

OUTLINE 17

VII. Mutation

A. Point Mutations

1. Substitution
2. Insertion
3. Deletion

B. Causes of Mutation

C. Consequences of Mutation

1. Beneficial
2. Neutral
3. Deleterious
4. Lethal
5. Heritable

D. Frequency of Mutations

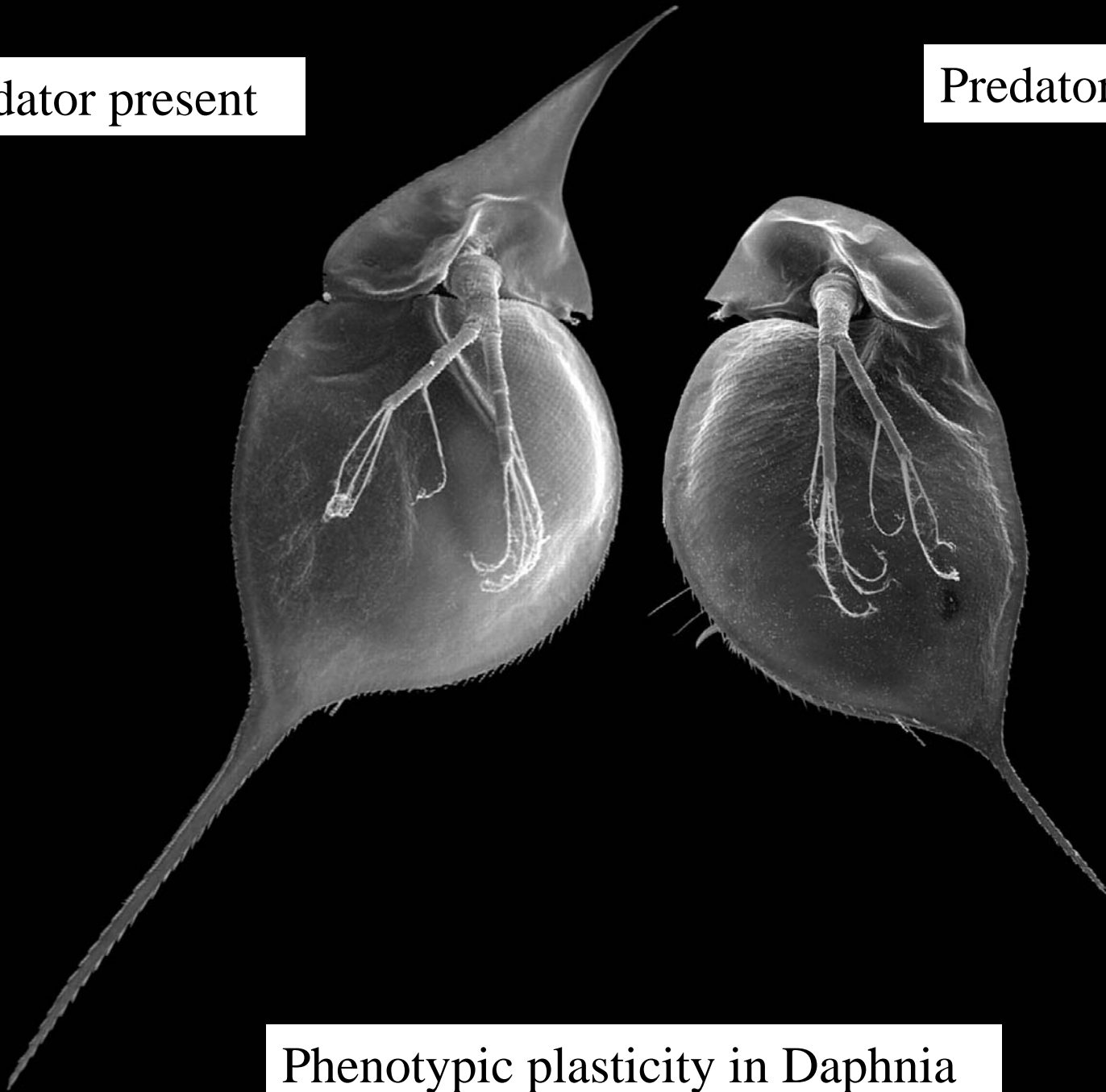
E. Examples

F. Chromosomal abnormalities

1. Chromosome breakage
2. Aneuploidy and non-disjunction

Predator present

Predator absent



Phenotypic plasticity in Daphnia

Crayfish predator



Sunfish predator

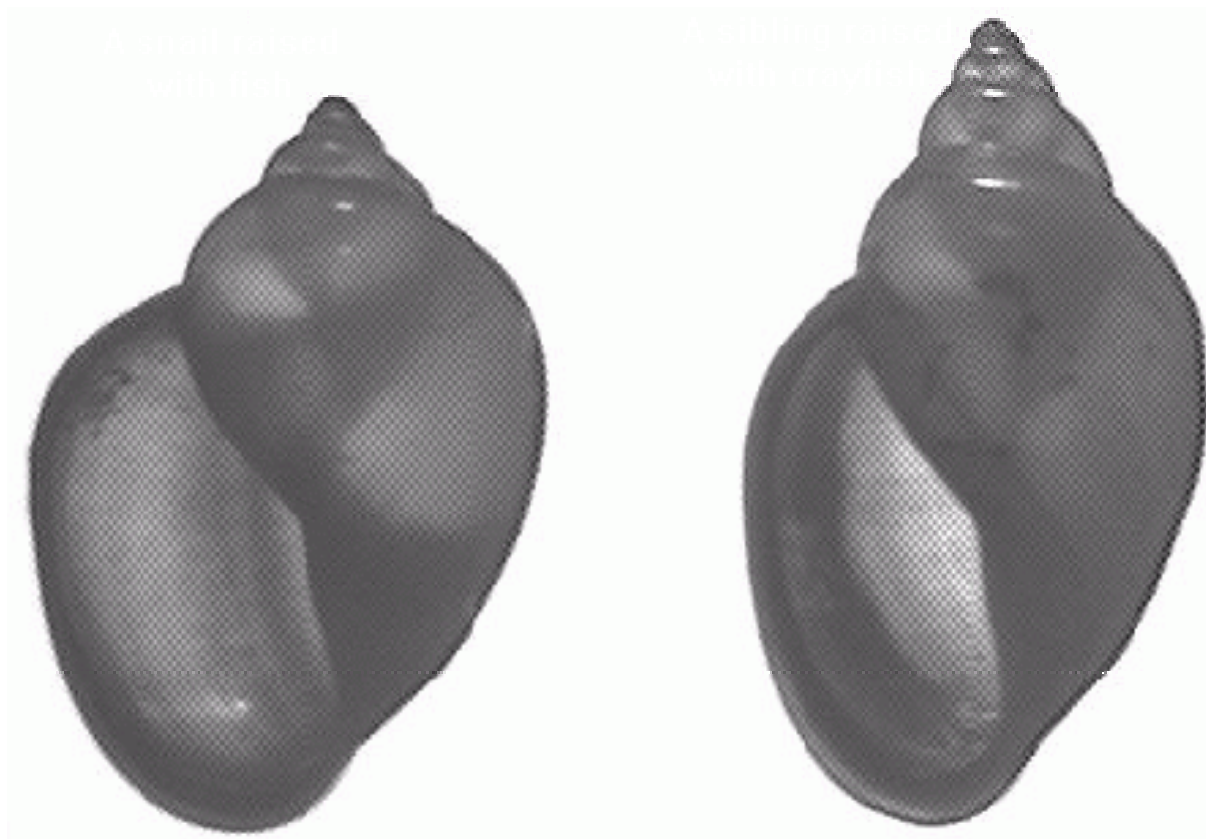


Snail prey



A snail raised
with fish

A full sib raised with
crayfish



Phenotypic plasticity in shell morphology in *Physis*





M



Erbgutverändernd

The genetic code

		Second base						
		U	C	A	G			
First base (5' end)	U	UUU	UCU	UAU	UGU	U	Third base (3' end)	
		UUC	UCC	UAC	UGC			C
		UUA	UCA	UAA Stop	UGA Stop			A
		UUG	UCG	UAG Stop	UGG Trp			G
	C	CUU	CCU	CAU	CGU	U		
		CUC	CCC	CAC	CGC	C		
		CUA	CCA	CAA	CGA	A		
		CUG	CCG	CAG	CGG	G		
	A	AUU	ACU	AAU	AGU	U		
		AUC	ACC	AAC	AGC	C		
		AUA	ACA	AAA	AGA	A		
		AUG Met or start	ACG	AAG	AGG	G		
	G	GUU	GCU	GAU	GGU	U		
		GUC	GCC	GAC	GGC	C		
		GUA	GCA	GAA	GGA	A		
		GUG	GCG	GAG	GGG	G		

Consequences of a frame shift mutation:

THE BIG CAT ATE THE RED EGG

THB IGC ATA TET HER EDE GG. ...

PKU disease - an autosomal recessive trait

Dietary Protein



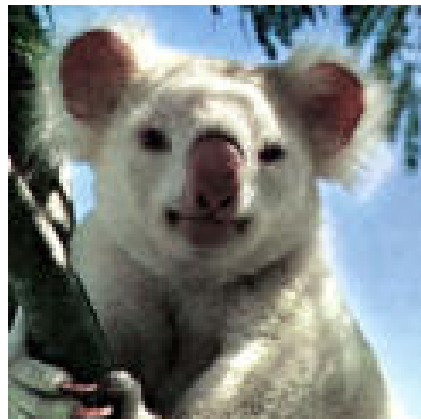
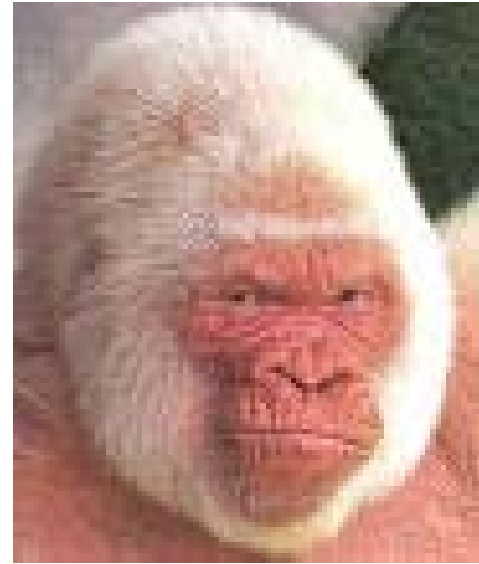
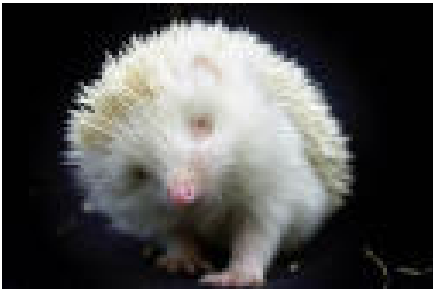
Phenylalanine



Tyrosine

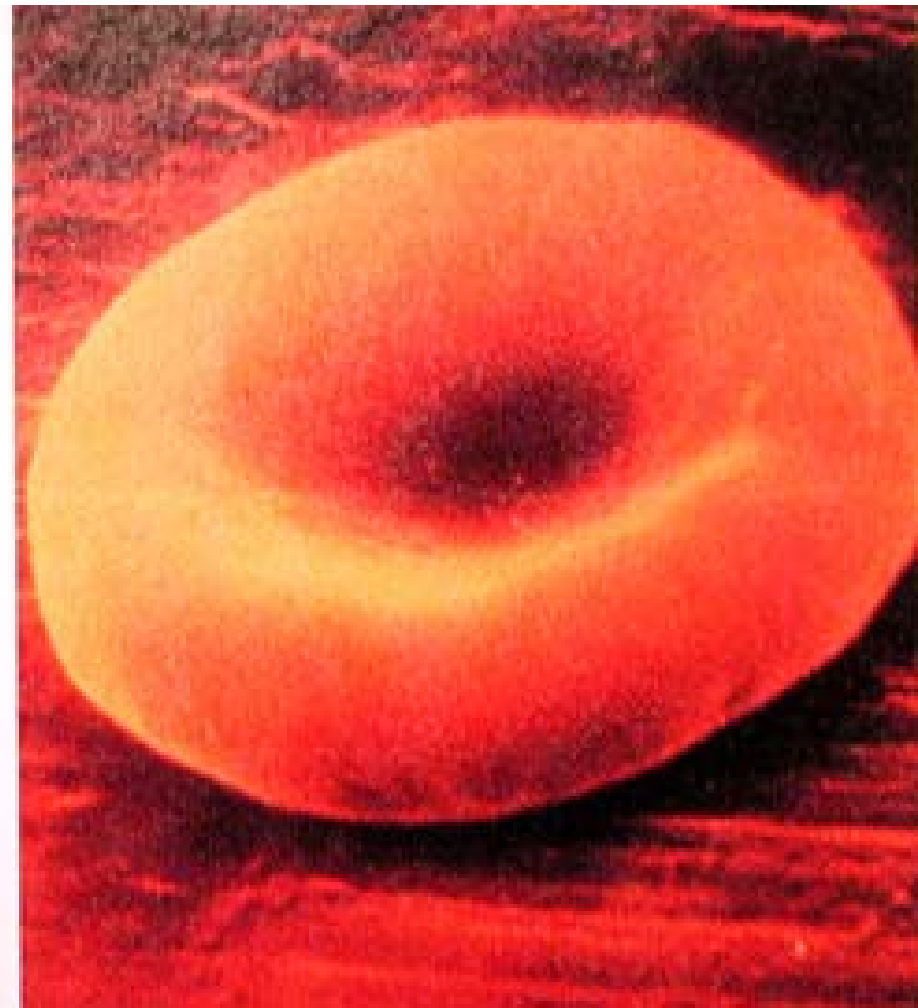
phenylalanine hydroxylase

Albinism



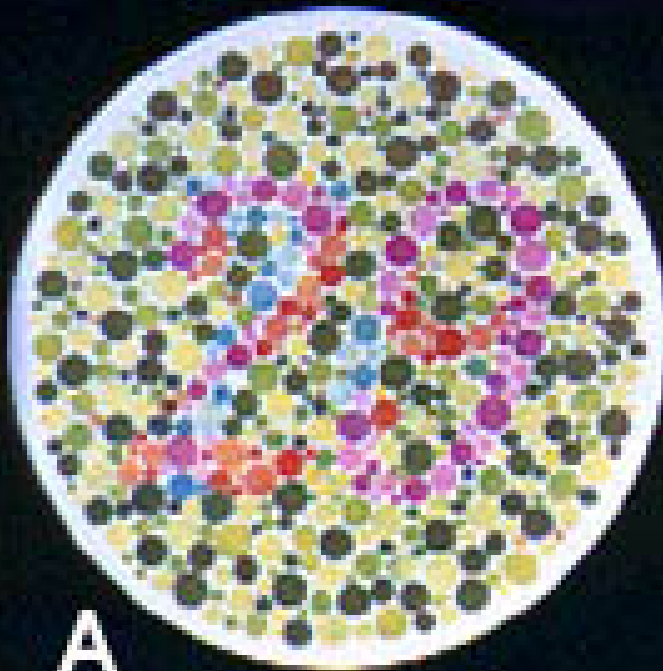


Sickle cell

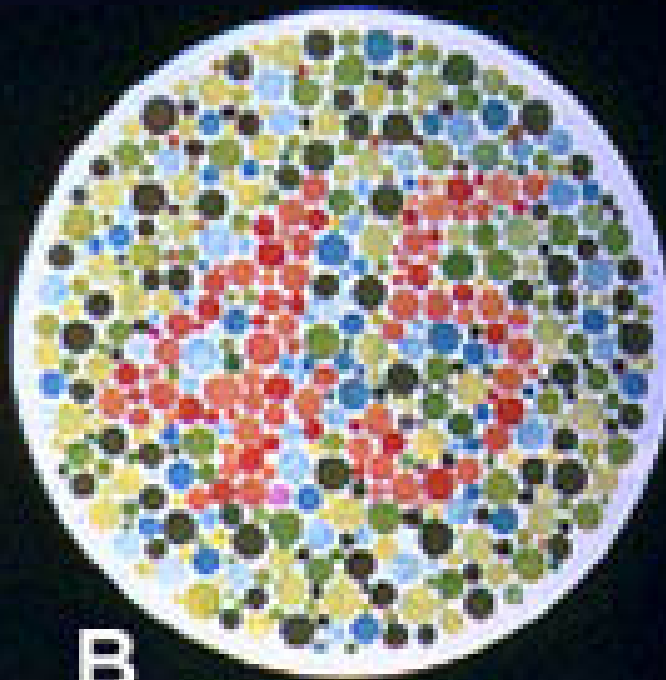


Normal red blood cell

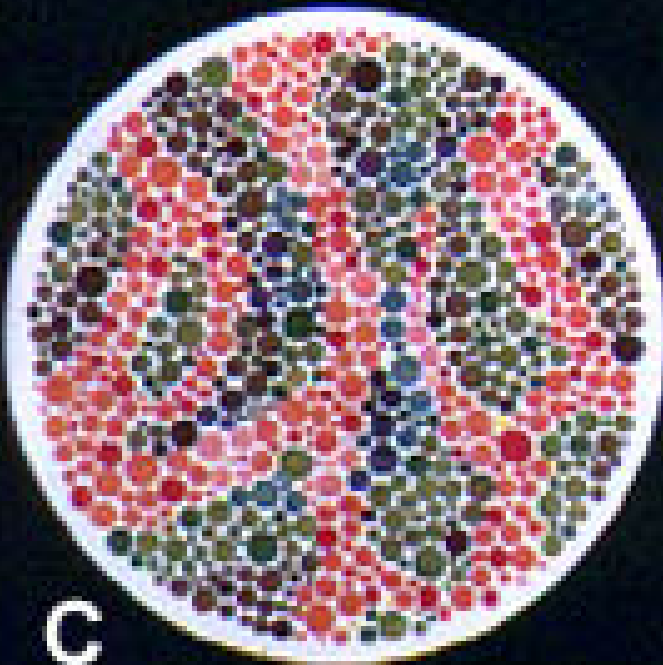
Sickle cell anemia: an autosomal co-dominant



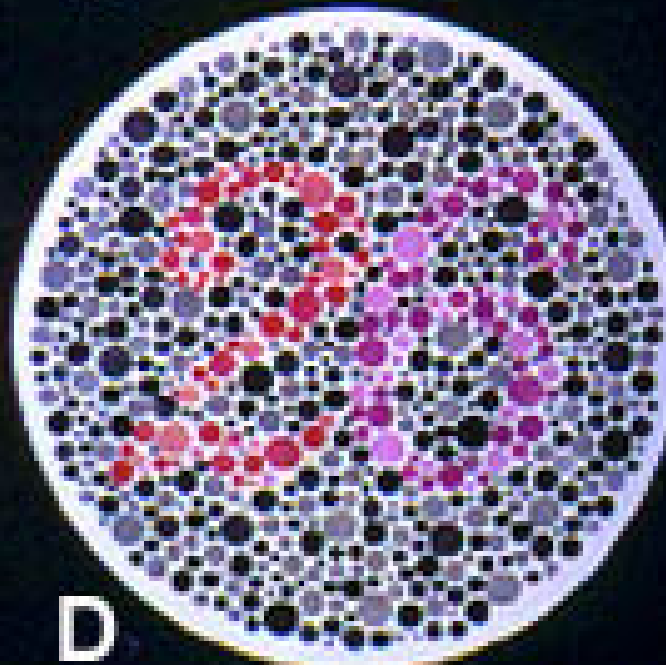
A



B

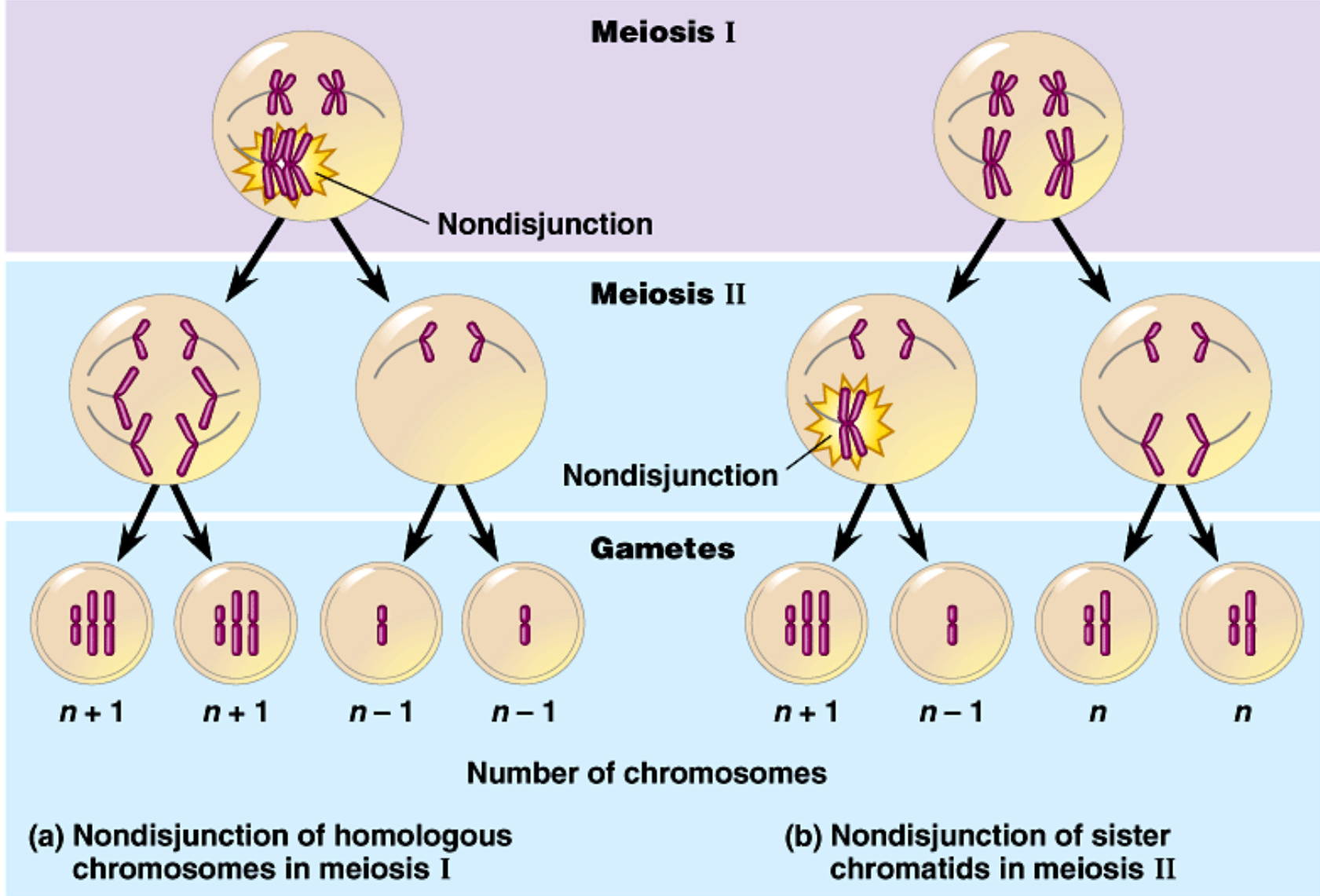


C

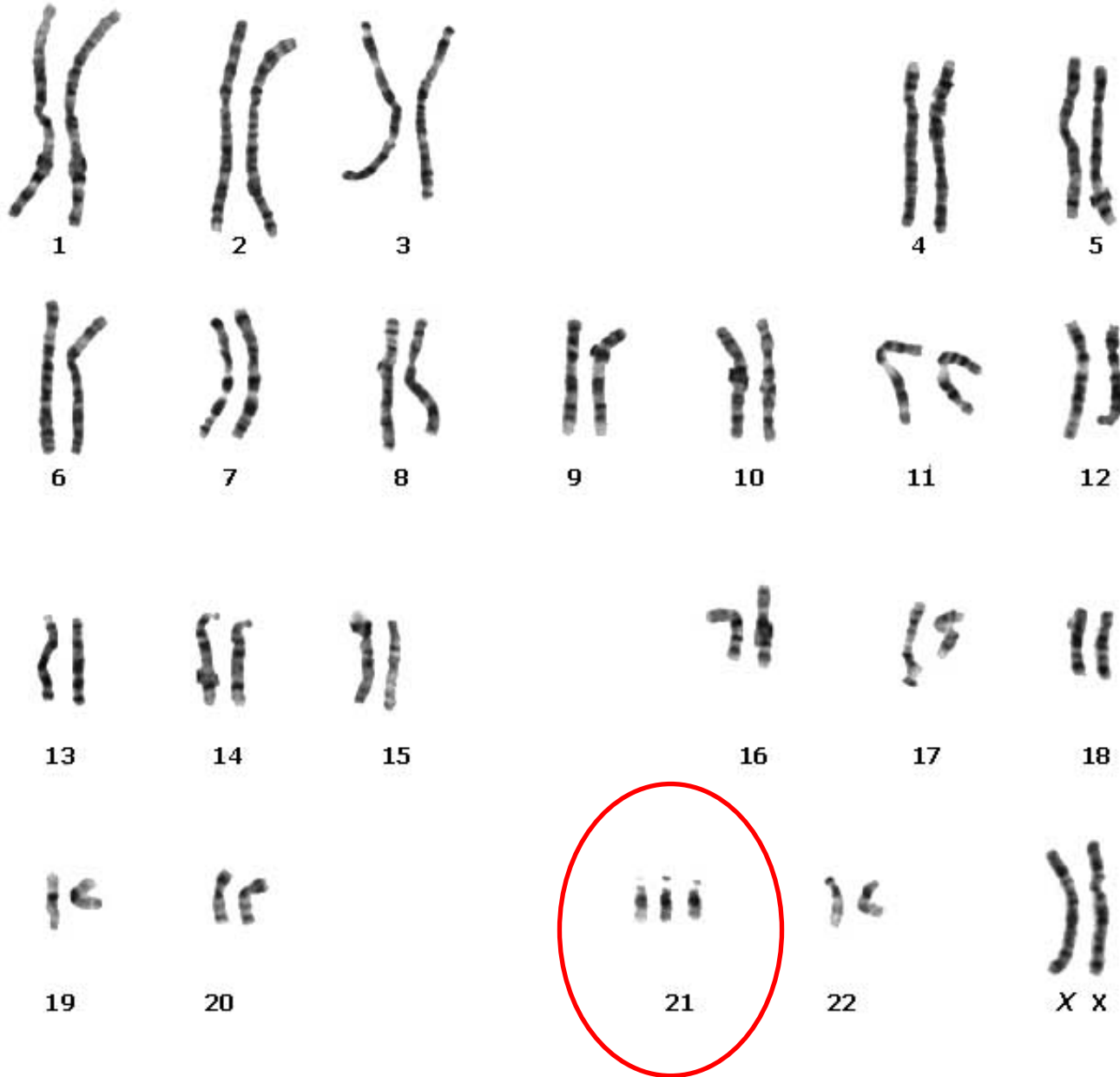


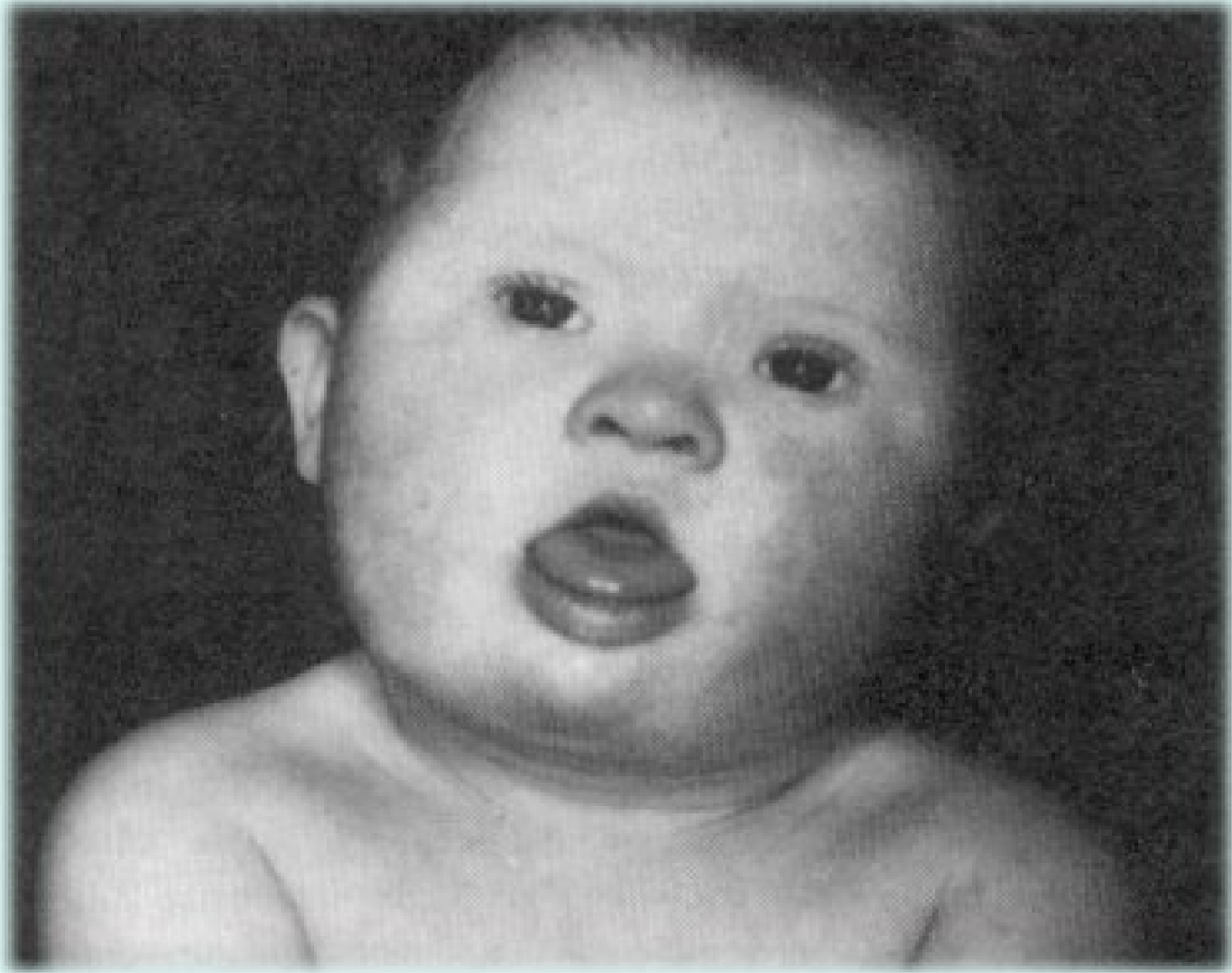
D

Fig. 15.11: Non-disjunction leading to aneuploid gametes

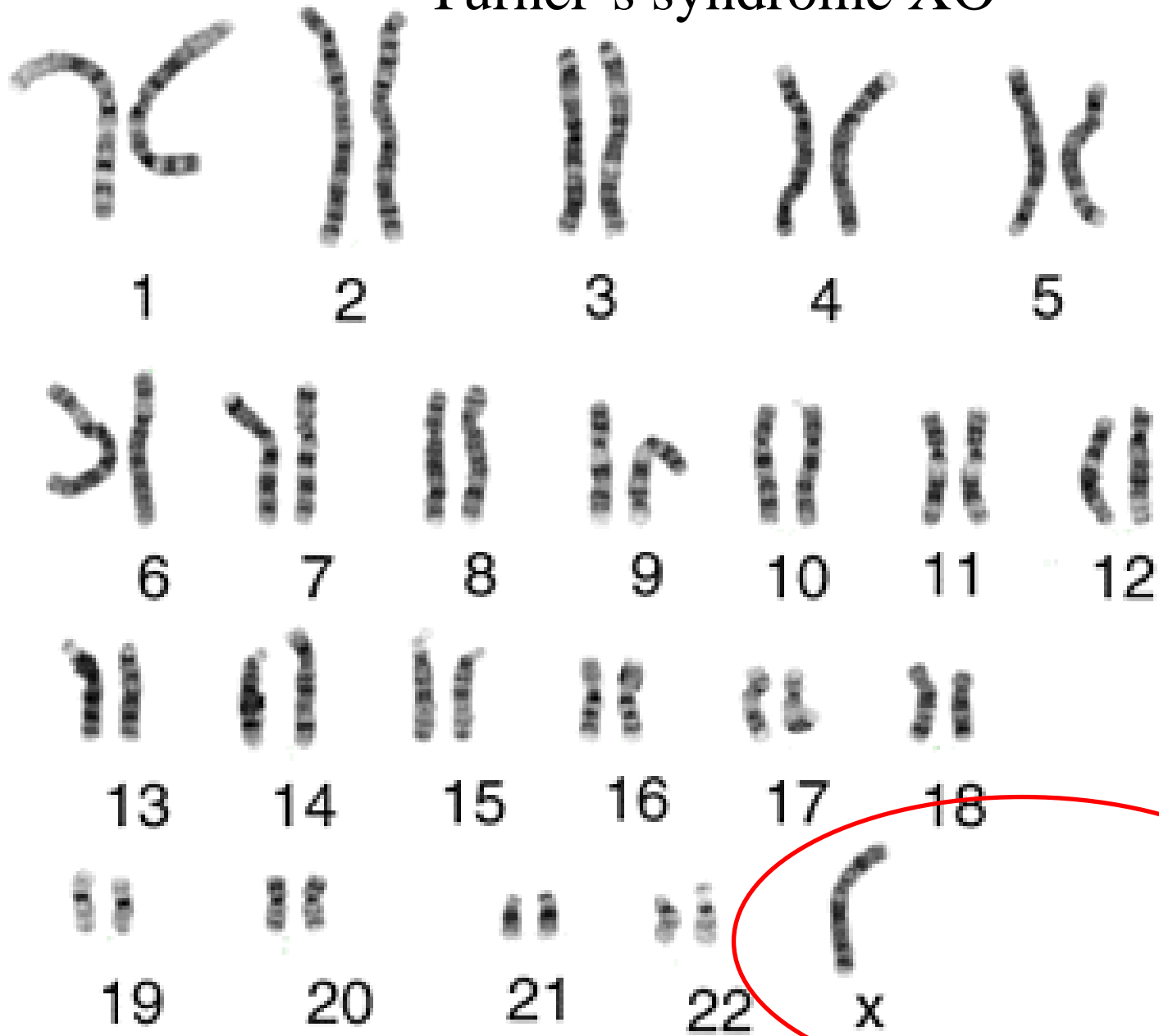


Trisomy 21

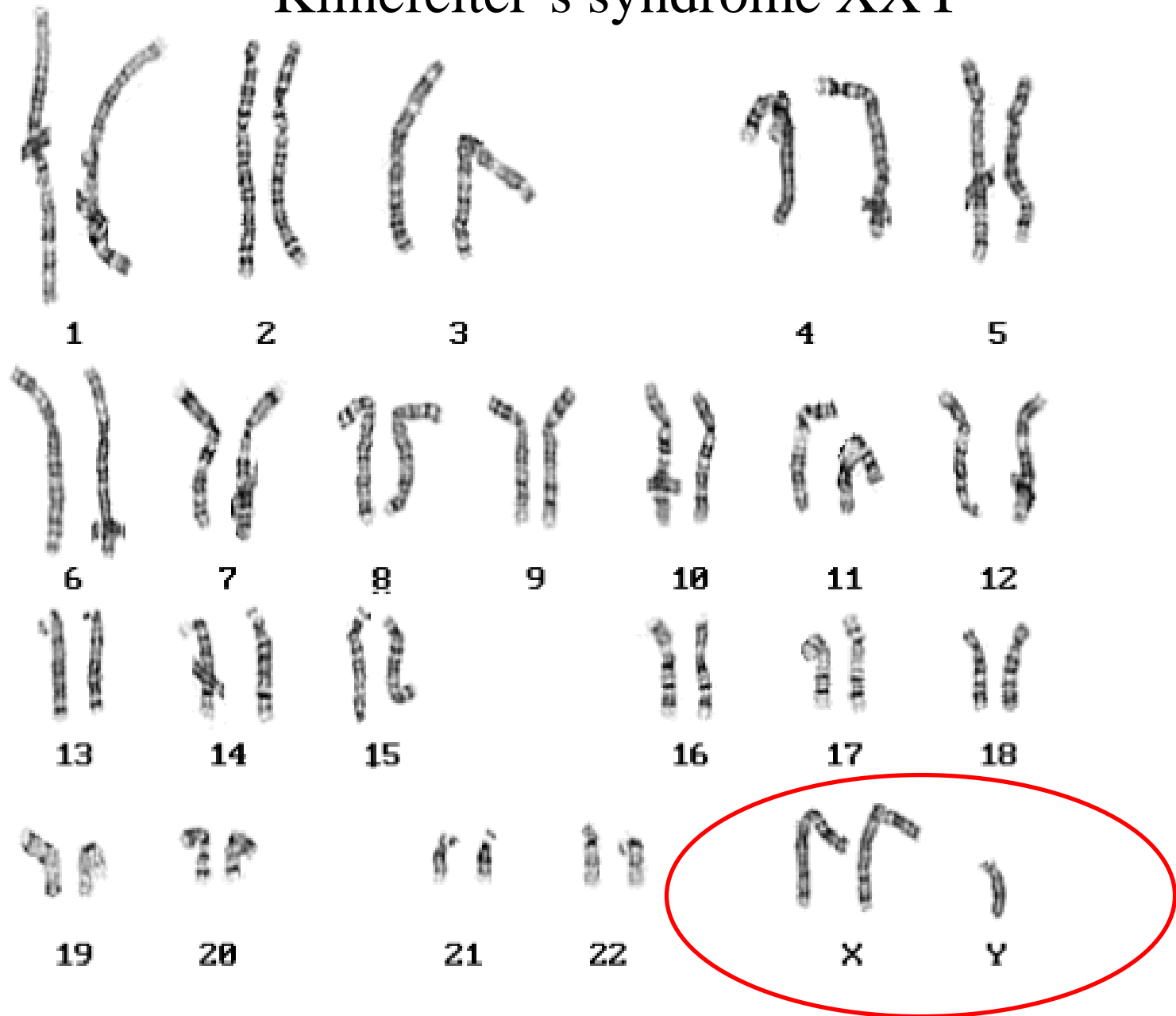




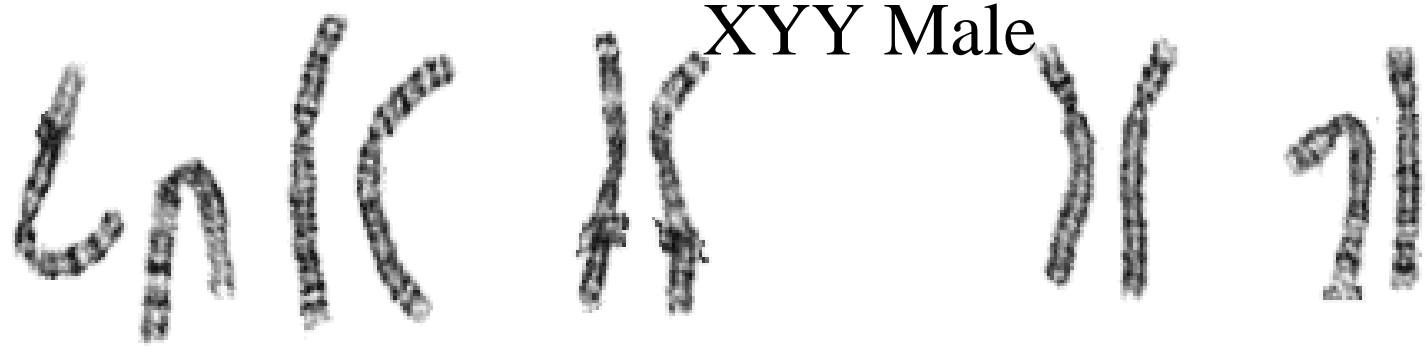
Turner's syndrome XO



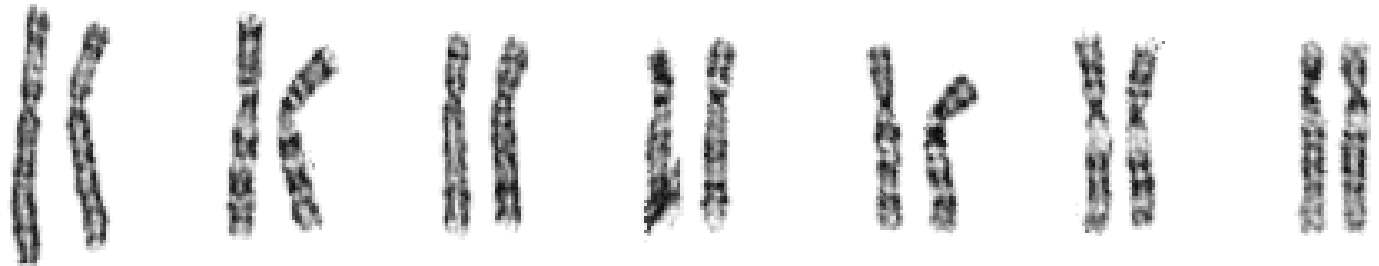
Klinefelter's syndrome XXY



XYY Male



1 2 3 4 5



6 7 8 9 10 11 12



13 14 15 16 17 18



19 20 21 22 X Y

Cri du chat

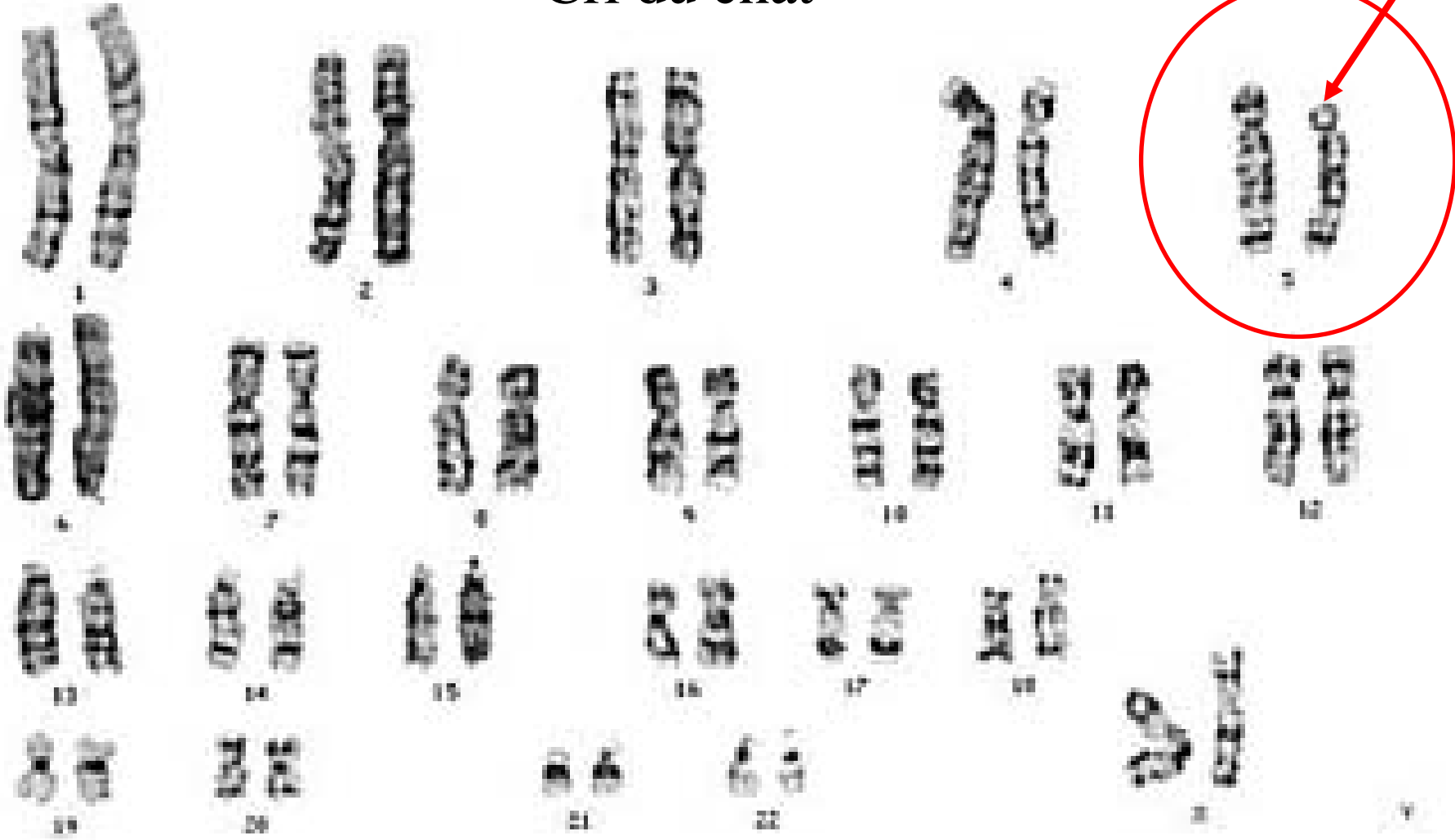
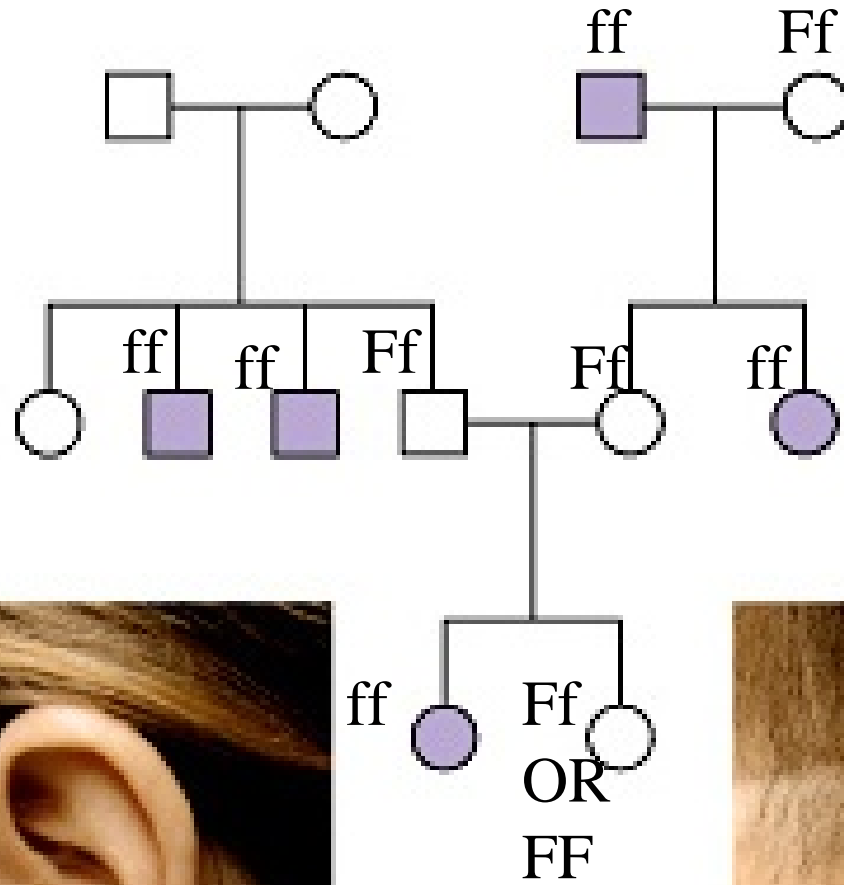
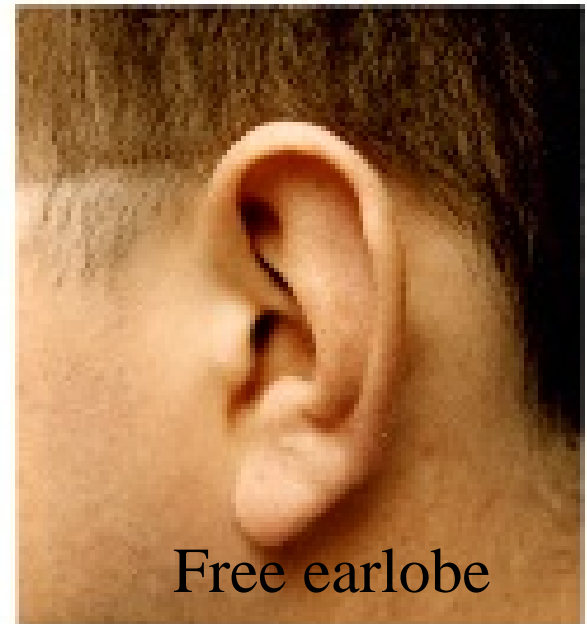
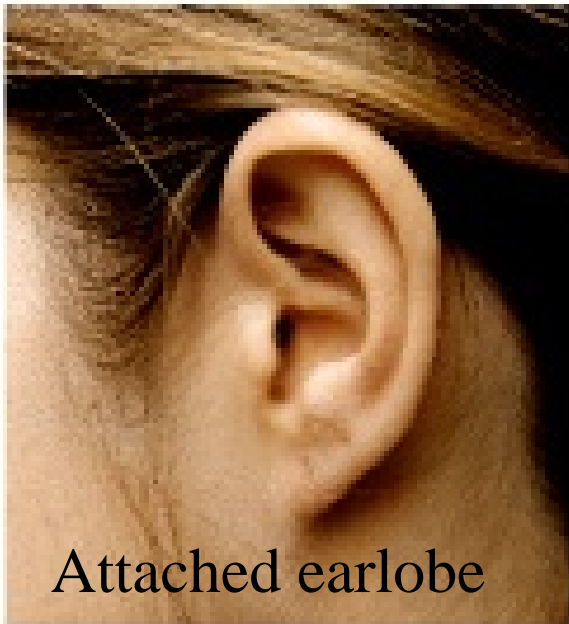




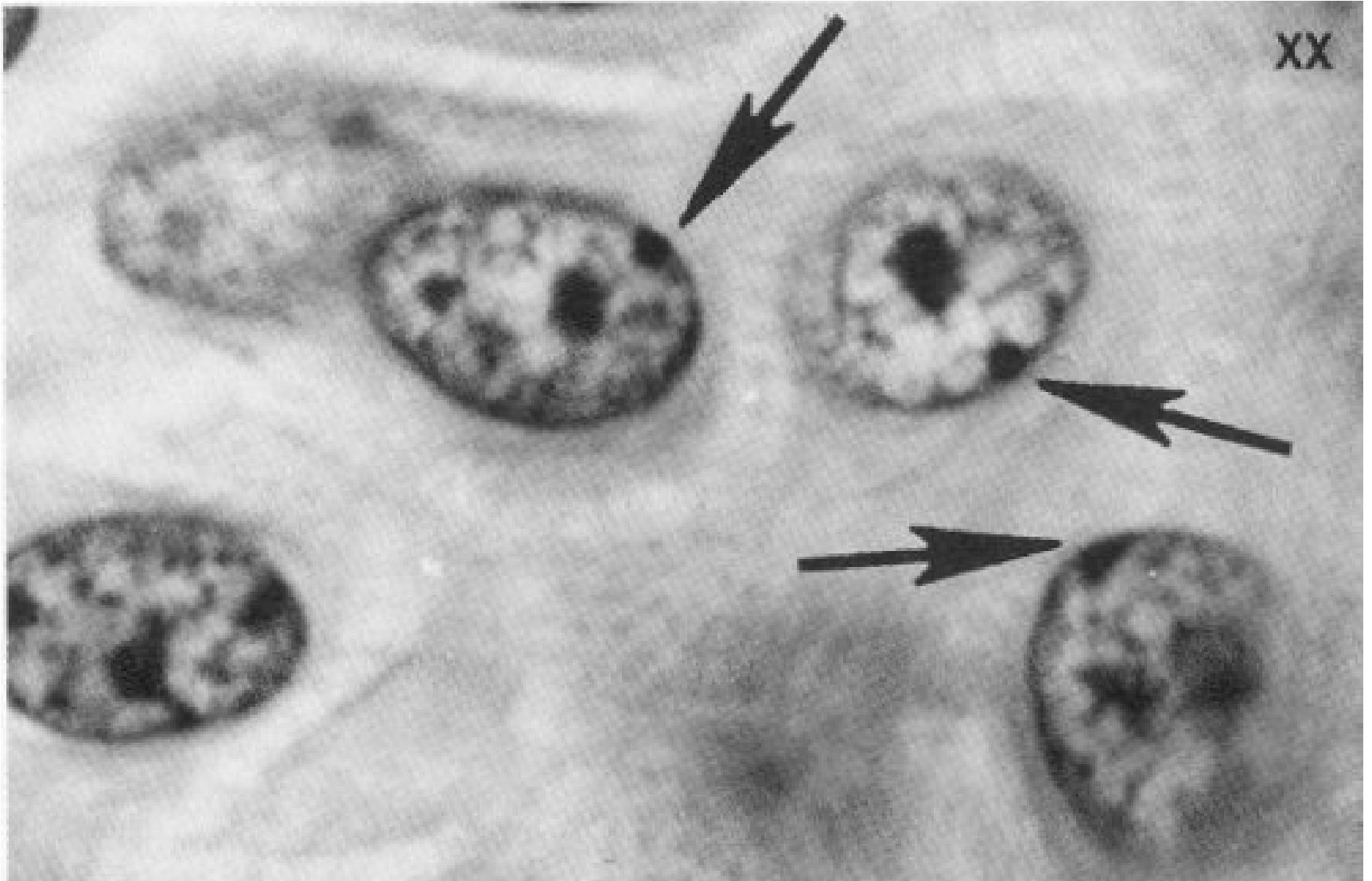
Fig 14.14 Use of pedigree analysis



□ = male
○ = female
● = attached



Sex chromatin: Barr body



DNA
Sequence

A
C
G
G
T
A
C
C
T
G
T
A
C
C
G

