Cha pter 2
Gene tic Ba ses of Child D ev elo p me nt

CHAPTER OVERV I EW

I. Mo d ule 2 . 1 : M ec hanis ms o f H er ed ity
- a. T he B io lo gy o f Her ed it y
  - i. **Chro mo so mes**
    1. E gg a nd sp er m ea ch co ntai n 2 3 chr o

    mo so mes ii. **In Vit ro F er t iliza t io n**
  - iii. **Aut o so me s**
  - iv. **Sex Chro mo so mes**
    1. X and Y
  - v. **Deo xy ribo nucleic Aci d (DN A)**
  - vi. **Gene**
    1. **Geno t y pe**
    2. **P heno t y pe**
- b. Sin gle Ge ne I n her
  - itance i. **Alleles**
    1. **H o mo zy g o us**
    2. **H et er o zy go us**
  - ii. **Do mi na nt**
  - iii. **Rec essiv e**
  - iv. **Inco mplet e Do mi na nce**
  - v. **Sic kle Cell Tra it**
  - vi. T ab le 2 -1 S o me Co mmo n Ph en o typ es A sso cia ted with S in g le P a irs o f G en es
- c. Cul tur al I n fl ue nce s
  - i. W h y Do Afr ica n Amer ican s I nher it Sick le - Cell Di sea se?
- d. Genetic Di so r d er s
  - i. I nher ited Diso r d er s
    1. H unt ing t o n's D isea se
    2. P KU
    3. T ab le 2 -2 Co mmo n Diso rd ers A sso cia ted with R ec essive A ll eles
- e. I mp r o vin g C hild r en ' s Li ves
  - i. Genetic Co u nseli n g
  - ii. Ab no r mal N u mb er o f Chr o mo so mes
    1. **Do w n Sy ndro me**
    2. T ab le 2 -3 Co mmo n Diso rd ers A sso cia ted with S ex Ch ro mo so mes

II. Mo d ule 2 . 2 : H er ed ity, E n vir o n me nt, a nd Develo p me nt a. B ehavio r al Genet ics
- i. **B eha v io ra l Genet ics**
- ii. **P o ly g enic Inher it a nce**
- iii. Me tho d s o f B eha vio r al Geneti cs
  1. **M o no zy go t ic Tw ins**
  2. **Dizy g o t ic Tw ins**
  3. T wi n and ad o p tio n st ud ies
     a. Su m mar y T ab le *P rima ry Met h o d s fo r B eh a vio ra l G en etics*
- iv. W hich P s yc ho lo gica l C har ac t er istics ar e Af fec ted b y Her ed i t y? b. Fo cus o n Resear c h
  - i. Her ed itar y a nd E n vir o n menta l B ases o f Seco nd - La n gua ge L ea r nin g c. P aths Fro m Ge nes to B eha vio r
  - i. Her ed it y and en vir o n me nt in te r ac t d yna micall y thr o u g ho ut d evelo p me nt

1. **Epig ene si s**
2. **H er it a bilit y Co ef f ec ient**

ii. Genes c a n in fl ue nce the ki nd o f en vir o n ment to wh ic h a chi ld is exp o sed

1. **Niche - P ic king**

iii. E nvir o n me ntal i n fl uence s t yp i ca ll y make c hild r en wit hi n a f a mil y d if fer en t

1. **No nsha re d E nv iro n ment a l I nfluence s**

CHAPTER MODU LE SUPPL EMENTS

MODULE2.1:MECHANISMSOFHEREDITY

LEARNINGOBJECTIVES:

W hat ar e chr o mo so me s and g enes?
W hat ar e d o mi na nt a nd r ec ess ive tr aits? Ho w ar e the y i nher ited ?
W hich d iso r d er s ar e inher ited ? W hich ar e ca used b y to o ma n y o r to o fe w chr

o mo so mes? (See Hand o ut 2 -1 fo r a li st o f t he lear ni n g o b j ec tives fo r the chap

ter .)

KEYTERMS:

chr o mo so me s, p . 4 2
in vitro fer tiliza tio n, p .
4 2 auto so me s, p . 4 3
sex c hr o mo so me s, p . 4 3 d eo x
yr ib o nucle ic ac id (DNA) , p . 4
3 gene, p . 4 3
geno t yp e, p . 4
3 p heno t yp e,
p . 4 3 alleles, p
. 4 3
ho mo z ygo us, p .
44 heter o z ygo us,
p . 44 d o mi na nt,
p . 4 5 r ec essive, p
. 4 5
inco mp lete d o mi na nce , p
. 4 5 sickle -ce ll tr ait, p . 4 5
Hu nti ngto n' s d isea se, p . 4 7
Do wn s ynd r o me, p . 4 8

LEC TUR E SU G G EST IO NS , CLASS RO O M ACTIVIT I E S, AND D ISCU SSIO N TO P ICS:

Rep ro d uctive T ec hno lo g y De b a te Have the clas s d ivid e in t o t wo lar ge gr o up s. One gr o u p will d eb ate the i ss ue o f in vitro fertili za tio n , and o ne gr o up will d eb ate the is sue o f su r ro g a cy . Once the t wo lar ge gr o up s ar e d ec id ed , ea ch gr o up sho uld sub d i vid e into t wo s maller gr o up s so t hat b o t h sid es o f t he d eb ate iss ue ar e r ep r esented (e. g. , p r o and co n) . Give st ud ent s se ver al class p er io d s to p r ep ar e fo r the d eb ate. On d eb ate d ay, the f ir st t wo gr o up s wil l d eb ate the to p ic o f in vitro fer tiliza tio n wh ile the o t her t wo gr o up s (in the sur r o gac y gr o up) watc h and eval uate. T hen the o ther t wo gr o up s will d eb ate t he to p ic o f sur r o gac y wh ile th e in vitro fer t ilizatio n gr o up watc hes. A fo r mat fo r t he d eb ate is listed b elo w and ca n b e mo d i fied to fit c las ses o f d i f fer ent le ng th s:

Deba t e 1 : In V itro F ertiliza tio n (3 0 mi n utes)
I . Co nstr uc tive Sp ee ches (P r esentatio n o f yo ur sid e o f the
ar gu me nt) : A. PRO sid e will p r ese nt fo r 7 min ute s
1 . Cr o ss -e xa minat io n b y t he C ON sid e fo r 3 mi n
utes B . CON sid e will p r ese nt fo r 7 min ute s
1 . Cr o ss -e xa minat i o n b y t he PRO sid e fo r 3 min utes
I I . Reb uttal Sp ee ches (Yo ur r esp o nse to the o t her sid e' s ar gu men t) :
A. C ON s id e wi ll r eb ut fo r 5 mi
nute s
B . PRO sid e will r eb ut fo r 5 minu
tes
I I I . Questio ns fr o m Aud ience (5 mi n utes)

Deba t e 2 : Su rro g a cy (3 0 mi n utes)

I . Co nstr uc tive Sp ee ches (P r esentatio n o f yo ur sid e o f the ar gu me nt) : A. PRO sid e will p r ese nt fo r 7 min ute s

1 . Cr o ss -e xa minat io n b y t he C ON sid e fo r 3 mi n utes B . CON sid e will p r ese nt fo r 7 min ute s

1 . Cr o ss-e xa minat io n b y t he PRO sid e fo r 3 min utes

I I . Reb uttal Sp ee ches (Yo ur r esp o nse to the o t her sid e' s ar gu men t) :

A. C ON s id e wi ll r eb ut fo r 5 mi nute s

B . PRO sid e will r eb ut fo r 5 minu tes

I I I . Questio ns fr o m Aud ience (5 mi n utes)

Guest Sp ea k er: Infe rt ility Sp e cia list As k an i n fer tilit y sp ec ia list to sp ea k to yo ur class ab o u t his/ her wo r k and t he challe ngi n g is sue s s ur r o und i n g thi s ne w se g me nt o f t he hea l th ca r e ind u str y. Co ntact a lo c al ho sp ital fo r a r efer r al.

Wha t W o uld Y o u Do ? Hand out 2 -2 as ks s tud e nts to co ns id er a var iet y o f o p tio ns t he y ma y fac e if t he y ar e co nfr o nted wit h an i n fer tilit y s ituatio n in t heir o wn li ves. St ud ent s s ho uld co mp lete t he ha nd o ut in cla ss a nd d iscu ss the r a mi ficat io ns o f ea ch o p tio n in s ma ll gr o up s.

Send in the C lo nes As k yo ur stud e nts to r esp o nd to the fo ll o wi ng t wo q ue stio n s: W o uld yo u wa nt to ha ve ano t her "yo u" ar o u nd ? W hy o r wh y n o t? T heir ans wer s to t he " wh y o r wh y no t" q ue stio n s ho u ld lead into a d iscus sio n o f the b ene fits a nd r isk s o f genet i c engi nee r i ng i n ge ner al, and c lo nin g i n p ar ticular . Sever al p o p ular so ur ce s (Time and New swee k) ha ve r ec ent l y fea t ur ed sto r ies o n clo ni ng, wh ic h ma y sup p le ment t he d isc us sio n nicel y. Also , i nvi tin g a set o f (p r efer ab l y id entica l) t wins to r eflec t o n the ir d evelo p men tal exp er ie nce s will ma ke this cla ss sess io n a me mo r ab le o ne.

Yo ur Genetic P ro f ile T o clar ify the co nce p t s o f p he no t yp e, g eno t yp e, and d o mi nant a nd r ec essi ve alleles, as k yo ur stud e nts to co mp lete Ha nd o ut 2 -3 either b efo r e class o r as a n in -c lass e xer cise. Yo u ma y want to d istr ib ute Ha nd o ut
2 -4 to sup p le me nt the te xtb o o k co ver age o f t he to p ic, b ut st ud ent s u suall y d o an ad eq uate j ob o f co mp leti n g
Hand o ut 2 -3 wit ho ut a d d itio n al r eso ur ce s. W hile heter o z yg o us ge no t yp e s ma y b e d if ficul t to d eter mi ne, the p o int o f this e xer cise i s to ma ke the stu d ents main tain clea r d isti n ctio ns b et wee n p heno t yp es a nd ge no t yp es, a nd to ca use the m to r ea so n ab o ut d o mina n t a nd r ec essi ve in her ita nce p atter ns.

Genetics W o rk s heet Fo r ano t her ac tivi t y to clar if y t he co nc ep ts o f p heno t yp e, geno t yp e, and d o mi na nt a nd r ec es sive alleles, as k yo ur s tu d e nts to co mp lete Hand o u t 2 -5 either b ef o r e class o r as a n in - clas s exer cise. T he p o int o f this exer cise is to make t he st ud en t s mai ntai n clea r d isti nctio n s b et wee n p he no t yp es a nd ge no t yp e s, and to ca use t he m to r ea so n ab o ut d o mina nt a nd r ec essi ve in her it a nce p atter ns.

Y o ur Genetic Fa m ily T ree T his p r o j ec t is an elab o r atio n o f the "Yo ur Gene tic P r o file" exe r cise d escr ib ed ab o ve. As a ho me wo r k ass ig n men t, h ave yo ur stud e nts co n str uc t a f a mil y tr ee o f ge netic c har ac ter istics, i ncl ud in g no r mal char ac ter istic s and ge netic d is o r d er s. W ith their p ar ents ' a n d gr and p ar ents ' help , the st ud ents sho uld b e ab le to tr ac e their ge netic a nce str y b ac k to their gr ea t -gr ea t - gr and p ar ents.

Guest Sp ea k er: Genetic Co un selo r I n vite a ge netic co u nse lo r to sp ea k to yo ur class ab o ut his/ her wo r k (ca ll a lo ca l ho sp ital fo r r efer r als). Have y o ur stud e nts p r ep ar e q uestio ns in ad vance o f the vis it to ma k e the ses sio n e ven mo r e valuab le.

Dea ling with Do wn Synd ro m e Dep end ing up o n a vailab ilit y o f sp ea ker s a nd the in ter ests o f yo ur class, i nv ite to yo ur clas s an i nd ivid ual who i s in vo lved wit h ca r egi vi ng fo r child r en wit h Do wn s ynd r o me. T his p er so n ma y b e a p ar ent o f a child wit h Do wn s ynd r o me, a co u nselo r in a gr o up ho me o r lar ger fac i lit y that ser ves t he nee d s o f child r en wit h d evelo p me ntal d iso r d er s, a p r escho o l o r eleme ntar y teac her wit h sp ec ial ed u ca tio n ce r tifica tio n, etc. Ask hi m/ her to shar e so me i n s igh t a b o ut the se chi ld r en, b r in gin g to yo ur class a p er so nal (r ather tha n si mp l y ac ad emic) p er sp ec tive o n th is d iso r d er .

Inter net A nno ta ted Bib lio g ra p hy Have yo ur stud e nts use t h e I nter net to id enti f y 1 0 web si tes that gi ve sc ho lar l y in fo r matio n o n the gene tic d is o r d er s d iscussed in t his c hap te r . Stud ent s sho uld t yp e an a n n o tated b ib lio gr ap hy t hat incl ud es the fo llo wi ng:

1. T he **na me** o f t he web site (e. g. , Natio nal Do wn S ynd r o me So ciet y).
2. A **v a lid UR L** (web site ad d r ess, e. g. , http :// nd ss. o r g /).
3. A b r ief (o ne o r t wo p ar agr ap h) **re v iew** o f the web site. Re vie ws s ho uld inc lud e a b r ief **su mma ry** o f wh at stud e nts ca n exp ec t to fi nd if t he y vis it the web s i te and a b r ief **ev a lua t io n** o f the web site.

As a fo llo w- up to thi s ac ti vit y, stud en ts ca n co mb ine all o f th e anno tated b ib lio gr ap hies i nt o an I nter net Reso ur ce

Dir ec to r y t hat co uld b e d istr ib uted in cla ss o r use it to co mp l ete the Kn o win g th e R isks ac ti vit y d e scr ib ed next.

Kno wi ng the Ri sk s T o pr o vid e stud en ts wit h a mo r e i n -d ep t h exp o s ur e to genetic d i so r d ers, have t he m co mp lete

Hand o ut 2 -6 b y usi n g the te xt, l ib r ar y r eso ur ce s, o r the I n ter net (see I nter net Re so ur ce list fo r this c hap ter) . Stud ent s

co uld a lso use t heir I nter net Anno tated B ib lio gr ap h y fr o m t h e p r evio us ac ti vit y. T his a ssi g n me nt wo r k s well as a n ind ivid ual o r s mal l gr o up p r o ject.

My Virt ua l Chi ld My V irtu a l Ch ild is an e xciti ng ne w ad d iti o n to the Kail te xt tha t st ud ent s ar e sur e to fi nd b o th inter esti n g and ed uca tio nal. W ith My V irtu a l Ch ild , st ud en ts lo g o n to the co ur se web site wher e the y will b e ab le to cr ea te their o wn vir t ual c Stud e nts ar e then r esp o n sib le fo r "r aisi n g" th is c hild fr o m b ir t h thr o u gh a ge 1 8 . **P lea se see**
t he Intr o duct i on t o My Virtua l Child list e d in Cha pte
r 1 o f t his ma nua l f o r mo re de t a ils.

P a rt 2– **Three t o Nine M o nths:** I n P ar t 2 o f My V irtu a l Ch ild , stud ent s ar e r esp o nsib le fo r r aisin g the ir child fr o m 3 to 9 mo nt h s o f age. As us ual, stud e nts ar e as ked to make a s er i es o f p ar entin g d ec isio ns, h ave ac ce ss to v id eo clip s o f child r en i n t his a ge r an ge, and ar e give n a set o f d isc u ssio n q uest io ns to r eflec t o n eit her o r ally o r in wr iti n g. Discu ssio n q ues tio ns fo r thi s s ec tio n ar e as fo llo ws:

1. Ho w d o es yo ur b ab y's ea ti n g, sleep in g and mo to r d evelo p ment c o mp ar e to the t yp ical d e v elo p me ntal p atter ns?

2. At 8 mo nt hs o f a ge was yo ur c hild an ea sy , slo w- to - wa rm - up , o r d ifficu lt b ab y i n ter ms o f T ho mas a nd
Che ss 's cla ssic te mp er a me ntal ca tego r ies? On what d o yo u b ase this j ud g me nt?

3. Ho w is yo ur c hild ' s attac h me n t to yo u and yo ur p ar tner d evelo p ing? W hat is hap p eni n g at the 3 - mo nt h a nd
8 - mo nth p er io d s that mi g ht a f f ec t a ttach men t secur i t y ac co r d ing to B o wlb y and Ai ns wo r t h, and var io us r esear ch st ud ies?

Stud e nts ar e ab le to p r int o ut t hese q ue stio n s d ir ec tl y fr o m t he web site i n ad va nce , and at 9 mo nth s o f a ge, the y ar e give n a p ed iatr ician 's r ep o r t o f the ir child 's d evelo p me nt a n d then g ive n t his se t o f q ues tio ns a gain to a ns wer (either in wr itte n, o r al, o r test fo r ma t, d ep end ing o n t h e in str uc to r 's p r efer ence) . T his sec tio n co ul d b e sup p leme nted wit h ac tivitie s o r in fo r matio n o n **o bje ct per ma nence** (Chap ter 6) **, B a y ley Sca les o f Infa nt Inte llig ence** (Chap ter 8) **, t e mpera ment** (C hap ter 1 0) and **a t ta ch ment** (C hap ter 1 0) .

F ILM S/VIDEO S/IN T ERN E T SO URC ES:

Hered ity a n d th e En viro n men t: B lu ep rin ts fo r a B a by fr o m T h e Dev elo p in g Ch ild ser ies (M agna S yste ms, 1 9 9 6 , 29 mi nute s) . E xp lo r es the var io u s asp ec ts o f co nce p tio n and th e fu nctio n o f ge nes a nd chr o mo so mes, and p r o vid es a n o ver vie w o n i n her itan ce a nd the inter ac t io n o f natur e a nd n u r tur e. Genetic ab no r ma lities a nd ge netic co u nseli n g ar e also co ver ed .

Hu ma n R ep ro du ctive B io lo g y (Fil ms fo r the H u ma nities a nd Science s, 1 9 9 4 , 3 5 min utes). T his p r o gr am co ver s the p r o ce sses lea d ing to no r mal i mp r e g n atio n as we ll a s var io u s fer tiliza tio n tec

hniq ues (e. g. , s ynthe tic sti mu latio n o f ho r mo ne s, in vitro fer tiliza t io n , micr o -i nse mi natio n, a nd test - tub e e mb r yo tr an sfer to t he wo mb) .

Hered ity a n d th e En viro n men t: B lu ep rin ts fo r a B a by fr o m T h e Dev elo p in g Ch i ld ser ies (M agna S yste ms, 1 9 9 6 , 29 mi nute s) . E xp lo r es the var io u s asp ec ts o f co nce p tio n and th e fu nctio n o f ge nes a nd chr o mo so mes, and p r o vid es a n o ver vie w o f i n her itance a nd th e inter ac tio n o f nat ur e and n ur tur e. Genetic ab no r malitie s and ge netic co u nse li n g ar e also co ver ed .

I a m Dek el: P o rtra it o f a Life with Do wn S yn d ro me (Fil ms f o r the Hu mani ties a nd Science s, 2 0 0 0 , 2 8 min ute s) . A d o cu men tar y o f a d a y i n t he li fe o f De kel S hekar zi, a 2 1 - yea r -o ld ac to r , po et, d ance r , and ro ma ntic. Heb r e w wit h E ngl is h s ub titles.

Th e Lily V id eo s: A Lo n g itud ina l V iew o f Life with Do wn S yn d ro me (David so n Fil ms – see d etails b elo w) . E lizab eth Gr ac e ca p tur es the es sence o f her d aug hter , L il y, as a scho o l gir l, a yo u n g wo ma n, and an a d ult wit h Do wn s ynd r o me. An e nga gi ng a nd i nsp ir i ng vid eo ser ies.

Lily: A S to ry A b o u t a Girl Like Me (1 9 7 8, 1 4 mi n utes). L il y at age 1 0 (3rd gr ad e) .

Lily: A S eq u el (1 9 88 , 15 mi n u tes). Lil y, at age 2 0 , gr ad uate s fr o m hi gh scho o l, wo r ks at a r estaur an t, and r esid es in a gr o up ho me.

Lily a t Th irty (1 9 9 7 , 14 mi nut es). Lil y live s in a n ap ar t me nt in an i nd ep end ent li vi n g p r o gr a m and is wo r ki ng i n a s up er mar ket. She s har es her vie ws o n li fe with her d isab ili t y.

Du o : Th e Tru e S to ry o f a Gifted Ch ild with Do wn S yn d ro me (1 9 96 , pr o d uce d b y Ale xa nd r e Gin n z and Ser gio
Sanc hez) .

S ea n ' s S to ry — A Lesso n in Life – seg me nt fr o m Life sp a n Hu ma n Dev elo p men t, S eries I I I (AB C Ne ws/P r entice Hal l Vid eo Lib r ar y, 1 9 9 6 , 1 6 .5 mi n utes). Vid eo seg me nt d etails t he fir st mo nt hs o f p ub lic scho o l fo r an 8 - yea r -o ld child wit h Do wn s ynd r o me. I ss ues o f mai nstr ea mi n g and d evelo p men tal exp ec tatio ns ar e p o r tr ayed .

S p ec ia l Need s S tu d en ts in R egu la r Cla ssro o ms? S ea n ' s S to ry (Fil ms fo r the H u mani ties a n d Science s, 1 9 9 4 ,
4 5 mi nu tes). T his vid eo tells t he sto r y o f Sean, a n 8 - yea r -o l d wit h Do wn s ynd r o me, who s e p ar ents fo u g ht to ha ve hi m in r e gular cla ssr o o ms. Co mp ar i so n s ar e mad e to Sean 's fr iend , B o b b y, who al so has D o wn s ynd r o me b ut i s enr o lled in a sp ec ial ed uca tio n scho o l.

Ch ild ren o f Men (Univer sal P i ctur es, 2 0 0 6 , 10 9 mi nute s) an d Th e Ha n d ma id ' s Ta le (B io sko p Fil ms, 1 9 9 0 , 1 0 8 mi nute s) – b o th fil ms d ea l wit h a fict io nalize d f ut ur e E ar th i n a ti me wh e n nat io n wid e i nfe r tilit y p r o b le ms r aise a ll so r ts o f eth ical iss ue s that stud ents mi gh t want to co n sid er .

– web site o f t he Natio nal Do wn S ynd r o me So ciet y

– Hu ma n Geno me P r o j ec t info r matio n, gene map p in g, and lin k s to the Ge n etic W o r ld (so cial issues, b asi c genetic i n fo r matio n, r eso ur c es, etc.)

Ho me p age fo r the Natio nal Ma r ch o f D i me s o r gan izati o n. T his site co ntai ns in fo r matio n a nd lin k s that p er t ain to ge netic and c hr o mo so mal d iso r d er s.

a web si te ab o ut sic kle -ce ll a ne mia

W eb sites ab o ut H u nti ng to n 's Disea

M O DULE 2 . 2 : H EREDI TY, ENVIRO NM ENT, AN D DE VELO P M ENT

LEARNINGOBJECTIVES:

W hat met ho d s d o scienti sts us e to stud y t he i mp ac t o f her ed i t y and en vir o n me nt o n c hild r en' s d evelo p me nt ? Ho w d o her ed it y a nd env ir o n men t wo r k to get her to in fl uen ce child d evelo p me nt?

KEYTERMS:

b ehavio r al ge netic s, p . 50
p o lygen ic in her ita nce , p . 51 mo no z ygo tic t wi n s, p . 5 2 d izygo tic t wi n s, p . 5 2
ep igene sis, p . 58
her itab ilit y co ef ficie nt, p . 5 8 niche -p ic ki ng, p . 5 9
no ns har ed en vir o n men tal in fl u ence s, p . 60

LEC TUR E SU G G EST IO NS , CLASS RO O M ACTIVIT I E S, AND D ISCU SSIO N TO P ICS:

Na ture/Nu rtu re In tera ctio ns Sand r a Scar r 's t heo r y o f geno t yp e -e nv ir o n me nt i nter ac tio n war r ant s a d e mo n str atio n d ue to its co mp lex it y. I n her chap ter in a b o o k entitled Th e E merg en ce o f P erso n a lity (198 7) , Scar r p r o vid es sever al exa mp le s o f ho w ge neti cs a nd envir o n me nt i nter ac t in shap i ng o ne' s p er so nalit y. Hand o u t 2 -7 p r esents se ver al exa mp le s tha t Sca r r used to ill ustr ate t he thr ee t yp es o f geno t yp e -e n vir o n ment i nter ac tio ns. Have yo ur s tud e nts ind icate wh ich t yp e o f i nter ac t io n ea ch exa mp le d ep icts .

Grea t Ex p ec ta tio ns Have st ud ents watc h t he vid eo Grea t E x p ec ta tio n s (see r efer ence b elo w i n t he Fil ms/ Vid eo s sec tio n) . Stud e nts ca n wr ite a su m mar y/r e vie w o f t he v id eo , o r yo u ca n u se the fo llo wi ng q uestio ns to help guid e and eval uate st ud ent s ' vie wi n g o f t he fil m:

Acc o r d in g to the vid eo , d o es divo r ce af fec t b o ys and gir ls d i f fer entl y? Gi ve evid e nce to su p p o r t yo ur ans wer .

Discu ss wh at yo u b elieve Ur ie B r o nfenb r en ner mea nt wh en he d escr ib ed the nat ur e ver s us nur t ur e

co ntr o ver s y a s "o ut -of -d ate. "

Acc o r d in g to the vid eo , ho w i s d evelo p me nt a f fec ted b y b o th o ur o wn ch ild ho o d and the e xp er ience s o f o ur p ar ents?

Discu ss J er o me Kaga n 's id ea t hat so me asp ec ts o f gr o wth ar e uni ver sal.

Discu ss J er o me Kaga n 's b elie fs ab o ut ho w d i f fer ence s in p e o p le emer ge.

F ILM S/VIDEO S/IN T ERN E T SO URC ES:

Grea t E xp ec ta tio n s (Amb r o se Vid eo P ub lishin g, 1 9 9 1 , 60 mi nute s) . Fro m the ser ies Ch ild h o o d , this vid eo p r o vid es a lo o k at the i mp o r tance o f b o th "nat ur e" and "n ur t ur e, " and ho w d i f fer ent so cieties a p p r o ac h b ir th.

B io lo g ica l G ro wth : Na tu re' s Ch ild (I nsi ght M ed ia, 1 9 9 1 , 60 mi n utes) . E xp lo r es t he nat u r e -n ur tur e co ntr o ver s y. E xa mine s the i n fl uence s o f ge netics o n b ehav io r , co nce ntr ati ng o n her ed itar y co ntr ib utio n s to intelli gence , te mp er a me nt, p er so nalit y, se x d iffer e nce s, and men tal ill nes s .

Like Two P ea s in a P o d (Filmmaker s L ib r a r y, 1 9 9 1 , 5 5 min utes). Re vie ws the p s ycho lo g y o f t wi ns b y fo llo wi ng thr ee sets o f t wi ns as t he y d ev elo p .

Th e E co lo g y o f D ev elo p men t (I nsi gh t M ed ia, 1 9 9 2, 3 0 mi n ut es). T his vid eo r evie ws ho w e nvir o n me ntal a nd ge netic fac to r s in fl ue nce the d eve lo p men t o f c h ild r en fr o m 1 2 fa mi lies in 5 co u ntr ies.

Th e Hu ma n A n ima l: Na tu re an d Nu rtu re (Fil ms fo r the H u man ities a nd Scie nce s, 1 9 9 1 , 5 2 mi nu tes). P r o d uce d b y P hil Do nah ue, t his vid eo incl u d es c lassic fo o tage fr o m Har lo w' s lab a nd the Mi nne so ta t wi n st ud y as we ll a s inter v ie ws wit h p r o mi nen t p s ycho lo gis ts co ver i ng t he natur e /nur t ur e

CHAPTER 2 CASE STUDY

Gen etic B a ses o f Ch ild Dev elo p men t

B ar b ar a and B r end a ar e ad o lescent t wi ns. T he y b o th ha ve b r o wn hair , haz el e yes, wa v y ha ir , fr ec kles, t hi n lip s, and , at the mo me nt , the y have ca ses o f p o iso n i v y. As a child , B r end a enj o yed p la yi n g and ac ti vel y e xp lo r in g her en vir o n ment ; B ar b ar a wa s q uieter and enj o yed b ein g hel d b y her mo ther , who wa s a b r igh t a nd s h y wo ma n. Since B r end a was t he "exp lo r er , " her extr o ver ted , athlet ic fa ther (un inte ntio nall y) p la yed wit h her mo r e tha n he p layed wit h B ar b ar a. B arb ar a p ar ticip ated in mo r e so litar y p la y ac ti vities o r wo r ked o n cr afts wi th her mo t her . I n their teena ge yea r s, B r end a was d escr ib ed b y her p ee r s as "o utgo i ng, a ni mated , sp o ntaneo us, tal kati ve, fr ie nd l y, a nd p o p ular . " B ar b ar a was d escr i b ed b y her p ee r s as "q uiet, s h y , intelli gen t, and nice. "

1. Ma n y c har ac ter istic s o f B ar b ar a and B r end a ar e listed in the ca se ab o ve. Do these fea t ur es r ep r esent their p heno t yp e s o r geno t yp e s?

2. W hich o f B ar b ar a and B r end a's c har ac ter istic s ar e the r es ult s o f ho mo z ygo us ge no t yp es a nd whic h ar e likel y the r esu lts o f heter o z ygo u s ge no t yp es?

3. W hich c har ac ter istic s in t he a b o ve d escr ip tio ns o f B ar b ar a and B r end a ar e likel y t he r esu lt s o f si ng le ge ne inher i tance ? P o lyge nic i nher i t ance ?

4. W hat t yp es o f ca r ee r s ar e B ar b ar a and B r end a likel y to p ur s ue? Car ee r selec tio n is an e xa mp le o f wh at t yp e o f gene -e nv ir o n me nt r elatio n?

CASE STUDY ANSWERS

Gen etic B a ses o f Ch ild Dev elo p men t

1. P heno t yp es

2. Ho mo z ygo us ver s us heter o z ygo us ge no t yp e:

Ho mo z ygo us Ge no t yp e	Hete r o zygo u s Ge no t yp e
B r o wn ha ir T hin lip s	Haz el e yes W av y ha ir
Susce p tib il it y to p o iso n i v y	Fre ckles

3. Sin gle ver su s p o l yge nic i n her itance :

Sin gle Ge ne I n her itance	P o lygenic I nher ita nce
Hair co lo r E ye co lo r	Chi ld ho o d ac tivit y level s T ee nage p er so nalit y c har ac ter i stics
Hig h chee k b o nes	T ee nage intelli ge nce
Nar r o w no se s	

4. B ar b ar a is likel y to p ur sue a c ar ee r that d o es no t in vo lve e xt ensi ve i nter ac tio n wit h o ther s (e. g. , wr iti ng, co mp uter p r o gr a m mi ng) . B r end a' s o ut go in g p er so nalit y wil l likel y g uid e her to war d a ca r ee r in sales, mar ket in g, p o litics, la w, etc. T hese ar e b o th exa mp les o f n ic h e p ickin g .

HANDOUT 2 - 1

Discu ssio n Que st io ns f o r Ch a pte r 2

1. W hat ar e chr o mo so me s and g enes?

2. W hat ar e d o mi na nt and r ec ess ive tr aits?

3. Ho w ar e the y i nher ited ?

4. W hich d iso r d er s ar e inher ited ?

5. W hich ar e ca u sed b y to o ma n y o r to o fe w c hr o mo so me s?

6. W hat met ho d s d o scienti sts us e to stud y t he i mp ac t o f her ed i t y and en vir o n me nt o n c hild r en' s d evelo p me nt ?

7. Ho w d o her ed it y a nd env ir o n men t wo r k to get her to in fl uen ce child d evelo p me nt?

HANDOUT 2 - 2

Wha t Wo uld Yo u Do ?

Direc tio n s: I mag ine t hat yo u have b ee n mar r ied fo r 1 5 yea r s and ar e 3 8 yea r s o ld . Yo u and yo ur sp o u se ha ve no t yet b ee n ab le to co nce ive a c hi ld , even tho ug h yo u have b ee n tr yin g co nce r ted l y fo r the p as t e igh t yea r s. Ra n k the fo llo win g o p tio ns fr o m mo st t o least p r efer r ed (1 = mo st, 8 = least), and p r o vid e so me r ea so ns (p r o s and co ns) fo r yo ur r an ki ng.

_ a. Hir e a sur r o gate mo t her (if t he wi fe is i n fer til e) .
P r o s/Co ns:

_ b. Co ntact a sp er m b a nk (i f t he h usb and i s in fer tile) .
P r o s/Co ns:

_ c. P ay a la wyer a mi ni mu m o f $ 1 0 , 0 00 to tr y to "b u y" a b ab y f o r yo u.
P r o s/Co ns:

_ d. B ec o me clie nts at a fer tilit y cl inic eve n t ho u gh ea c h atte mp t at p r egnanc y wil l c o st $ 1 0 , 0 00 and the chance o f co nce i vin g is ver y s mall.
P r o s/Co ns:

_ e. Ap p l y to ad o p t a b ab y thr o u g h legal cha n nels alt ho u g h it wil l ta ke at least fi ve yea r s i f yo u ev er get a b ab y.
P r o s/Co ns:

_ f. Ad o p t a "har d -to -ad o p t" child (i.e . , an o ld er child , o ne with s er io us ha nd icap s, etc.) .
P r o s/Co ns:

_ g. Ad o p t a b ab y fr o m ano t her co untr y at t he co st o f $ 1 5 , 0 0 0 – $4 0 , 0 00 even tho u g h it will ta k e 2 -3 yea r s and ma y no t b e succ e ss f ul.
P r o s/Co ns:

_ h. Red ir ec t yo ur ener gies i nto yo ur ca r ee r , ho b b ies, so cializing, civic ac ti vities, etc.
P r o s/Co ns:

S o u rce : DeWo lff, D. K. & K ail, R. V. (1 9 9 3) . In stru cto r' s R eso u rce a n d Testin g Ma nu a l to A cc o mp an y Dev elo p men ta l P syc h o log y (5 th ed .) . E ngle wo o d Cliff s, NJ : P r ent ice Hall.

HANDOUT 2 - 3

Yo ur Genet ic P ro f ile

Direc tio n s: Co mp lete t he fo ll o wi ng tab le b y li sti n g the c har ac ter istics o f yo ur p ar ent s and yo ur sel f.

Char ac ter is tic	Mo ther ' s T r ait (her p heno t yp e)	Father 's T r ait (his p he no t yp e)	Yo ur T r ait (yo ur p heno t yp e)	Y o ur Geno t yp e *
E ye co lo r				
Hair co lo r				
Heig ht (ta ll, a ve ra g e, sh o rt)				
B o d y weig ht (o ve rweig h t, a ve ra g e, u n d erweig n				
B lo o d typ e				
P er so nalit y (sh y o r o u tg o ing ; p a ssive o r a g g ressive, etc .)				

*Ho mo z ygo us, he ter o z ygo us, o r inco mp lete d o mina nce

HANDOUT 2 - 4

Do mi na nt a nd Rec es siv e Ch a ra ct er ist ics

Char ac ter is tics i n t he left - han d co lu mn d o minate o ver tho se char ac ter istics l isted in t he r i g ht -ha nd co lu mn.

Do mi na nt Tra it s Rec essiv e Tra it s

e ye co lo r b r o wn gr a y, gr ee n, haz el, b lue	
visio n far si gh ted nes s no r mal visio n no r mal visio n	no r mal visio n
	nea r si ghted
	nes s nig ht b li
	nd ne ss co lo r b
	lind ness *
hair d ar k hair no n -r ed hair cur l y hair	b lo nd e, light, r ed
fu ll hea d o f hair	hair r ed hair
wid o w' s p ea k	str aig ht ha ir b ald ness * no r mal hair line
fac ial fea tur e s d i mp les	no d i mp les
unat tached ea r lo b es fr ec kle s	attac hed ea r lo b es no fr ec kle s
b r o ad lip s	thi n lip s
ap p end ages extr a d igit s fu sed d igit	no r mal nu mb er o f d igit s no r mal d ig its
s sho r t d igit s	no r mal d ig its
fi nger s lac k o ne j o int li mb d war fi ng	no r mal j o ints
club b ed thu mb d o ub le -j o inted nes s	no r mal p r o p o r tio n no r mal t hu mb no r mal j o ints
o ther char ac ter istic s i mmu nit y to p o iso n i v y	su sce p tib ilit y to p o iso n i v y alb inis m
no r mal s ki n p ig me ntatio n no r mal b lo o d clo tting no r mal hea r in g	he mo p h ilia * co nge nital d ea f nes s p hen ylke to n ur ia (P KU)
no P KU (no r ma l) T yp e A b lo o d T yp e B b lo od	T yp e O b lo o d
Rh -p o siti ve b lo o d	T yp e O b lo o d Rh - negat ive b lo o d

* se x- lin ked char ac ter is tic

S o u rce : Hor to n, S. & P r eisser , G. (1 99 7) . I n stru cto r’ s R eso u rce Ma n u a l to A cco mp an y Dev elo p men t A cro ss th e Lifesp a n . Up p er Sad d le River , NJ : P r entice Hall.

HANDOUT 2 - 5

Genet ics Wo r
ksheet

Do min a n t - R ec essive Gen etic R ela tio n sh ip s (Ho mo zyg o u s - Ho mo zyg o u s):
B = Da rk H a ir (Do mi na nt) b = B lo nde H a ir (Re ce ssiv e)

Da rk- H a ired F a t her (H o mo zy g o us) B lo nde M o t her (Ho mo zy g ous)

Geno t yp e: **BB** Geno t yp e: **bb**
P heno t yp e: **Da r k H a ir** P heno t yp e: **B lo nde H a ir**

Geno t yp e: _ Geno t yp e: _ Geno t yp e: _ Geno t yp e:
P heno t yp e: P heno t yp e: P heno t yp e: P heno t yp e:

Do min a n t - R ec essive Gen etic R ela tio n sh ip s (Hete ro zyg o u s - Ho mo zyg o u s):

Da rk- H a ired F a t her (H et er ozy g o us) B lo nde M o t her (Ho mo zy g o us)

Geno t yp e: **Bb** Geno t yp e: **bb**
P heno t yp e: **Da r k H a ir** P heno t yp e: **B lo nde H a ir**

Geno t yp e: _ Geno t yp e: _ Geno t yp e: _ Geno t yp e:

P heno t yp e: P heno t yp e: P heno t yp e: P heno t yp e:

Do min a n t - R ec essive Gen etic R ela tio n sh ip s (Ho mo zyg o u s - Hete ro zyg o u s):
B = Da rk H a ir (Do mi na nt) b = B lo nde H a ir (Rec essiv e)

<u>Da rk- H a ired F a t her (H o mo zy g o us) Da rk- H a ired M o t her (H et ero zy g o us)</u>

Geno t yp e: **BB** Geno t yp e: **Bb**
P heno t yp e: **Da r k H a ir** P heno t yp e: **Da r k H a ir**

Geno t yp e: _Geno t yp e: _ Geno t yp e: _ Geno t yp e:
P heno t yp e: P heno t yp e: P heno t yp e: P heno t yp e:

Do min a n t - R ec essive Gen etic R ela tio n sh ip s (Hete ro zyg o u s - Hete ro zyg o u s):

<u>Da rk- H a ired F a t her (H et er ozy g o us) Da rk- H a ired M o t her (H et ero zy g o us)</u>

Geno t yp e: **Bb** Geno t yp e: **Bb**
P heno t yp e: **Da r k H a ir** P heno t yp e: **Da r k H a ir**

Geno t yp e: _ _ Geno t yp e: _Geno t yp e: _ Geno t yp e:
P heno t yp e: P heno t yp e: P heno t yp e: P heno t yp e:

Do min a n t - R ec essive Gen etic R ela tio n sh ip s (Co d o min a n ce):
A = Ty pe A B lo o d (Do mi na n t) B = Ty pe B B lo o d (Do mina n t)
o = Ty pe O B lo o d (R ec essiv e)

F a t her (Ty pe A – H o mo zy g o us) M o t her (Ty pe B – Ho mo zy g ous)

Geno t yp e: **AA** Geno t yp e: **BB**
P heno t yp e: **Ty pe A B lo o d** P heno t yp e: **Ty pe B B lo o d**

Geno t yp e: _ Geno t yp e: _ Geno t yp e: _ Geno t yp e:
P heno t yp e: P heno t yp e: P heno t yp e: P heno t yp e:

F a t her (Ty pe A – H et er o zy g ous) M o t her (Ty pe B – H et er o zyg ous)

Geno t yp e: **Ao** Geno t yp e: **Bo**
P heno t yp e: **Ty pe A B lo o d** P heno t yp e: **Ty pe B B lo o d**

Geno t yp e: _ Geno t yp e: _ Geno t yp e: _ Geno t yp e:
P heno t yp e: P heno t yp e: P heno t yp e: P heno t yp e:

Do min a n t - R ec essive Gen etic R ela tio n sh ip s (X - Lin ke d o r S ex - Lin ke d)
X = No r ma l F e ma le Sex C hr o mo so me (Do
mi na nt) Y = No r ma l M a le Sex Chro mo so me
X ^{h} = F e ma le Sex C hro mo so me (H e mo p hilia Tra it – Recessiv e)

<u>Una f f ec t ed F a t her Ca rr ier M o t her</u>

Geno t yp e: **XY** Geno t yp e: **XX ^{h}**
P heno t yp e: U naf fec ted Ma le P heno t yp e: Car r ier Fe male

B o y 1 B o y 2 Gir l 1 Gir l 2

Geno t yp e: _ Geno t yp e: _ Geno t yp e: _ Geno t yp e:
P heno t yp e: P heno t yp e: P heno t yp e: P heno t yp e:

<u>H e mo p hilia c F a t her Ca rr ier M o t her</u>

Geno t yp e: **X ^{h}Y** Geno t yp e: **XX ^{h}**
P heno t yp e: He mo p hiliac Ma le P heno t yp e: Car r ier Fe male

B o y 1 B o y 2 Gir l 1 Gir l 2

Geno t yp e: _ Geno t yp e: _ Geno t yp e: _ Geno t yp e:
P heno t yp e: P heno t yp e: P heno t yp e: P heno t yp e:

HANDOUT 2 - 6

K no w ing t he
Risks

Direc tio n s: Kno wled ge o f ge netic d iso r d er s ma y b e yo ur b est p r o tectio n agai nst t he m. U se the te xtb o o k, lib r ar y r eso ur ce s, o r the I nter net to lo ca te in fo r matio n o n the c har ac ter istics, r is k fac to r s, and avail ab le tr ea t ment s (if a n y) fo r the ge netic d iso r d er s listed b elo w.

Genetic Di so r d er	Char ac ter is tics o f t he Diso r d er	Ris k Facto r s	T r ea tment (i f an y)
P KU (p hen ylketo nur ia)			
Do wn s ynd r o me			
Sickle -ce ll d isea se			
Hu nti ngto n' s d isea se			

HANDOUT 2 - 7

Na t ure/Nurt ure Inte ra ct io ns

Sand r a Scar r (1 9 87) illustr ate d sever al wa ys in wh ic h o ne 's envir o n me nt a nd o ne' s ge neti cs inter ac t to s hap e o ne' s p er so nalit y. Fo r ea ch o f t he n u mb er ed exa mp les b elo w, lab el the t yp e o f nat ur e/n ur t ur e in ter ac tio n b y u sin g o ne o f the fo llo wi n g t yp es o f in ter ac tio ns:

A. p assive ge ne -e n vir o n ment r ela tio n
B. evo ca tive gene -e n vir o n ment r elatio n
C. ac tive ge ne -e nvir o n me nt r elati o n (niche p ic ki ng)

_ 1. S mil in g, ac ti ve b ab ies r ec eive mo r e so cial sti mu latio n t ha n f us s y, d if fic ult i n fan ts.

_ 2. P ar ents who ar e so ciab le wil l e xp o se their ch ild r en to mo r e so cial sit uatio n s tha n p ar ent s wh o ar e so ciall y i nep t a nd iso lated .

_ 3. Co o p er ative, attenti ve p r escho o ler s r ec eive mo r e p leasant a n d instr uct io nal i nter ac tio n s fr o m the ad ults ar o u nd the m tha n unco o p er ative, d istr ac tib le child r en .

_ 4. Chi ld r en who ar e q uic k, str o n g, and agile wi ll li kel y b ec o m e invo l ved in at hletic ac ti viti e s .

_ 5. P r escho o ler s wit h lo n g atte nti o n sp ans a nd go o d sp atial sk ill s o fte n see k ga mes a nd p uzz le s to p lay.

_ 6. P ar ents who ar e asser ti ve, fac ed wit h a child who i s p assi ve, ma y e xer t mo r e p r ess ur e and d o mo r e asser ti vene ss tr ai nin g t han t h e y wo uld wit h a mo r e asser ti ve o ff sp r in g.

S o u rce : Scar r , S. (19 8 7). "P er so nalit y a nd exp er ie nce : I nd i vid ual e nco u nter s wit h t he wo r ld . " I n J . Ar o no f f, A. I . Rab in, & R. A. Zuc ker (E d s.) , Th e E merg en ce o f P erso n a lity (pp . 67 -6 8) . New Yo r k: Sp r in ger .

HANDOUT ANSW ERS

H ANDO UT 2 - 5: Genet ics Workshee t

Do mi nant - Rec ess ive Ge netic Relatio n sh ip s —Ho mo zyg o u s - Ho mo zyg o u s Geno t yp es : B b , B b, B b, Bb
P heno t yp es: Da r k ha ir , Dar k h air , Dar k hair , Dar k hair

Do mi nant - Rec ess ive Ge netic Relatio n sh ip s —Hete ro zyg o u s- Ho mo zyg o u s G eno t yp es : B b , B b, b b, b b
P heno t yp es: Da r k ha ir , Dar k h air , B lo nd e hair , B lo nd e hair

Do mi nant - Rec ess ive Ge netic Relatio n sh ip s —Ho mo zyg o u s - Hete ro zyg o u s Geno t yp es : B B , B b, BB , Bb
P heno t yp es: Da r k ha ir , Dar k h air , Dar k hair , Dar k hair

Do mi nant - Rec ess ive Ge netic Relatio n sh ip s —Hete ro zyg o u s- Hete ro zyg o u s Geno t yp es : B B , B b, Bb , bb
P heno t yp es: Da r k ha ir , Dar k h air , Dar k hair , B lo nd e hair

Do mi nant - Rec ess ive Ge netic Relatio n sh ip s — Co d o min a n ce- A - Ho mo zyg ou s- B - Ho mo zyg ou s
Geno t yp es : AB , AB , AB , AB
P heno t yp es: AB b lo o d typ e, AB b lo od typ e, AB b lo o d typ e, AB b lo o d typ e

Do mi nant - Rec ess ive Ge netic Relatio n sh ip s — Co d o min a n ce- A - Hete ro zyg o u s- B - Hete ro zyg o u s
Geno t yp es : AB , Ao , B o , o o
P heno t yp es: AB b lo o d typ e, A b lo o d typ e, B b loo d typ e, O b lo o d typ e

Do mi nant - Rec ess ive Ge netic Relat io n sh ip s —Se x - Li nked — Una ffec ted Ma le - Car r ier Mo ther Geno t yp es : X Y, $X^{h}Y$, XX, $X X^{h}$
P heno t yp es: No r mal ma le, Hemo p hiliac male, No r mal fe mal e, Car r ier fe male

Do mi nant - Rec ess ive Ge netic Relatio n sh ip s —Se x - Li nked — He mo p hiliac Ma le - Car r ier Mo ther Geno t yp es : X Y, $X^{h}Y$, XX^{h}, $X^{h} X^{h}$
P heno t yp es: No r mal ma le, Hemo p hiliac male, Car r ier fe mal e, He mo p hiliac fe male

H ANDO UT 2 - 7: Nat ure /Nurt ure Int eract i ons

Ans wer o p tio ns :
A. p assive ge ne -e n vir o n ment r ela tio n
B. evo ca tive gene -e n vir o n ment r elatio n
C. ac tive ge ne -e nvir o n me nt r elati o n

Ans wer ke y: 1. B
2. A
3. B
4. C
5. C
6. A