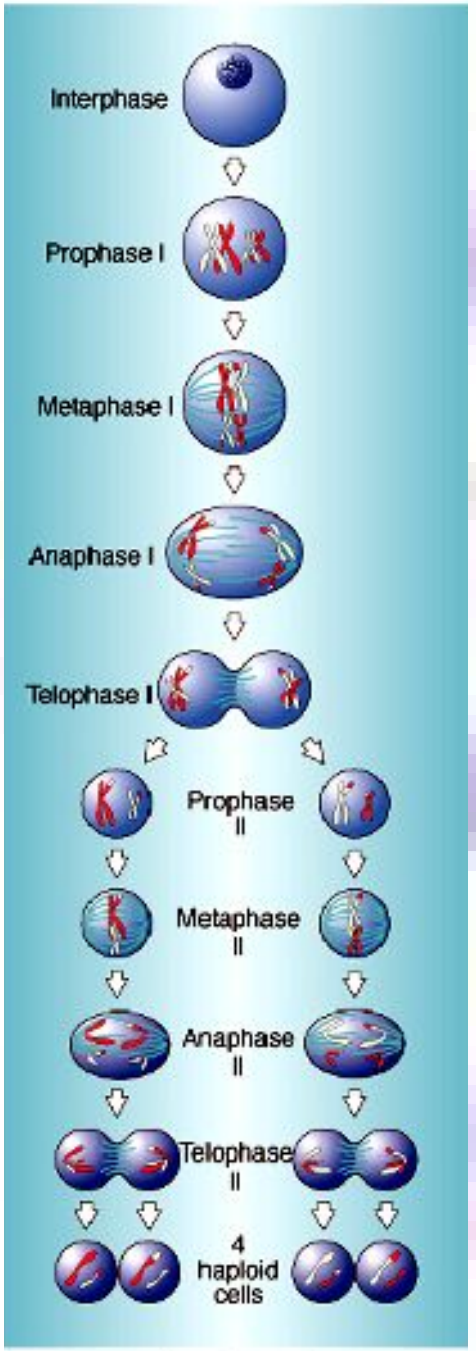
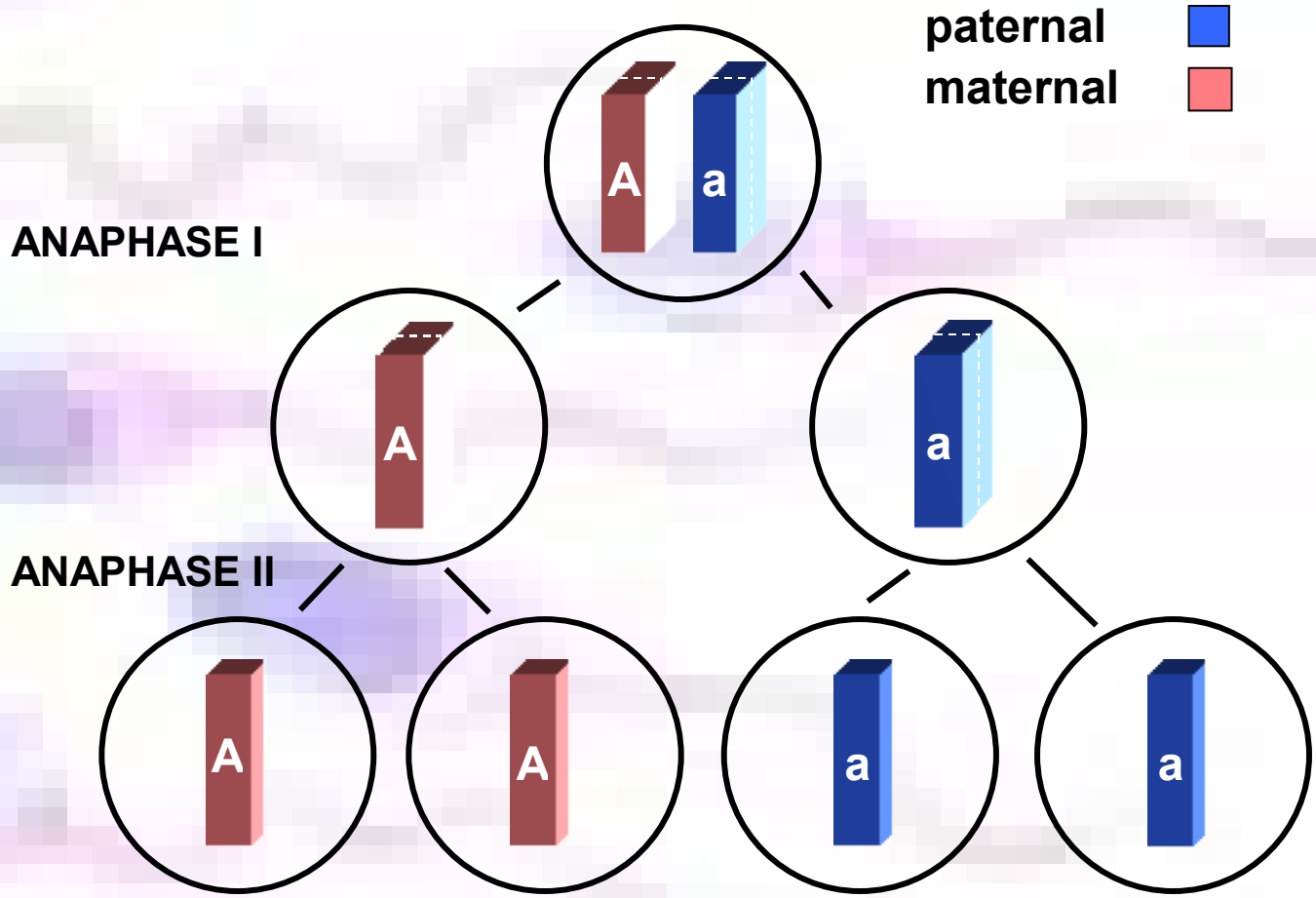
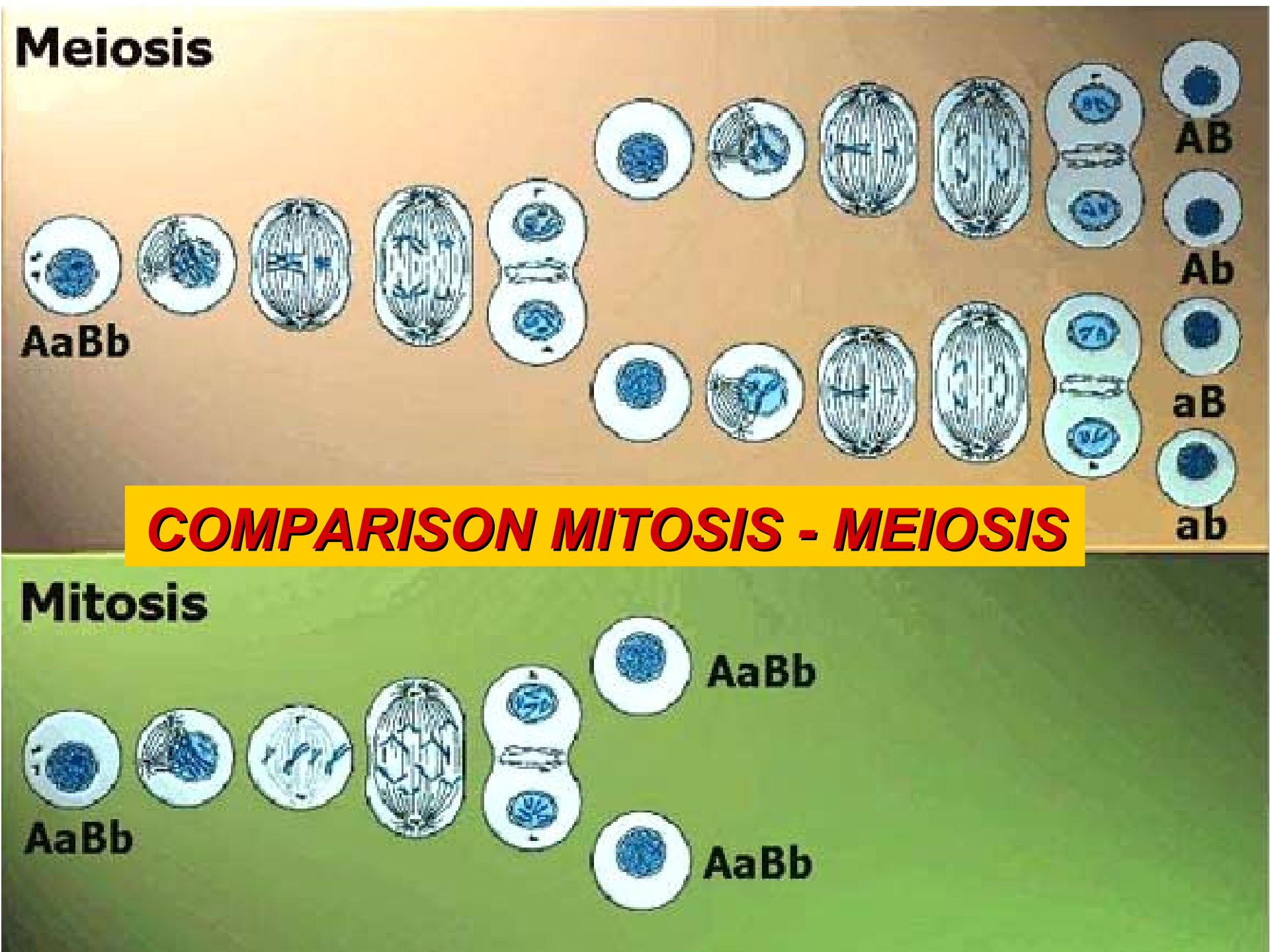
MEIOSIS

Institute of Biology and Medical Genetics of the First Faculty of Medicine and General Teaching Hospital

REDUCTION OF THE CHROMOSOME NUMBER AND SEPARATION BY MEIOSIS

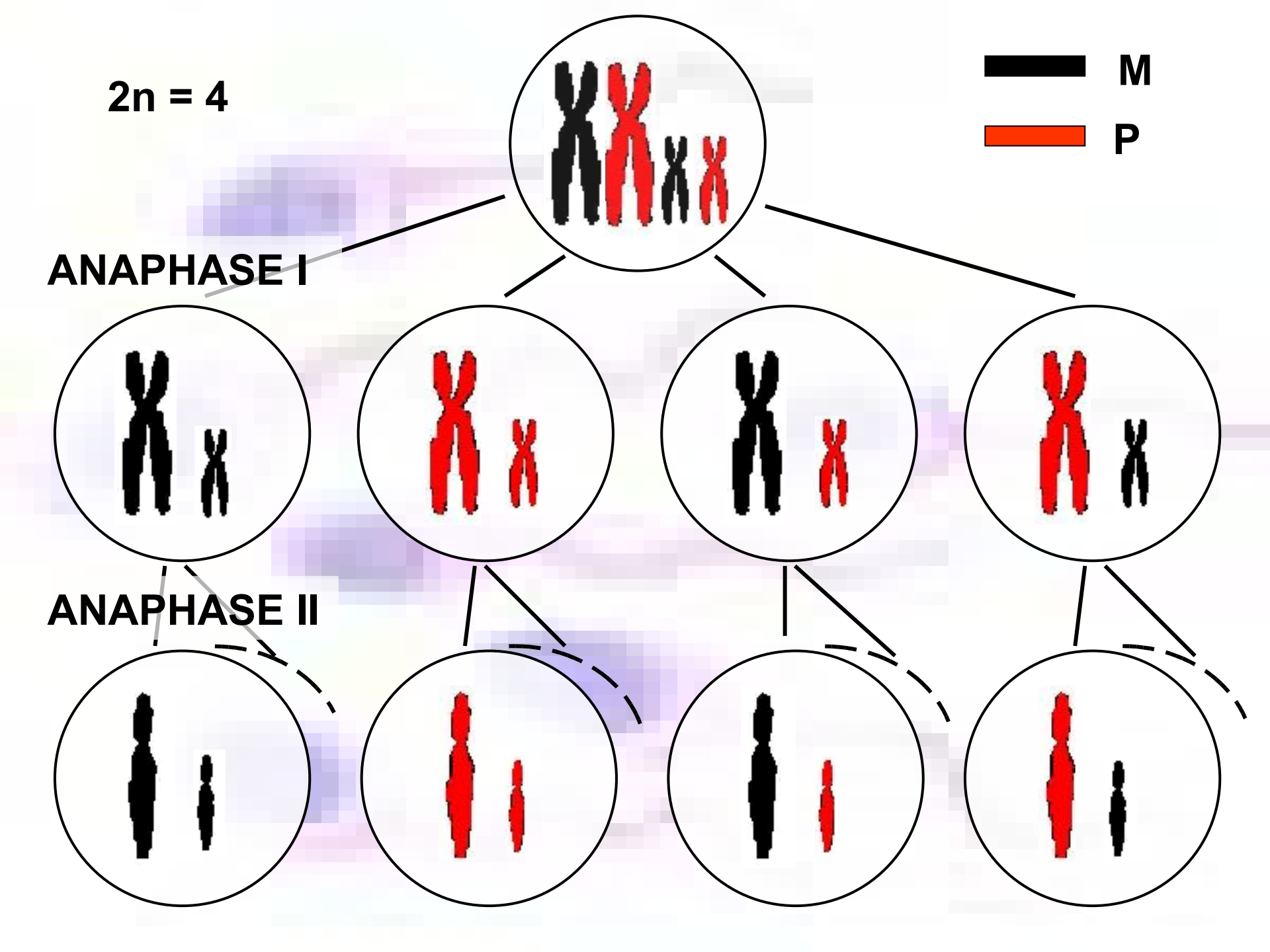





Meiosis
AaBb
AB
Ab
aB
ab
COMPARISON MITOSIS - MEIOSIS
Mitosis
AaBb
AaBb
AaBb

DRAW THE EXPECTED DISTRIBUTION OF 2 PAIRS OF CHROMOSOMES (2n = 4) DURING MEIOSIS (NO-CROSSING OVER IS SUPPOSED)

HOW MANY DIFFERENT TYPES OF GAMETES CAN ORIGINATE WHEN: 2n = a) 4, b) 6, c) 46?


2n = 4
M
P
ANAPHASE I
ANAPHASE II

HOW MANY DIFFERENT TYPES OF GAMETES CAN ORIGINATE WHEN: 2n = a) 4, b) 6, c) 46?

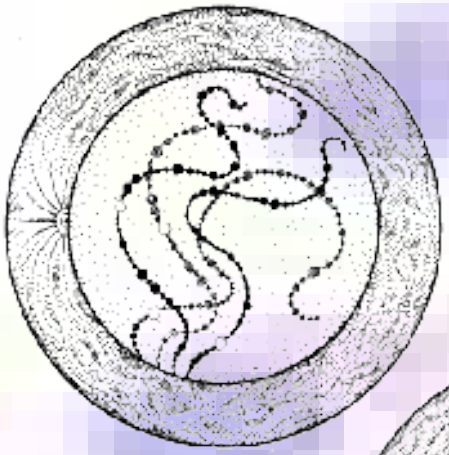
a) 4

b) 8

c) 2^{23}

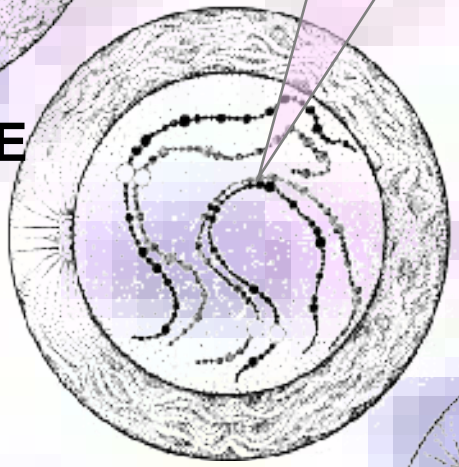
In general 2^n

MEIOSIS – PROPHASE I

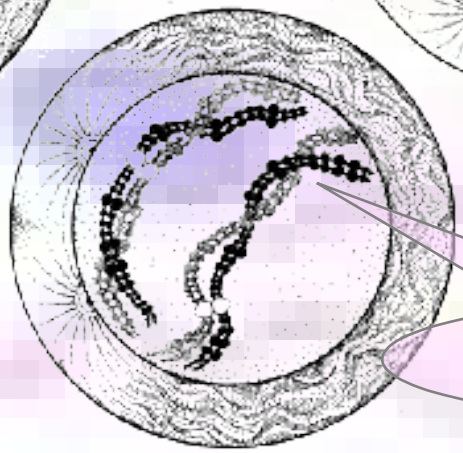


LEPTOTENE

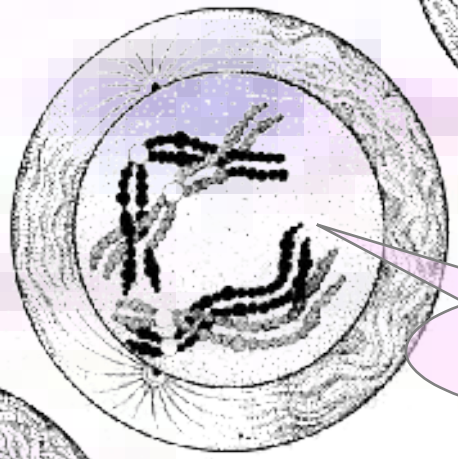
SYNAPSE
BIVALENT



ZYGOTENE



PACHYTENE

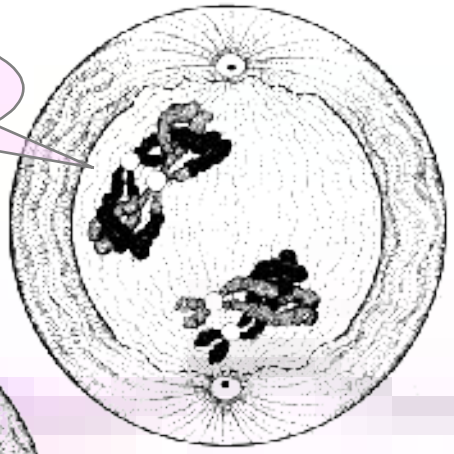


DIPLOTENE

DESYNAPS
E

CROSSING-OVER

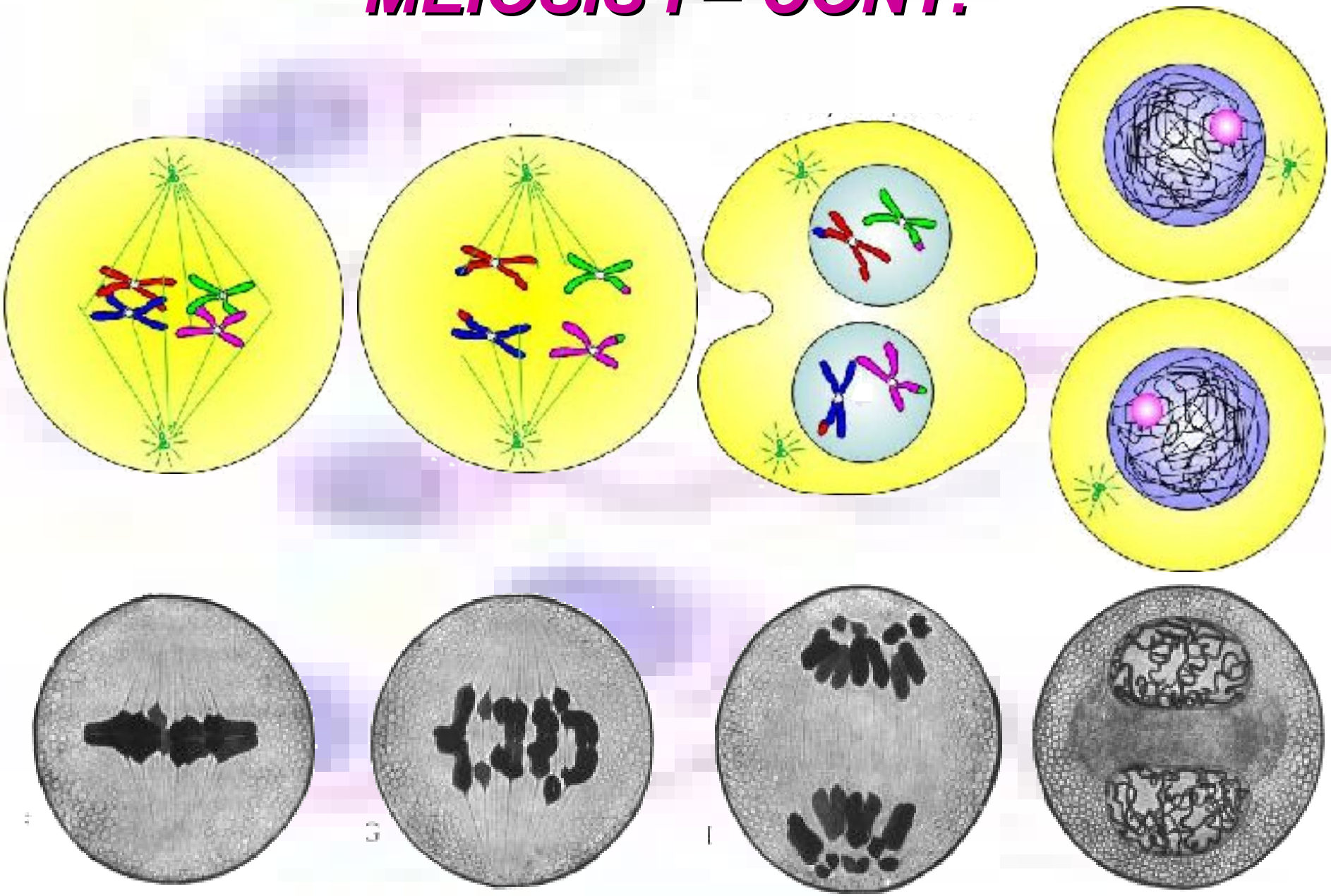
TETRAD



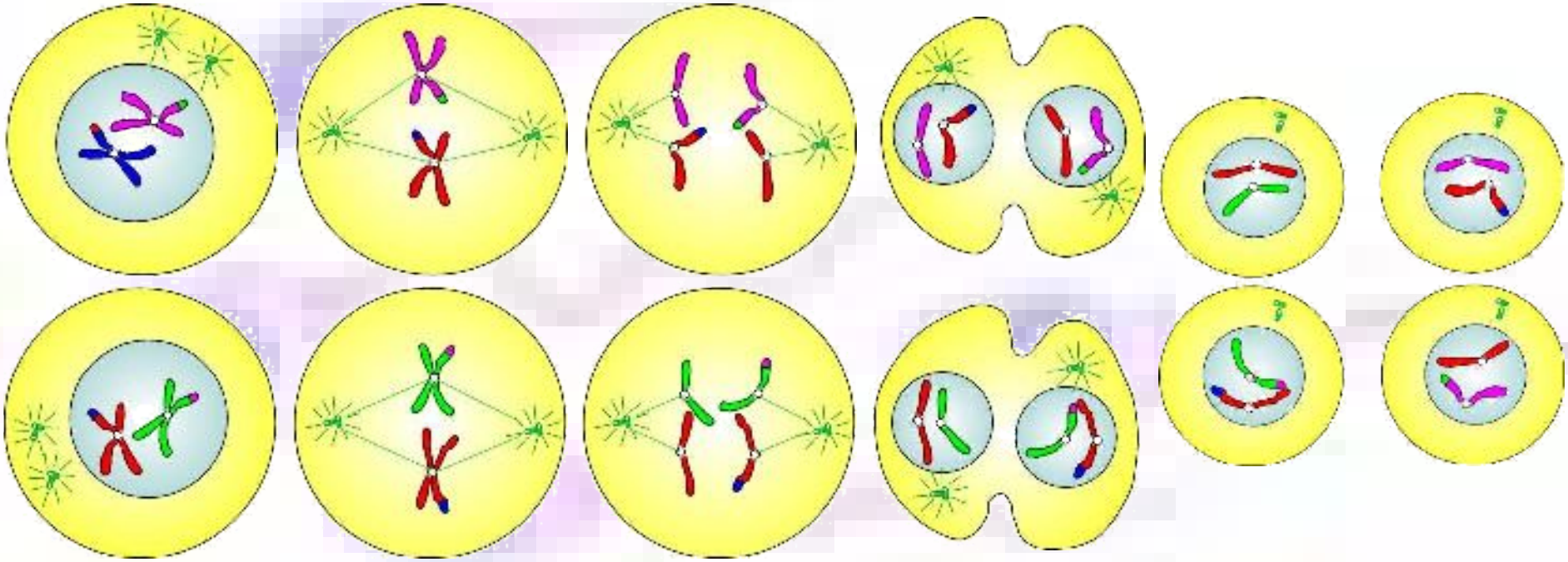
DIAKINESIS

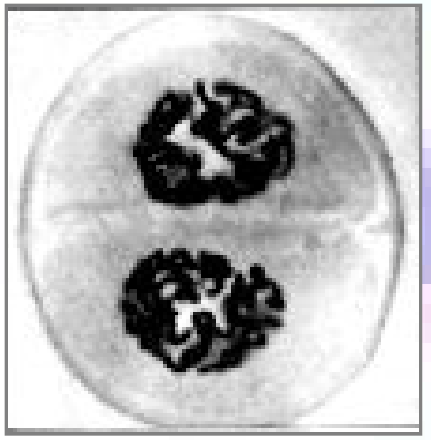
2n = 4

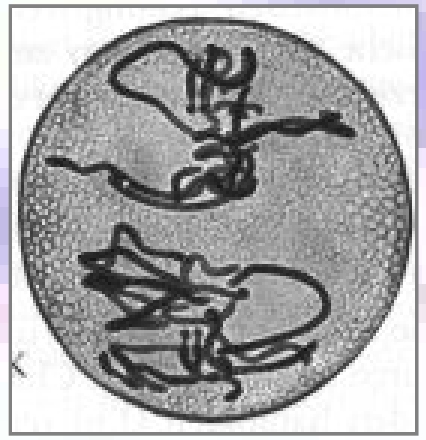
MEIOSIS I – CONT.

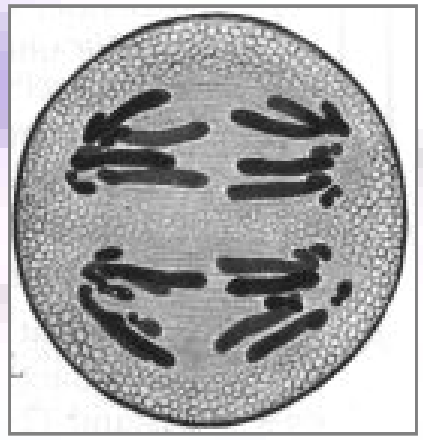


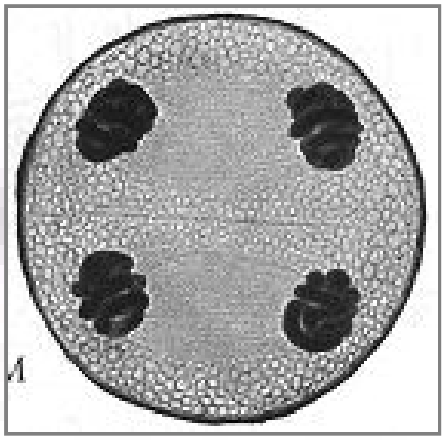
MEIOSIS II











Task 7, p. 29

WHICH GENETIC MECHANISMS COULD CAUSE THE GENETIC VARIABILITY OF NEXT GENERATIONS?

RECOMBINATIONS

- *INTRACHROMOSOMAL*
- *OF MATERNAL AND PATERNAL CHROMOSOMES DURING GAMETOGENESIS*
- *CHROMOSOME SETS DURING FERTILIZATION*

MUTATIONS

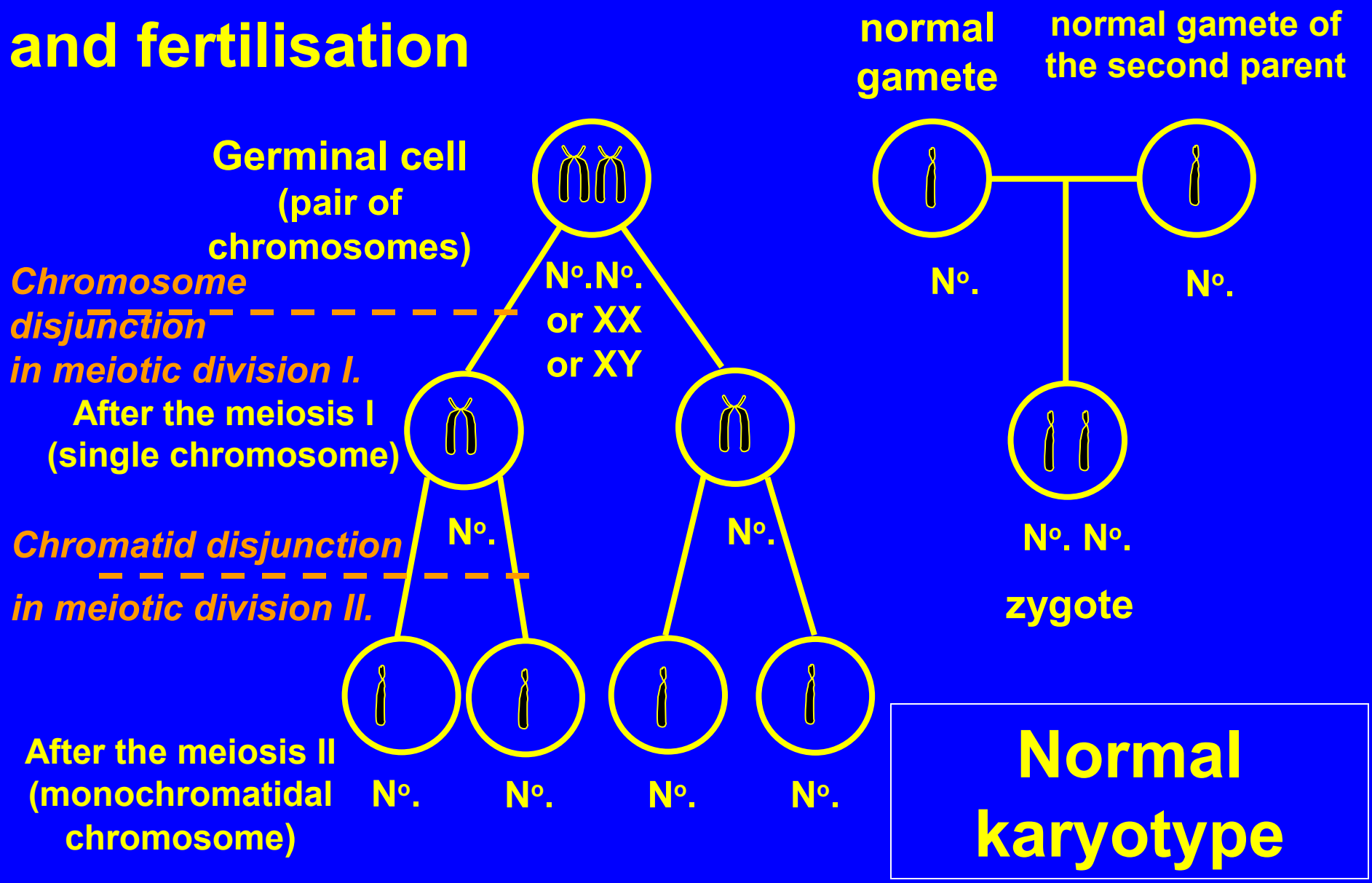
1. Nondisjunction in Down, Turner, and Klinefelter syndrome

p. 80/Task 6e, a, b (preserve this order)

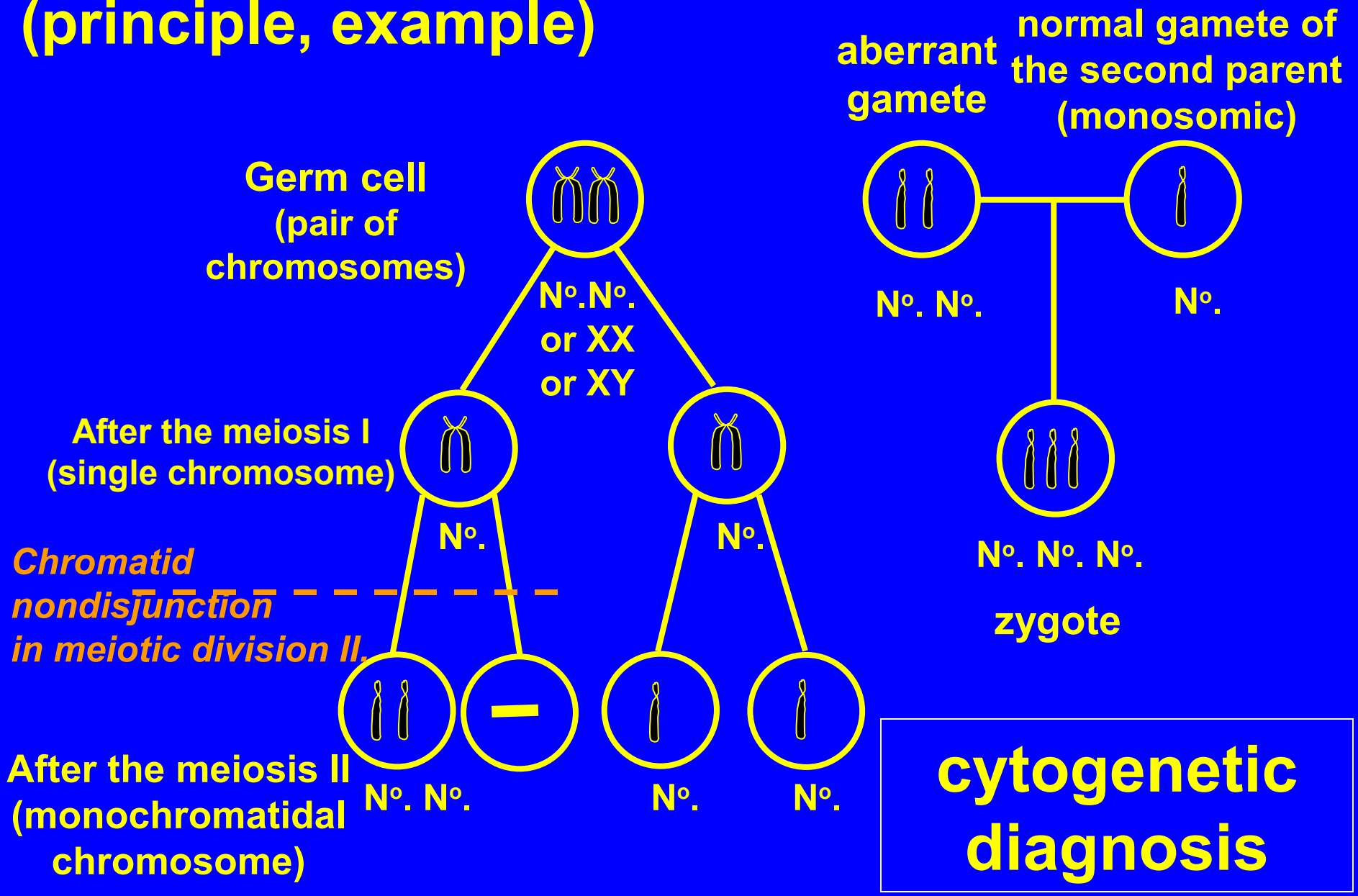
Remaining c) and d) - syndromes XXX and supermale – home work, as selfstudy!

N.B.: Fill in all possibilities of the nondisjunction events for a particular syndrome could originate. This is asked in the text, exactly as in final exam test. 11

General schedule of disjunction of chromosomes in the meiosis and fertilisation

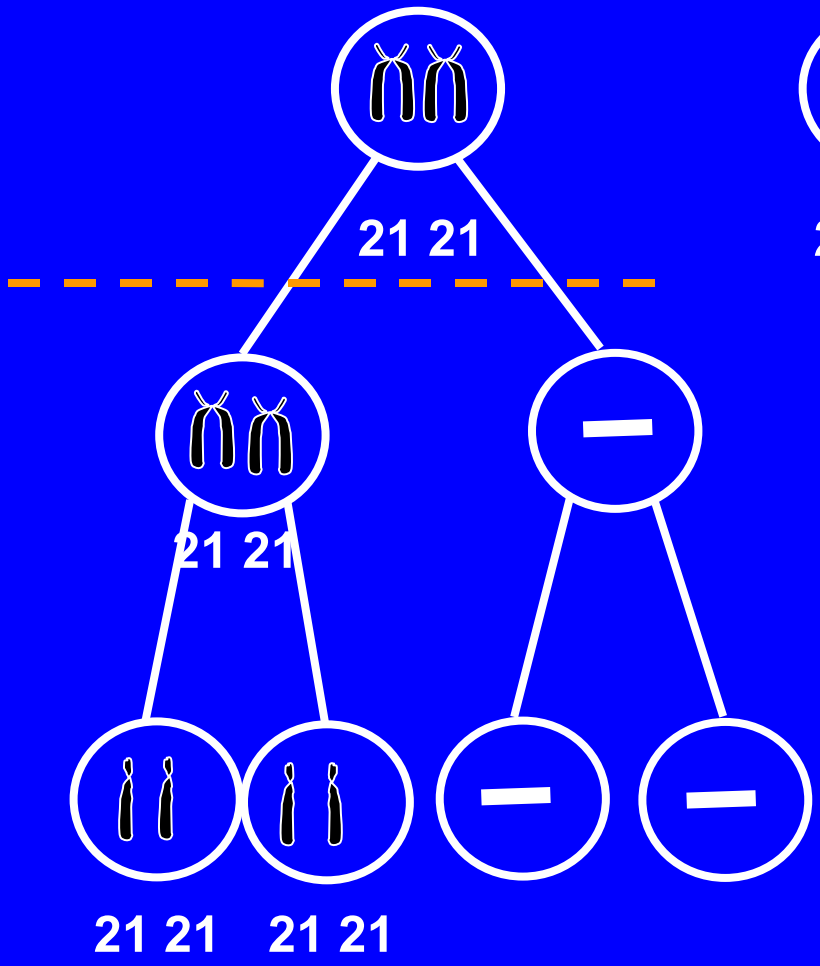


General schedule of nondisjunction (principle, example)



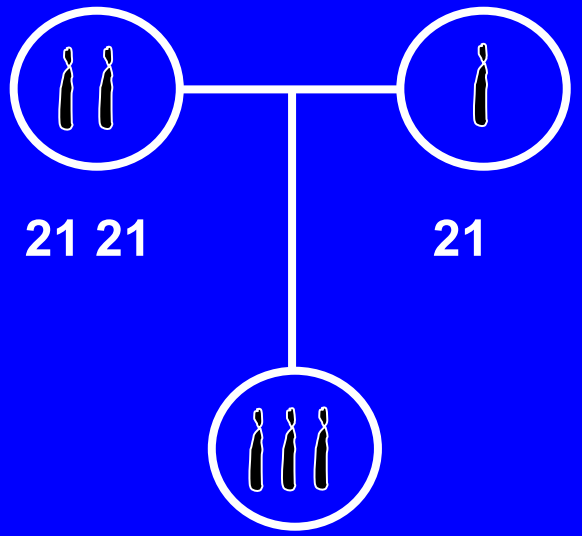
cytogenetic diagnosis

Down syndrome (simple trisomy)
Nondisjunction in the meiosis I
in the father or in the mother



aberrant gamete

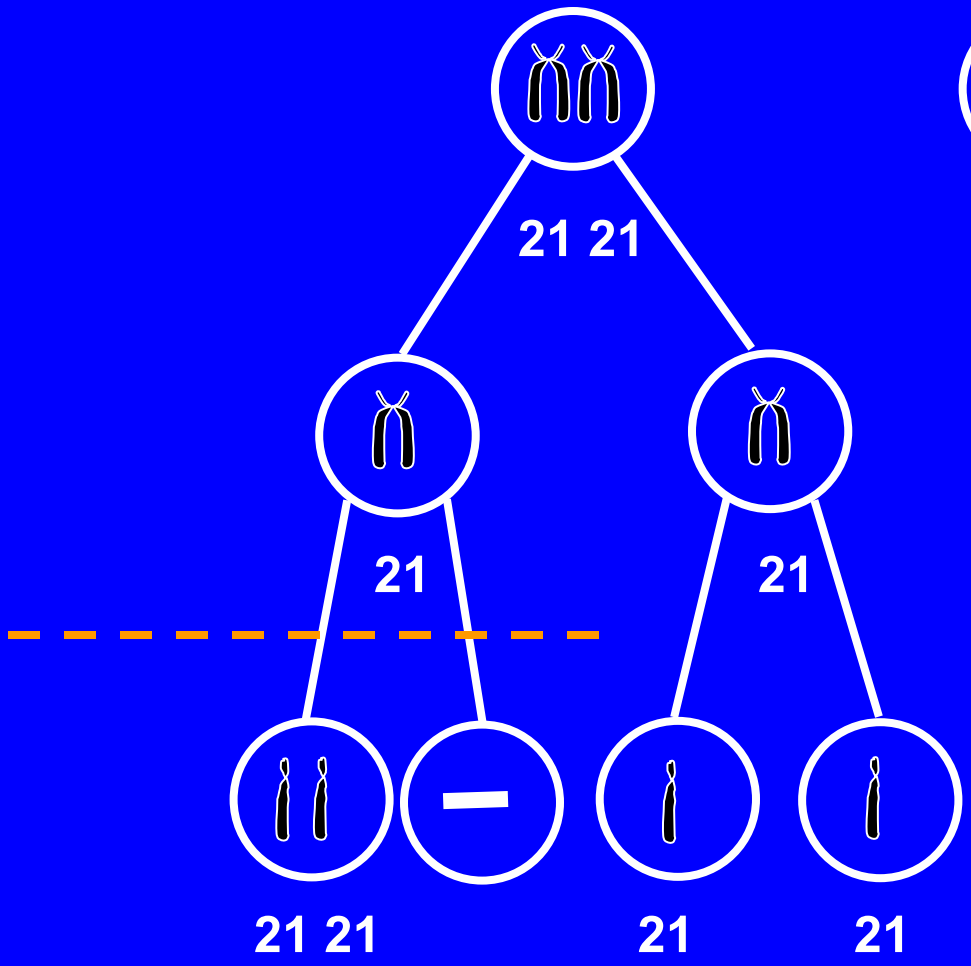
normal gamete of the second parent (monosomic)



zygote

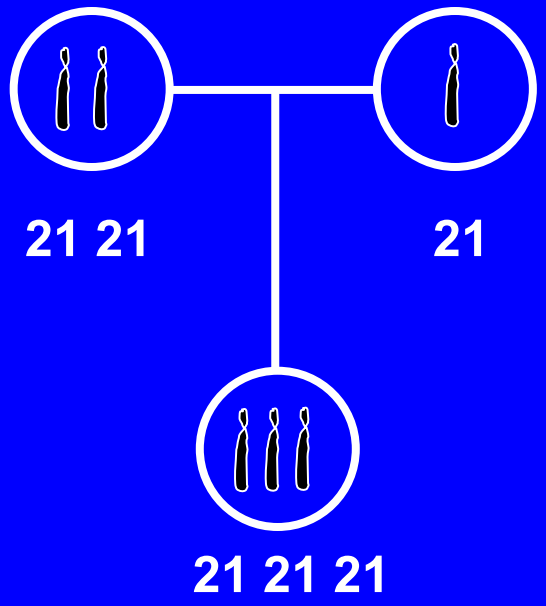
47,XX,
+2147,XY,

Down syndrome (simple trisomy)
Nondisjunction in the meiosis II
in the father or in the mother



aberrant gamete

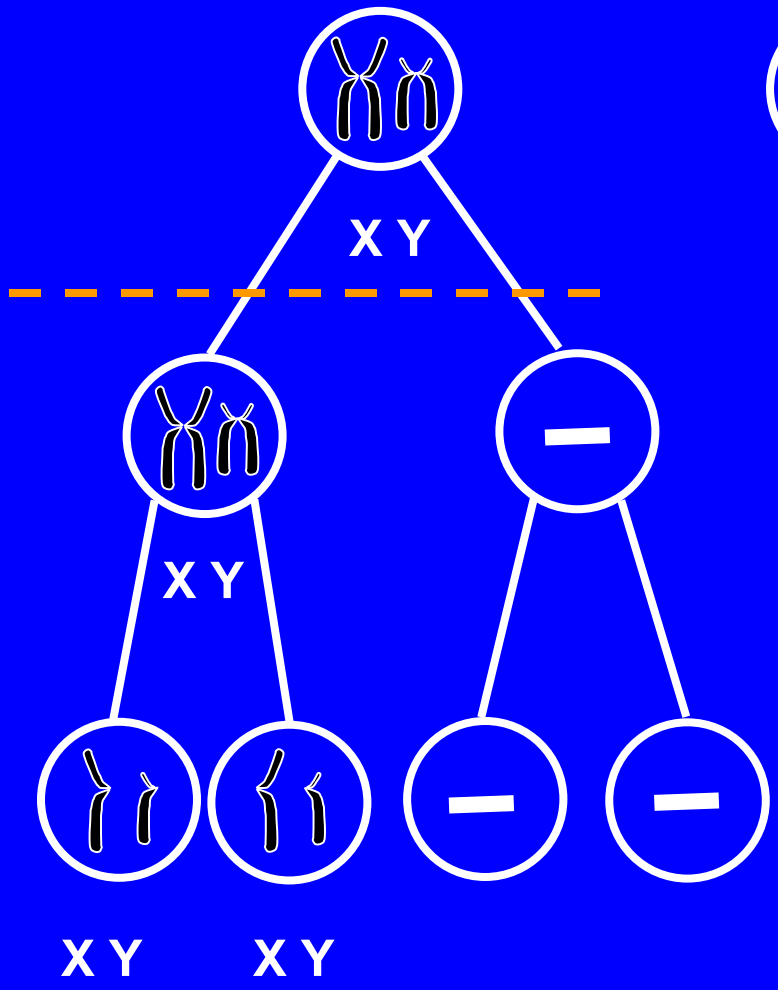
normal gamete of the second parent (monosomic)



zygote

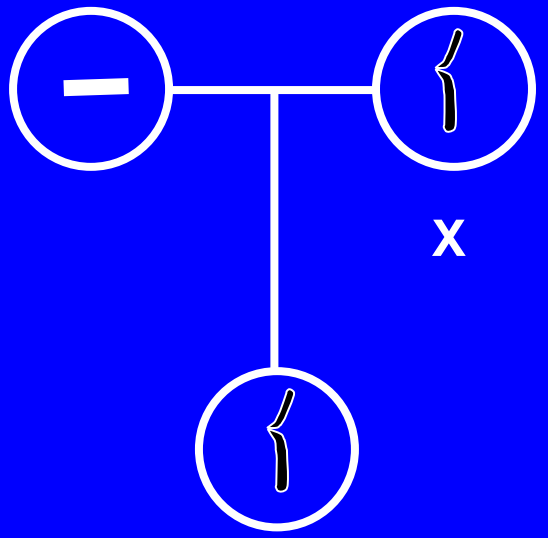
47,XX,+21
47,XY,+21

Turner syndrome
Nondisjunction in the paternal meiosis I



aberrant gamete

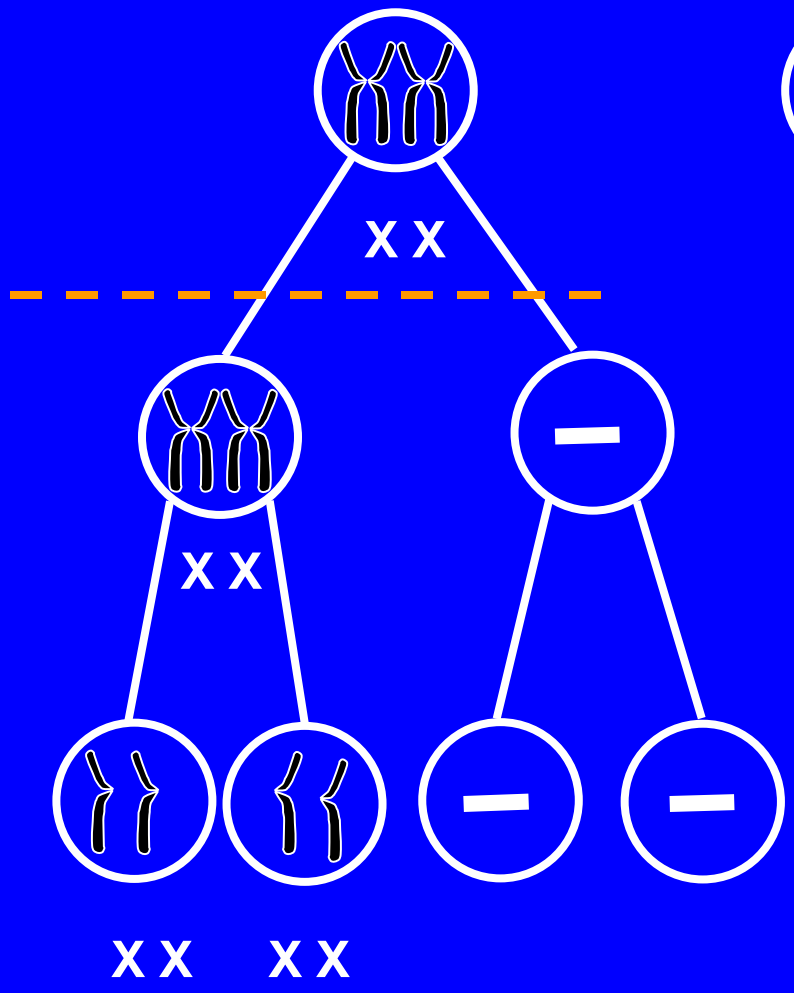
mother's normal gamete (monosomic)



zygote

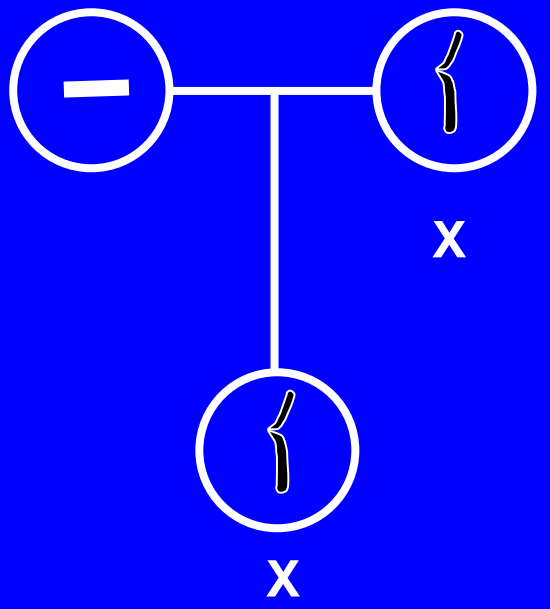
45,X

Turner syndrome
Nondisjunction in the maternal meiosis I



aberrant gamete

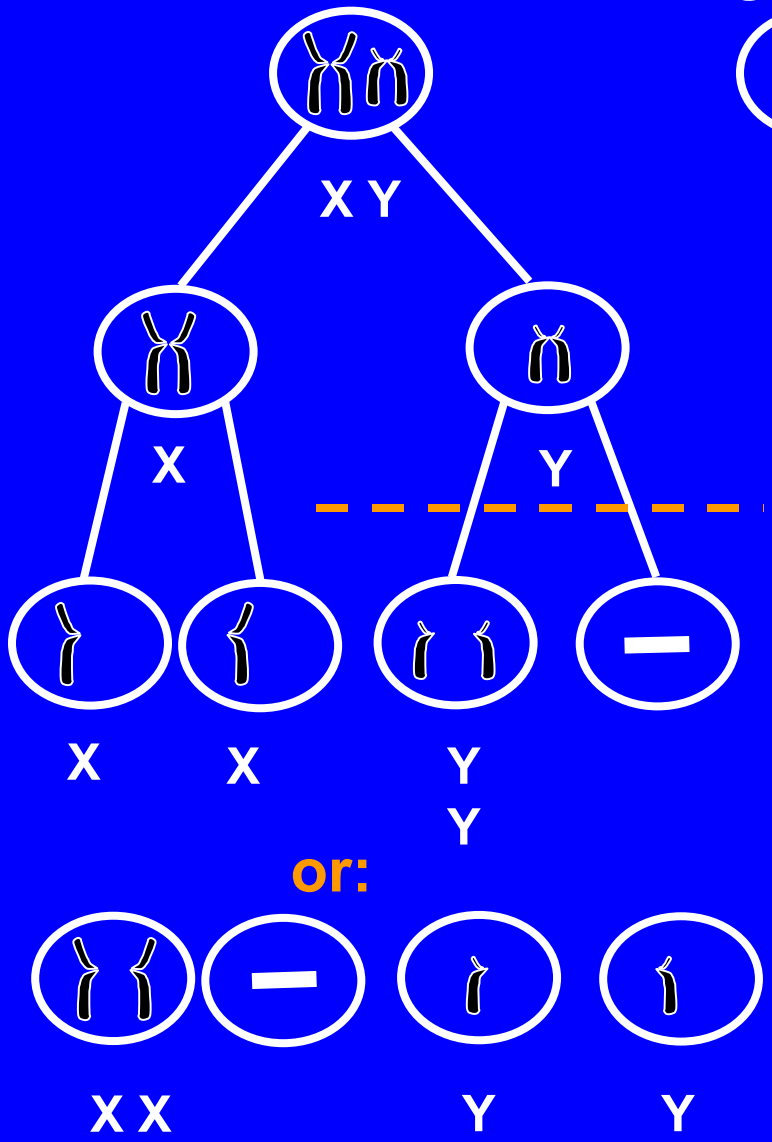
father's normal gamete (monosomic)

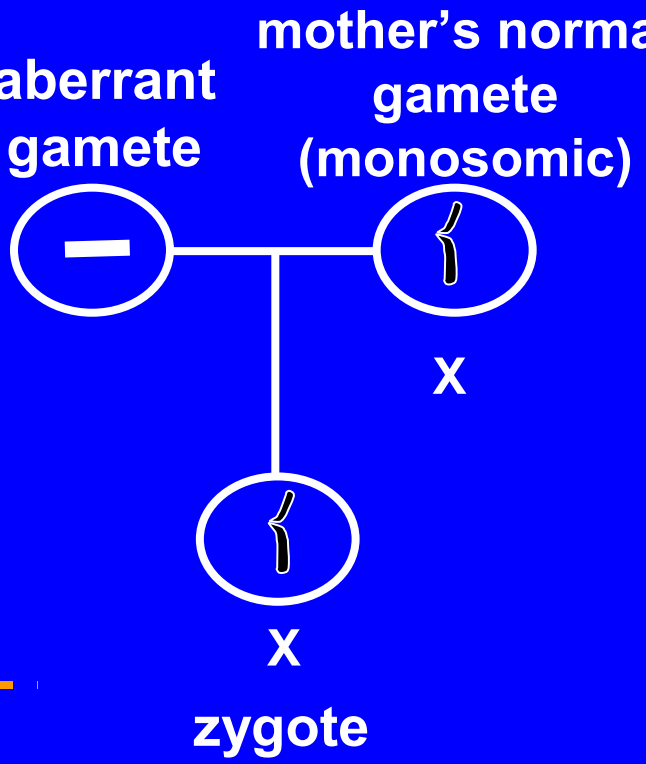


zygote

45,X

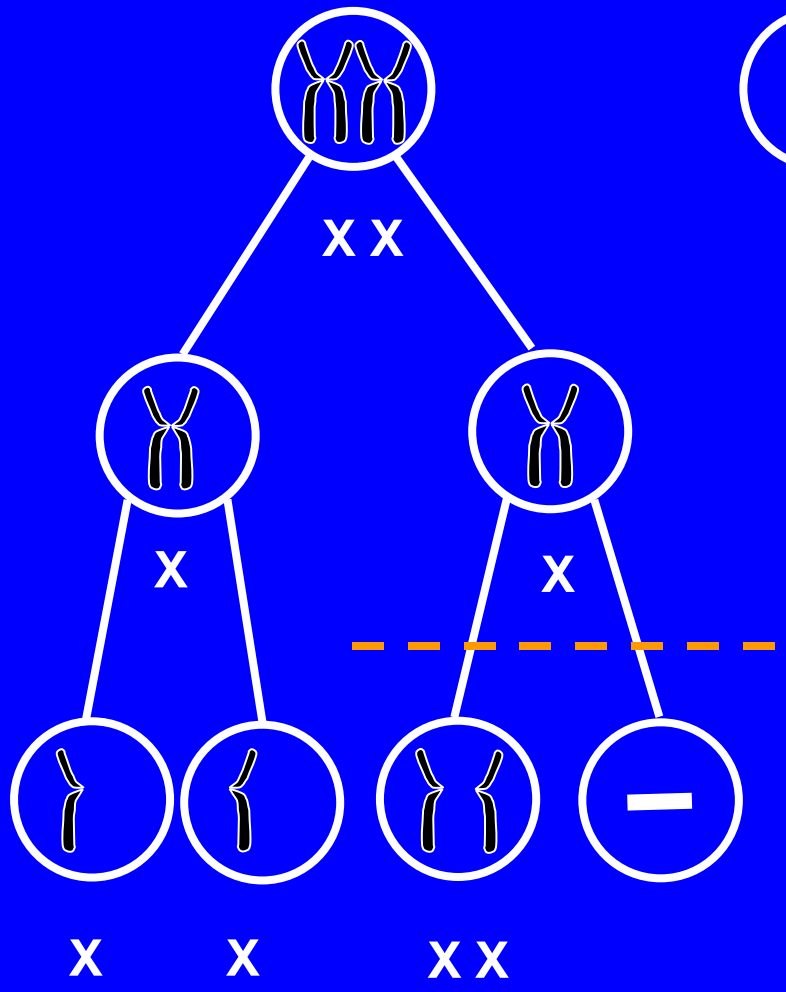
Turner syndrome
Nondisjunction in the paternal meiosis II





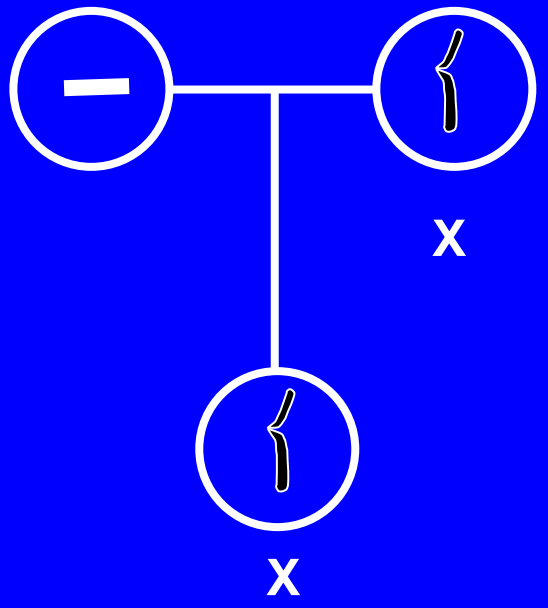
45,X

Turner syndrome
Nondisjunction in the maternal meiosis II



aberrant gamete

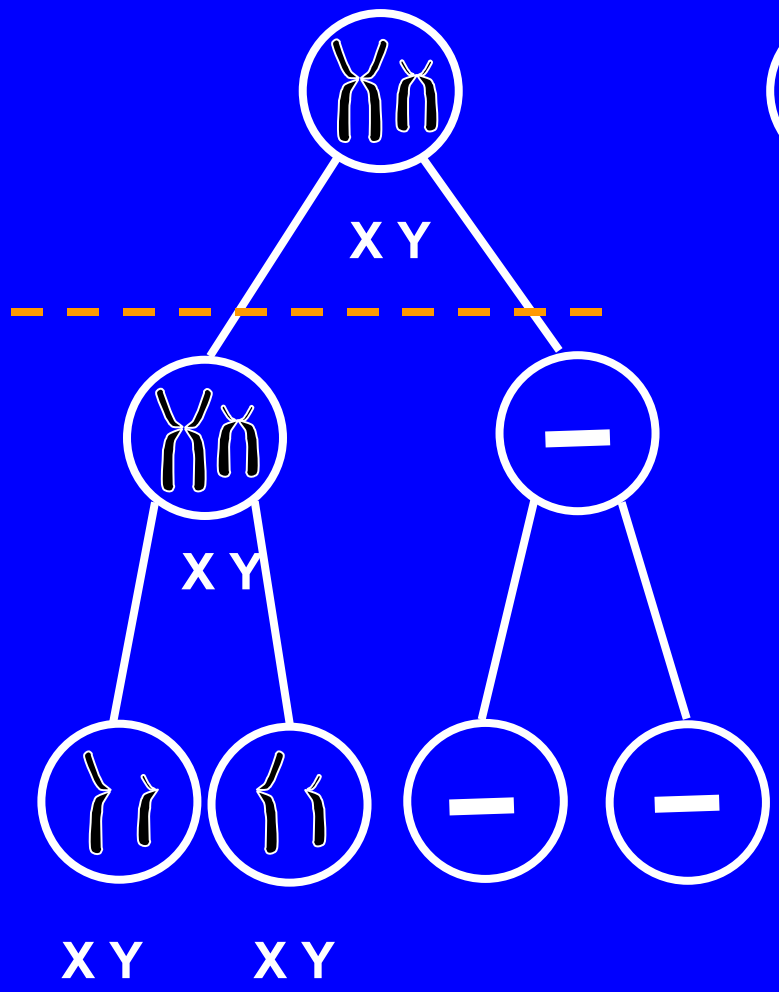
father's normal gamete (monosomic)



zygota

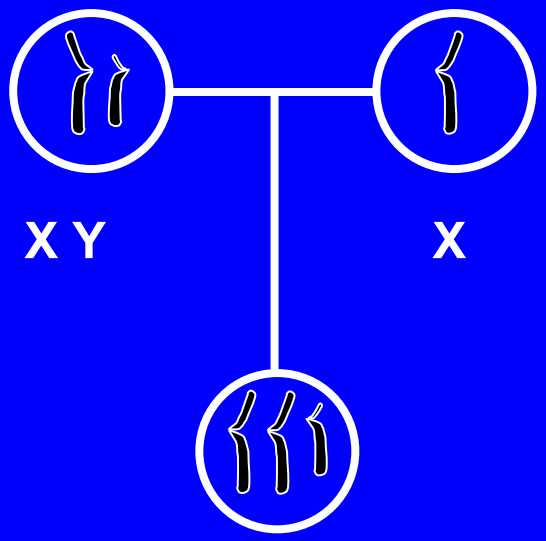
45,X

Klinefelter syndrome
Nondisjunction in the paternal meiosis I



aberrant gamete

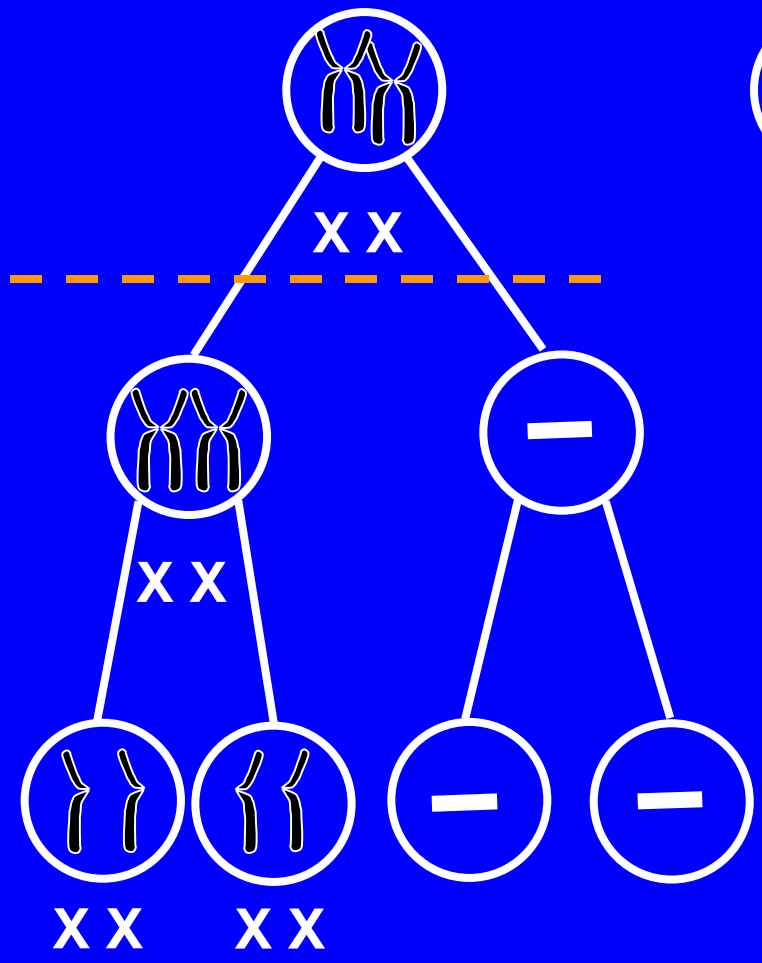
mother's normal gamete (monosomic)

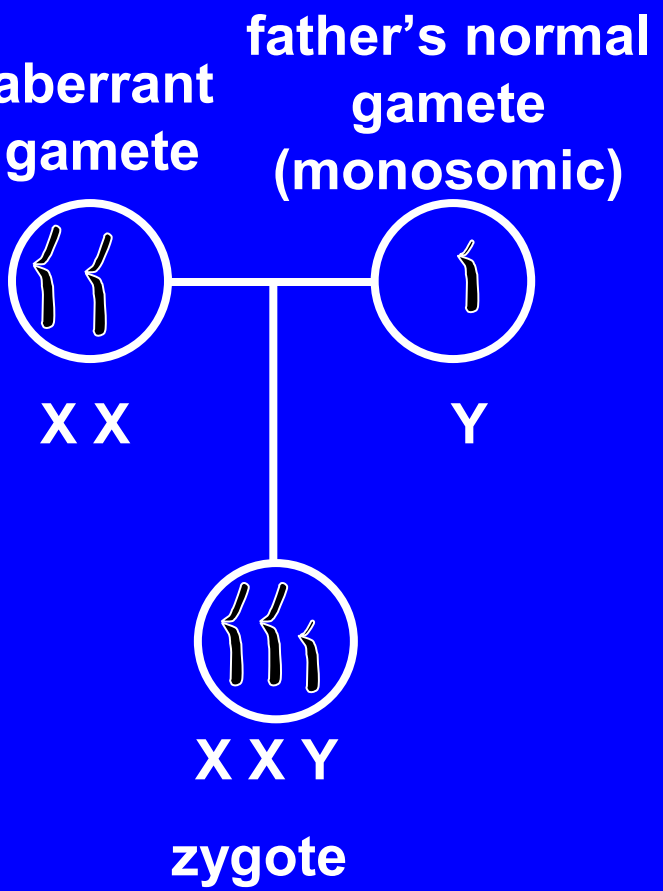


zygote

47,XXY

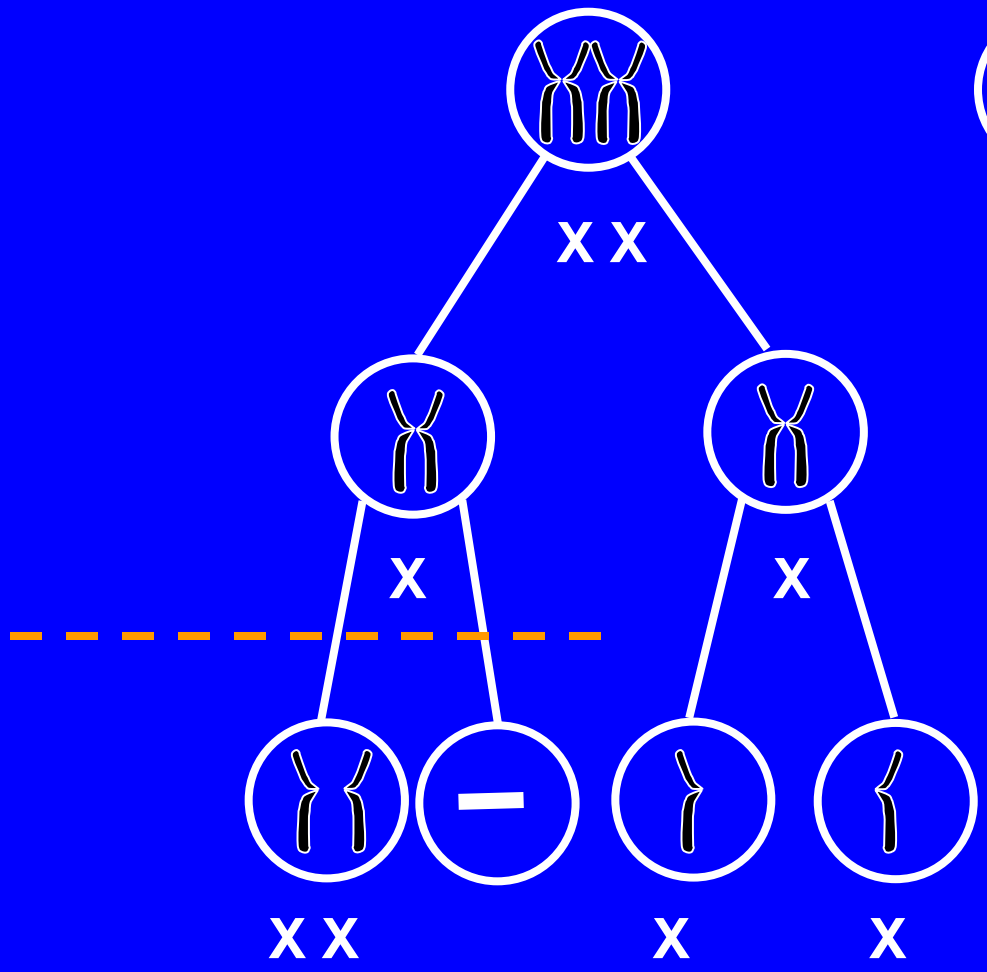
Klinefelter syndrome
Nondisjunction in the maternal meiosis I





47,XXY

Klinefelter syndrome
Nondisjunction in the maternal meiosis II



aberrant gamete

father's normal gamete (monosomic)

X X

Y

X X Y

zygote

47,XXY