"Face Lab" – A study in human variation HINSLEY / BIOL II

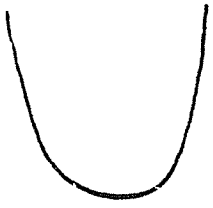
What would your baby look like if both you and your classmate (who will simulate your spouse) have one dominant gene and one recessive gene for each of the facial features illustrated in the following pages? In other words, each of you will be heterozygous for each trait. To determine the facial appearance of your child, you and your "spouse" will each flip a coin to determine what bit of information or gene you will contribute to the child. HEADS will represent DOMINANT (shown with a large letter) and TAILS will represent RECESSIVE (shown with a small letter). Flip the coins to determine which gene of each pair you contribute. Each child will have two genes for each trait, one from each parent. You will supply one gene and your "spouse" will supply one gene. Record the genetic contributions of each parent on the chart provided. When you have determined all of the features for a particular structure (eyes, for example), draw and color the way the baby will look <u>after he/she has reached high school age.</u> You and your "spouse" will produce one child.

The traits indicated by an asterisk are believed to be inherited in the explained manner. Most of the traits, however, in this activity were created to illustrate how human heredity works in a simplified model and to reinforce basic genetics principles. In actuality, inherited characteristics of the face are much more complicated than this activity illustrates. Most of these facial characteristics are determined by many genes working together in a way geneticists do not yet understand. Good Luck in this very important role as parents. Your first task is to record your names, as parents, on the attached data sheet.

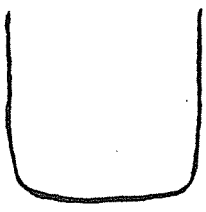
First, we should determine the sex of the child. Which parent should flip a coin to determine the sex of the child? Heads will be a boy (Y-bearing sperm) and tails will be a girl (X-bearing sperm). Give your child a name and record the name on your data sheet. Continue.

1. FACE SHAPE:

ROUND (RR, Rr)



SQUARE (rr)



2. CHIN SHAPE: Next three flips

VERY PROMINENT (VV, Vv)

LESS PROMINENT (vv)

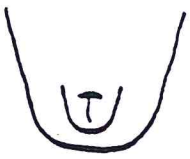
3. CHIN SHAPE: ONLY flip coins for this trait if chin shape genotype is VV or Vv. (The genotype vv prevents the expression of the next two pairs of genes.)

ROUND (RR, Rr)

SQUARE (rr)

4. CLEFT CHIN: * THIS TRAIT CAN ONLY BE PRESENT IF THERE IS A ROUNDED CHIN.

PRESENT (AA, Aa)



ABSENT (aa)

5. SKIN COLOR:

To determine the color of skin, assume there are three gene pairs involved. Flip you coins first to determine the genotype of the first pair of genes (AA, Aa, aa). Then flip your coins again to determine the genotype of the second pair of genes (BB, Bb, bb). Flip for the last time to determine the third pair of genes (CC, Cc, cc). AAAA

Each capital letter represents an active allele for pigmentation.

6 capitals – very dark black
5 capitals – very dark brown
4 capitals – dark brown
3 capitals – medium brown
2 capitals – light brown
1 capital – light tan
NO capitals – white

6. HAIR TYPE:

CURLY (CC) WAVY (Cc) STRAIGHT (cc)

7. WIDOW'S PEAK: The hair-line comes to a point in the center of the forehead.

PRESENT (WW, Ww) ABSENT (ww)

8. COLOR OF EYEBROWS: Consider all eyebrow traits (next three) before drawing.

VERY DARK (HH) MEDIUM DARK (Hh) LIGHT (hh)

9. EYEBROW THICKNESS:

BUSHY (BB, Bb) FINE (bb)

10. EYEBROW PLACEMENT:

NOT CONNECTED (NN, Nn) CONNECTED (nn)

11. EYE COLOR: Darker eyes are produced in the presence of more active alleles. In this situation, the large letters (A or B) represent alleles that are active in depositing dark pigment. Small letters (a and b) represent alleles that deposit little pigment.

To determine the color of the eyes, assume there are two gene pairs involved, one that codes for depositing pigment in the front of the iris and one that codes for depositing pigment in the back of the iris. Determine the genotype of the first pair (AA, Aa, aa) and then the second pair (BB, Bb, bb). The following eye colors are indicated for a particular genotype. In reality, the determination of eye color is much more complicated.

AABB	VERY DARK BROWN	AABb	DARK BROWN
AaBB	DARK BROWN	AaBb	Brown
AAbb	Dark blue	aaBB	Dark blue
Aabb	Light blue	aabb	Pale blue
		aaBb	LIGHT BLUE

EYE TRAITS – NEXT FOUR FLIPS Determine the phenotype with respect to all four flips before drawing the eyes.

12. EYES – DISTANCE APART:

CLOSE TOGETHER (EE) AVERAGE DISTANCE (Ee) FAR APART (ee)

13. EYES – SIZE:

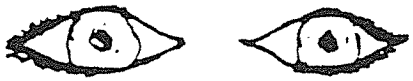
LARGE (EE) MEDIUM (Ee) SMALL (ee)

14. EYES – SHAPE:

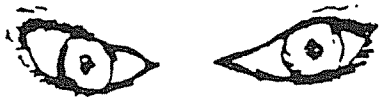
ALMOND (AA, Aa) ROUND (aa)

15. EYES – SLANTEDNESS:

HORIZONTAL (HH, Hh)

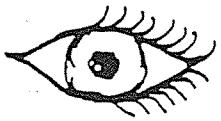


UPWARD SLANT (hh)



16. EYELASHES:

LONG (LL, Ll)



SHORT (ll)

Mouth and lip traits will be determined in the next four flips.

17. MOUTH – SIZE

LONG (MM)

AVERAGE (Mm)

SHORT (mm)

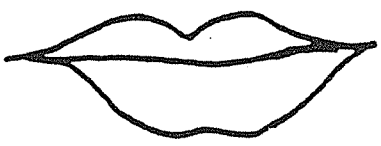
18. LIPS:

THICK (LL, Ll)

THIN (ll)

19. PROTRUDING LIP:

VERY PROTRUDING (HH)



SLIGHTLY PROTRUDING (Hh)

ABSENT

20. DIMPLES:

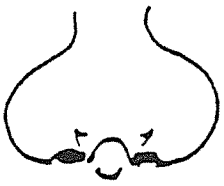
PRESENT (DD, Dd)

ABSENT (dd)

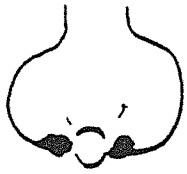
Nose and ear traits are determined in the next 7 flips. Record your genotypes on your data sheet but do not draw these features until all the traits are established.

21. NOSE SIZE:

BIG (NN)



MEDIUM (Nn)

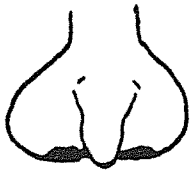


SMALL (nn)

22. NOSE SHAPE:

ROUNDED (RR, Rr)

POINTED (rr)



23. NOSTRIL SHAPE:

ROUNDED (RR, Rr)

POINTED (rr)

Next four flips control ear traits.

24. EARLOBE ATTACHMENT:

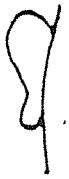
FREE (FF, Ff)

ATTACHED (ff)

25. DARWIN'S EAR POINT

PRESENT (DD, Dd)

ABSENT (dd)



26. EAR PITS: * THIS TRAIT CAN ONLY BE PRESENT IF THERE ARE FREE EARLOBES

PRESENT (PP, Pp)

ABSENT (pp)

27. HAIRY EARS: (Hairy ears is sex-limited to males)

ABSENT (HH, Hh)

PRESENT (hh)

28. FRECKLES ON CHEEKS:

PRESENT (FF, Ff)

ABSENT (ff)

29. FRECKLES ON FOREHEAD:

PRESENT (FF, Ff)

ABSENT (ff)