You're Having My Zygote!

Purpose: In this investigation you will learn about inherited and abnormal developmental conditions in humans.

Materials:

1) Human Chromosome Set in pairs of envelopes. One envelope reflects the maternal chromosomes and the second envelope reflects the paternal chromosomes. Note: copy female chromosomes on pink paper and copy male chromosomes on blue paper
2) chart of gene mapping and human karyotype
3) scissors
4) tape

The sheets are grouped:

Karyotyping Lab
Groupings

1. Cystic Fibrosis chromosome 7q
2. Klinefelter's Syndrome Trisomy 23
3. Down's Syndrome Trisomy 21
4. Tay-Sachs chromosome 15q
5. Huntingdon's chromosome 4p
6. Retinoblastoma chromosome13q
7. Duchenne Muscular Dystrophy x-linked
8. Neurofibromatosis chromosome17q
9. Prader Willi extra chromosome 15 from mother missing from father's
10. Angelman extra chromosome 15 from father missing from mother's
11. Achondroplastic Dwarfism dominant chromosome #4p
12. Albinism autosomal recessive chromosome 11q

Procedure:

1) Find the number on the outside of your envelope and match it to another student in the class. This is your "marriage" partner for the project.
2) Remove the sheet of chromosomes from the envelope (pink in maternal envelope and blue in paternal envelope)..
3) Notice any special markings on any chromosomes as you perform the karyotype.
4) Cut out the chromosomes. Do not cut so close that you cut out the previously identified mark when cutting out the chromosome. With the inclusion of your partner's chromosomes create a karyotype for your child. Match the chromosome configuration

using the supplied chart. Align 1-23, the Maternal chromosomes in front of the paternal chromosomes. Tape the entire roll down on the karyotype chart.
5) After you finish the karyotype, answer the questions that follow.

Questions:

1. What is the sex of your child?

2. What is the name of your child?

3. Identify any unusual condition present by using the karyotype you have created and the Human Chromosome chart.

4. Prepare a PowerPoint presentation using genetic texts in the classroom library and the internet, find out as much as you can about this condition. Include the following information:

- A DESCRIPTION of the physical and/or mental condition of your child as a result of the "disorder". Include the range of severity of this condition
- A DISCUSSION of the probability of the occurrence of this condition in the general population and as it relates to your specific genetic configuration.
- A DESCRIPTION of the inheritance pattern (or lack thereof) of the condition. That is is the trait autosomal dominant, autosomal recessive, sex linked, etc. Include diagrams or illustrations. Punnet squares are a good choice.
- Can this condition or the inheritance of this condition be determined by genetic testing (prenatal, post natal, in either parents)
- A CITATION of your resources.
- Describe your reaction and what you would do in each of the following situations:

    A) The condition was discovered EARLY in the pregnancy.
    B) The condition was not discovered until LATE in pregnancy.
    C) The condition was not discovered until AFTER birth.

6. Did you and your partner agree on the course of action taken? How did you resolve any differences?

The Marriage Ceremony

Dearly beloved, we are gathered here in the sight of Mother Nature and in the presence of these dominant and recessive alleles to join the bearer of these two X chromosomes and this X and Y in a phase of mutual matrimony.

Join envelopes and repeat after me:

I gamete take your haploid number of chromosomes to be my awfully wedded DNA partner for as long as this genetic project lasts.

If there is anyone present who sees just cause why this sperm and ovum should not join let him send his messenger RNA or forever prevent meiosis.

I now pronounce you 46 chromosomes. What this Biology teacher has brought together let no cell divide.

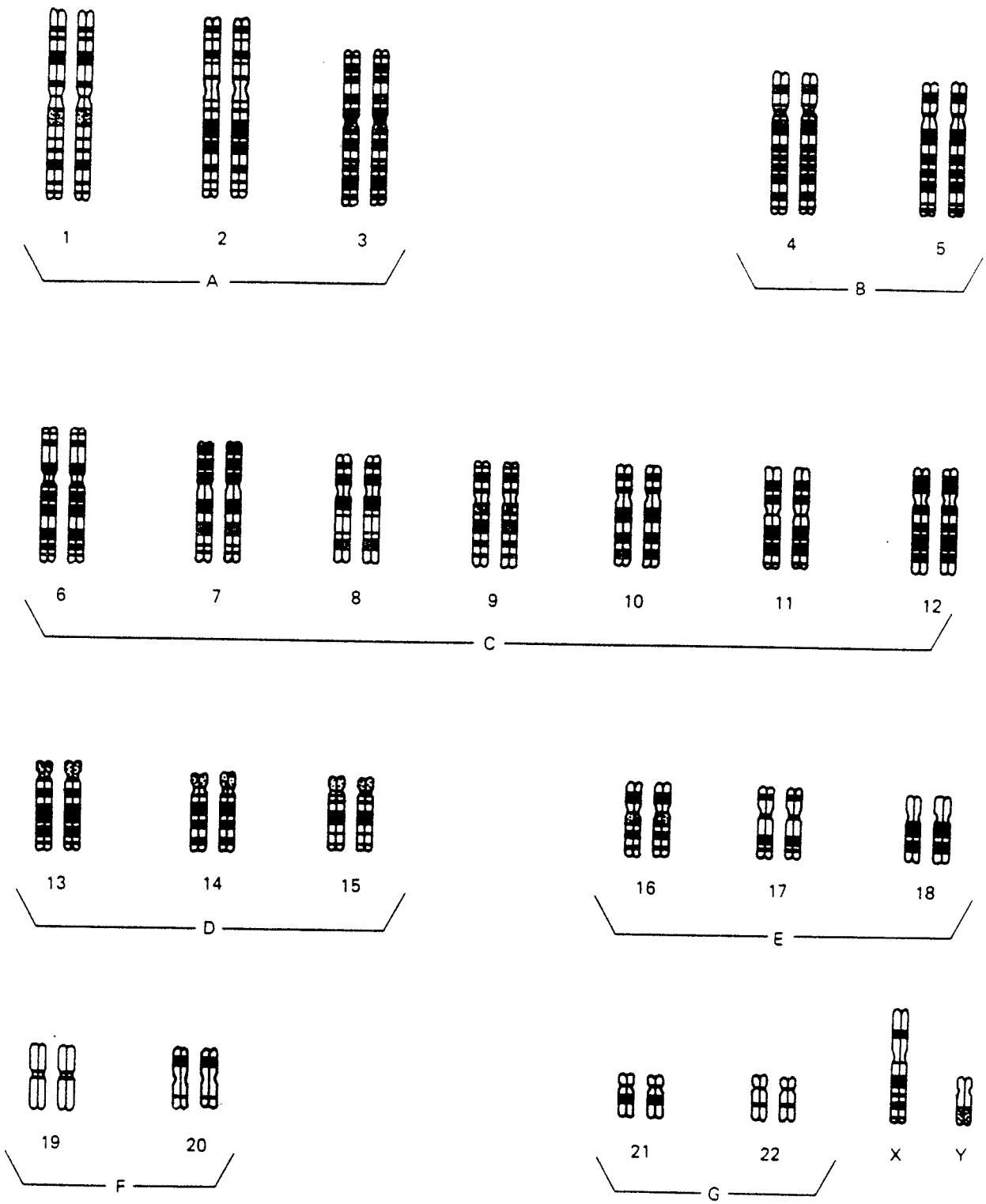
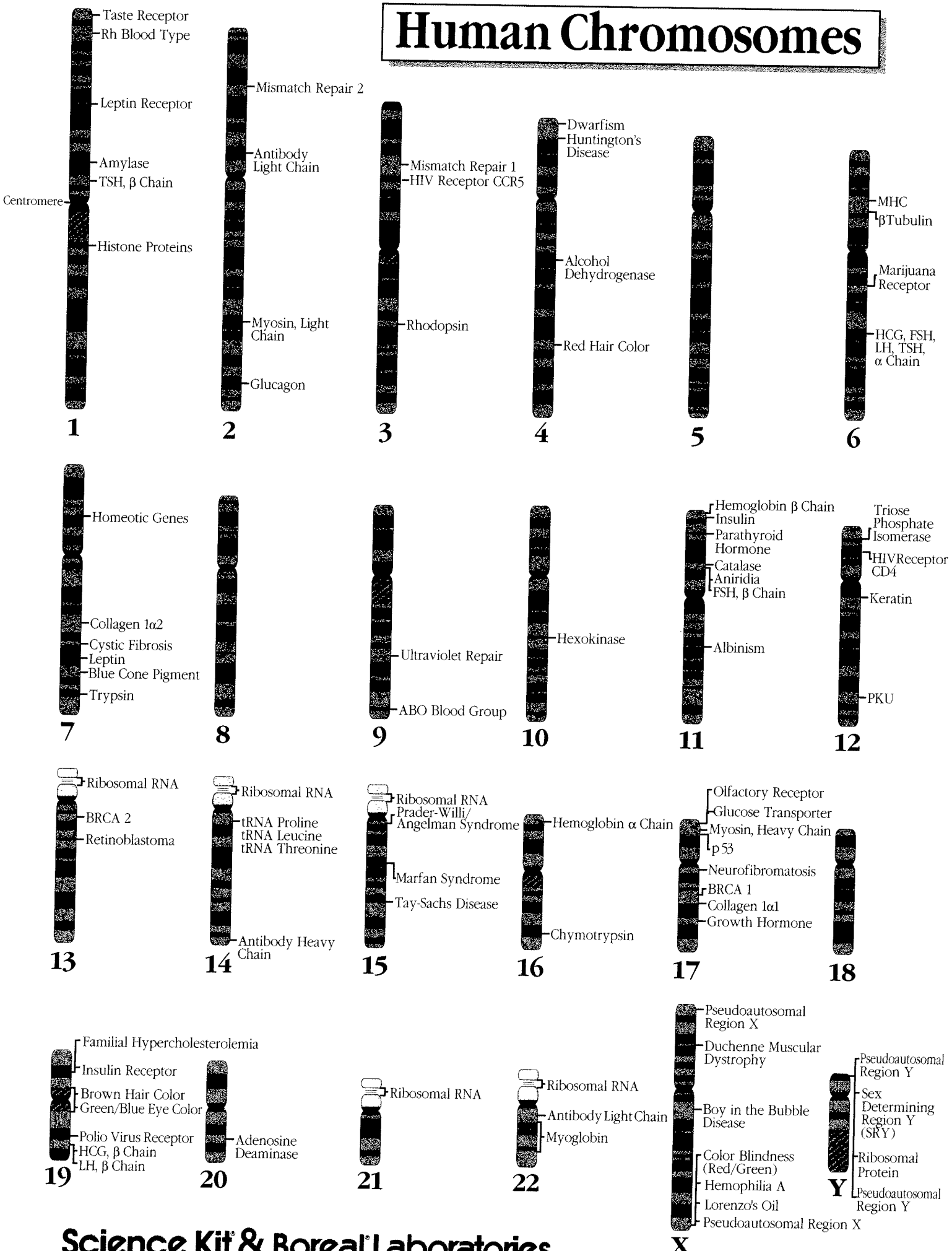


Figure 12–4. Human male karyotype. These are the chromosomes found in each cell of a normal male diagrammed to show the banding pattern after staining. Length and centromere position are important in sorting the chromosomes. (Redrawn from Jorge J. Yunis. *Science* 191:1269, 1976. © American Association for the Advancement of Science.)

Human Chromosomes



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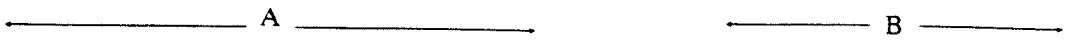
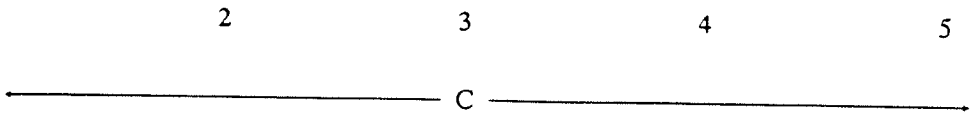
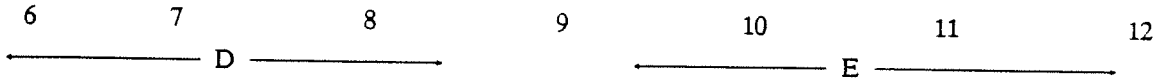
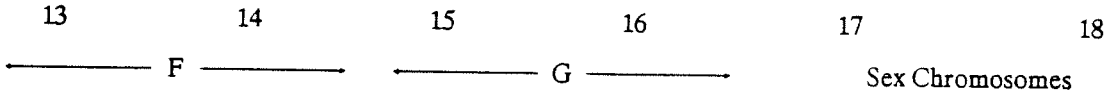
KARYOTYPE ANALYSIS SHEET

Analysts Name _____





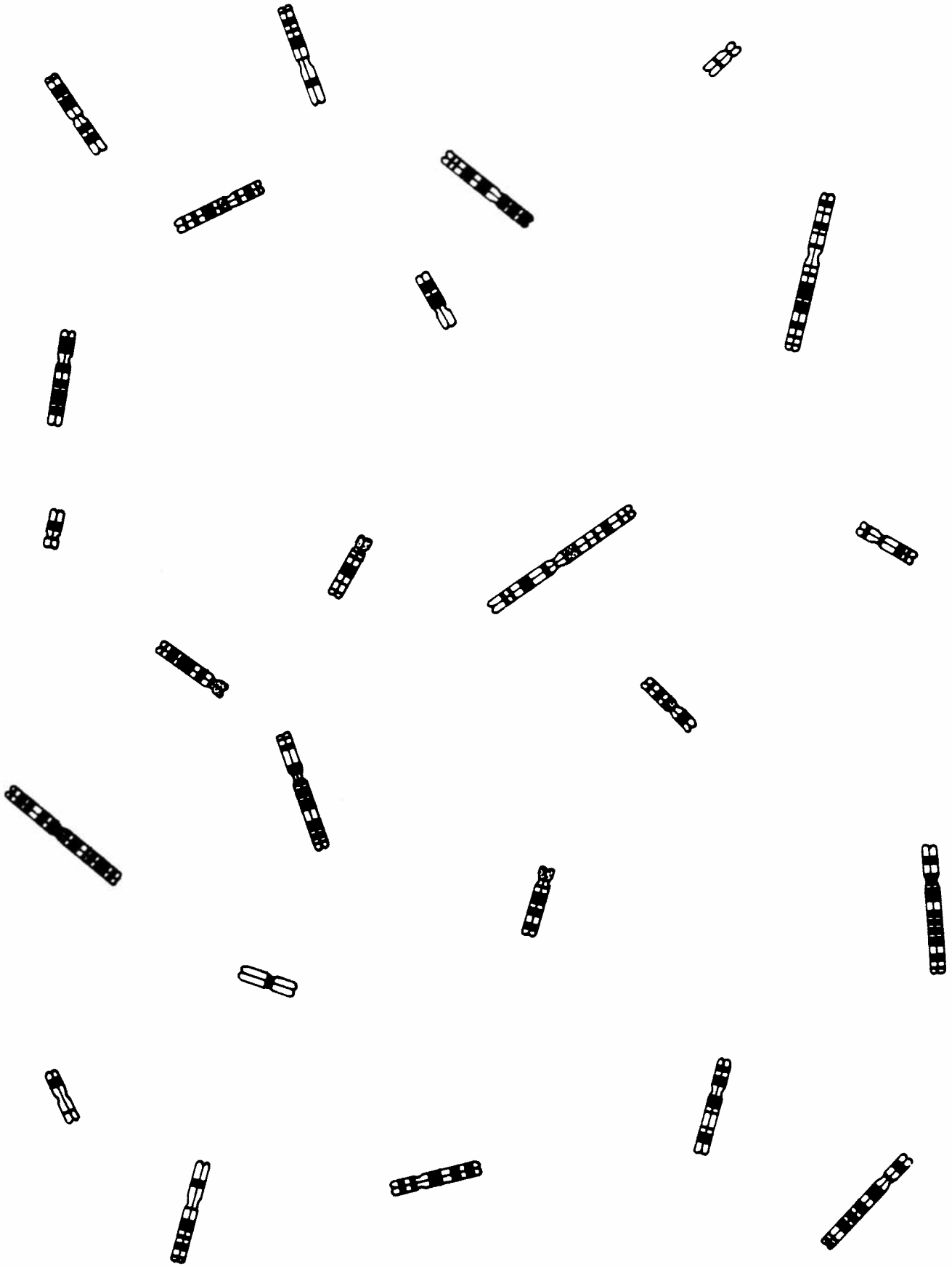




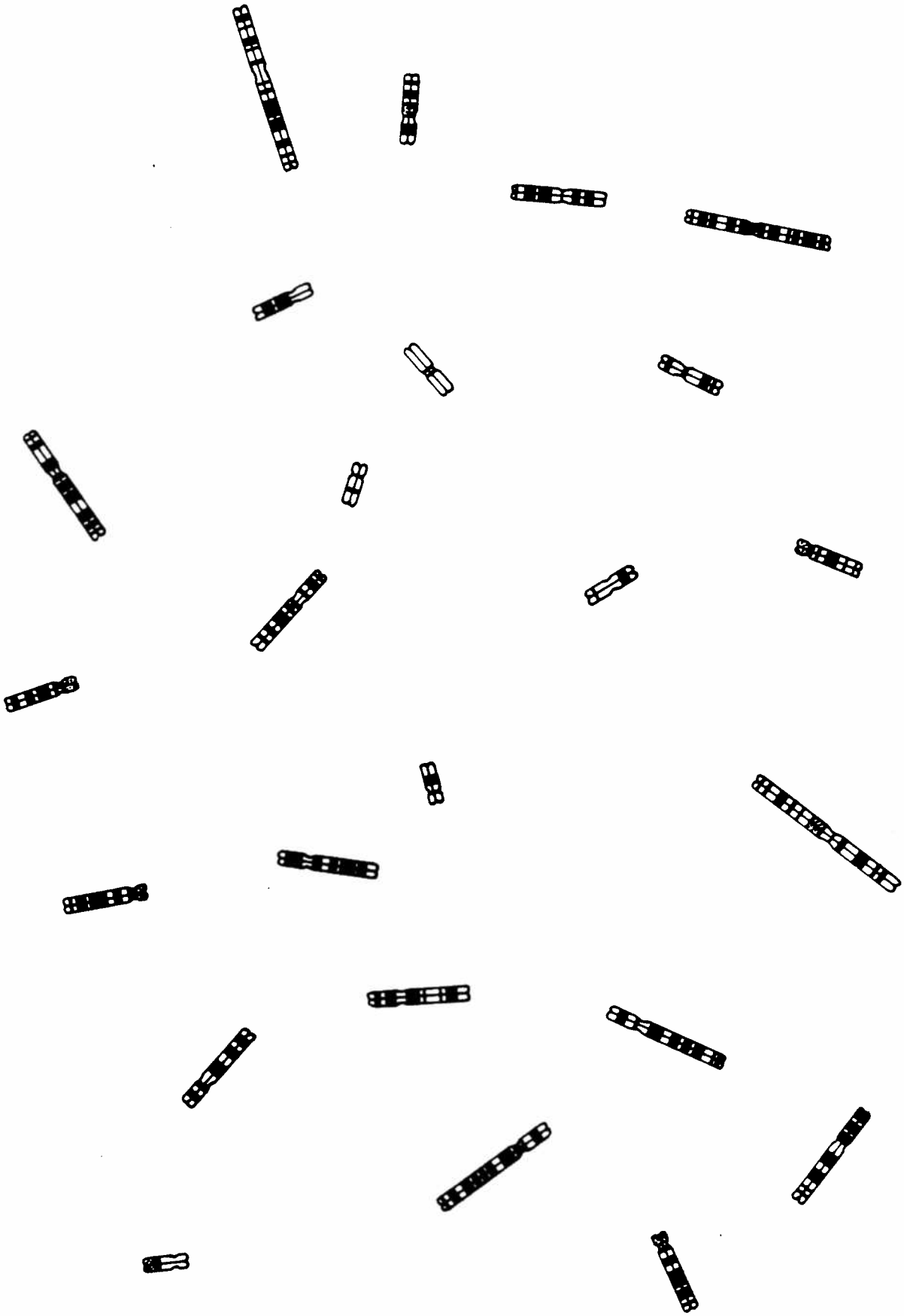
19 20 21 22

Sex of Subject _____

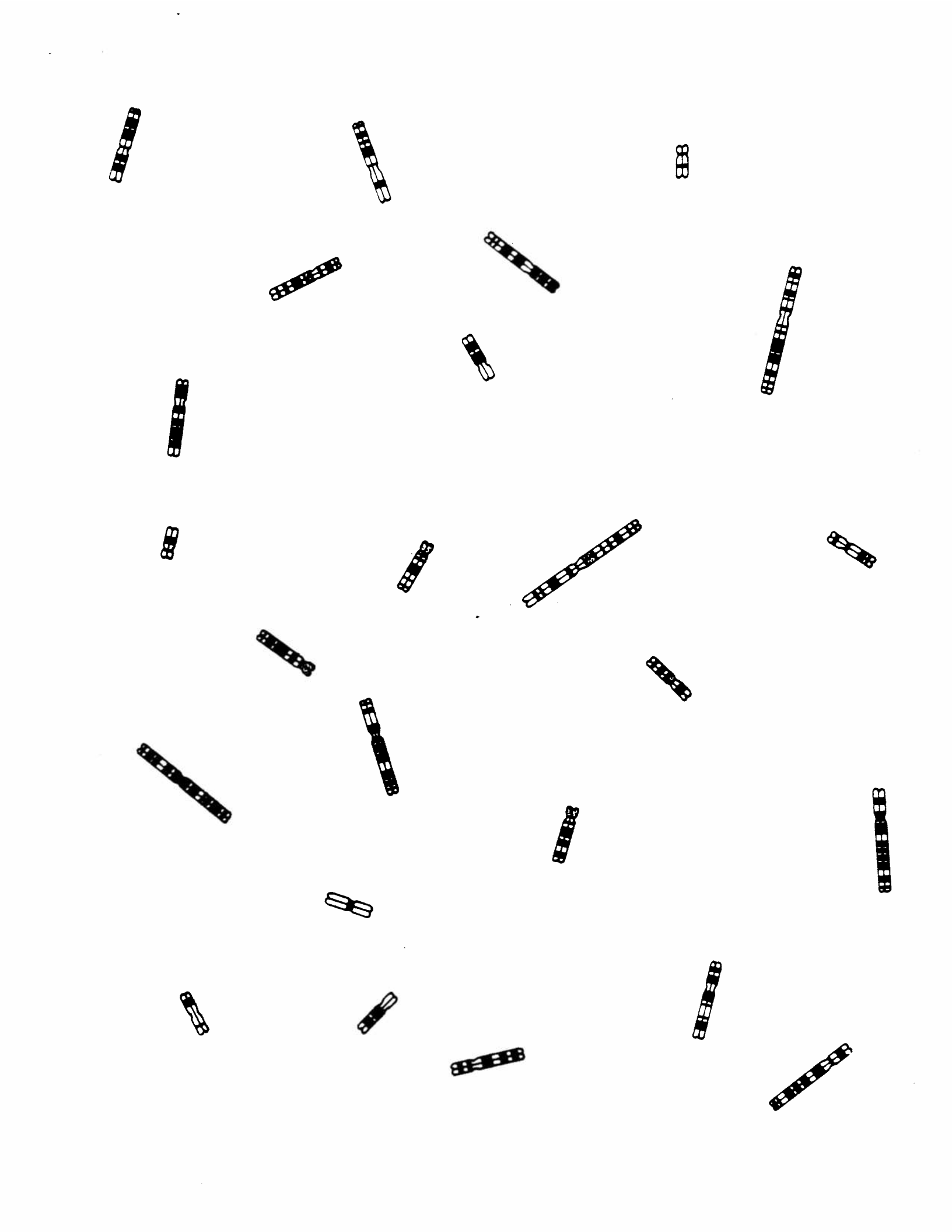
Abnormality Present _____



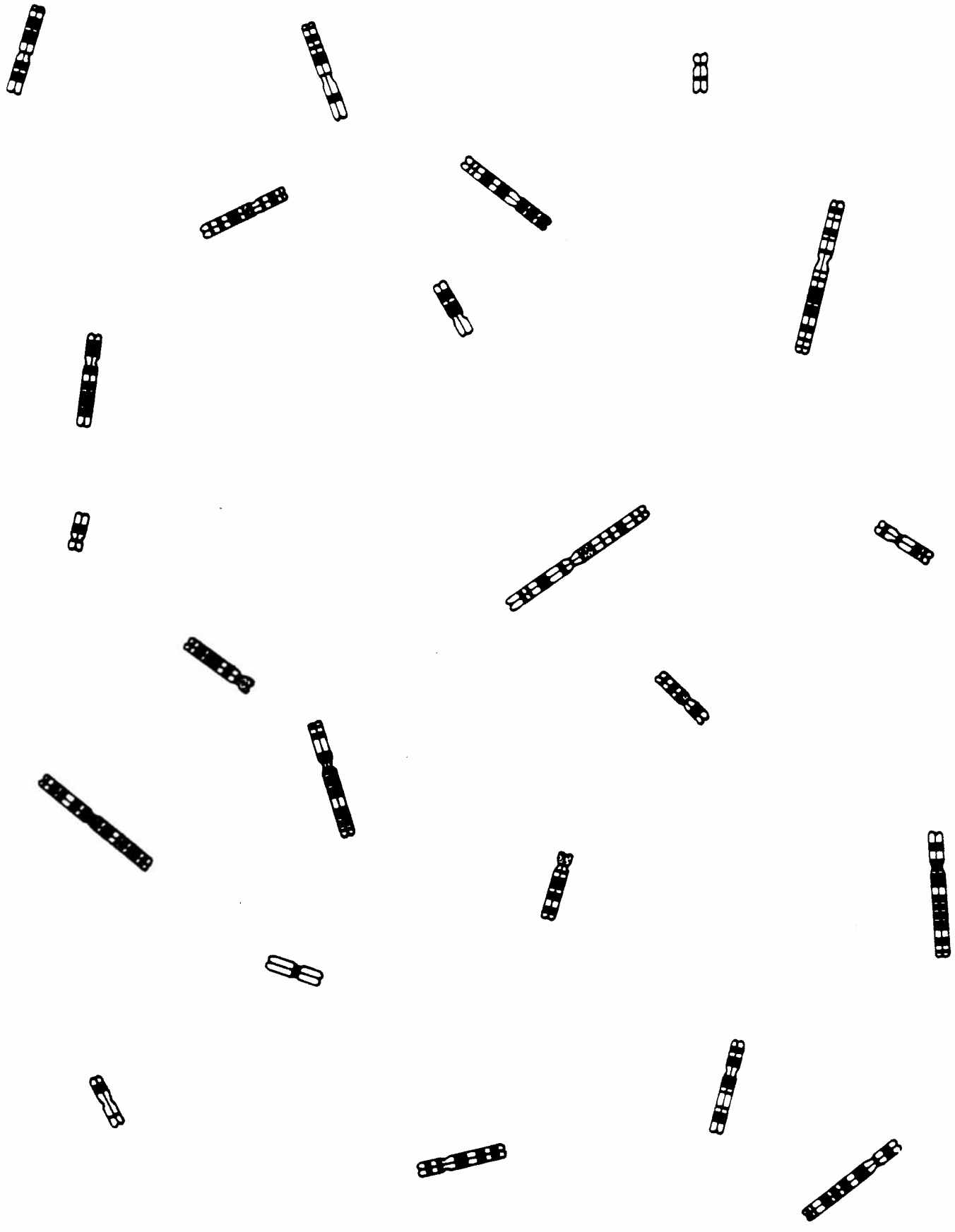
24 CHROMOSOMES
TWO X CHROMOSOMES
(Klinefelter)



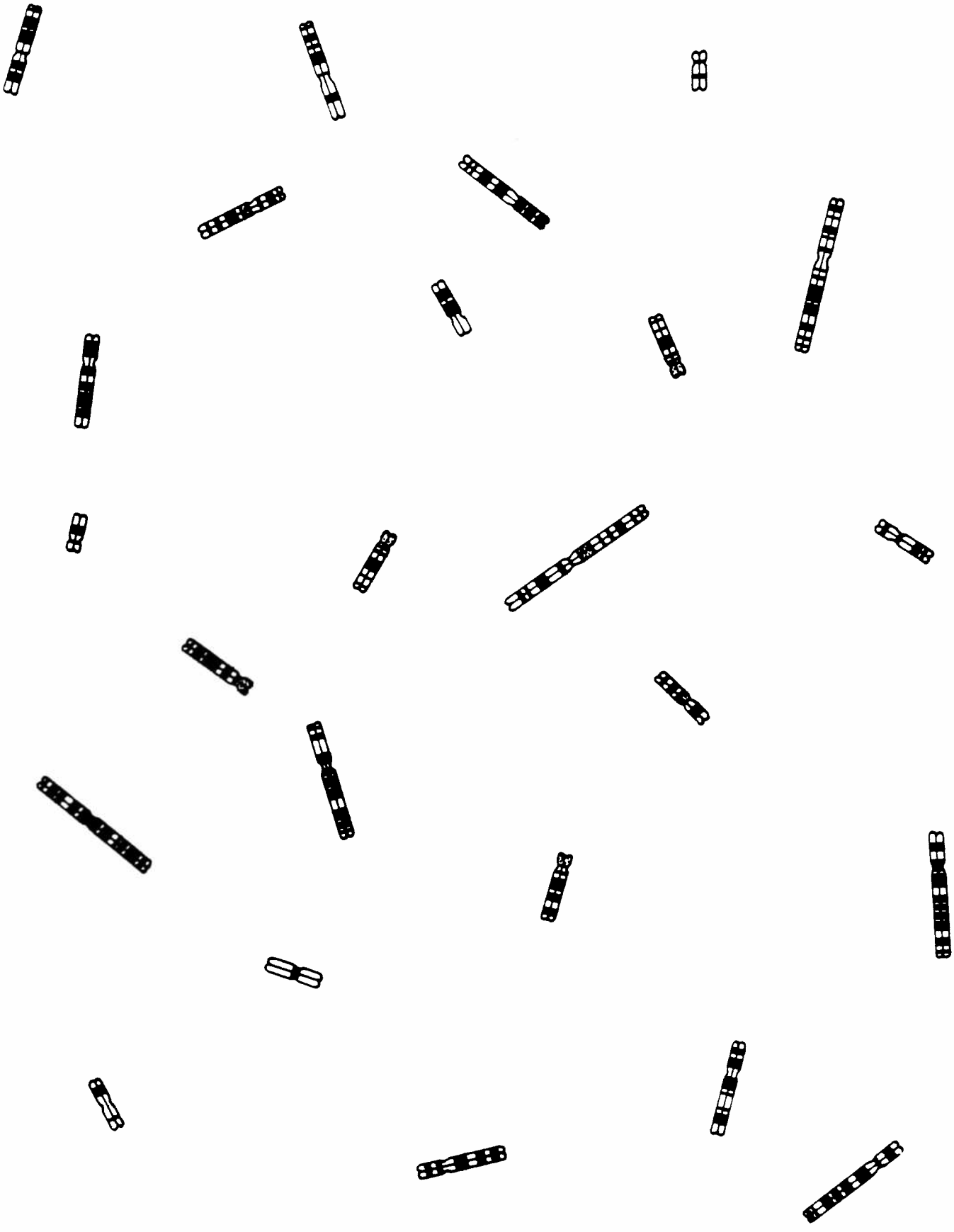
24 CHROMOSOMES
TWO # 13 CHROMOSOMES
(Trisomy 13)
Male Child



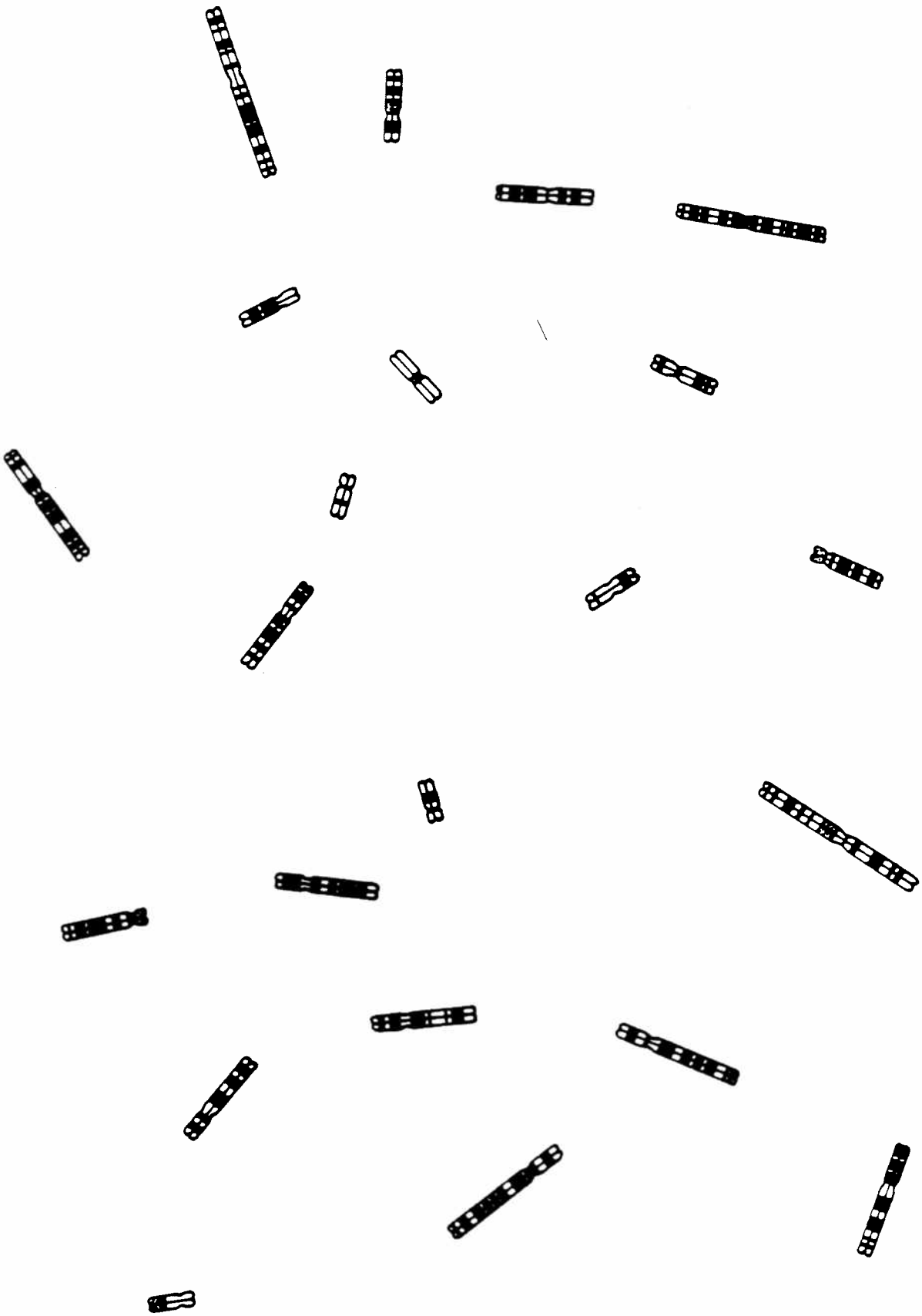
24 CHROMOSOMES
TWO # 18 CHROMOSOMES
(Trisomy 18)
Female Child



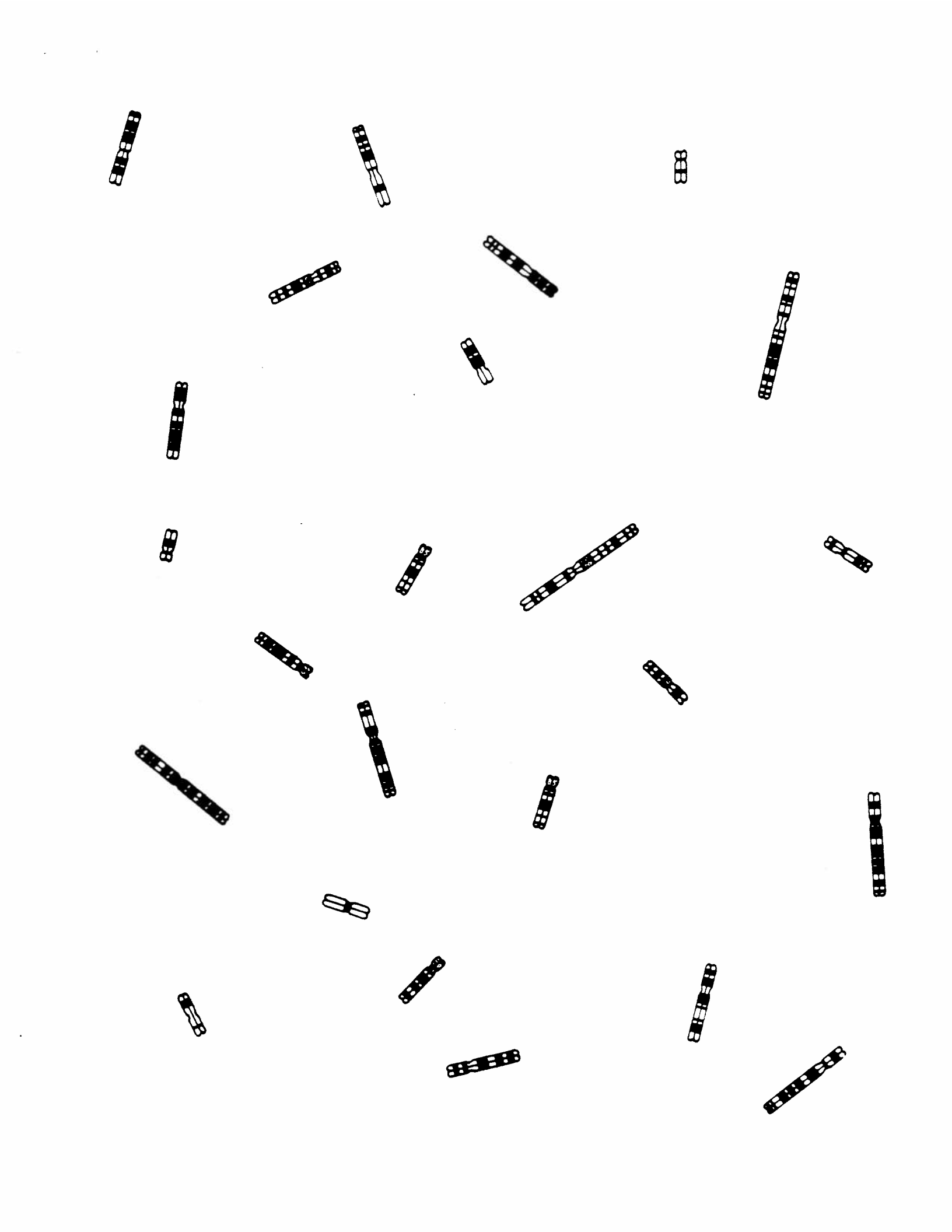
MATERNAL: No #15 CHROMOSOME
(Angelman)



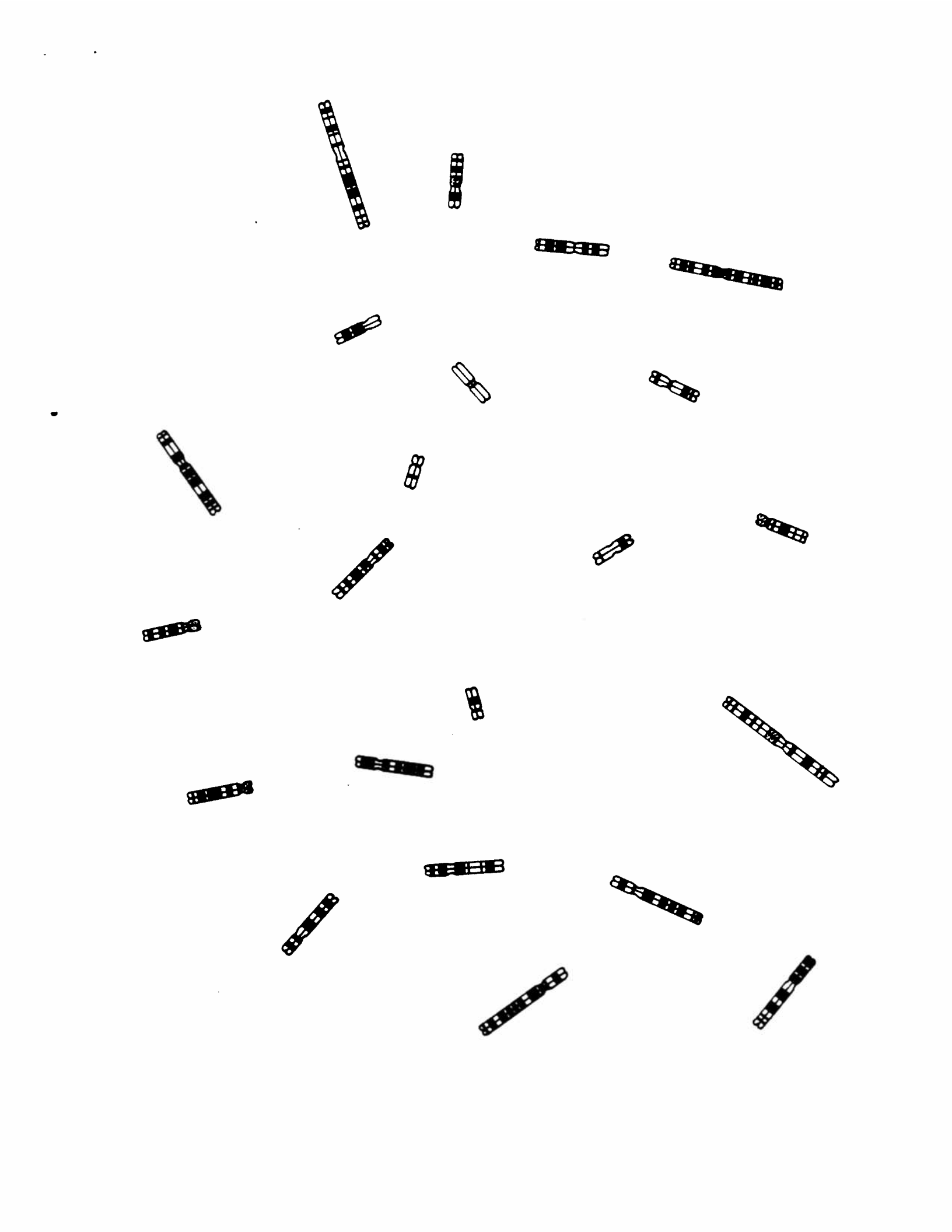
PATERNAL: TWO # 15 CHROMSOMES
(Angelman)
Female Child



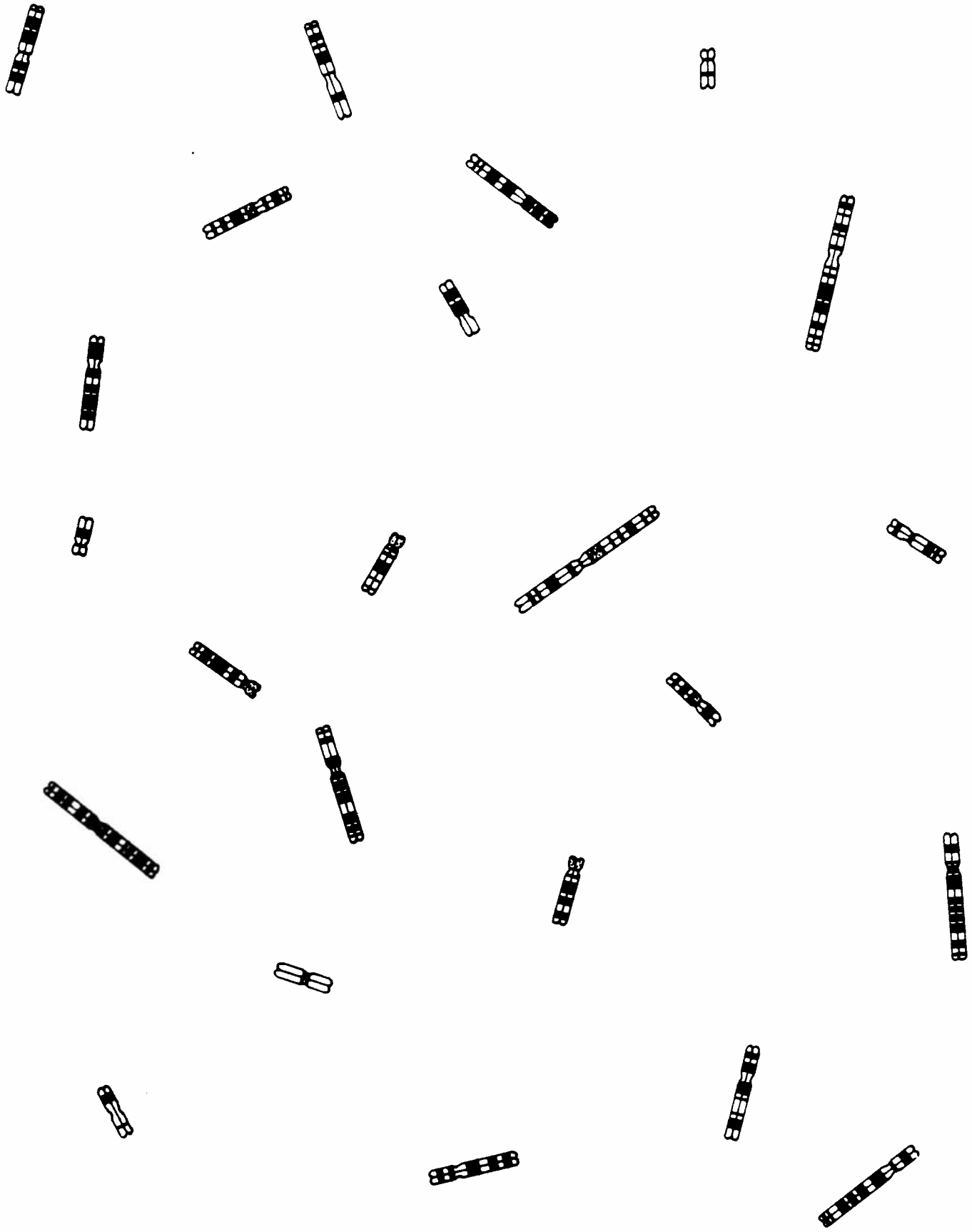
PATERNAL: NO # 15 CHROMOSOME
(Prader-Willi)



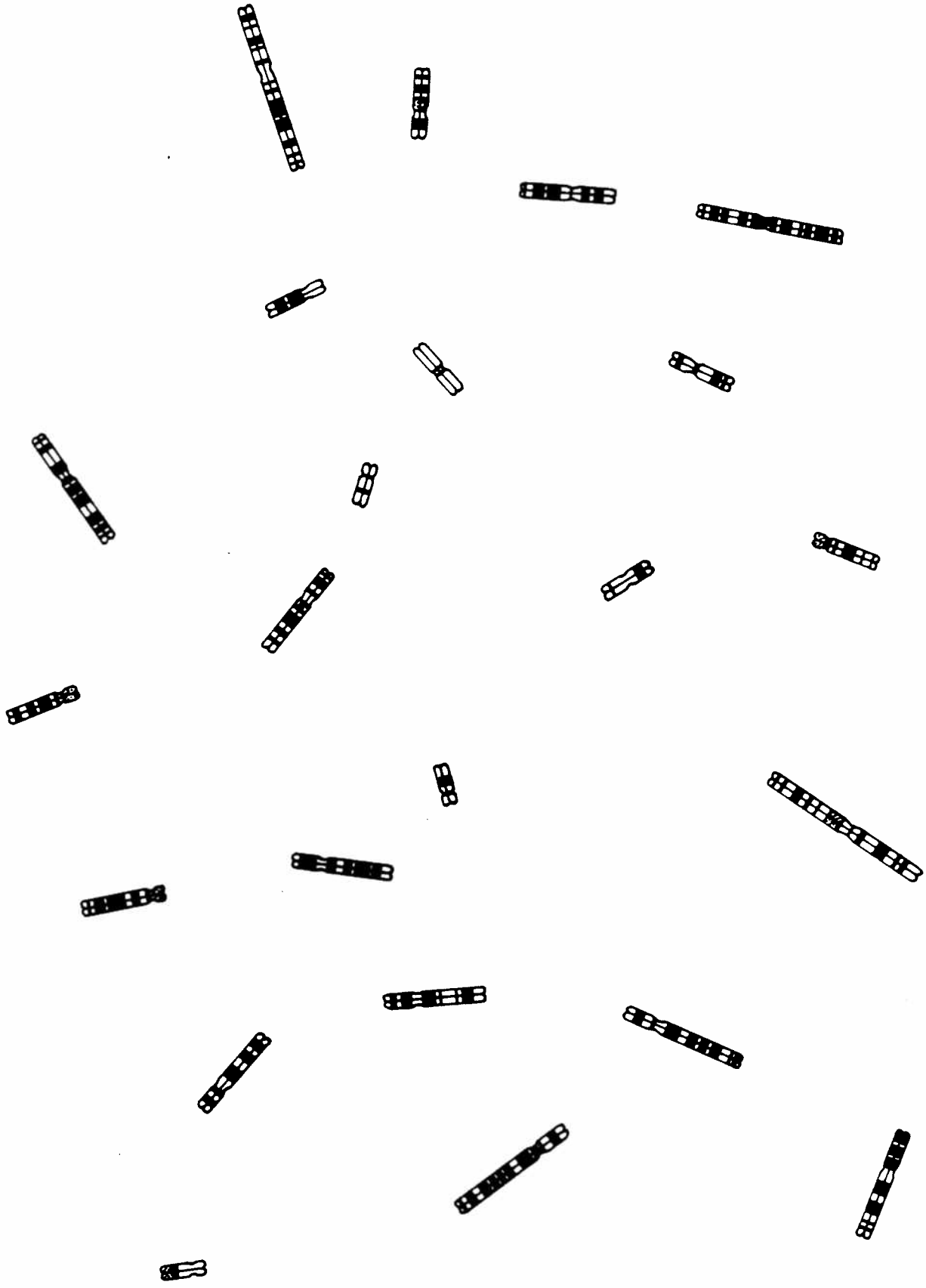
MATERNAL: TWO CHROMOSOME #15
(Prader-Willi)
Male Child



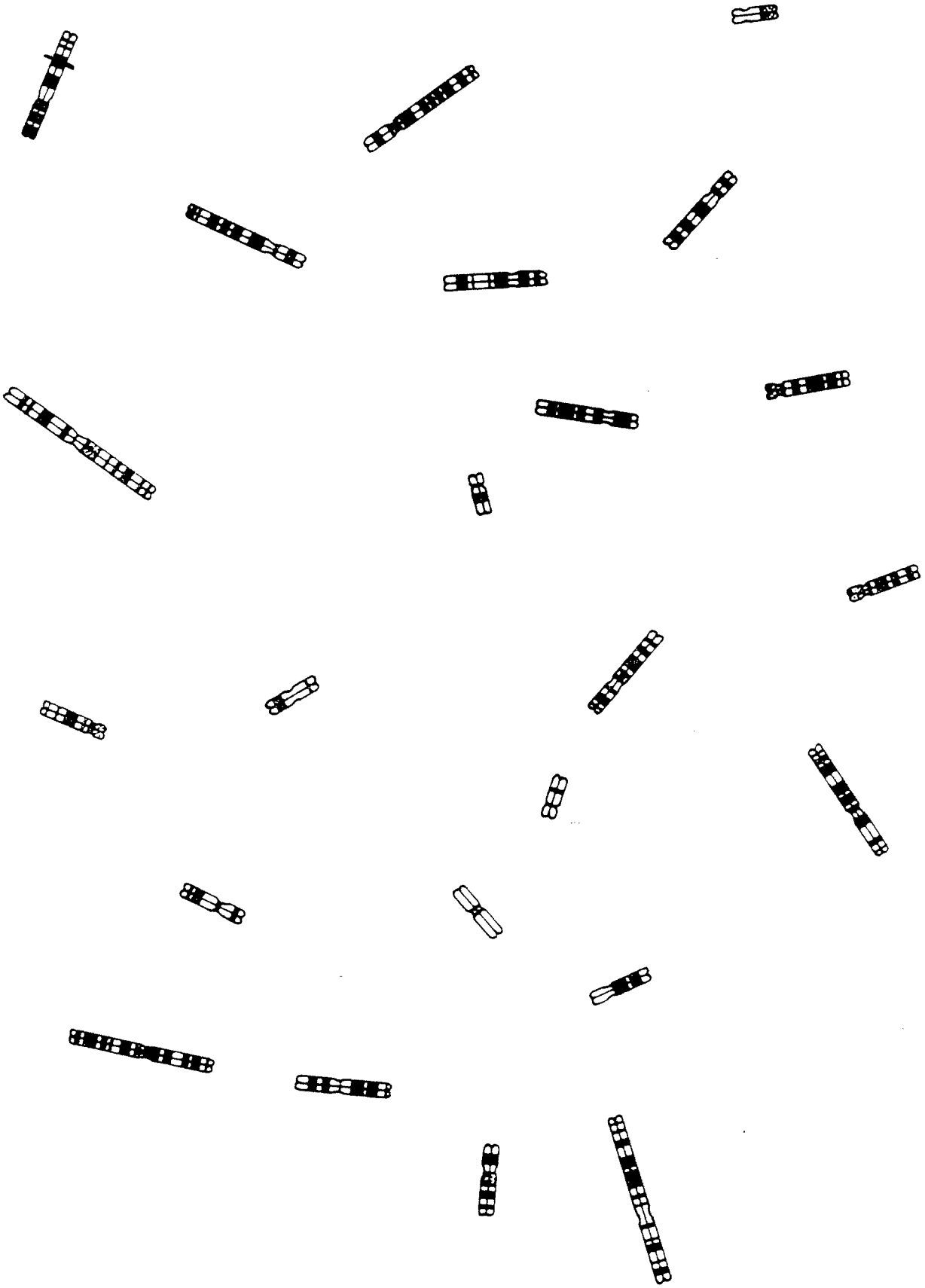
22 CHROMOSOMES
NO SEX CHROMOSOME
(Turner)



23 CHROMOSOMES
WITH X

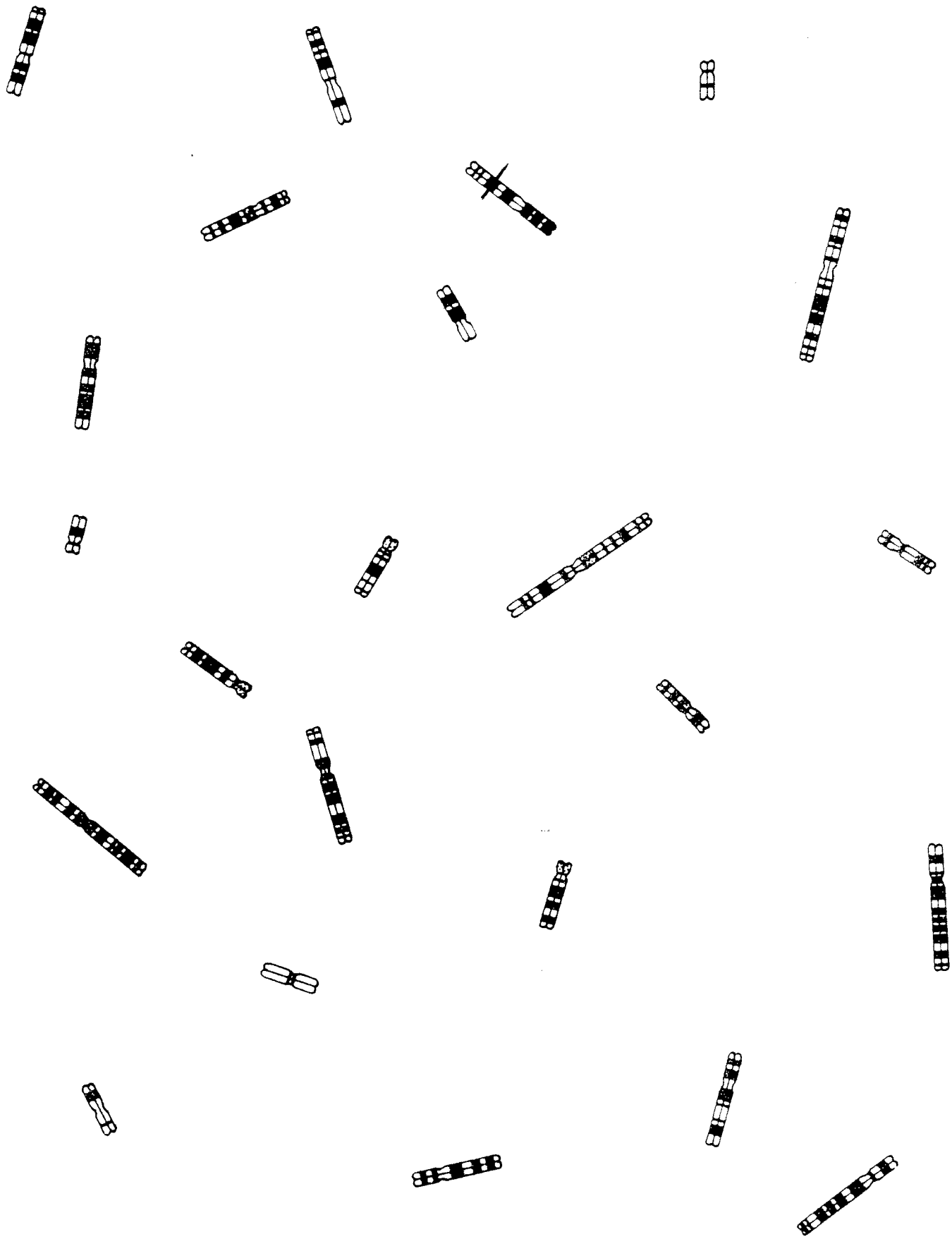


23 CHROMOSOMES
WITH Y

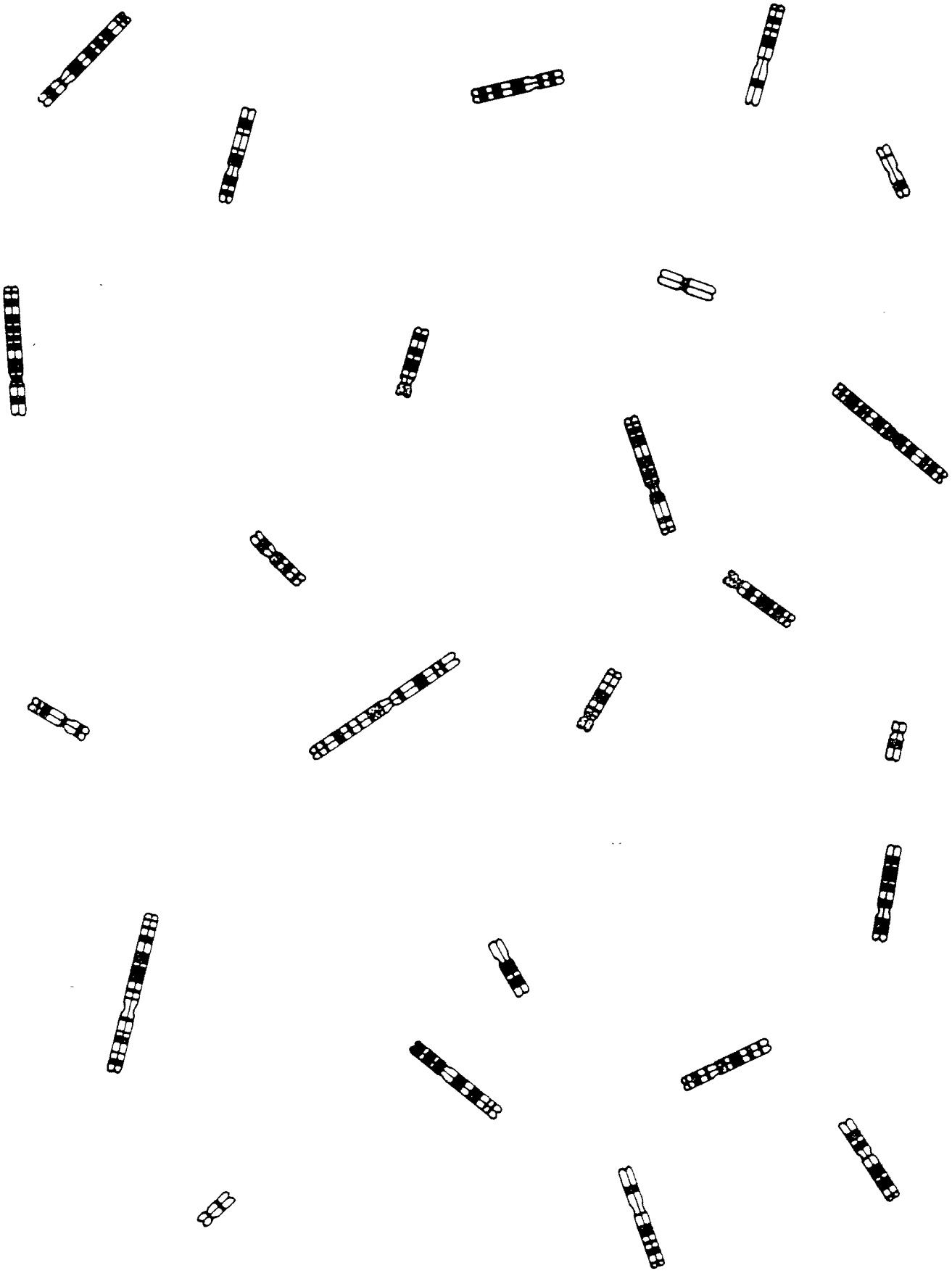


23 w/ y
cystic fibrosis (7g)

①

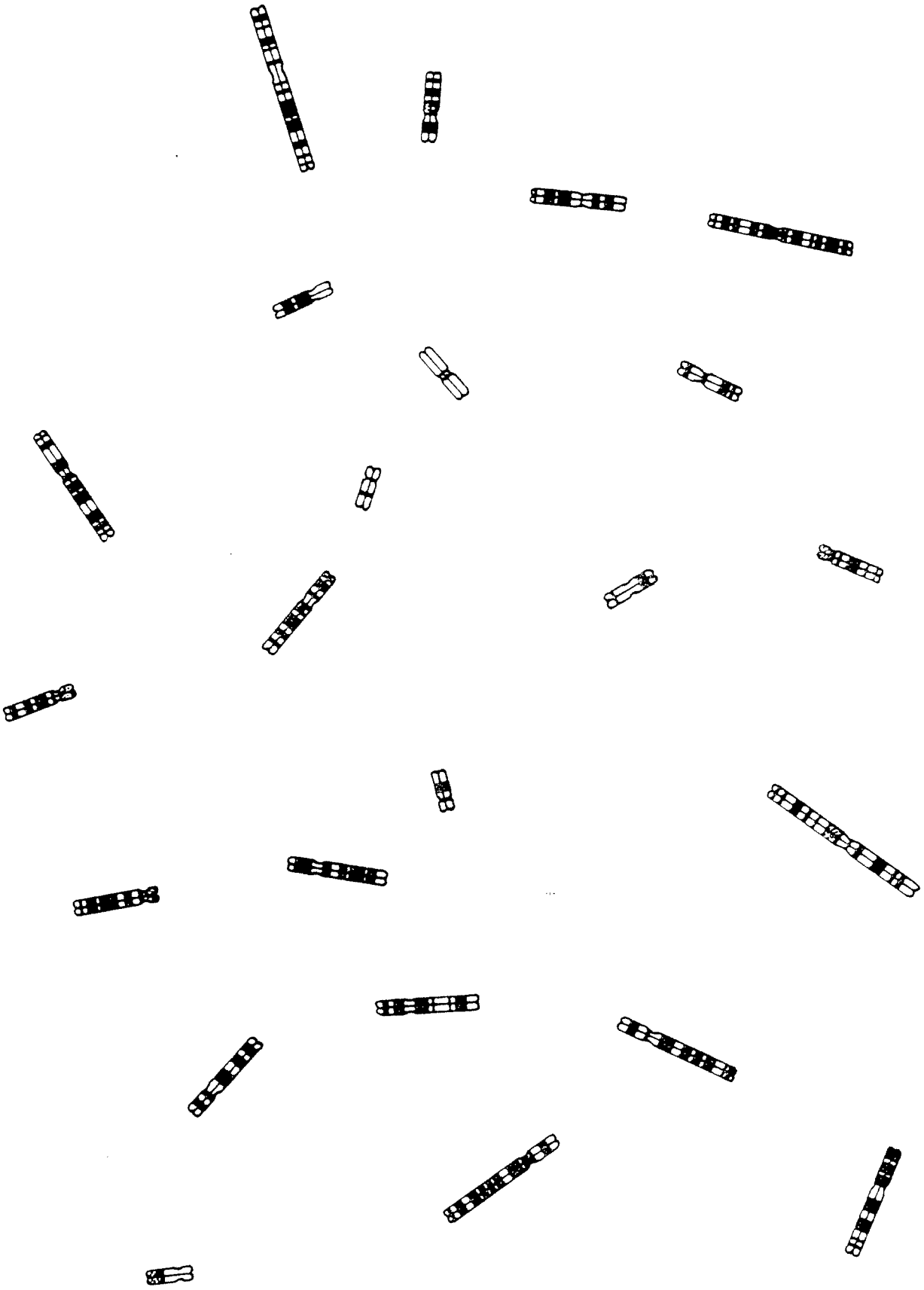


23 w/ X
cystic fibrosis (7q) ①



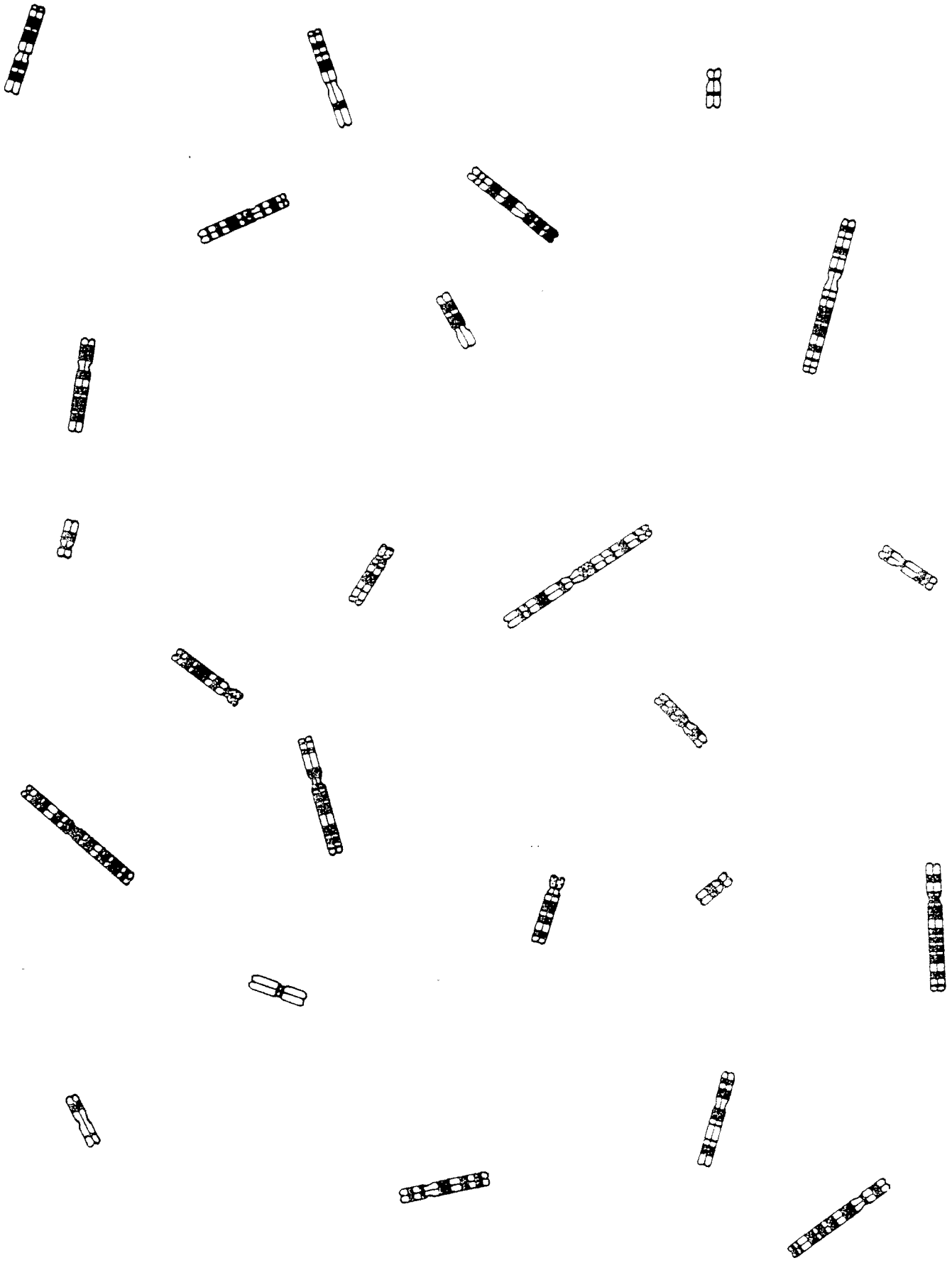
24 w/ X
Klinefelters (trisomy ~~23~~ X)

(2)



23 w/ y

Klinefelter (Trisomy XX) (2)

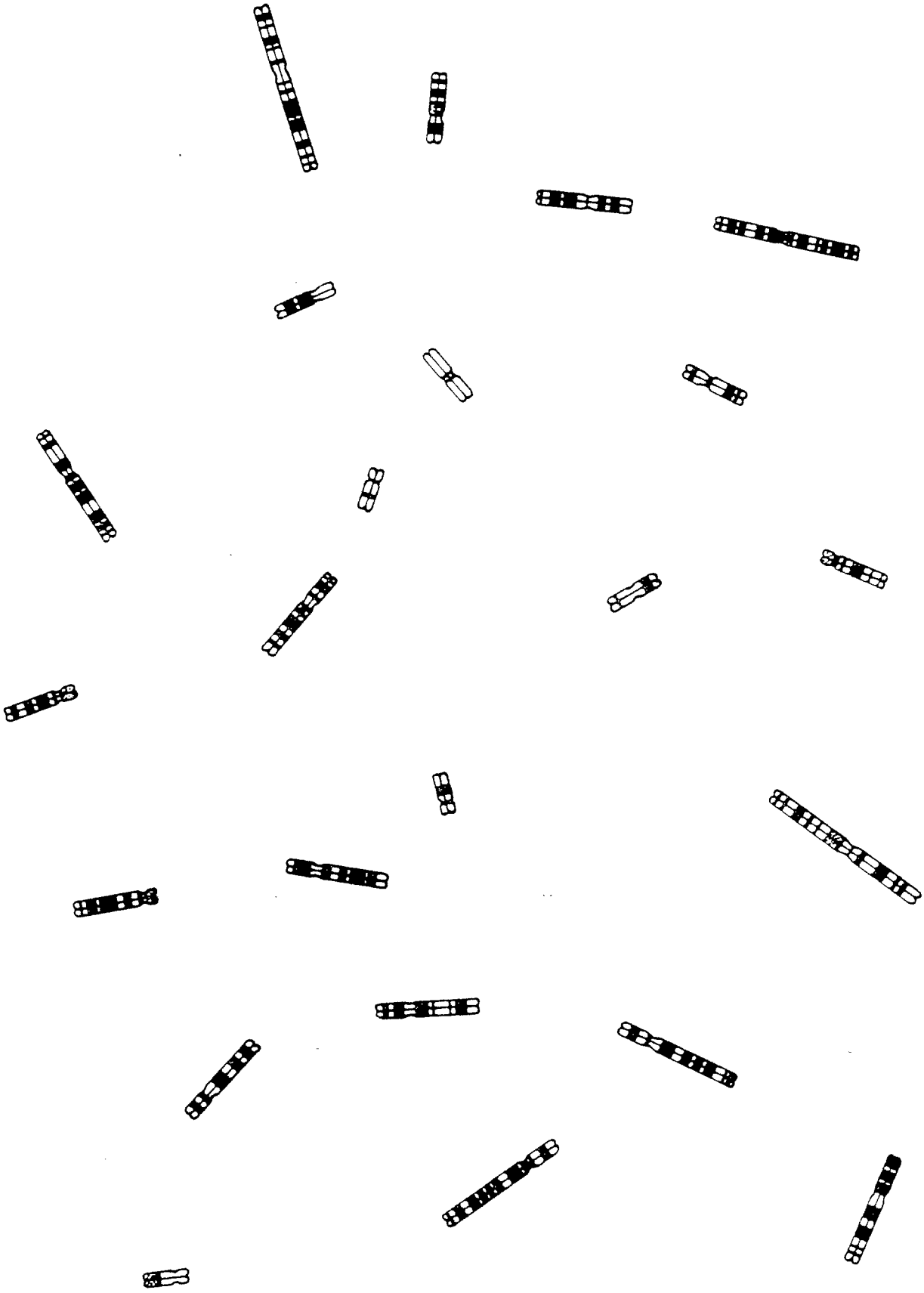


24 w/ x

Down's Syndrome

(Trisomy 21)

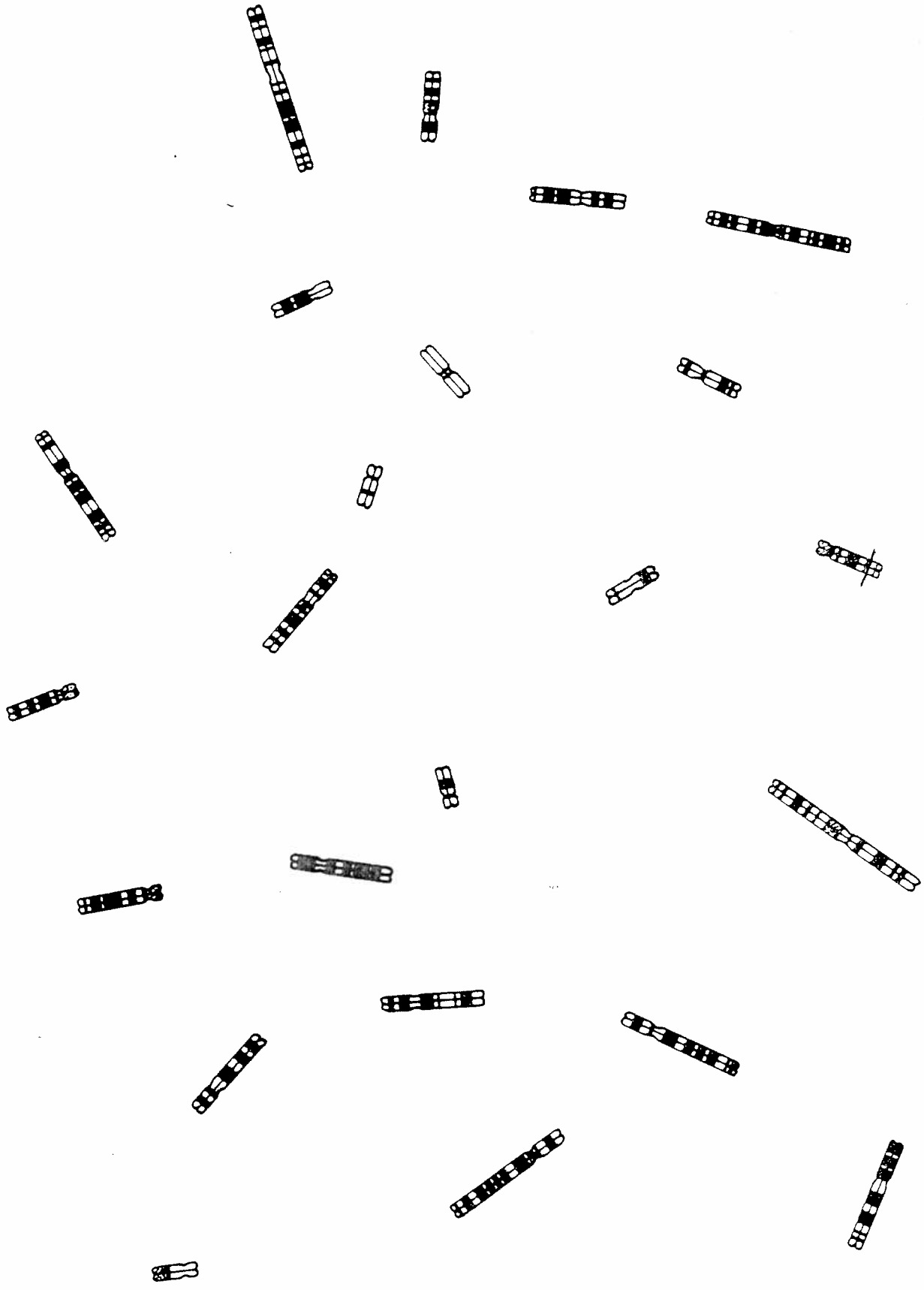
(3)



23 w/ y

Down's Syndrome.

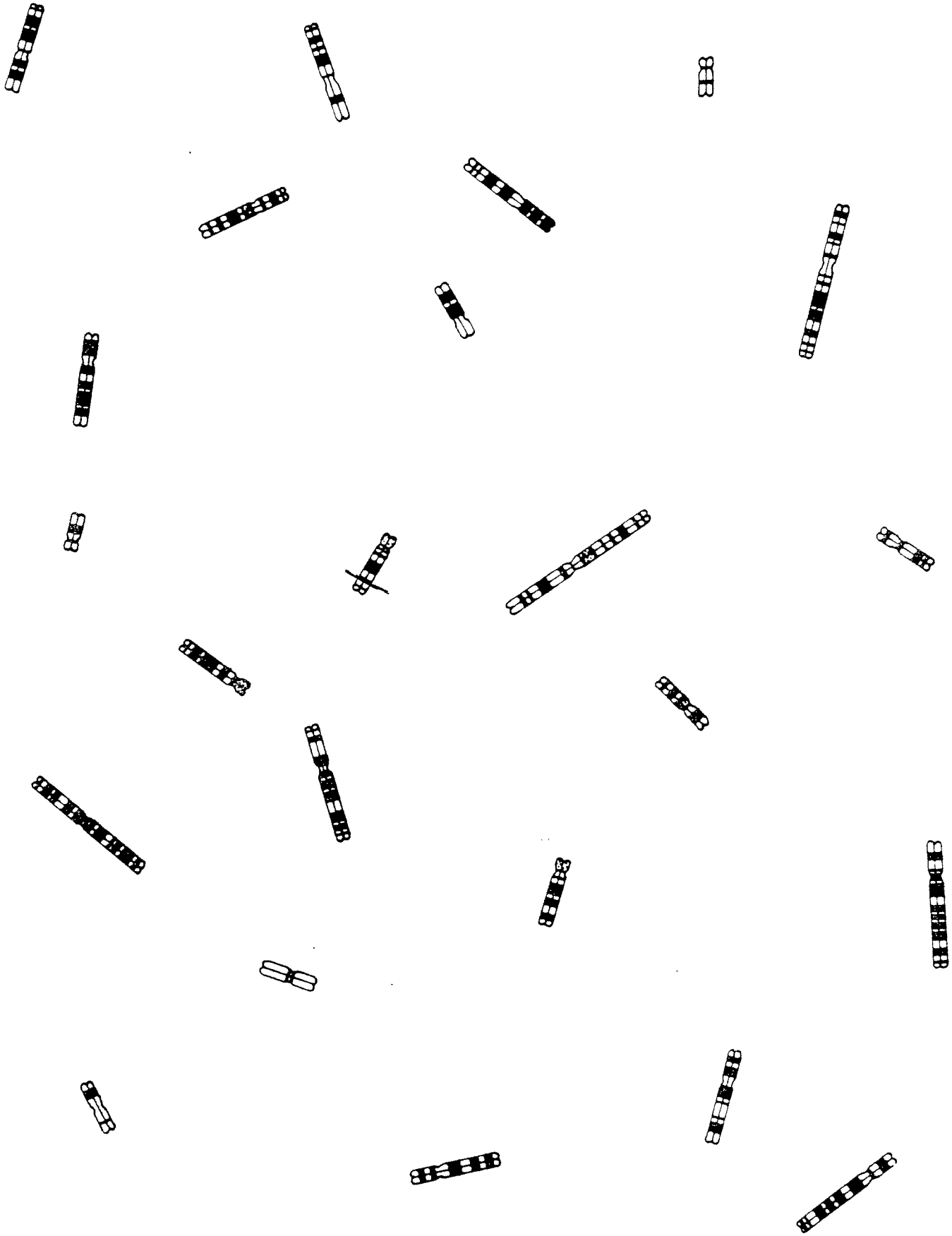
(3)



23 w/ y

Tay Sachs (158)

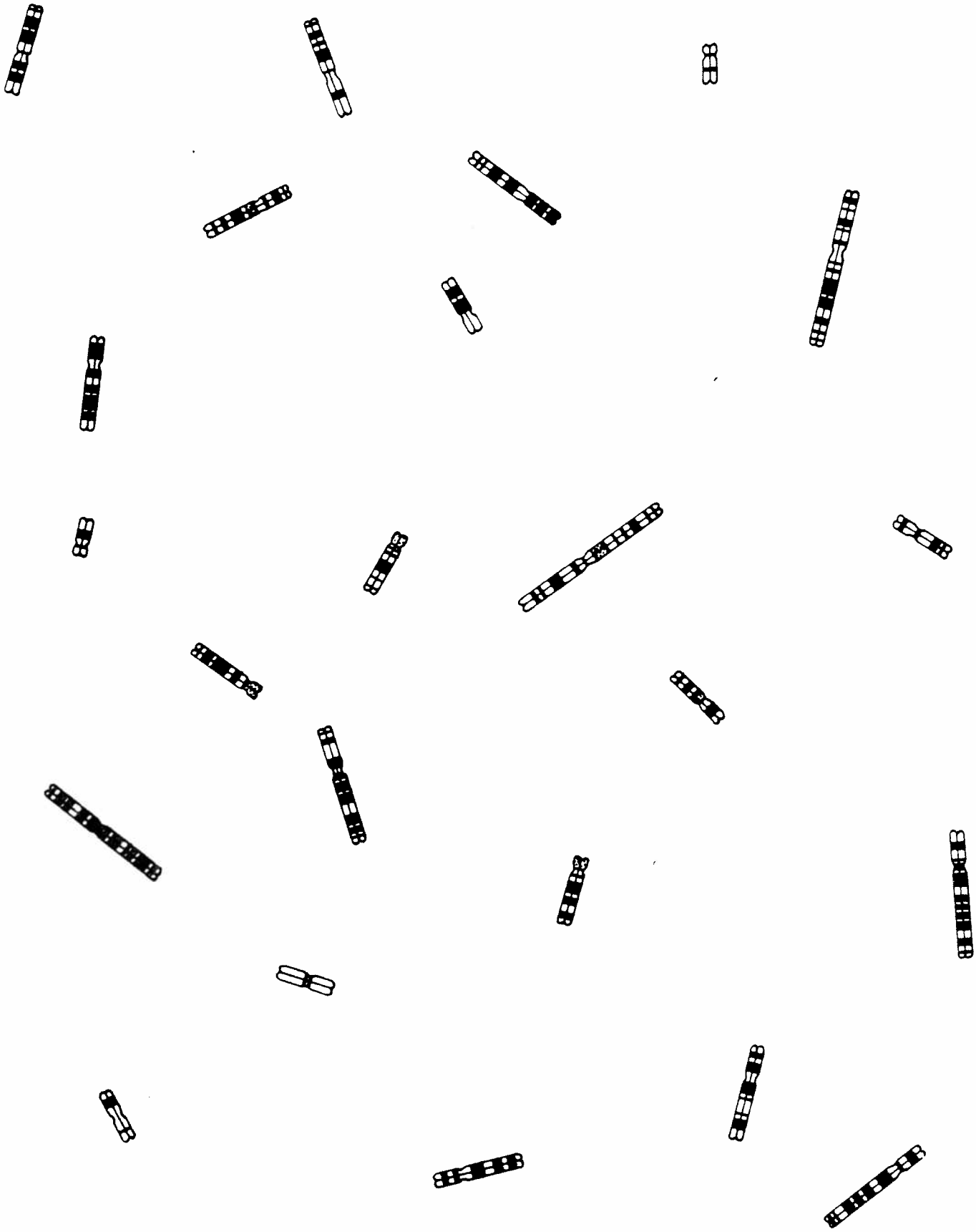
(4)



23 w/ x

Tay Sachs (15 g)

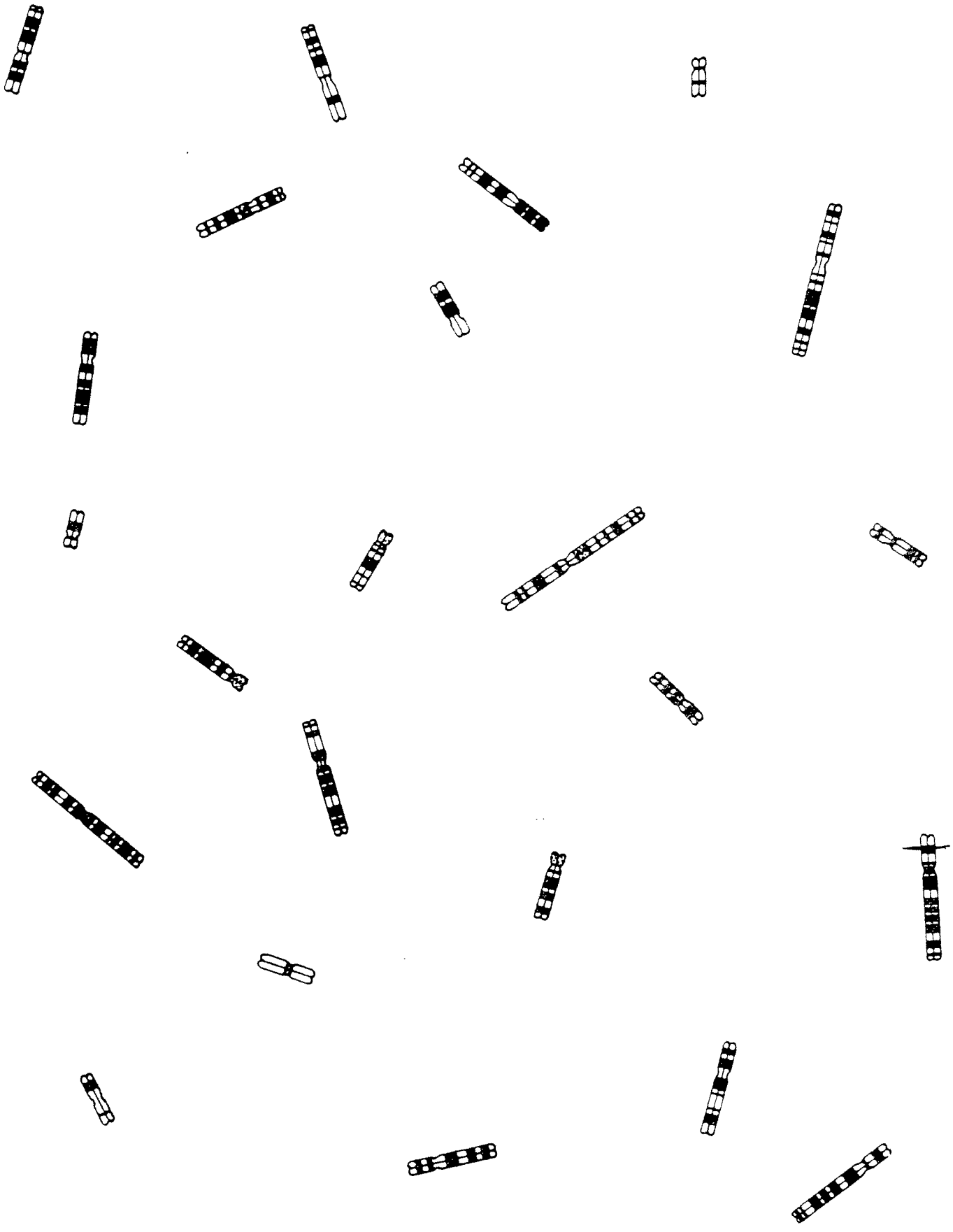
(4)



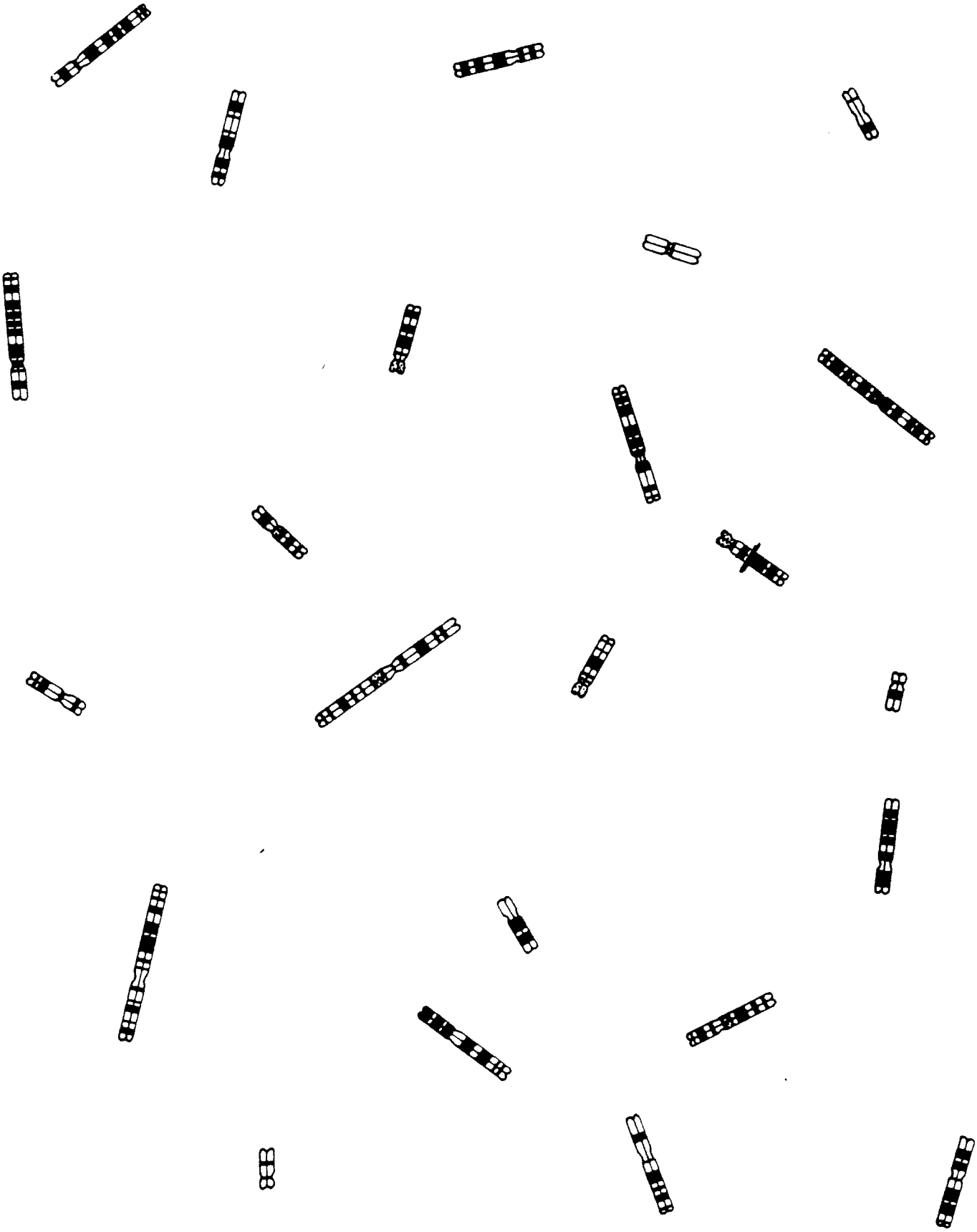
2300/F

Huntington's (48)

(E)

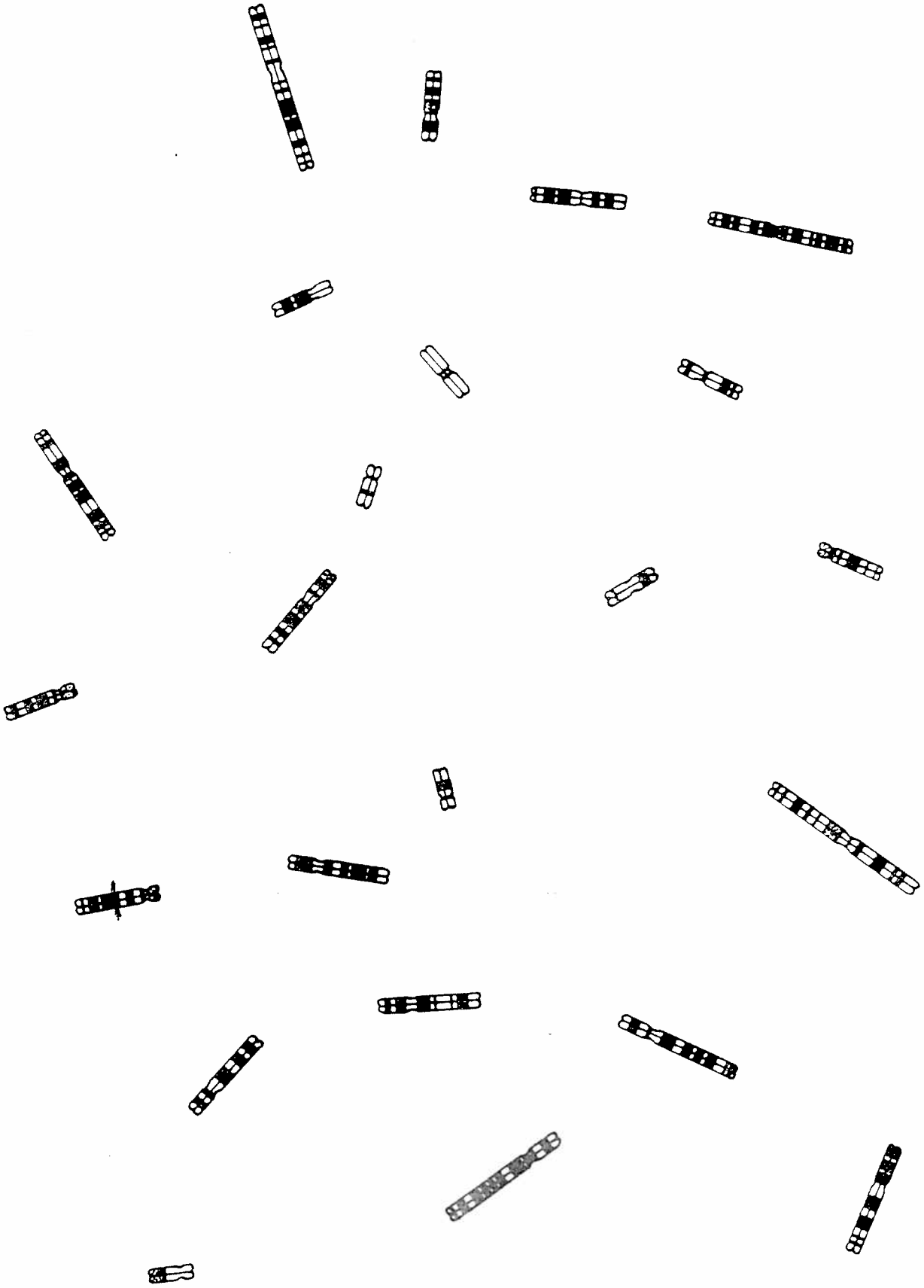


23 w/ x
Huntindon's (48) (5)



2340/2

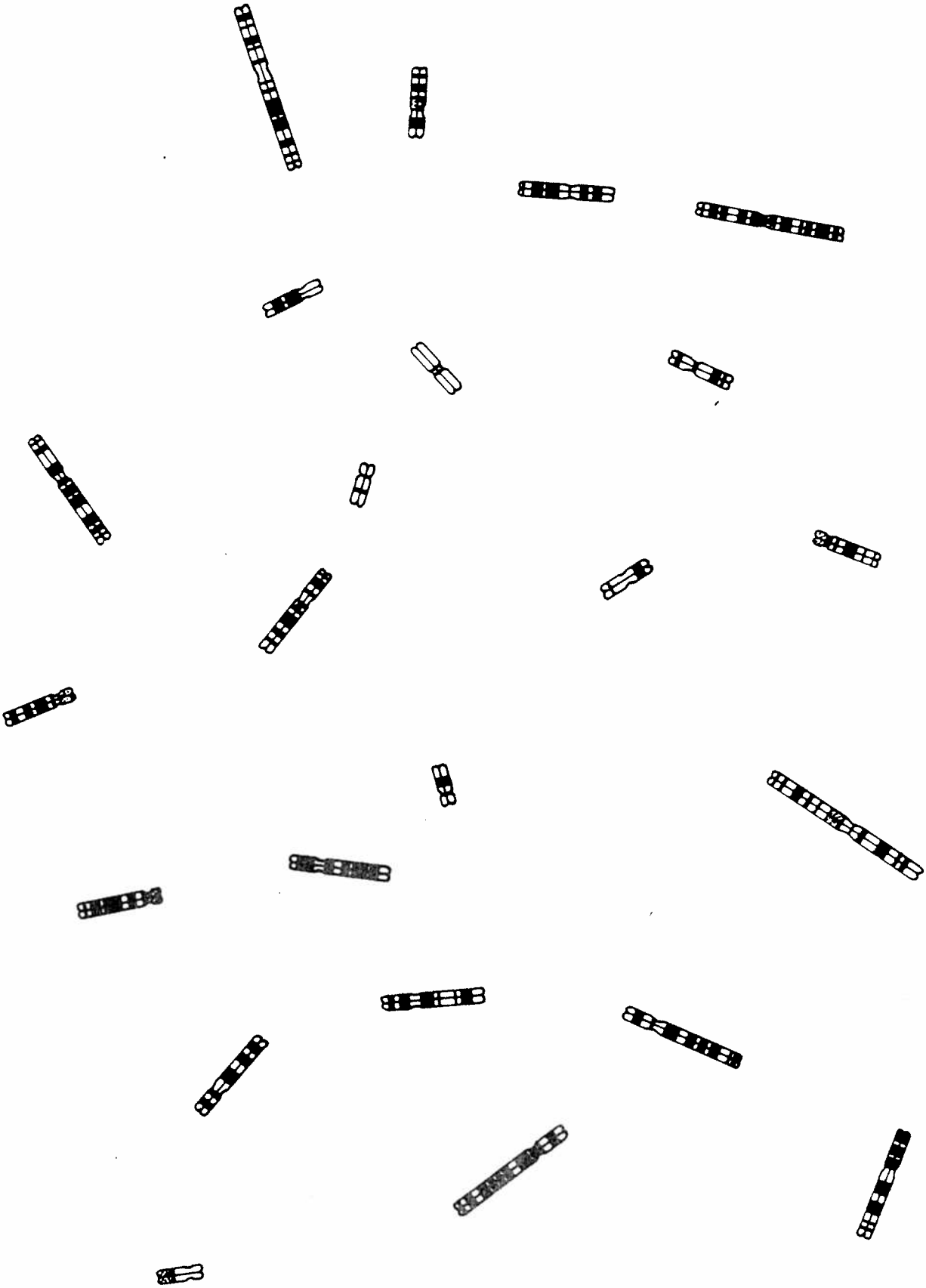
Retino blastoma (138) (6)



23 w/ y

Retinoblastoma (13q)

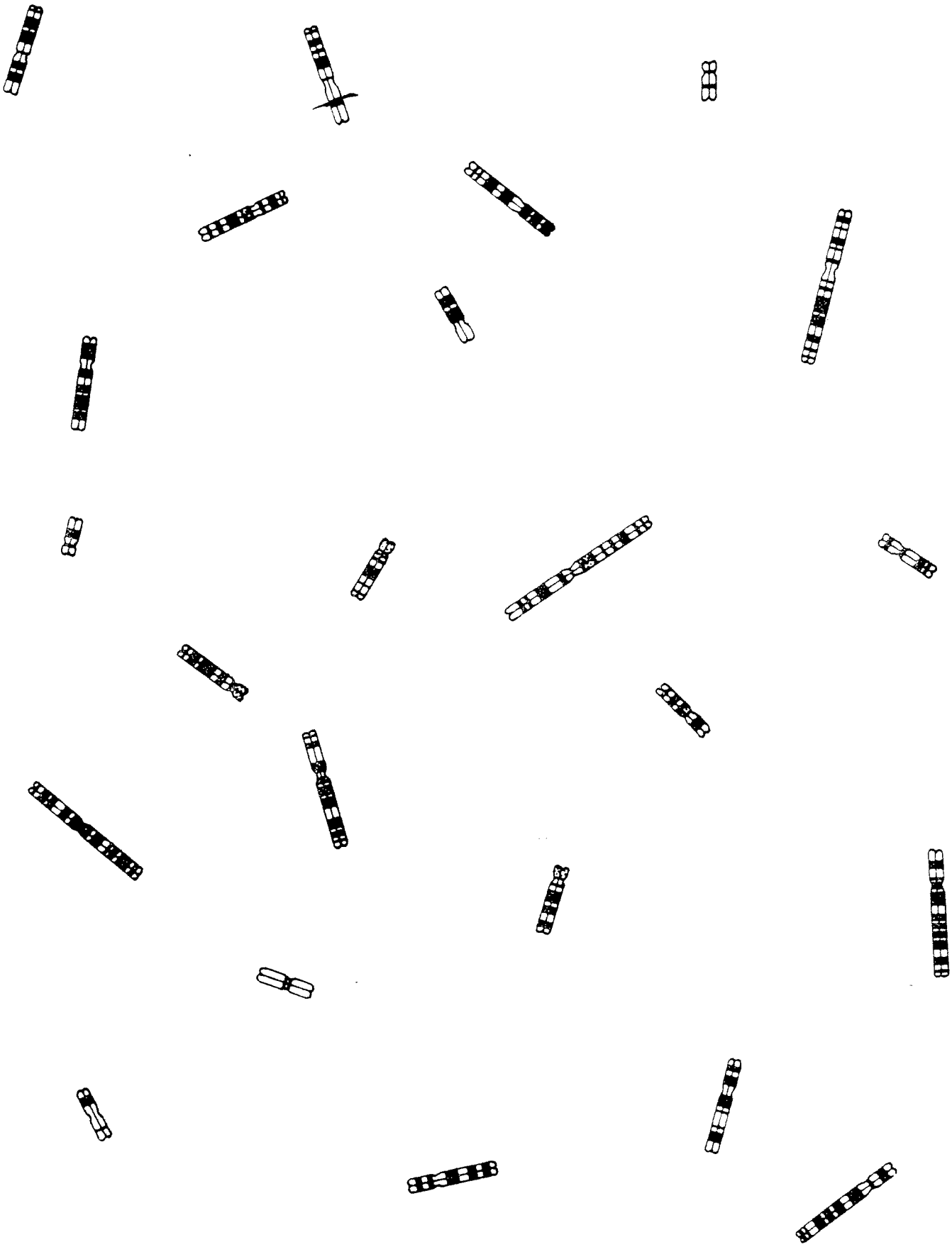
(6)



2300/4

Duchenne MD

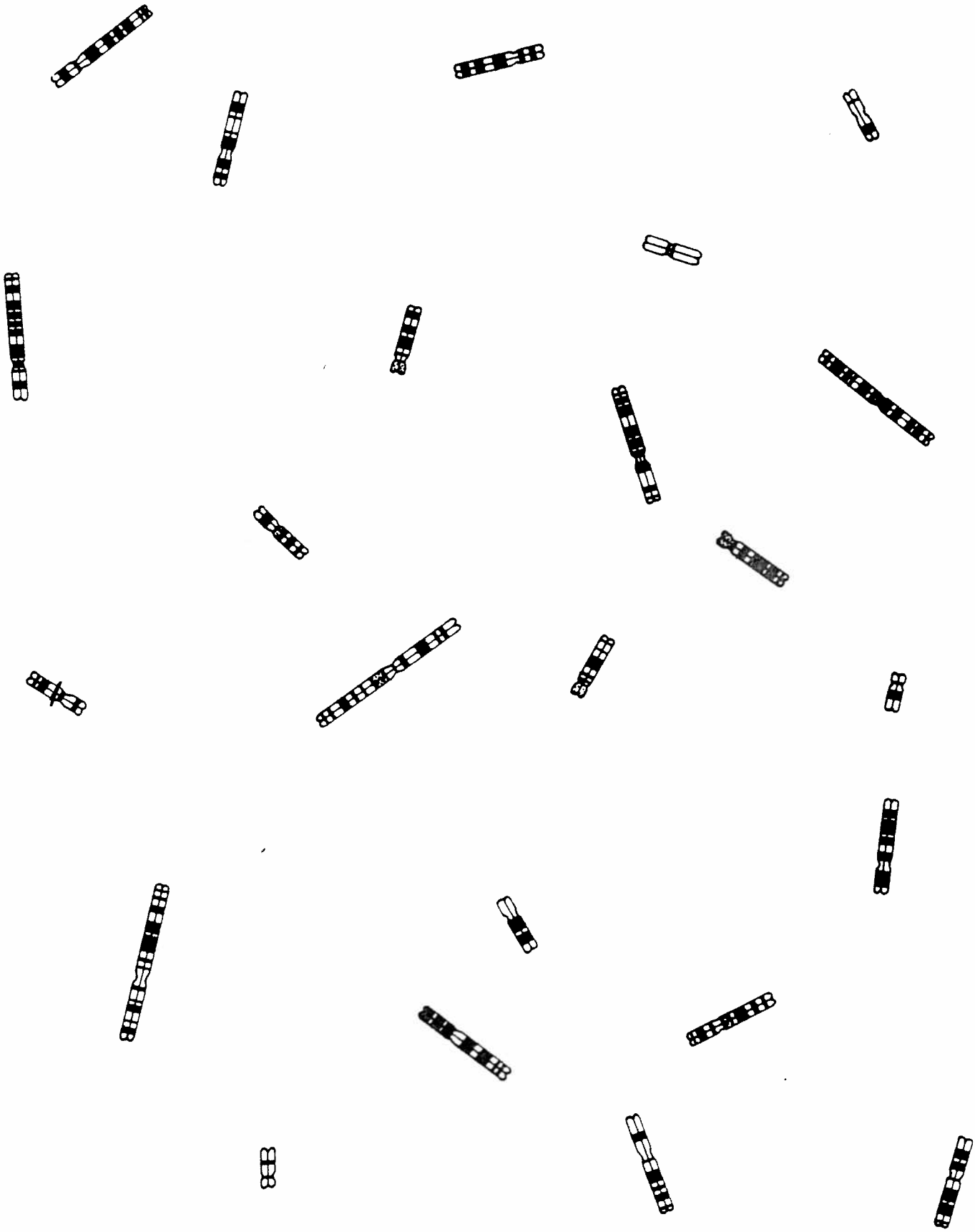
(2)



23 w/ x

duchennes MD.

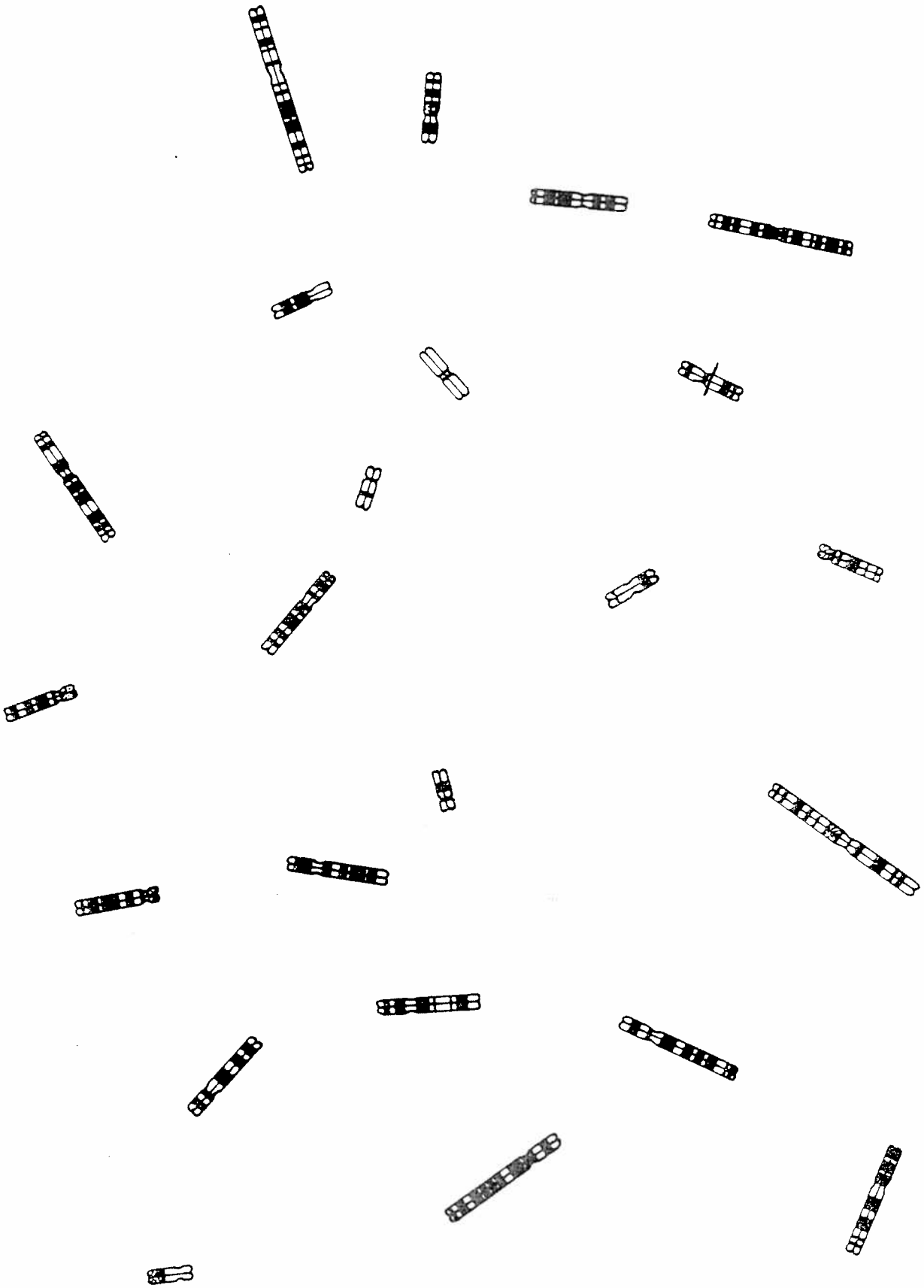
(7)



2300/X

(8)

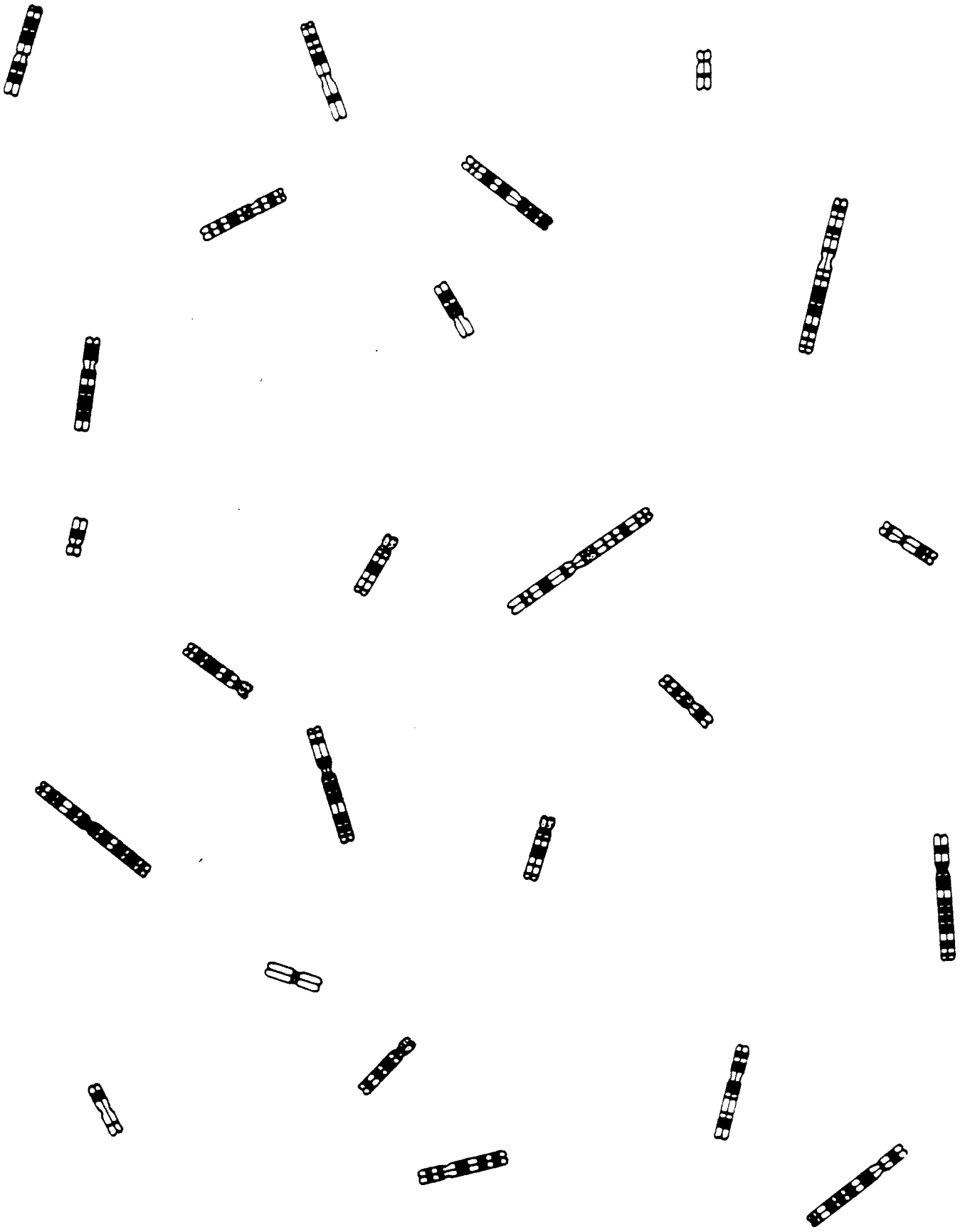
Neurofibromatosis



23 w/ y

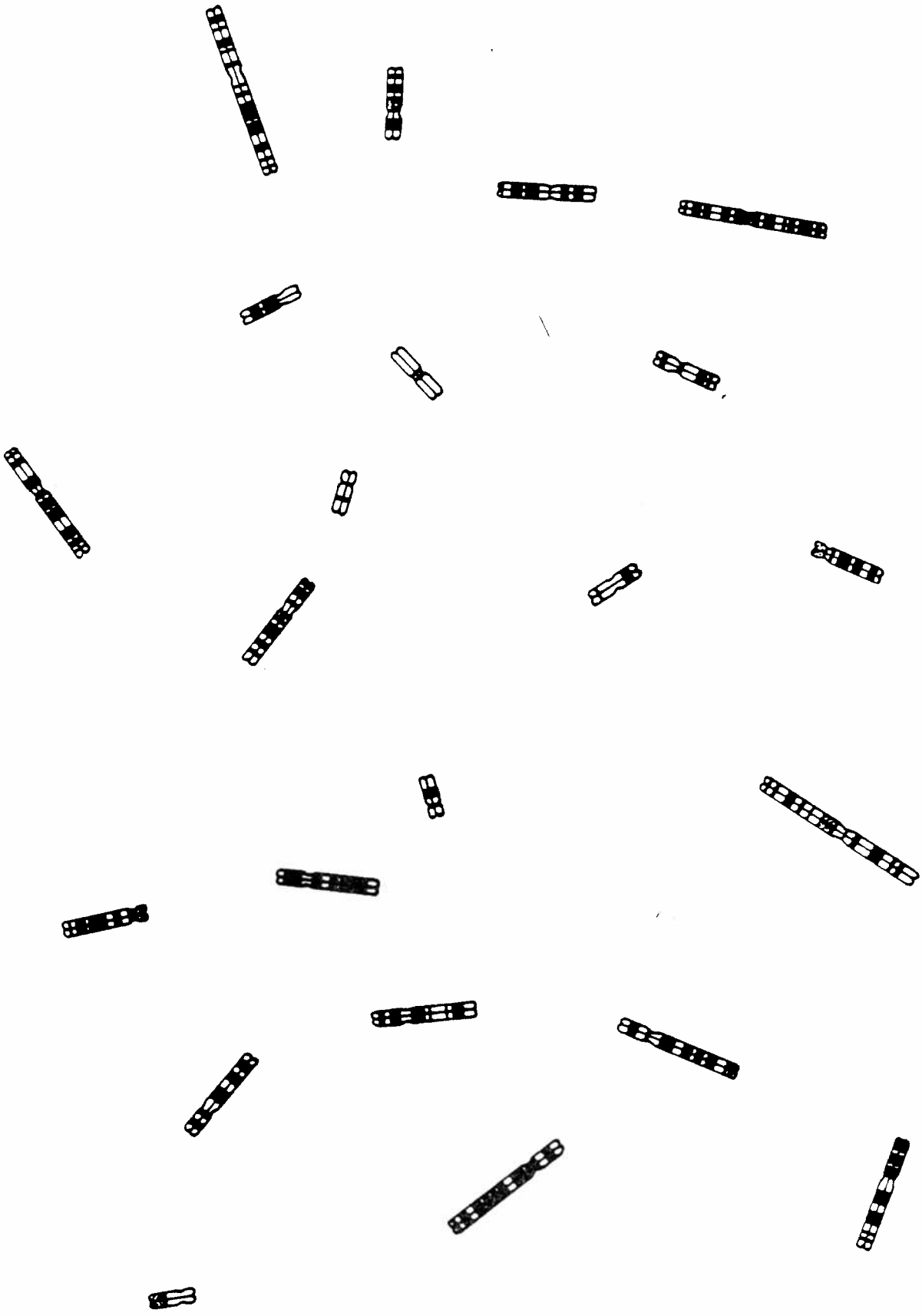
Pseudochromatosis (178)

(8)



24w/X

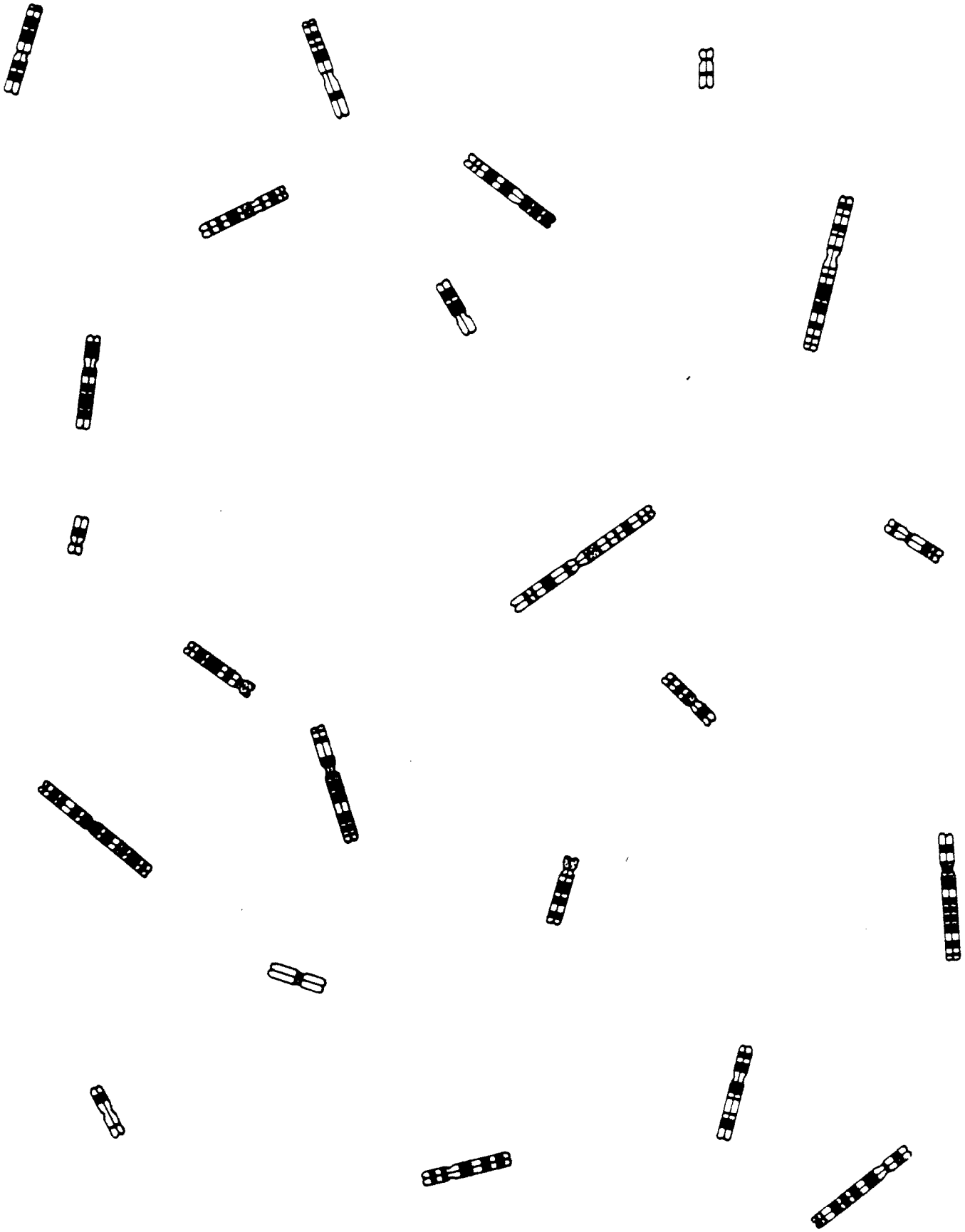
2 chromosome #15 (Prader-Willi) (9)



22 w/4

No #15 chromosome (2)

(Prader-Willi)

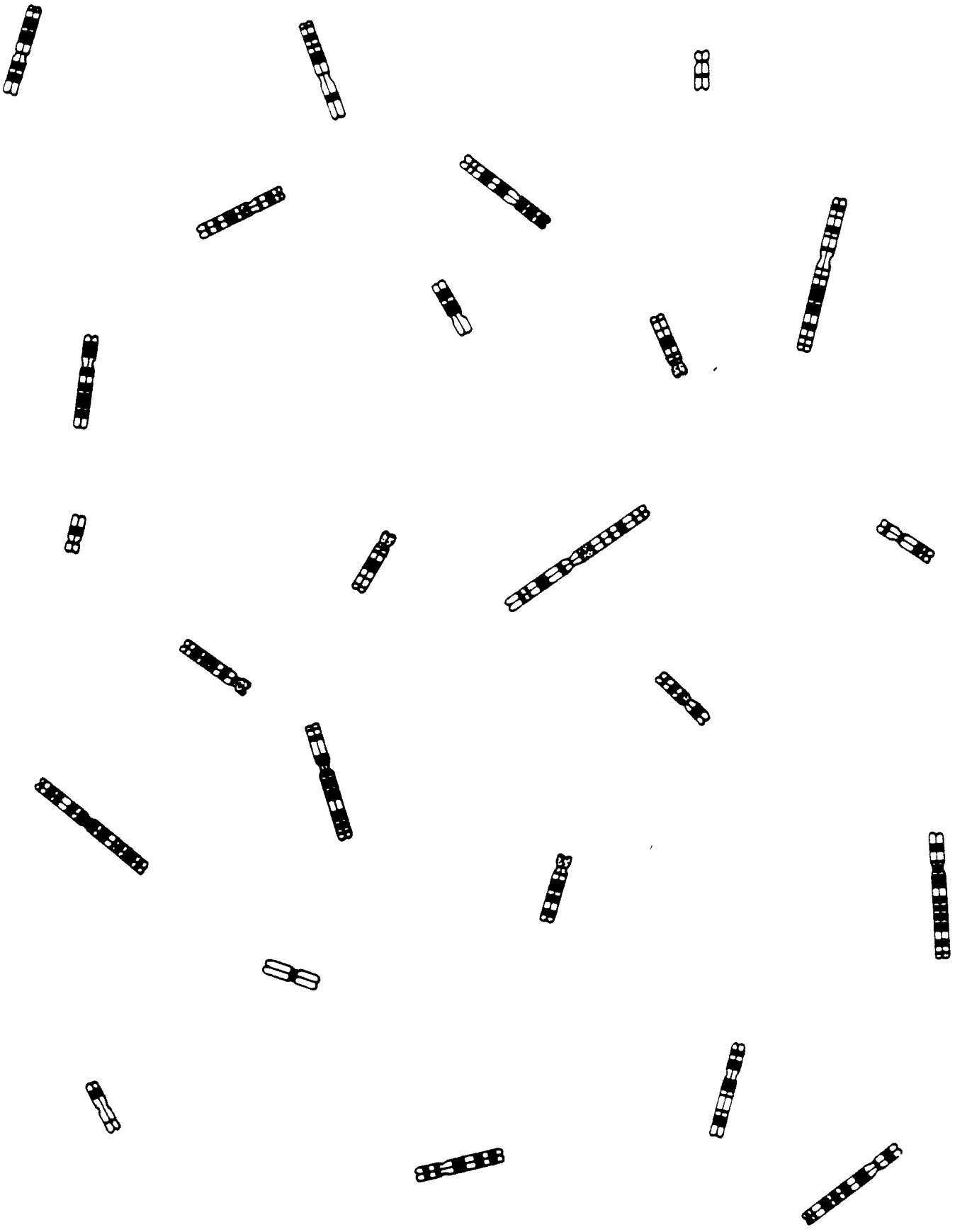


22/10 x

Nott 5

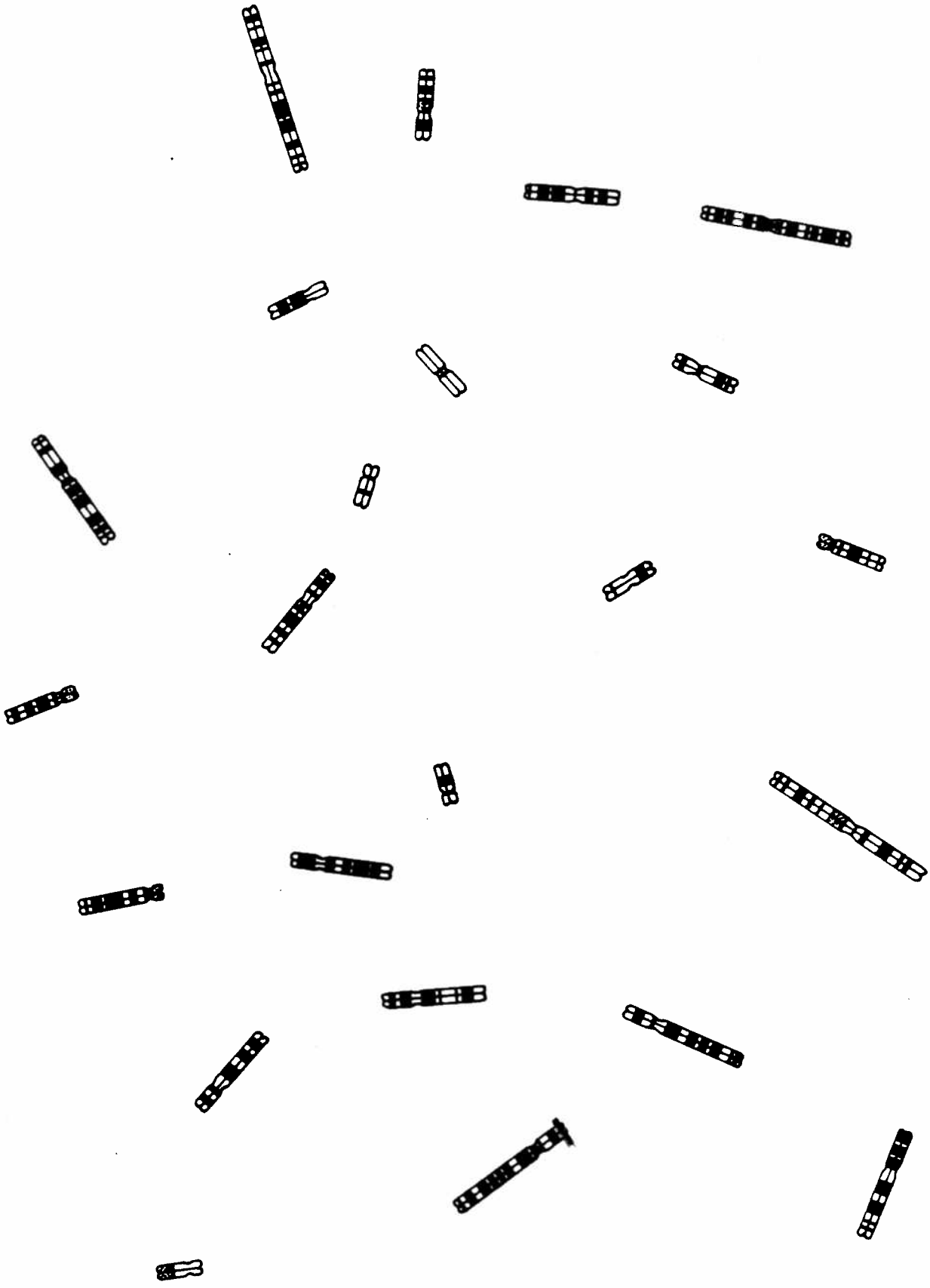
(angelman)

(10)



24 w/x
2 # 15
(acrylamide) (10)

$ 07



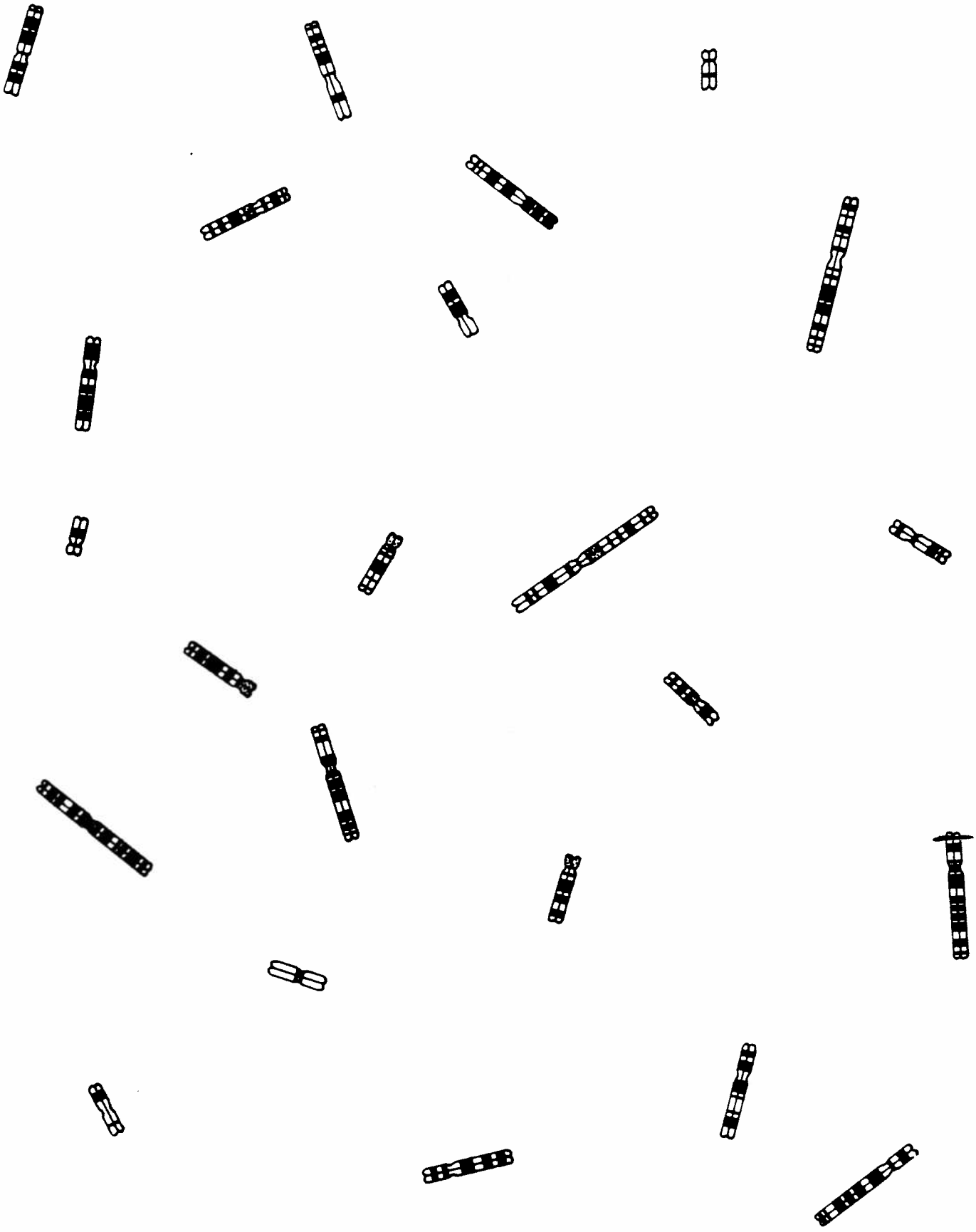
23 chromosomes w/ Y

(11)

dwarfism (achondroplastic)

auto. dominant chrom # 4 p

inflicted 07



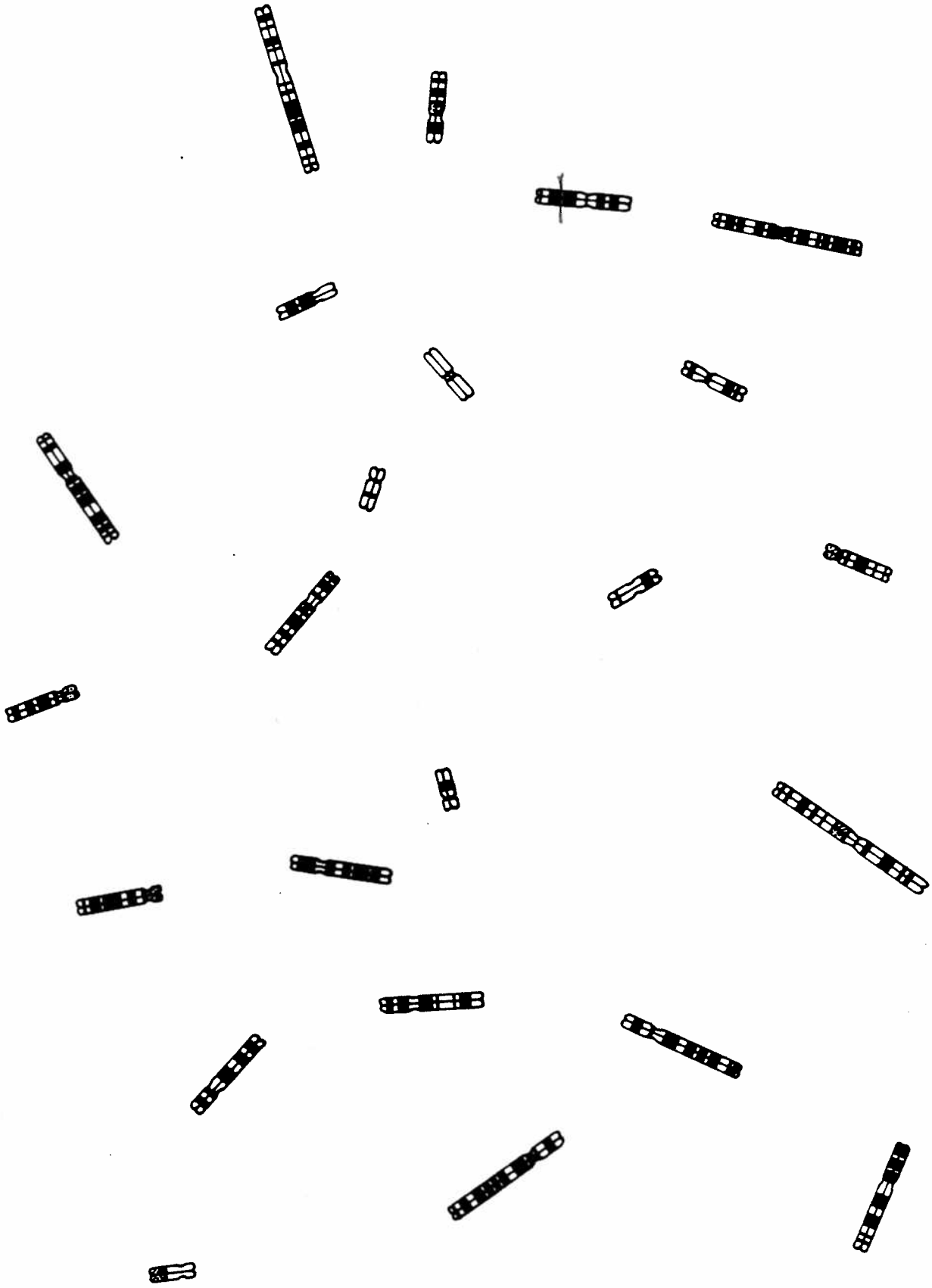
23 w / x

(11)

dwarfism (achondroplastic)

auto dom (chromo. # 4p)

inflicted ♀



23 chromosomes a/Y

albinism (auto-recess. chrom. #11q)

(12)