

# Survey of Bio.

Wk. 10

Survey  
Thripp  
Pg. 1

WED, 2009-11-04, 8-9:20 AM

	A      a	<u>Complete Dominance:</u>	
(CD-2)	a   Aa    aa	Genotypic ratio: 2Aa: 2aa	all or
	a   Aa    aa	Phenotypic ratio: 2 purple: 2 white	nothing

A = dwarf (allele of human height gene)      AA = dwarf  
 a = normal (allele of H/HG)      Aa = dwarf  
 aa = normal

(CD-3)	B      b	Father bb	aa = normal	
b   Bb    bb			↑	↑
b   Bb    bb		Woman — Husband bb	genotypes	phenotypes

bb = blonde      Bb      bb      CD-4 for homework  
 BB or Bb = brown

D      d	Two parents
D   DD    Dd	who have
d   Dd    dd	hearing can

B-      bb	Bb	Bb      bb
Bb		bb

DD = hearing      have a deaf child if they are both heterozygous  
 Dd = hearing      (they both carry the deafness allele).

dd = deaf      Not extreme: heterozygotes have

Incomplete Dominance: an appearance in between the

Example: Hypercholesterolemia      two extremes!       $C^R$  = red       $C^W$  = white

HH = can make LDL receptors       $C^R C^R$  = red       $C^W C^W$  = white

Hh = mild disease       $C^R C^W$  = pink

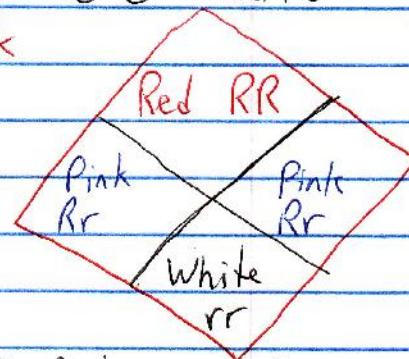
hh = cannot make LDL receptors      C for carnation

Codominance: flowers

The heterozygote expresses both alleles completely: Example: AB blood type.

Pg. 8 of homework: i.e. a rat who

Type AB:  $I^A I^B$  has black hairs & white hairs w/ black parent & white parent Dr. Backer says Rr is confusing. Use  $C^R$  instead



WED, 2009-11-04, 8:9:20 AM:

### ABO blood types = Multiple Alleles

Phenotype	Genotype	
O	(ii)	→ recessive!
AB	$I^A I^B$	$I^A - = I^A I^A \text{ or } I^A i$ ↳ (unknown second allele)
A	$I^A I^A \text{ or } I^A i$	$I^B - = I^B I^B \text{ or } I^B i$ ↳ (unknown)
B	$I^B I^B \text{ or } I^B i$	→ codominant!

$I^A -$  is  $I^A I^A$  or  $I^A i$ ; NOT  $I^A I^B$  as that is AB type.

Ø WRONG:

A  $\begin{matrix} O & O \\ Aa & Aa \end{matrix}$  Use one letter  
B  $\begin{matrix} O & O \\ Bb & Bb \end{matrix}$  for gene (I)  
lowercase (i) = recessive

→  $I^A I^B$  (AB phenotype) is the universal donor because it has no antigens.

Codominance is when the heterozygote is expressed completely expresses both alleles completely.

Both alleles are expressed in the phenotype of AB blood type.

ID-2)  $C^R C^w$  pink

white	$C^w C^w$	$C^w C^w$	genotypic ratio = 1 $C^R C^w$ : 1 $C^w C^w$
$C^w$	$C^R C^w$	$C^w C^w$	phenotypic ratio = 1 pink : 1 white

ID-3) Red snapdragon =  $C^R C^R$  Pink snapdragon =  $C^R C^w$   
White snapdragon =  $C^w C^w$  or  $C^w C^R$  → write  $C^w C^R$   
 $C^R C^R$  as  $C^R C^w$

$C^w$	$C^R C^w$	$C^R C^w$	genotypic ratio = 4 $C^R C^w$ : 0
$C^w$	$C^R C^w$	$C^R C^w$	phenotypic ratio = 4 pink : 0 (D-4)

homework for 2009-11-09 (Mon.) = ID-4) & ID-5), MA-5)

We don't have enough children to prove homozygosity.  
You can have 5 children who are boys or girls in a row — same for genes. ( $2^5 = 32 \rightarrow \frac{1}{32}$  chance)

WED, 2009-11-04, 8-9:20 AM. Pedigrees next week.  
THU, 2009-11-05, 9:30-10:50 AM.

B = Brown hair allele of hair color gene (HCG)

b = Blonde hair (mutant) allele of hair color gene

Nobody is haploid (a walking sperm or egg)

Everyone has two alleles: one from Mom & one from Dad

Genotypic ratio is the possible alleles of the offspring  
(in the 4 boxes of the Punnett square)

Complete Dominance == Simple Dominance == Dominant/Recessive

Red = phenotype

Incomplete Dominance

Pure-breeding = homozygous genotype (AA or aa)

Incomplete Dominance = Two extremes mated gives  
an intermediate phenotype Red  $\times$  White  $\rightarrow$  Pink

$C^R C^R$  = red

Pure-breed red  $\times$  pure breed white

$C^W C^W$  = white

= heterozygous pink ( $C^R C^W$ )

$C^R C^W$  = pink

heterozygous pink  $\times$  heterozygous pink

= 1 pure-breed red: 2 half-breed pink:

1 pure-breed white

phenotypic ratio: 1 red: 2 pink: 1 white

$C^R$        $C^W$

$C^R$	$C^R C^R$	$C^R C^W$
$C^W$	$C^R C^W$	$C^W C^W$

In diseases, incomplete dominance yields:  
no disease or mild disease or extreme disease

$C^R$  is one symbol.  $C^W$  is one symbol. Don't split  
 $C$  from  $R$ .

Thripp  
Survey  
Pg. 4

THU, 2009-11-05, 9:30 - 10:50 AM.

ID-2)  $C^R$   $C^W$  ← pink ID-3)  $C^R$   $C^R$  ← red

$C^W$	$C^R C^W$	$C^W C^W$
$C^W$	$C^R C^W$	$C^W C^W$

↑  
white      genotypic:  
              1 C<sup>R</sup>C<sup>w</sup>: 1 C<sup>w</sup>C<sup>w</sup>  
genotypic: 1 pink: 1 white

$C^W$	$CRCW$	$CR^WC$
$C^W$	$CR^WC$	$CR^C$

<sup>↑</sup>  
white      genotypic: 4 C<sup>R</sup>C<sup>w</sup>  
phenotypic: 4 pink

~~phenotypic: I pink: I white~~

**Codominance:** The heterozygous condition expresses both alleles completely. AB blood type is both A and B blood type at once.

~~Phenotype = AB → Genotype: I<sup>A</sup>I<sup>B</sup>~~

O blood type (~~is~~) (ii genotype) is Recessive in the ABO blood type system.

An O blood type man has a child with an AB blood type woman.

type woman: An A blood type man whose father	i	i	$\leftarrow$ O alleles
	I <sup>A</sup>	I <sup>A</sup> i	I <sup>A</sup> i
	I <sup>B</sup>	I <sup>B</sup> i	I <sup>B</sup> i
	↑	AB alleles	genotypic ratio: I <sup>A</sup> I <sup>A</sup> : I <sup>A</sup> i: I <sup>B</sup> i
			phenotypic ratio: 1 A: 1 B

type woman. The man has the genotype  $I^A i$  (not  $I^A I^A$  because his father has the genotype  $ii$  & the phenotype O). The

~~woman has the genotype  $I^A I^B$ . genotypic ratio =  $I^A I^A : I^A I^B$~~

I A	I A I A	I A
I B	I A I B	I B

oops, should be super script : (I(A)) : (I(B))

AB alleles (woman)

Thripp  
Survey  
Pg. 5

THU, 2009-11-05, 9:30-10:50 AM

Father is O blood type

$I^B - = I^B I^B$  or  $I^B i$

MA-3)  $I^B - \rightarrow I^B$  or  $i$

$i$   $I^B i$   $I^B i$  or  $ii$

$i$   $I^B i$   $I^B i$  or  $ii$

sperm cells  
will all carry  
 $i$  allele

$\textcircled{X} i-$  is an impossible  
genotype.

Tue. / Thu next wk: more genetics, fun stuff, review

Pedigrees



#1: Determine the recessive trait.

→ unaffected is recessive

#2: Follow the

hidden (recessive)  
because parents  
were not affected

shaded = "affected" little a's up &  
square = man down the family tree.  
circle = woman

MUST be homozygous recessive phenotype.] unshaded = "unaffected" TR 12:30  
interview

THU, 2009-11-05, 12:30-1:50 PM:

Complete dominance:  $Aa$  has an identical phenotype to  $AA$

$A A$  If the Each letter is a gamete (egg or

$a Aa Aa$  man in CD-2) sperm) from the parents.

$a Aa Aa$  was homozygous for dwarfism, or  $AA$  genotype,

All children would be  $Aa$  (dwarves). He must be  $Aa$  to have a normal-height child

END

SUPPLEMENTAL INSTRUCTION FOR SURVEY OF BIOLOGY by Richard X. Thripp

Week 10, Fall 2009, Nov 3 / 4 / 5. Reproduction Ch. 26. daytonastate.org/biology

- 1.) Sperm cells are made in the Seminiferous tubules, which are part of the testes. This is called spermatogenesis. The testes are in the scrotum a.k.a. gonads.
- 2.) Sperm cells are stored and matured in the epididymis.
- 3.) The prostate contributes alkali to semen to neutralize the vagina's acidic pH.
- 4.) Cowper's gland produces lubricating fluid before ejaculation.
- 5.) Seminal vesicles feed sugar to the sperm ("last-bag lunch").
- 6.) Semen exits via the vas deferens during ejaculation (sterilization = vasectomy).
- 7.) In men, the urethra (starts with "u") serves both urination and ejaculation.
- 8.) During sexual intercourse sperm enters the vagina (birth canal).
- 9.) The cervix is the narrow neck at the end of the vagina / beginning of uterus.
- 10.) The site where a fertilized egg grows into a baby is the uterus (starts with "u").
- 11.) Fertilization of the woman's ovum (egg) takes place in the fallopian tube a.k.a. oviduct (sterilization = tubal ligation).
- 12.) The ovaries release an egg during ovulation. This is called oo genesis.
- 13.) A follicle grows in the ovary, which ruptures to release an egg during [Ans. 12].
- 14.) The [Ans. 13] then becomes the Corpus luteum (body yellow), which secretes progesterone and estrogen (P&E) to stop more eggs from being released.
- 15.) The ovarian cycle begins with an increase in follicle-stimulating hormone (FSH) and luteinizing hormone (LH).
- 16.) If the egg is unfertilized, menstruation begins with the loss of the endometrium of the uterus, and the rest of the cycle rebuilds it.
- 17.) A sperm cell has 3 parts:

- 1.) a head with chromosomes and an acrosome, a modified lysosome with digestive enzymes to eat through the jellylike layer around the ovum.
  - 2.) The middle piece with mitochondria to make ATP for energy.
  - 3.) The tail with a flagellum for movement.
- 18.) The birth control pill uses synthetic P&E to prevent ovulation.
- 19.) A vasectomy is the cutting and tying of the vas deferens, sterilizing the man.
- 20.) A tubal ligation is the cutting and tying of the oviducts, sterilizing the woman.
- 21.) The rhythm method is avoiding sexual intercourse during ovulation.
- 22.) The withdrawal method (coitus interruptus) is when the man pulls out before ejaculating. Warning: this is hard to do and pre-ejaculate from Cowper's gland contains sperm.
- 23.) A condom (male) is a plastic sheath that covers the erect penis to catch semen, preventing it from entering the vagina.
- 24.) A diaphragm is a dome-shaped bowl made of thin, flexible rubber that sits over the cervix, blocking semen. It is normally coated with spermicide to kill sperm.
- 25.) Meiosis II is not completed until fertilization ( $23 + 23 = 46$  chroms. in humans).
- 26.) What three STDs are bacterial and thus curable by antibiotics? Chlamydia infections, gonorrhea ("g"), and syphilis (chancres, fatal if untreated).
- 27.) What three diseases are viral and thus incurable? Genital herpes, genital warts (papillomaviruses), and HIV infection (human immunodeficiency → AIDS).
- 28.) Trichomoniasis ("trich," vaginitis) is a protozoan infection.
- 29.) A yeast infection (candidiasis) is a fungal infection common in women, frequently acquired without sex. Treatment is anti-fungal chemicals.
- 30.) Asexual reproduction is good for stable environments. It involves budding or fragmentation and regeneration (starfish, cacti, sponges).
- 31.) A hermaphrodite has both male and female sexual organs.