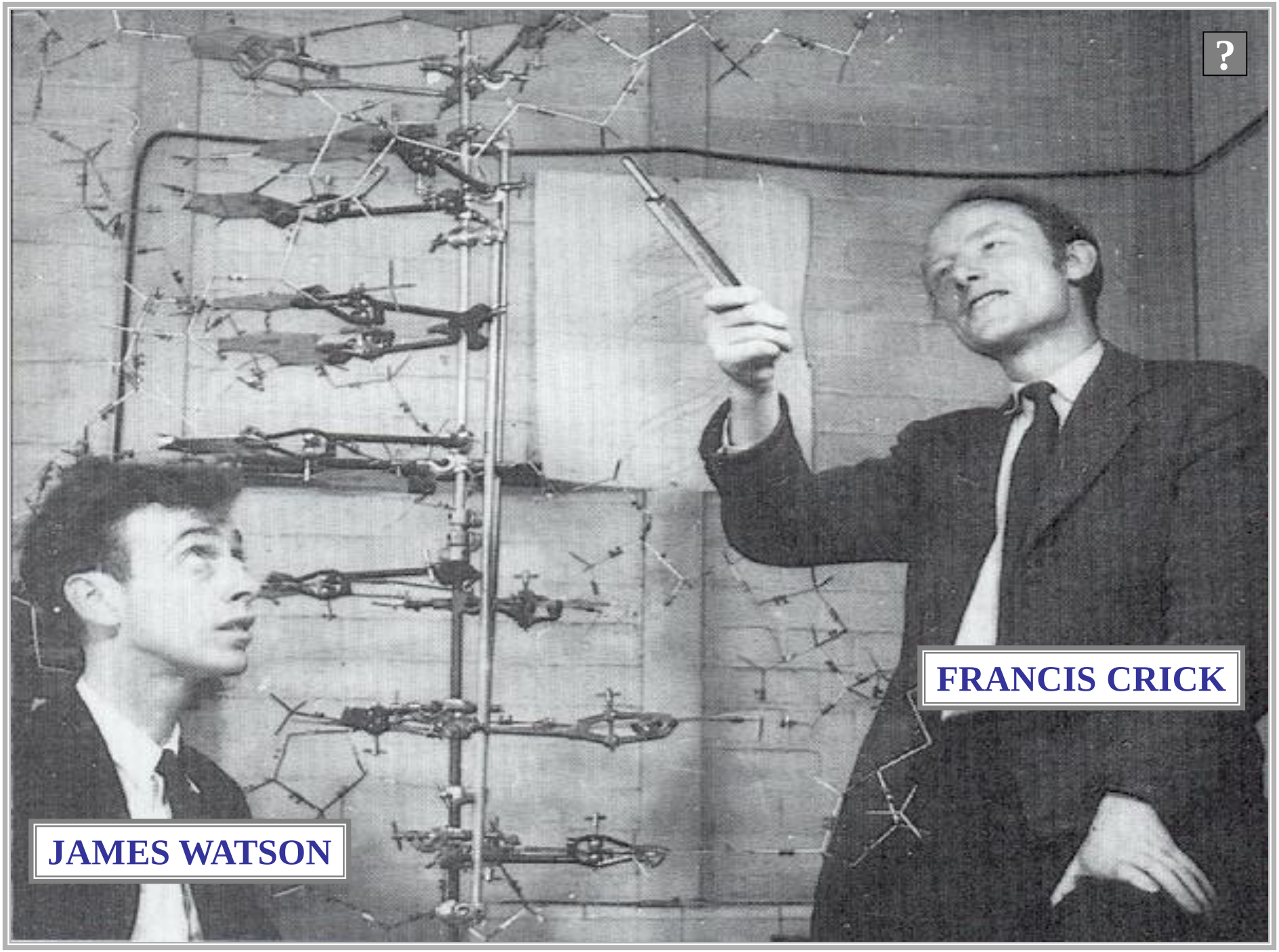
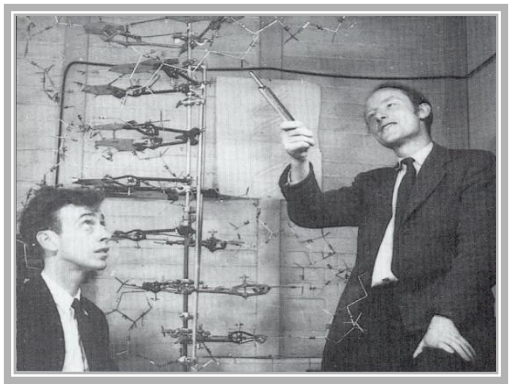
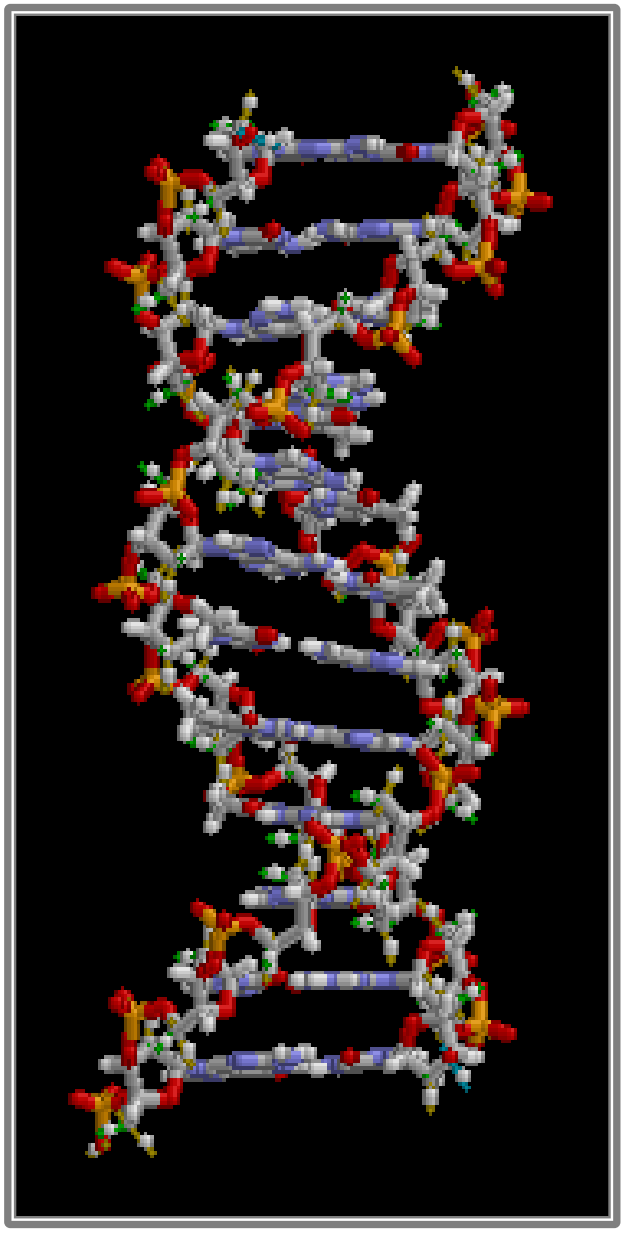
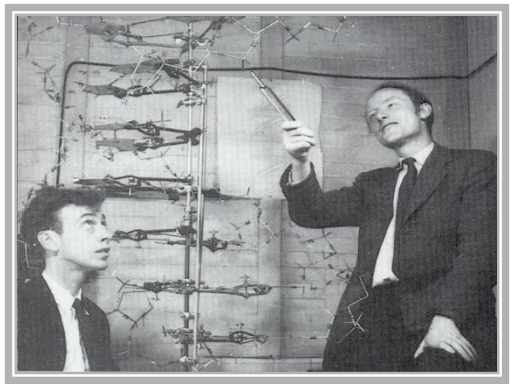

?
FRANCIS CRICK
JAMES WATSON

A







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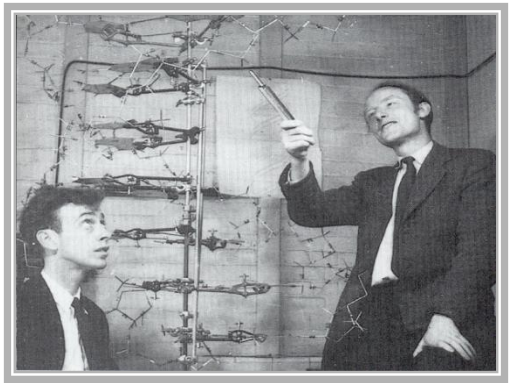
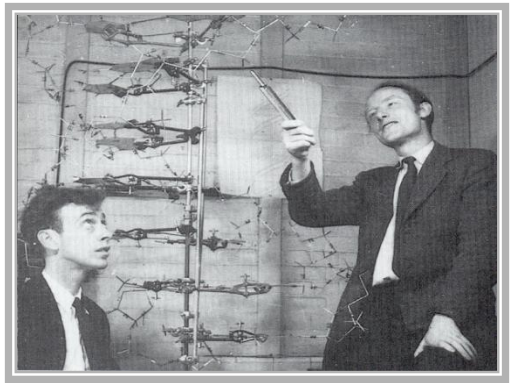
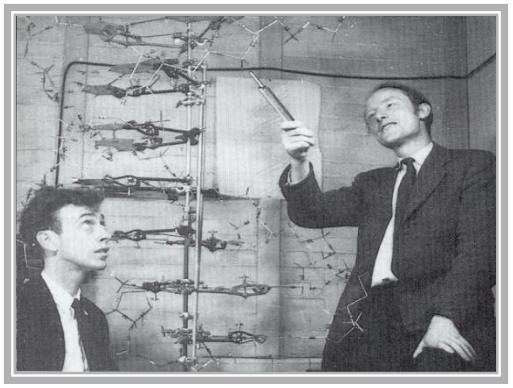
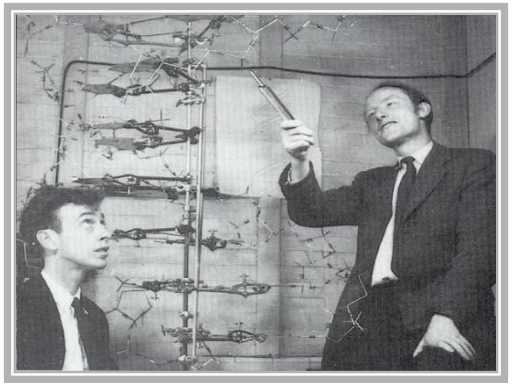
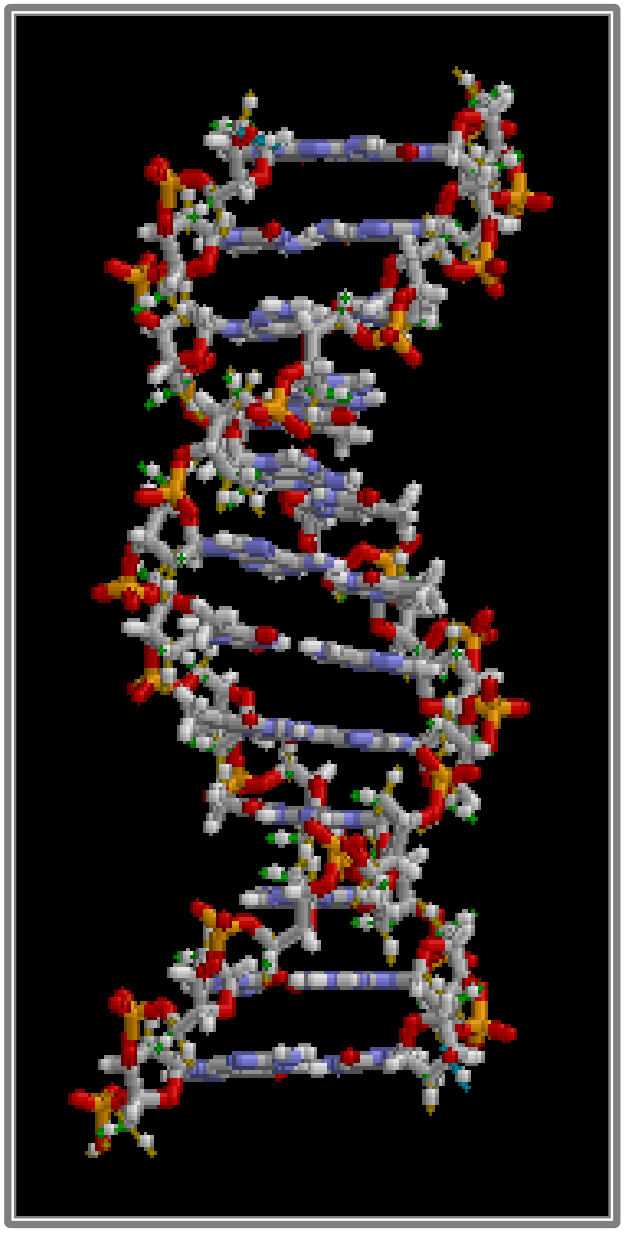


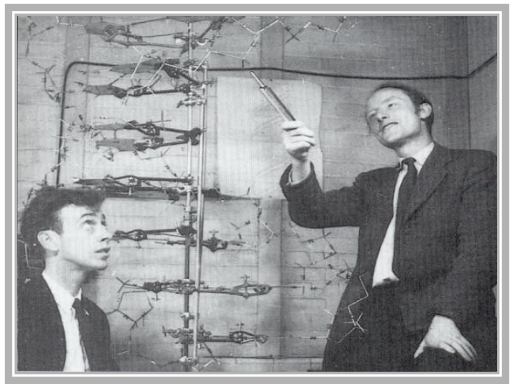




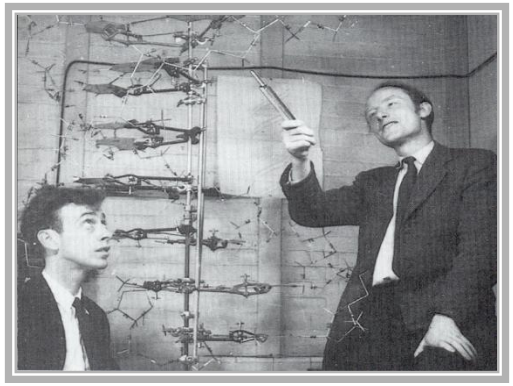
DOUBLE HELIX MODEL







DOUBLE HELIX MODEL



DNA DOUBLE HELIX MODEL

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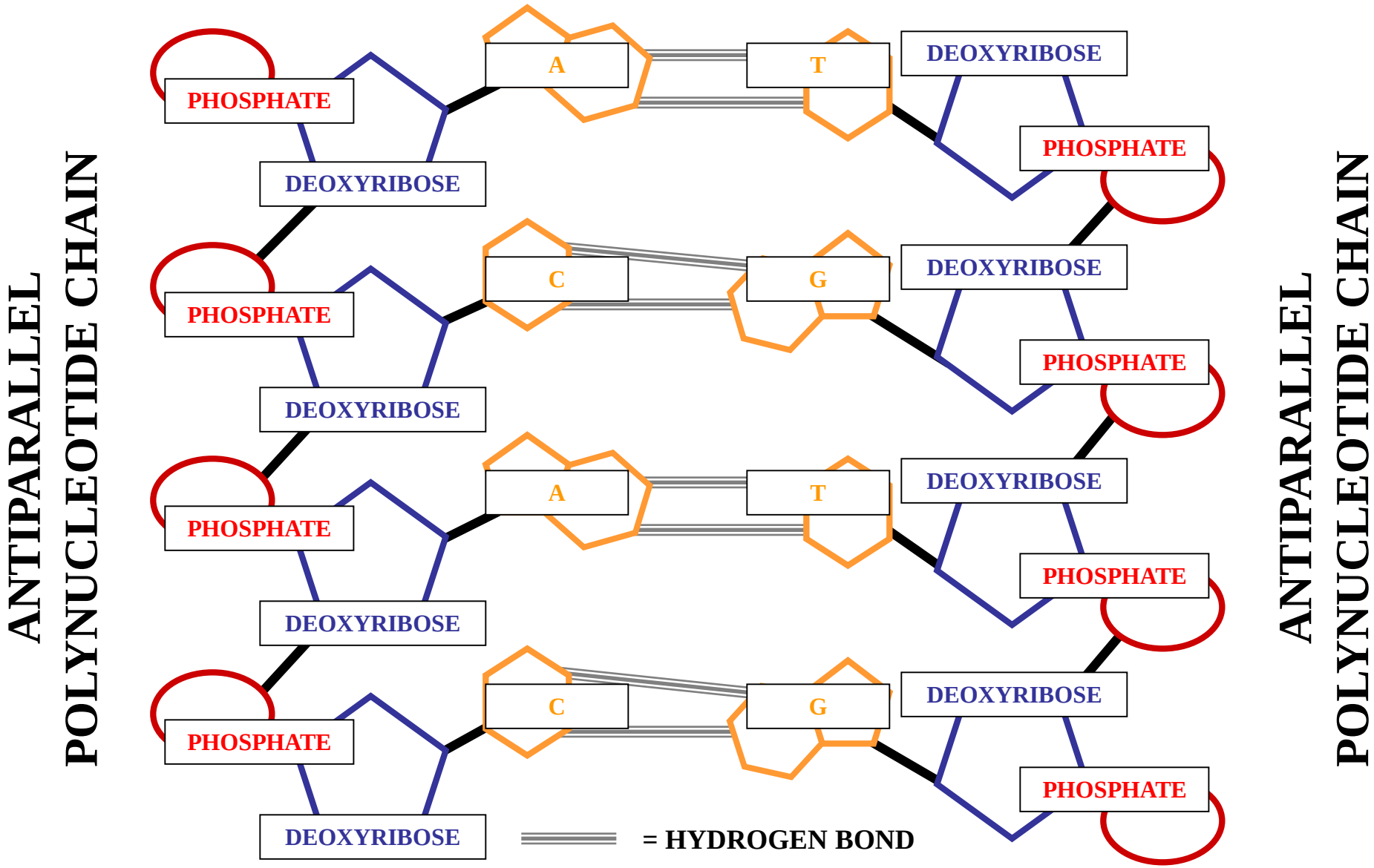
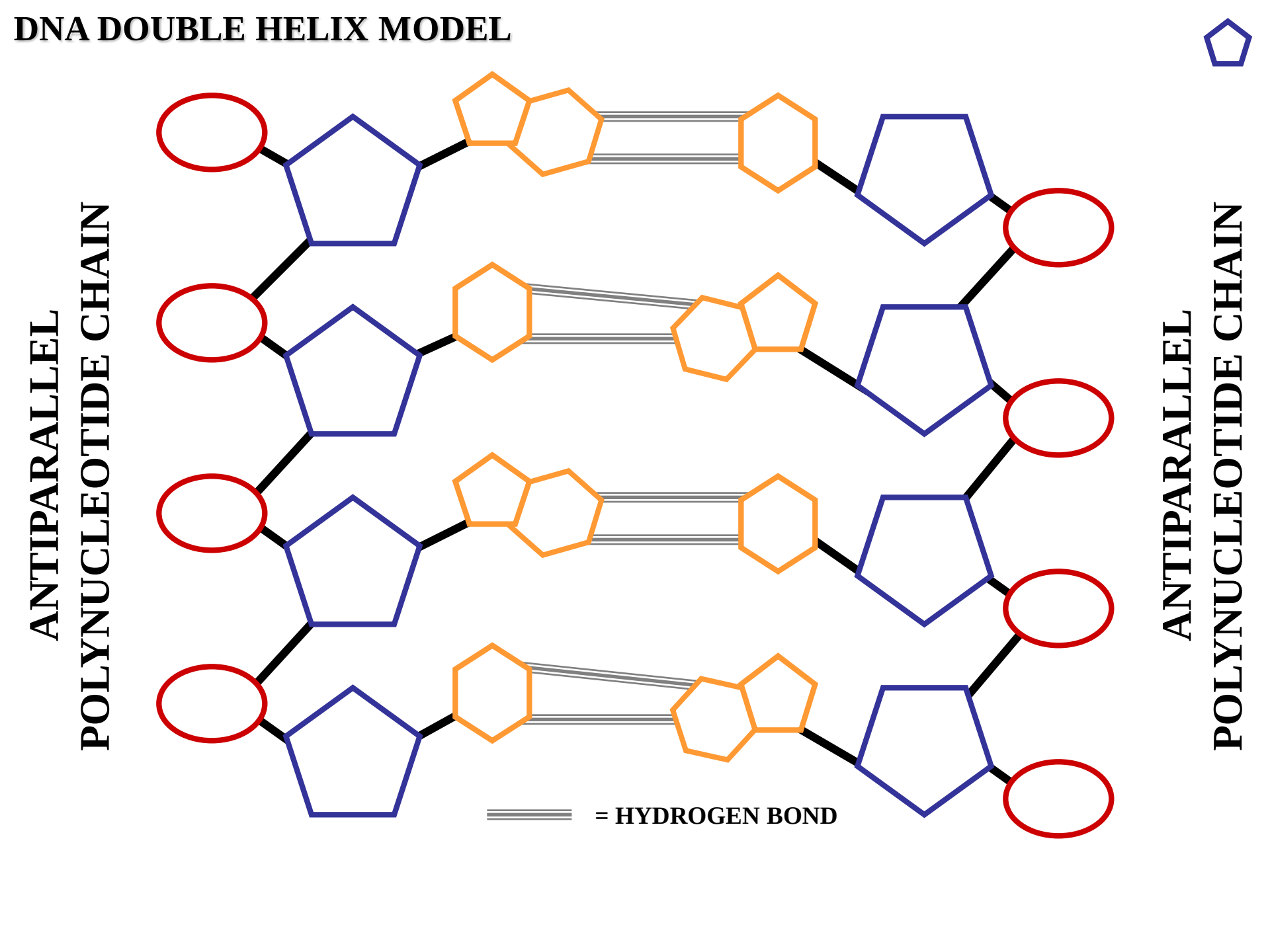


QUESTION

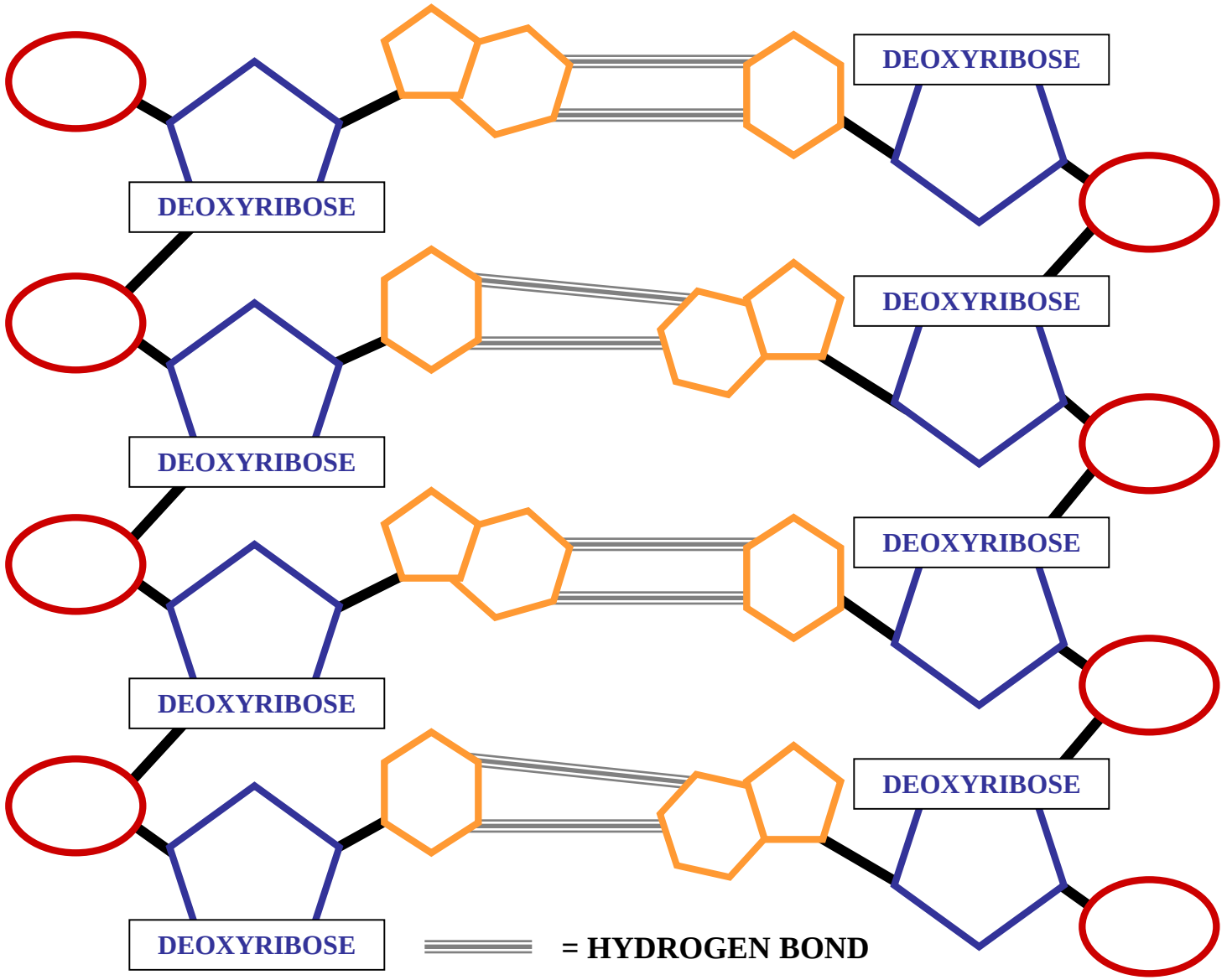
WHAT DIFFERS BETWEEN SPECIES DNA?

QUESTION

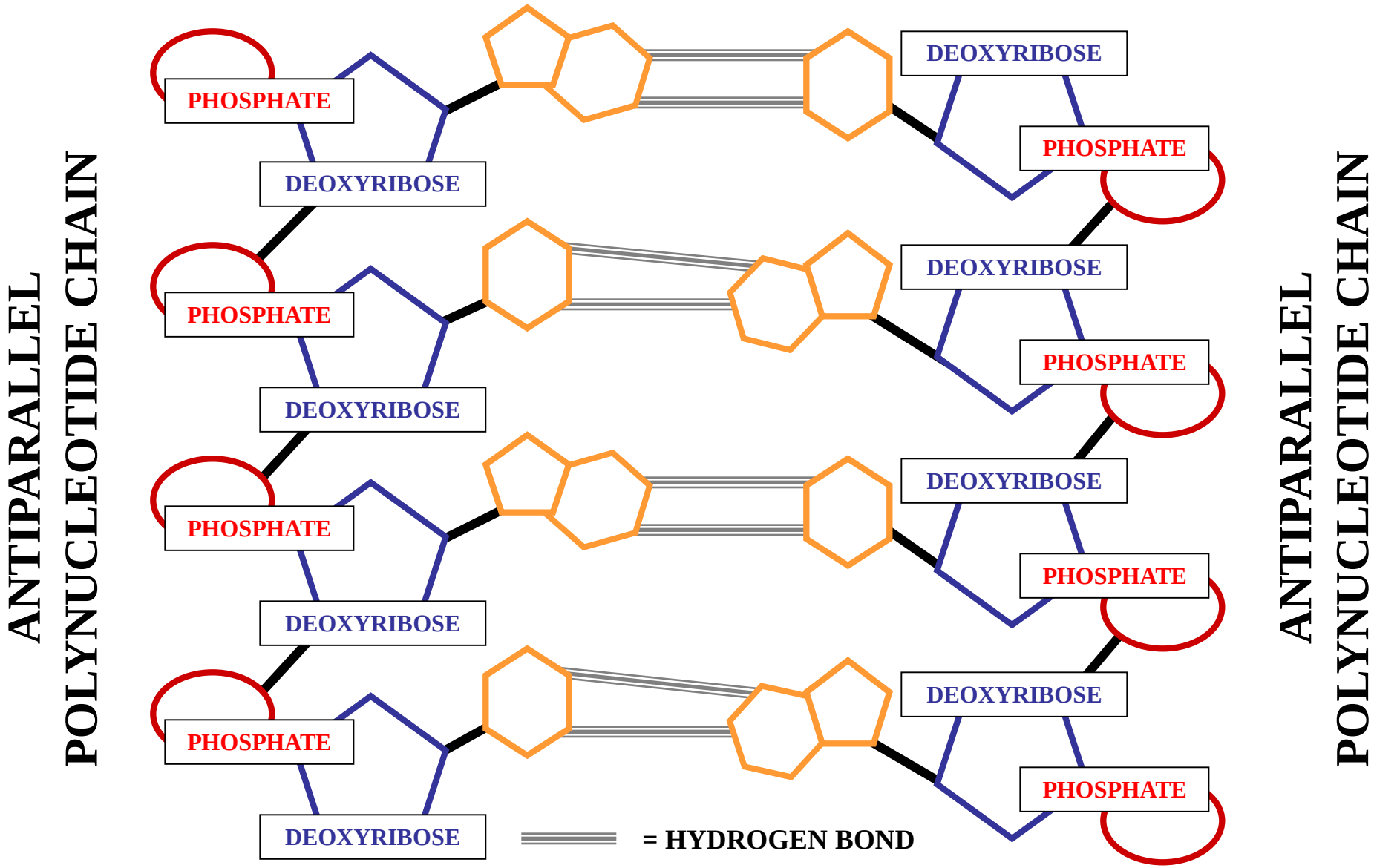
DNA DOUBLE HELIX MODEL



DNA DOUBLE HELIX MODEL

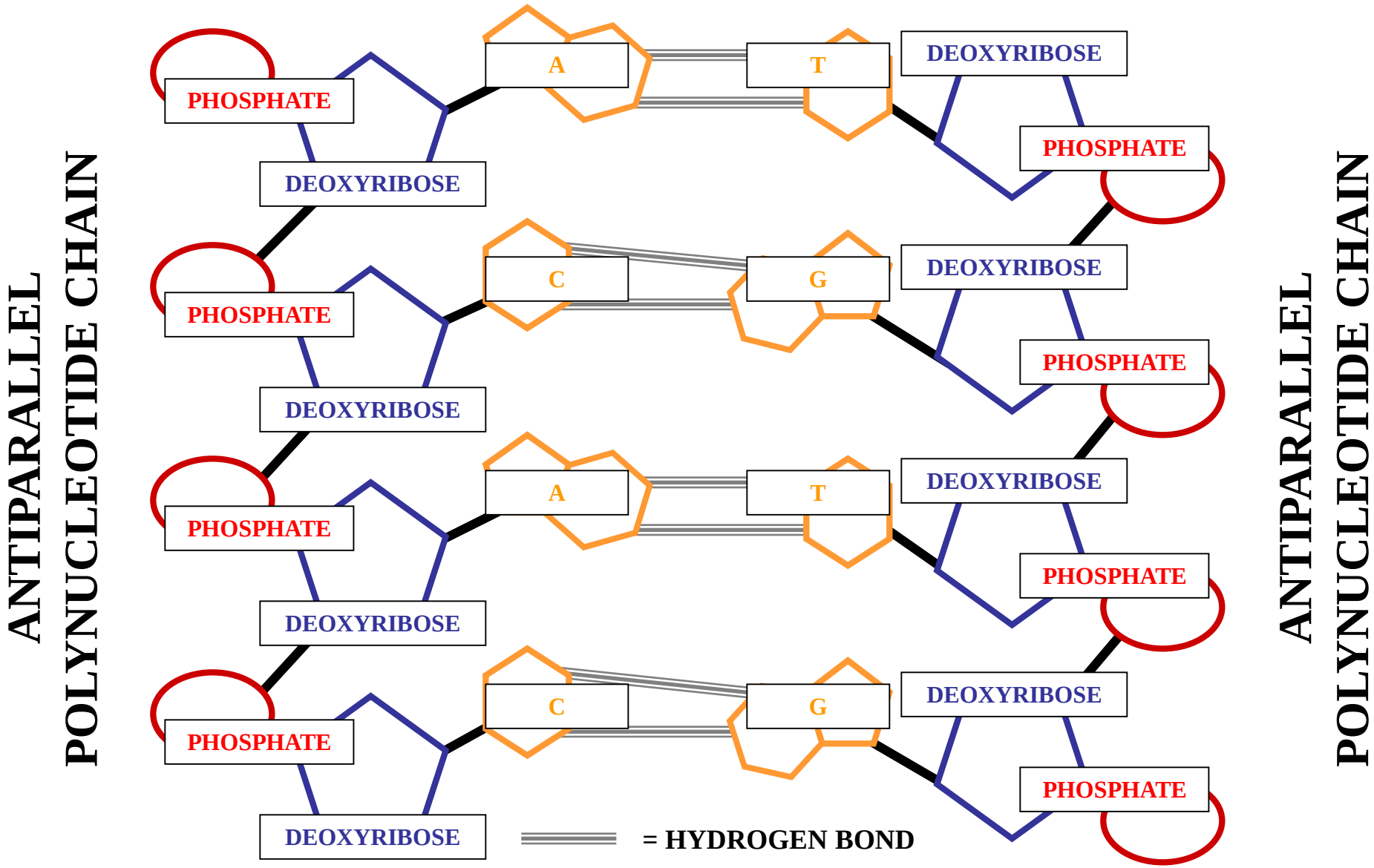


DNA DOUBLE HELIX MODEL



DNA DOUBLE HELIX MODEL

A



ANSWER

SEQUENCE NUCLEOTIDE BASES

ANSWER

DIFFERENT SP DIFFERENT DNA

D

SPECIES #1	SPECIES #2	SPECIES #3
		
T A A T A T C G C G G C	A T G C T A G C G C A T	T A A T A T C G A T A T

DIFFERENT SP DIFFERENT DNA

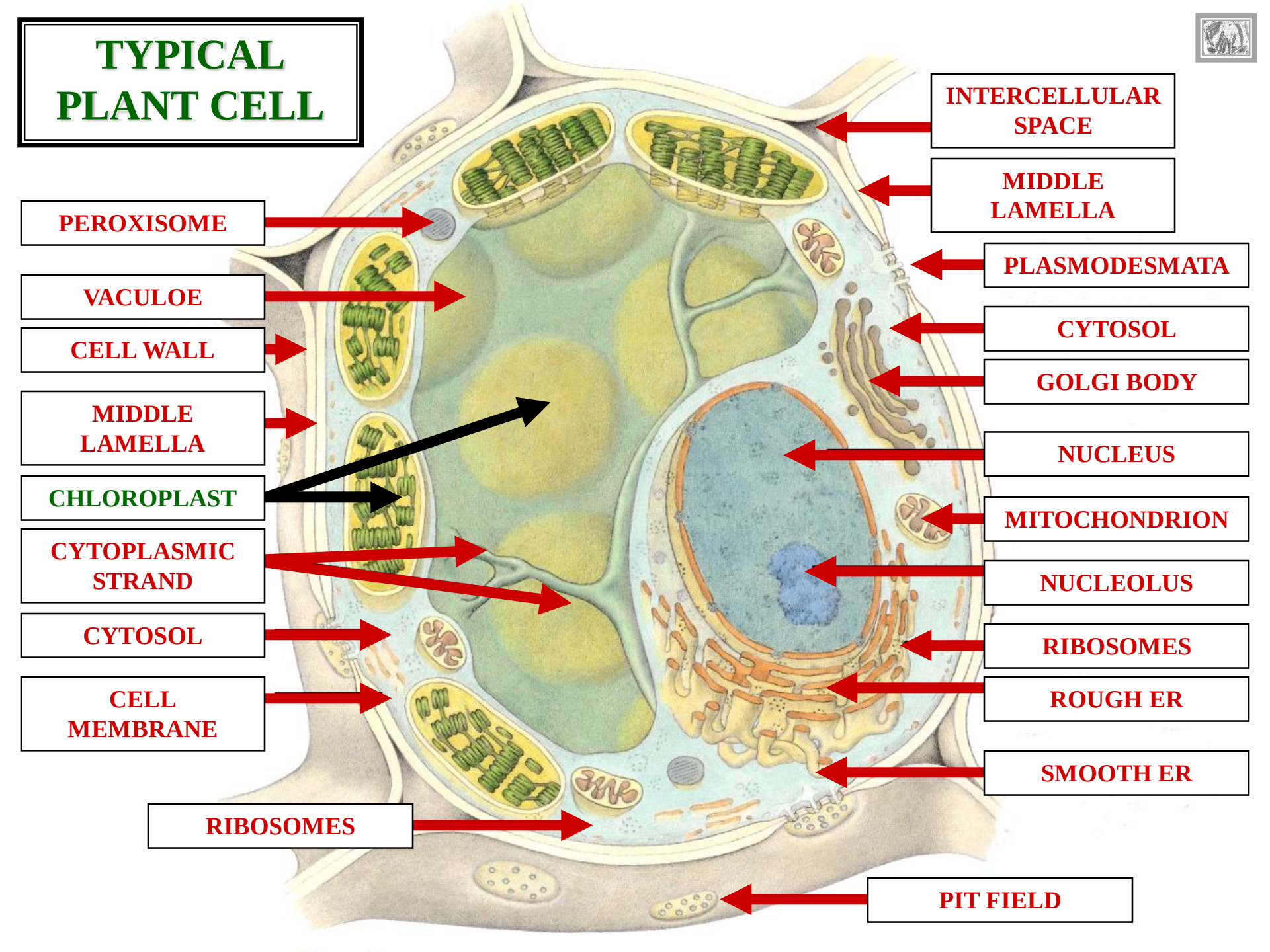
DIFFERENT SP DIFFERENT DNA

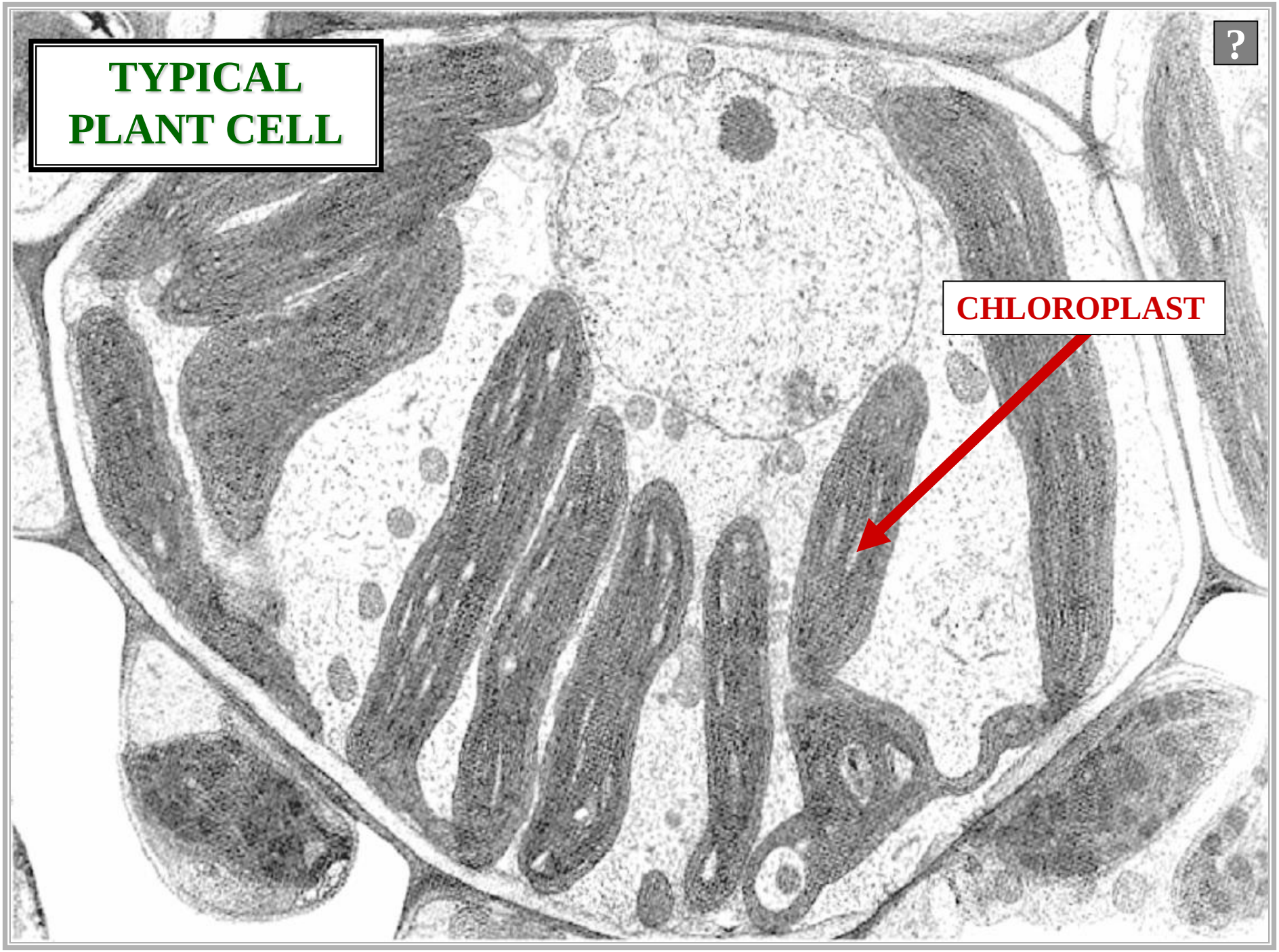
SPECIES #1	SPECIES #2	SPECIES #3
		
T A A T A T C G C G G C	A T G C T A G C G C A T	T A A T A T C G A T A T

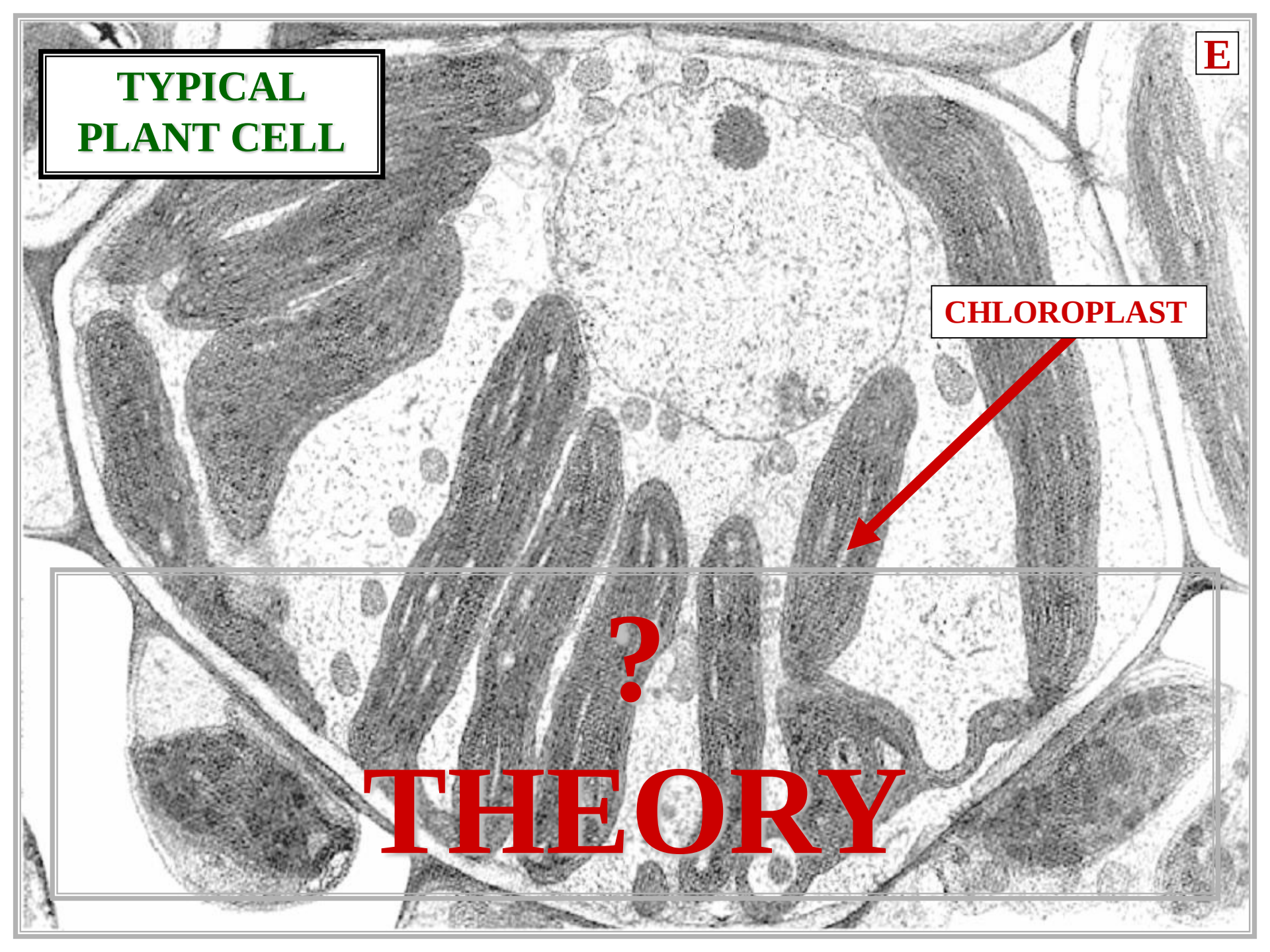
DIFFERENT NUCLEOTIDE SEQUENCES

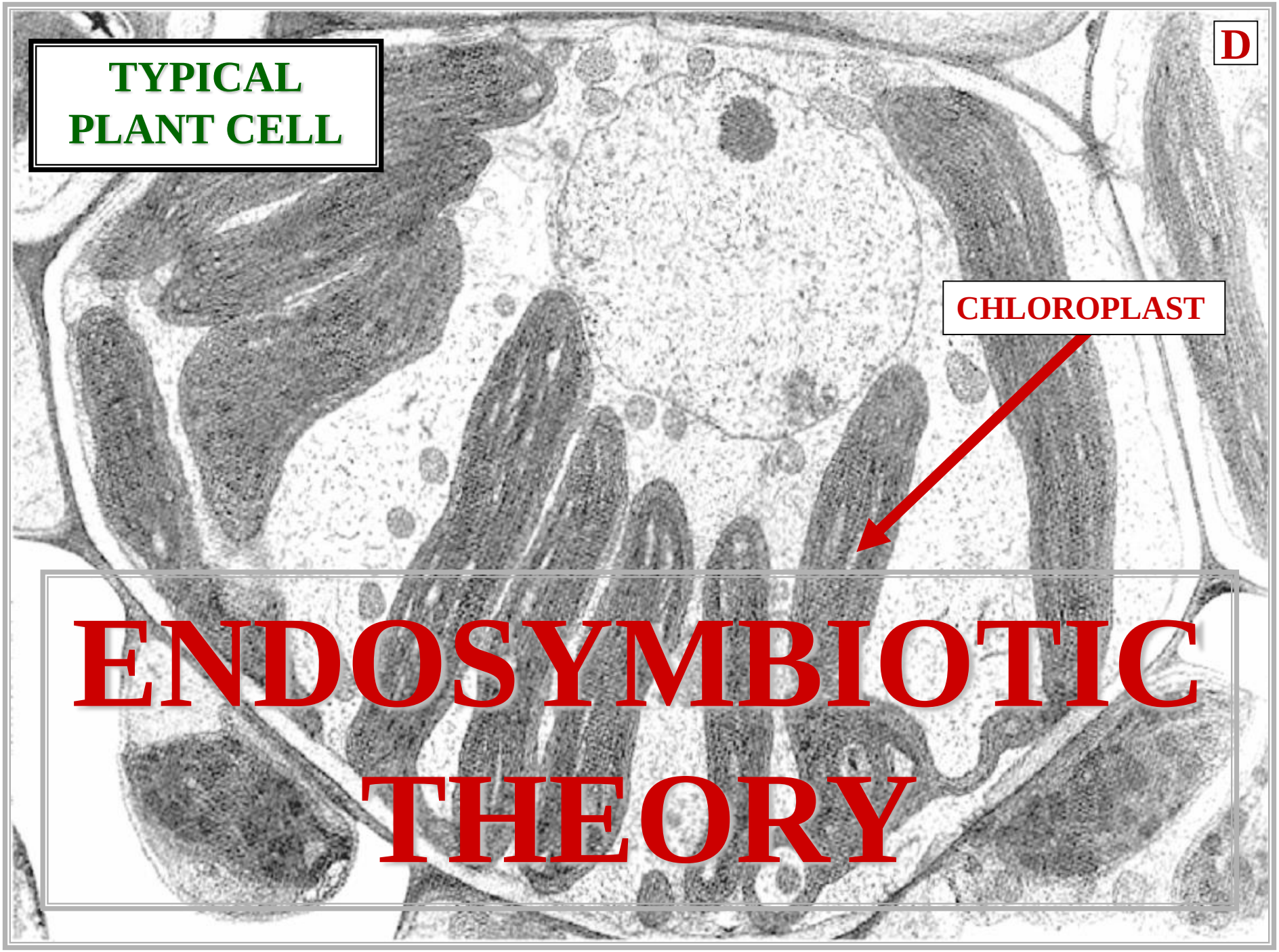
CHLOROPLAST DNA

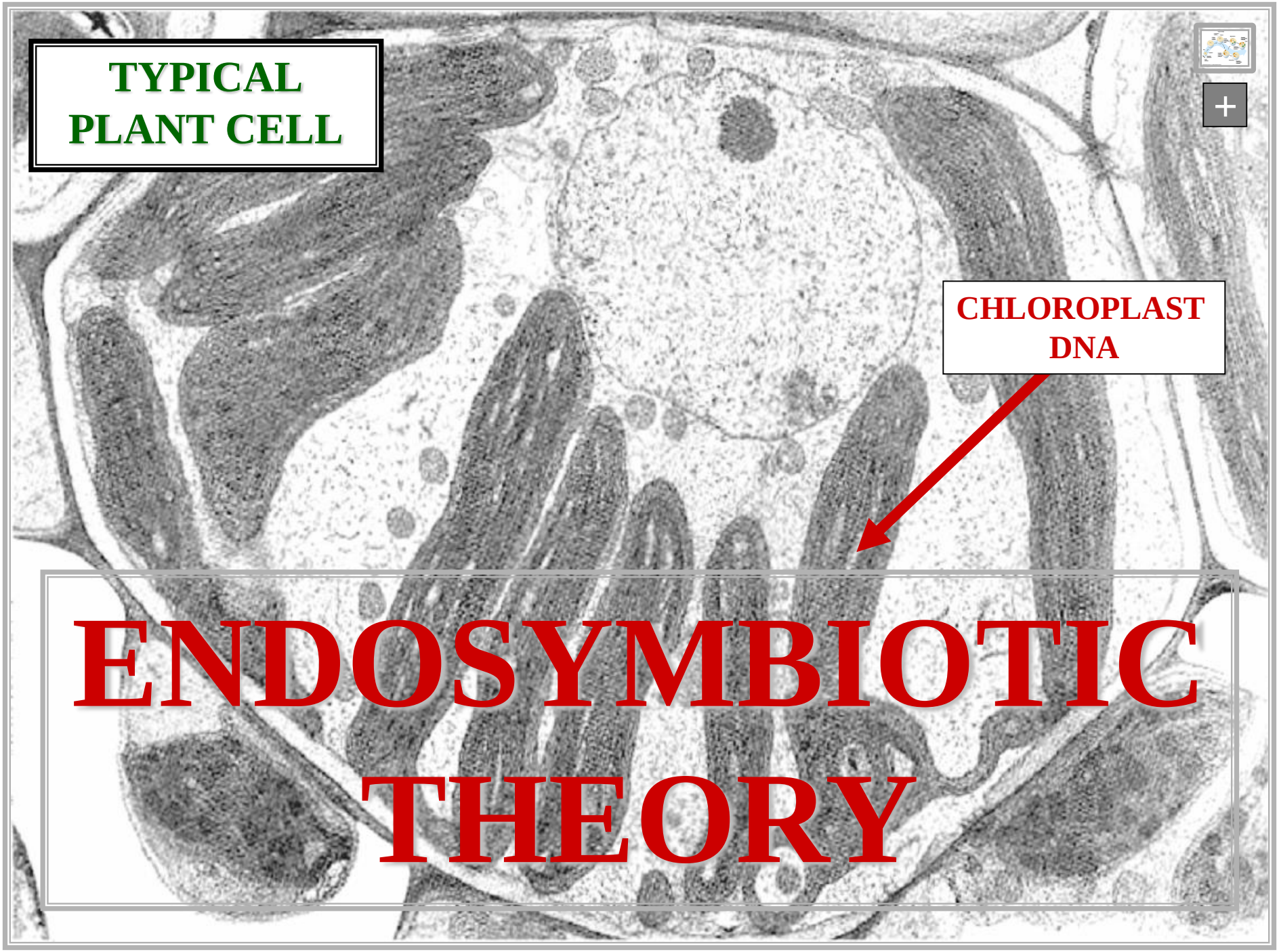
TYPICAL PLANT CELL



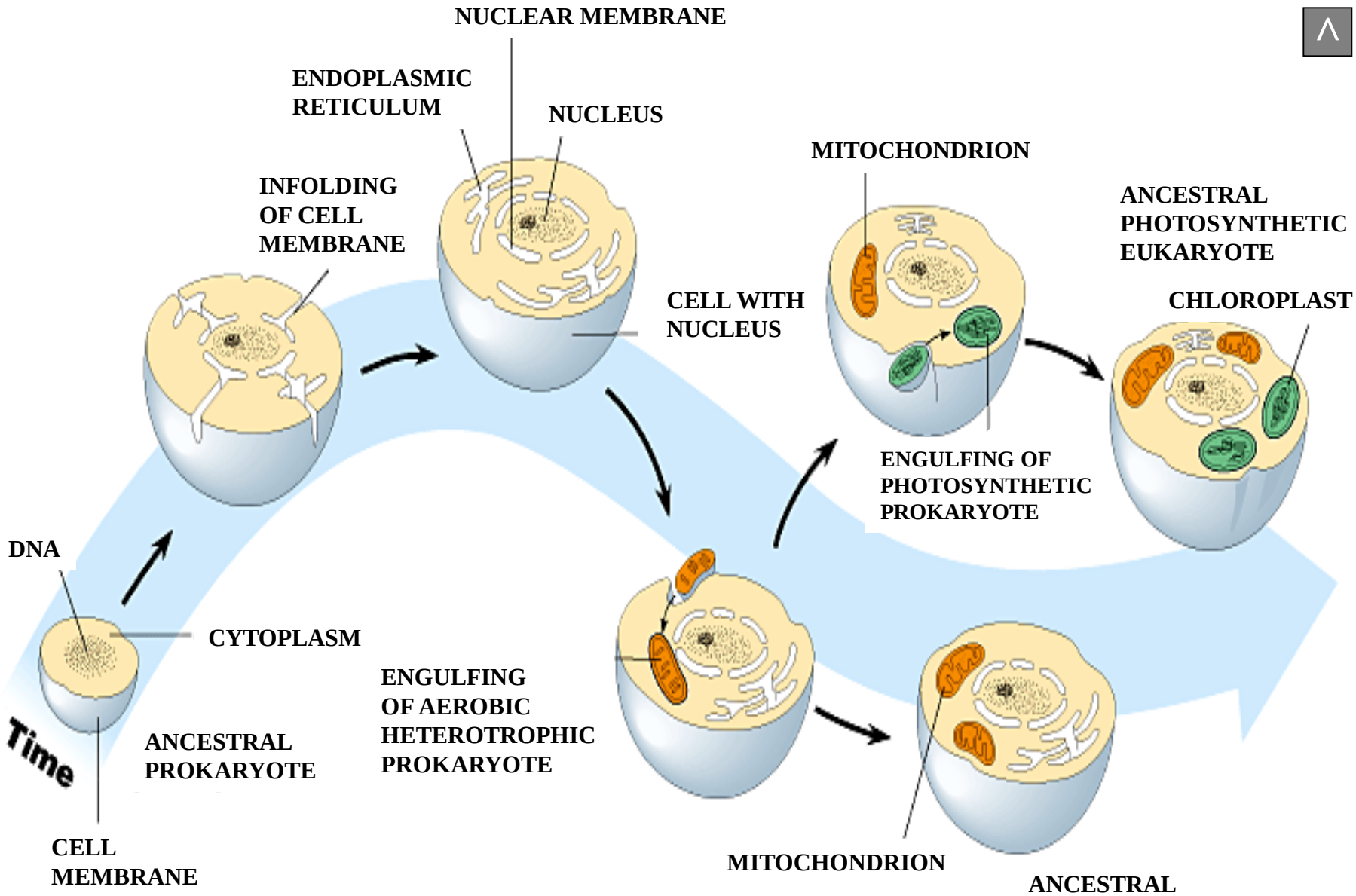

TYPICAL
PLANT CELL
?
CHLOROPLAST


TYPICAL
PLANT CELL
E
CHLOROPLAST
?
THEORY


TYPICAL
PLANT CELL
D
CHLOROPLAST
ENDOSYMBIOTIC
THEORY

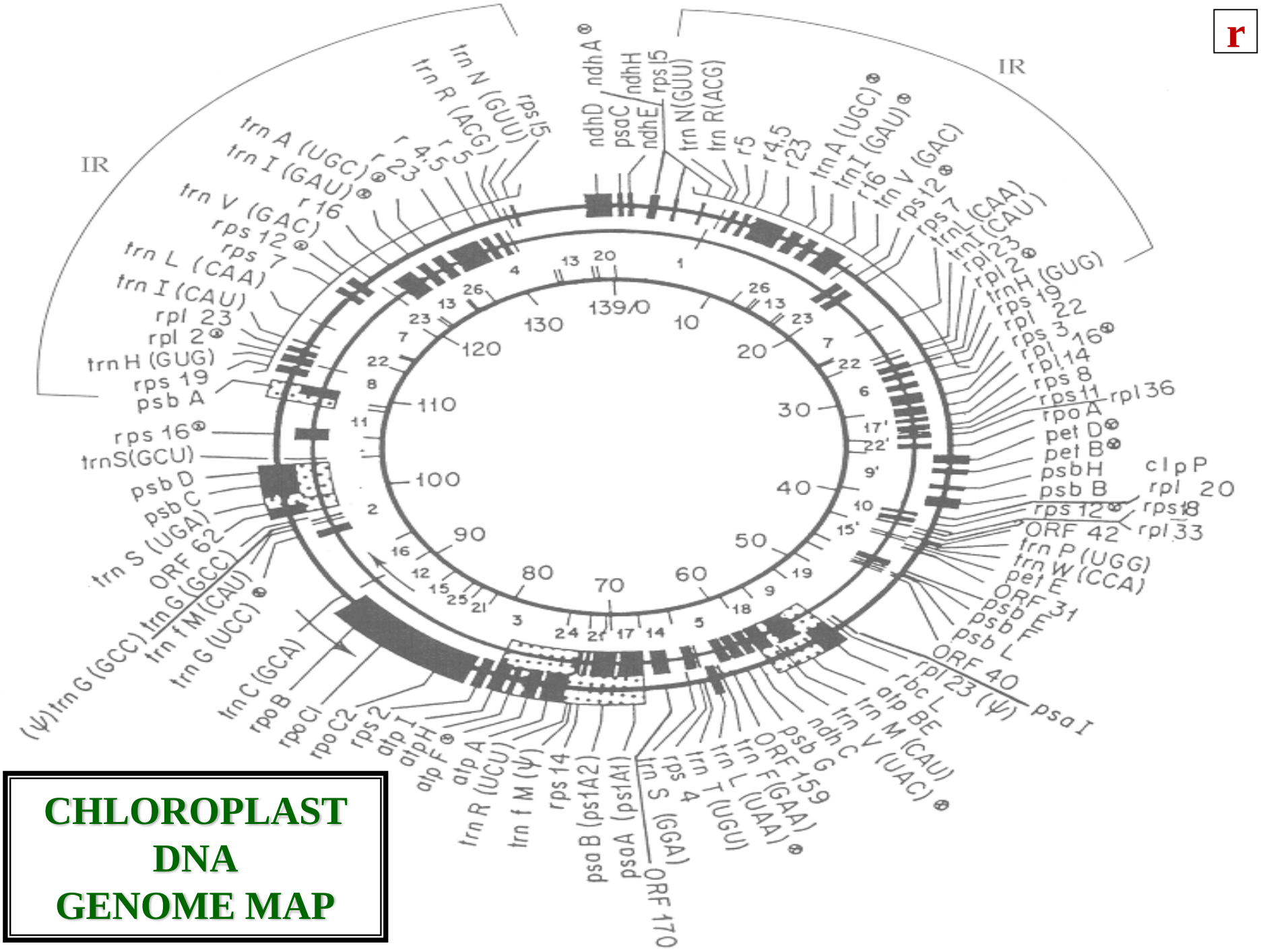


ENDOSYMBIOTIC THEORY

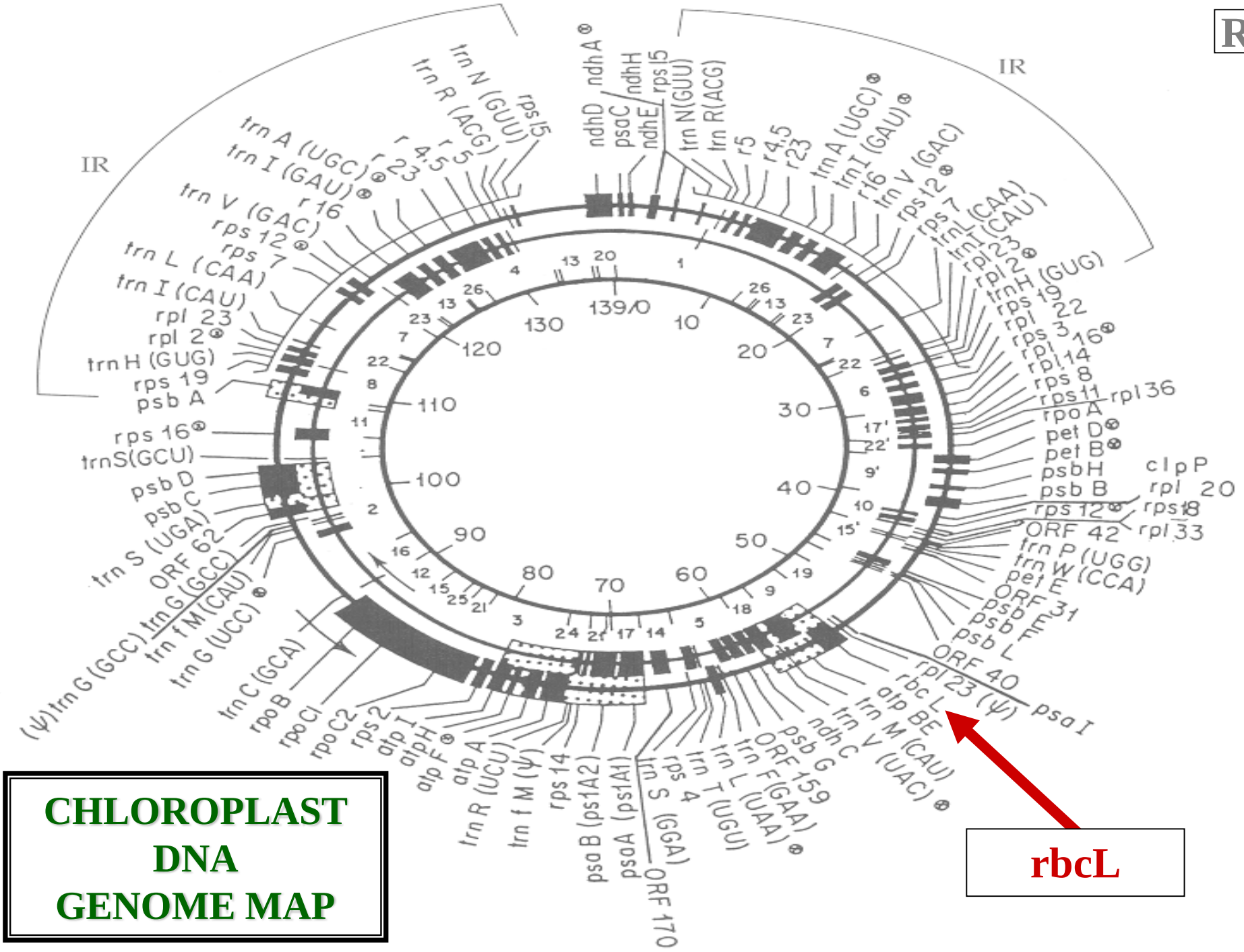


ENDOSYMBIOTIC THEORY

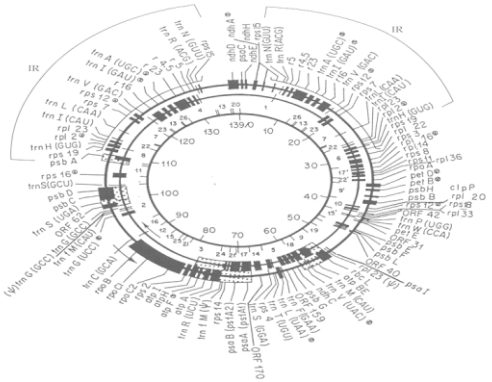
CHLOROPLAST DNA GENOME

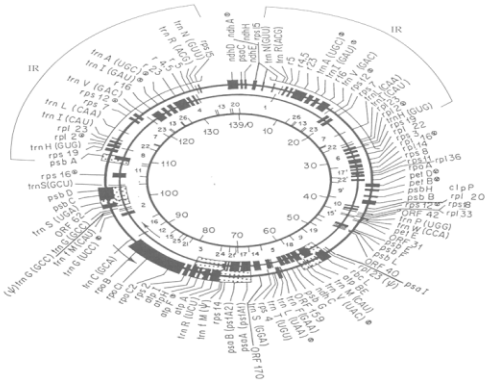


CHLOROPLAST DNA GENOME MAP


R
IR
IR
ndhA ®
ndhD
ndhC
ndhE
psaC
rps15
trn N(GUU)
trn R(ACG)
r5
r4.5
r23
trn A (UGC) ®
trn I (GAU) ®
r16
trn V (GAC)
rps12 ®
rps 7
trn L (CAA)
trn I (CAU)
rpl 23
rpl 2 ®
trn H (GUG)
rps 19
rpl 22
rps 3
rps 16 ®
rpl 14
rps 8
rps 11
rpl 36
rpo A
pet D ®
pet B ®
psb H
psb B
rps 12 ®
clp P
rpl 20
rps 18
rpl 33
ORF 42
trn P (UGG)
trn W (CCA)
pet E
ORF 31
psb I
psb M
psb L
ORF 40
rpl 23 (Ψ)
psa I
rbc L
atp BE
trn M (CAU)
trn V (UAC) ®
ndh C
psb G
ORF 159
trn F (GAA) ®
trn L (UAA)
trn T (UGU)
rps 4
trn S (GGA)
ORF 170
psa A (ps1A1)
psa B (ps1A2)
rps 14
trn f M (Ψ)
trn R (UCU)
atp A
atp F ®
atp H
atp I
rps 2
rpo C2
rpo C1
rpo B
trn C (GCA)
trn G (UCC) ®
trn f M (CAU)
trn G (GCC)
(Ψ) trn G (GCC)
ORF 62
trn S (UGA)
psb C
psb D
trnS(GCU)
rps 16 ®
psb A
trn I (CAU)
trn L (CAA)
rps 7
rps 12 ®
trn V (GAC)
r16
trn I (GAU) ®
trn A (UGC) ®
r23
r4.5
r5
trn R (ACG)
trn N (GUU)
rps15
1390
10
20
30
40
50
60
70
80
90
100
110
120
130
CHLOROPLAST
DNA
GENOME MAP
rbcL

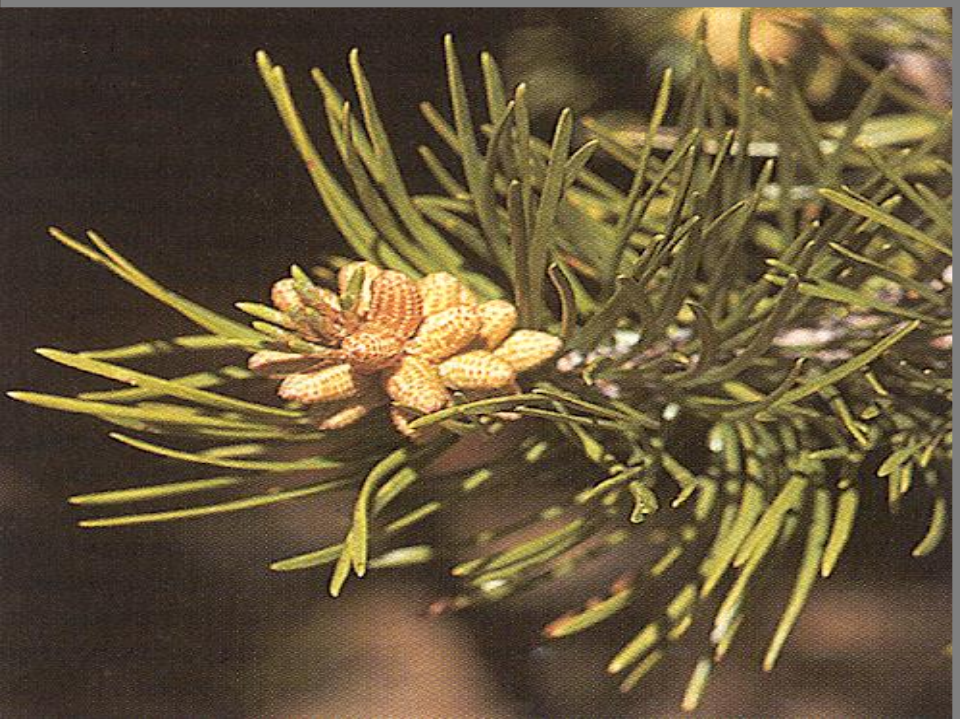
CHLOROPLAST GENE rbcL

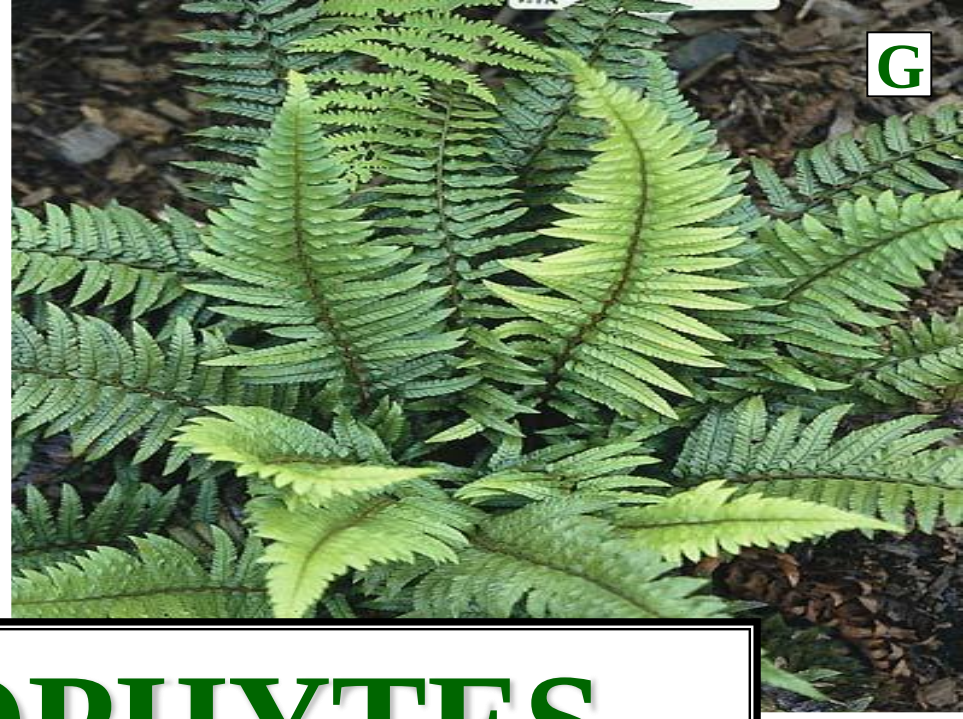




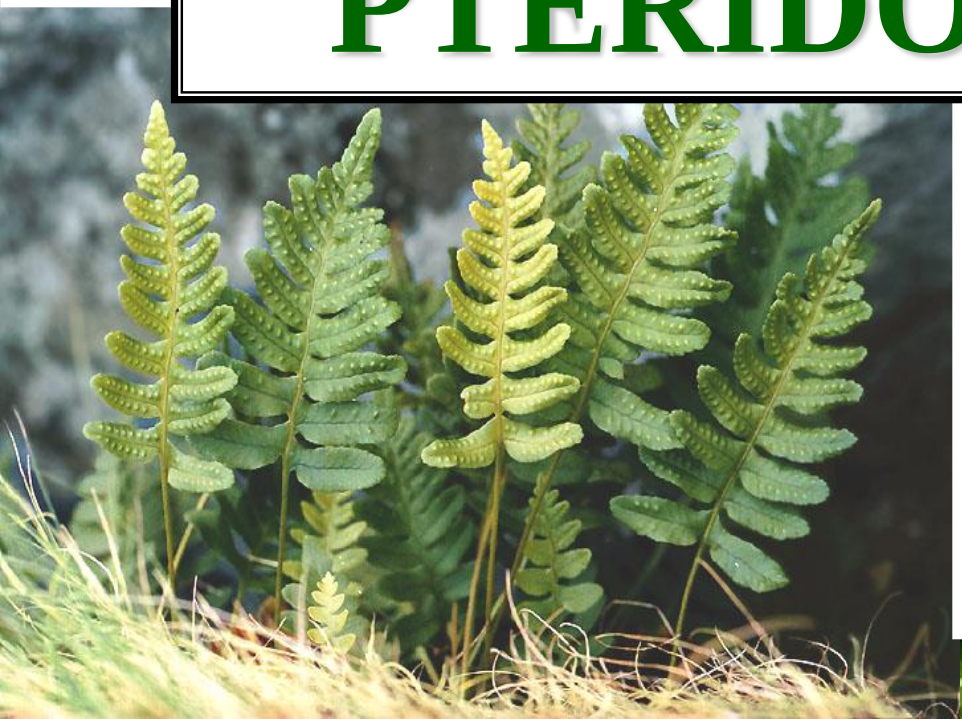
RIBULOSE BISPHOSPHATE CARBOXYLASE

rbcL GENE KNOWN TO ALL PHOTOSYNTHETIC TRACHEOPHYTES





PTERIDOPHYTES



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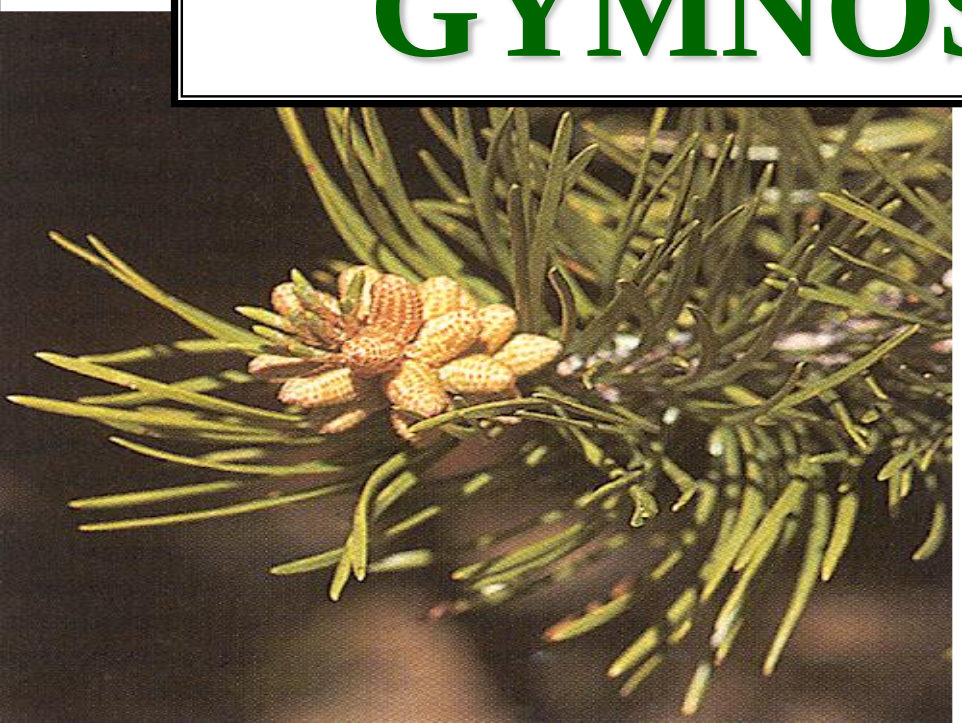
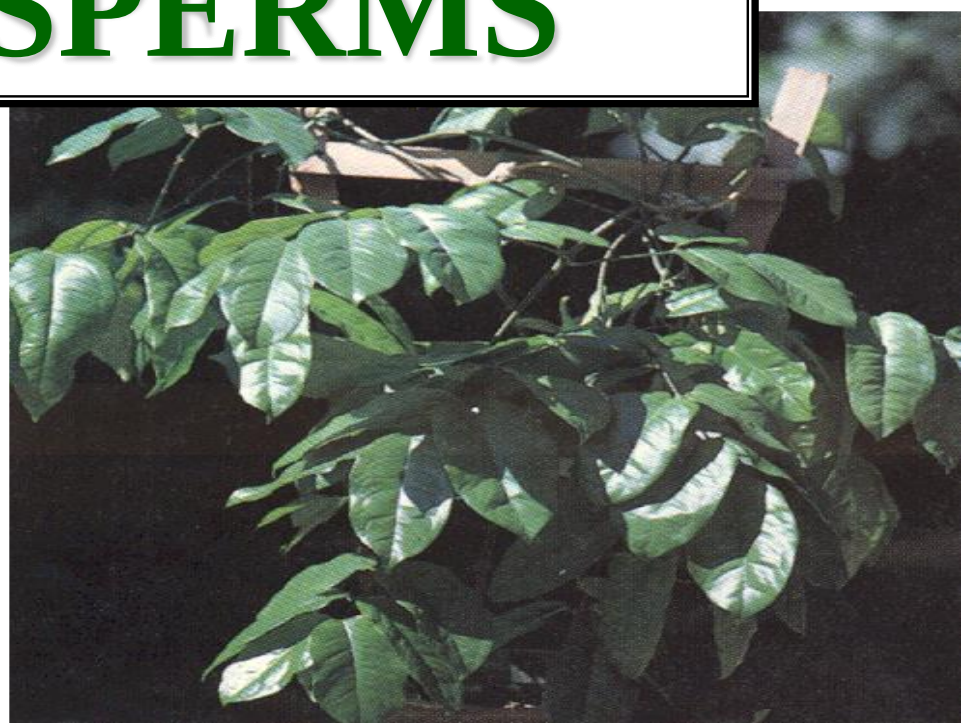
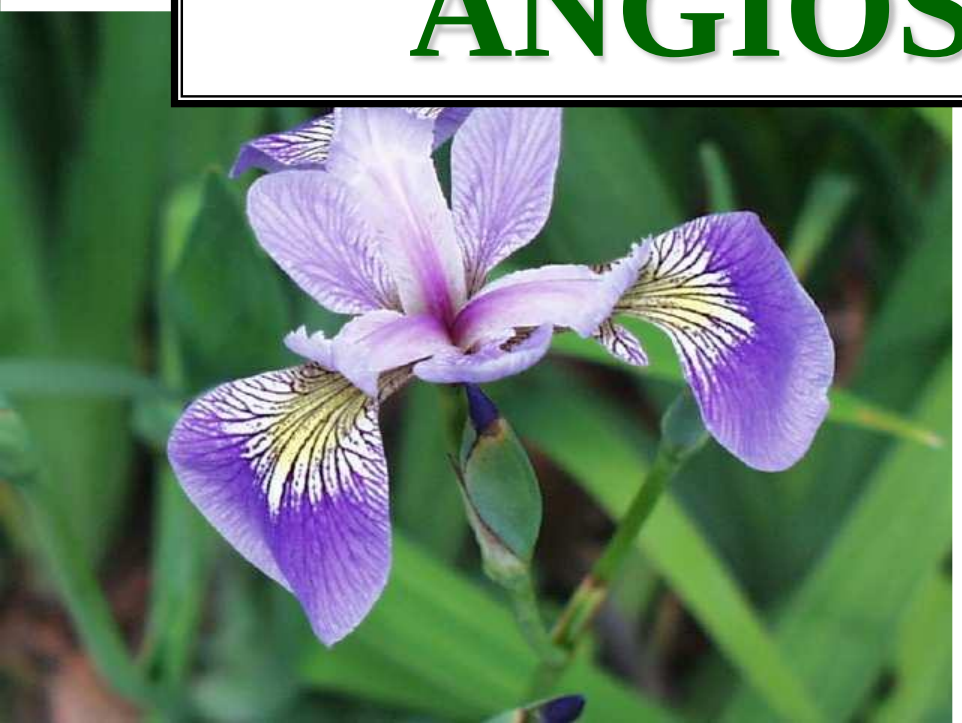
GYMNOSPERMS



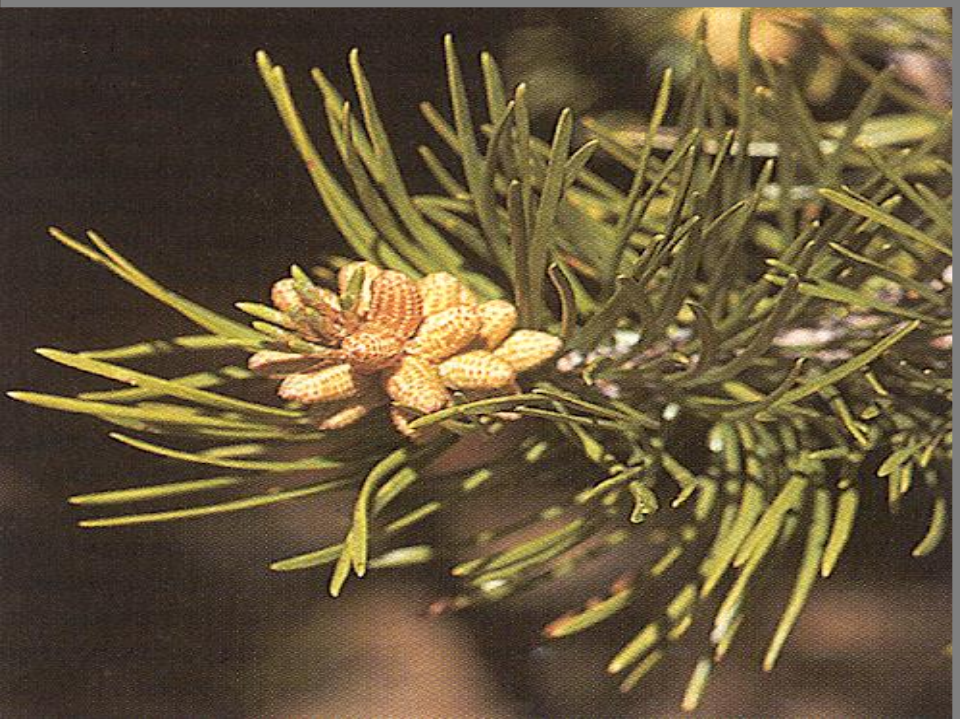


ANGIOSPERMS



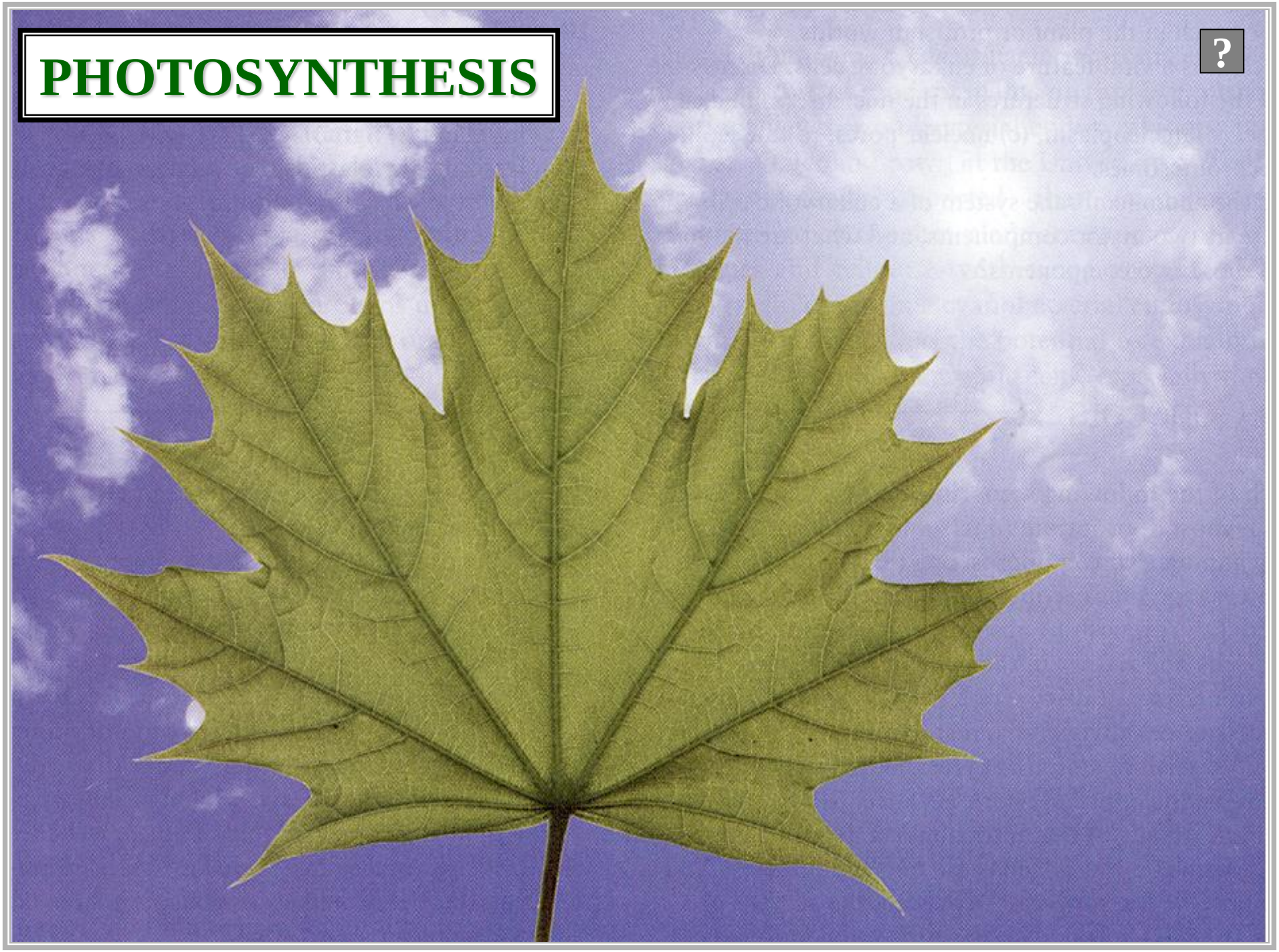
rbcL GENE KNOWN TO ALL PHOTOSYNTHETIC TRACHEOPHYTES

USEFUL FOR MOLECULAR TAXONOMY



PHOTOSYNTHESIS

?



PHOTOSYNTHESIS

LR

WATER

CO2

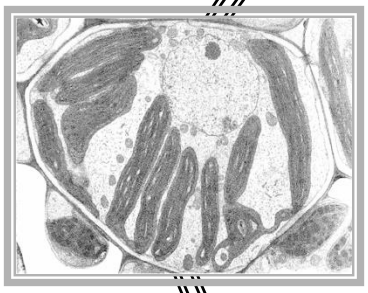
LIGHT EGY

PHOTO

ATMOSPHERE

E-

PHOTOLYSIS



?

ATP

?

SYNTHESIS

CHEM EGY INPUT

CHLOROPLAST

ATMOSPHERE

OXYGEN

GLUCOSE

PHOTOSYNTHESIS

DR

WATER

CO2

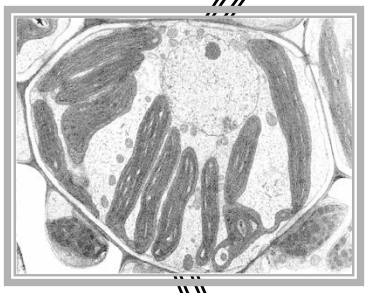
LIGHT EGY

PHOTO

ATMOSPHERE

E-

PHOTOLYSIS



LT RXT

THYLAKOID

ATP

?

SYNTHESIS

CHEM EGY INPUT

CHLOROPLAST

ATMOSPHERE

OXYGEN

GLUCOSE

PHOTOSYNTHESIS

WATER

CO2

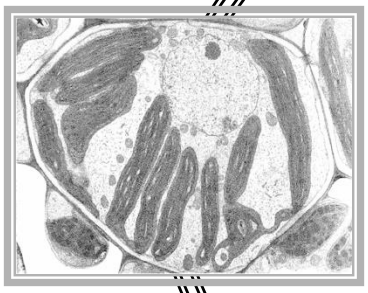
LIGHT EGY

PHOTO

ATMOSPHERE

E-

PHOTOLYSIS



LT RXT

THYLAKOID

ATP

DK RXT

STROMA

SYNTHESIS

CHEM EGY INPUT

CHLOROPLAST

ATMOSPHERE

OXYGEN

GLUCOSE