
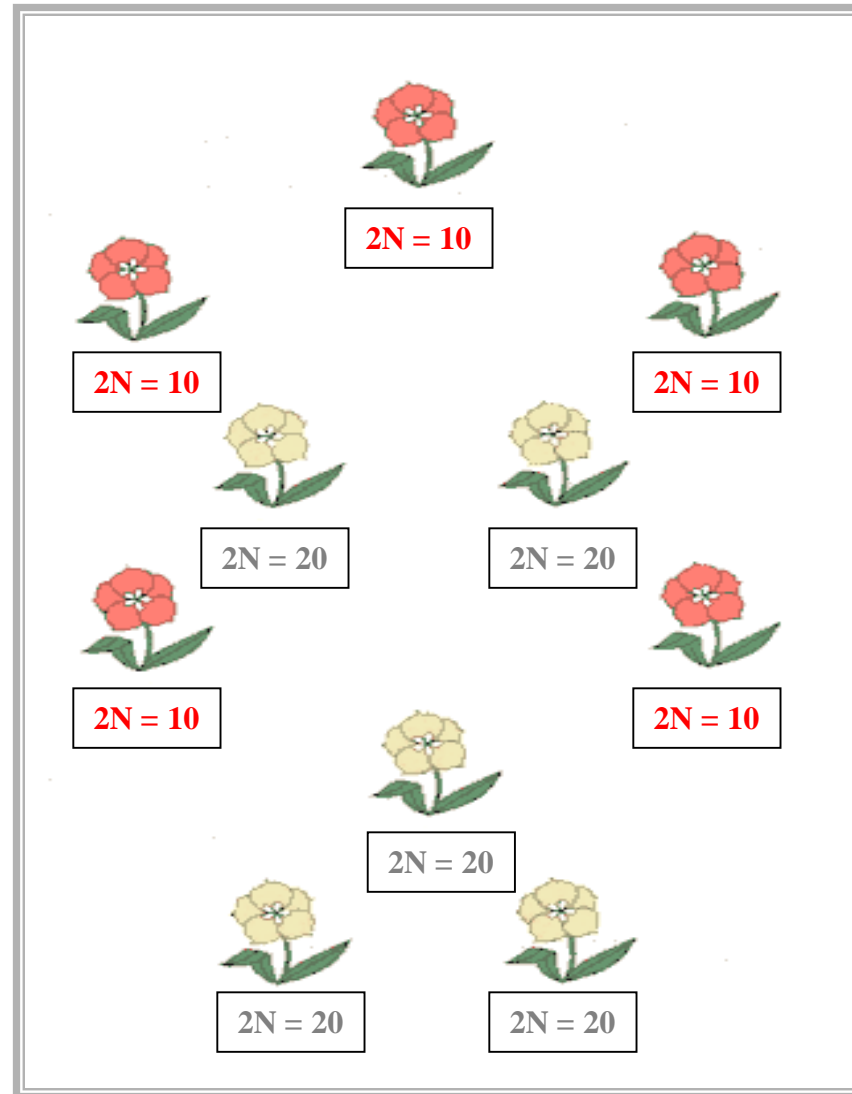


ALLOPOLYPLOID COMPONENT



5

GAMETE
 $2N = 10$ PLT
MEIOSIS
DISJUNCTION



10

GAMETE
 $2N = 20$ PLT
MEIOSIS
DISJUNCTION

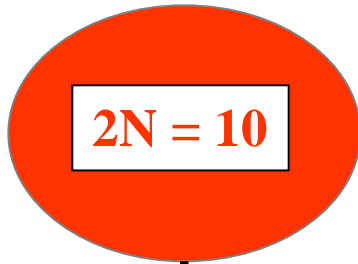
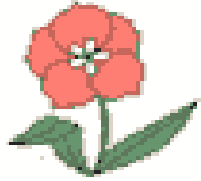
2 PARENTAL SPECIES

HYBRIDIZATION

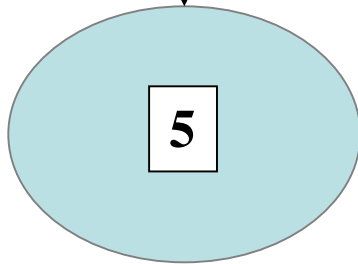
S

i

+

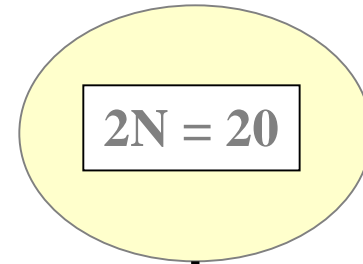


GAMETE

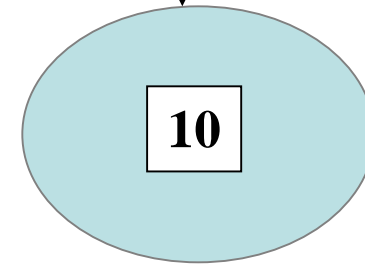


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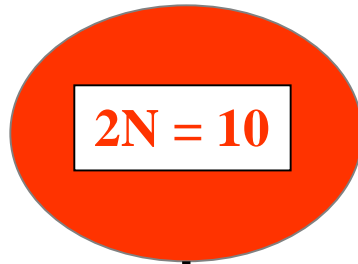
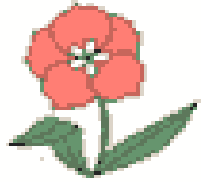
MEIOSIS



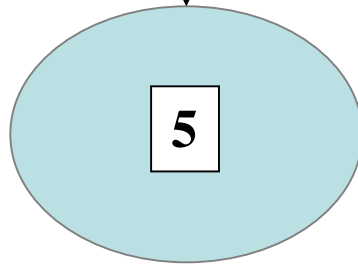
GAMETE



HYBRIDIZATION

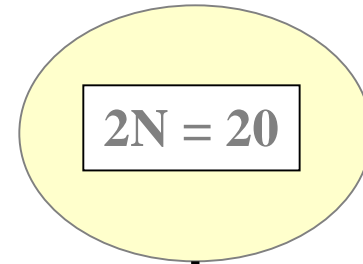


GAMETE

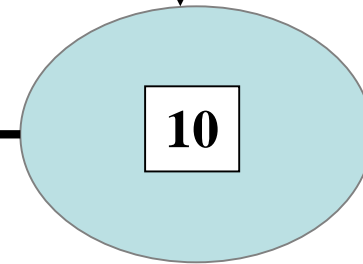


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MEIOSIS

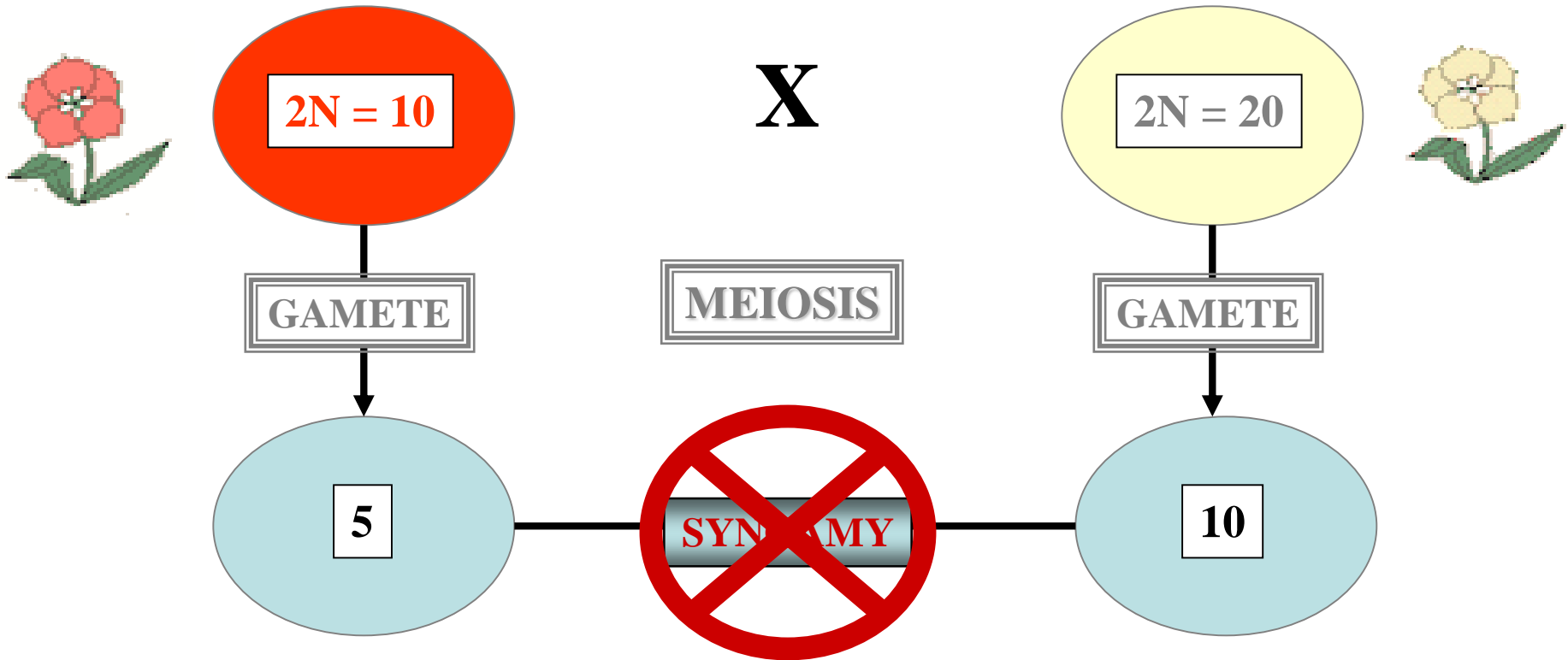


GAMETE



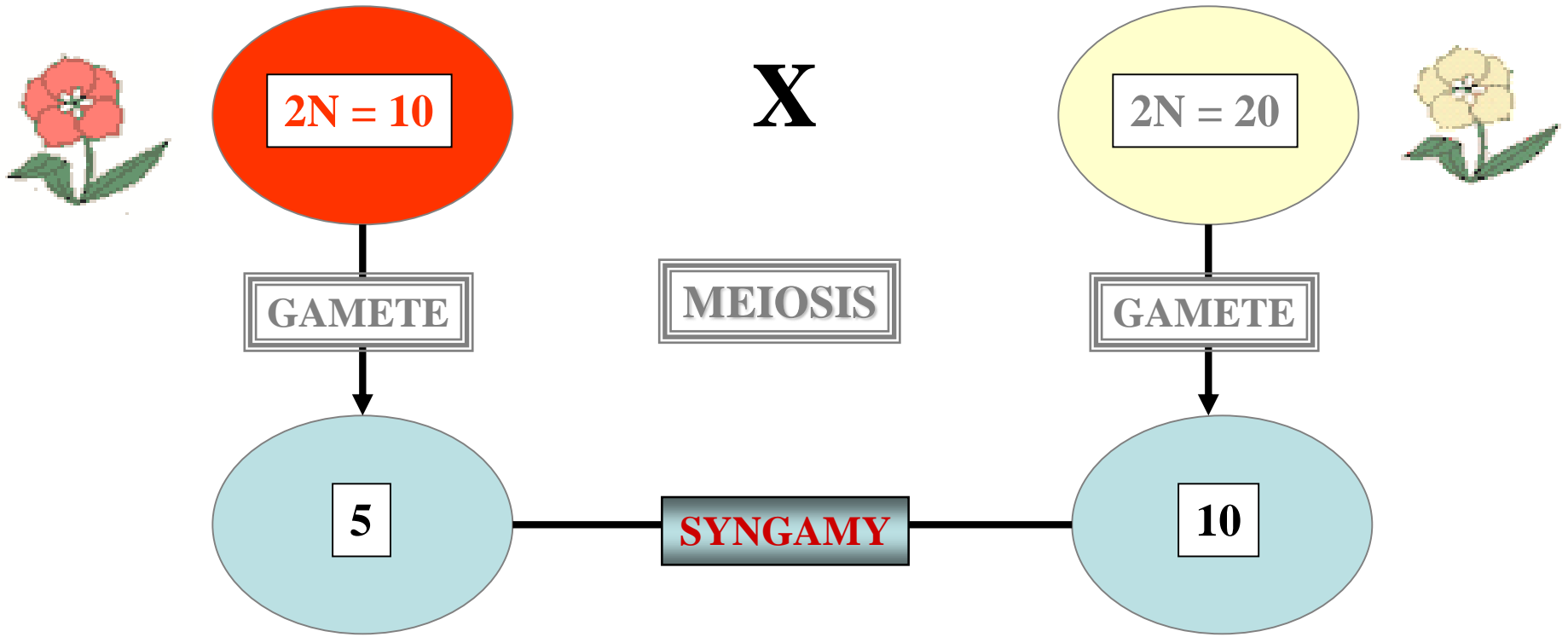
SYNGAMY

HYBRIDIZATION



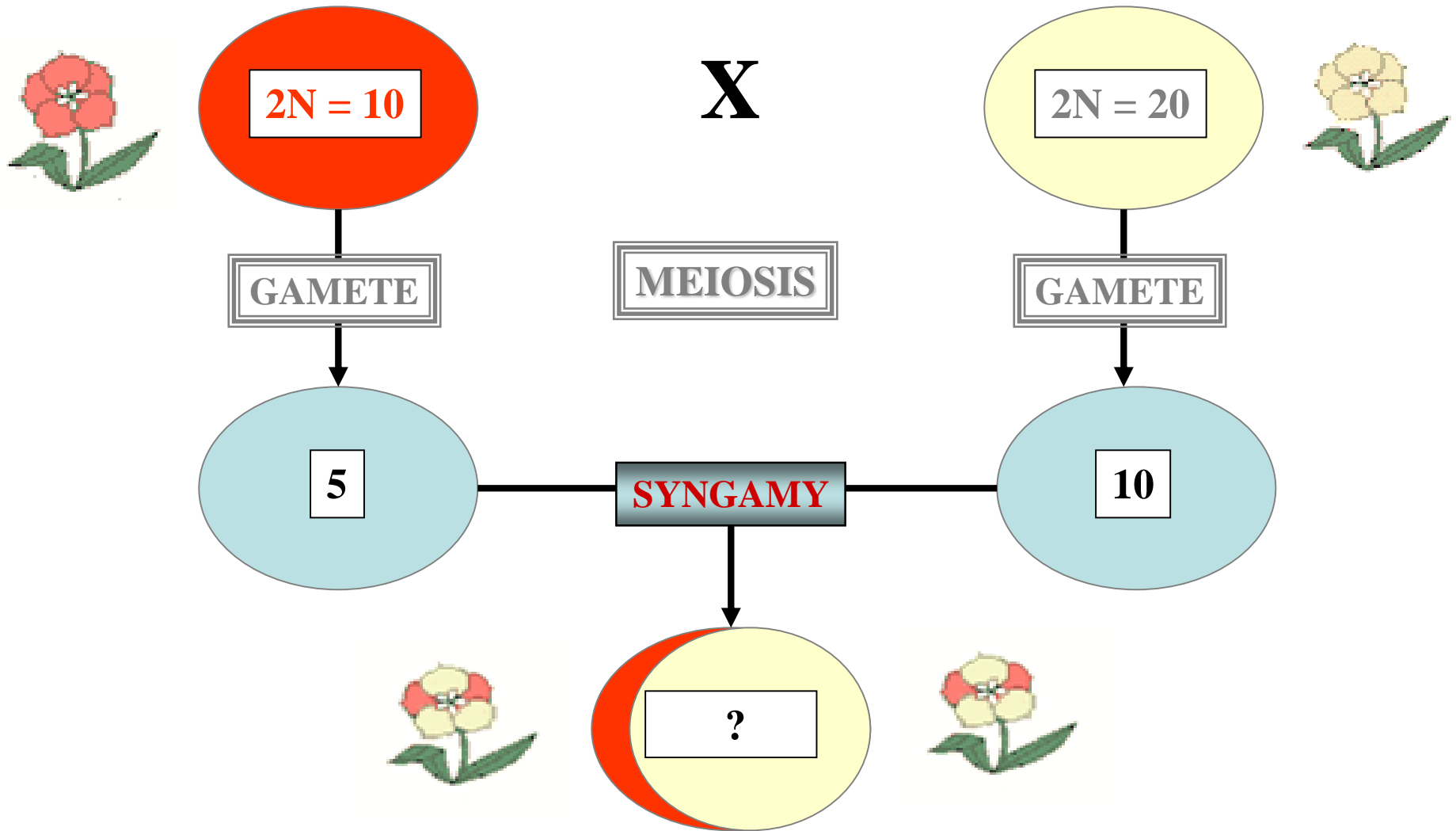
**SYNGAMY TYPICALLY
DOES NOT OCCUR**

HYBRIDIZATION



**SYNGAMY RARELY
DOES OCCUR**

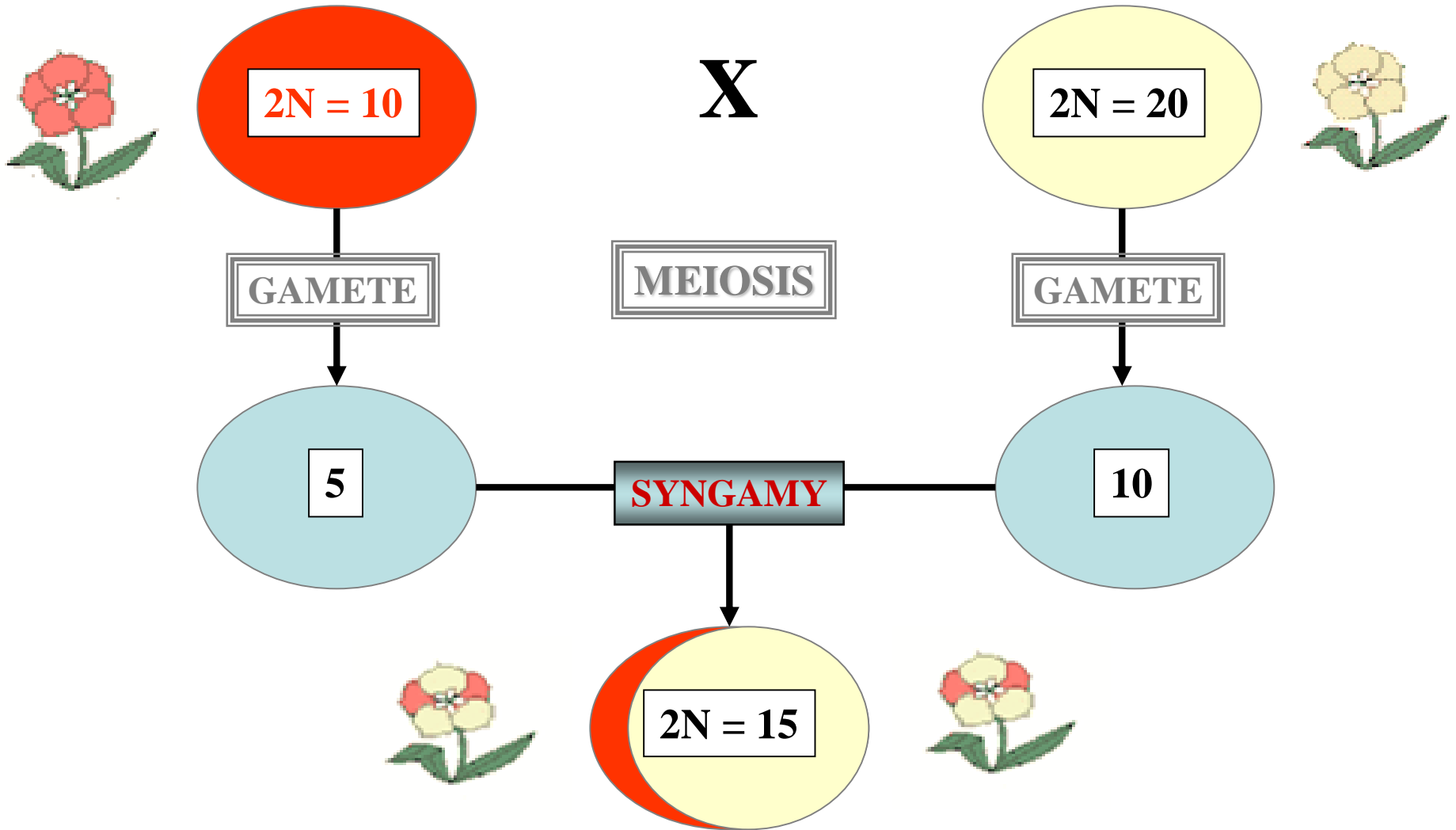
HYBRIDIZATION



HYBRIDIZATION



15

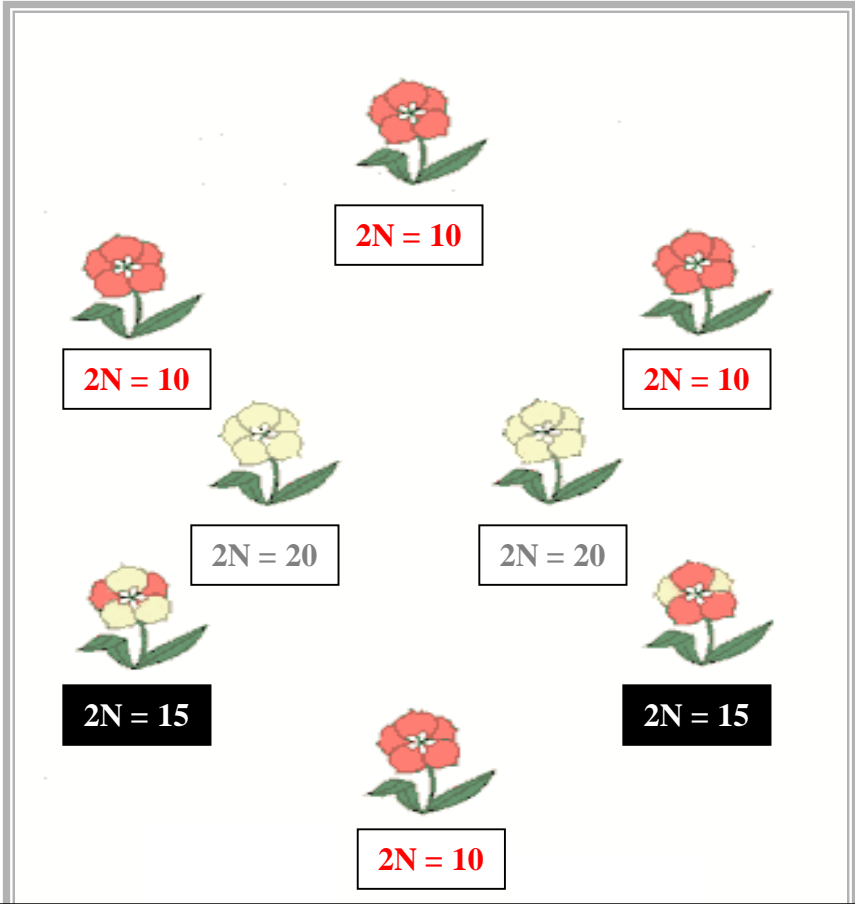


STERILE HYBRID



HYBRIDIZATION

SAME
GEOGRAPHIC
AREA



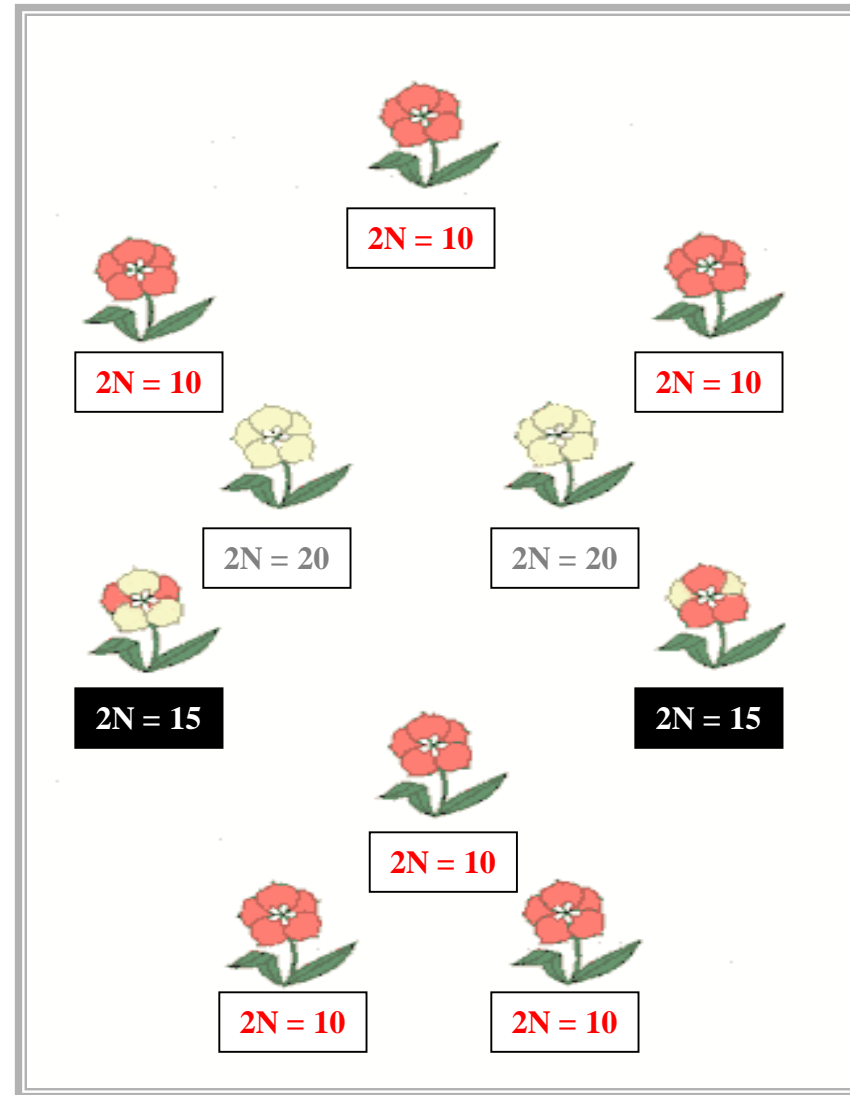
SAME
GEOGRAPHIC
AREA

**HYBRIDIZATION
STERILE HYBRIDS**



STERILE HYBRIDS

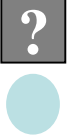
HYBRIDIZATION



**SAME
GEOGRAPHIC
AREA**

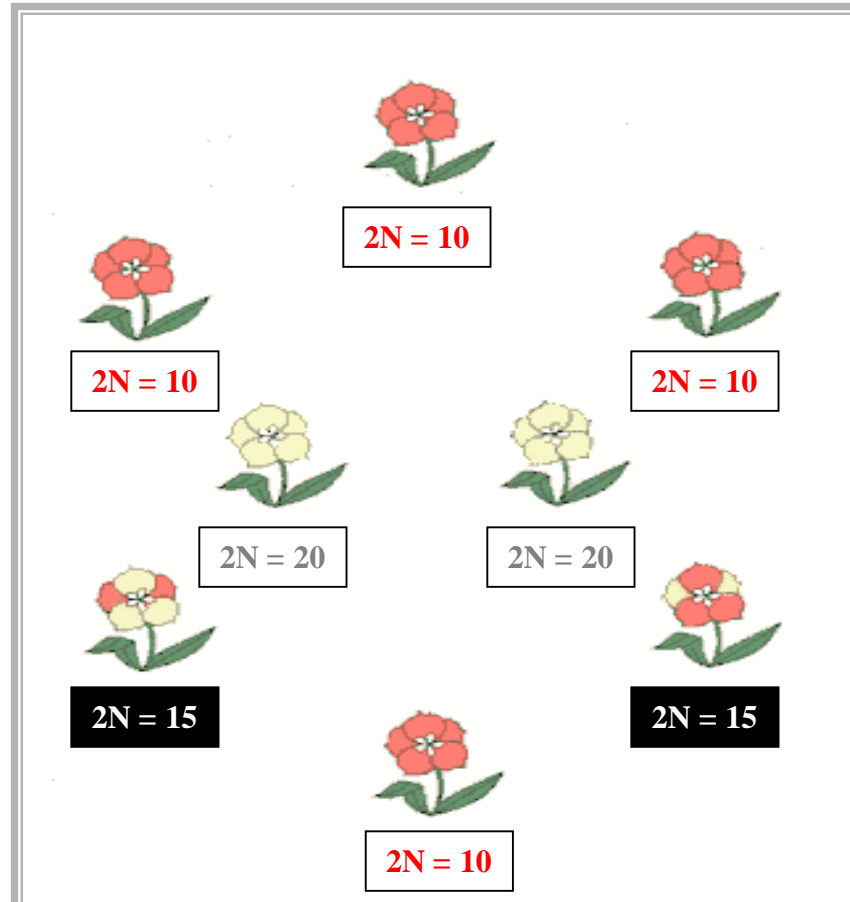
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GEOGRAPHIC
AREA**

STERILE HYBRIDS $2N = 15$



HYBRIDIZATION

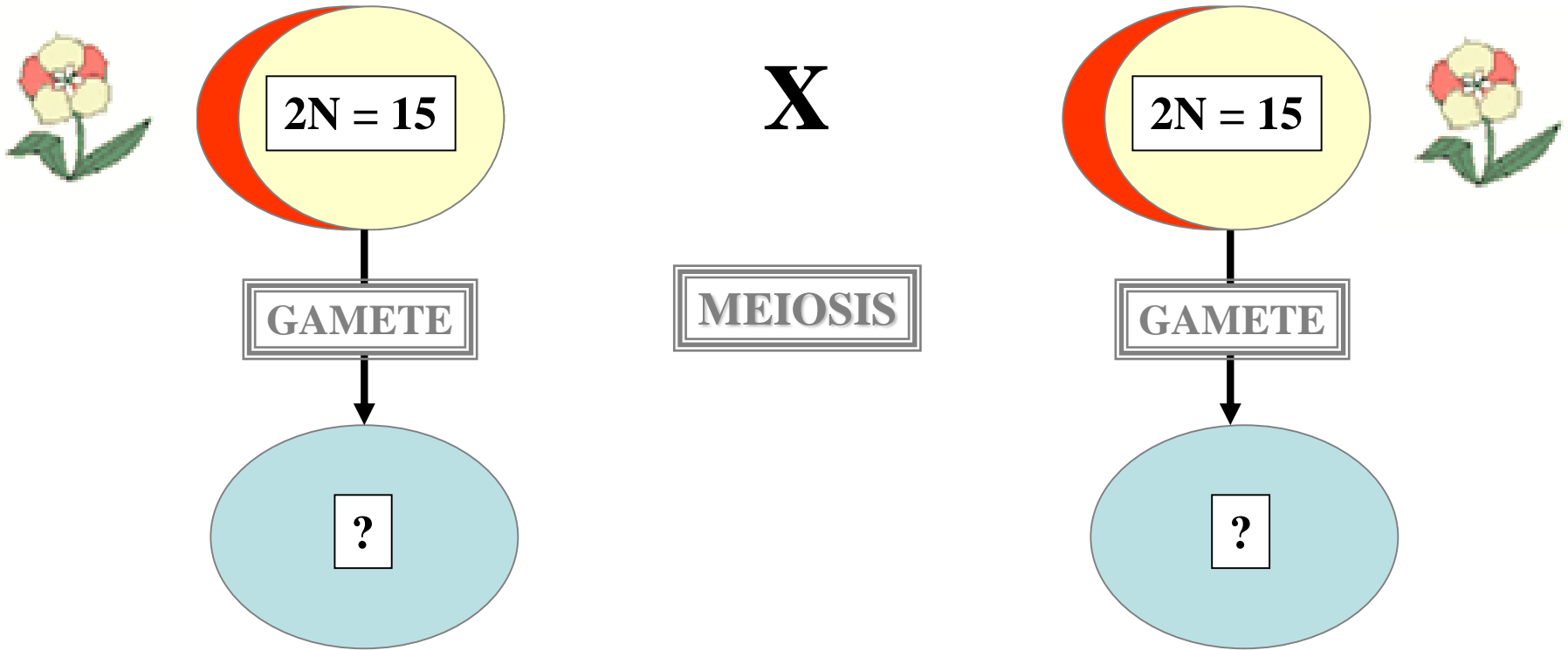
**SAME
GEOGRAPHIC
AREA**



**SAME
GEOGRAPHIC
AREA**

**STERILE HYBRIDS
UNDERGO MEIOSIS**

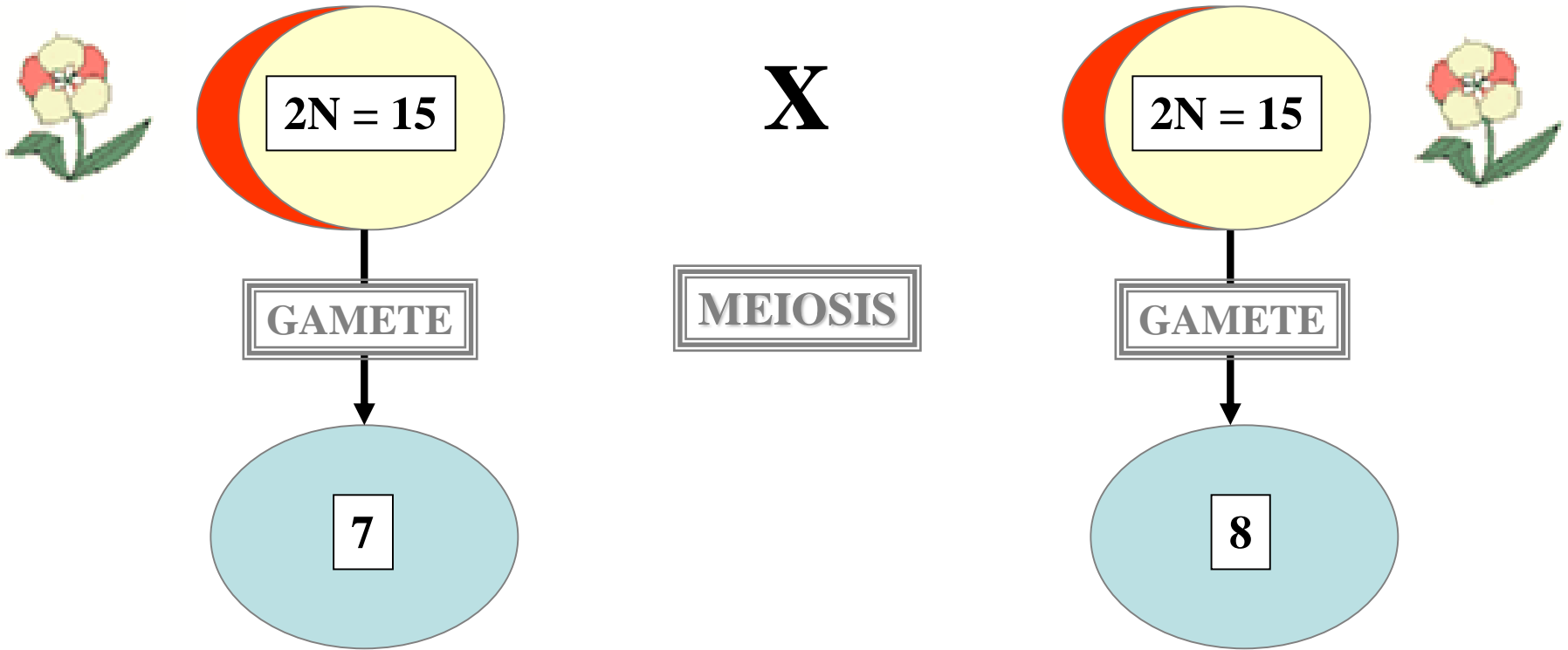
STERILE HYBRIDS



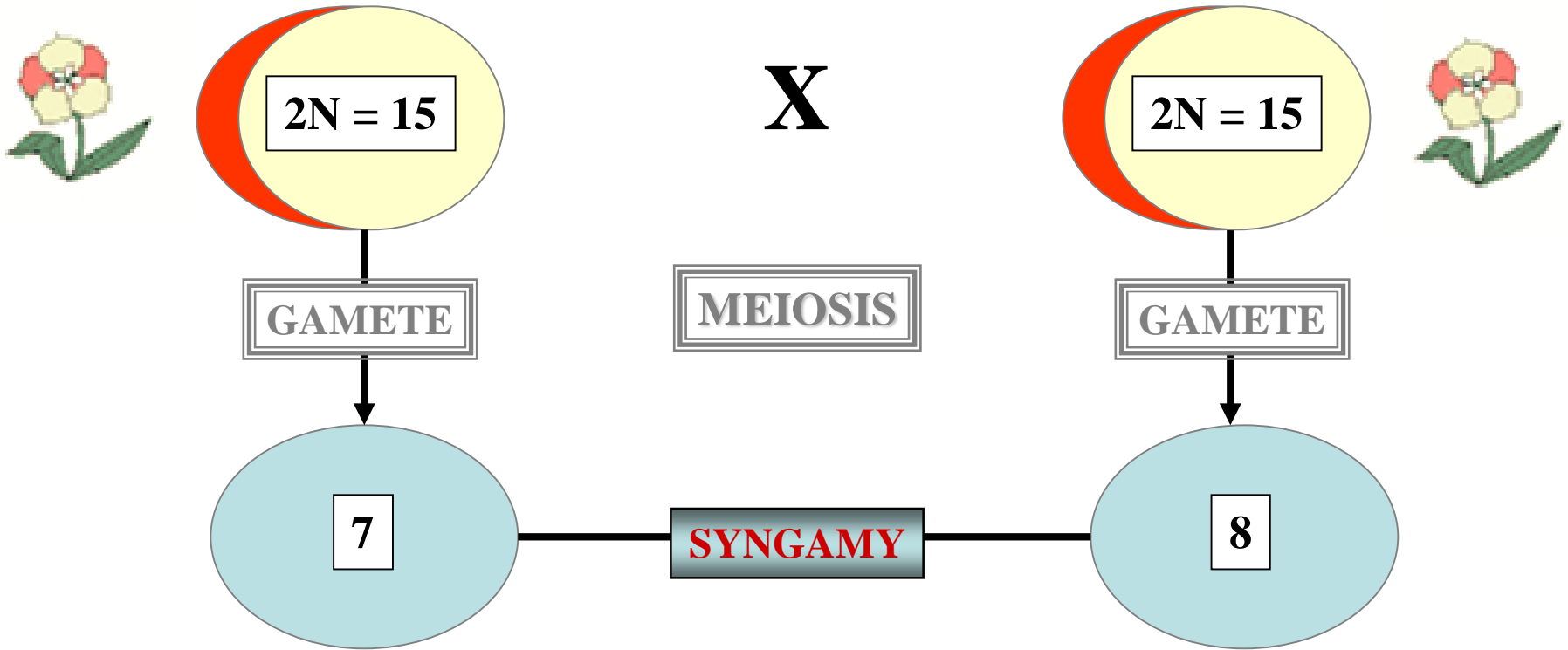
STERILE HYBRIDS

S

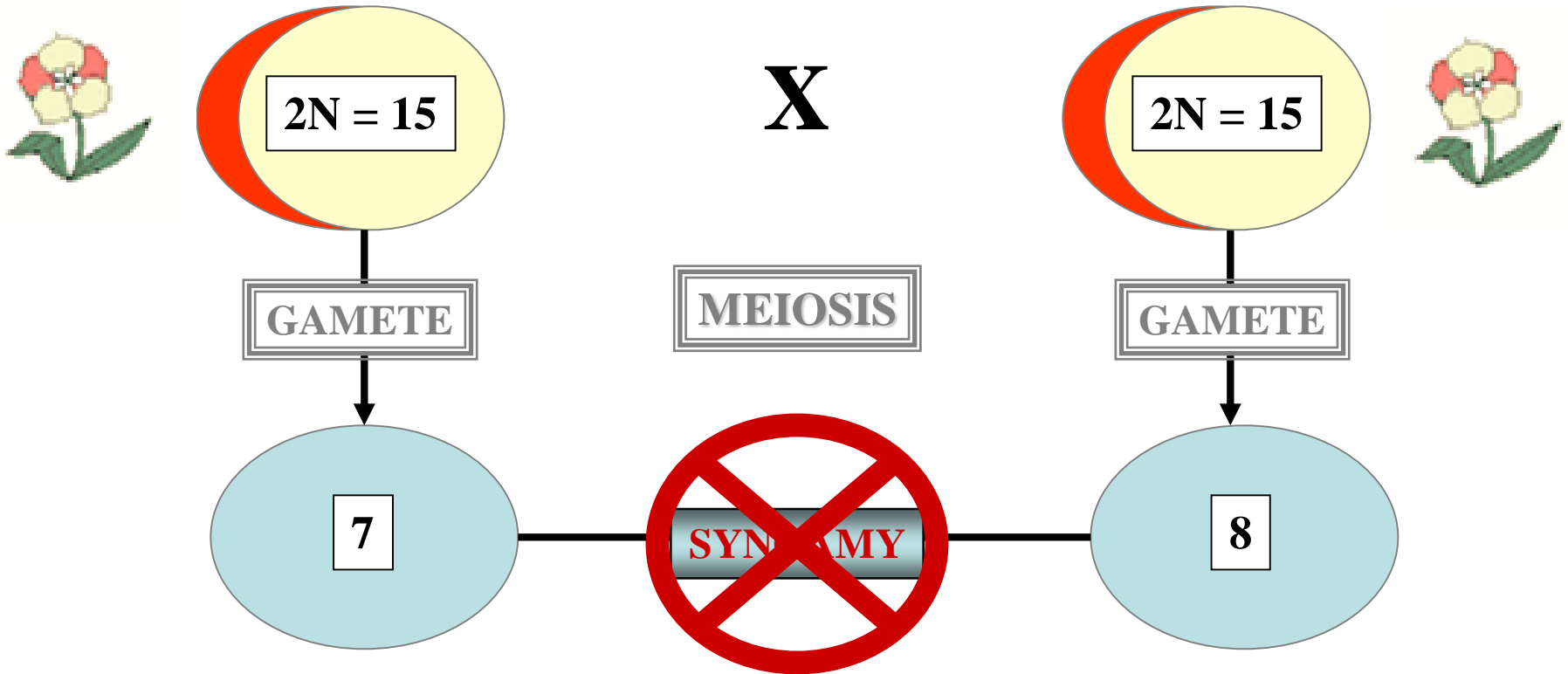
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STERILE HYBRIDS

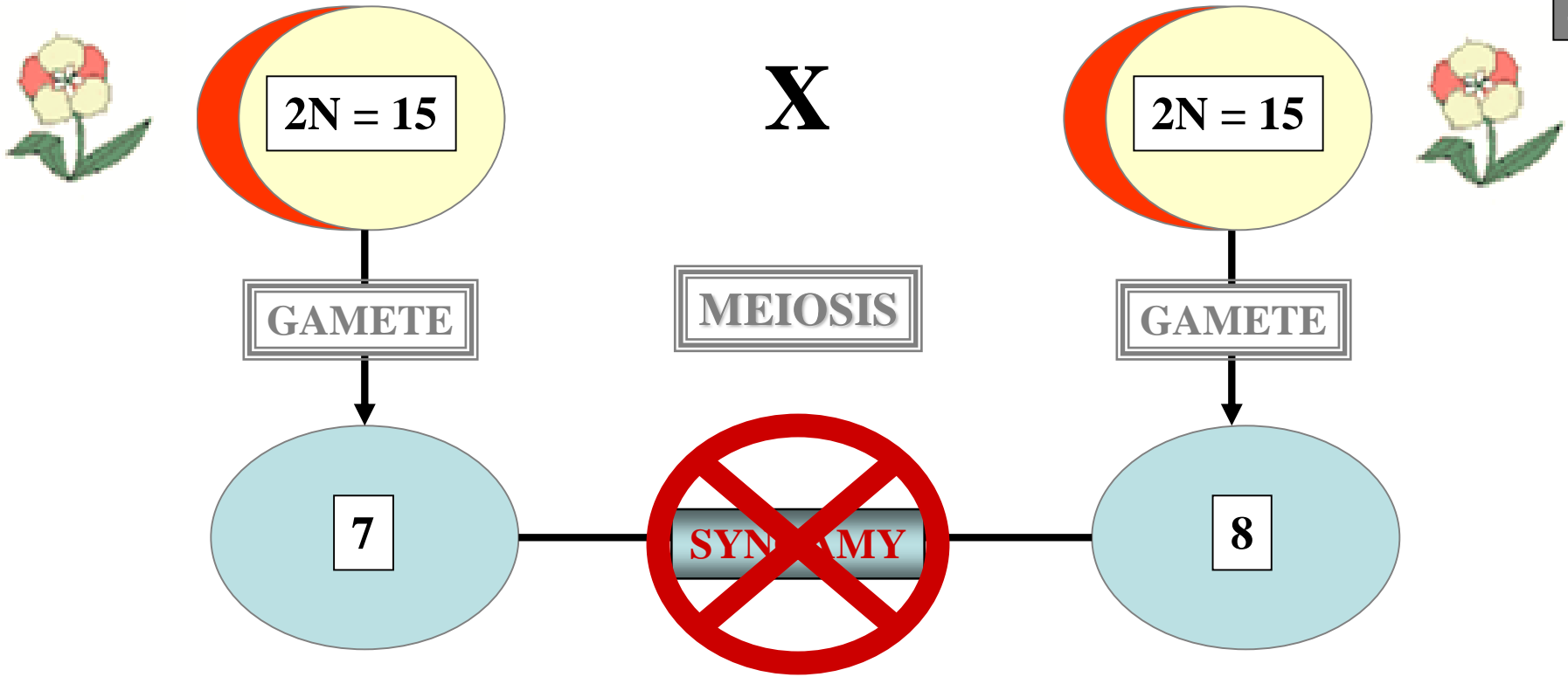


STERILE HYBRIDS



**TYPICALLY
INFERTILE GAMETES**

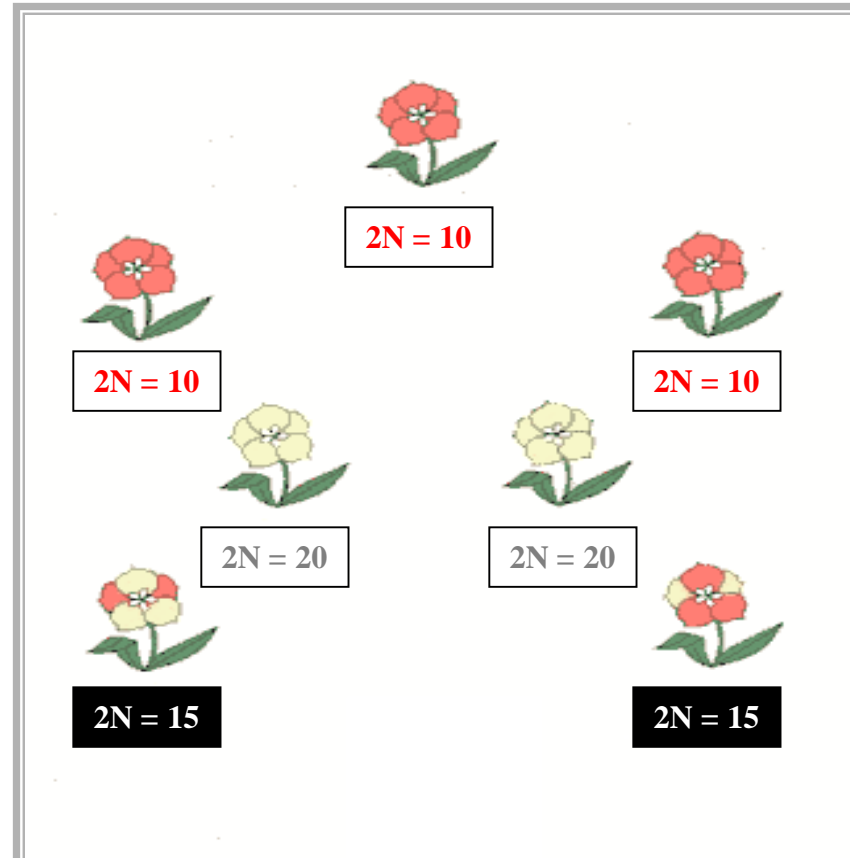
STERILE HYBRIDS



HYBRIDS
STERILE HYBRIDS



STERILE HYBRIDS



SAME
GEOGRAPHIC
AREA

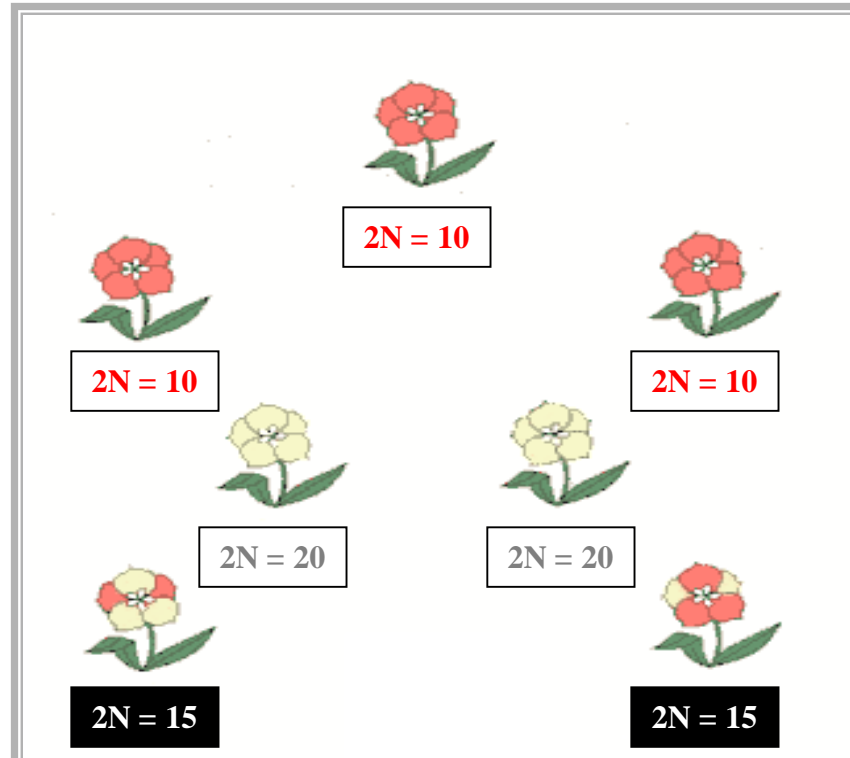
SAME
GEOGRAPHIC
AREA

HYBRIDS
STERILE HYBRIDS



STERILE HYBRIDS

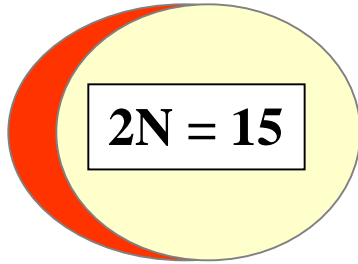
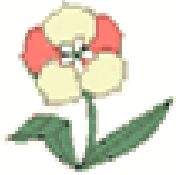
SAME
GEOGRAPHIC
AREA



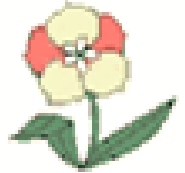
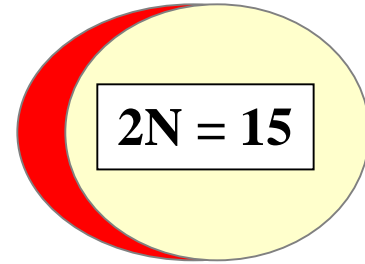
SAME
GEOGRAPHIC
AREA

STERILE HYBRIDS
UNDERGO MEIOSIS
NON-DISJUNCTION

STERILE HYBRIDS



X

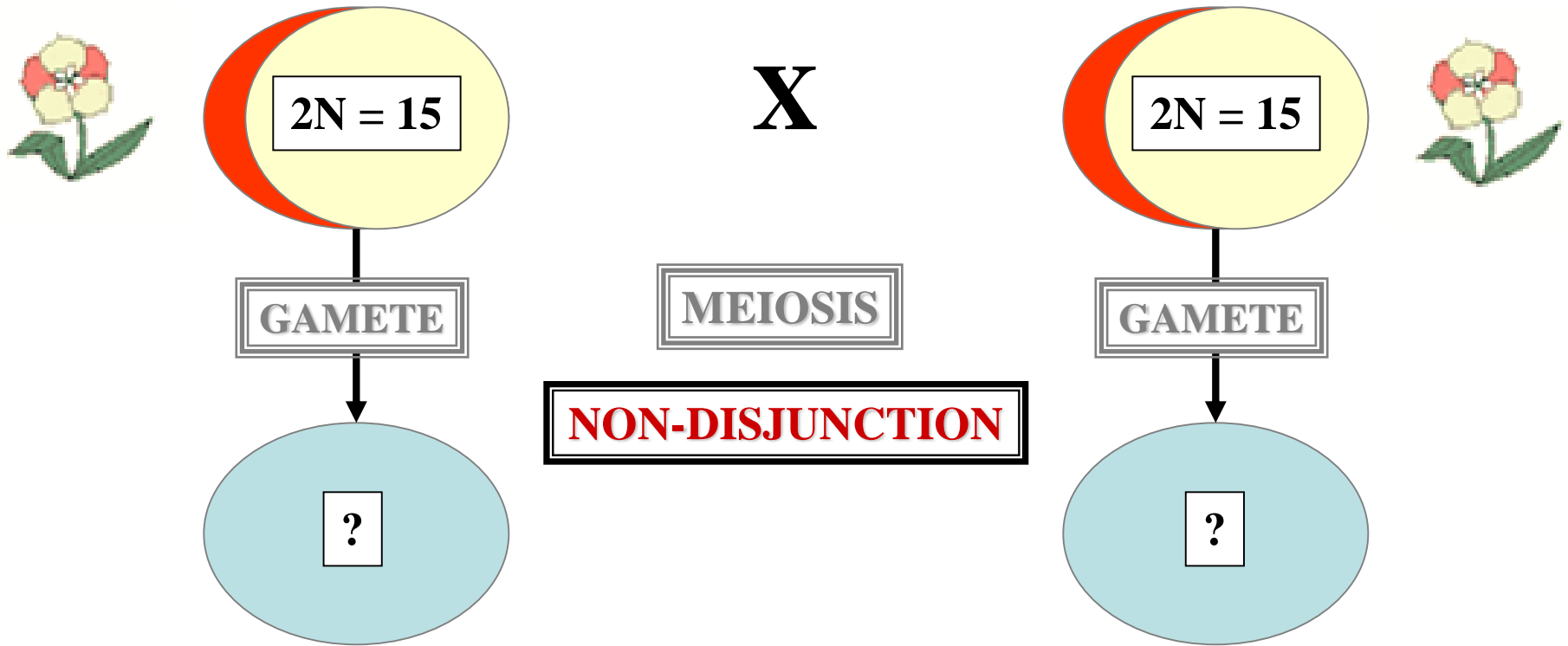


MEIOSIS

NON-DISJUNCTION

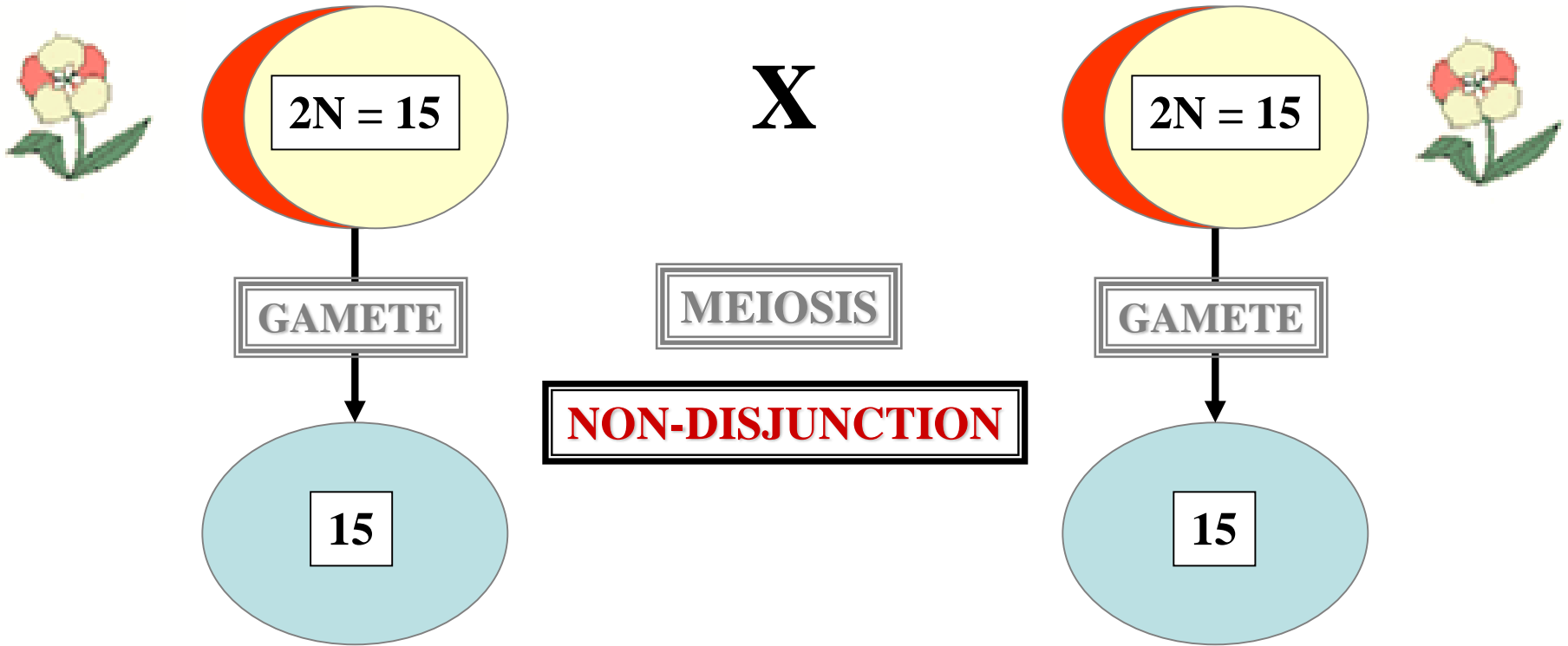
CENTROMERES **DO NOT**
BREAKDOWN
DURING ANAPHASE-II

STERILE HYBRIDS

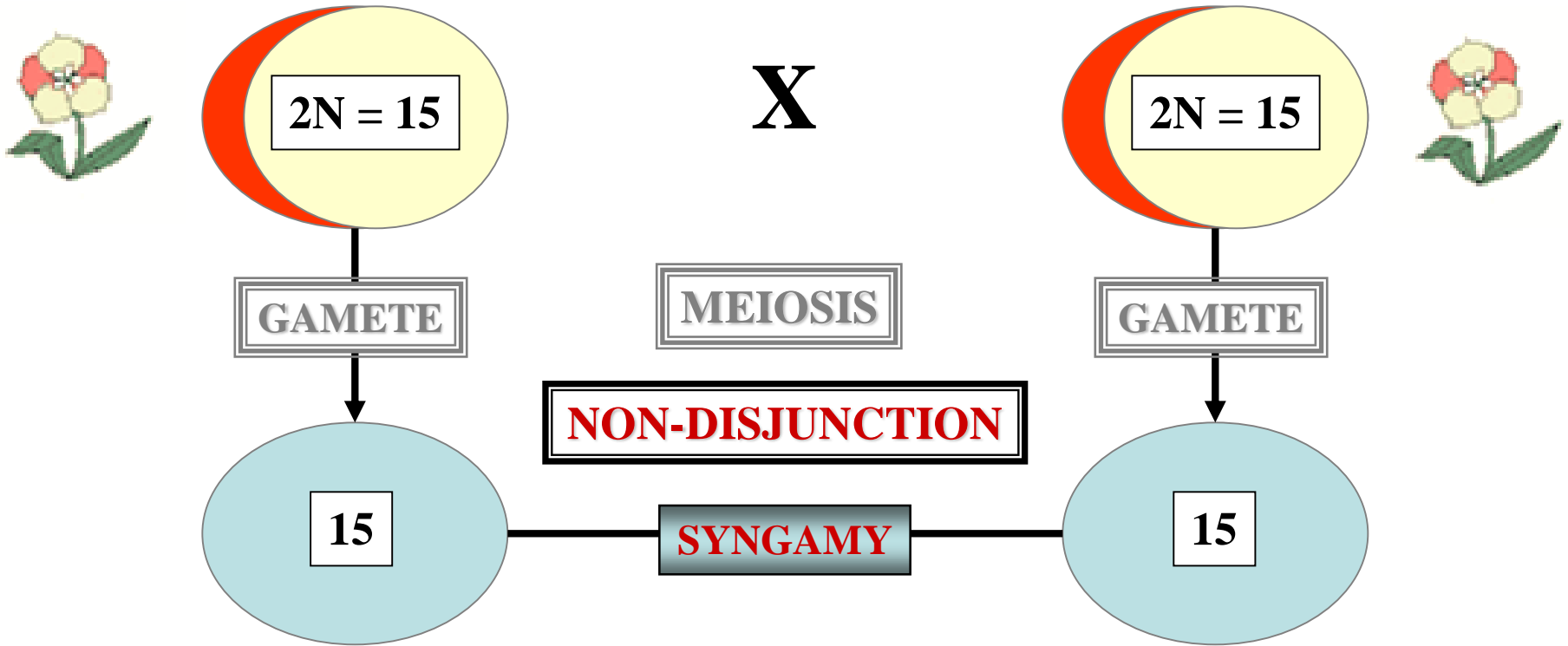


**CENTROMERES DO NOT
BREAKDOWN
DURING ANAPHASE-II**

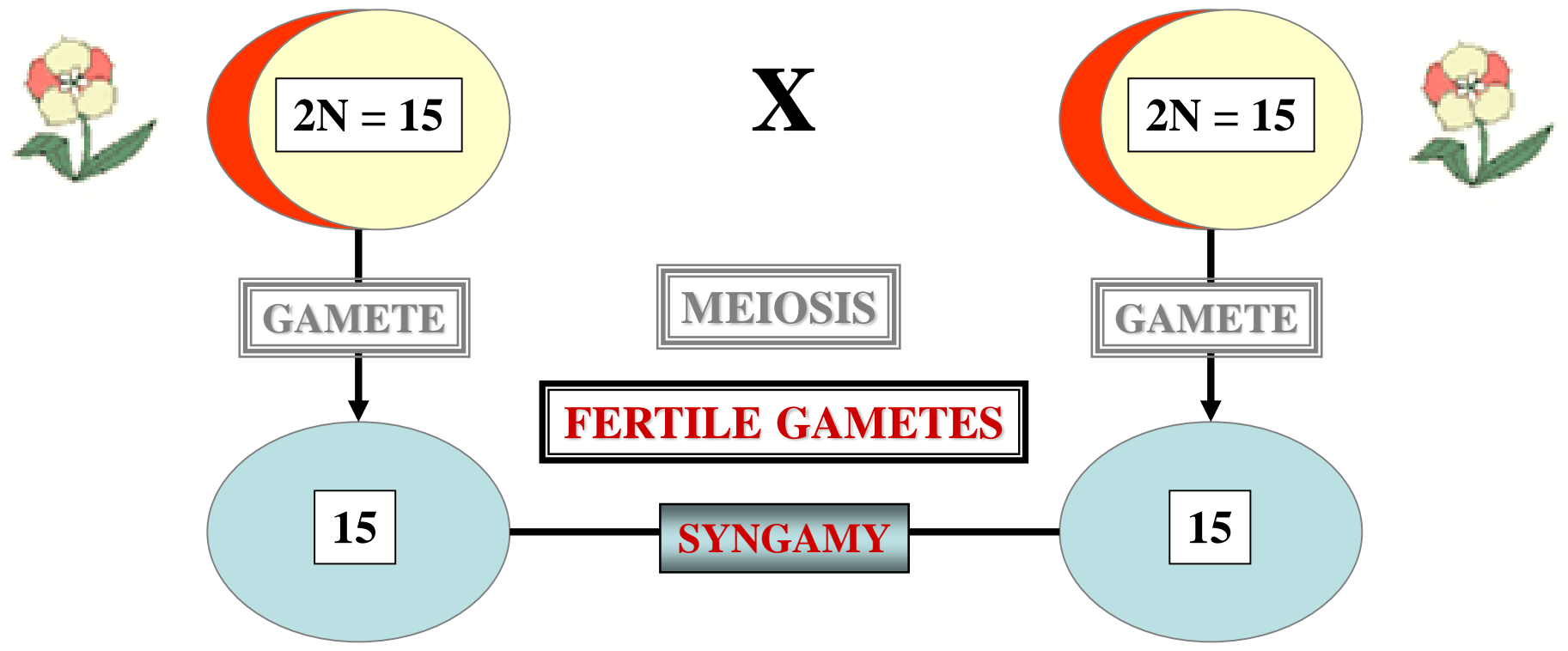
STERILE HYBRIDS



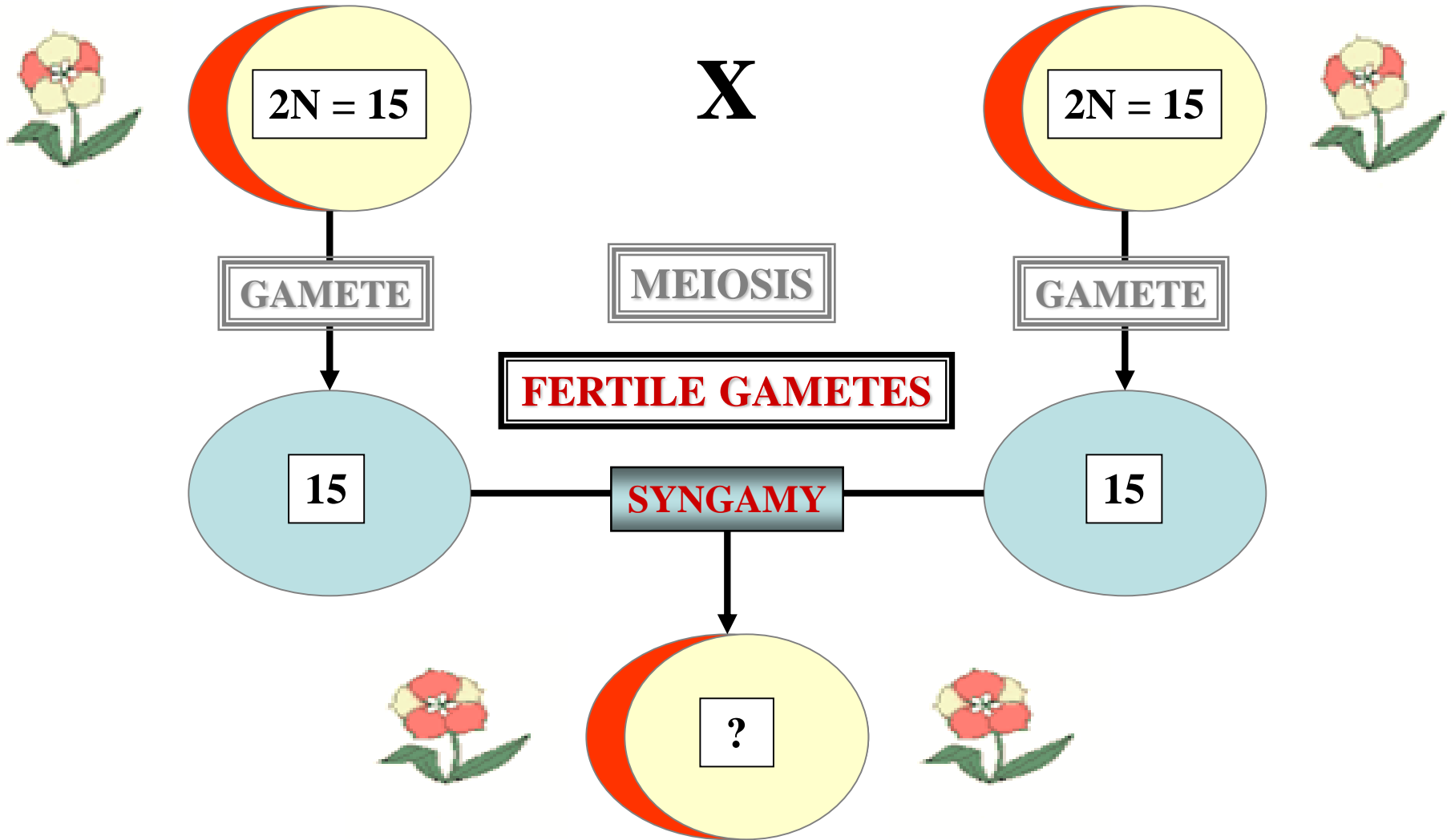
STERILE HYBRIDS



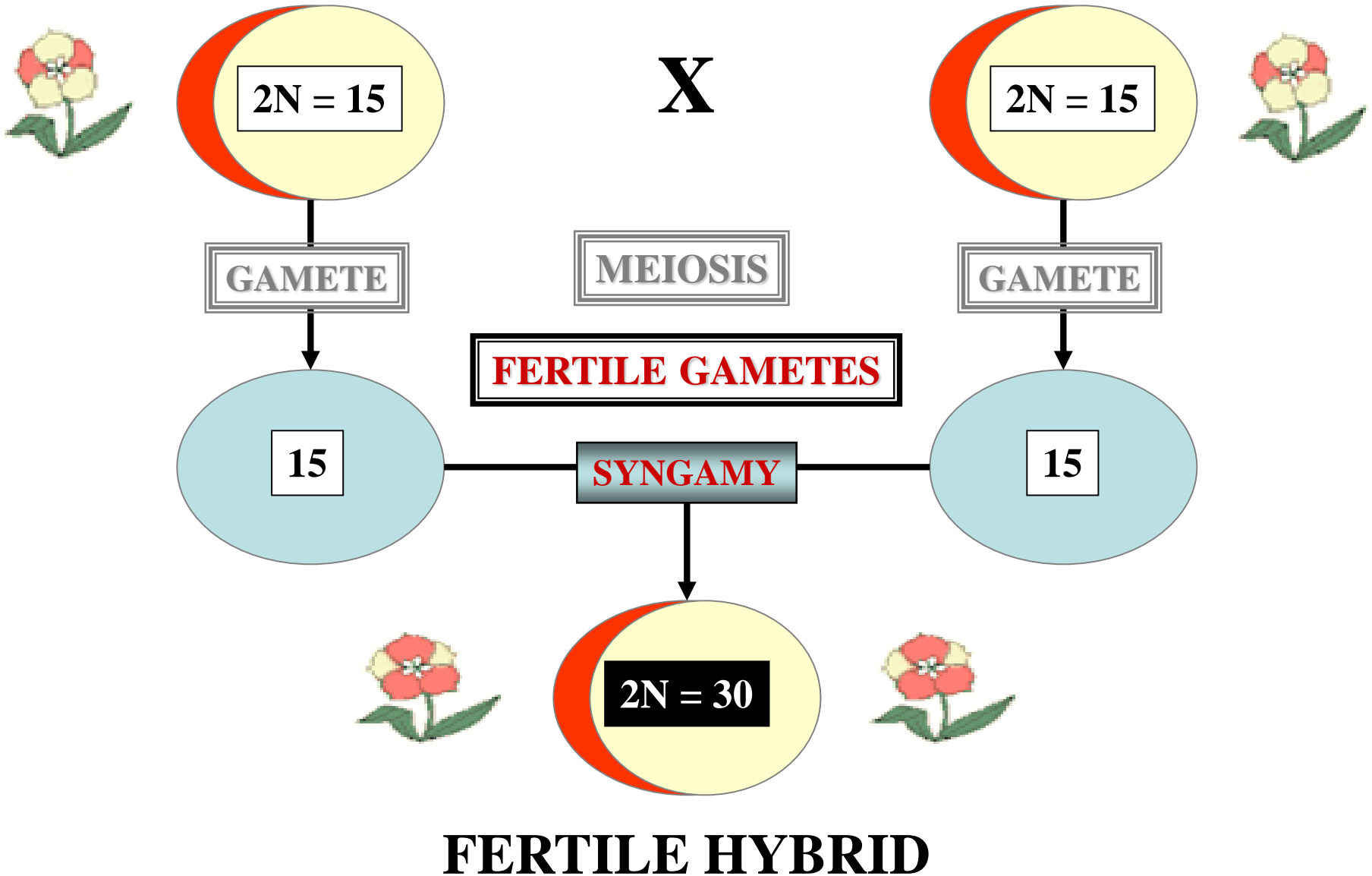
STERILE HYBRIDS



STERILE HYBRIDS



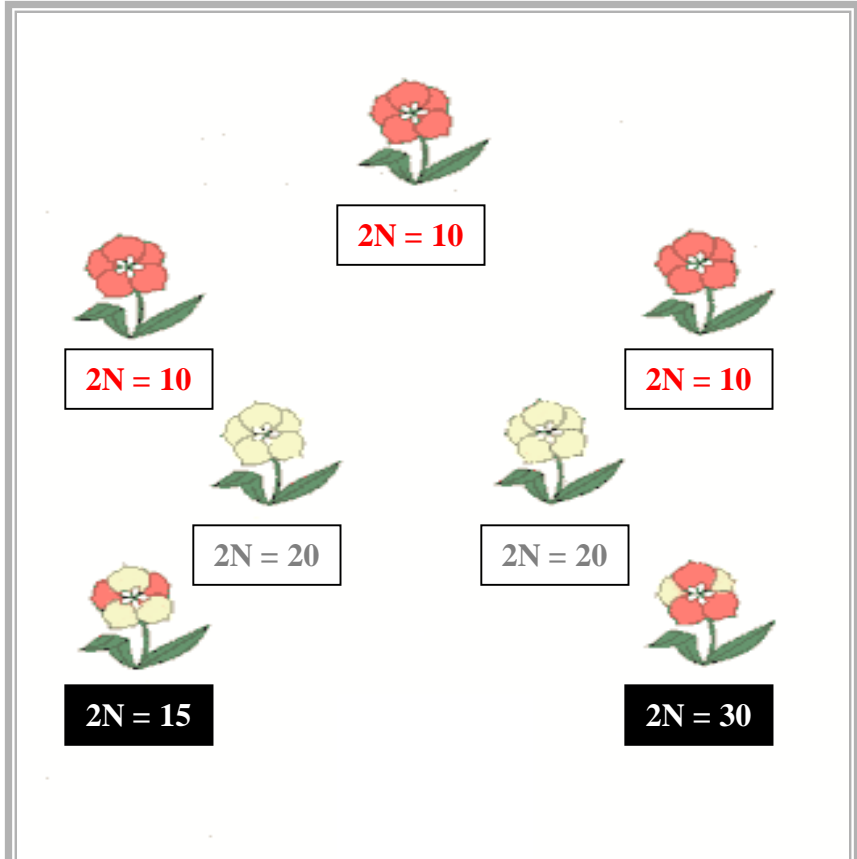
STERILE HYBRIDS





HYBRIDIZATION

SAME
GEOGRAPHIC
AREA



SAME
GEOGRAPHIC
AREA

HYBRIDS
FERTILE HYBRIDS

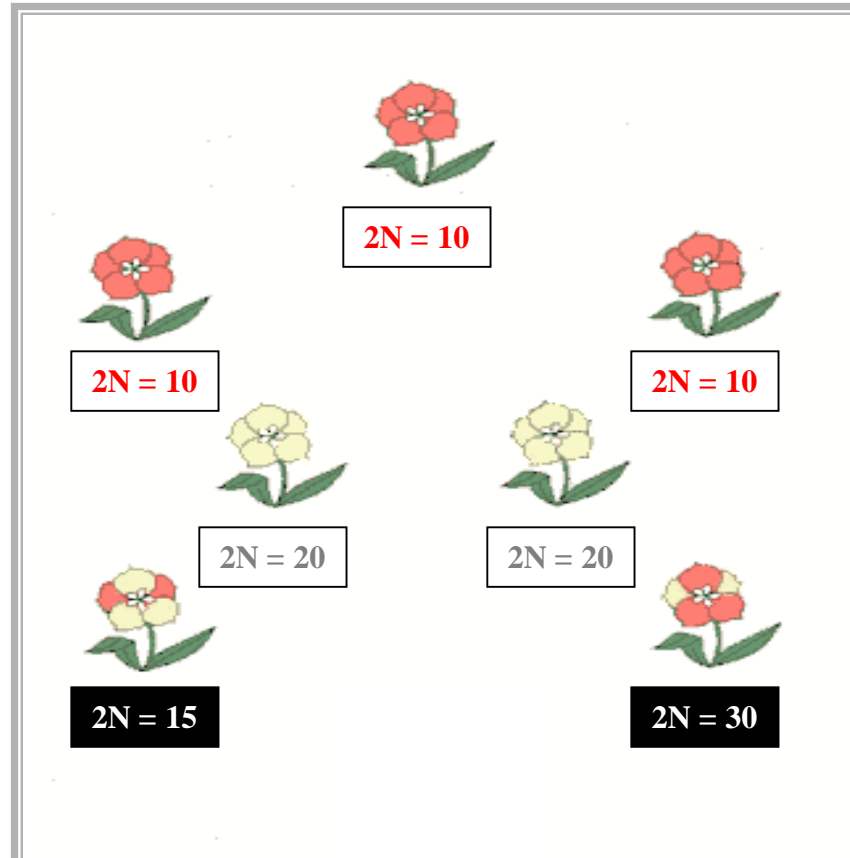


FERTILE HYBRIDS



HYBRIDIZATION

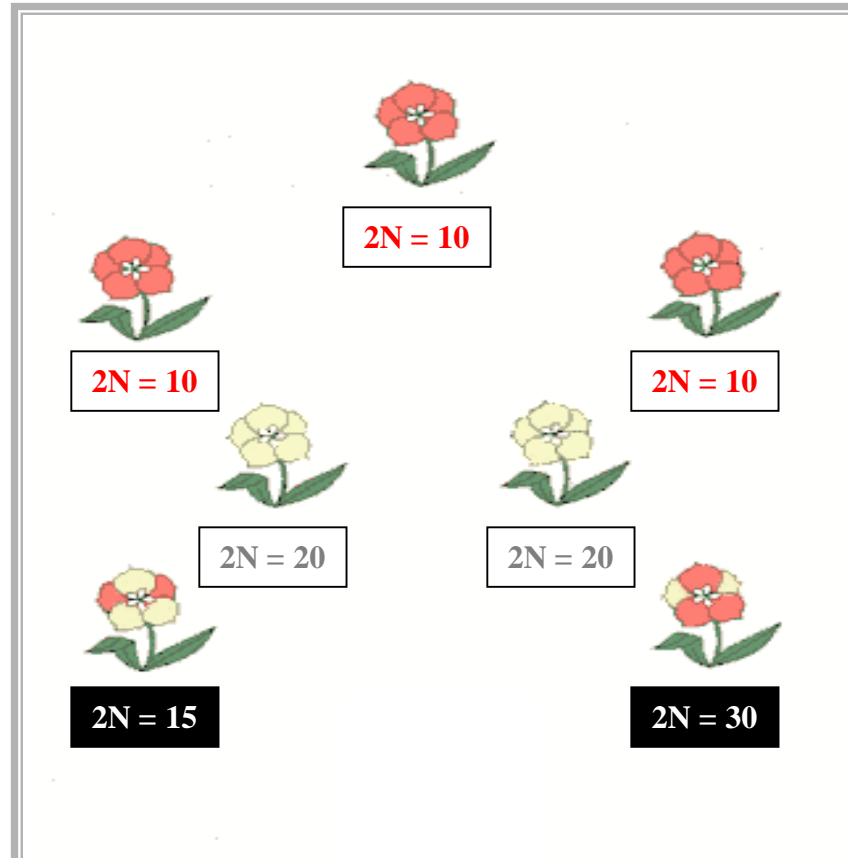
SAME
GEOGRAPHIC
AREA



SAME
GEOGRAPHIC
AREA

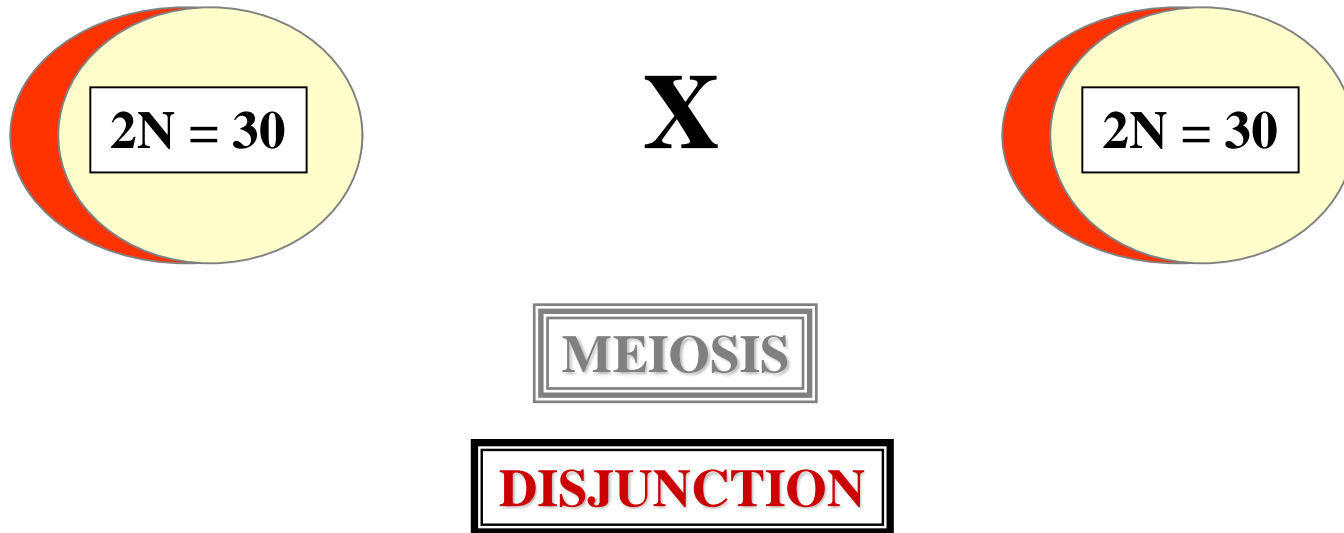
HYBRIDS
FERTILE HYBRIDS

HYBRIDIZATION



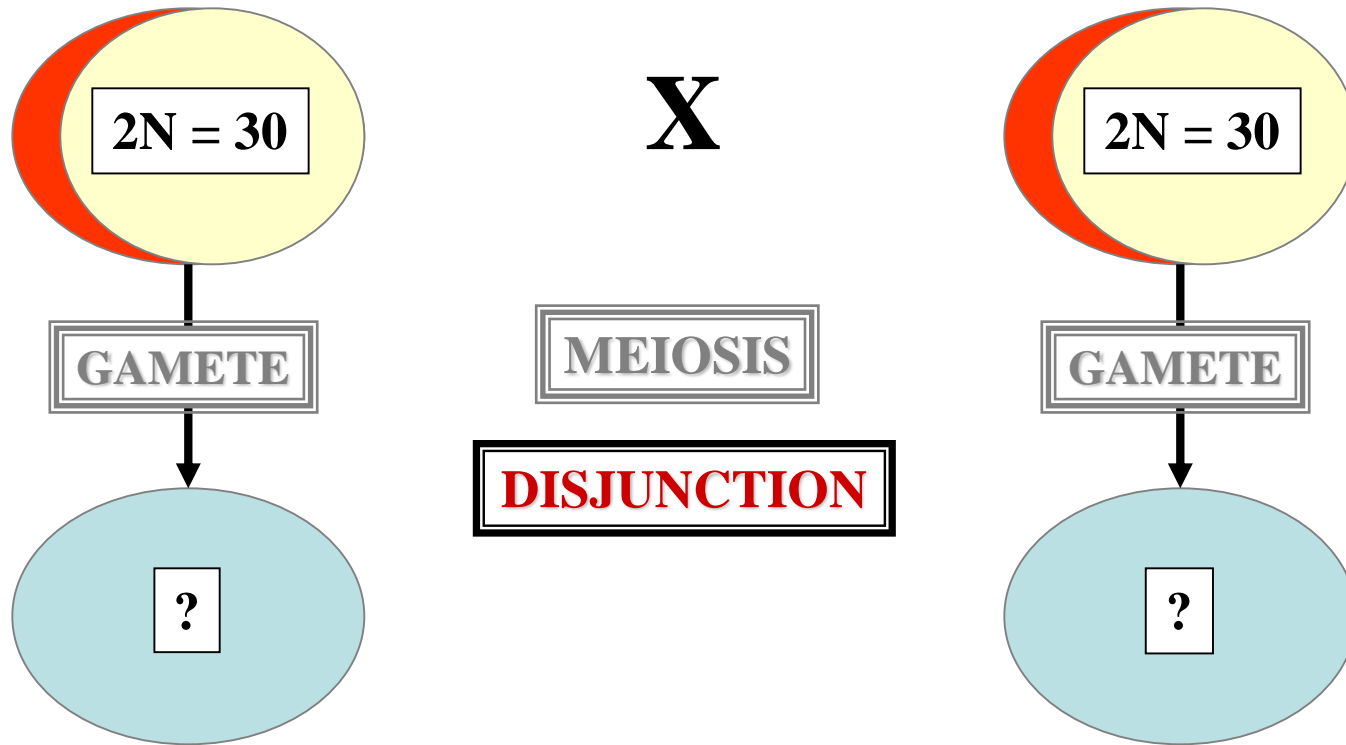
**FERTILE HYBRIDS
CROSS**

FERTILE HYBRIDS



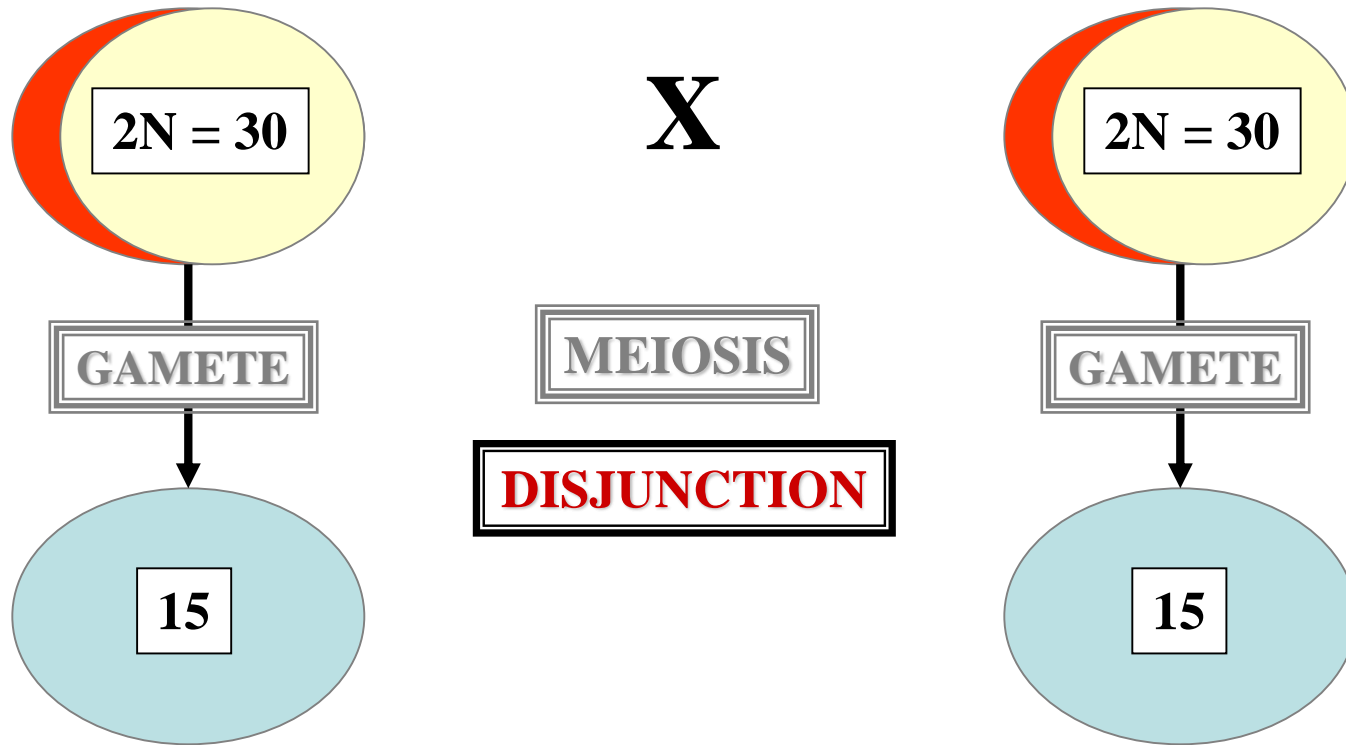
**CENTROMERES DO
BREAKDOWN
DURING ANAPHASE-II**

FERTILE HYBRIDS



**CENTROMERES DO
BREAKDOWN
DURING ANAPHASE-II**

FERTILE HYBRIDS

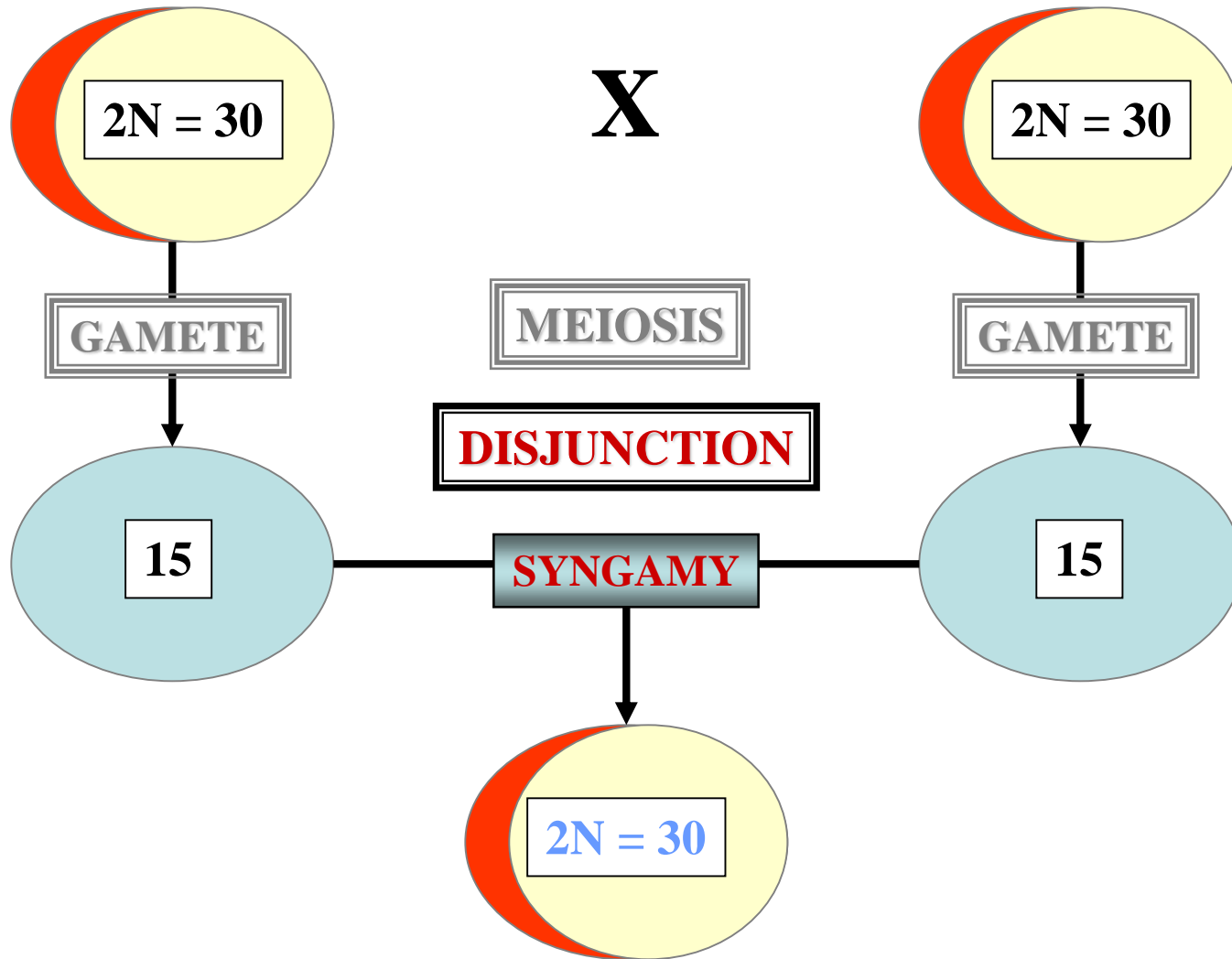


CENTROMERES **DO**
BREAKDOWN
DURING ANAPHASE-II

FERTILE HYBRIDS

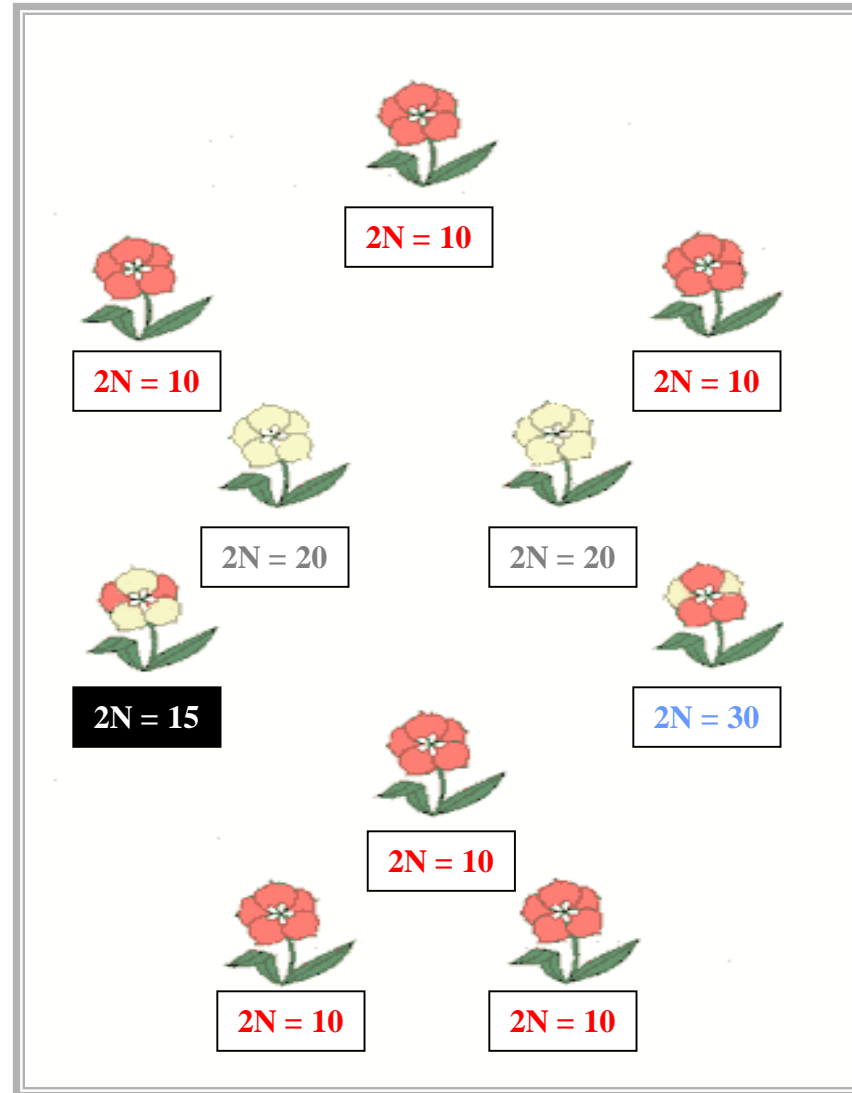


$2N = 30$



FERTILE HYBRID CYTOTYPES INTERBREEDING

ALLOPOLYPLOID SPECIATION



**SAME
GEOGRAPHIC
AREA**

**SAME
GEOGRAPHIC
AREA**

FERTILE HYBRID CYTOTYPES INTERBREEDING

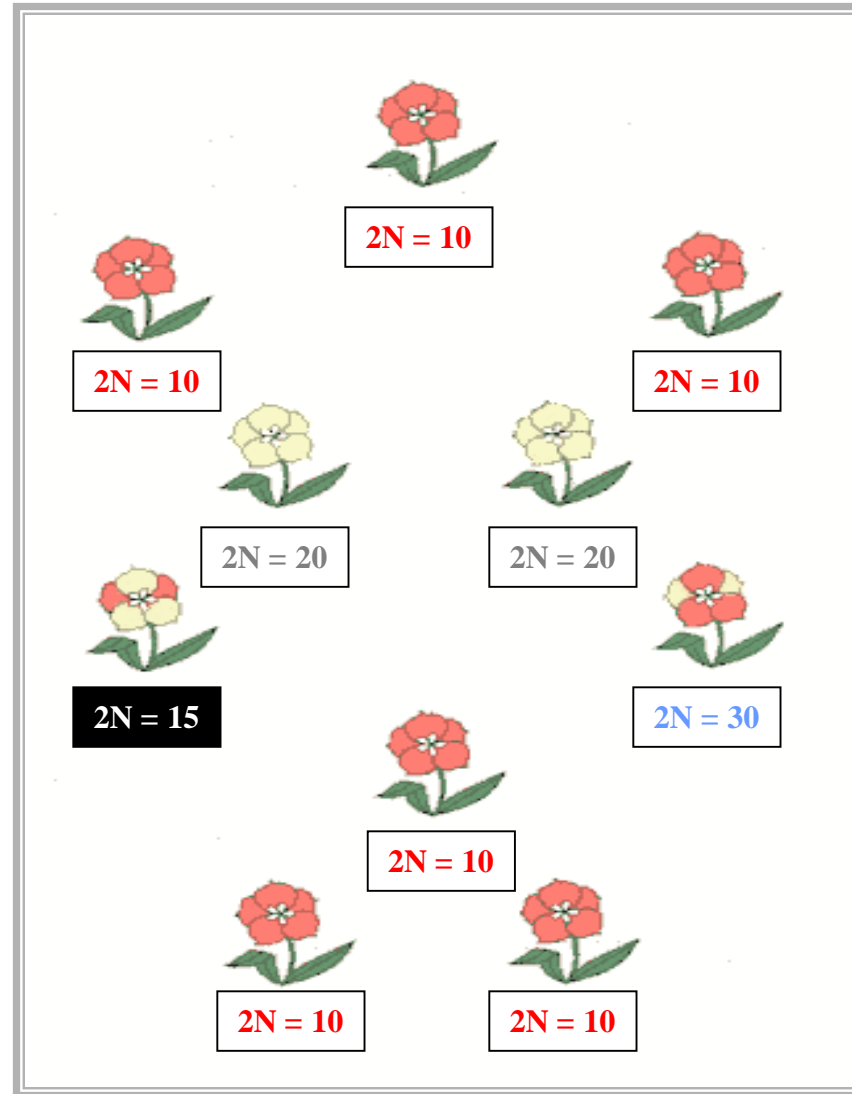


$$2N = 30$$

FERTILE CYTOTYPES

ALLOPOLYPLOID SPECIATION

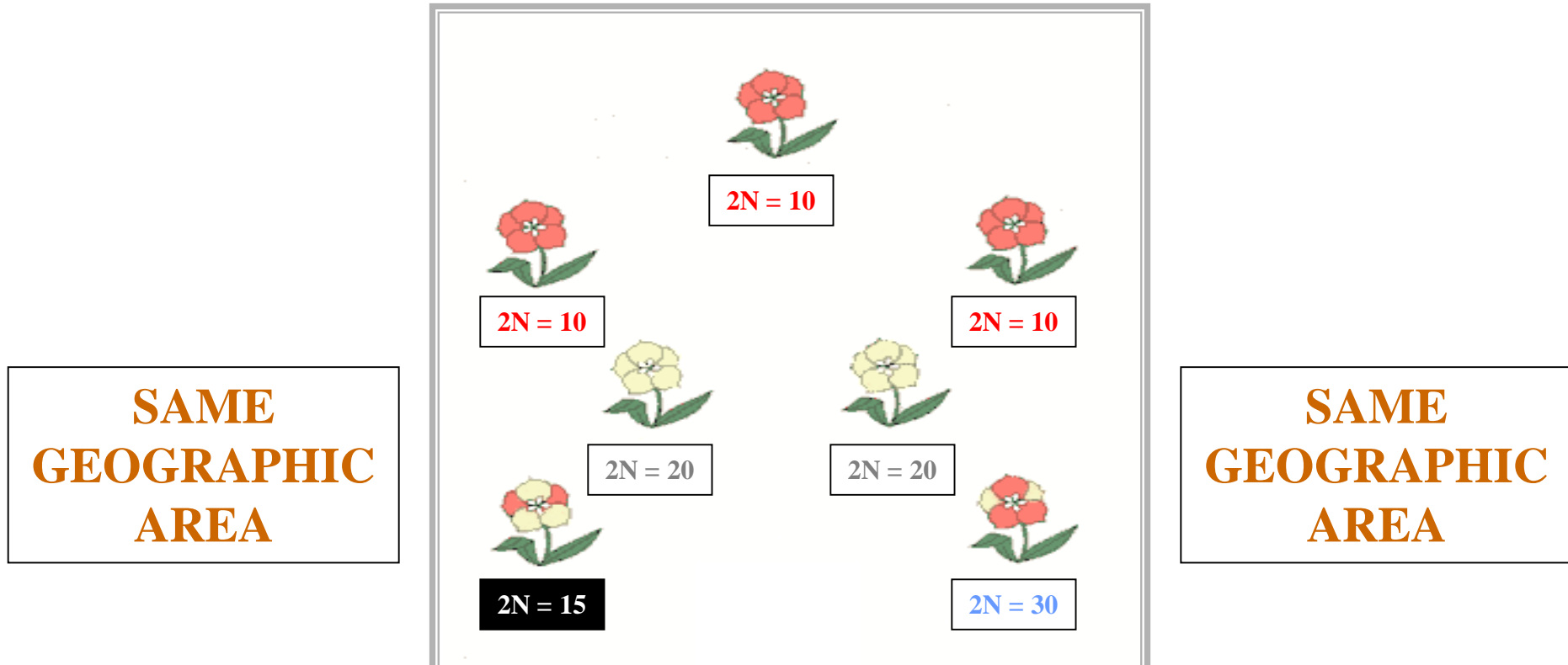
SAME
GEOGRAPHIC
AREA



SAME
GEOGRAPHIC
AREA

FERTILE CYTOTYPES $2N = 30$

ALLOPOLYPLOID SPECIATION

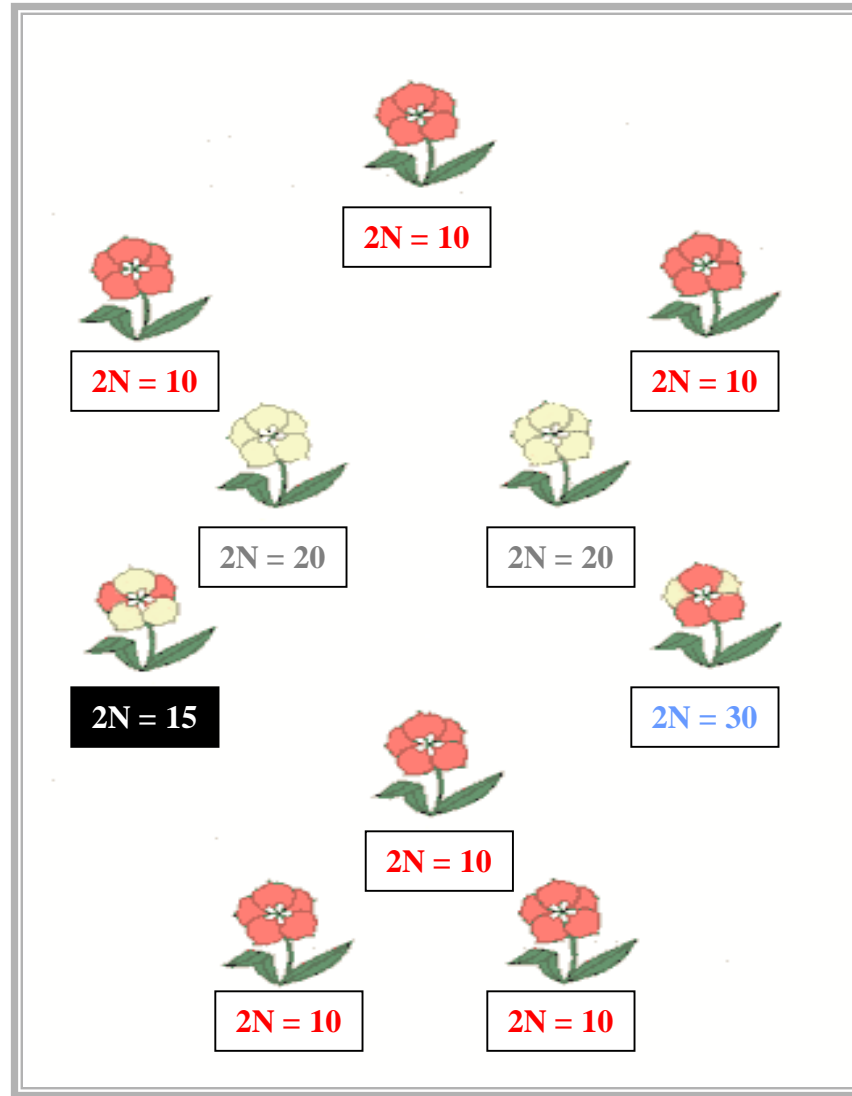


$$2N = 30$$

**FERTILE HYBRID CYTOTYPES
REPRODUCTIVELY
ISOLATED**

ALLOPOLYPLOID SPECIATION

TIME



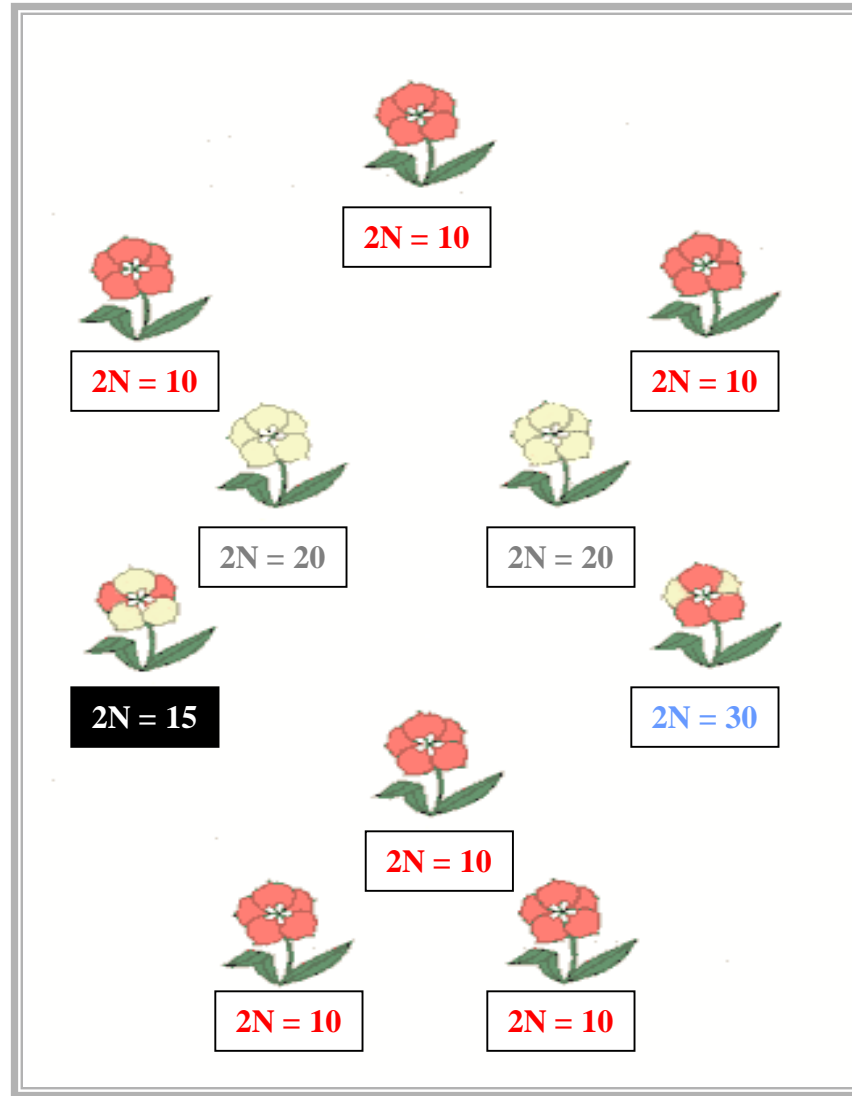
TIME

FERTILE CYTOTYPES 2N = 30

ALLOPOLYPLOID SPECIATION

T

**2N = 30
CYTOTYPES
UNDERGO
SEPARATE
MUTATIONS
&
SELECTION**

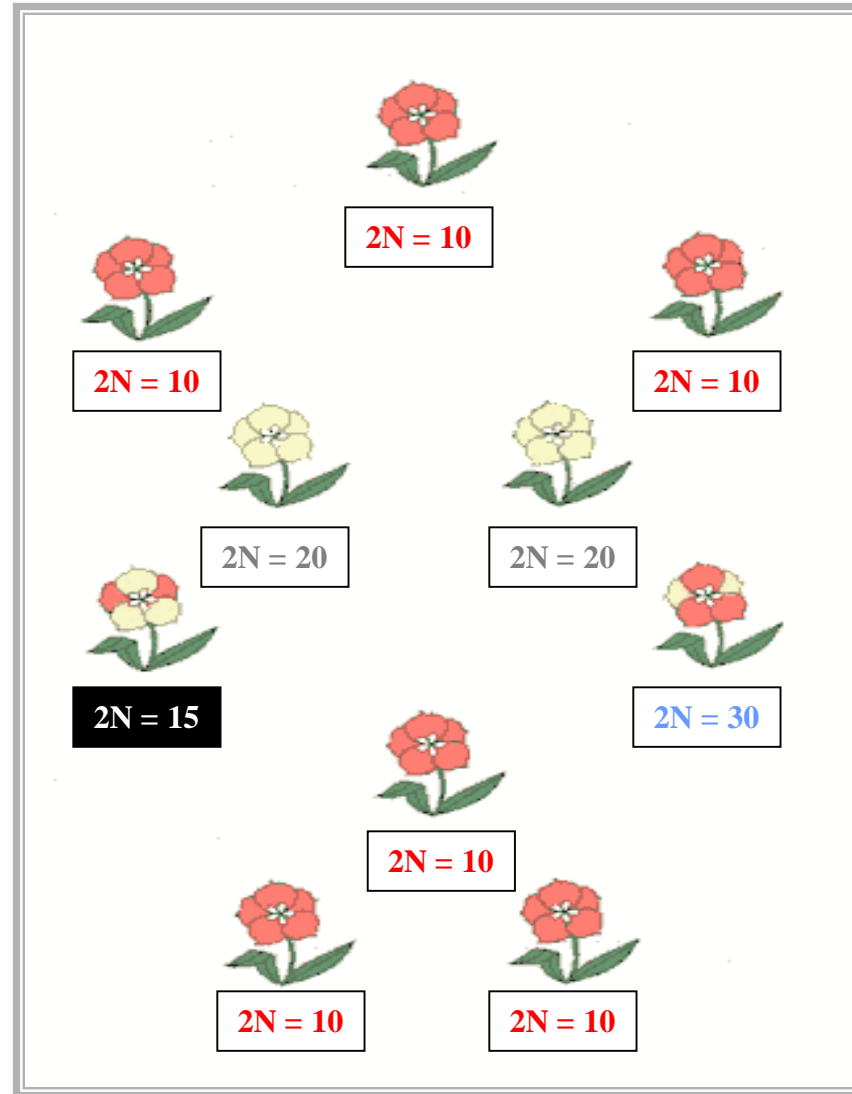


**2N = 30
CYTOTYPES
UNDERGO
SEPARATE
MUTATIONS
&
SELECTION**

FERTILE CYTOTYPES 2N = 30

ALLOPOLYPLOID SPECIATION

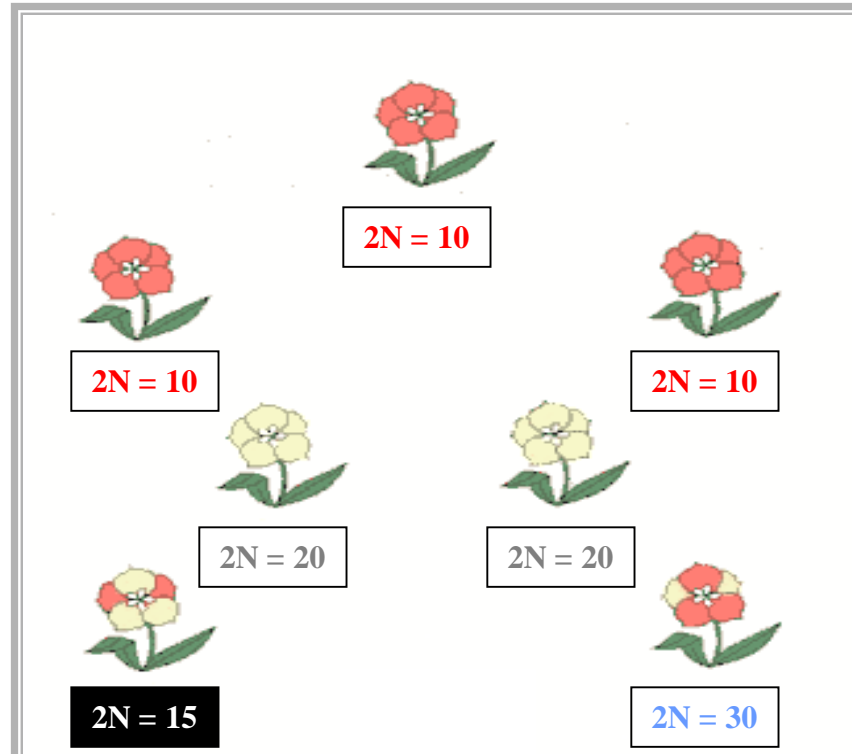
TIME



FERTILE CYTOTYPES $2N = 30$

ALLOPOLYPLOID SPECIATION

SAME
GEOGRAPHIC
AREA



SAME
GEOGRAPHIC
AREA

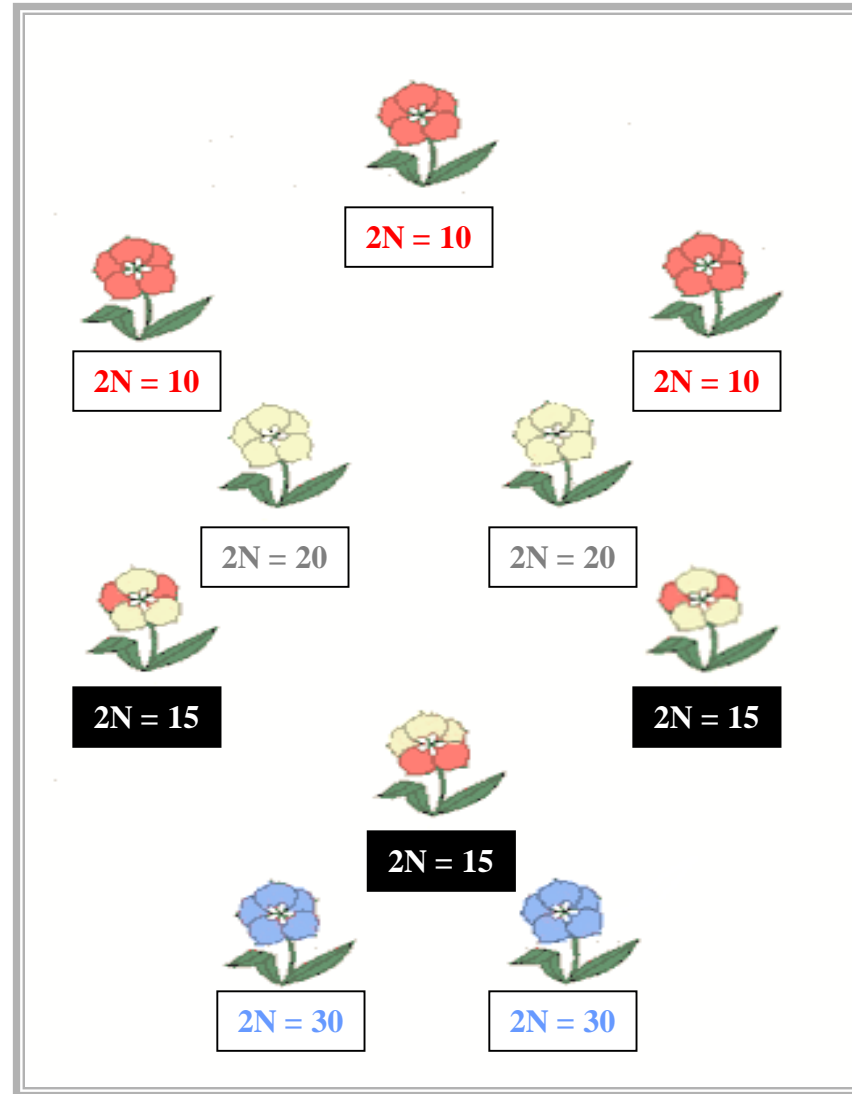
$2N = 30$

**FERTILE HYBRID CYTOTYPES
EVOLVE
MORPHOLOGICAL
CHANGES**

ALLOPOLYPLOID SPECIATION



**SAME
GEOGRAPHIC
AREA**



**SAME
GEOGRAPHIC
AREA**

2N = 30 CYTOTYPES EVOLVE BLUE FLOWERS

ALLOPOLYPLOID SPECIATION



**MORPHOLOGICALLY
DISTINCT
&
REPRODUCTIVELY
ISOLATED
POPULATION**



$2N = 30$



$2N = 30$



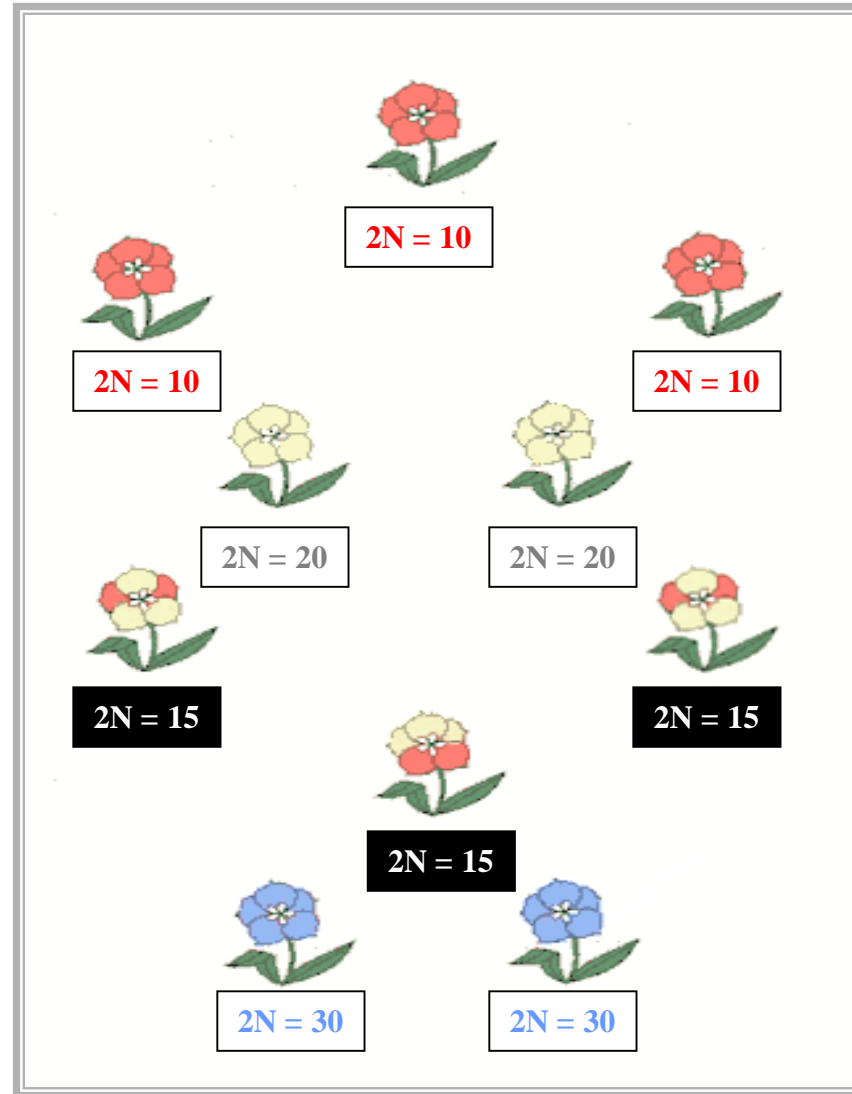
$2N = 10$



$2N = 20$

$2N = 30$ CYTOTYPES EVOLVE BLUE FLOWERS

ALLOPOLYPLOID SPECIATION DS

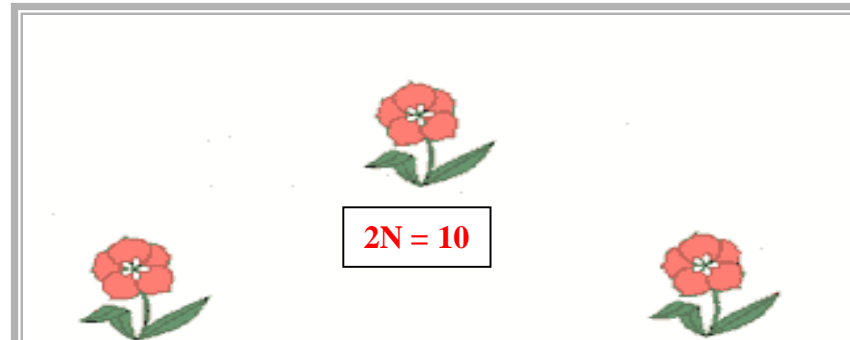


**SAME
GEOGRAPHIC
AREA**

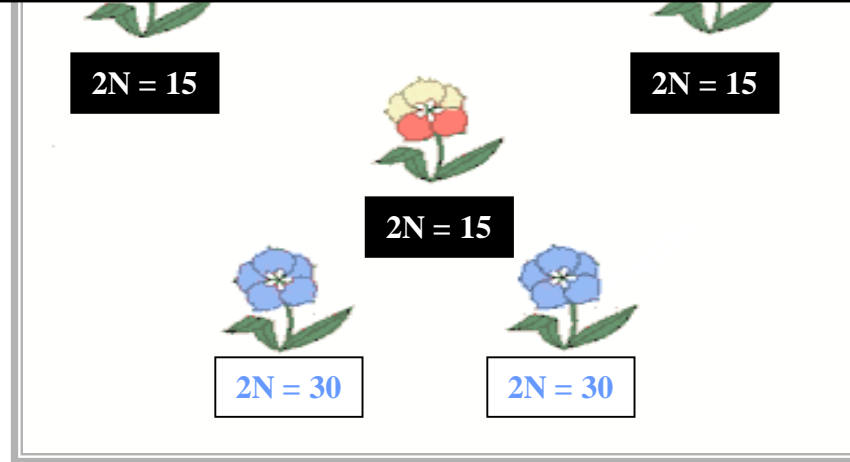
**SAME
GEOGRAPHIC
AREA**

2N = 30 CYTOTYPES EVOLVE BLUE FLOWERS

ALLOPOLYPLOID SPECIATION



**DAUGHTER SPECIES
EVOLVES**

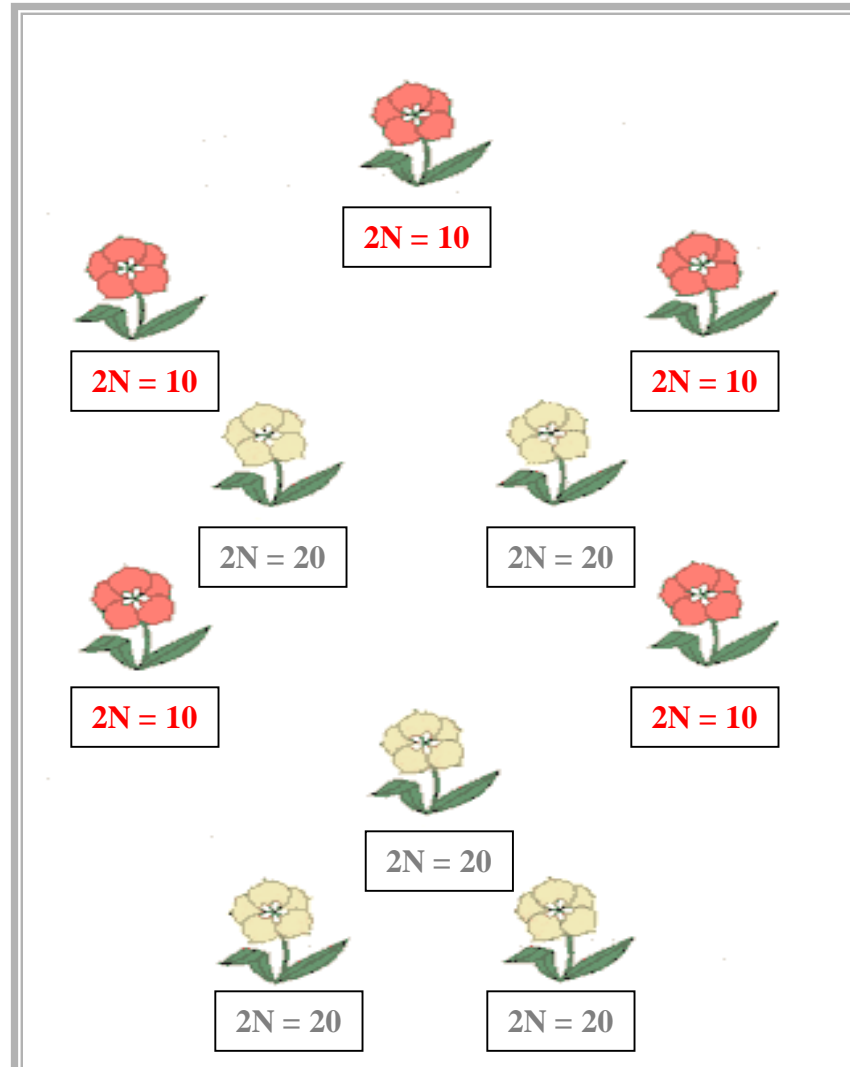


DAUGHTER SPECIES EVOLVES

**SYMPATRIC
ALLOPOLYPLOID
SPECIATION
OUTCOME**

ALLOPOLYPLOID SPECIATION

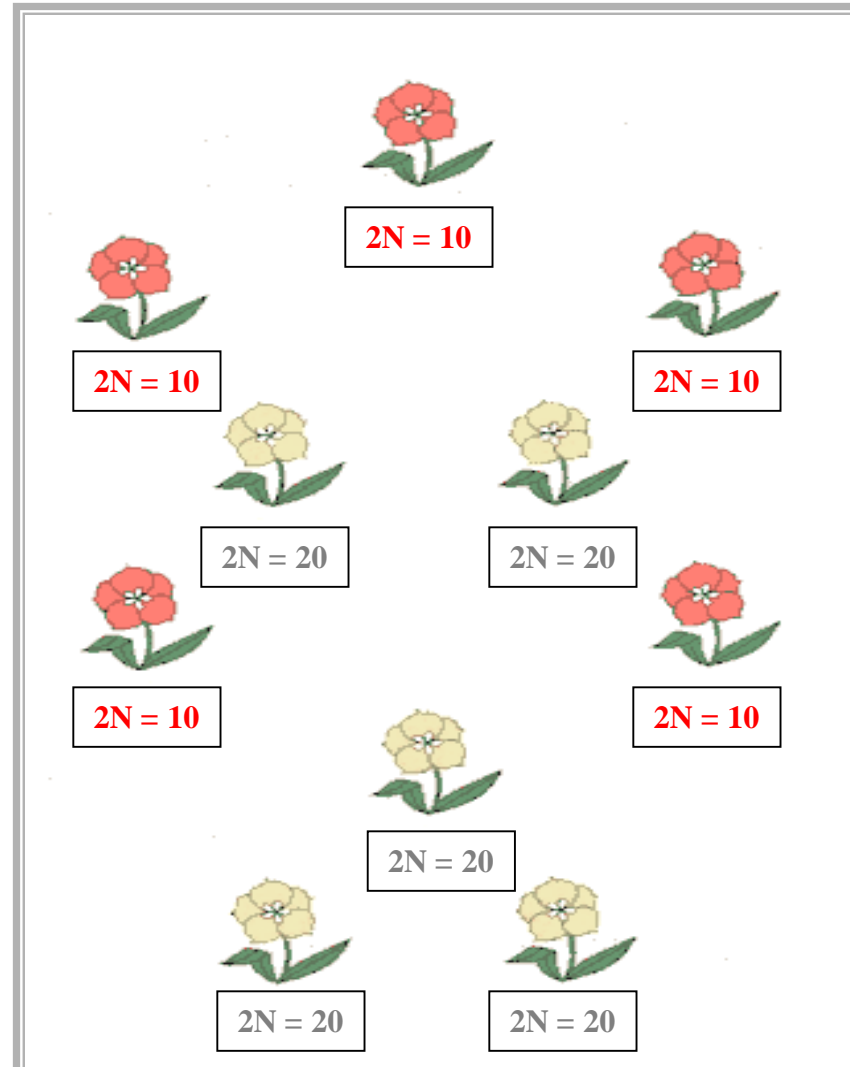
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GEOGRAPHIC
AREA**



**SAME
GEOGRAPHIC
AREA**

2 PARENTAL SPECIES

ALLOPOLYPLOID SPECIATION AS

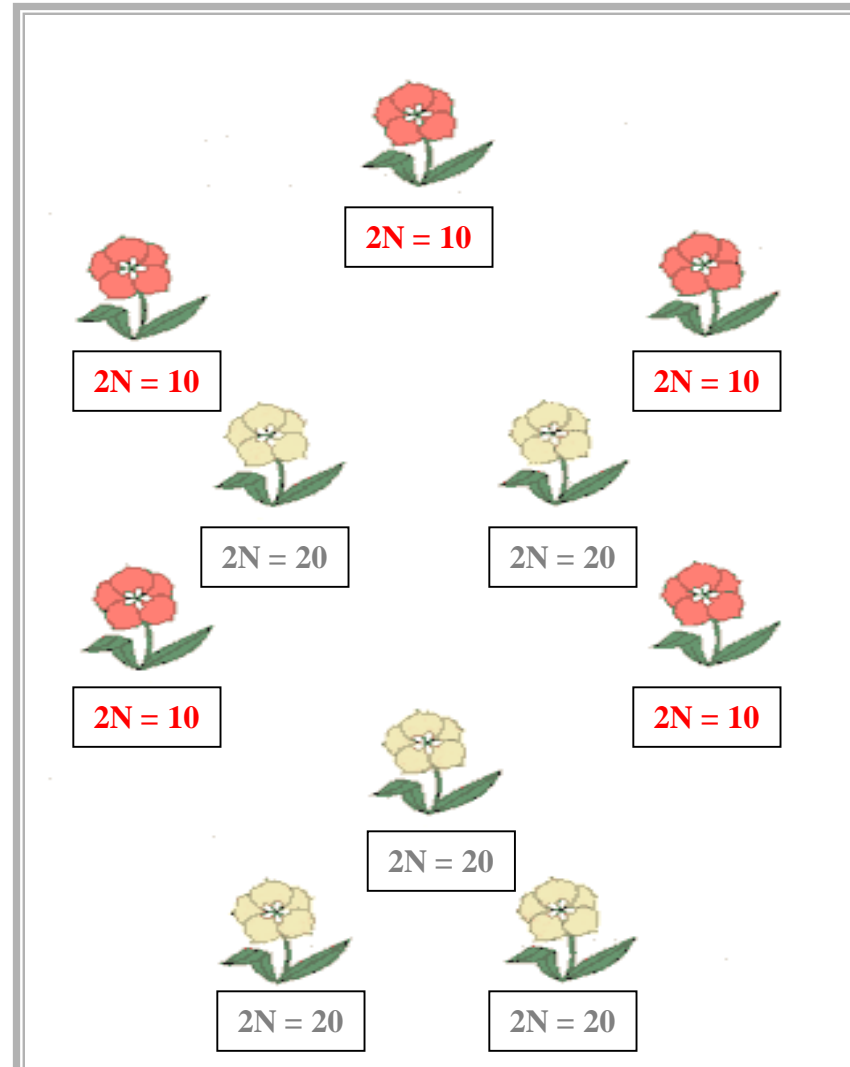


**SAME
GEOGRAPHIC
AREA**

**SAME
GEOGRAPHIC
AREA**

EVOLVE

ALLOPOLYPLOID SPECIATION DS

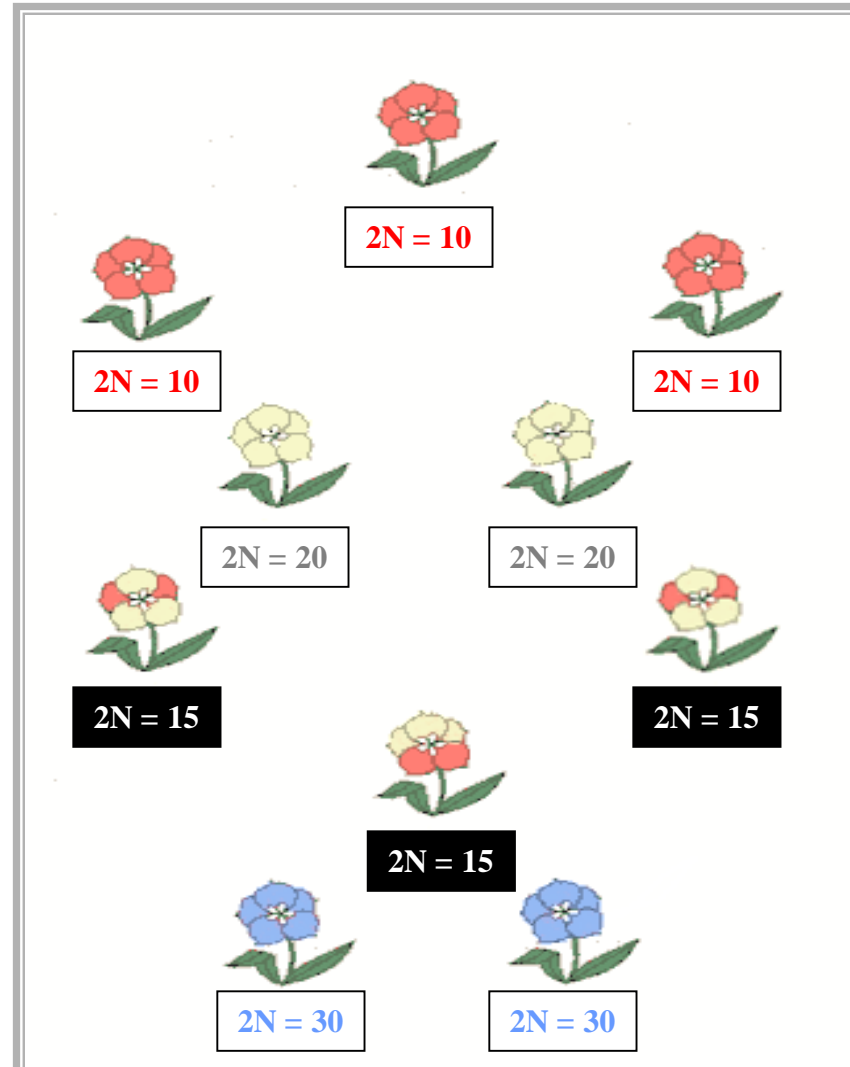


**SAME
GEOGRAPHIC
AREA**

**SAME
GEOGRAPHIC
AREA**

ALLOPOLYPLOID SPECIATION

ALLOPOLYPLOID SPECIATION



SAME
GEOGRAPHIC
AREA

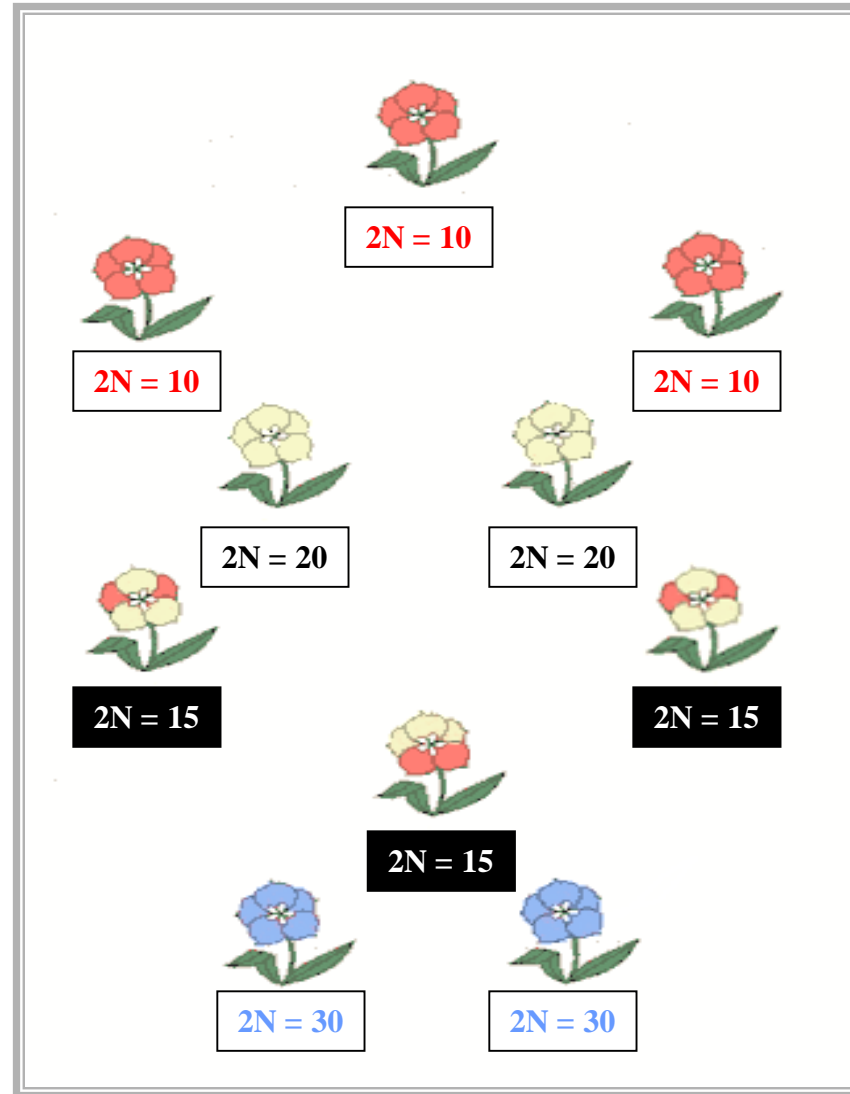
SAME
GEOGRAPHIC
AREA

DAUGHTER SPECIES

ALLOPOLYPLOID SPECIATION



I



SAME
GEOGRAPHIC
AREA

SAME
GEOGRAPHIC
AREA

2 PARENTAL SP - 1 HYBRID - 1 DAUGHTER SP

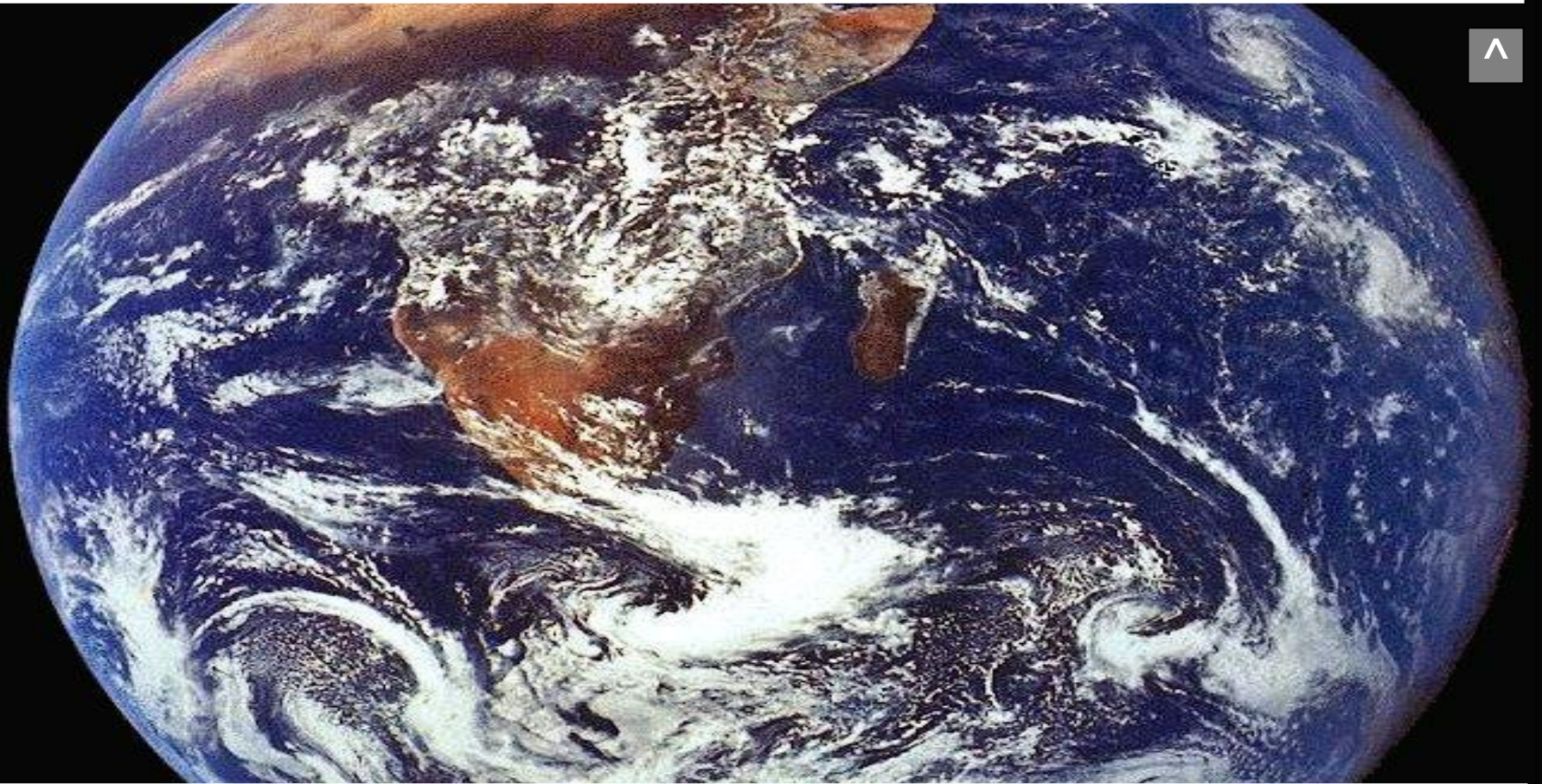
ALLOPOLYPLOID SPECIATION



I

INCREASE PLANT DIVERSITY

ALLOPOLYPLOID SPECIATION



^

INCREASE PLANT DIVERSITY



PLANT SPECIATION SUMMARY

PLANT SPECIATION SUMMARY



INCREASE PLANT DIVERSITY

ALLOPATRIC SPECIATION



INCREASE PLANT DIVERSITY

SYMPATRIC SPECIATION



INCREASE PLANT DIVERSITY

AUTOPOLYPLOID SPECIATION

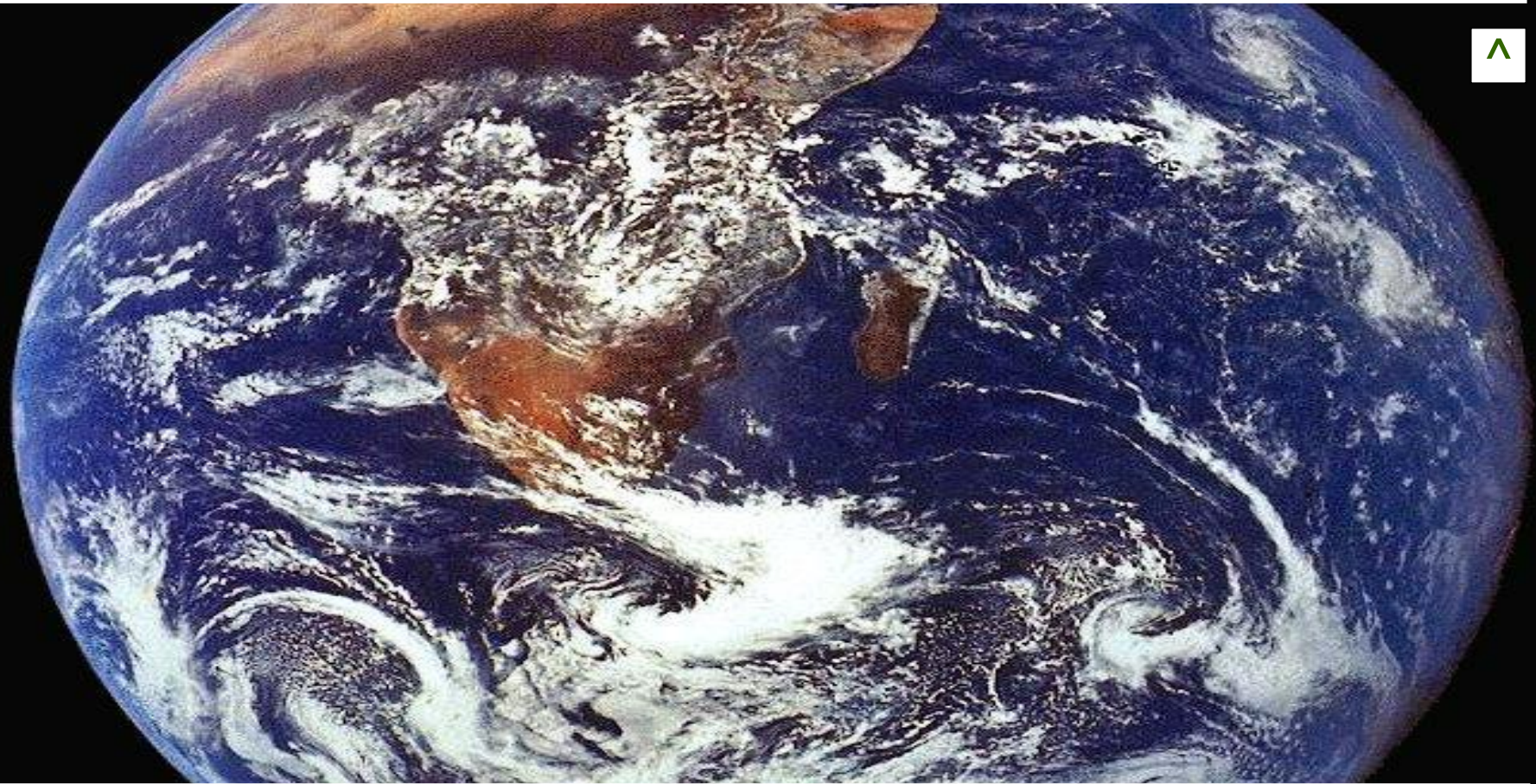


INCREASE PLANT DIVERSITY

ALLOPOLYPLOID SPECIATION

^

INCREASE PLANT DIVERSITY





PLANT SPECIES

QUESTION

**WHAT IS THE BASIC
TAXONOMIC RANK?**

QUESTION



ANSWER

SPECIES

ANSWER

?

PLANTAE



Common potato

Eggplant

Habanero pepper

Tomato

Morning glory

Sweet potato

Maple

Sunflower

Pea

Corn

Grass



MAGNOLIOPHYTA



MAGNOLIOPSIDA



MAGNOLIALES



MAGNOLIACEAE

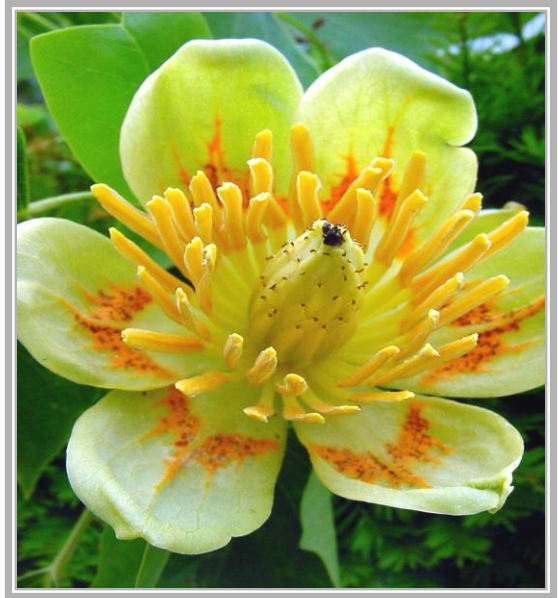


GENUS



**TAXONOMIC HIERARCHY
SPECIES
IS THE BASIC
TAXONOMIC RANK**

SPECIES



LIRIODENDRON TULIPIFERA

QUESTION

WHAT IS A SPECIES?

QUESTION



ANSWER
DEPENDS
ON
BOTANIST
ANSWER

SPECIES DEFINITION

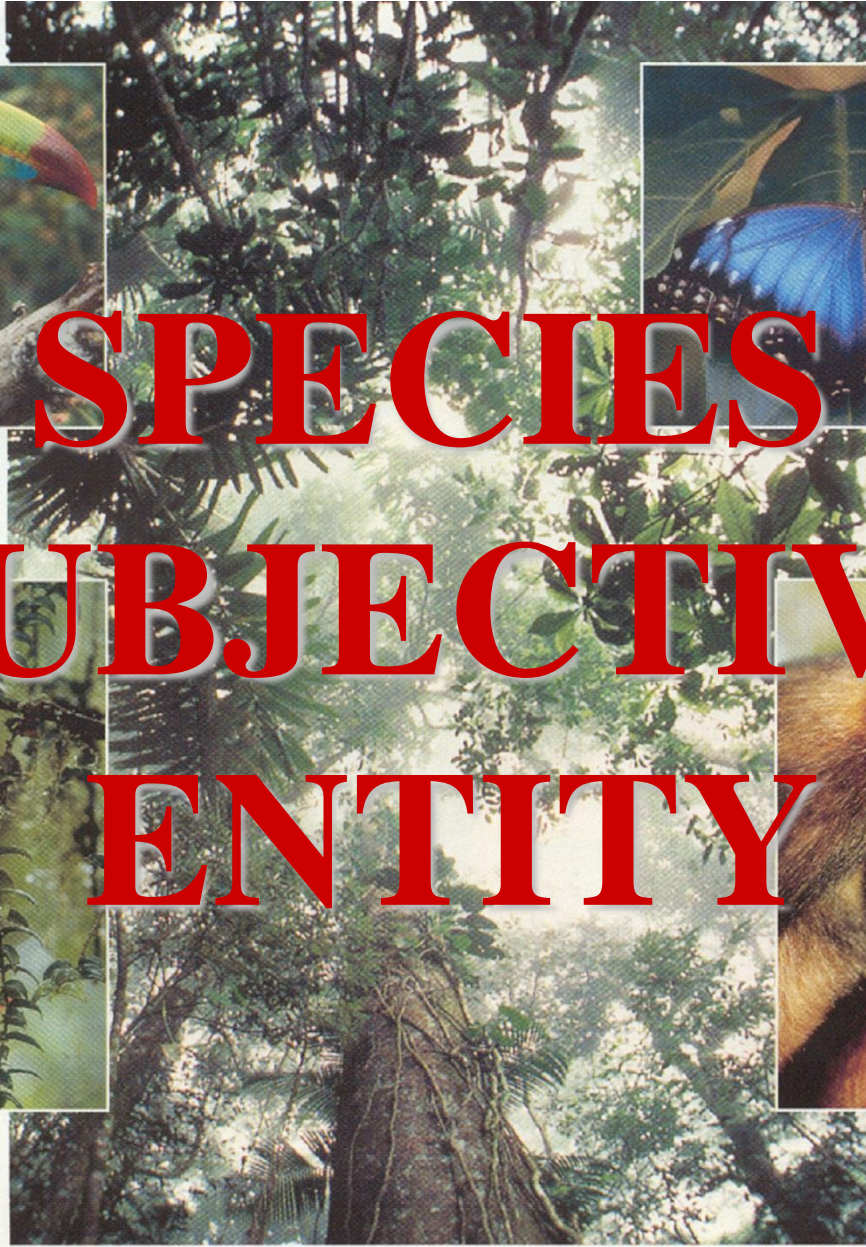


SPECIES DEFINITION
NO
COMMON DEFINITION
AMONGST BOTANISTS

SPECIES DEFINITION



SPECIES
SUBJECTIVE
ENTITY





PLANT SPECIES CONCEPTS

**BIOLOGICAL
SPECIES**

VS

**MORPHOLOGICAL
SPECIES**

BIOLOGICAL SPECIES



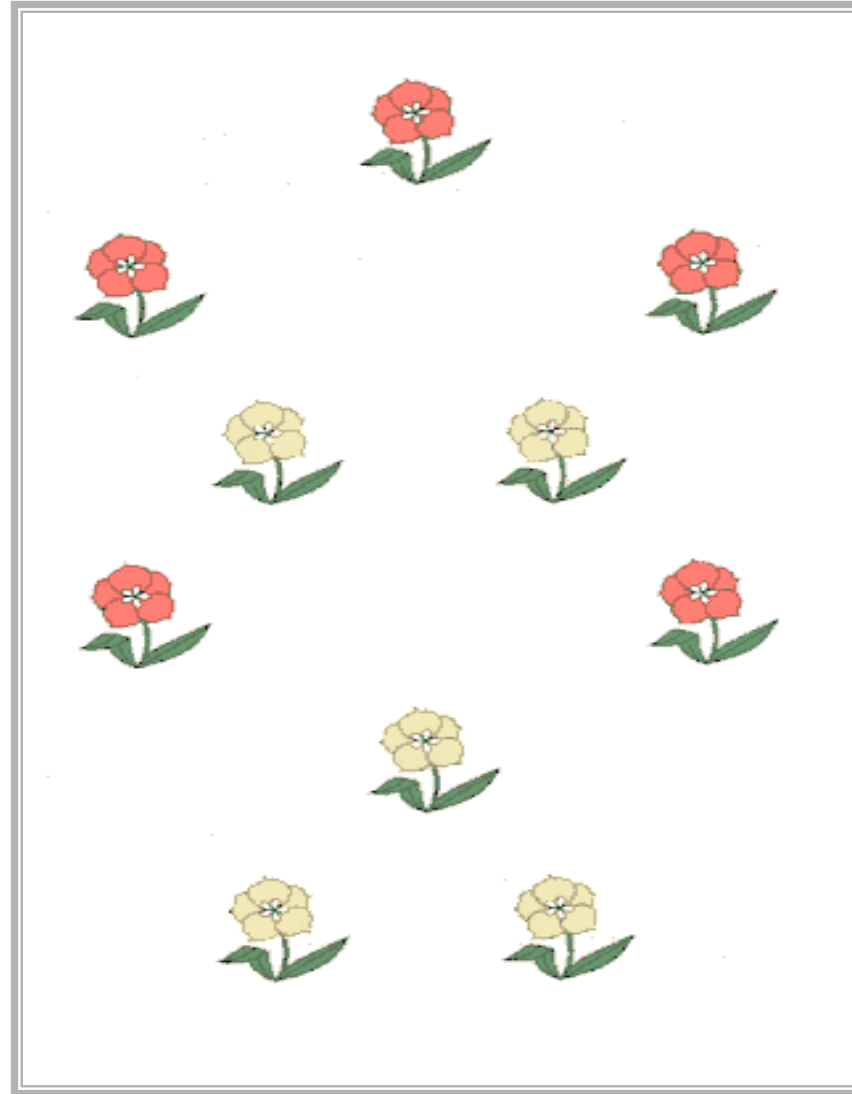
**BIOLOGICAL
SPECIES CONCEPT**

**BASED
ON ABILITY TO
INTERBREED**

**BIOLOGICAL
SPECIES CONCEPT**

BIOLOGICAL SPECIES

SP#1



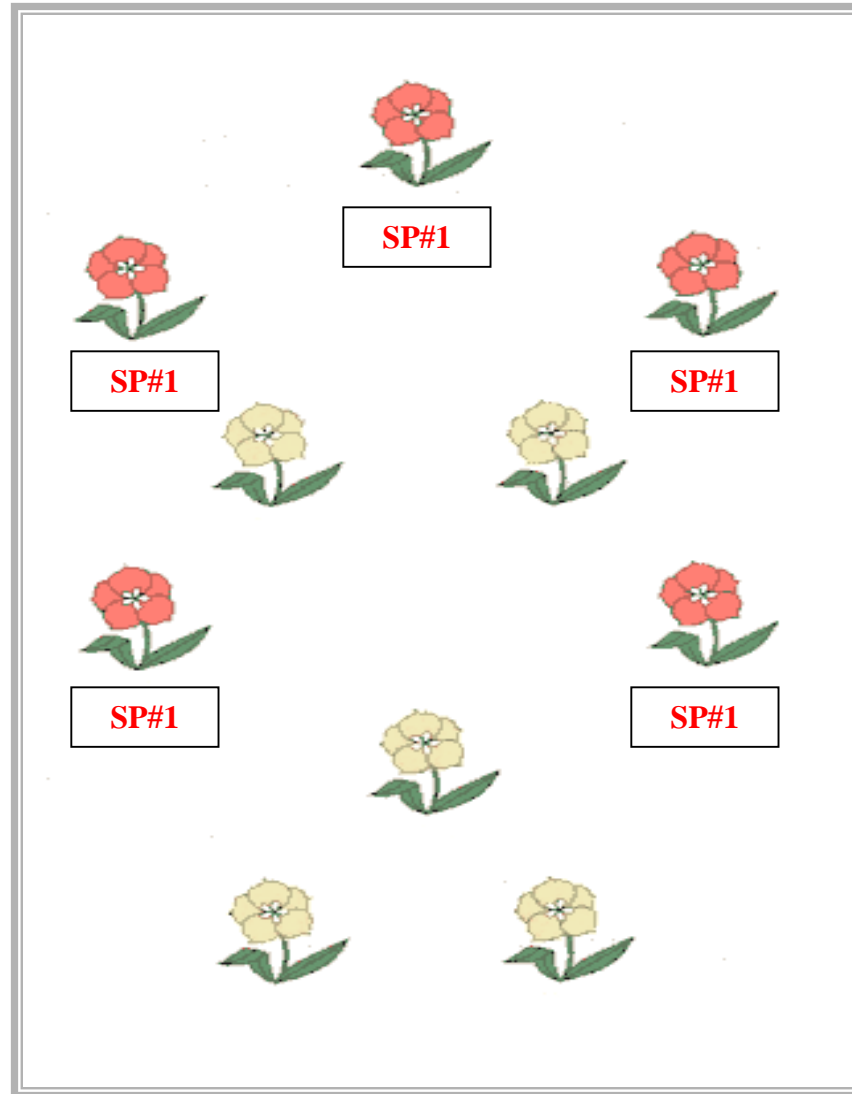
**GEOGRAPHIC
AREA**

**GEOGRAPHIC
AREA**

ABILITY TO INTERBREED

BIOLOGICAL SPECIES

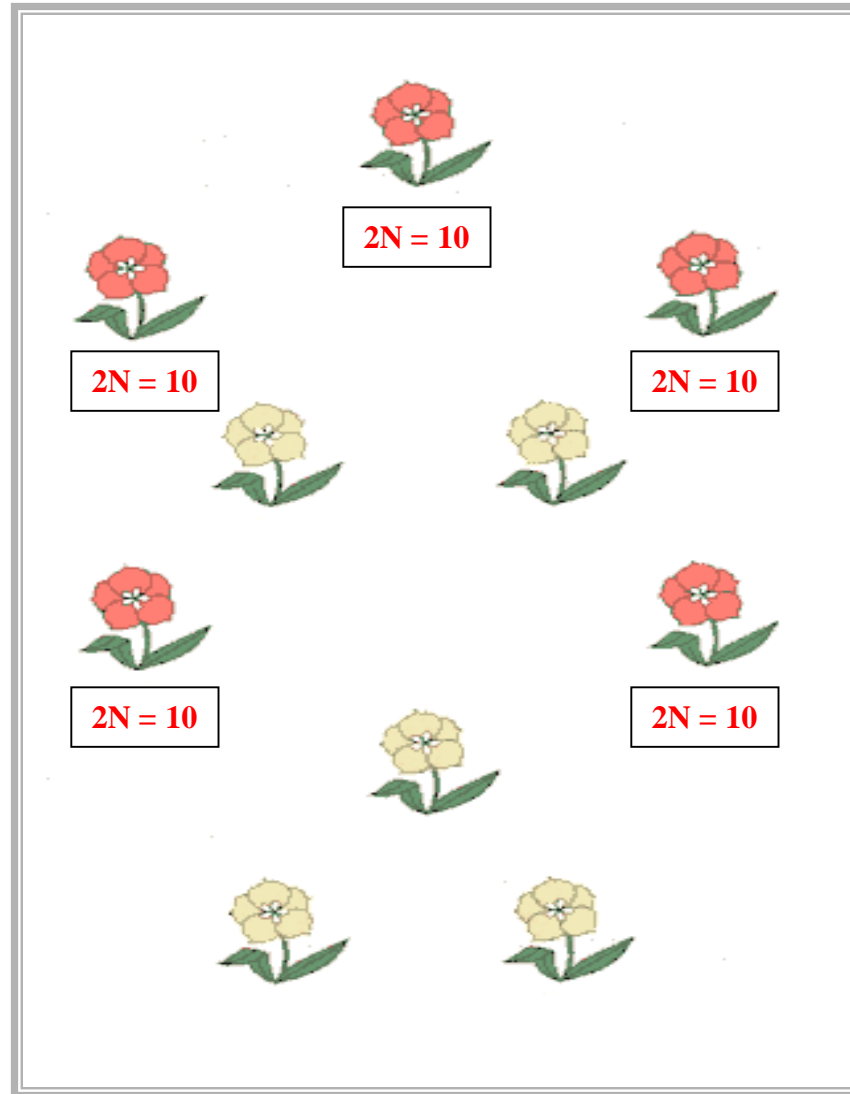
GEOGRAPHIC
AREA



GEOGRAPHIC
AREA

ABILITY TO INTERBREED

BIOLOGICAL SPECIES

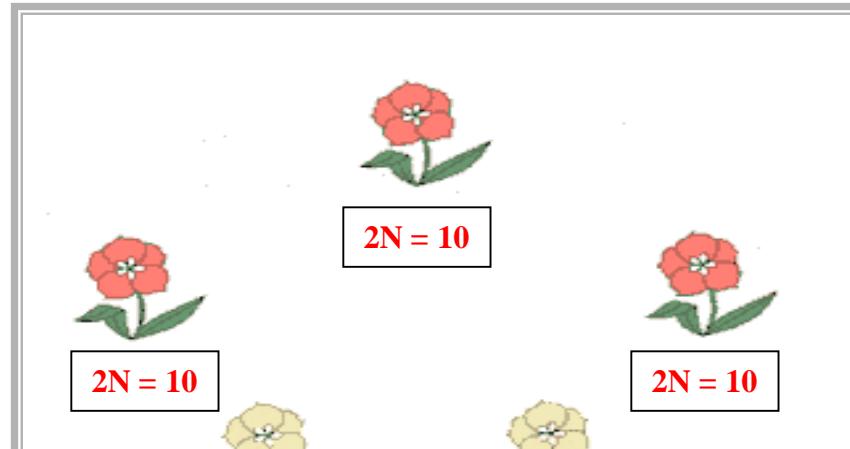


**GEOGRAPHIC
AREA**

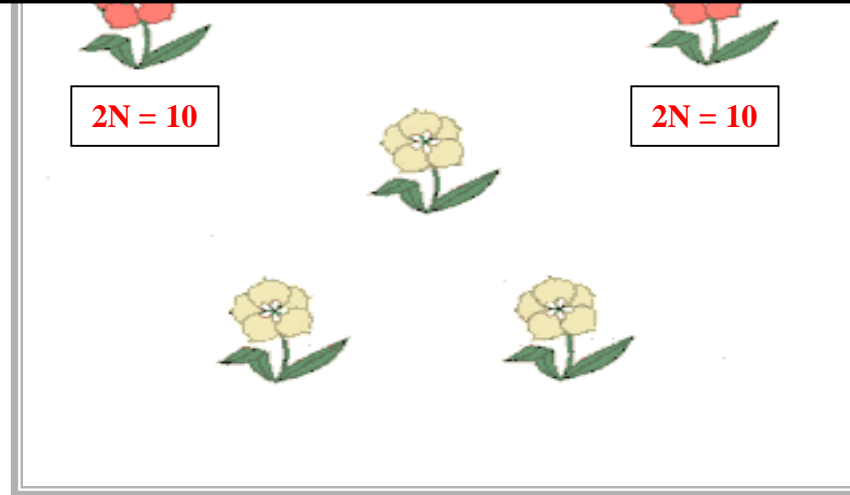
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AREA**

ABILITY TO INTERBREED

BIOLOGICAL SPECIES

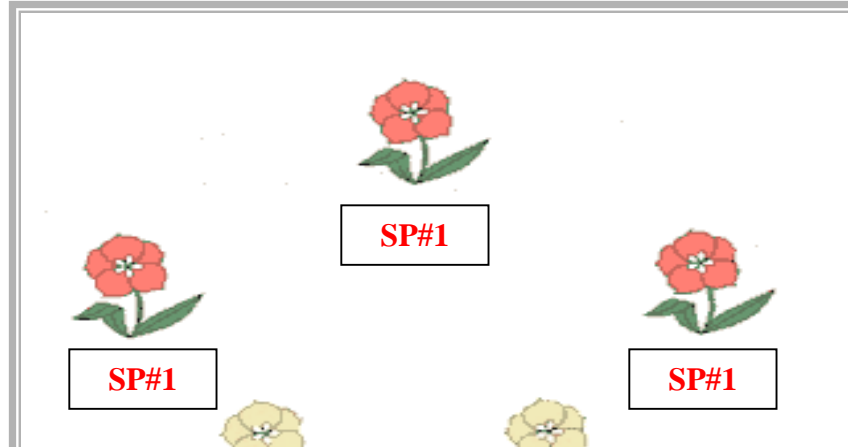


ABILITY TO INTERBREED

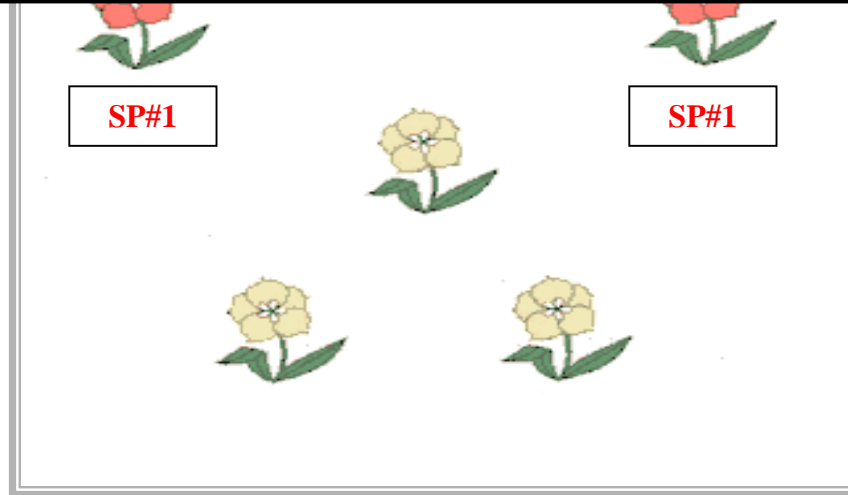


ABILITY TO INTERBREED

BIOLOGICAL SPECIES



BIOLOGICAL SPECIES

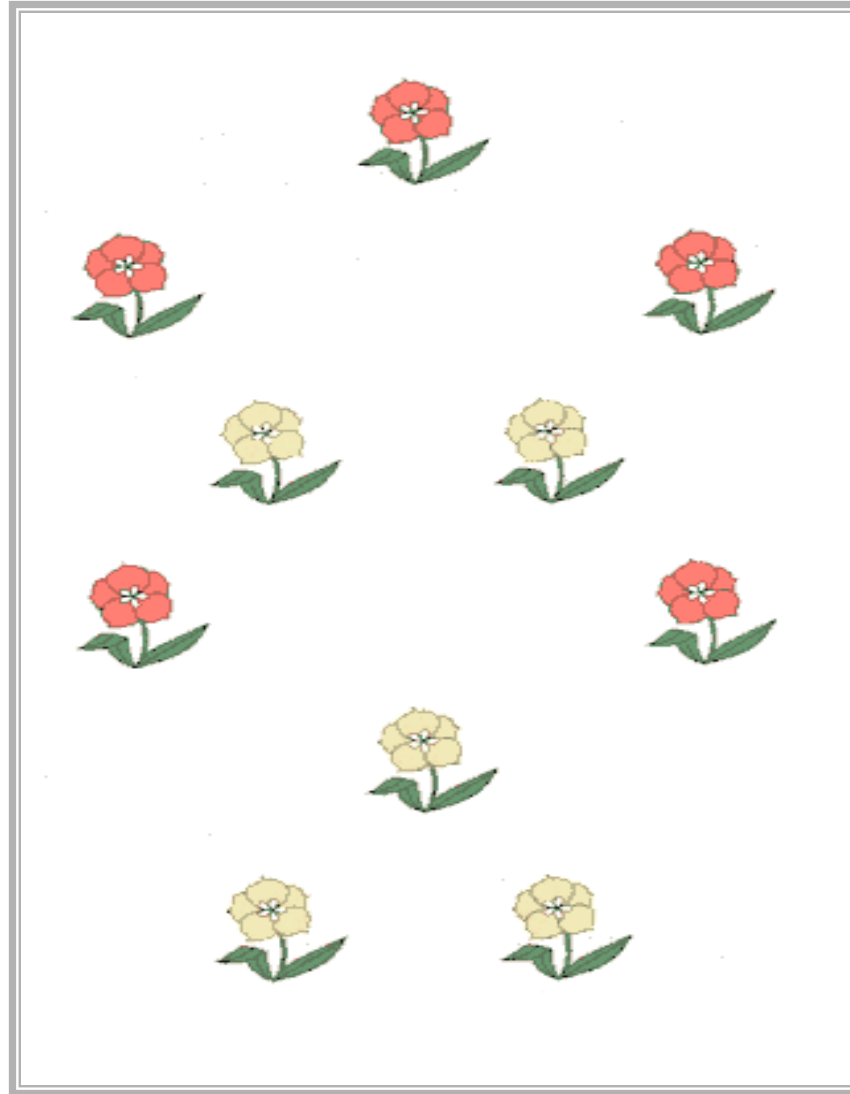


ABILITY TO INTERBREED

BIOLOGICAL SPECIES

SP#2

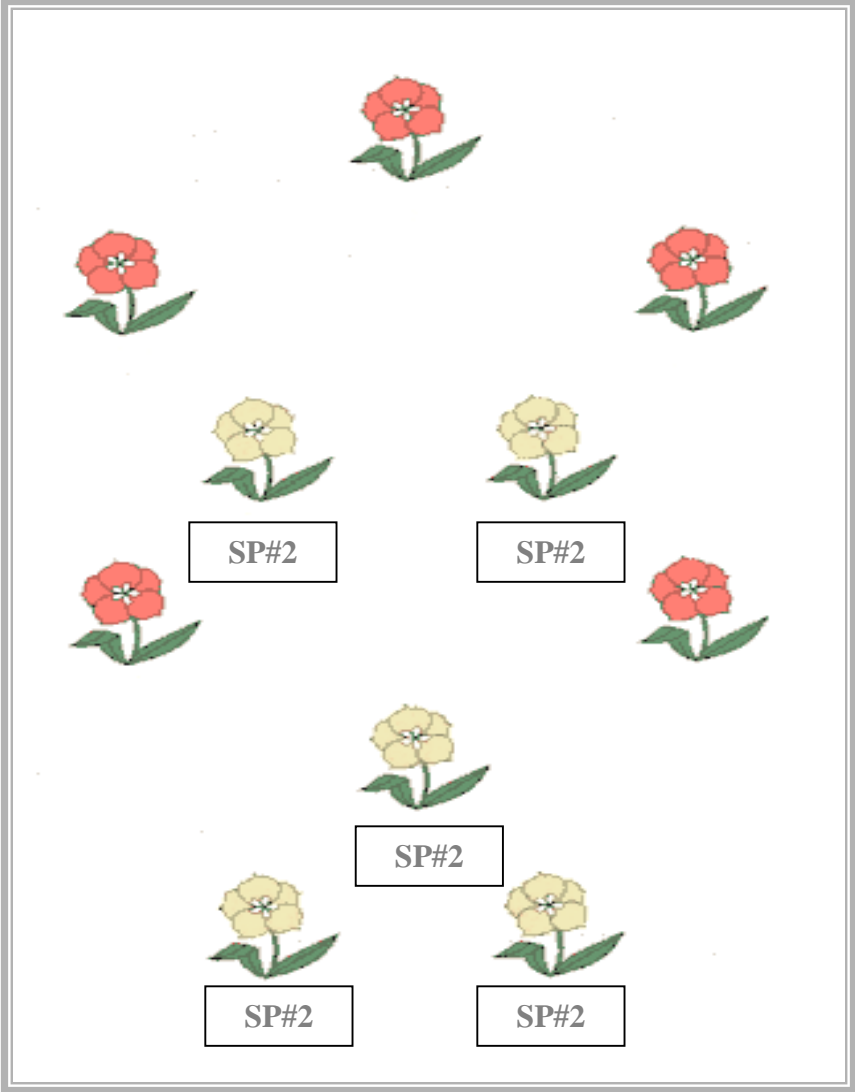
**GEOGRAPHIC
AREA**



**GEOGRAPHIC
AREA**

ABILITY TO INTERBREED

BIOLOGICAL SPECIES



**GEOGRAPHIC
AREA**

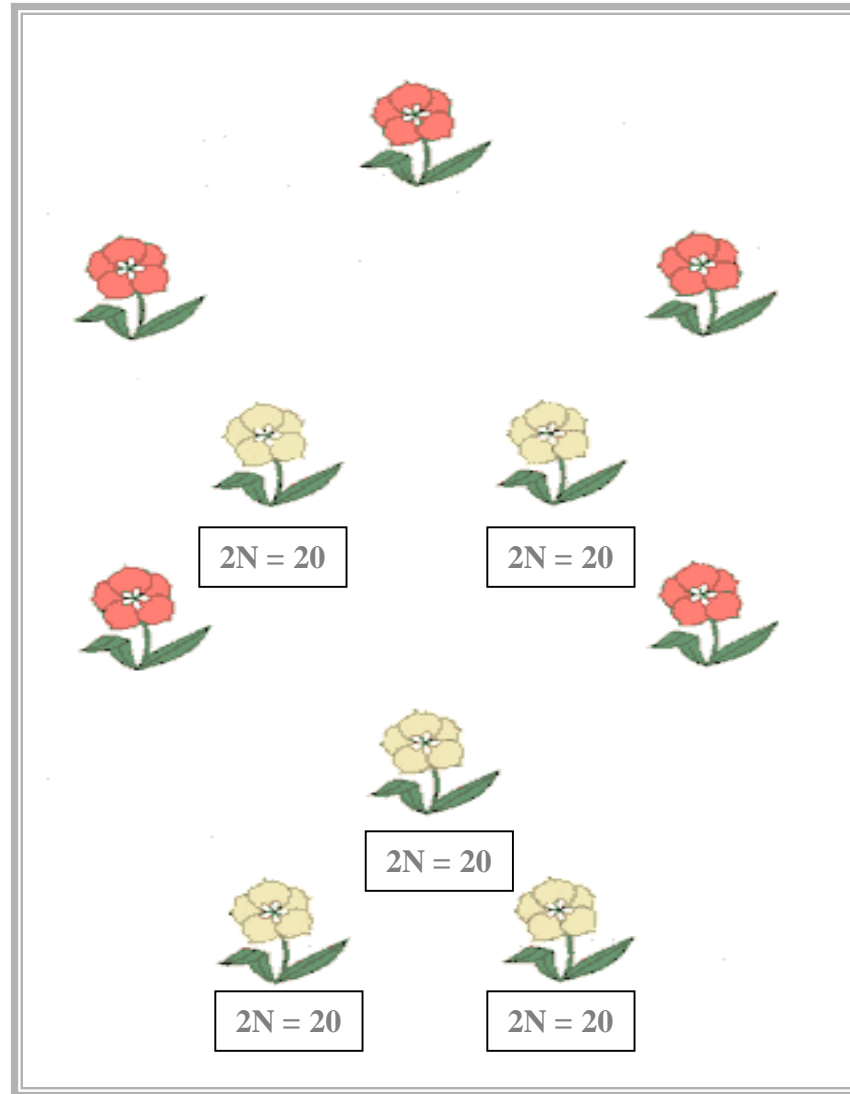
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AREA**

ABILITY TO INTERBREED

BIOLOGICAL SPECIES



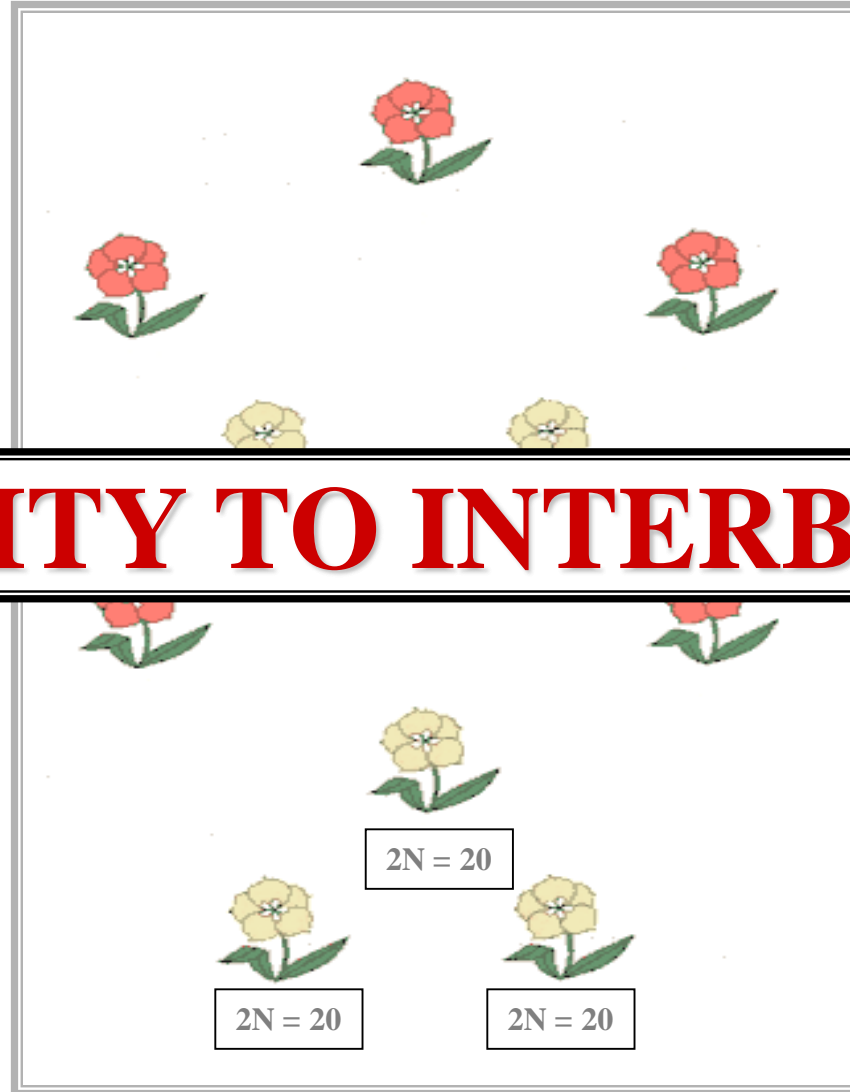
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AREA**



**GEOGRAPHIC
AREA**

ABILITY TO INTERBREED

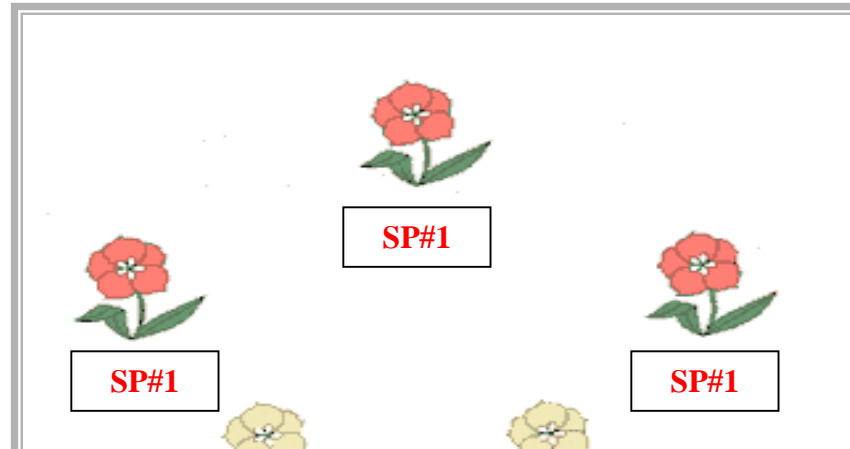
BIOLOGICAL SPECIES



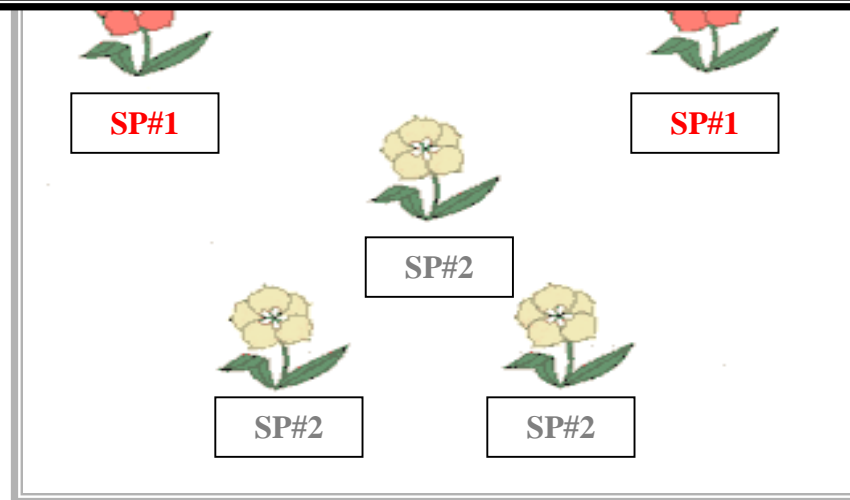
ABILITY TO INTERBREED

ABILITY TO INTERBREED

BIOLOGICAL SPECIES



BIOLOGICAL SPECIES



ABILITY TO INTERBREED

MORPHOLOGICAL SPECIES

MORPHOLOGICAL SPECIES CONCEPT

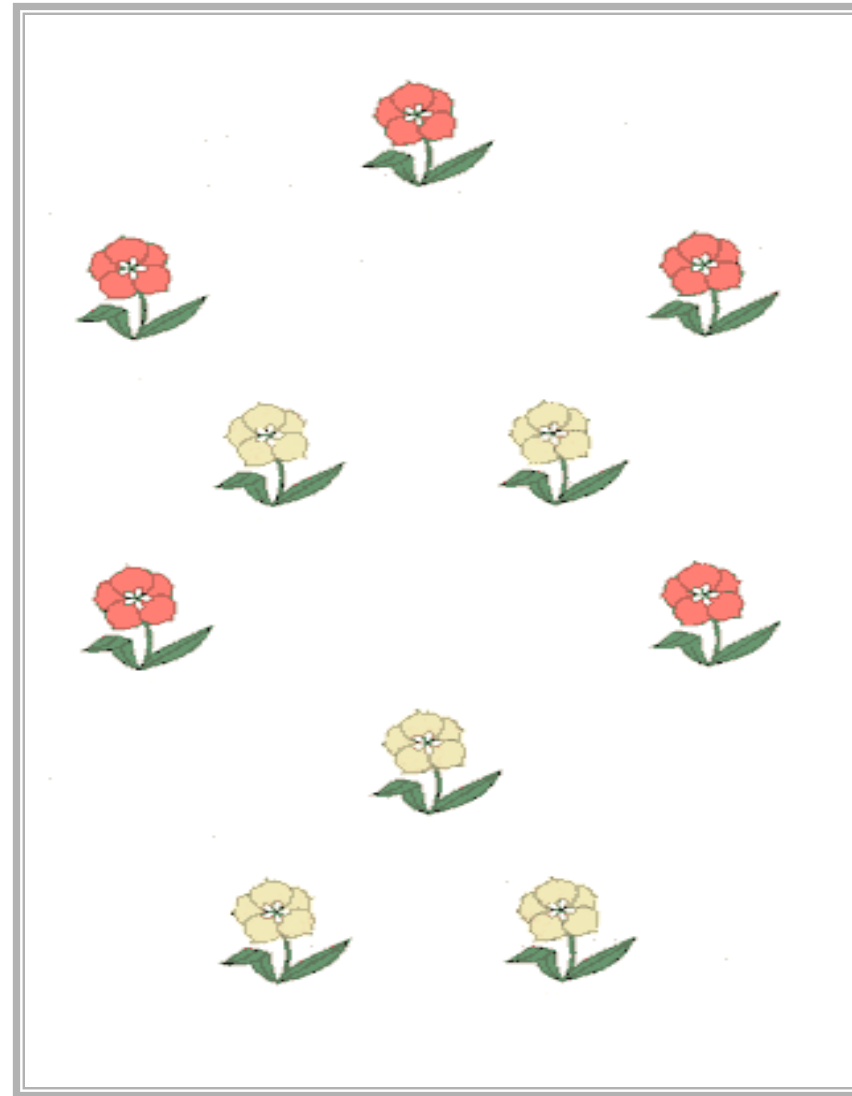


BASED
ON STRUCTURAL
SIMILARITY

MORPHOLOGICAL
SPECIES CONCEPT

MORPHOLOGICAL SPECIES

SP#1

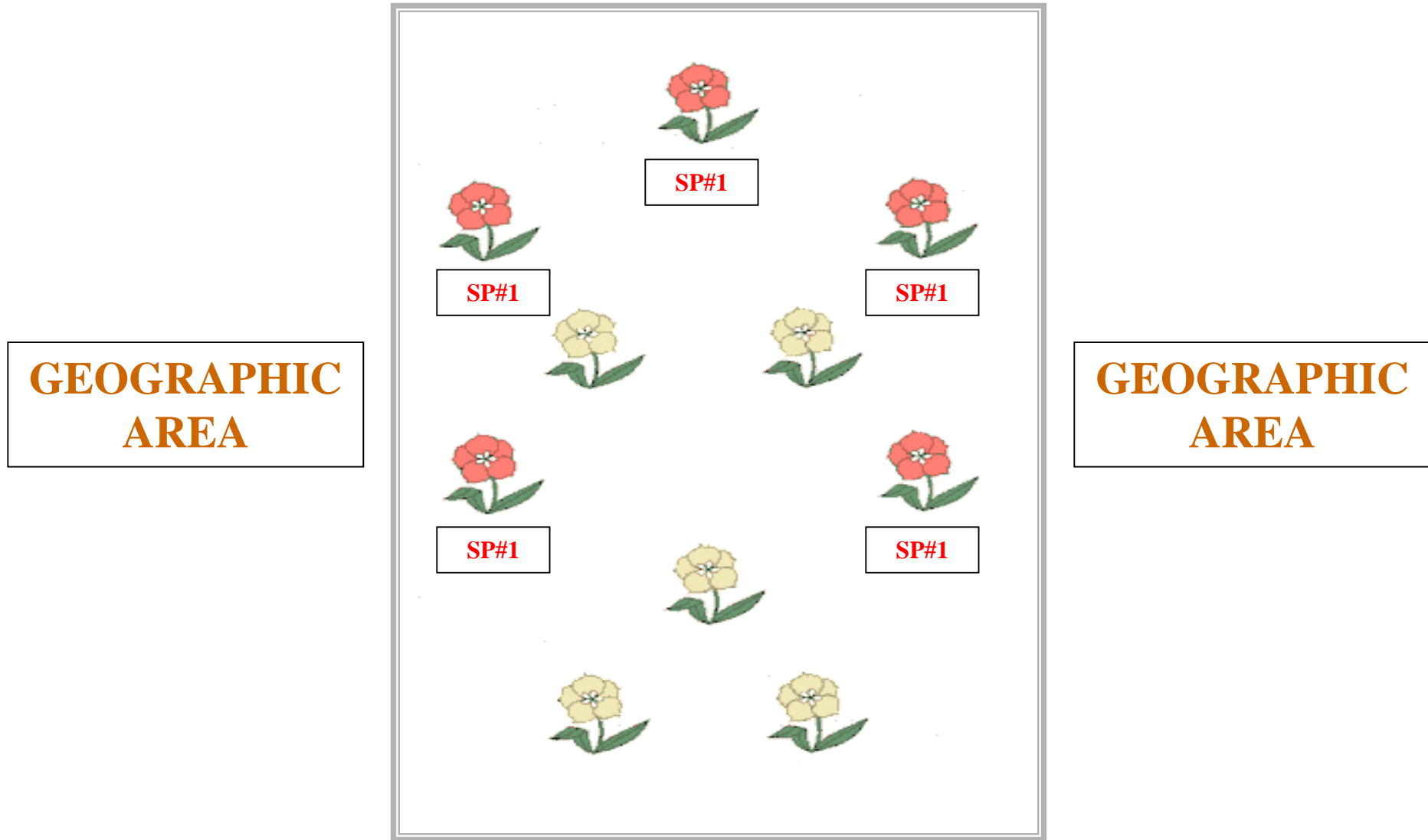


**GEOGRAPHIC
AREA**

**GEOGRAPHIC
AREA**

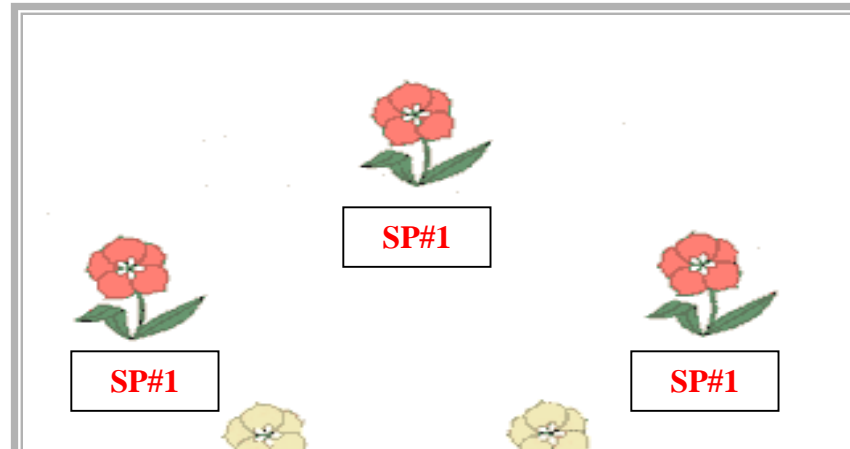
STRUCTURAL SIMILARITY

MORPHOLOGICAL SPECIES

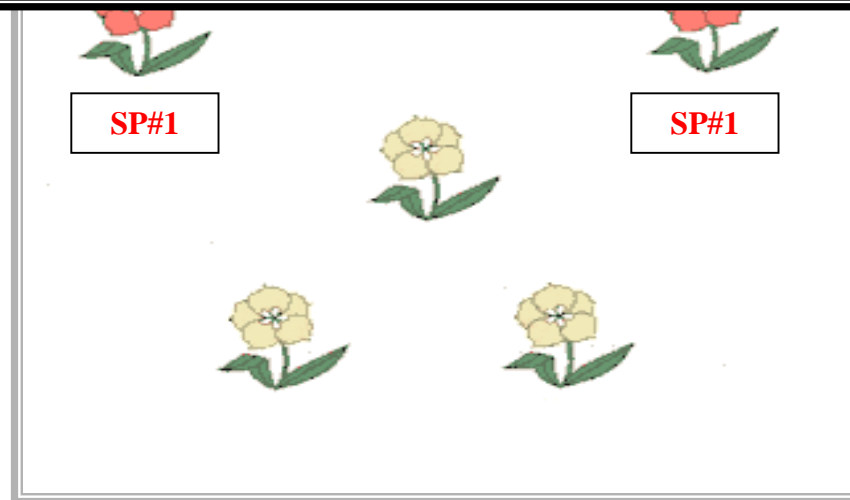


STRUCTURAL SIMILARITY

MORPHOLOGICAL SPECIES

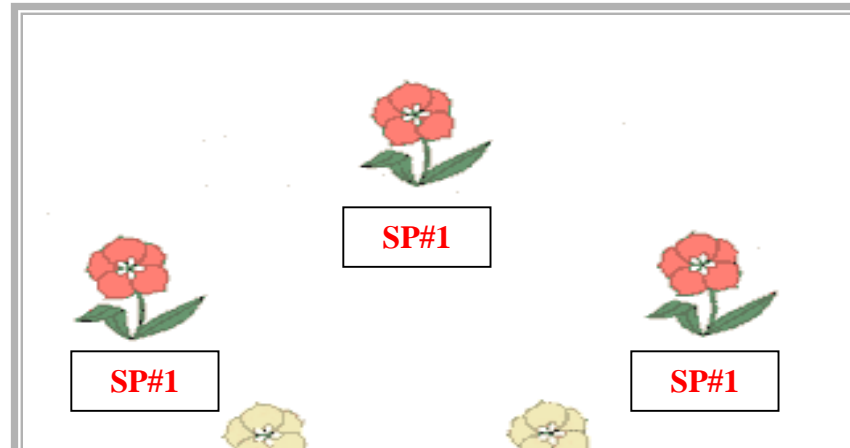


STRUCTURALLY SIMILAR

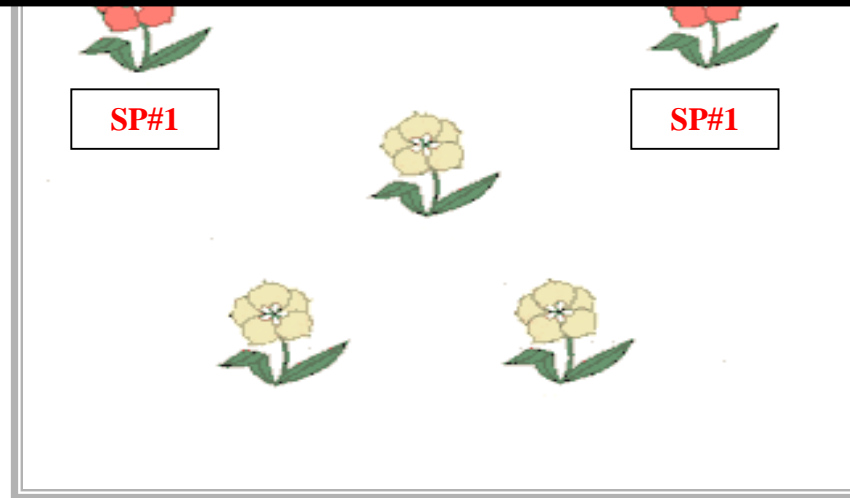


STRUCTURAL SIMILARITY

MORPHOLOGICAL SPECIES



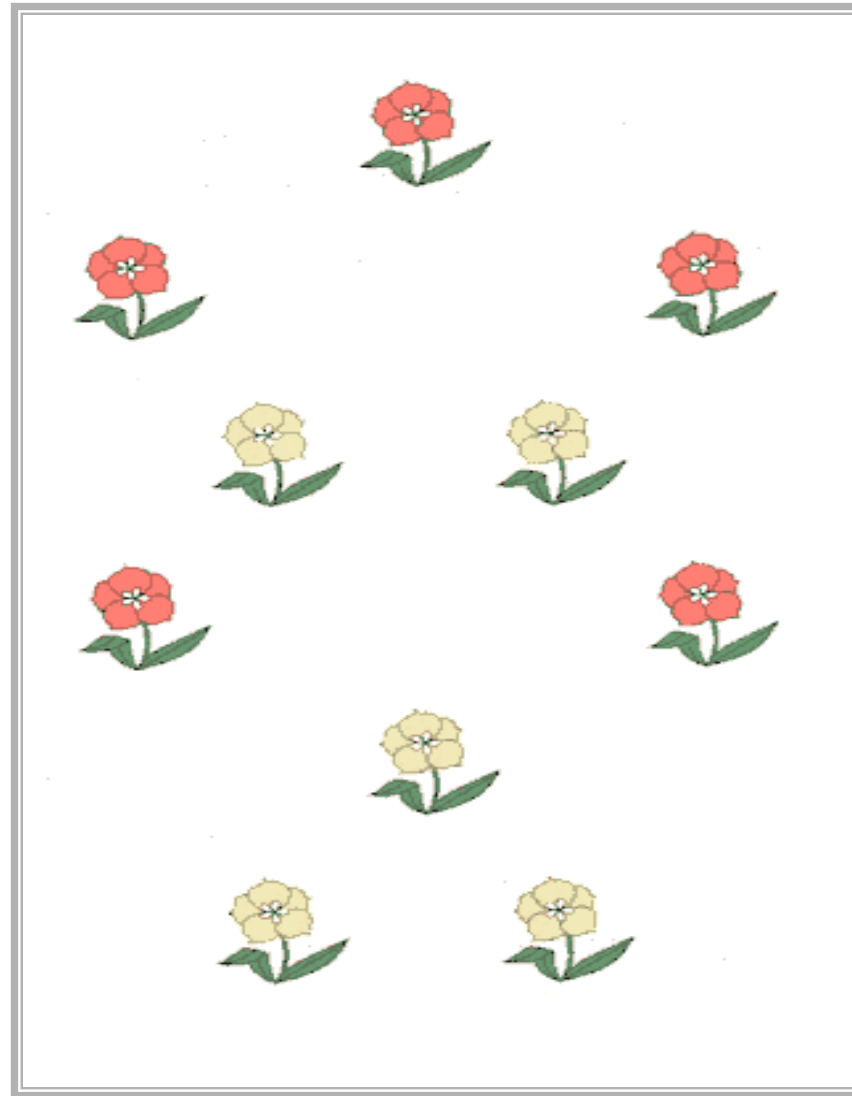
MORPHOLOGICAL SPECIES



STRUCTURAL SIMILARITY

MORPHOLOGICAL SPECIES

SP#2

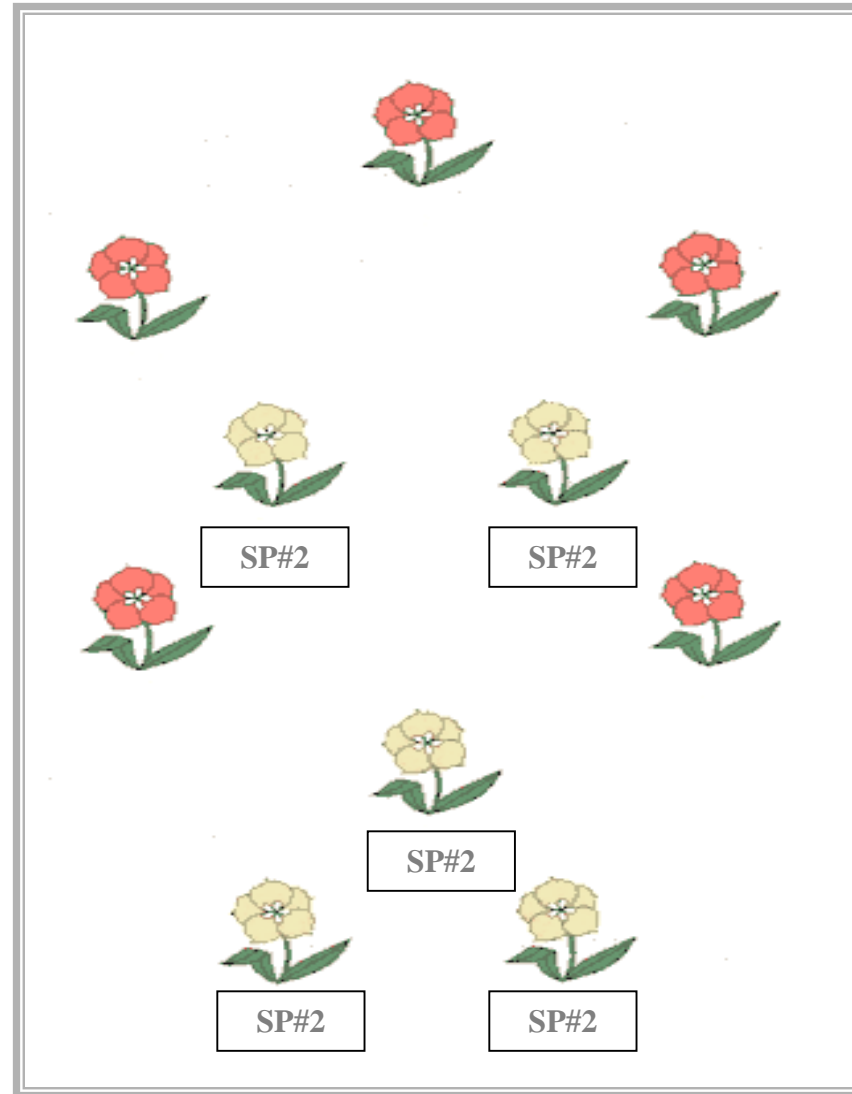


**GEOGRAPHIC
AREA**

**GEOGRAPHIC
AREA**

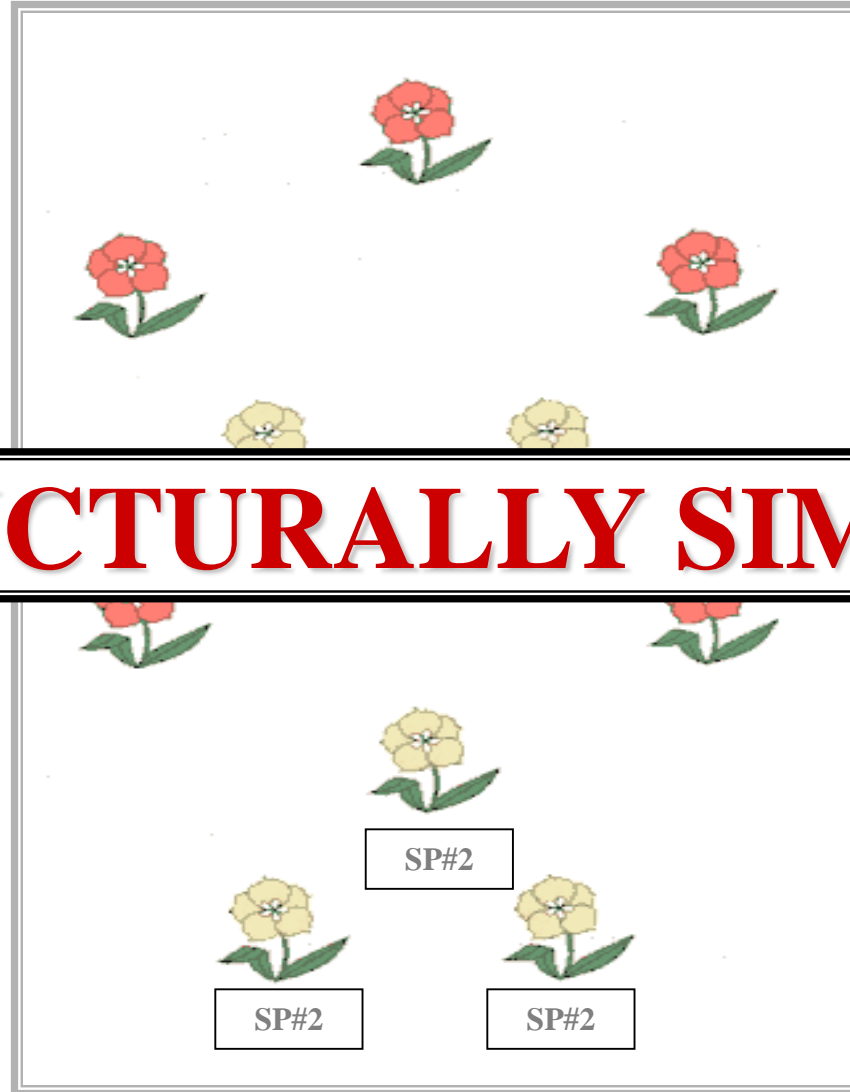
STRUCTURAL SIMILARITY

MORPHOLOGICAL SPECIES



STRUCTURAL SIMILARITY

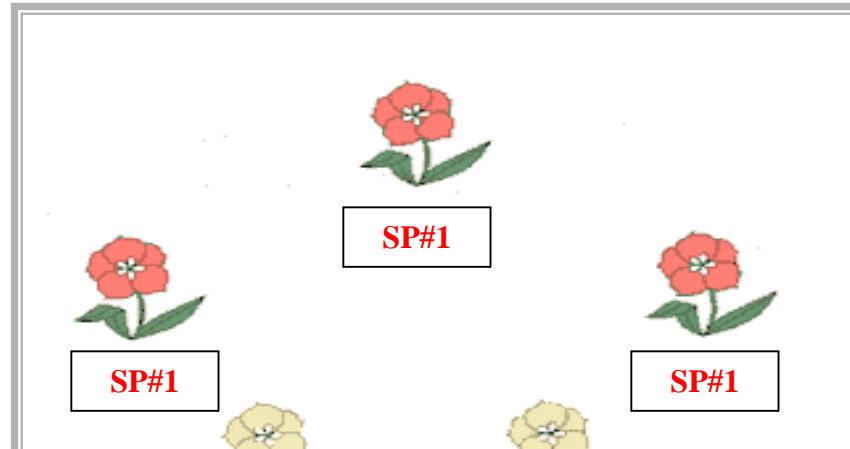
MORPHOLOGICAL SPECIES



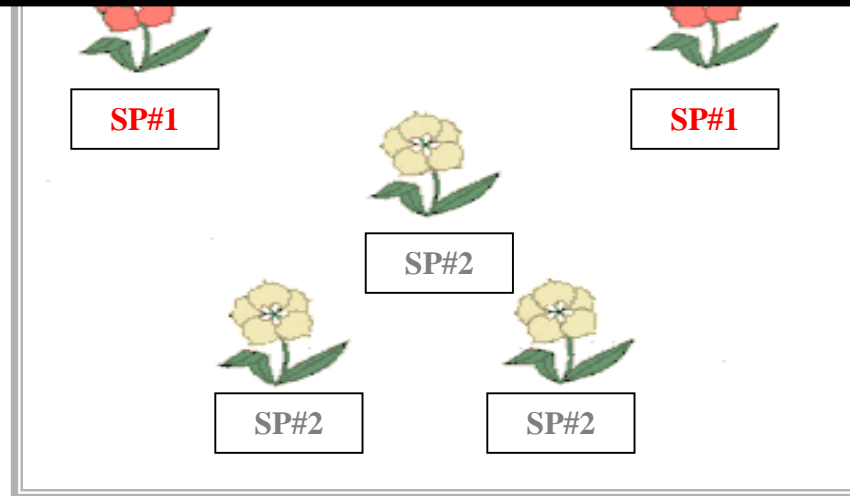
STRUCTURALLY SIMILAR

STRUCTURAL SIMILARITY

MORPHOLOGICAL SPECIES



MORPHOLOGICAL SPECIES



STRUCTURAL SIMILARITY

IDEAL SPECIES

IDEAL SPECIES



IDEAL SPECIES

**MORPHOLOGICALLY DISTINCT
(MORPHOLOGICAL SPECIES)**

AND

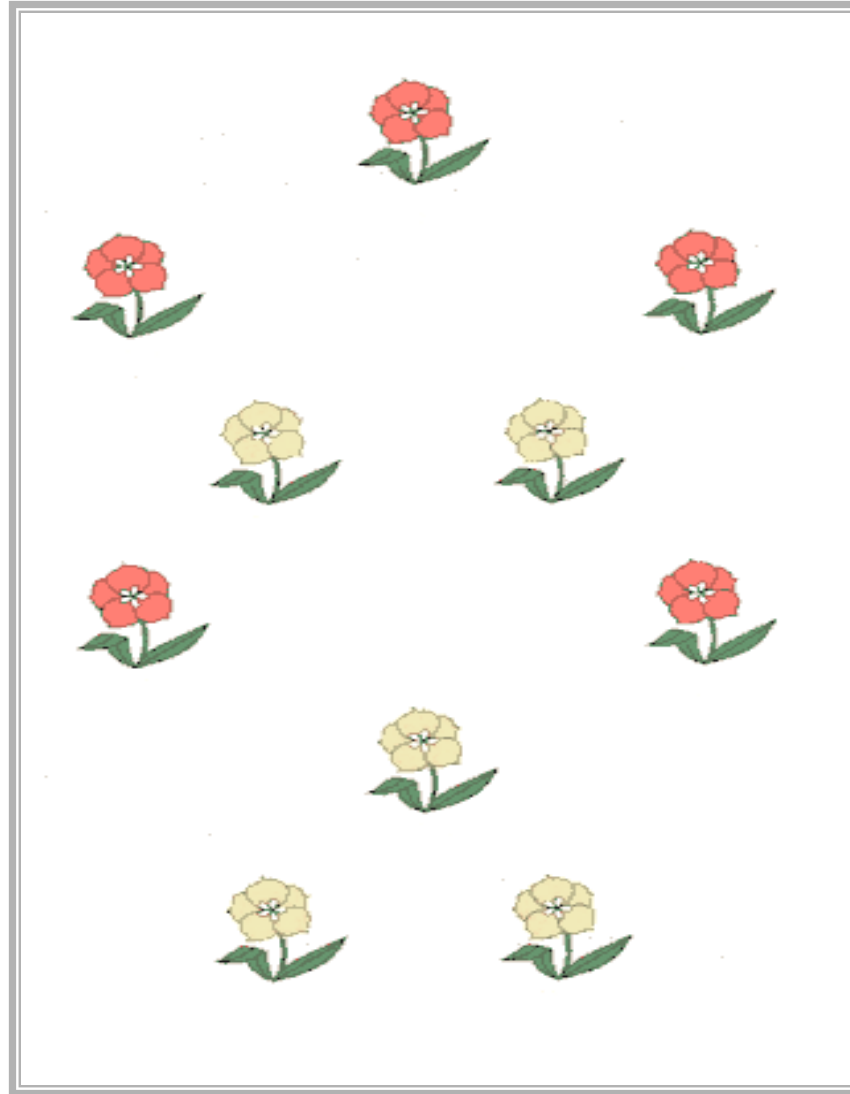
**REPRODUCTIVELY ISOLATED
(BIOLOGICAL SPECIES)**

IDEAL SPECIES

IDEAL SPECIES

SP#1

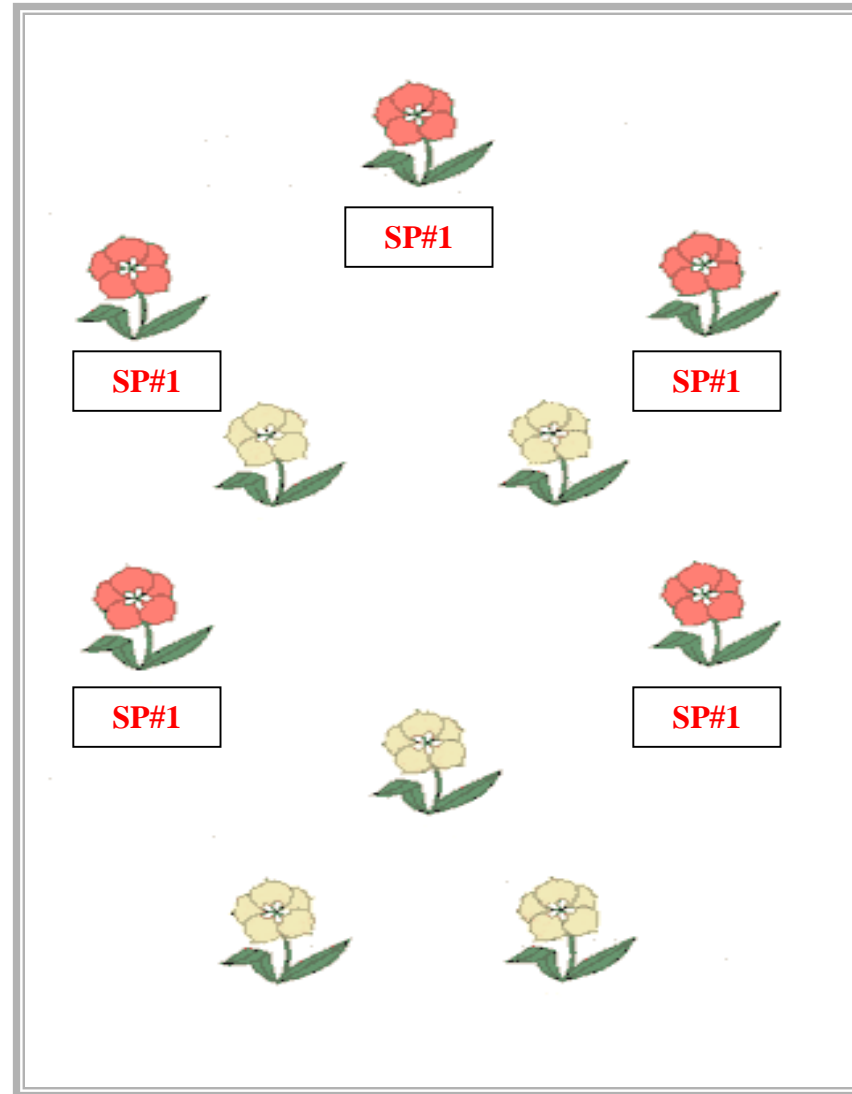
**GEOGRAPHIC
AREA**



**GEOGRAPHIC
AREA**

MORPHOLOGICALLY DISTINCT & REPRODUCTIVELY ISOLATED

IDEAL SPECIES

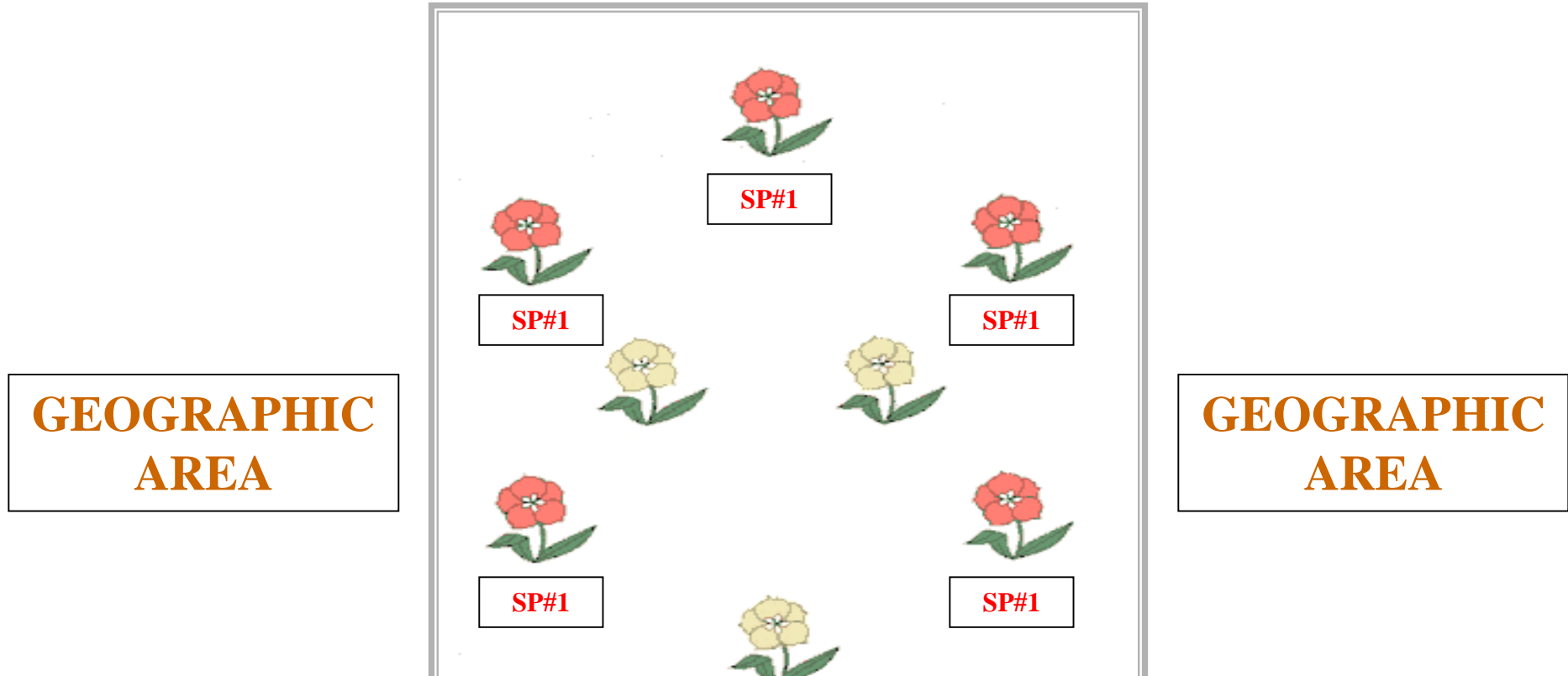


**GEOGRAPHIC
AREA**

**GEOGRAPHIC
AREA**

MORPHOLOGICALLY DISTINCT & REPRODUCTIVELY ISOLATED

IDEAL SPECIES

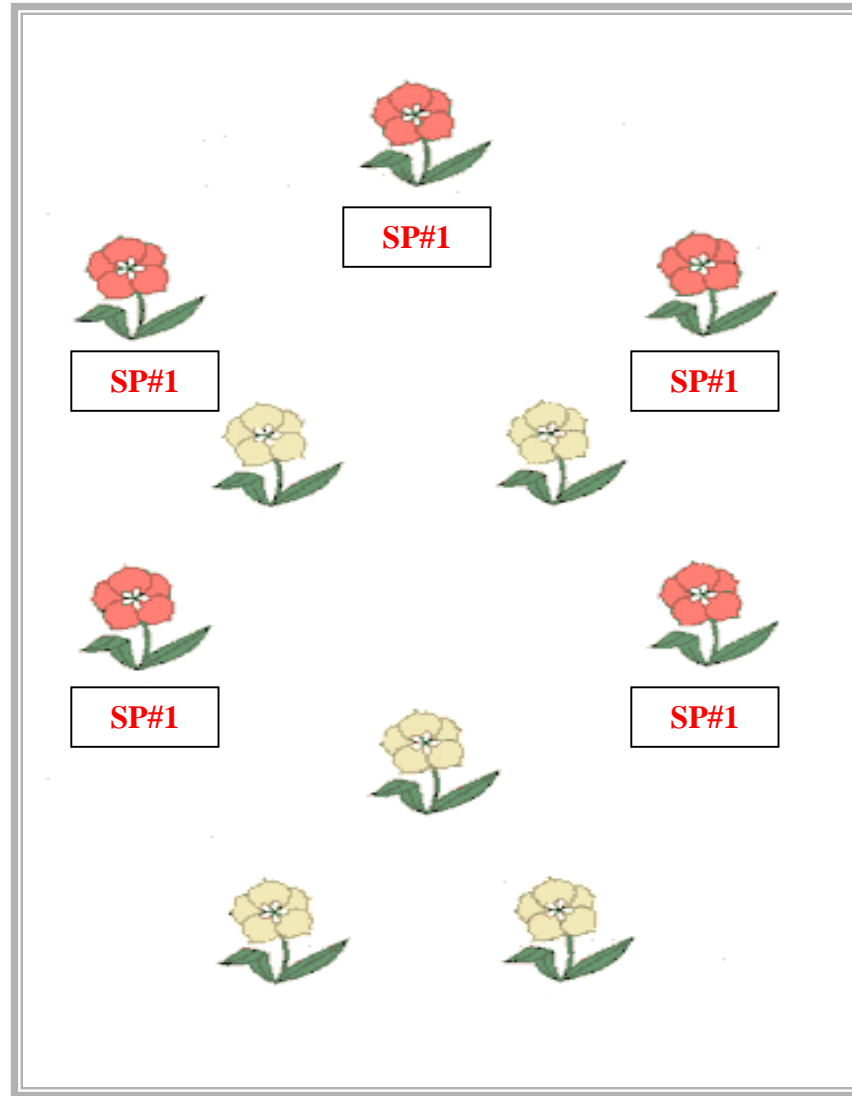


**MORPHOLOGICALLY
DISTINCT**

MORPHOLOGICALLY DISTINCT & REPRODUCTIVELY ISOLATED

IDEAL SPECIES

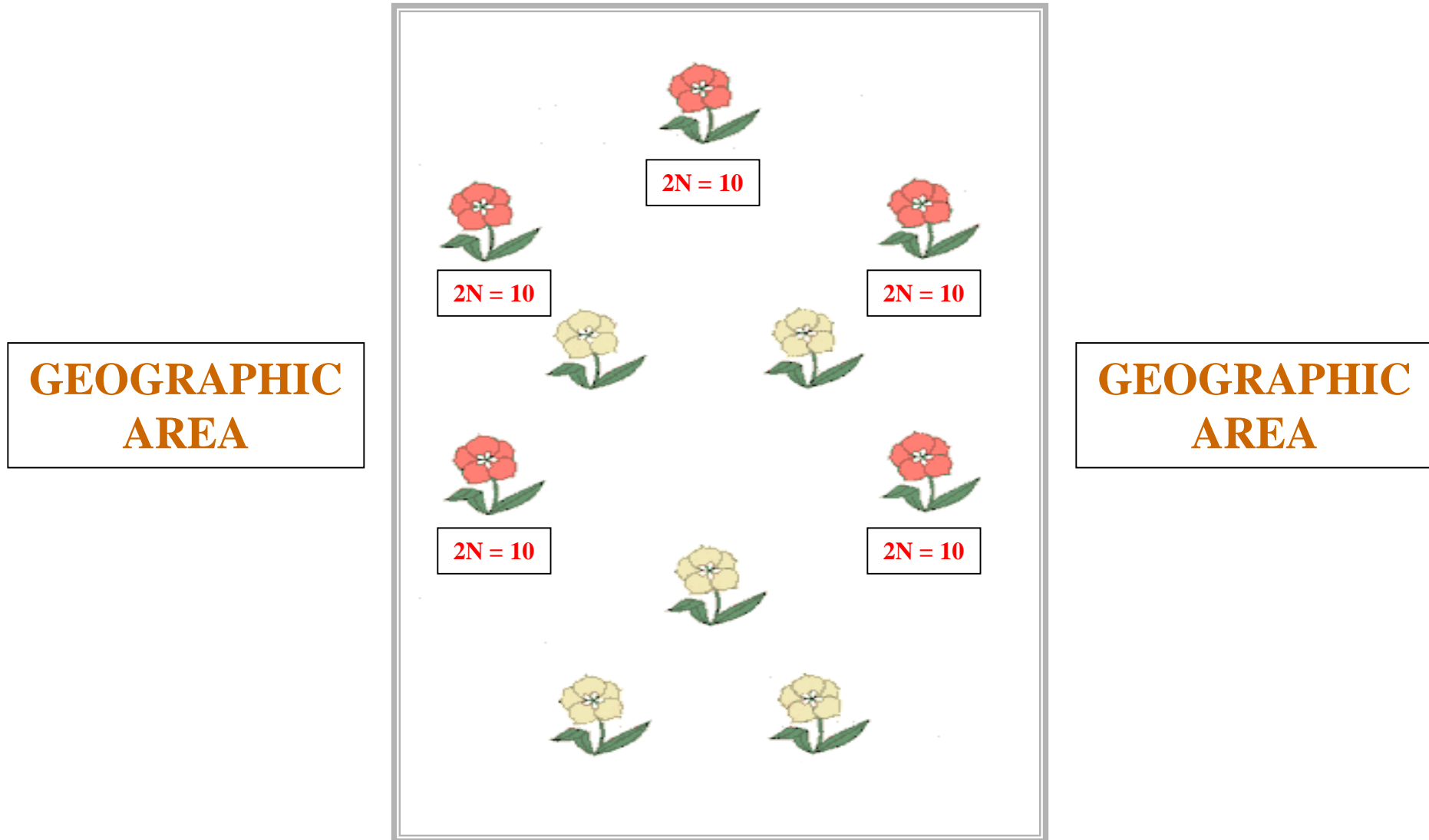
GEOGRAPHIC
AREA



GEOGRAPHIC
AREA

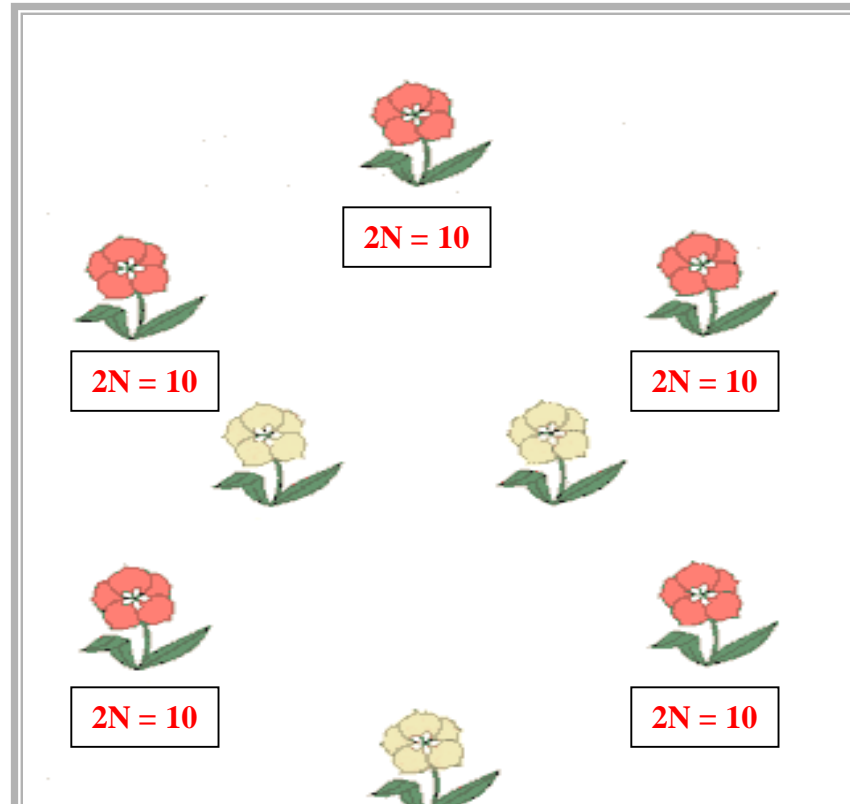
MORPHOLOGICALLY DISTINCT & REPRODUCTIVELY ISOLATED

IDEAL SPECIES



MORPHOLOGICALLY DISTINCT & REPRODUCTIVELY ISOLATED

IDEAL SPECIES



**GEOGRAPHIC
AREA**

**GEOGRAPHIC
AREA**

**REPRODUCTIVELY
ISOLATED**

MORPHOLOGICALLY DISTINCT & REPRODUCTIVELY ISOLATED