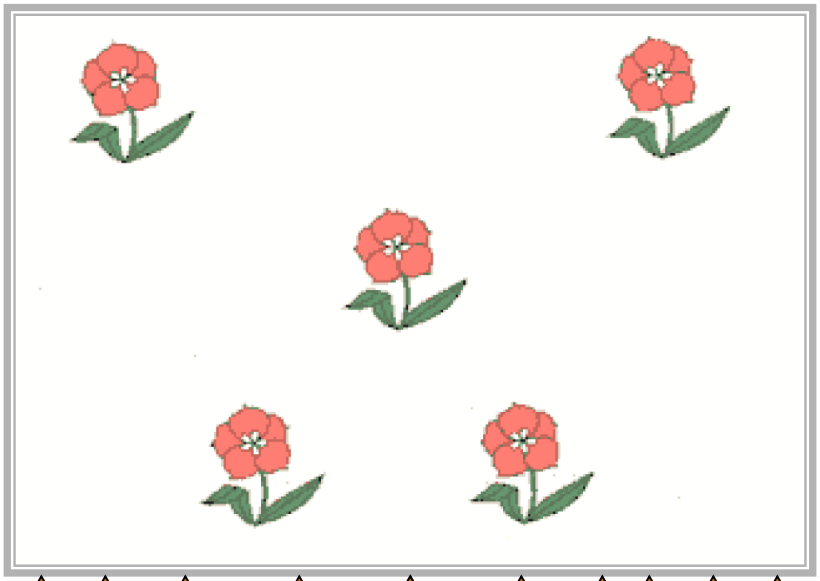
NORTHERN POPULATION

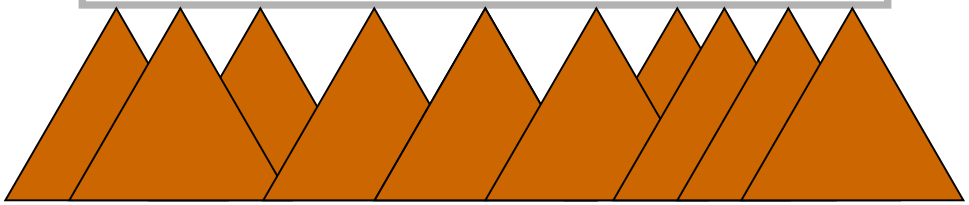
GEOLOGIC BARRIER REMOVED

SOUTHERN POPULATION

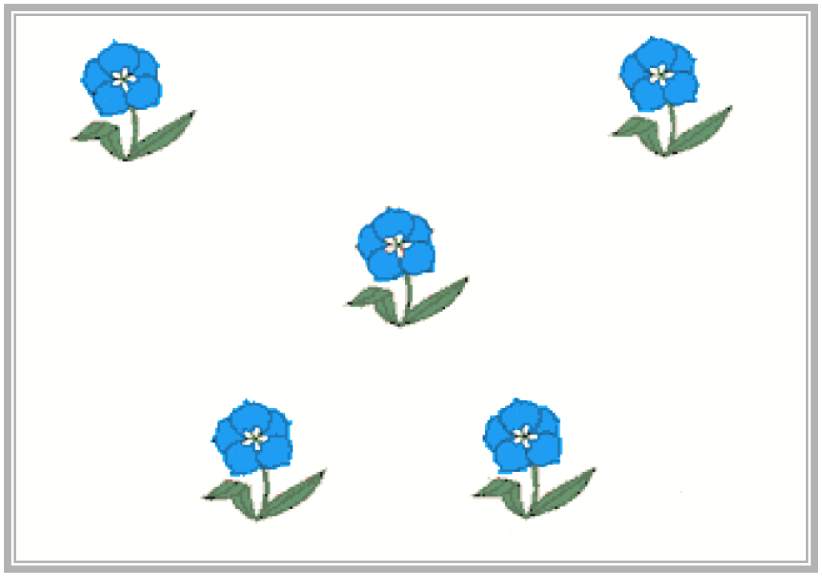
NORTHERN POPULATION



MOUNTAIN RANGE ERODES

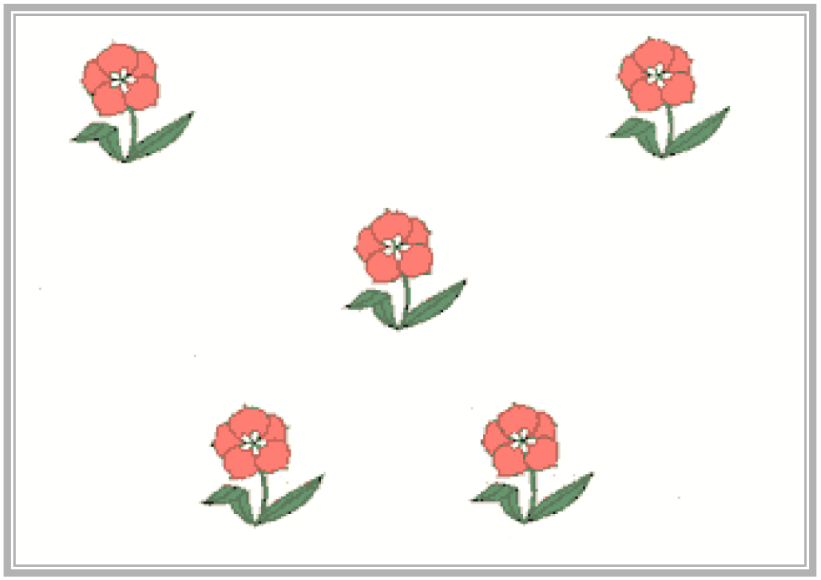


MOUNTAIN RANGE ERODES

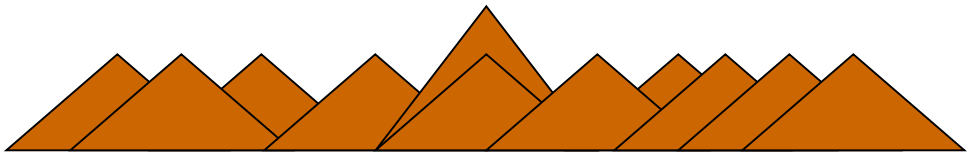


SOUTHERN POPULATION

NORTHERN POPULATION



TIME



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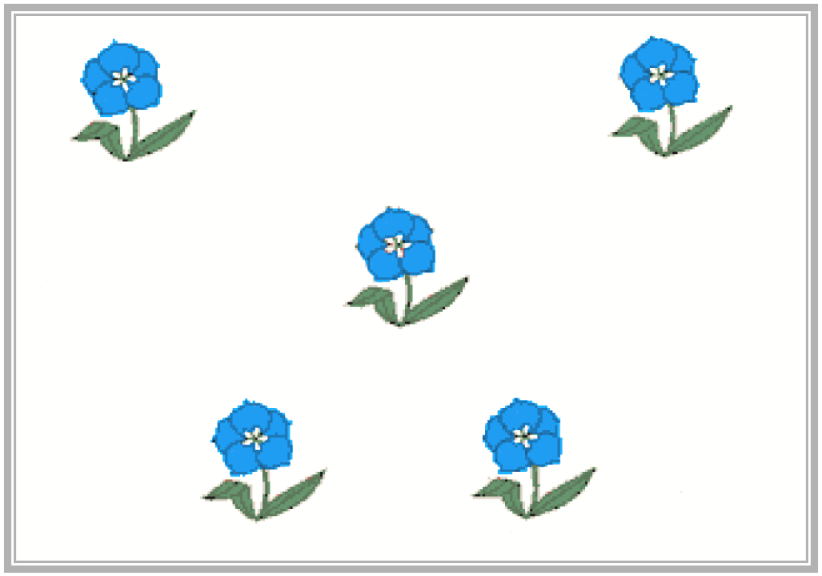
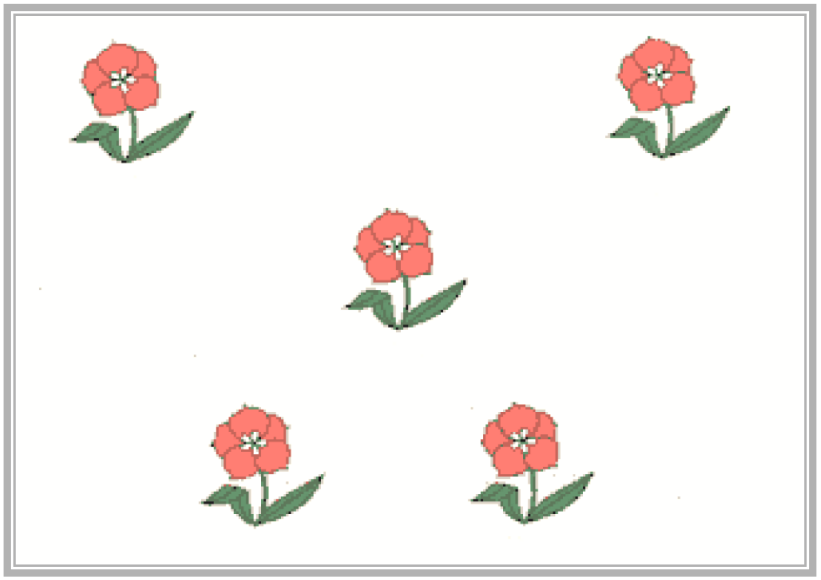


SOUTHERN POPULATION

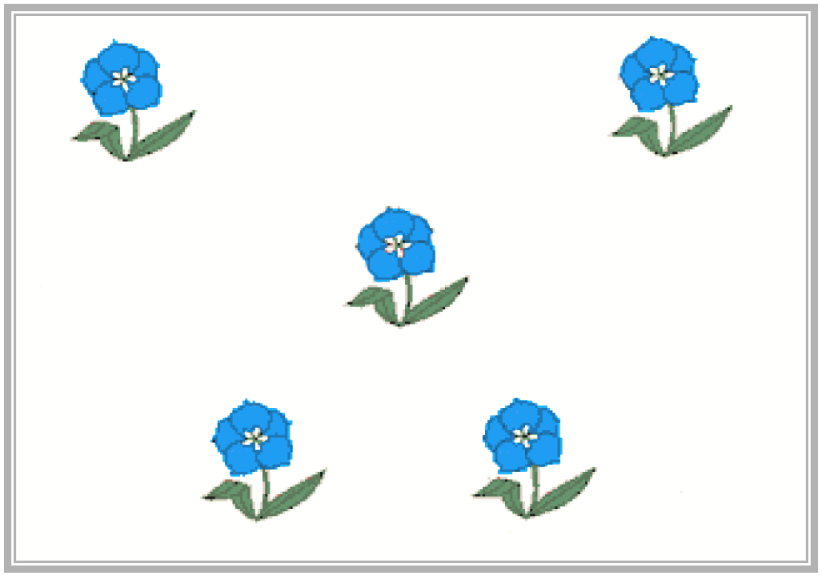
T

NORTHERN POPULATION



TIME

TIME

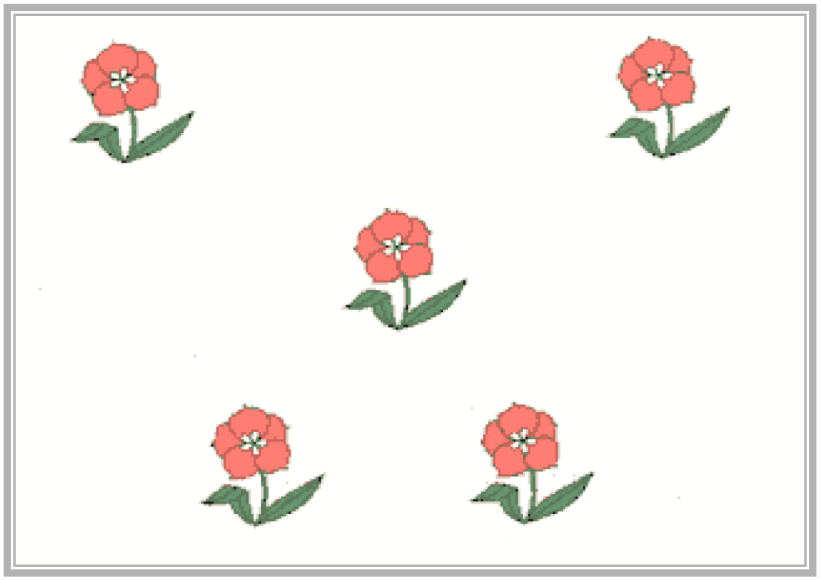


SOUTHERN POPULATION

T

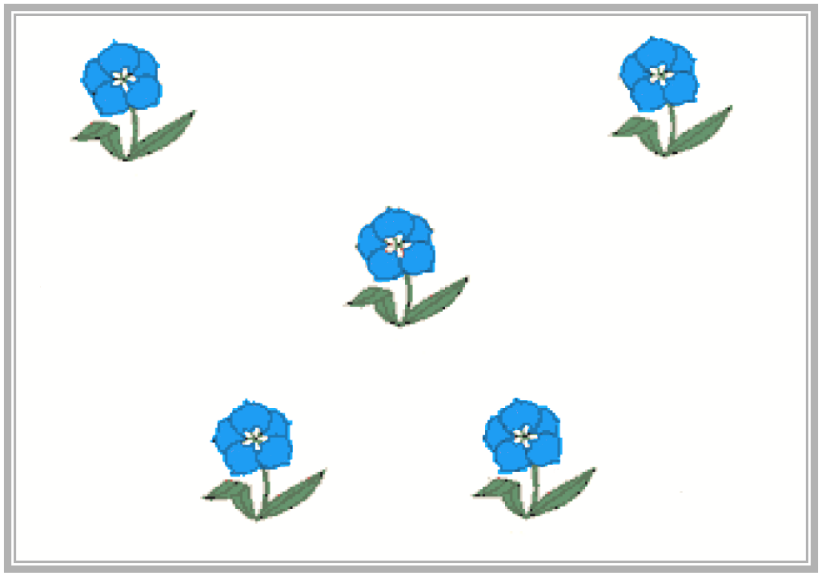
S

NORTHERN POPULATION



MOUNTAIN RANGE ERODES

MOUNTAIN RANGE ERODES

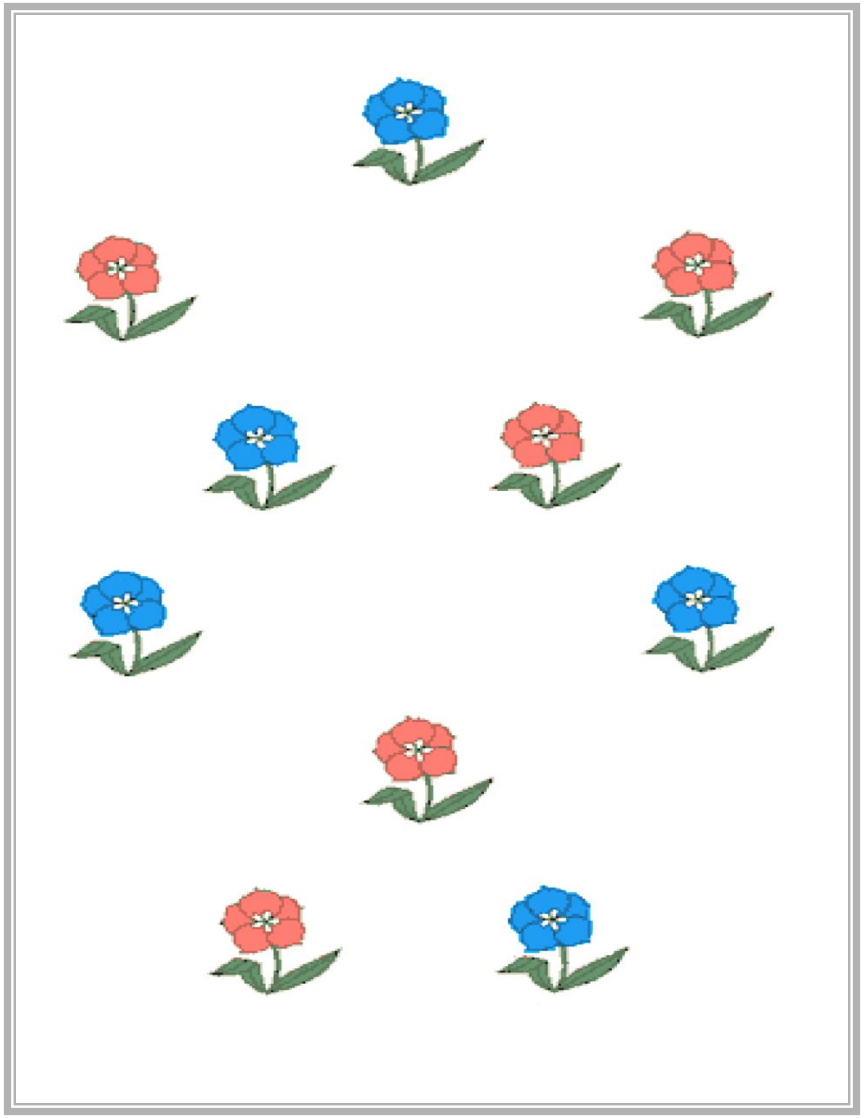


SOUTHERN POPULATION

DISTRIBUTION

NORTHERN POPULATION

SAME GEOGRAPHIC AREA

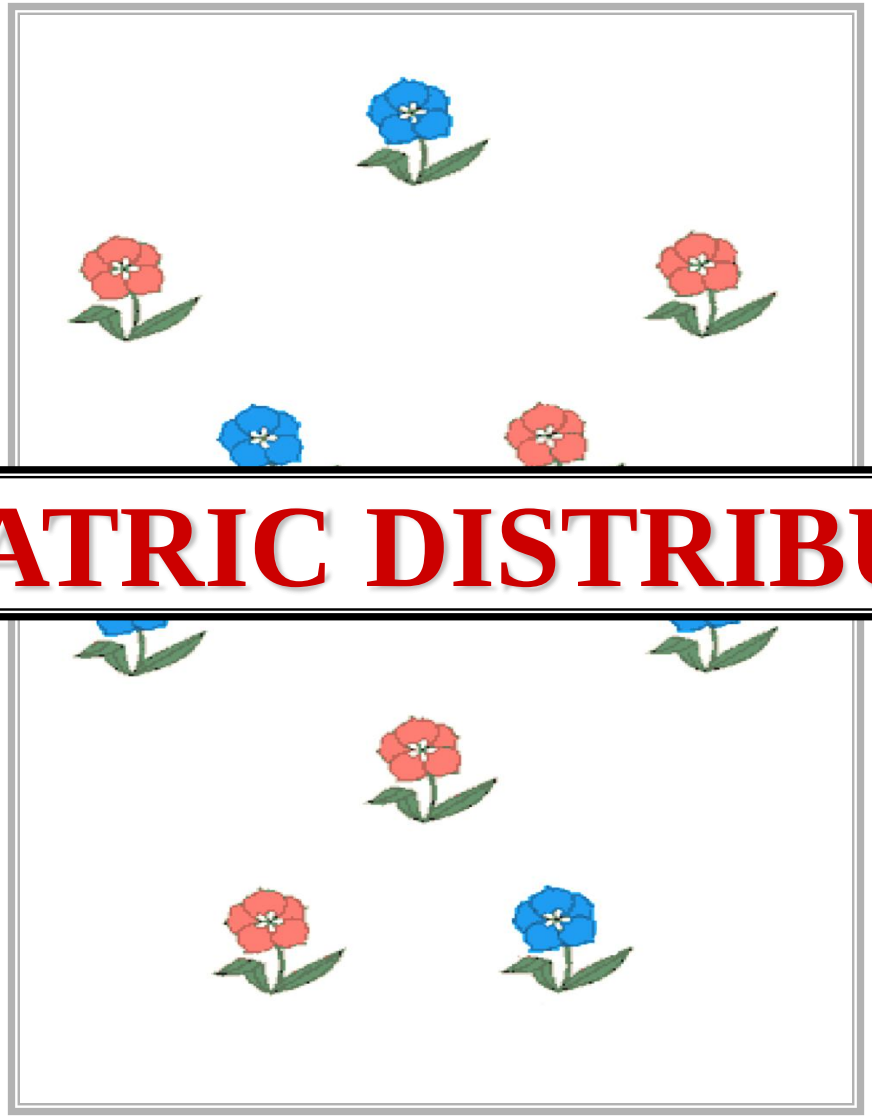


SAME GEOGRAPHIC AREA

SOUTHERN POPULATION

2 DAUGHTER SPECIES

DISTRIBUTION



SYMPATRIC DISTRIBUTION

2 DAUGHTER SPECIES

ALLOPATRIC SPECIATION OUTCOME

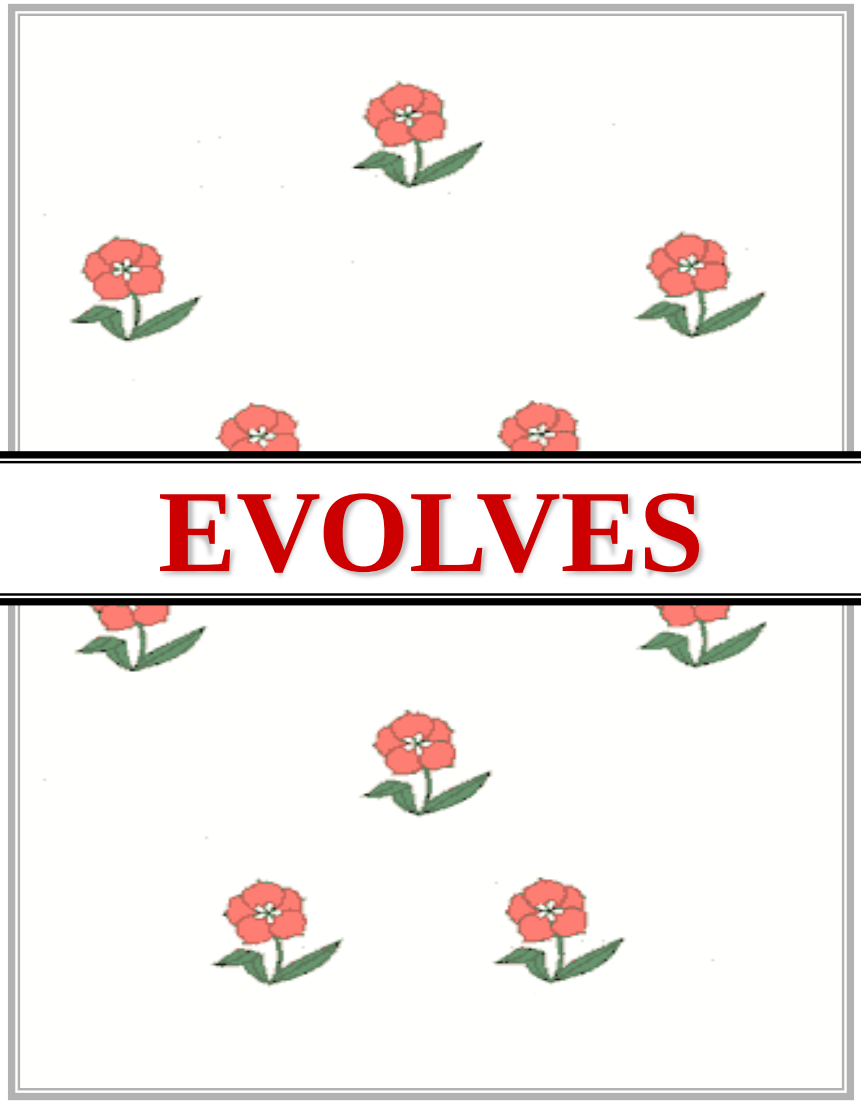
ALLOPATRIC SPECIATION

PARENTAL SPECIES

PARENTAL SPECIES

ALLOPATRIC SPECIATION

AS



EVOLVES

PARENTAL SPECIES

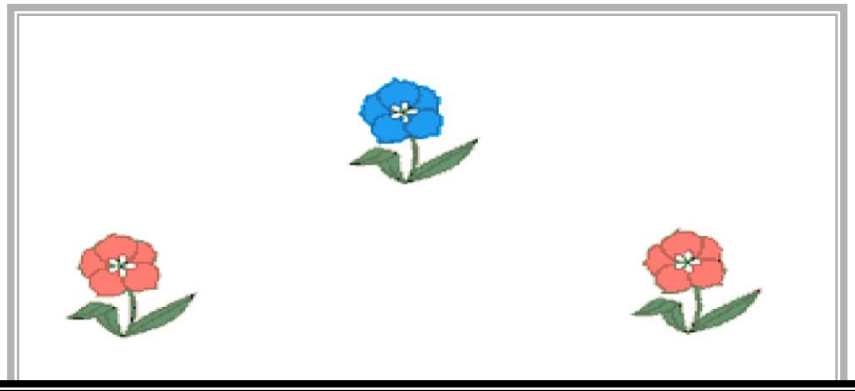
ALLOPATRIC SPECIATION

DS

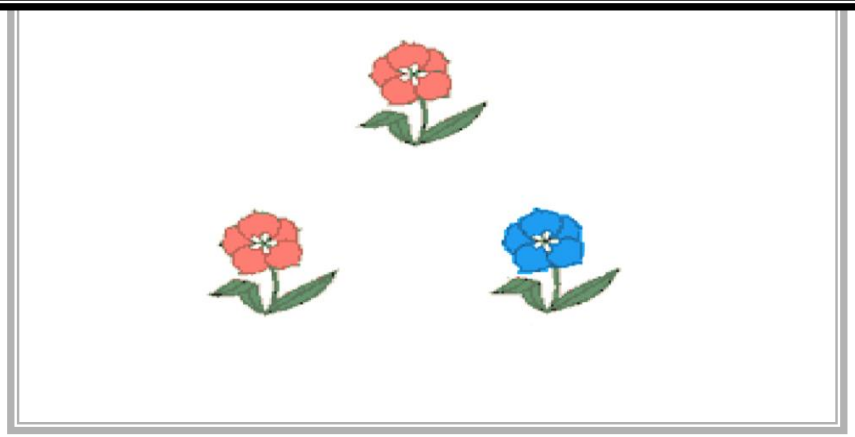
ALLOPATRIC SPECIATION

PARENTAL SPECIES

ALLOPATRIC SPECIATION

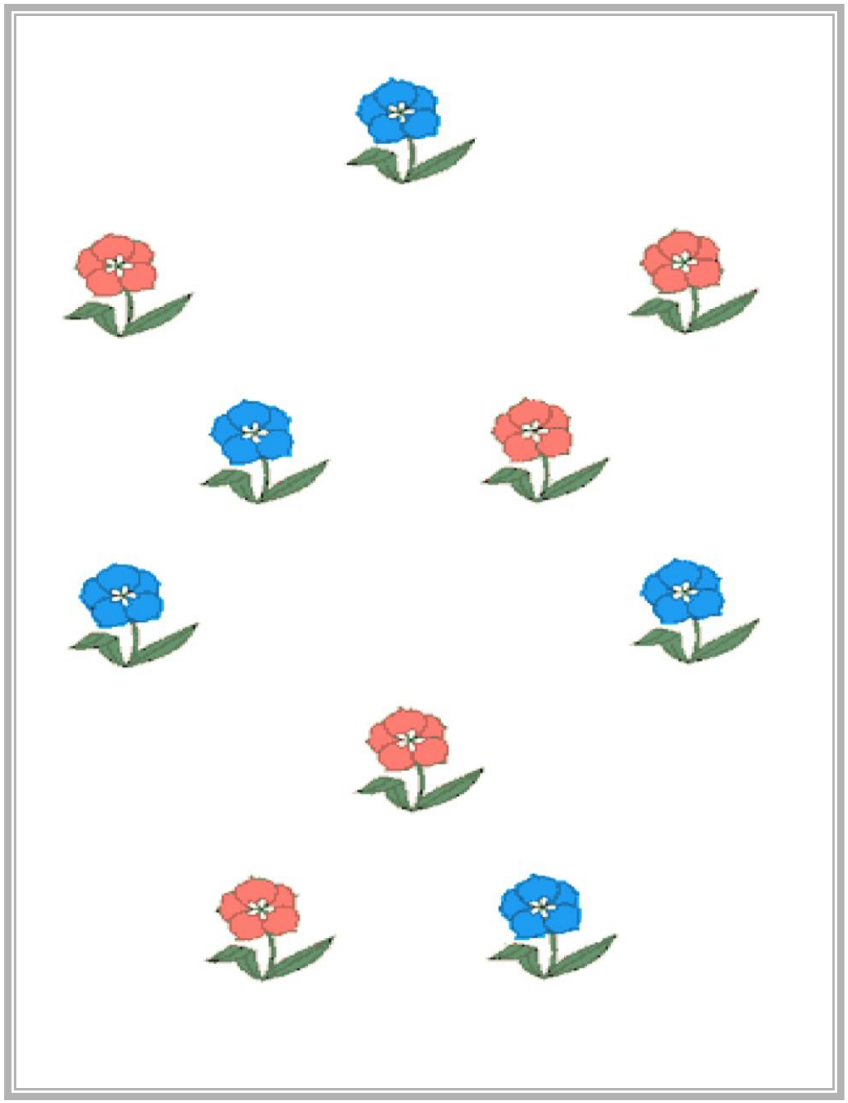


DAUGHTER SPECIES EVOLVES



DAUGHTER SPECIES EVOLVES

ALLOPATRIC SPECIATION



1 PARENTAL SPECIES & 1 DAUGHTER SPECIES

ALLOPATRIC SPECIATION

I

INCREASE PLANT DIVERSITY

ALLOPATRIC SPECIATION

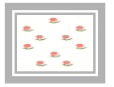
INCREASE PLANT DIVERSITY

SYMPATRIC SPECIATION

C

CYTOTYPES VS POLYPLOIDS

CYTOTYPES



CY

+

CYTOTYPES

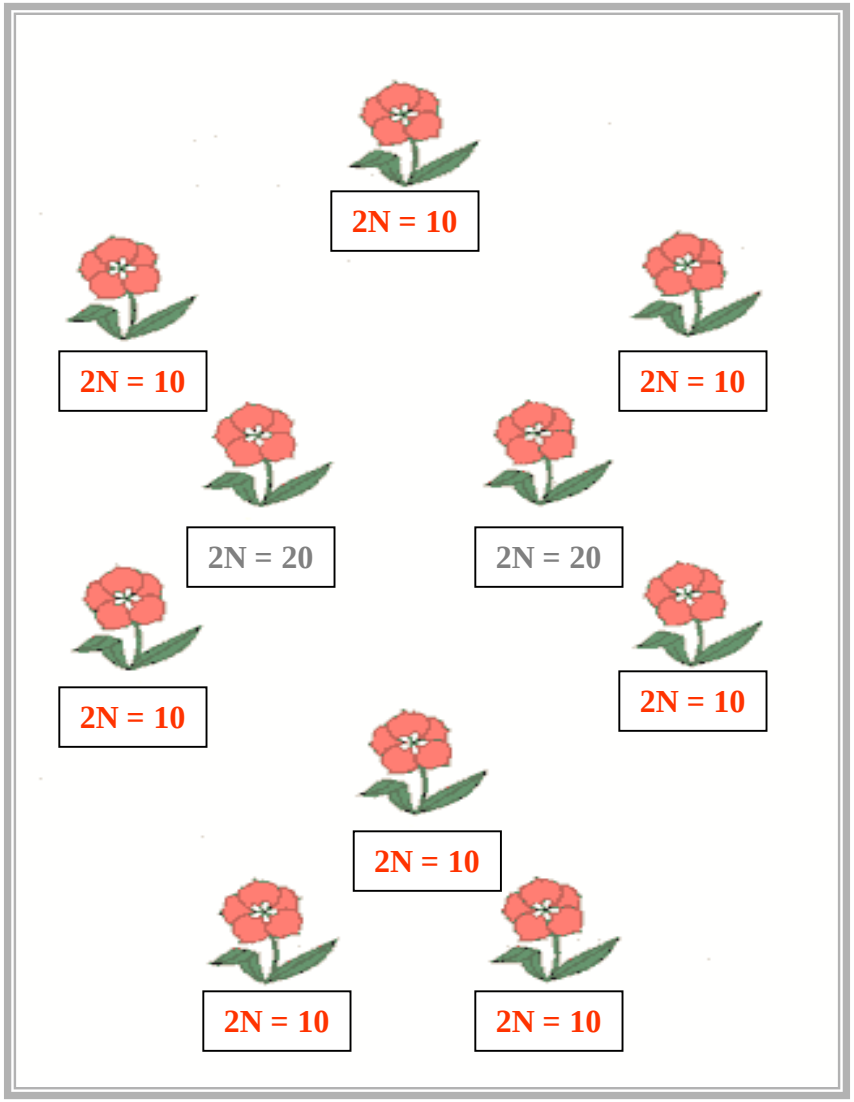
RELATED POPULATIONS WITH DIFFERENT CHROMOSOME NUMBERS

CYTOTYPES

CYTOTYPES VS POLYPLOIDS

^
P

RELATED POPULATIONS WITH DIFFERENT CHROMOSOME NUMBERS

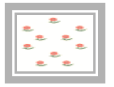


RELATED POPULATIONS WITH DIFFERENT CHROMOSOME NUMBERS

CYTOTYPES

POLYPLOIDS

POLYPLOIDS



PL

+

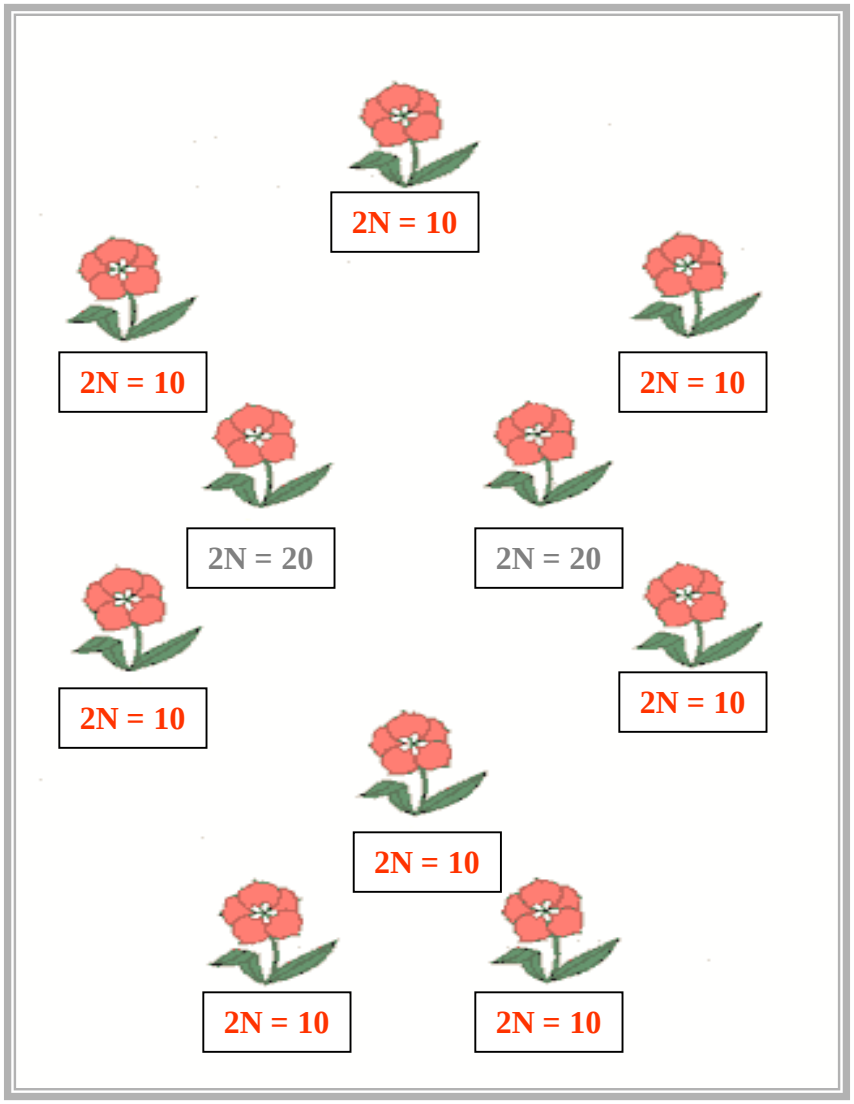
RELATED POPULATIONS WITH AN ADDITIONAL CHROMOSOME COMPLIMENT

POLYPLOIDS

CYTOTYPES VS POLYPLOIDS

?

RELATED POPULATIONS WITH AN ADDITIONAL CHROMOSOME COMPLIMENT



RELATED POPULATIONS WITH AN ADDITIONAL CHROMOSOME COMPLIMENT

POLYPLOIDS

QUESTION

HOW DO CYTOTYPES AND POLYPLOIDS ARISE WITHIN A POPULATION?

QUESTION

ANSWER

PLOIDY LEVEL CHANGE OCCURS

ANSWER

CYTOTYPES VS POLYPLOIDS

^

PLOIDY LEVEL CHANGE

GIVES RISE TO

CYTOTYPES & POLYPLOIDS

CYTOTYPES VS POLYPLOIDS

PLOIDY LEVEL CHANGE

PLOIDY LEVEL CHANGE

>

CHANGE CHROMOSOME NUMBER

PLOIDY LEVEL CHANGE

PLOIDY LEVEL CHANGE

OCCURS DUE TO MEIOSIS NON-DISJUNCTION

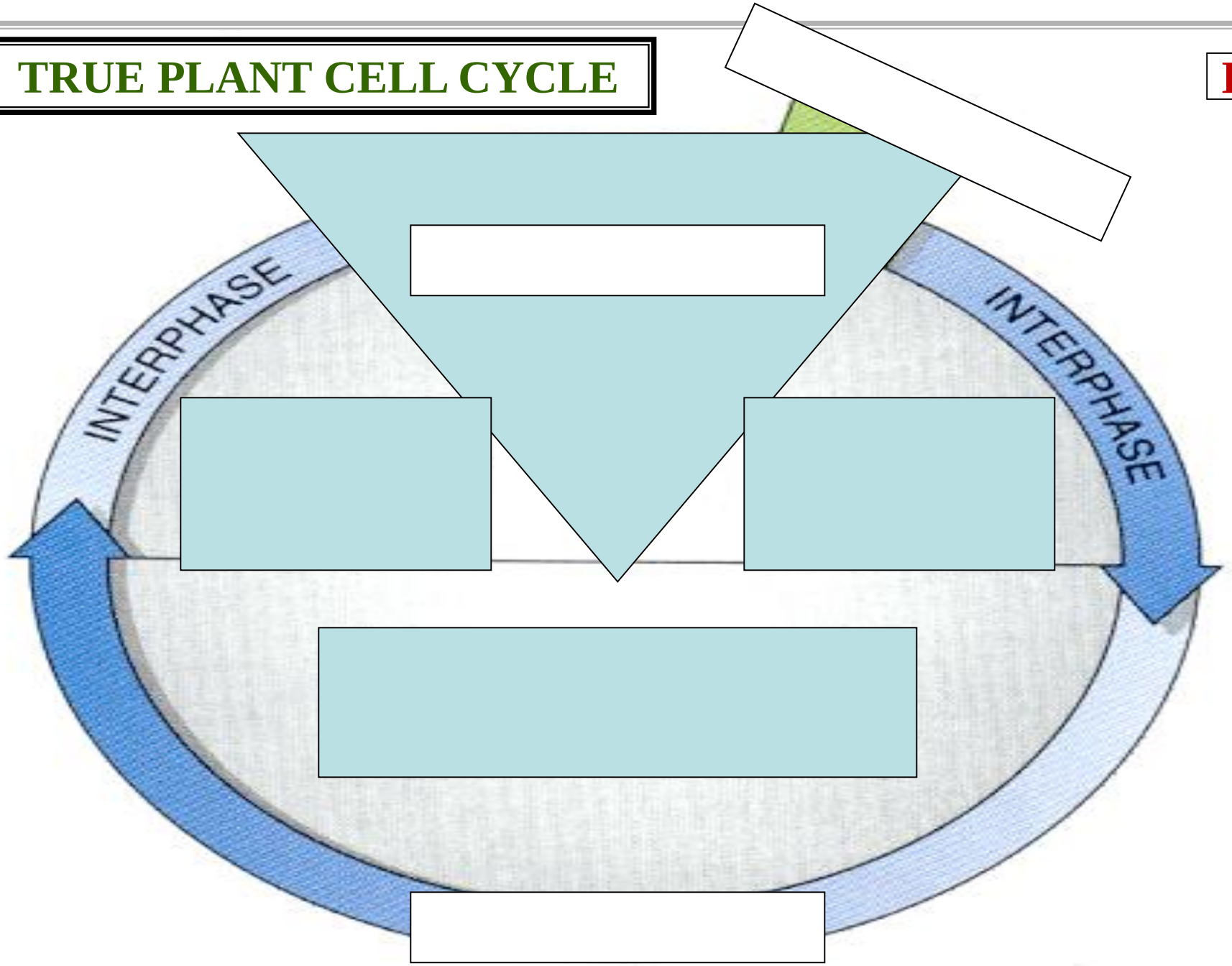
PLOIDY LEVEL CHANGE

MEIOSIS
NON-DISJUNCTION

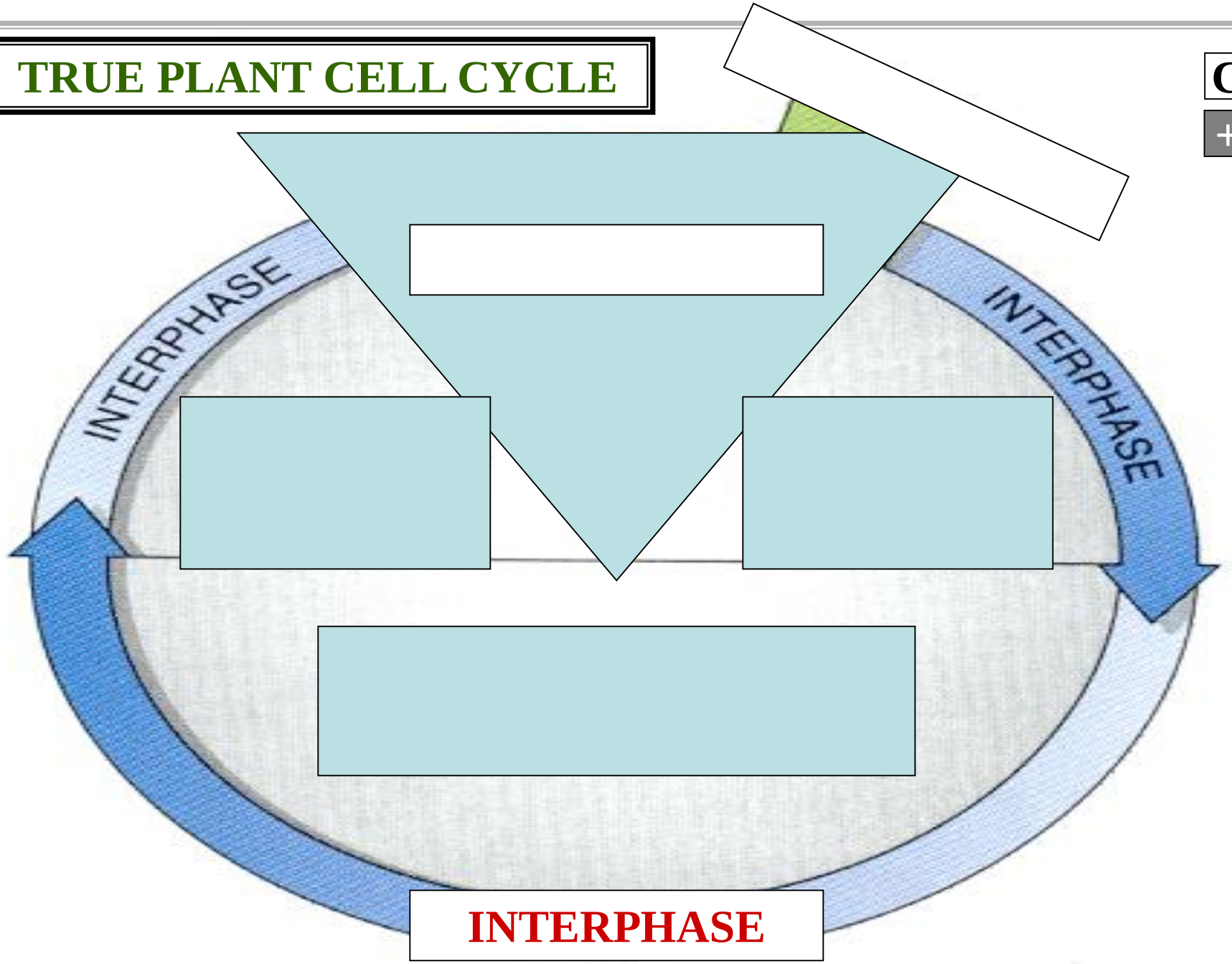
CELL CYCLE STAGES

TRUE PLANT CELL CYCLE

I

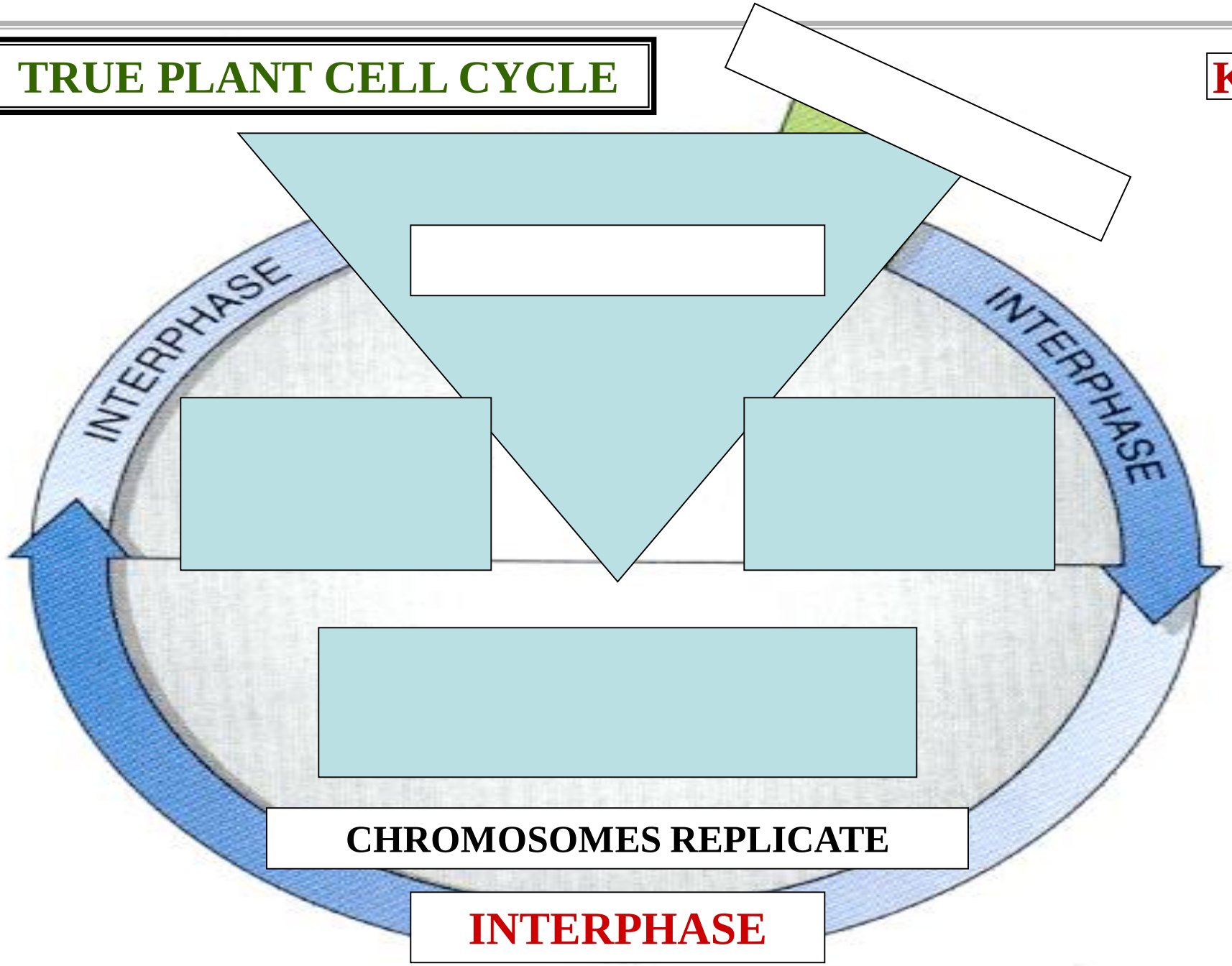


TRUE PLANT CELL CYCLE

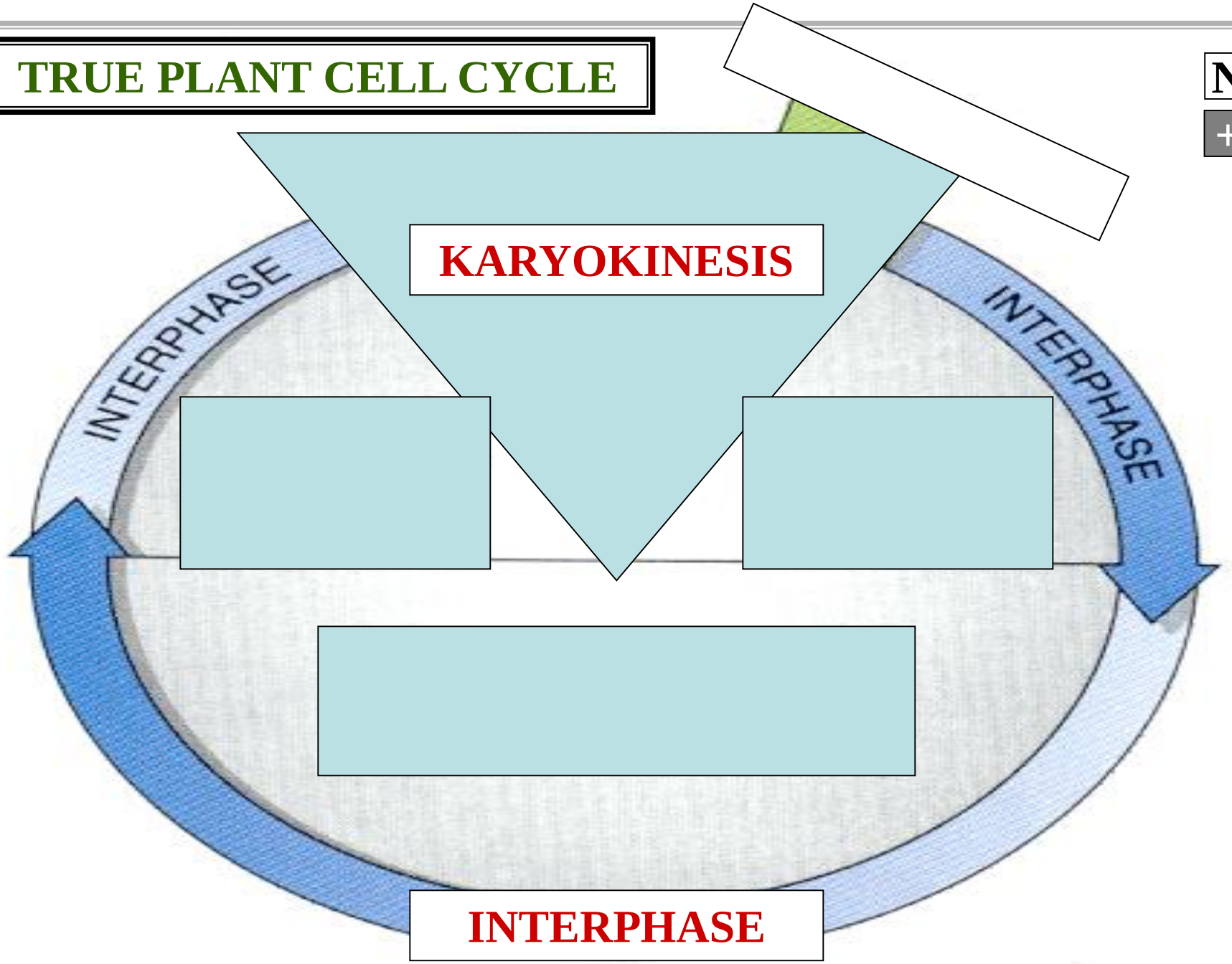


TRUE PLANT CELL CYCLE

K

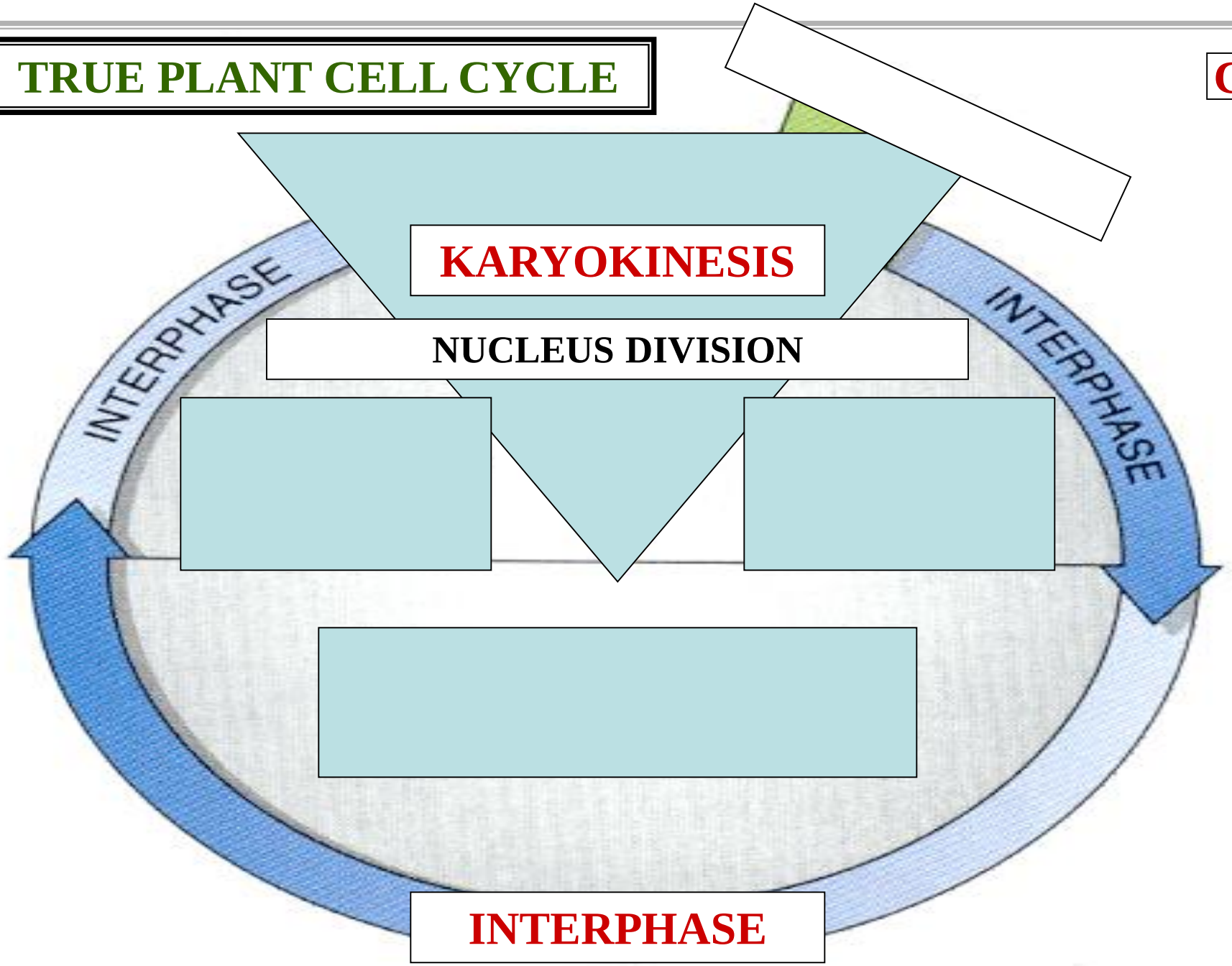


TRUE PLANT CELL CYCLE

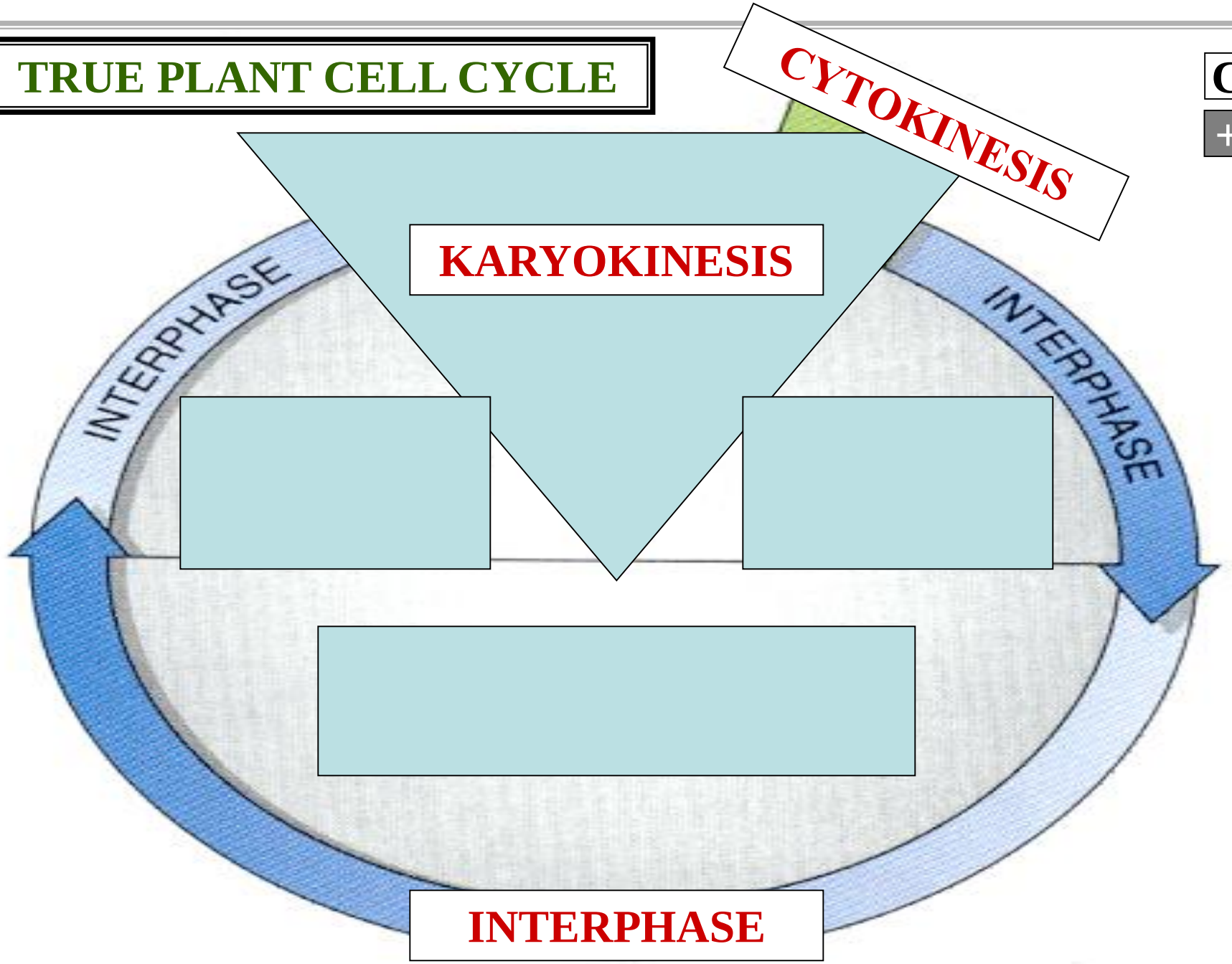


TRUE PLANT CELL CYCLE

C



TRUE PLANT CELL CYCLE



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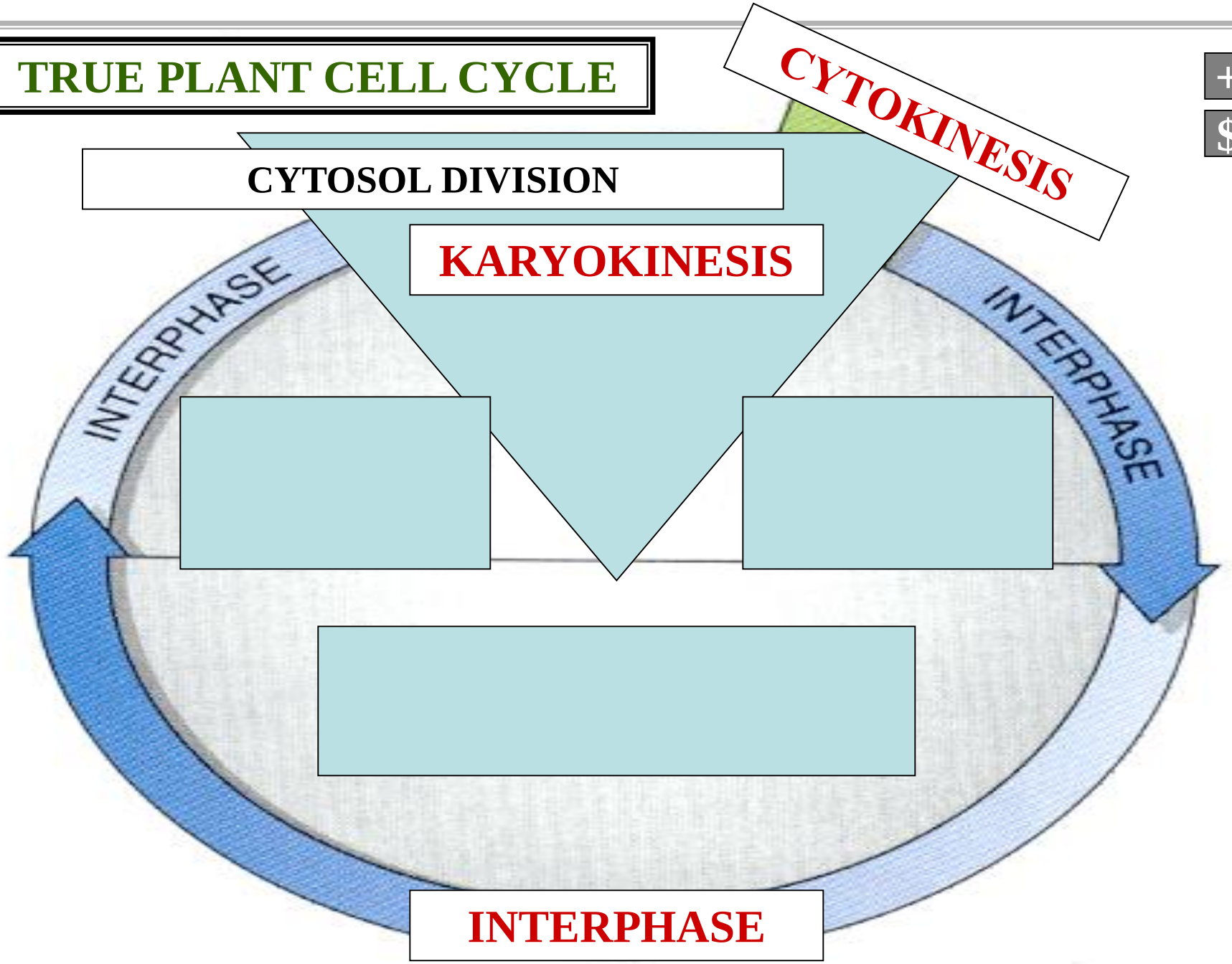
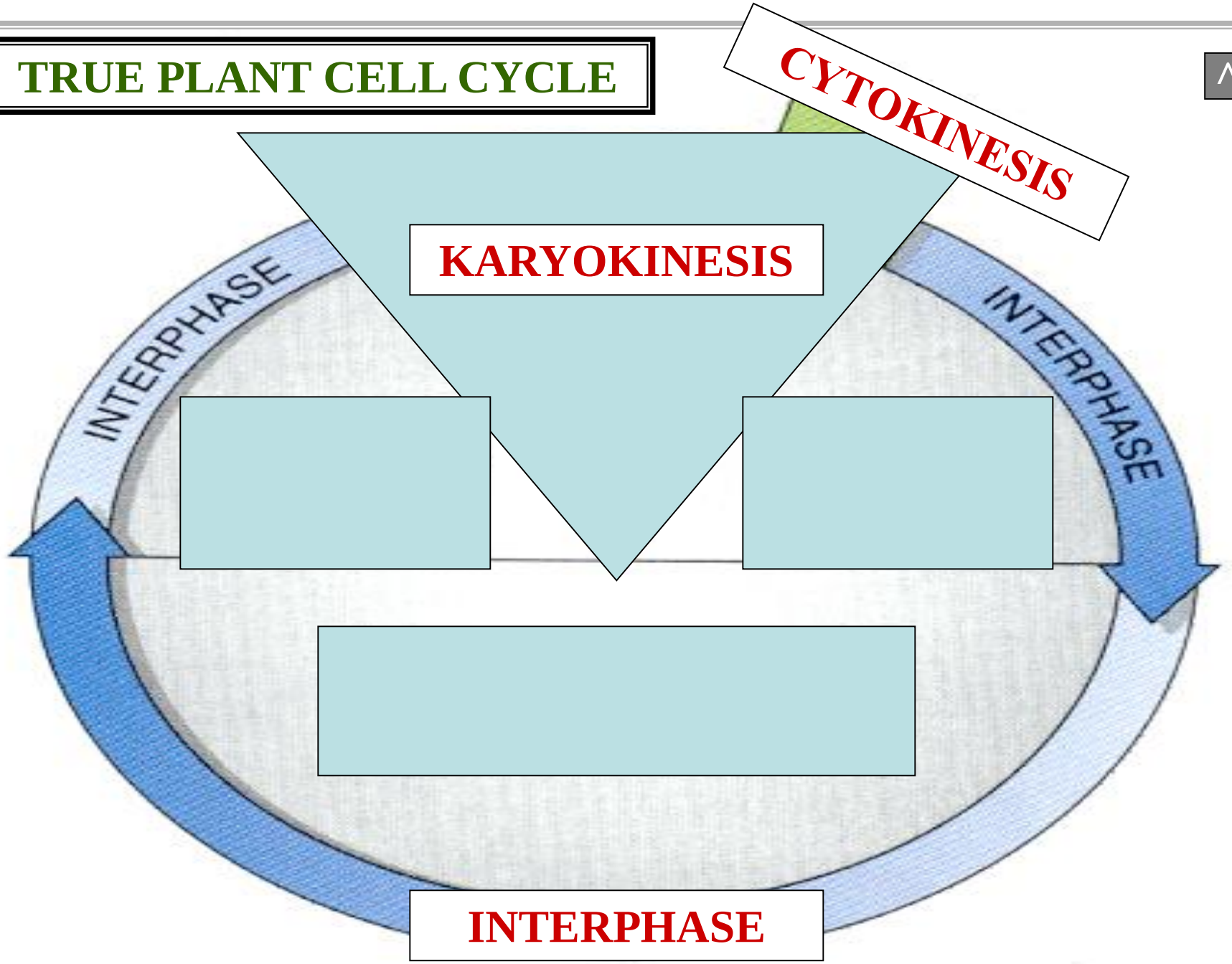


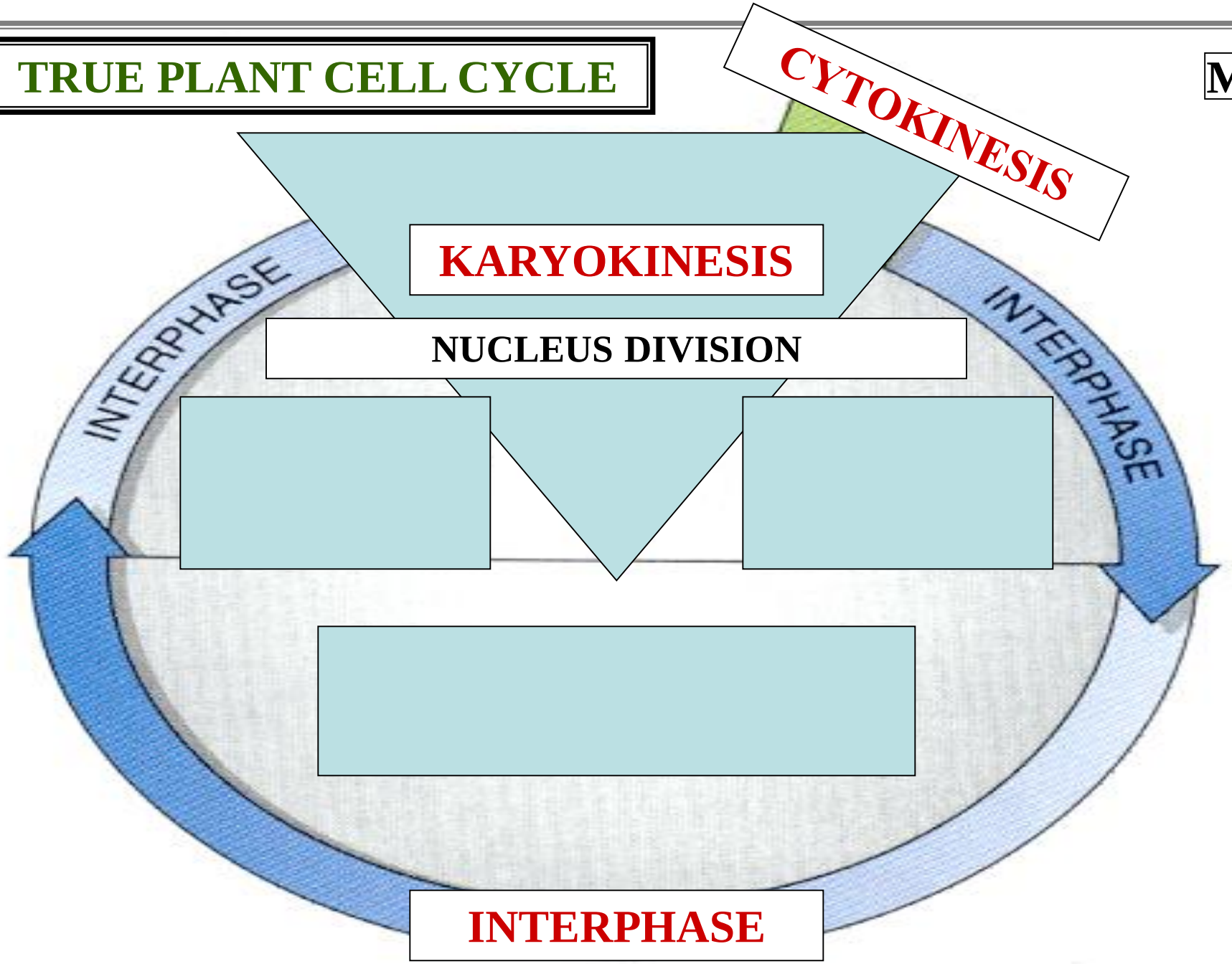
TRUE PLANT CELL CYCLE



KARYOKINESIS TYPES

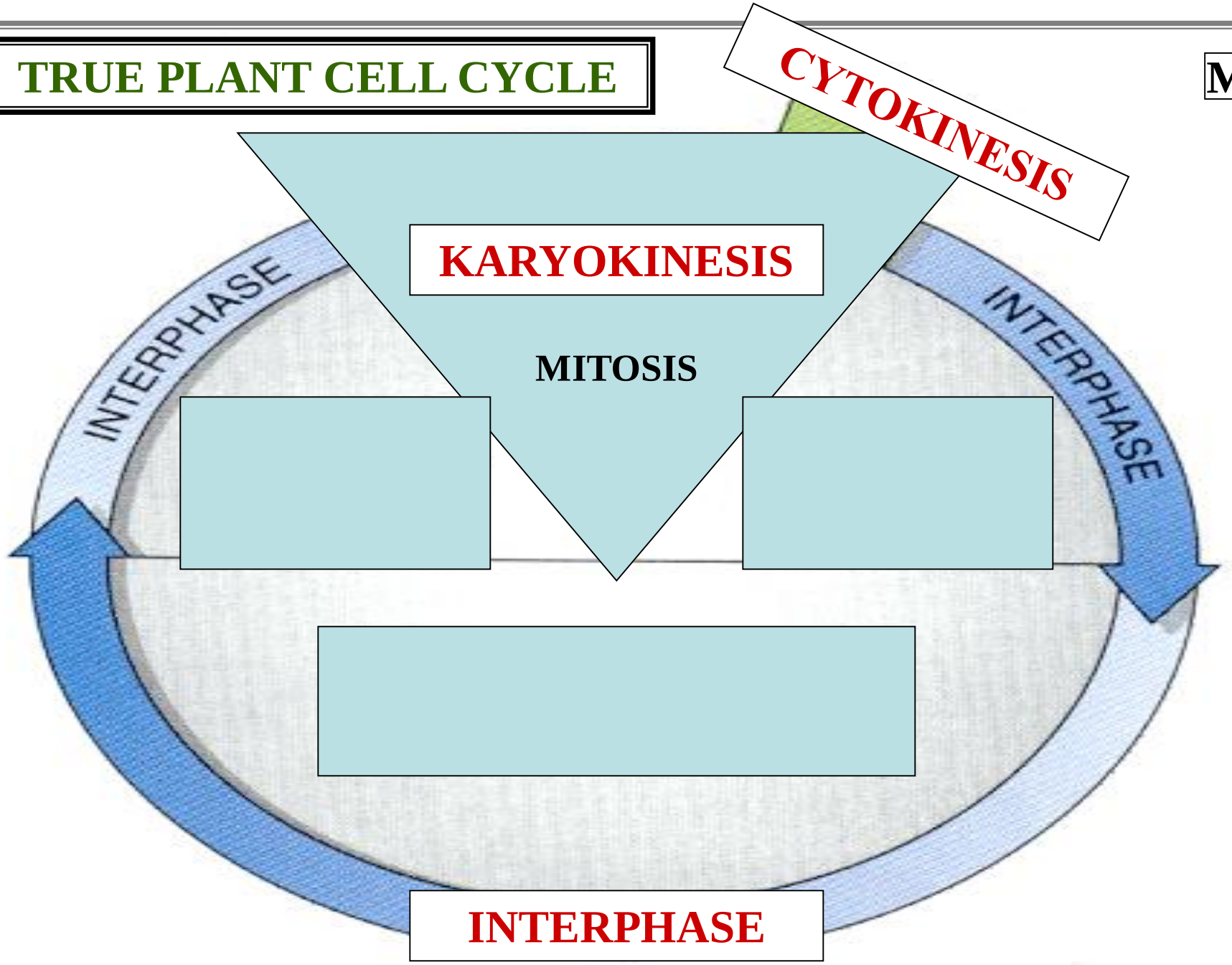
TRUE PLANT CELL CYCLE

M

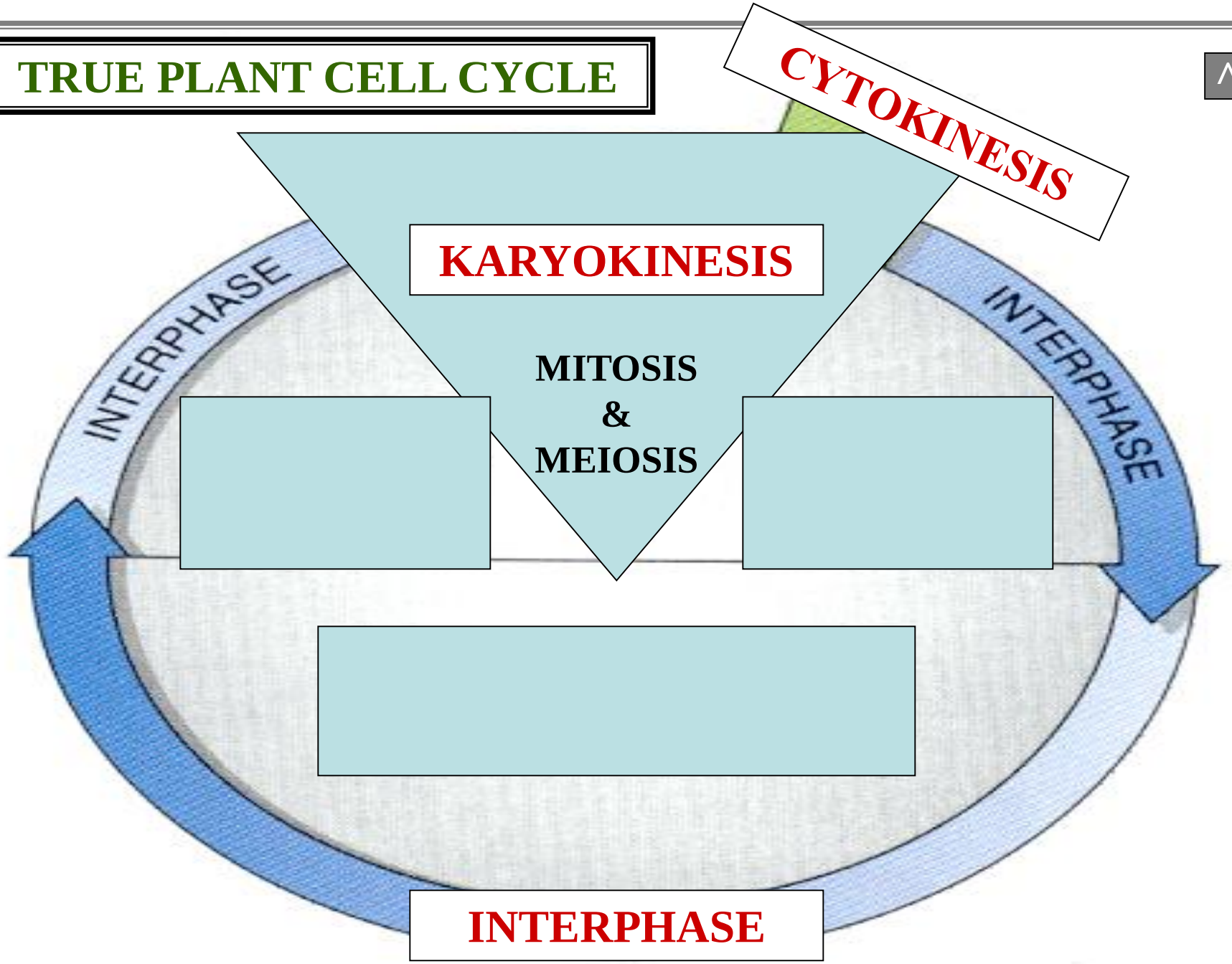


TRUE PLANT CELL CYCLE

M

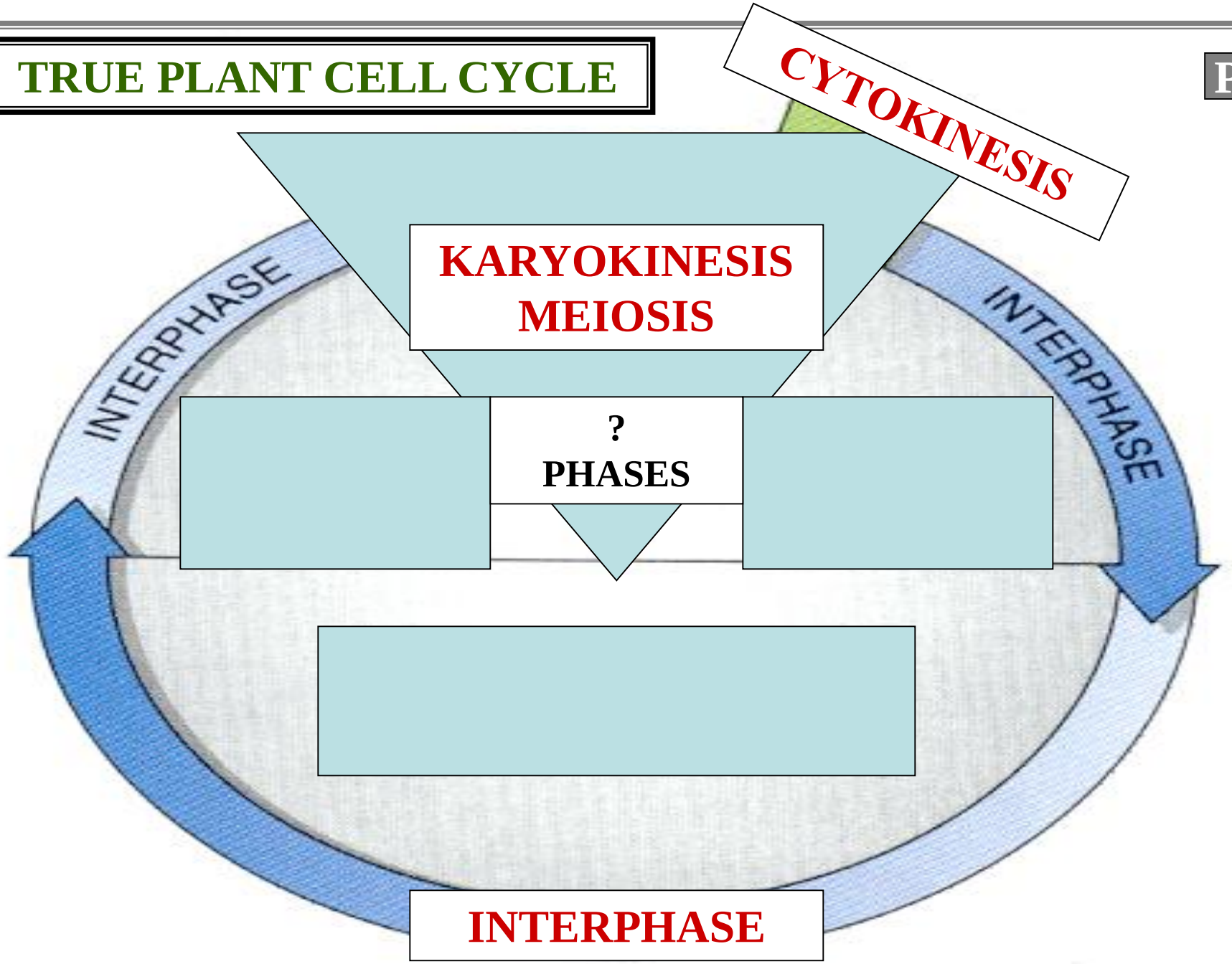


TRUE PLANT CELL CYCLE

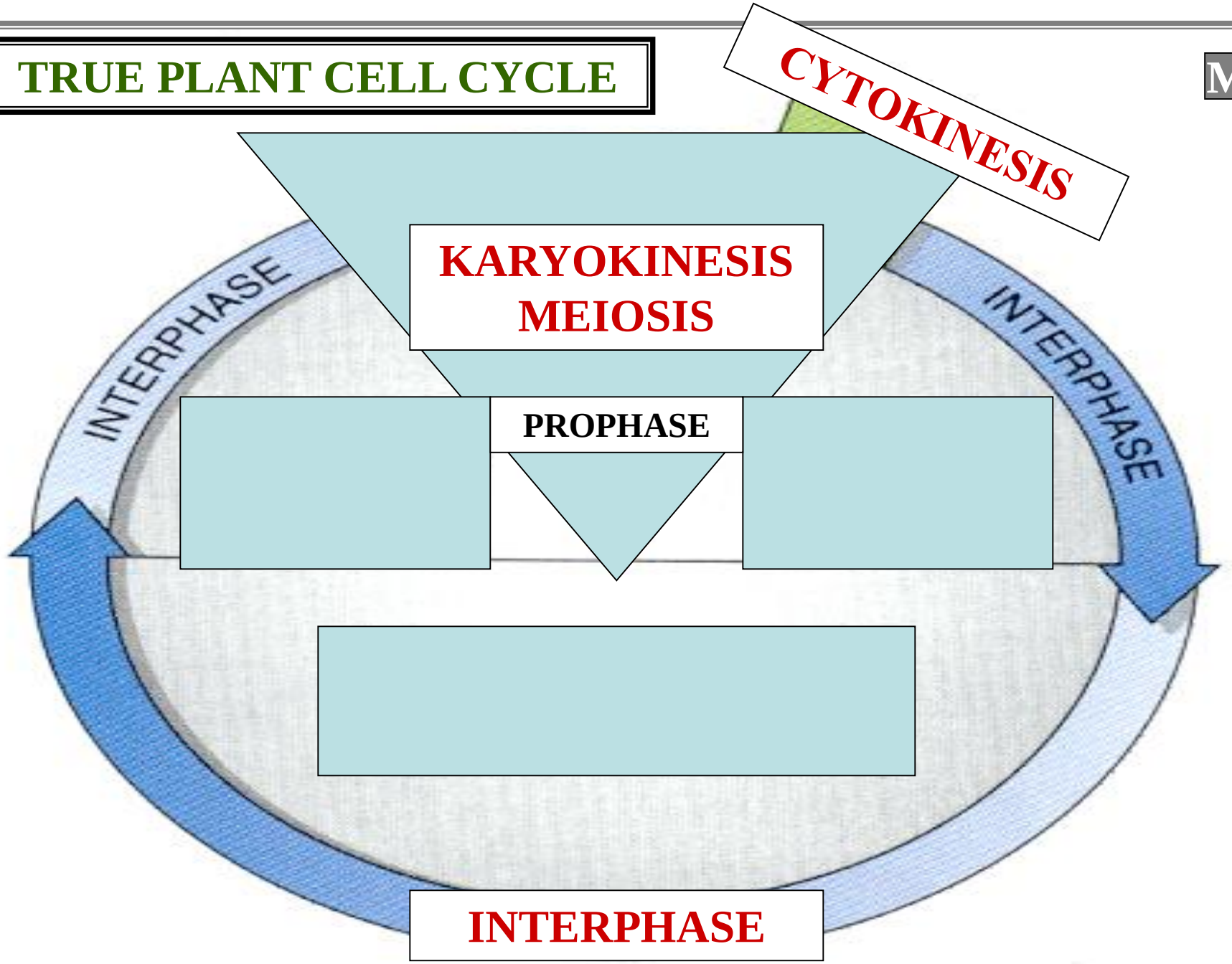


MEIOSIS
KARYOKINESIS
PHASES

TRUE PLANT CELL CYCLE

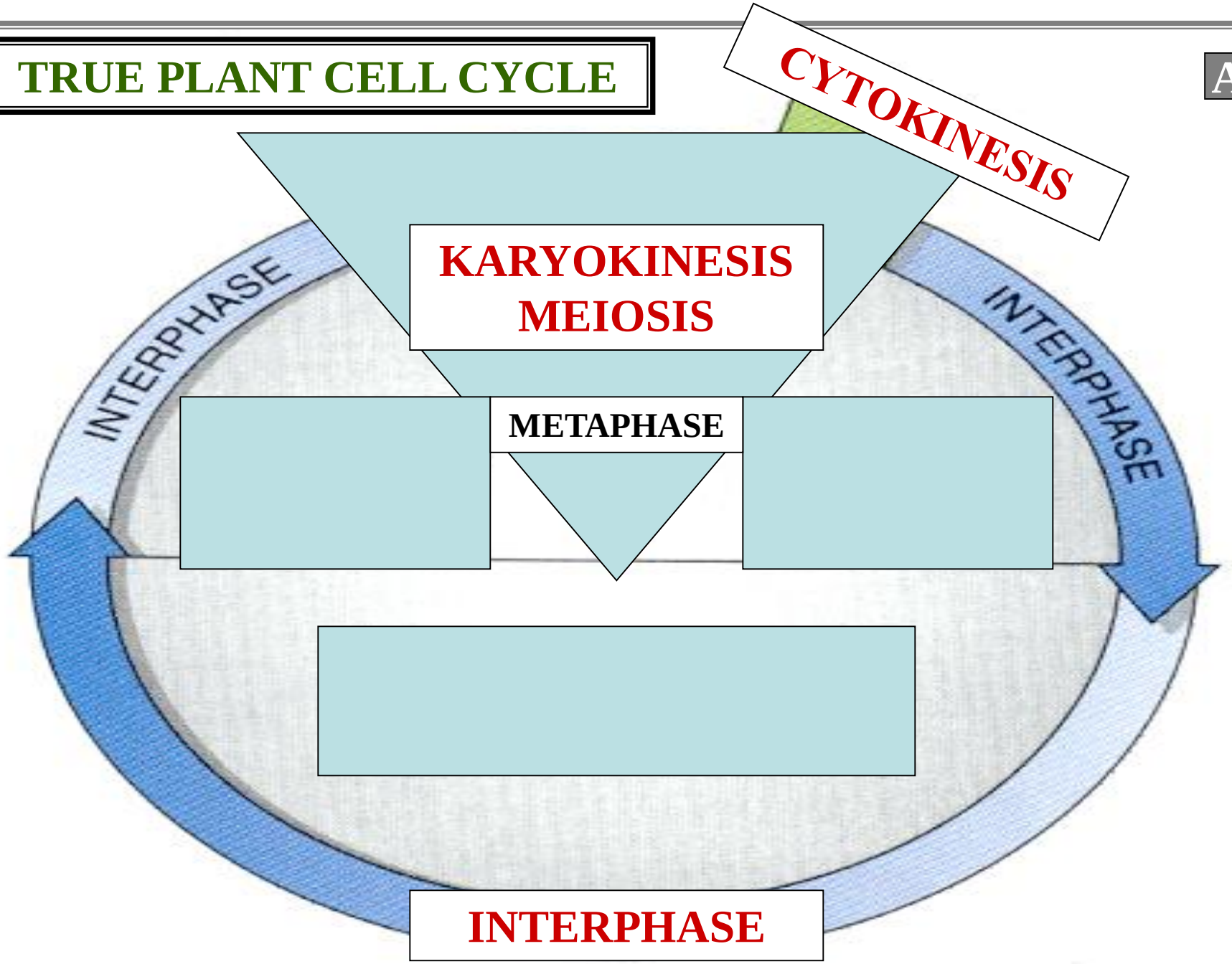


TRUE PLANT CELL CYCLE

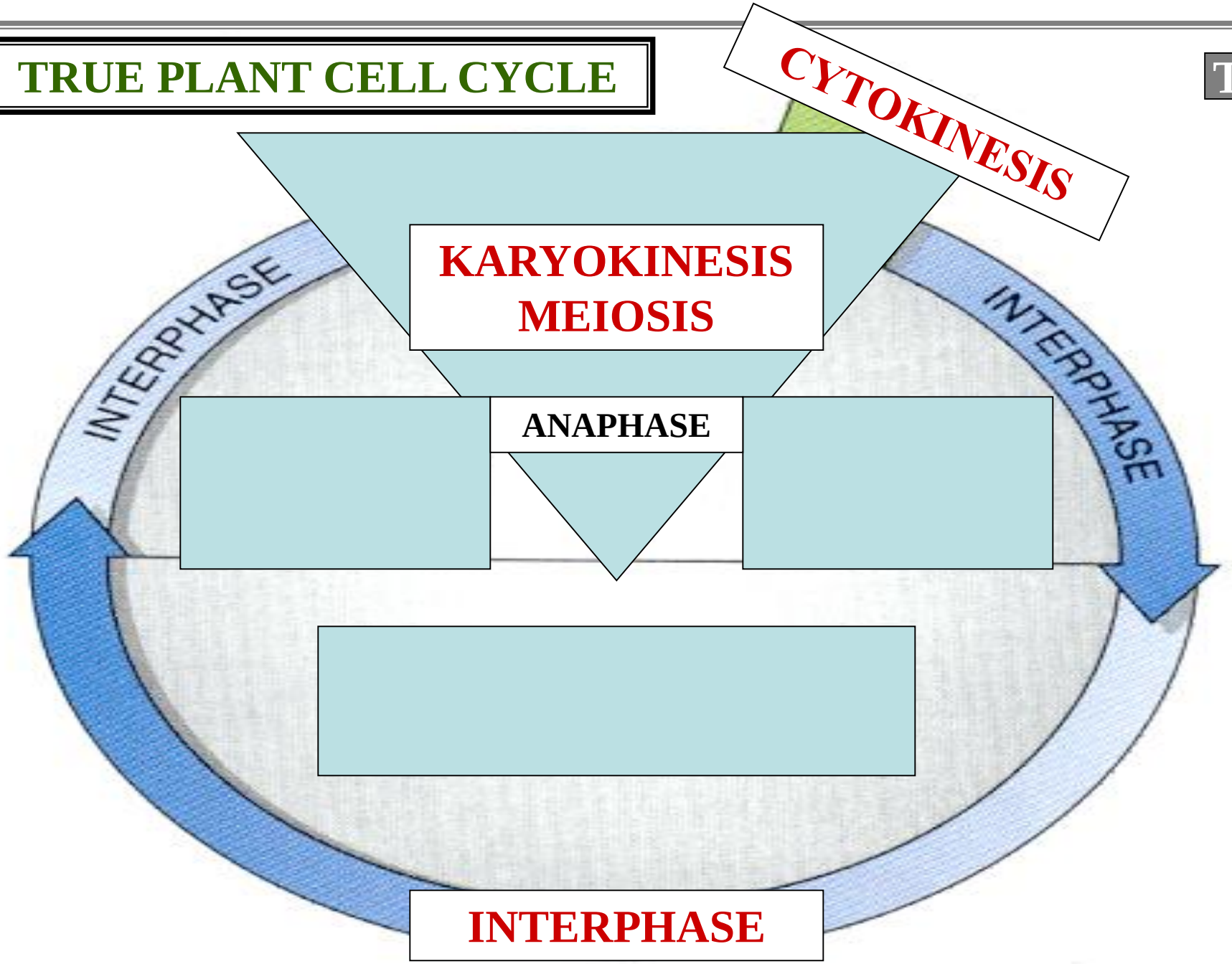


TRUE PLANT CELL CYCLE

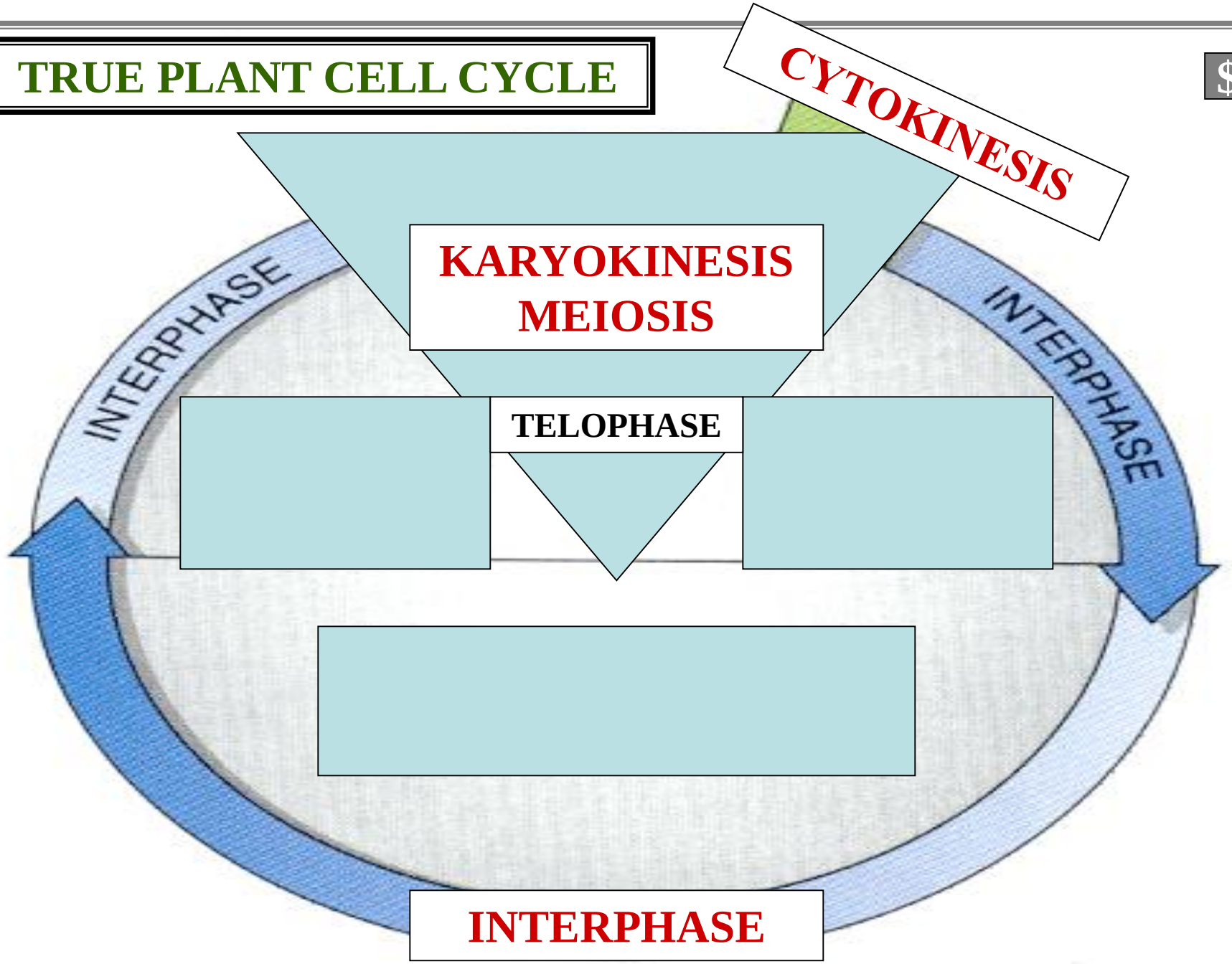
A



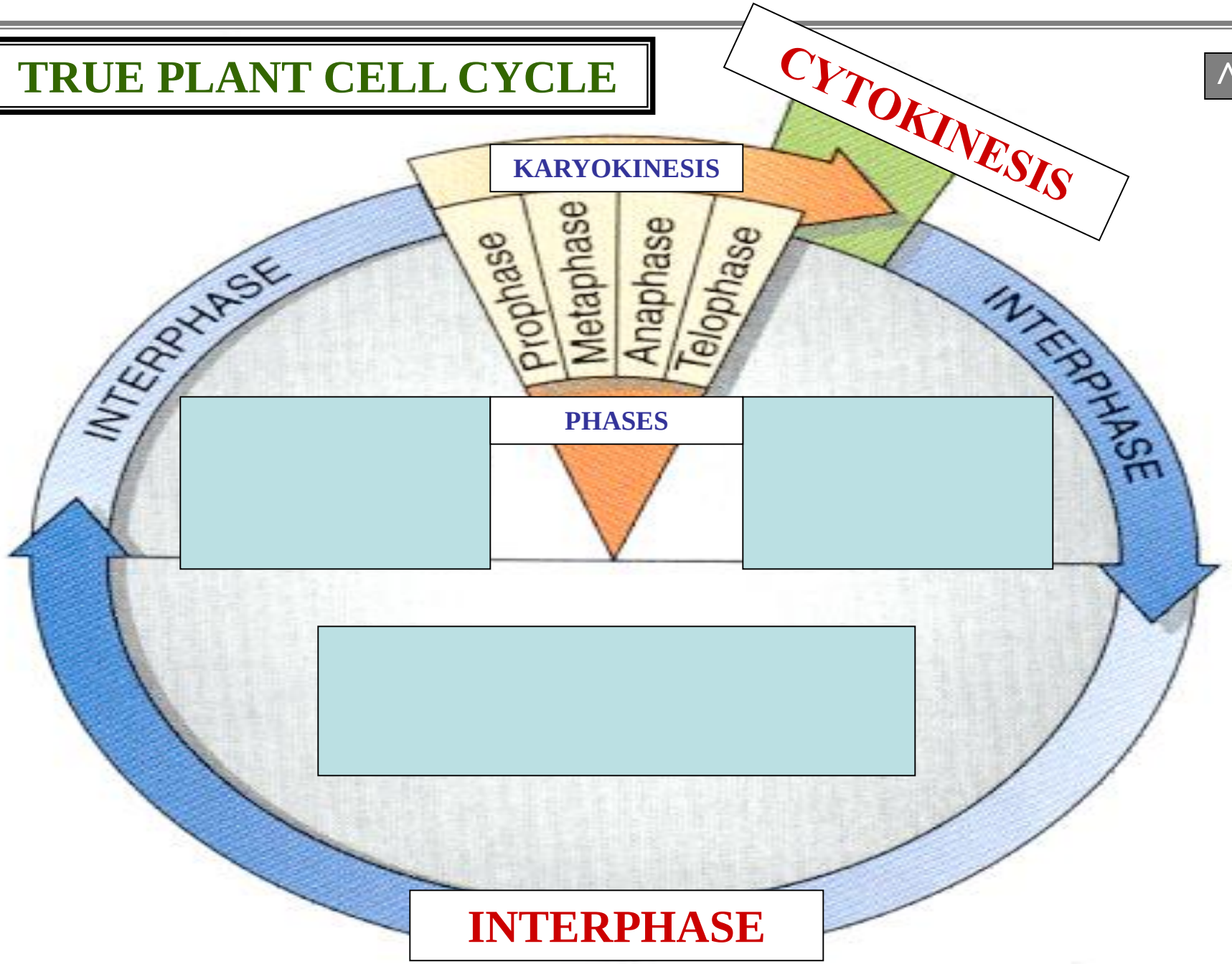
TRUE PLANT CELL CYCLE



TRUE PLANT CELL CYCLE



TRUE PLANT CELL CYCLE



MEIOSIS
ANAPHASE-II

MEIOSIS: ANAPHASE-II

NON-DISJUNCTION OCCURS

MEIOSIS: ANAPHASE-II

DISJUNCTION
VS
NON-DISJUNCTION

CHROMOSOME TERMS

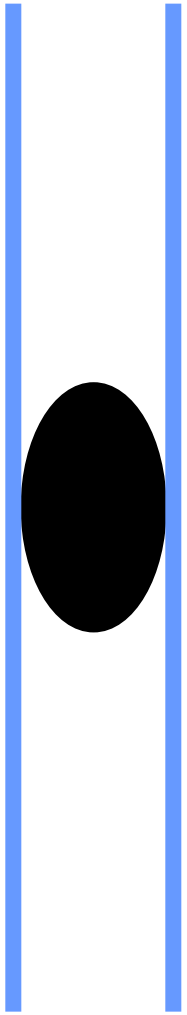
R

INTERPHASE - I

CHROMOSOME

?

INTERPHASE - I

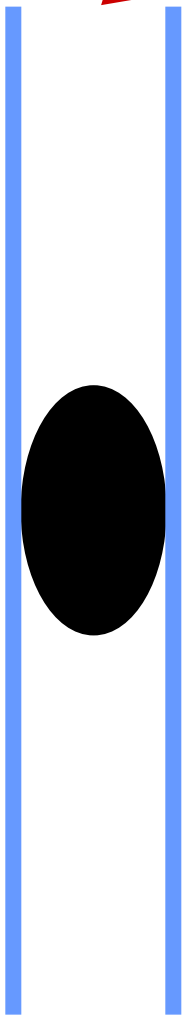


REPLICATED CHROMOSOME

C

?

INTERPHASE - I

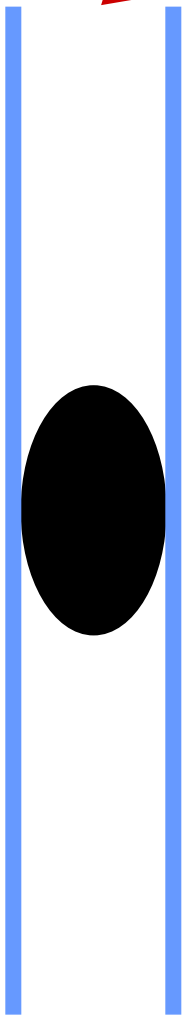


REPLICATED CHROMOSOME

?

CHROMATIDS

INTERPHASE - I

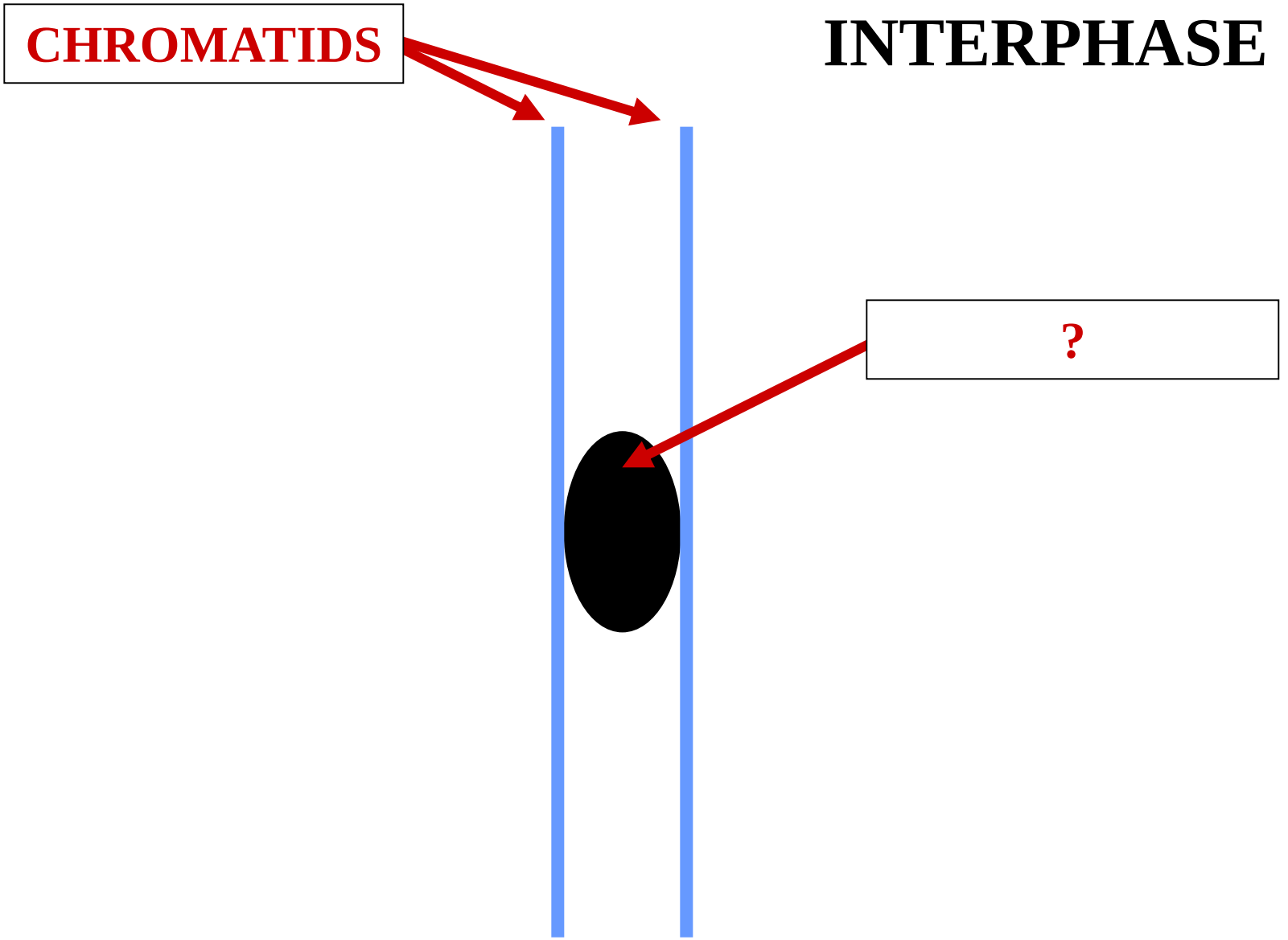


REPLICATED CHROMOSOME

C

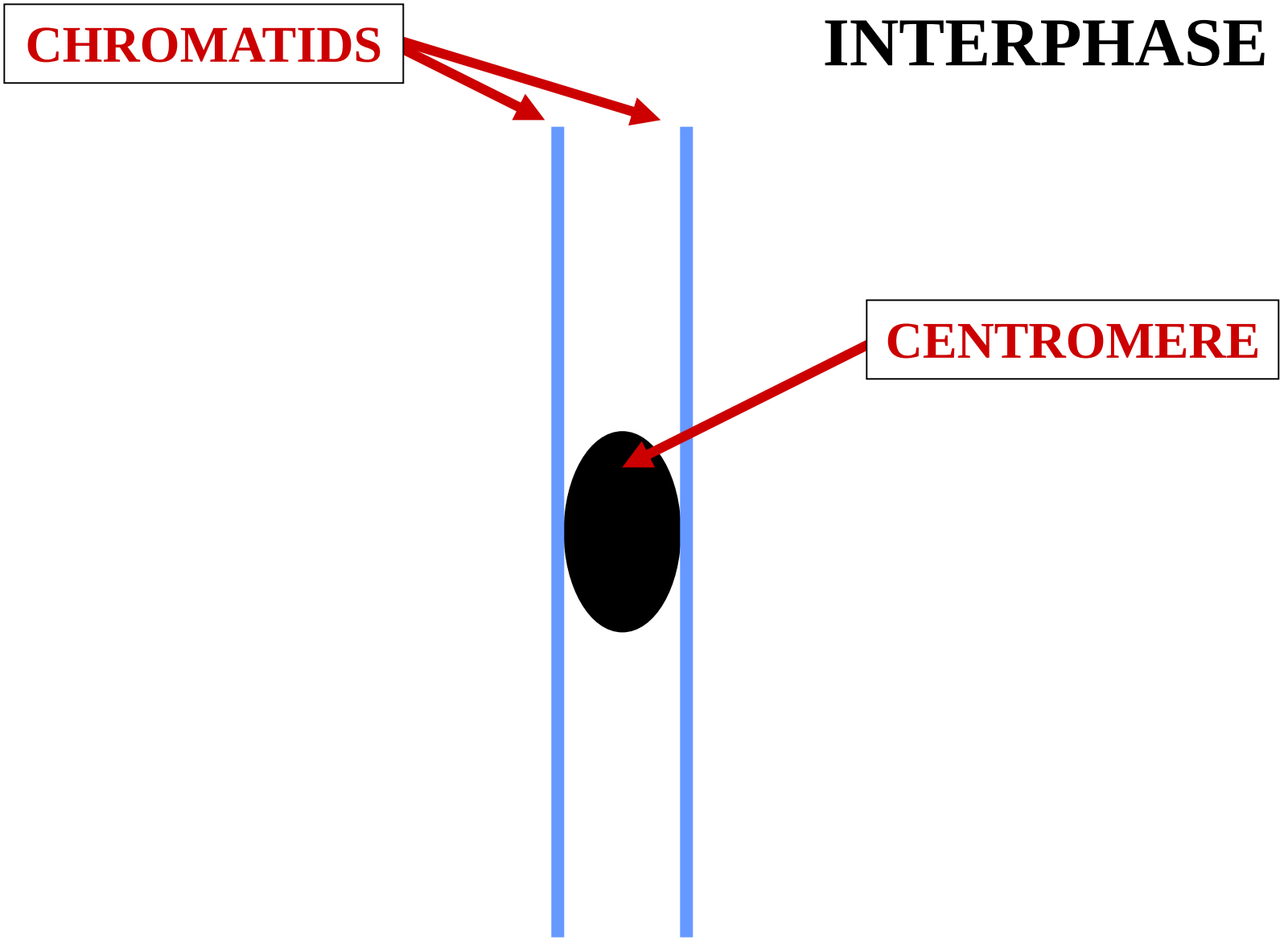
CHROMATIDS

INTERPHASE - I

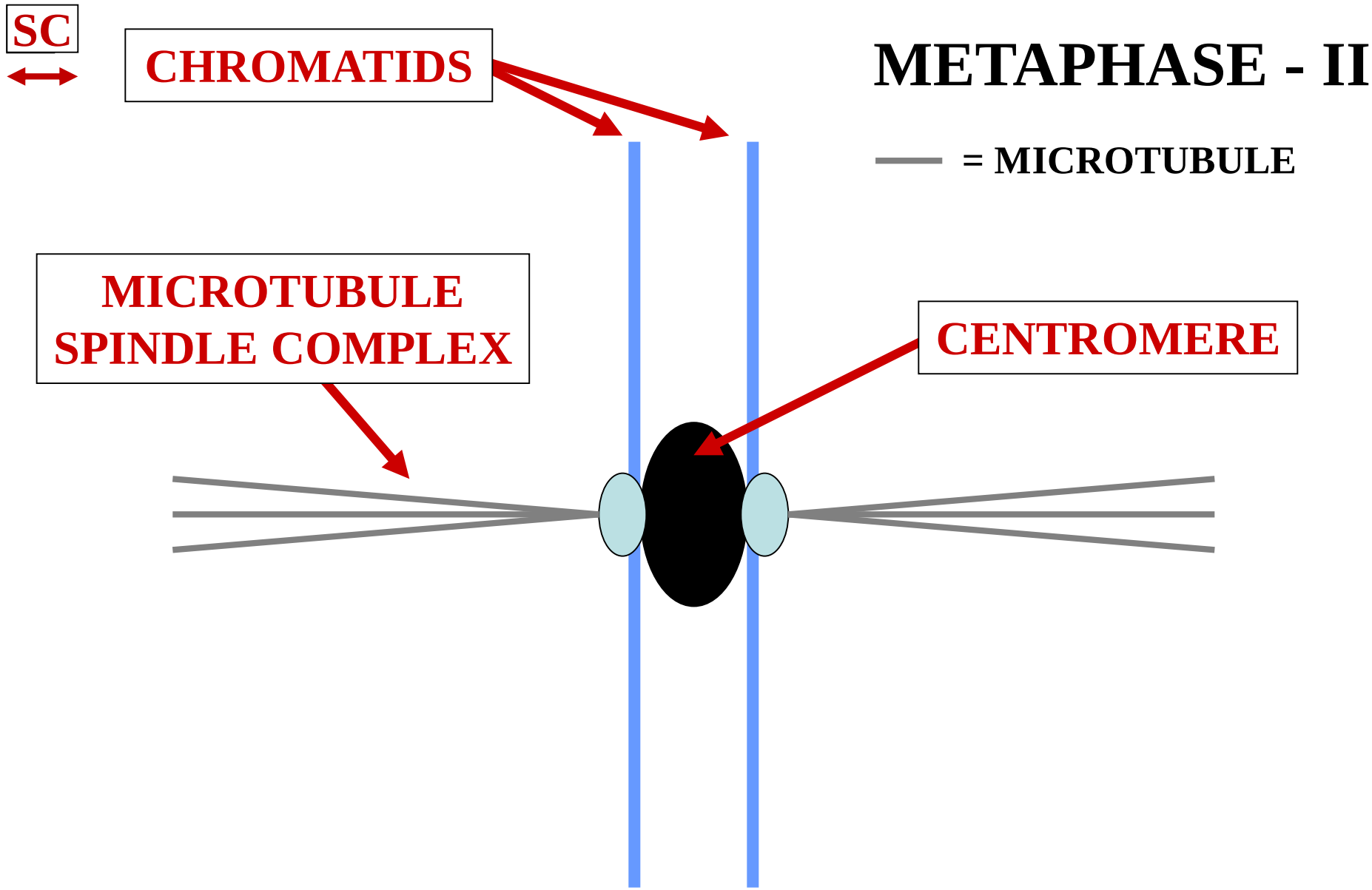


REPLICATED CHROMOSOME

INTERPHASE - I

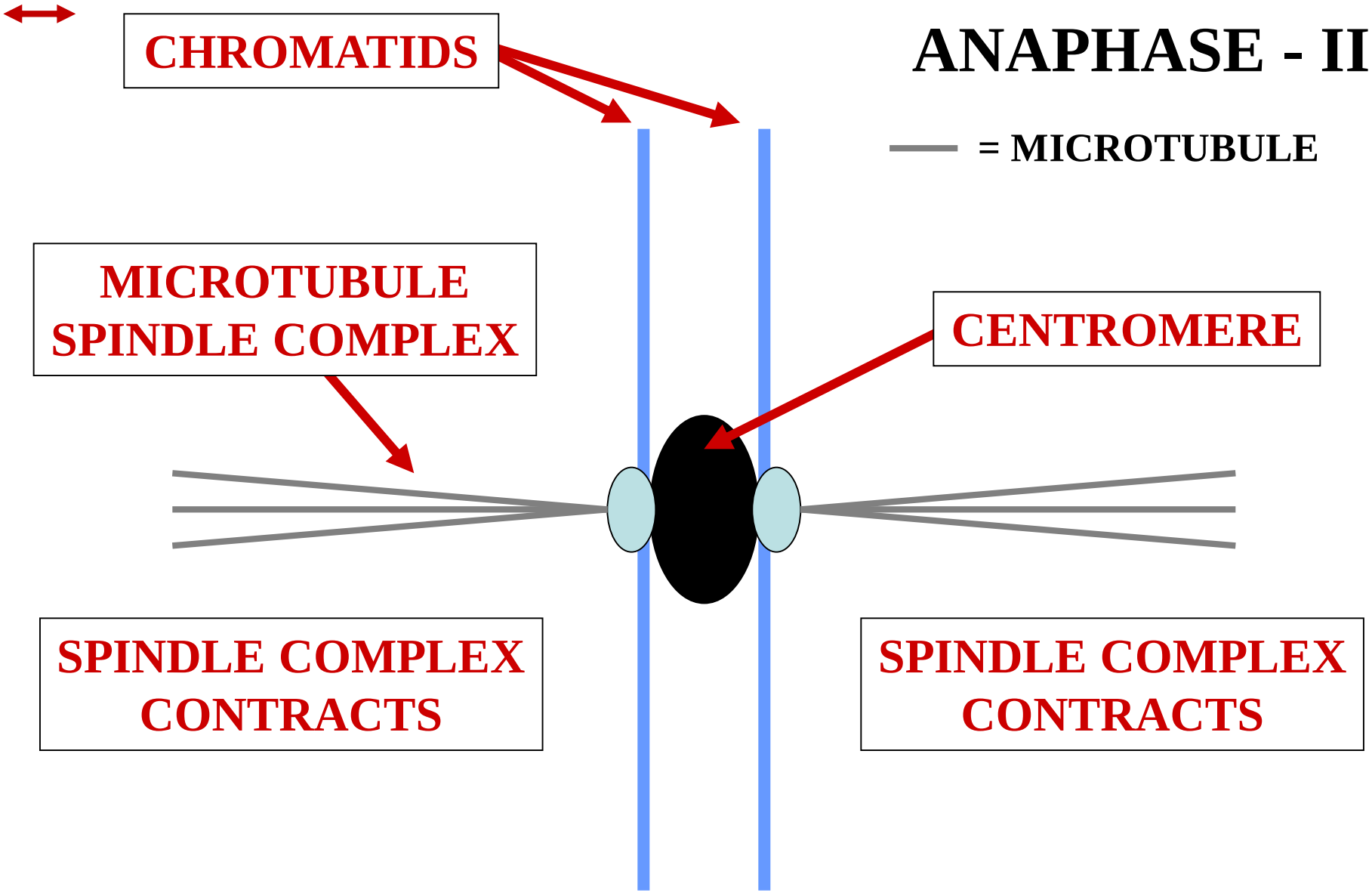


REPLICATED CHROMOSOME



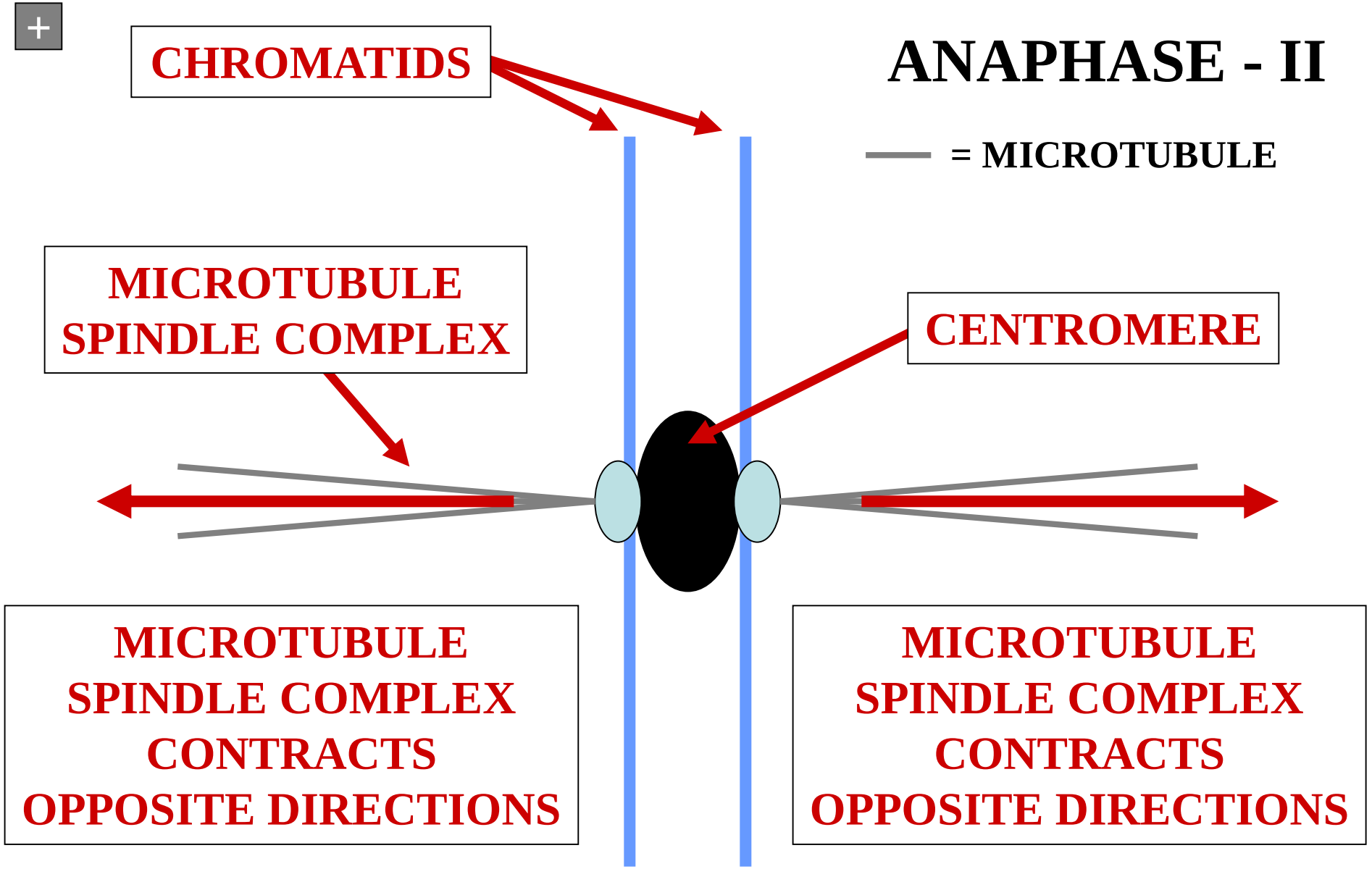
REPLICATED CHROMOSOME

ANAPHASE - II



REPLICATED CHROMOSOME

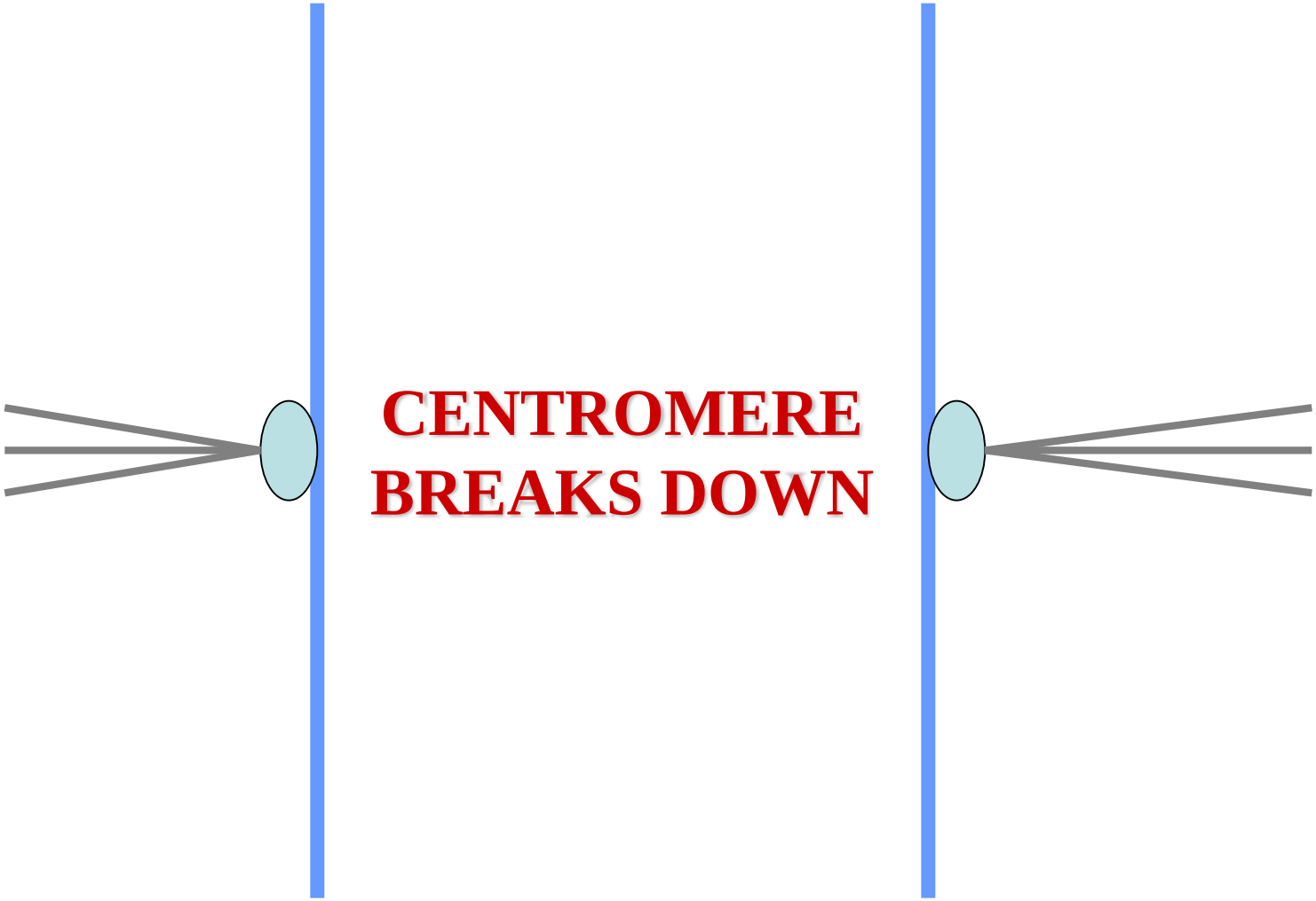
ANAPHASE - II



REPLICATED CHROMOSOME

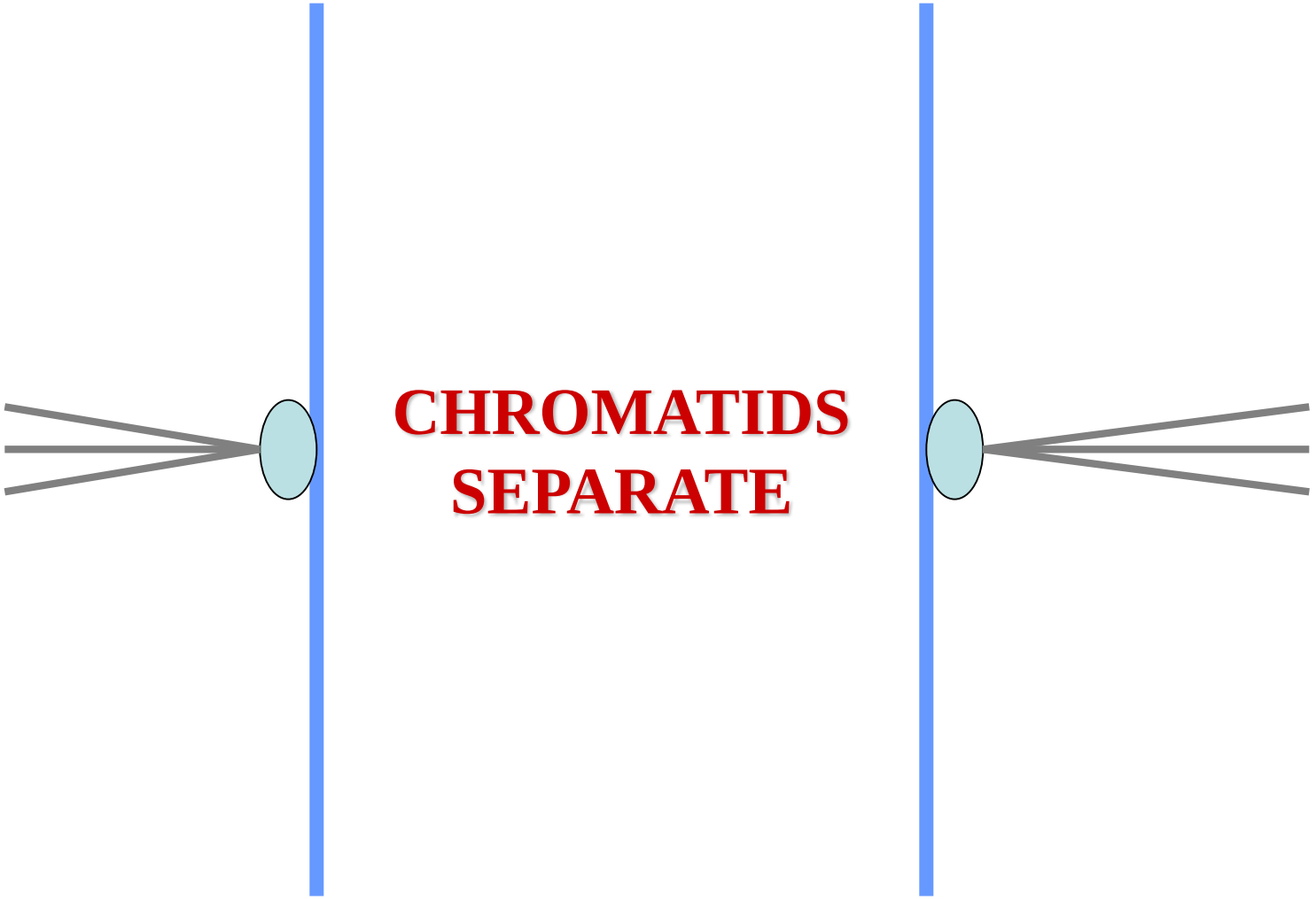
CS

ANAPHASE - II

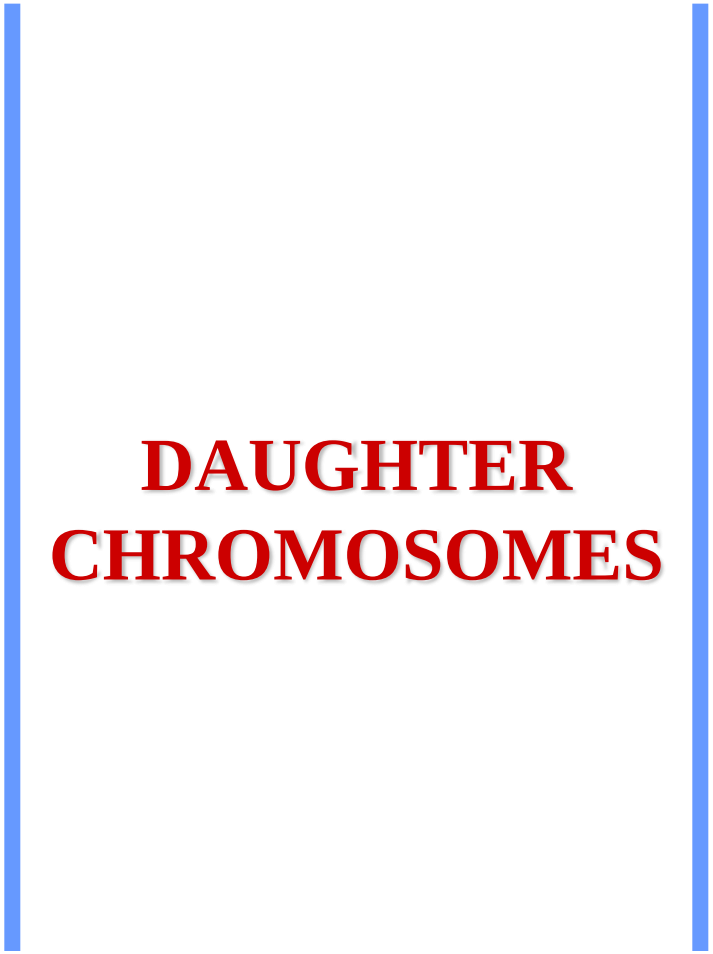


D

ANAPHASE - II



ANAPHASE - II



DAUGHTER
CHROMOSOMES

D

MEIOSIS
ANAPHASE-II
DISJUNCTION

DISJUNCTION

DISJUNCTION

CENTROMERES DO BREAKDOWN DURING ANAPHASE-II

→

DISJUNCTION

DISJUNCTION

CENTROMERES DO BREAKDOWN DURING ANAPHASE-II

→

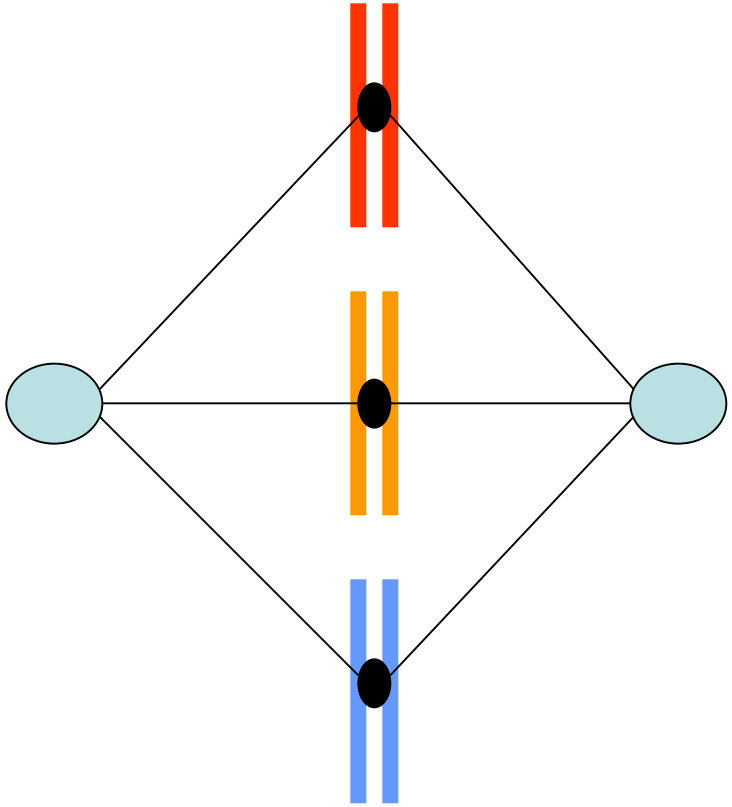
NORMAL 1N SPORES & GAMETES

DISJUNCTION

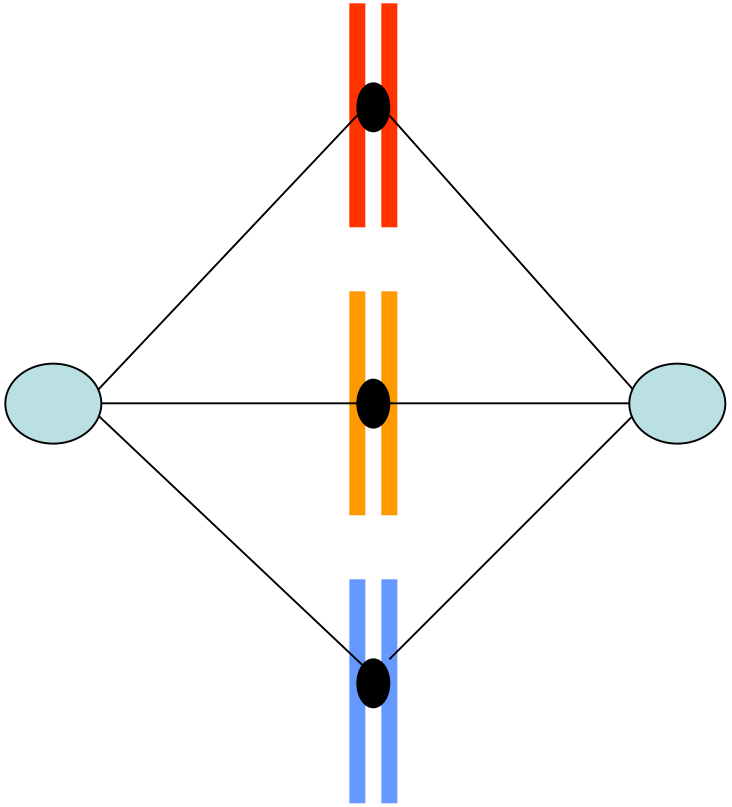
ANAPHASE - II

= CENTROMERE

= MICROTUBULE



SPINDLE COMPLEX CONTRACTS



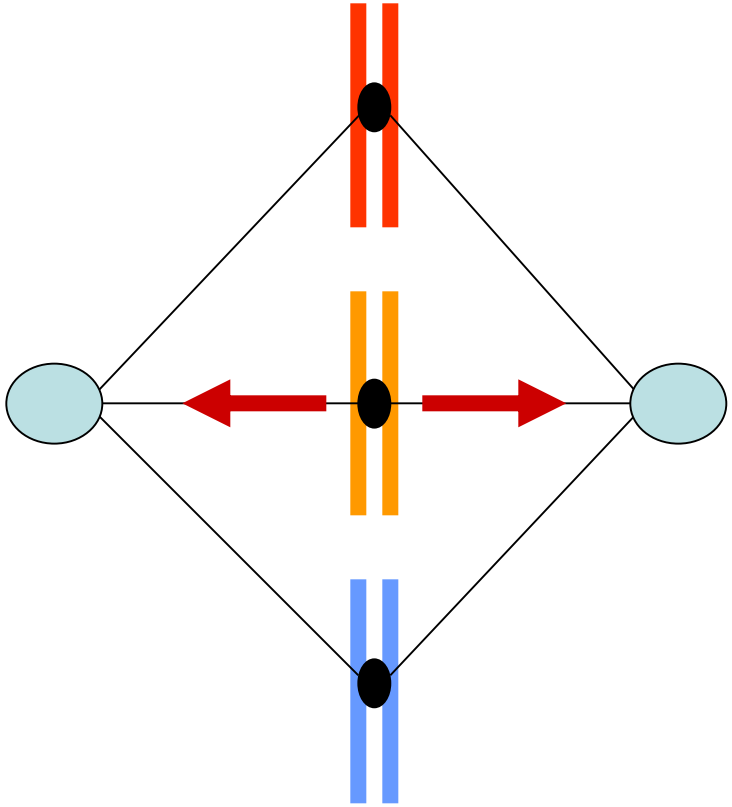
SPINDLE COMPLEX CONTRACTS

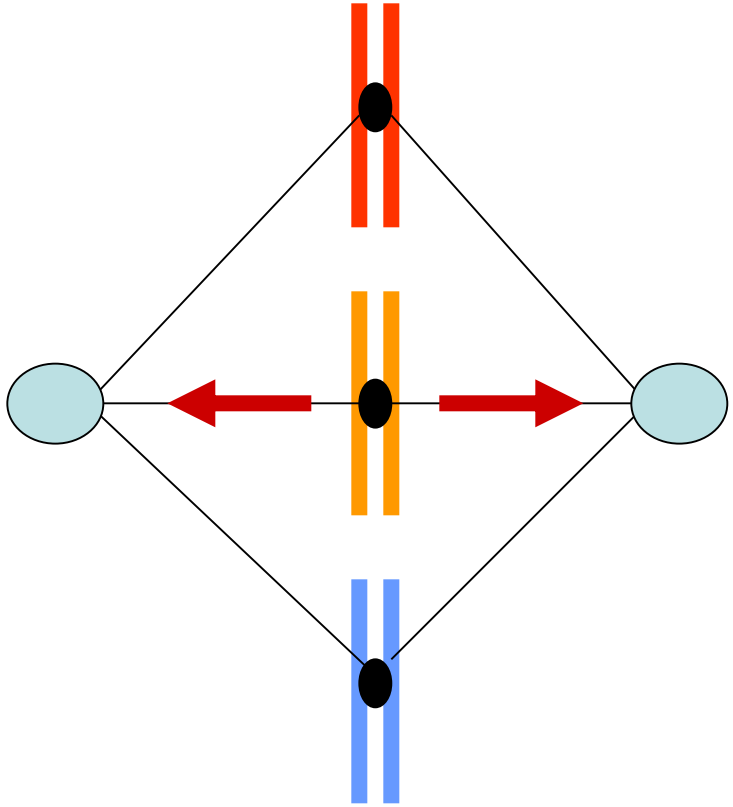
ANAPHASE - II

= CENTROMERE

= MICROTUBULE

?





SPINDLE COMPLEX CONTRACTS OPPOSITE DIRECTIONS

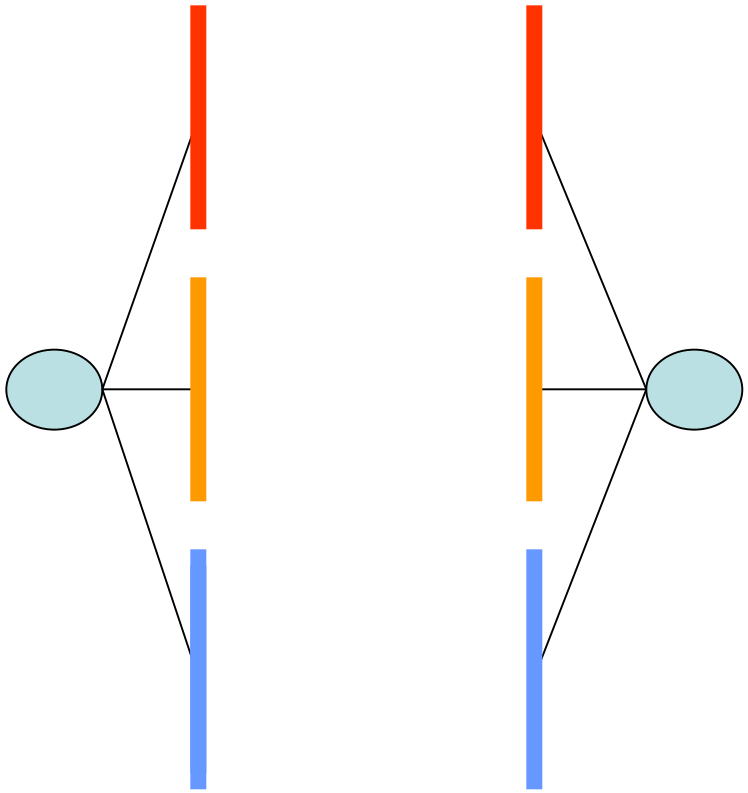
SPINDLE COMPLEX CONTRACTS OPPOSITE DIRECTIONS

ANAPHASE - II

C

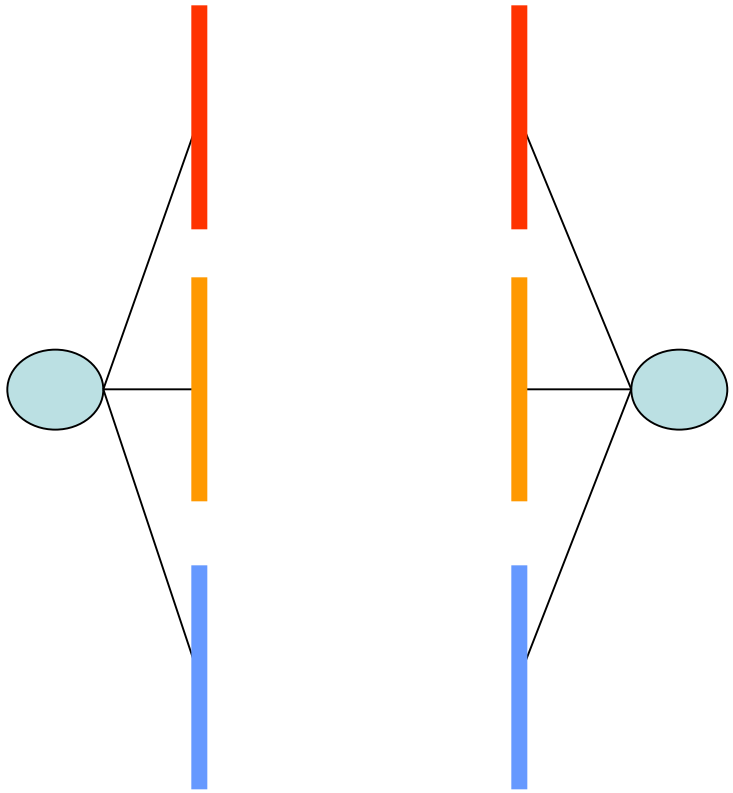
= CENTROMERE

= MICROTUBULE



?

BREAKDOWN



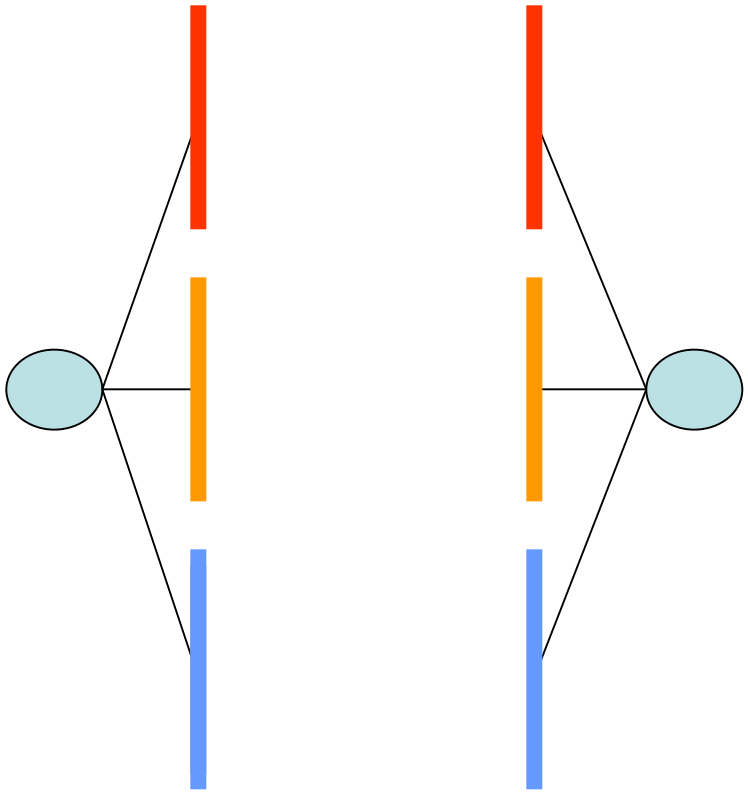
?

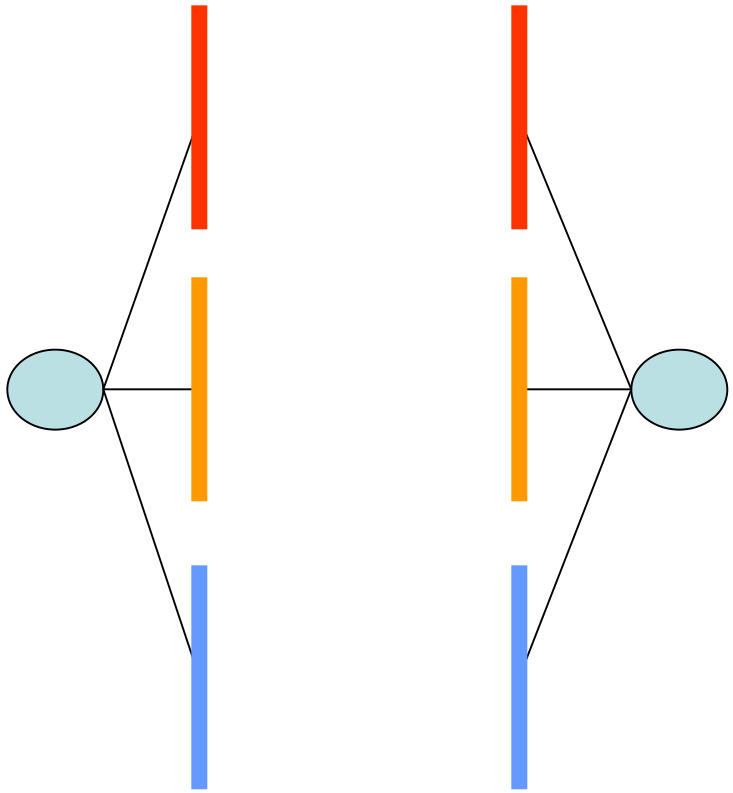
BREAKDOWN

ANAPHASE - II

= CENTROMERE

= MICROTUBULE





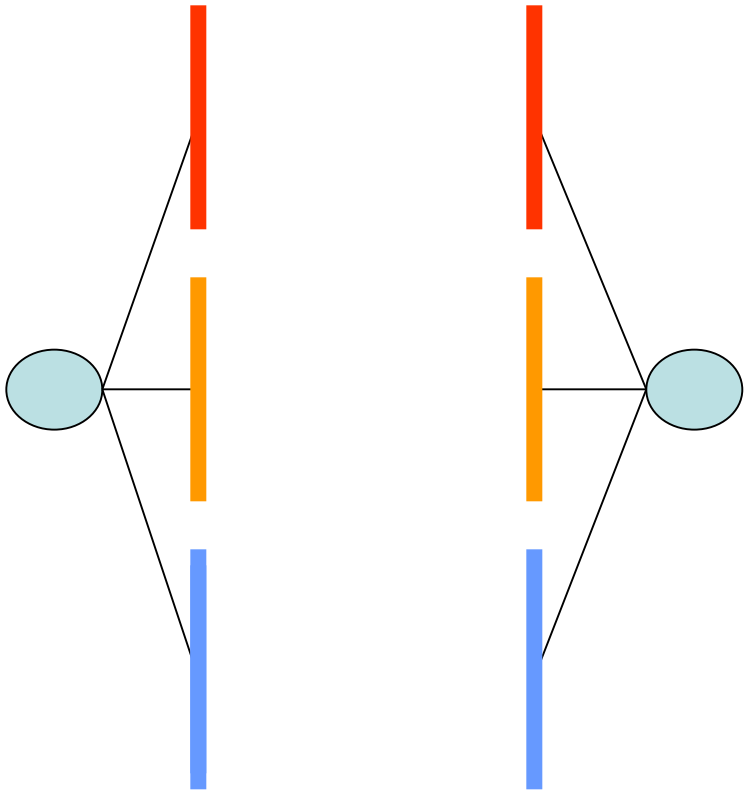
CENTROMERES BREAKDOWN

CENTROMERES BREAKDOWN

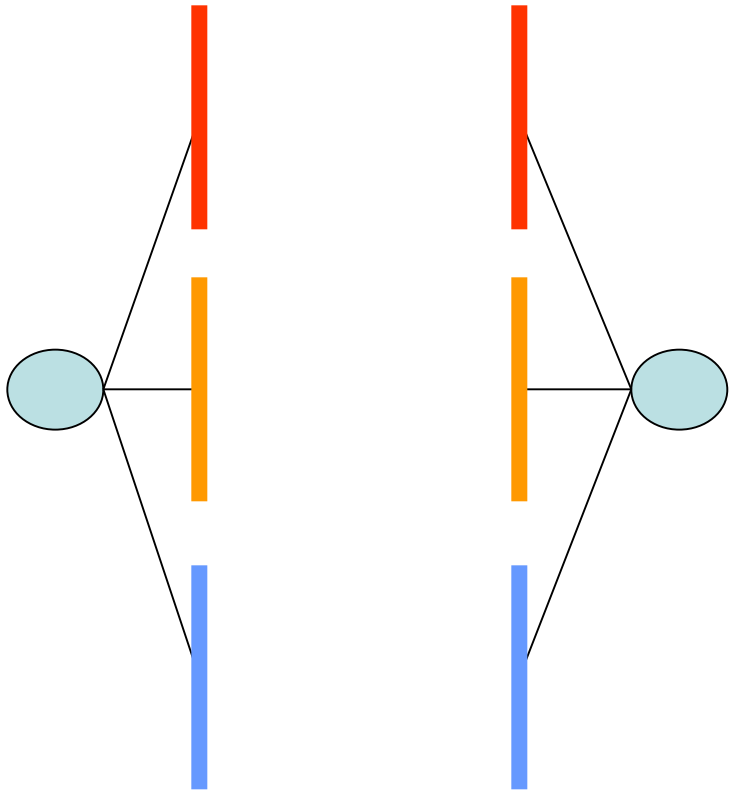
ANAPHASE - II

= CENTROMERE

= MICROTUBULE



CHROMATIDS SEPARATE



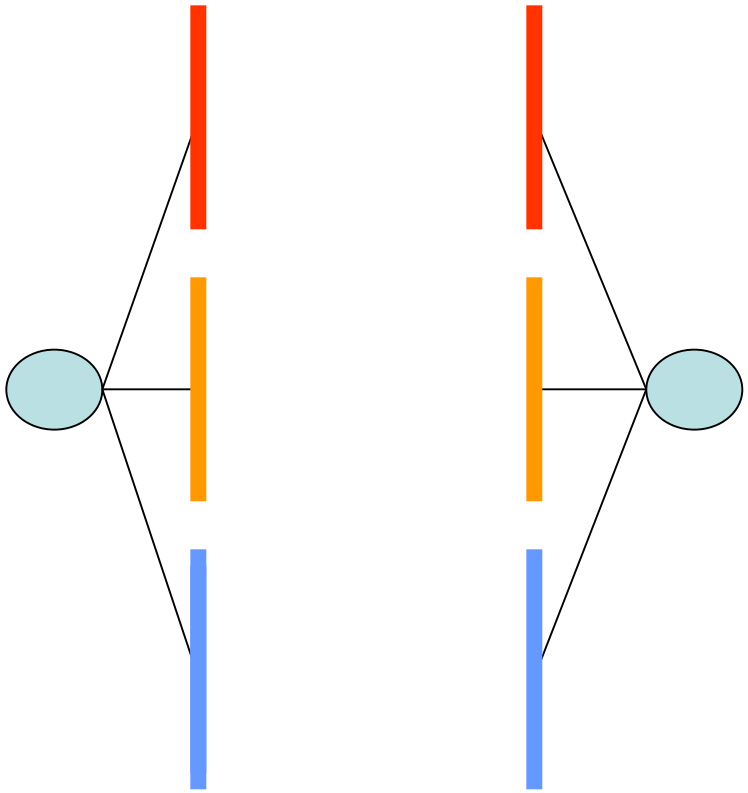
CHROMATIDS SEPARATE

ANAPHASE - II

D

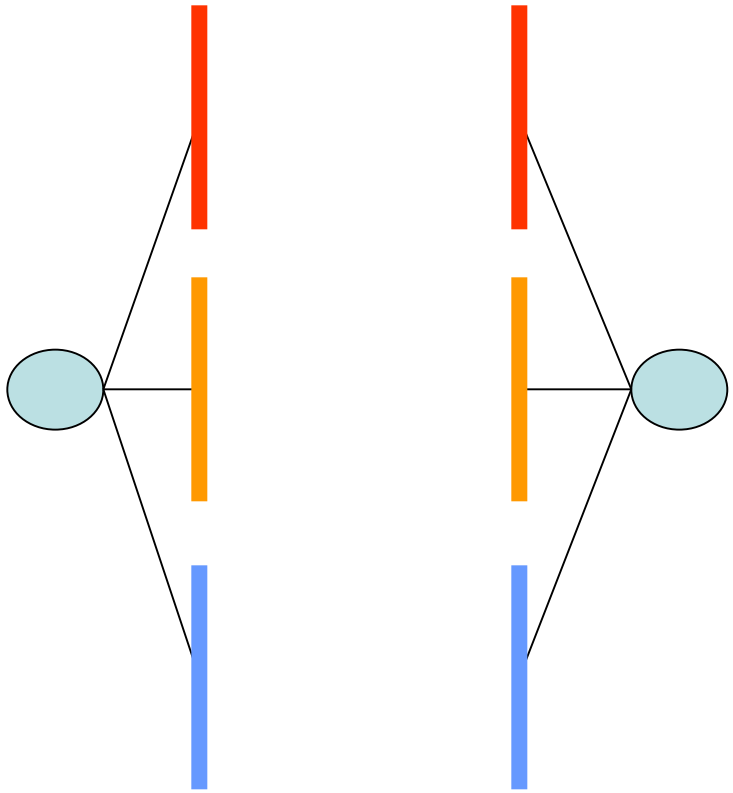
= CENTROMERE

= MICROTUBULE



?

OCCURS



?

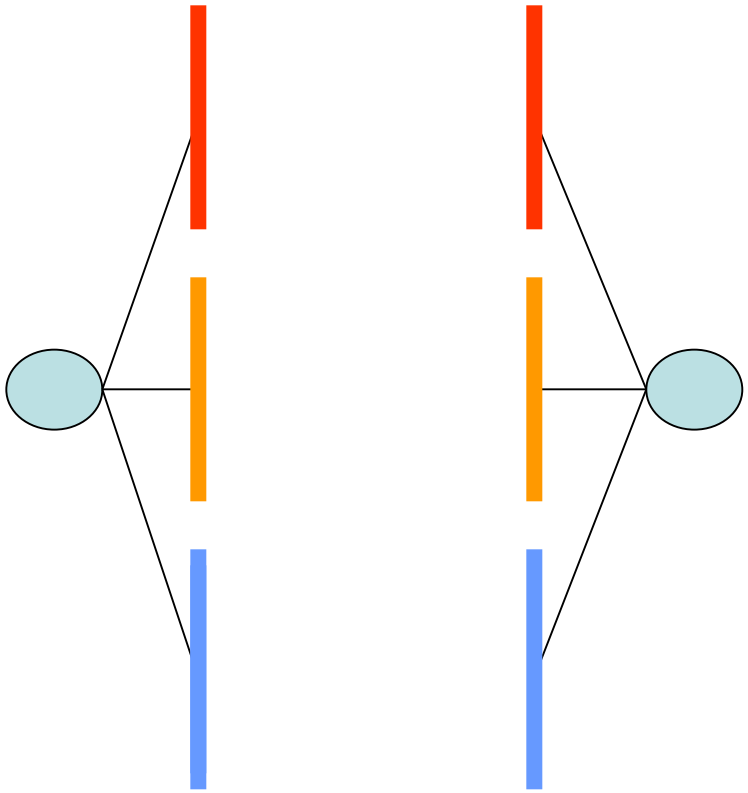
OCCURS

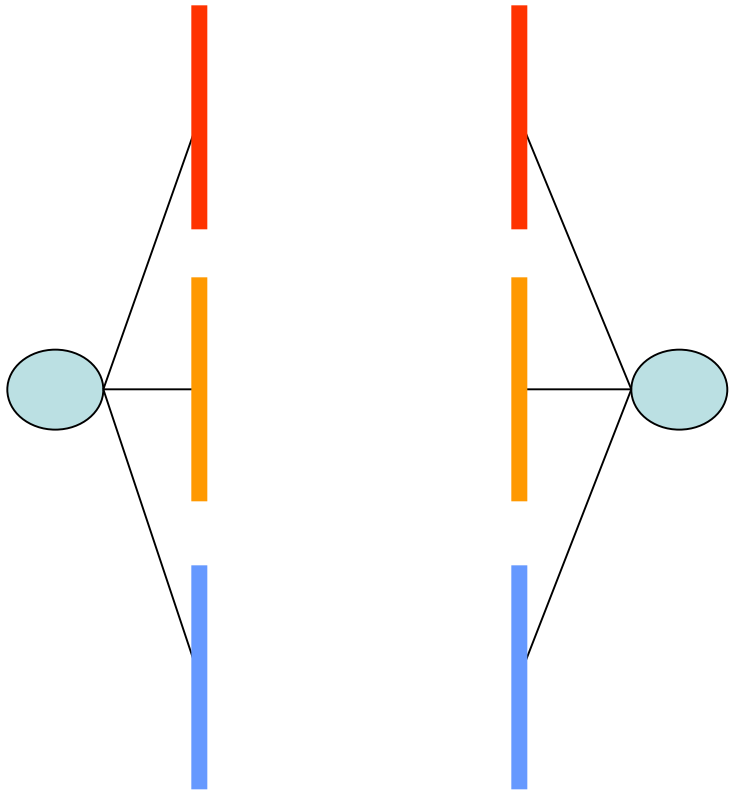
ANAPHASE - II

D

= CENTROMERE

= MICROTUBULE





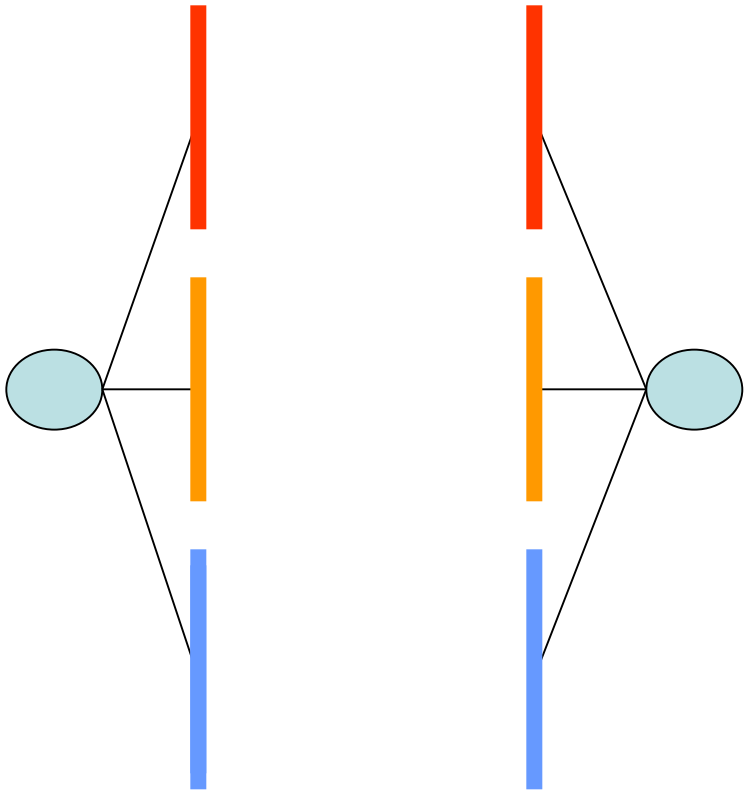
DISJUNCTION OCCURS

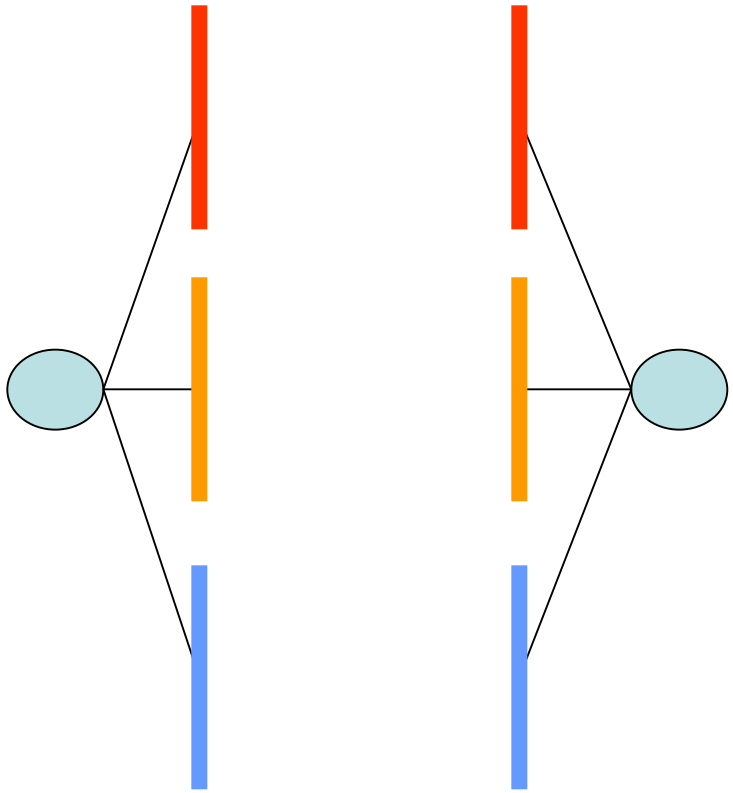
DISJUNCTION OCCURS

ANAPHASE - II

= CENTROMERE

= MICROTUBULE



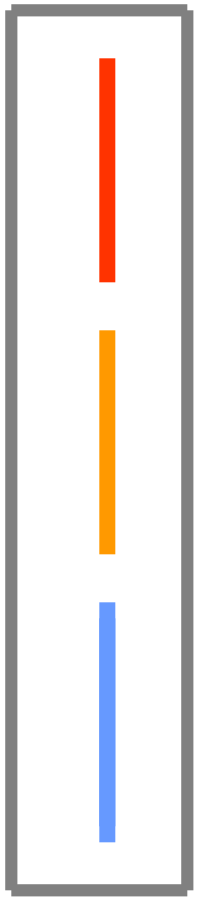


DAUGHTER CHROMOSOMES

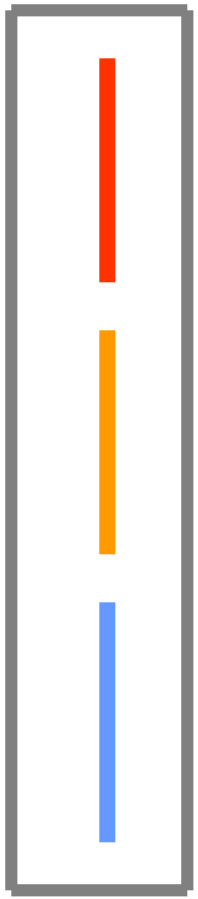
DAUGHTER CHROMOSOMES

DISJUNCTION RESULT: NORMAL 1N SPORES

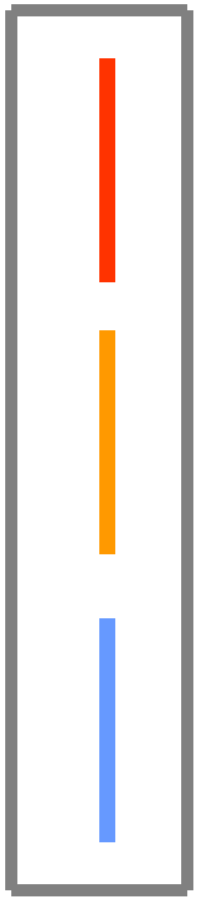
N



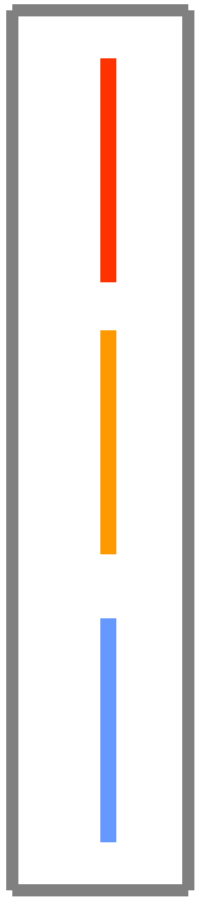
NORMAL HAPLOID 1N SPORE



NORMAL HAPLOID 1N SPORE

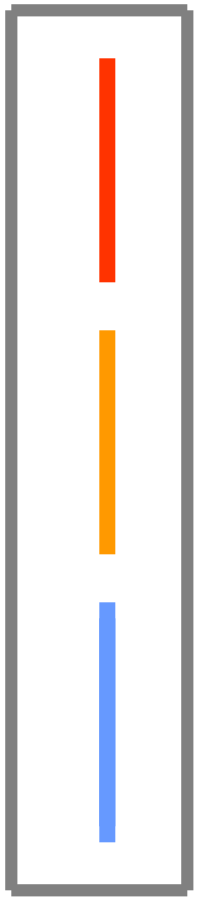


NORMAL HAPLOID 1N SPORE

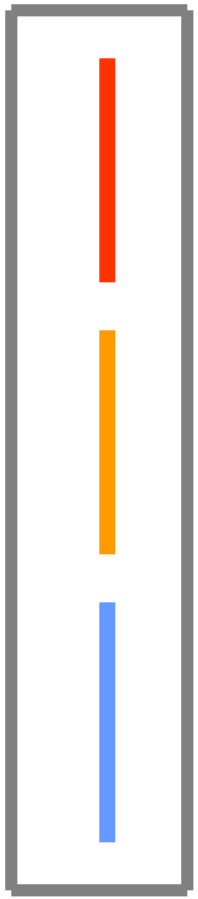


NORMAL HAPLOID 1N SPORE

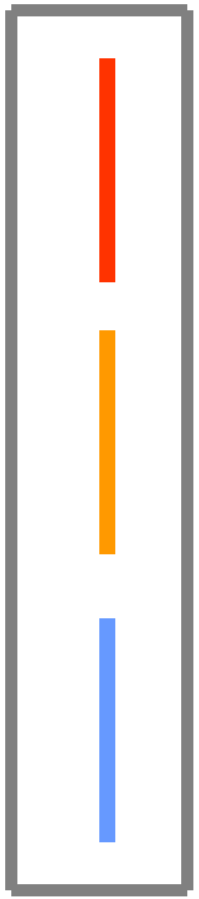
DISJUNCTION RESULT: NORMAL 1N GAMETES



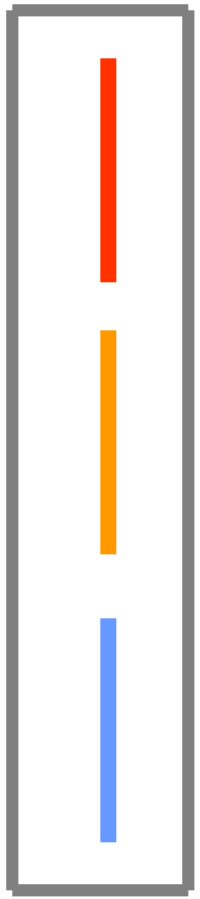
NORMAL HAPLOID 1N GAMETE



NORMAL HAPLOID 1N GAMETE



NORMAL HAPLOID 1N GAMETE



NORMAL HAPLOID 1N GAMETE

MEIOSIS

ANAPHASE-II

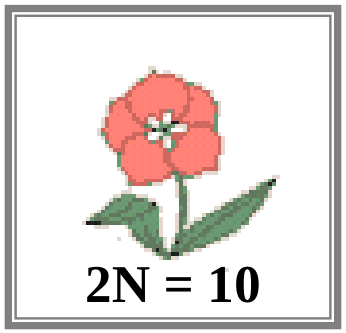
DISJUNCTION

OUTCOME

DISJUNCTION: OUTCOME

= ORGANISM

= GAMETE



PARENTAL POPULATION

= CHROMOSOMES

= SYNGAMY

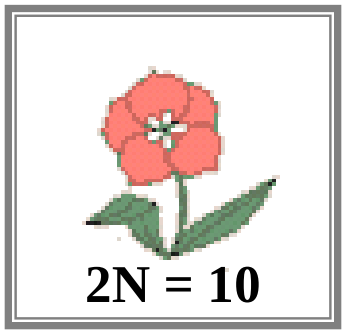
DISJUNCTION: OUTCOME

?

D

= ORGANISM

= GAMETE



MEIOSIS

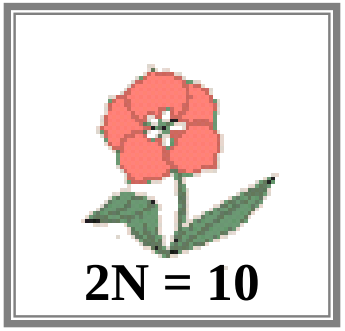
= CHROMOSOMES

= SYNGAMY

DISJUNCTION: OUTCOME

= ORGANISM

= GAMETE



MEIOSIS

= CHROMOSOMES

= SYNGAMY

1N = ?

+

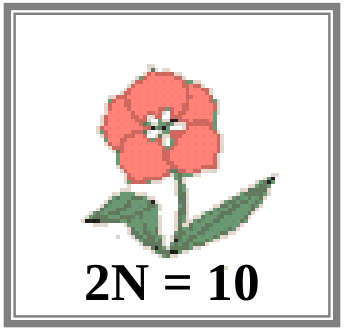
1N = ?

DISJUNCTION

DISJUNCTION: OUTCOME

= ORGANISM

= GAMETE



MEIOSIS

= CHROMOSOMES

= SYNGAMY

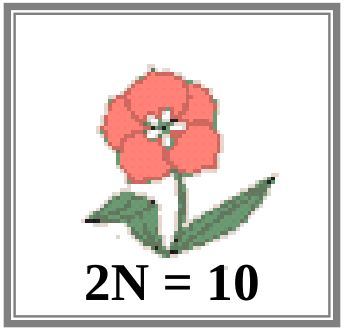
1N = 5 + 1N = 5

DISJUNCTION

DISJUNCTION: OUTCOME

= ORGANISM

= GAMETE

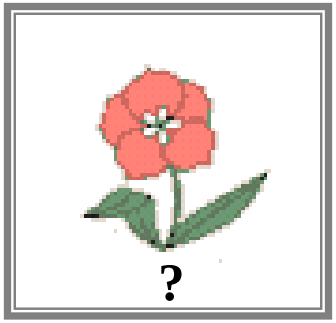


MEIOSIS

= CHROMOSOMES

= SYNGAMY

1N = 5 + 1N = 5 →



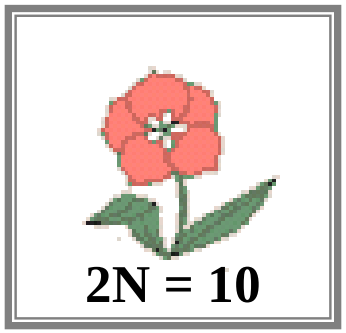
DISJUNCTION

DISJUNCTION: OUTCOME

AB

= ORGANISM

= GAMETE

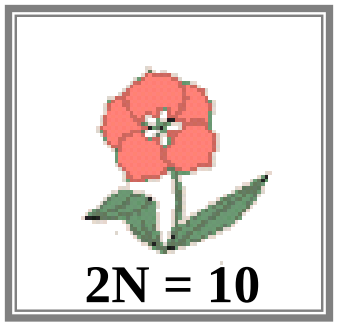


MEIOSIS

= CHROMOSOMES

= SYNGAMY

1N = 5 + 1N = 5 →



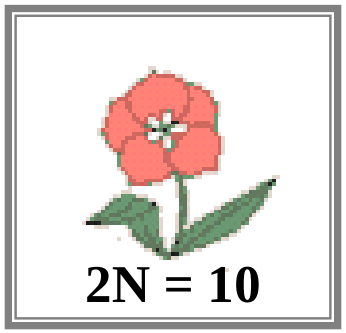
DISJUNCTION

CYTOTYPES & POLYPLOIDS

DISJUNCTION: OUTCOME

= ORGANISM

= GAMETE

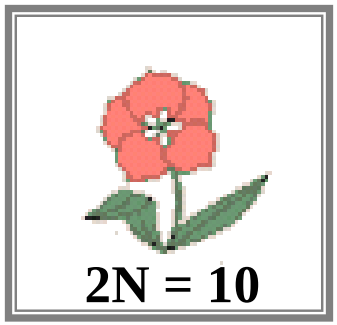


MEIOSIS

= CHROMOSOMES

= SYNGAMY

1N = 5 + 1N = 5 →



DISJUNCTION

CYTOTYPES & POLYPLOIDS

ABSENT

MEIOSIS
ANAPHASE-II
NON-DISJUNCTION

NON-DISJUNCTION

NON-DISJUNCTION

CENTROMERES **DO NOT** BREAKDOWN DURING ANAPHASE-II

→

NON-DISJUNCTION

NON-DISJUNCTION

CENTROMERES **DO NOT** BREAKDOWN DURING ANAPHASE-II

→

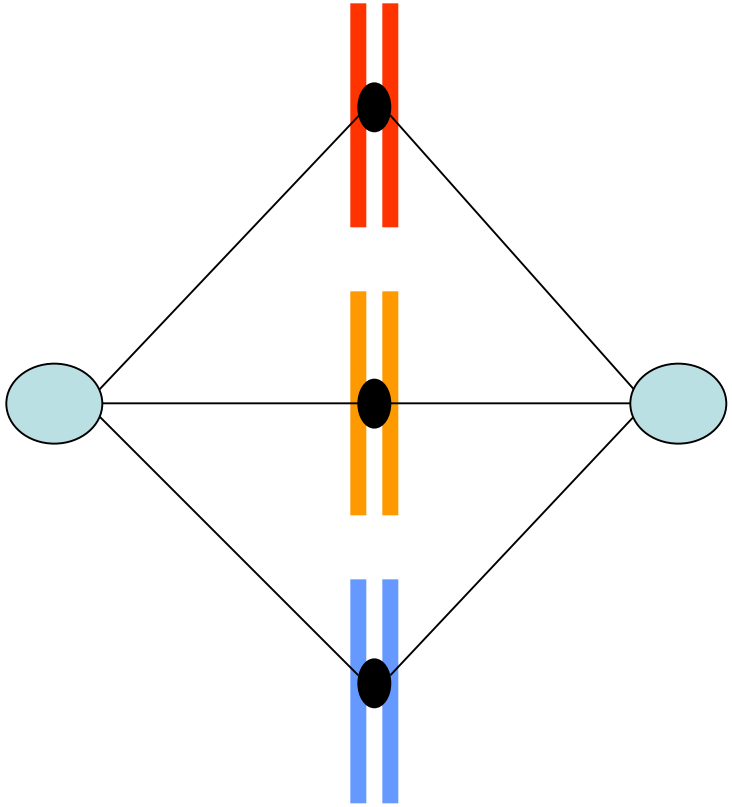
ABNORMAL 2N SPORES & GAMETES

NON-DISJUNCTION

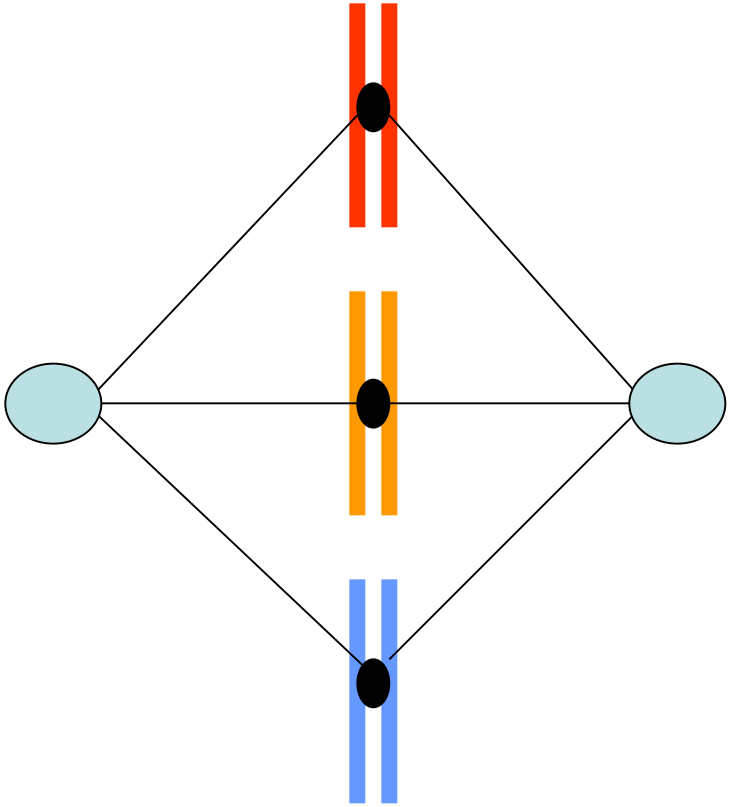
ANAPHASE - II

= CENTROMERE

= MICROTUBULE



SPINDLE COMPLEX CONTRACTS

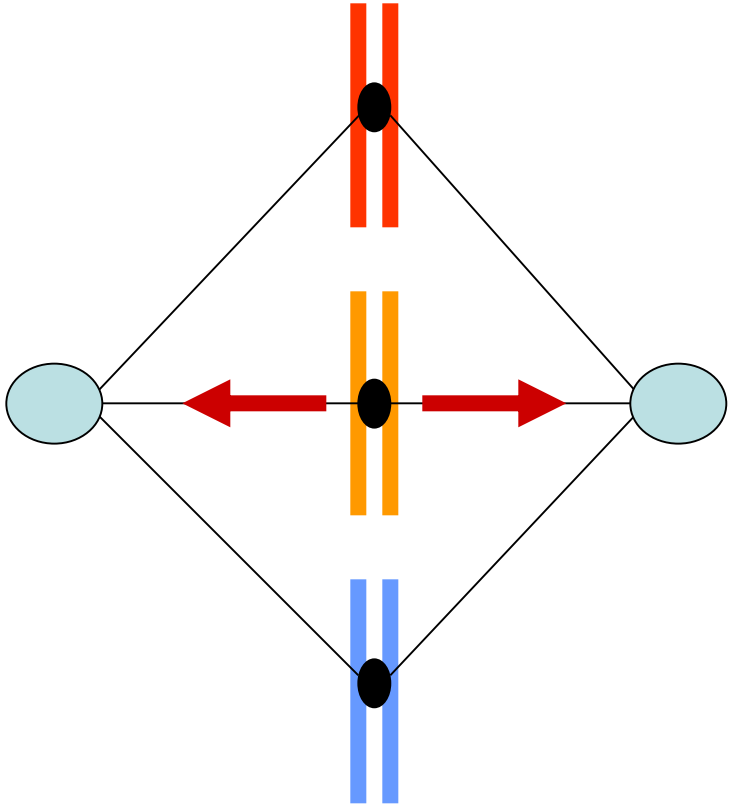


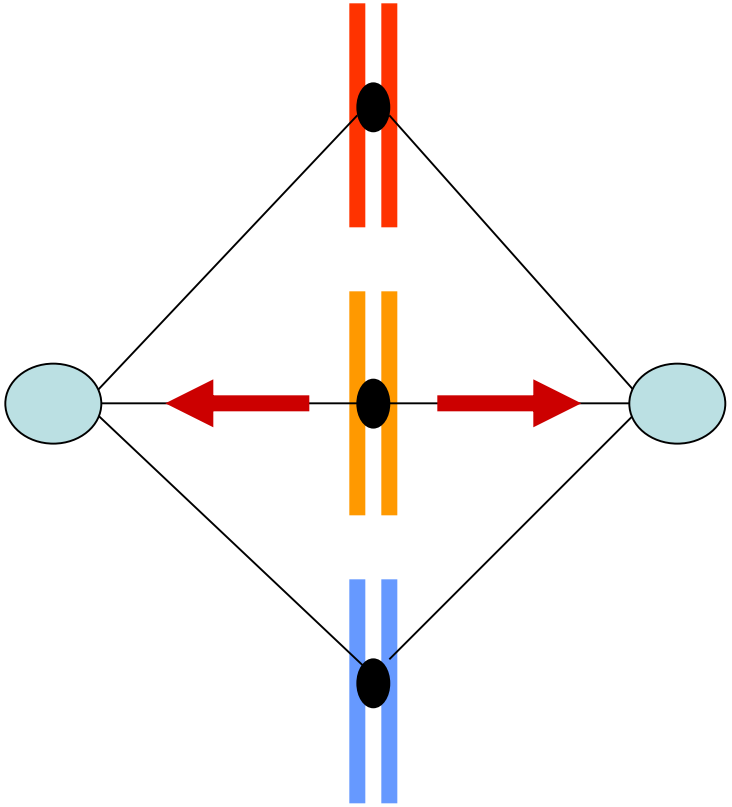
SPINDLE COMPLEX CONTRACTS

ANAPHASE - II

= CENTROMERE

= MICROTUBULE





SPINDLE COMPLEX CONTRACTS OPPOSITE DIRECTIONS

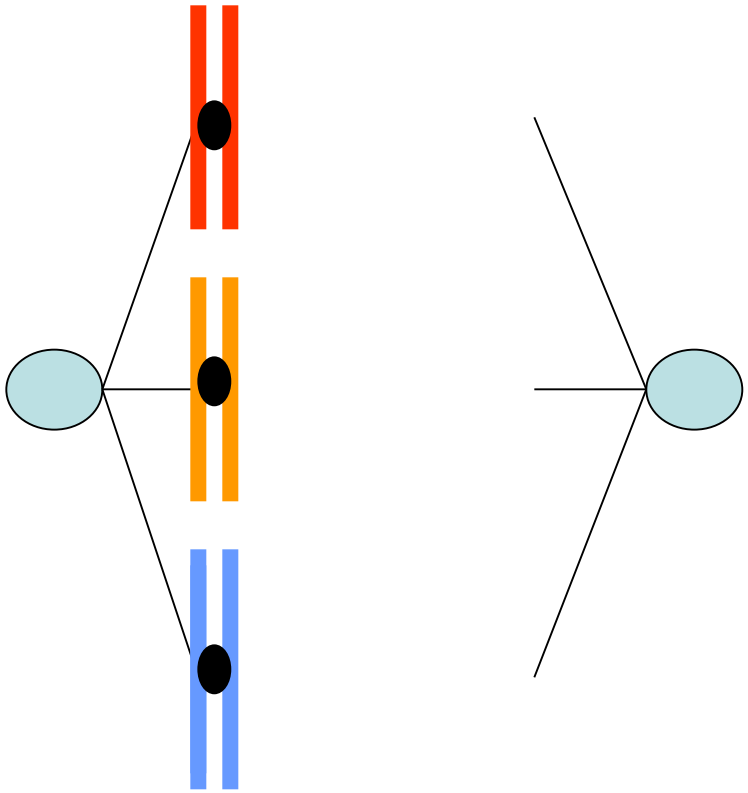
SPINDLE COMPLEX CONTRACTS OPPOSITE DIRECTIONS

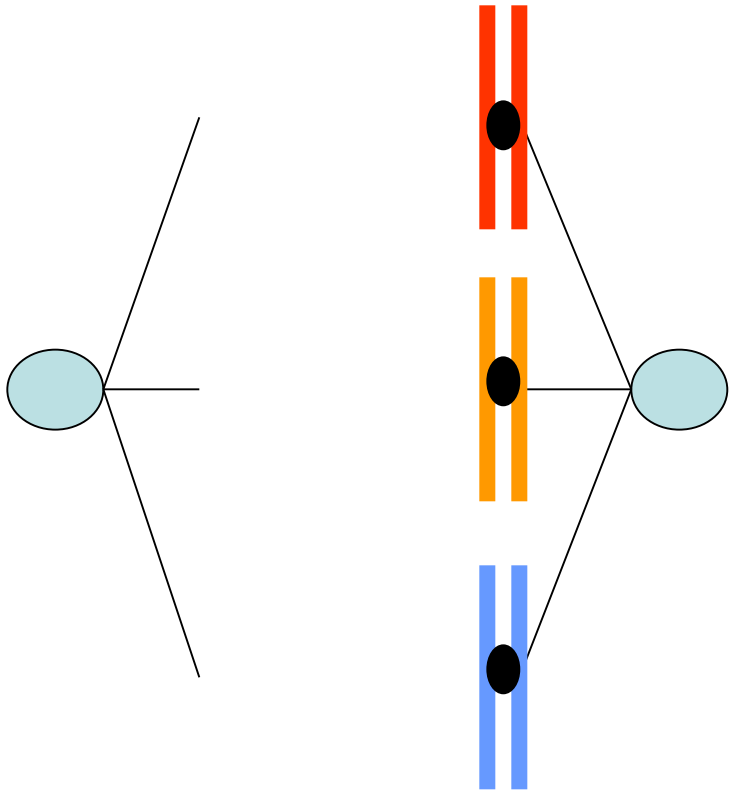
ANAPHASE - II

C

= CENTROMERE

= MICROTUBULE





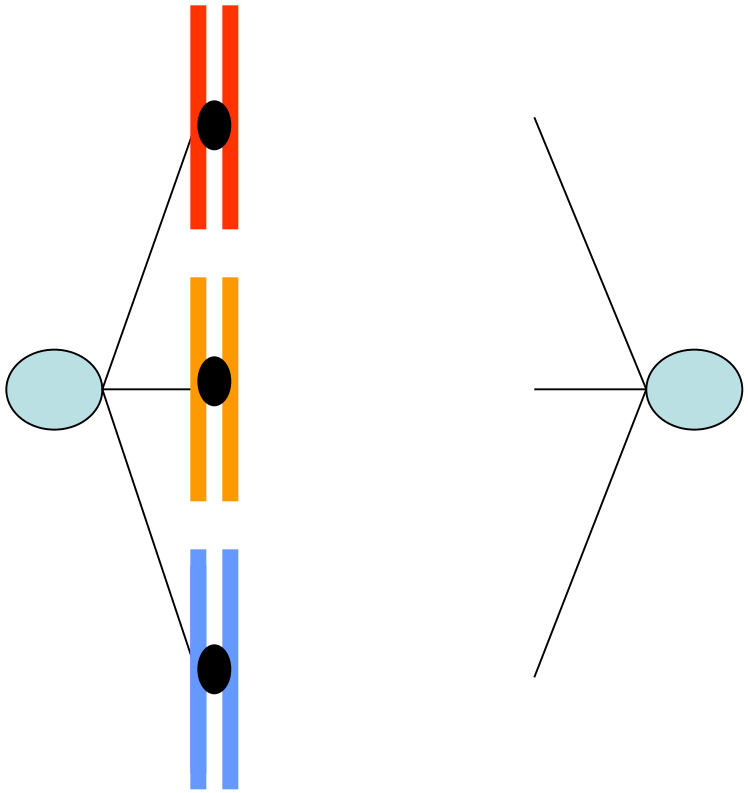
CENTROMERE BREAKDOWN FAILS

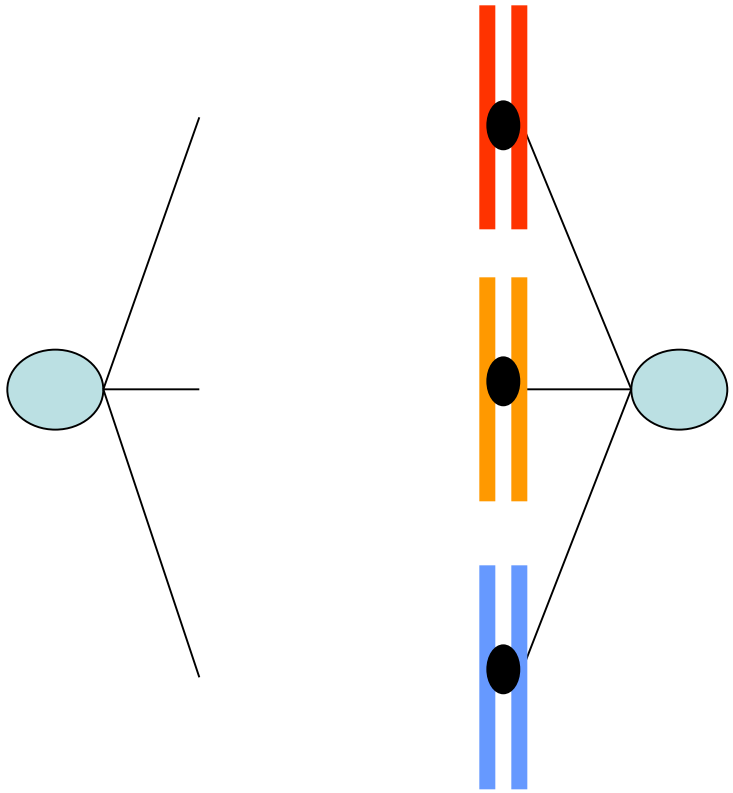
CENTROMERE BREAKDOWN FAILS

ANAPHASE - II

= CENTROMERE

= MICROTUBULE





CHROMATIDS DO NOT SEPARATE

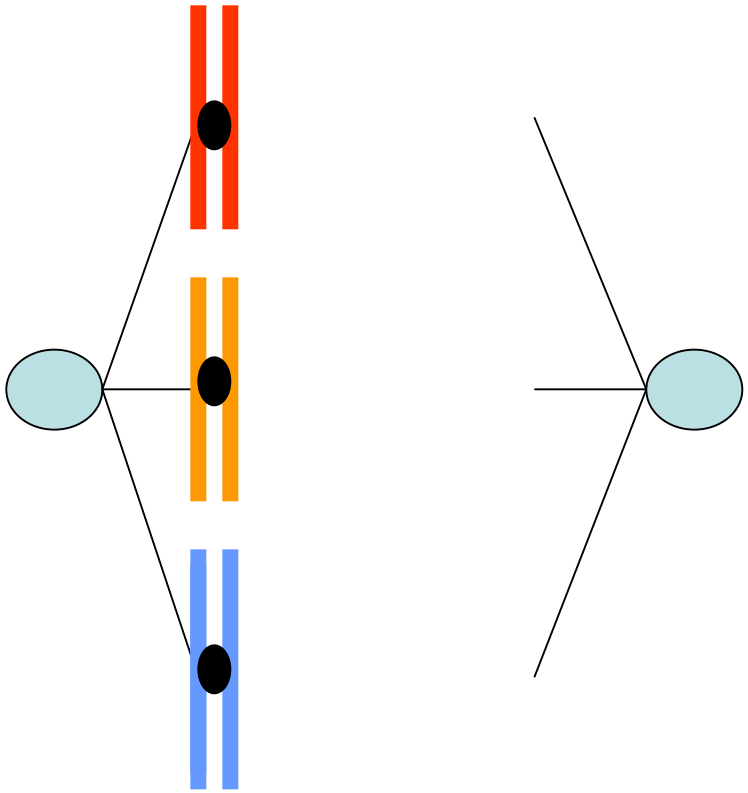
CHROMATIDS DO NOT SEPARATE

ANAPHASE - II

ND

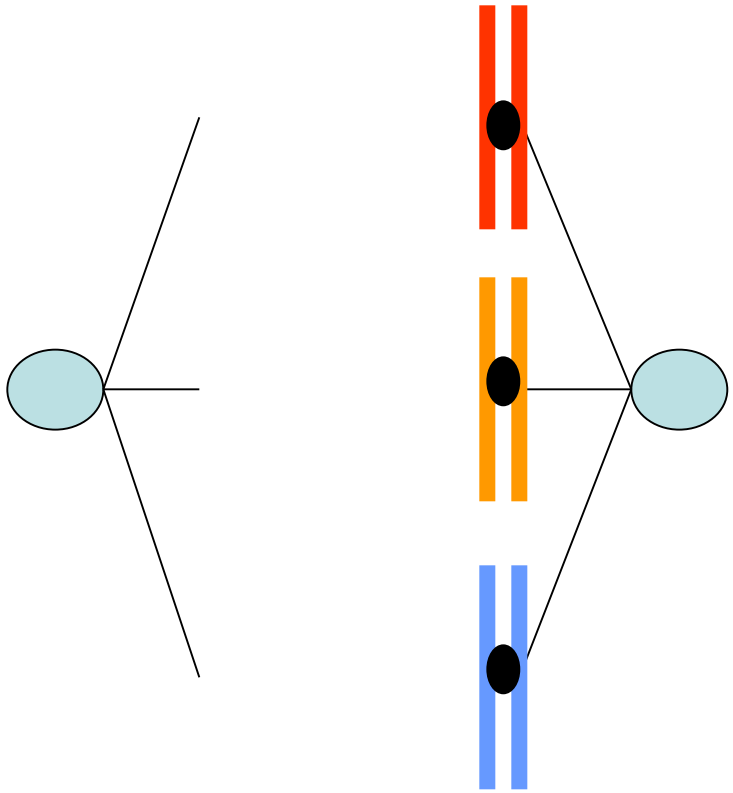
= CENTROMERE

= MICROTUBULE



?

OCCURS



?

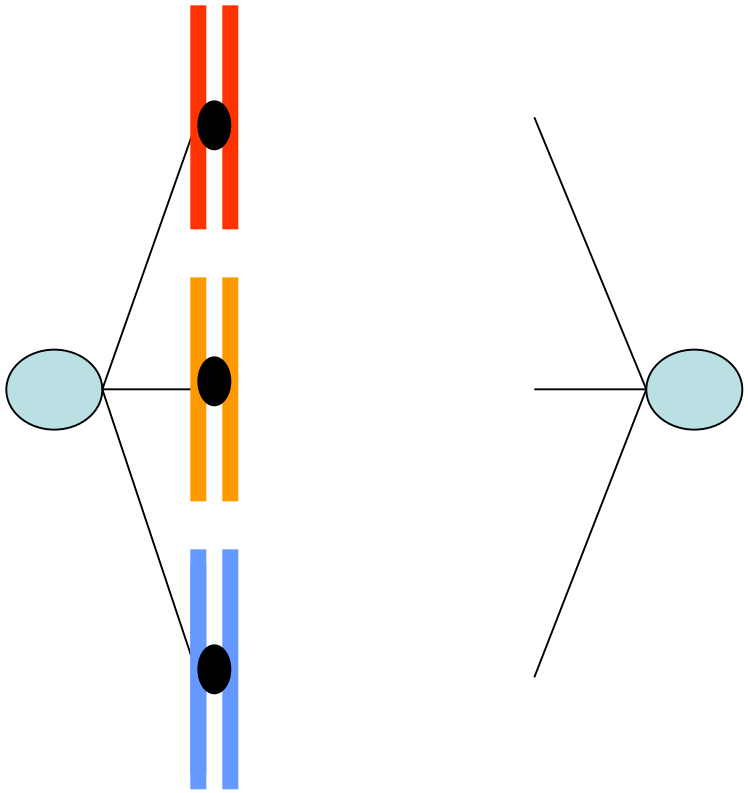
OCCURS

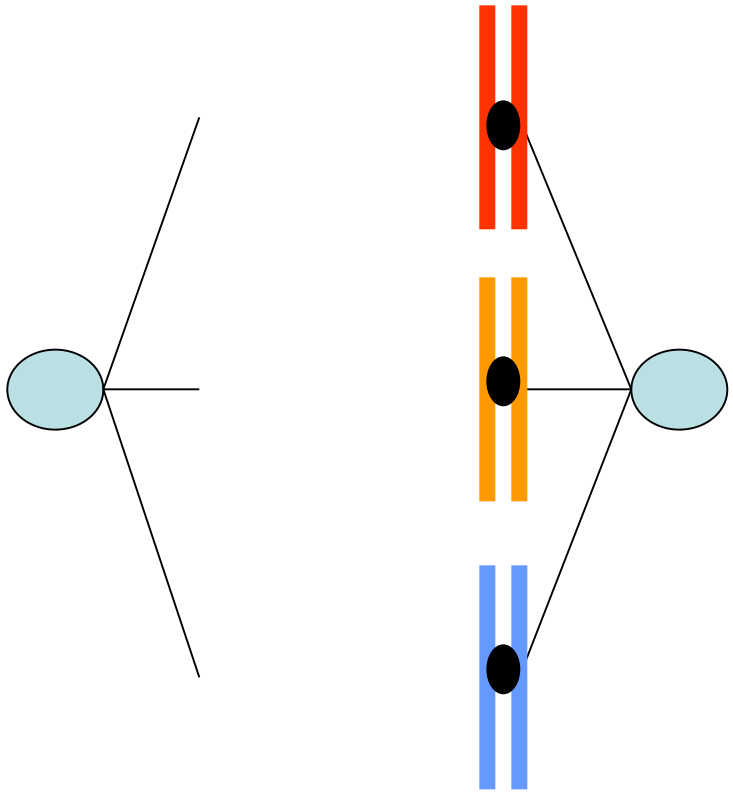
ANAPHASE - II

A

= CENTROMERE

= MICROTUBULE



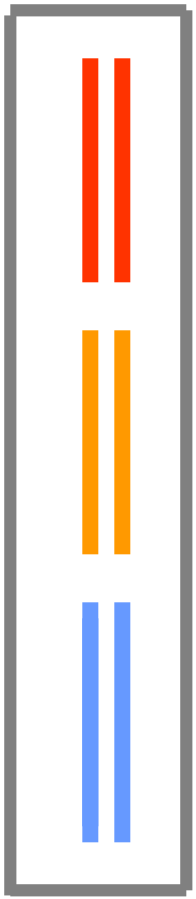


NON-DISJUNCTION OCCURS

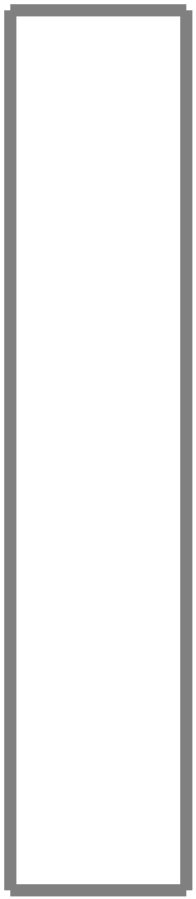
NON-DISJUNCTION OCCURS

NON-DISJUNCTION RESULT: ABNORMAL 2N SPORES

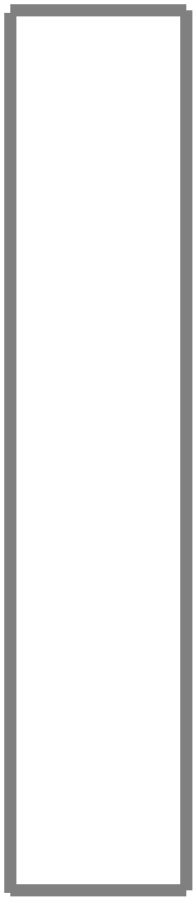
A



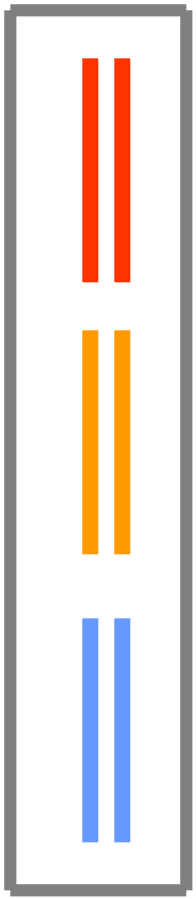
ABNORMAL DIPLOID 2N SPORE



ABNORMAL STERILE SPORE

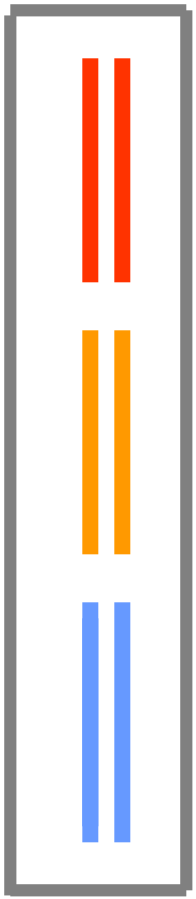


ABNORMAL STERILE SPORE

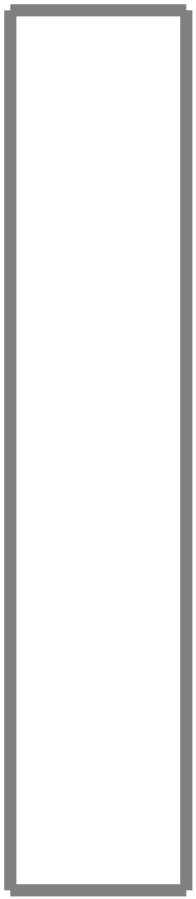


ABNORMAL DIPLOID 2N SPORE

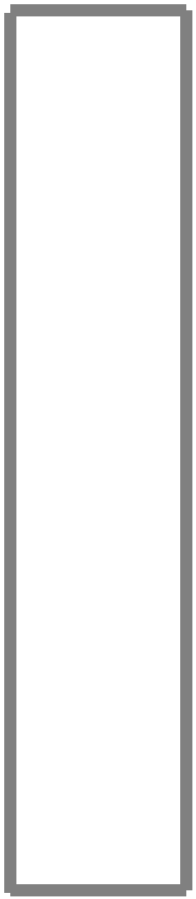
NON-DISJUNCTION RESULT: ABNORMAL 2N GAMETES



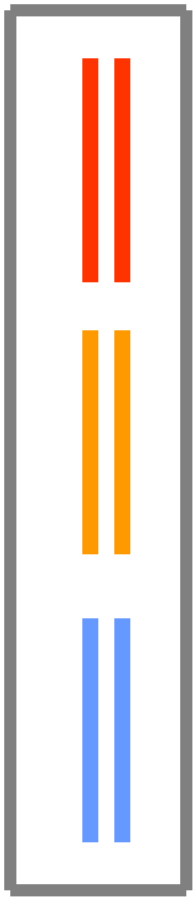
ABNORMAL DIPLOID 2N GAMETE



ABNORMAL STERILE GAMETE



ABNORMAL STERILE GAMETE



ABNORMAL DIPLOID 2N GAMETE