6. Eye Colour

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New Zealand

Presentation Contents:

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2. History of Eye Colour
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4. Pedigree Chart
5. What Determines Your Eye Colour
6. Ancestry
7. Conclusion

The Problem:

"In certain human populations, genetics allows predicting inheritance of eye color among family members. In other populations of the present day World, nearly everyone has the same eye color. What information is it possible to determine about the eye colors in both distant and close ancestors, descendants, and relatives of one living person?"

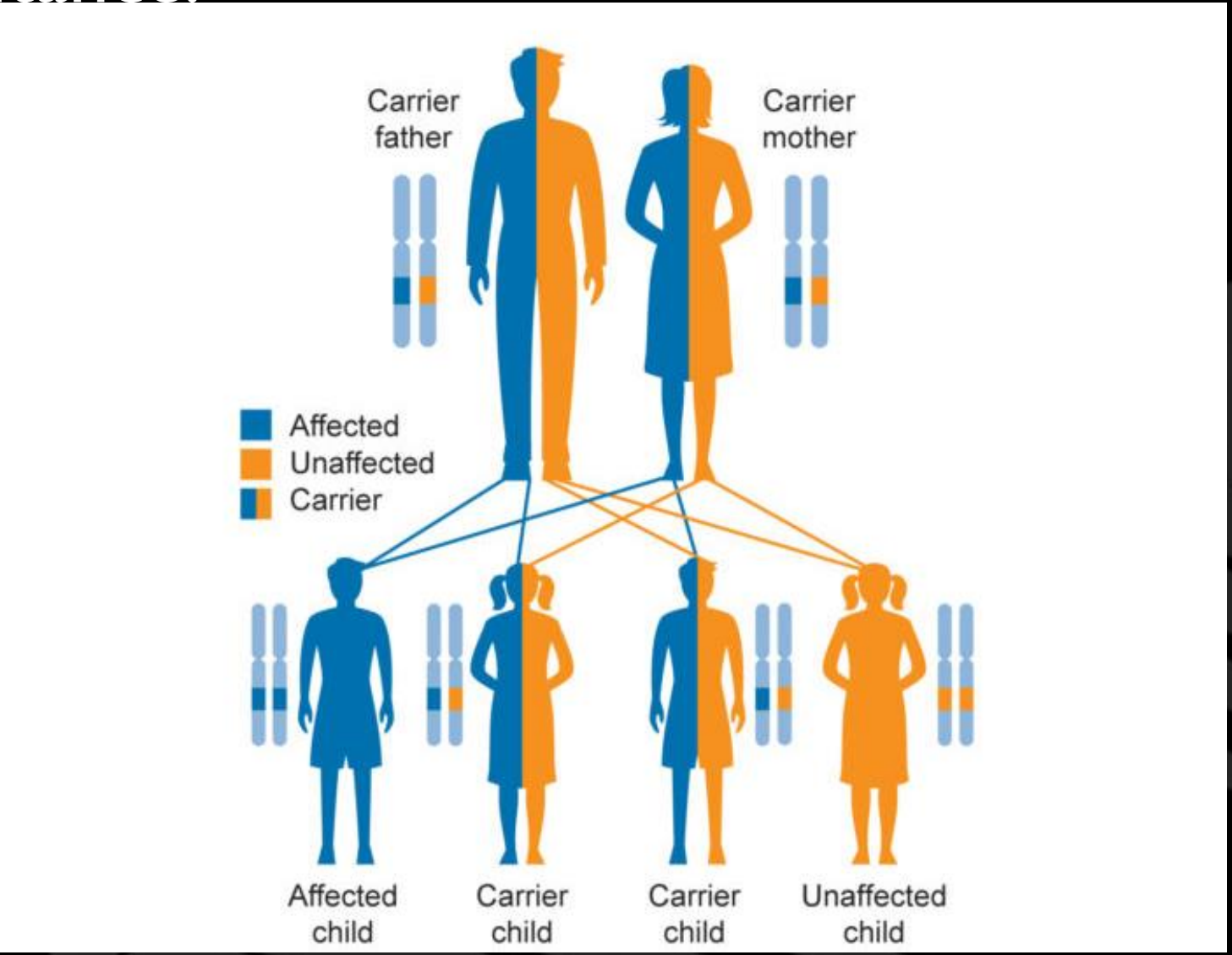
Definitions:

- Populations
- Ancestor
- Descendant
- Relative

Population:

Photo credit: healthitanalytics.com

Inheritance:



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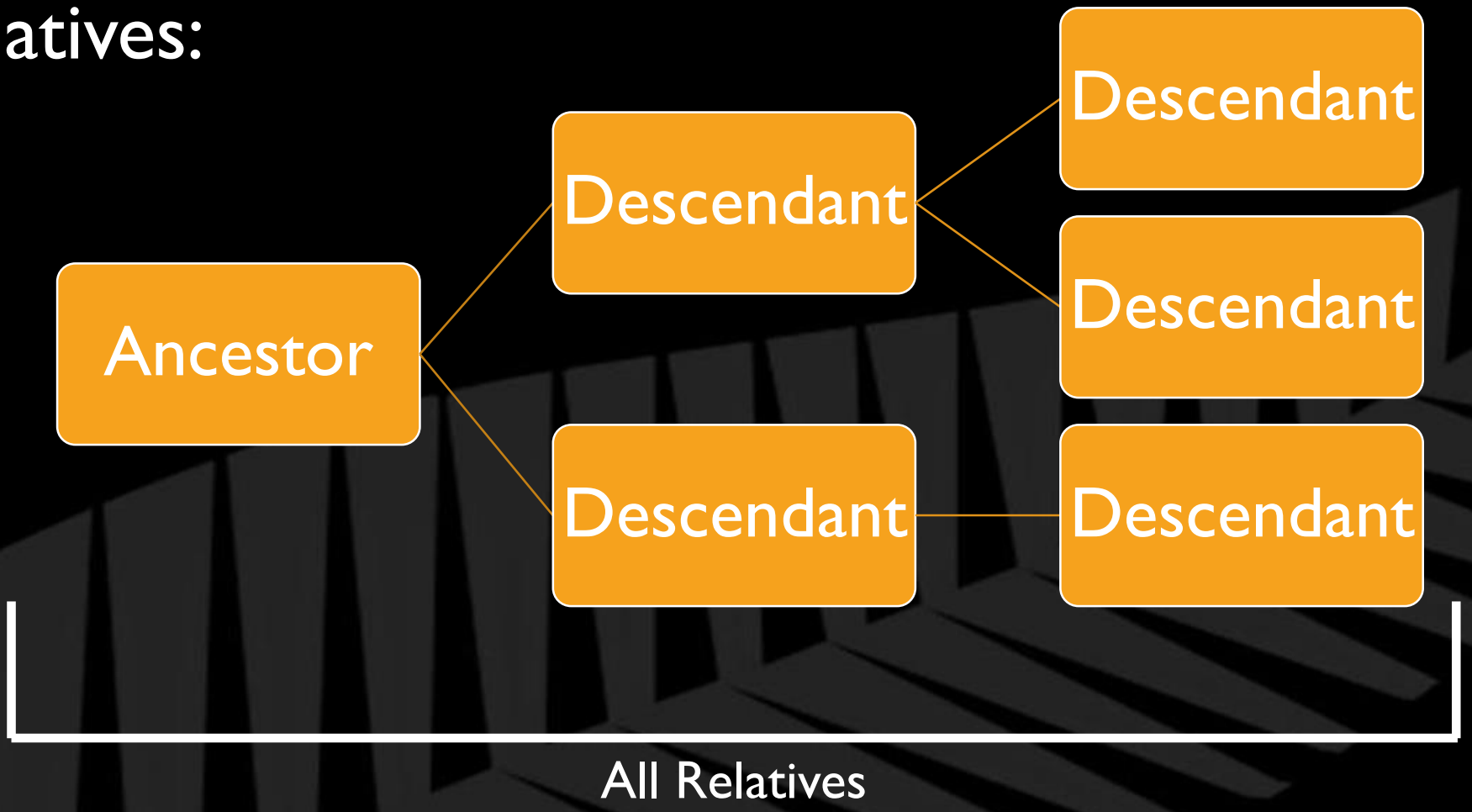
Ancestors, Descendants and Relatives:



History of Eye Colour

- Origin of different eye colours
- Mendelian trait

History of Eye Colour

- Origin of different eye colours

Photo Credits: http://zaidshoufan.com/info/world/

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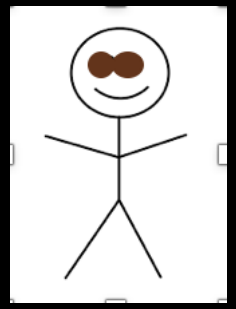
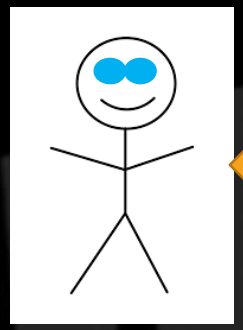
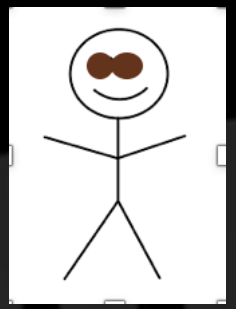
History of Eye Colour

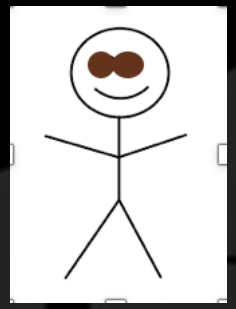
- Origin of different eye colours

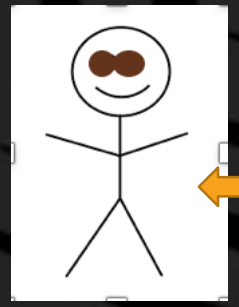




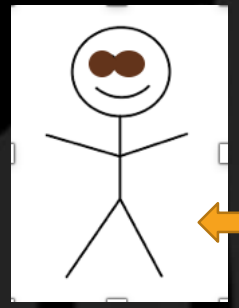
Shows blue eye mutation







Carries blue eye mutation



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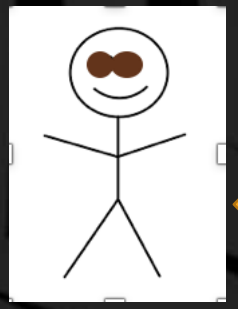
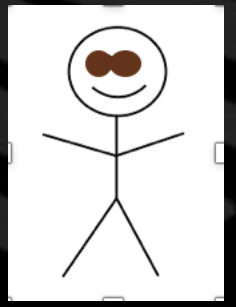


Blue eye mutation



History of Eye Colour

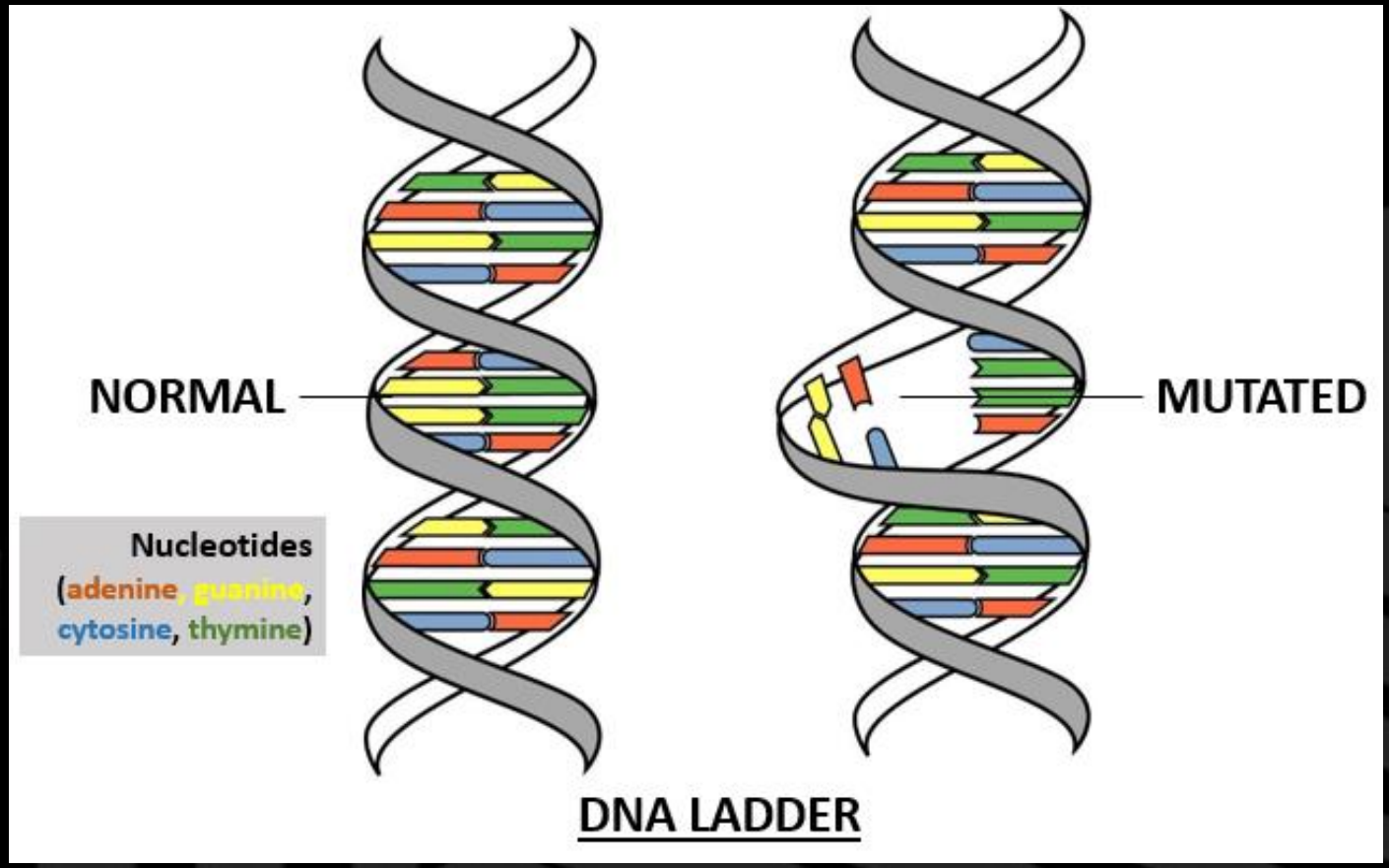


Photo Credits: https://dnasu.com/what-is-a-dna-mutation/

History of Eye Colour

- Mendelian trait

Mendelian Trait:

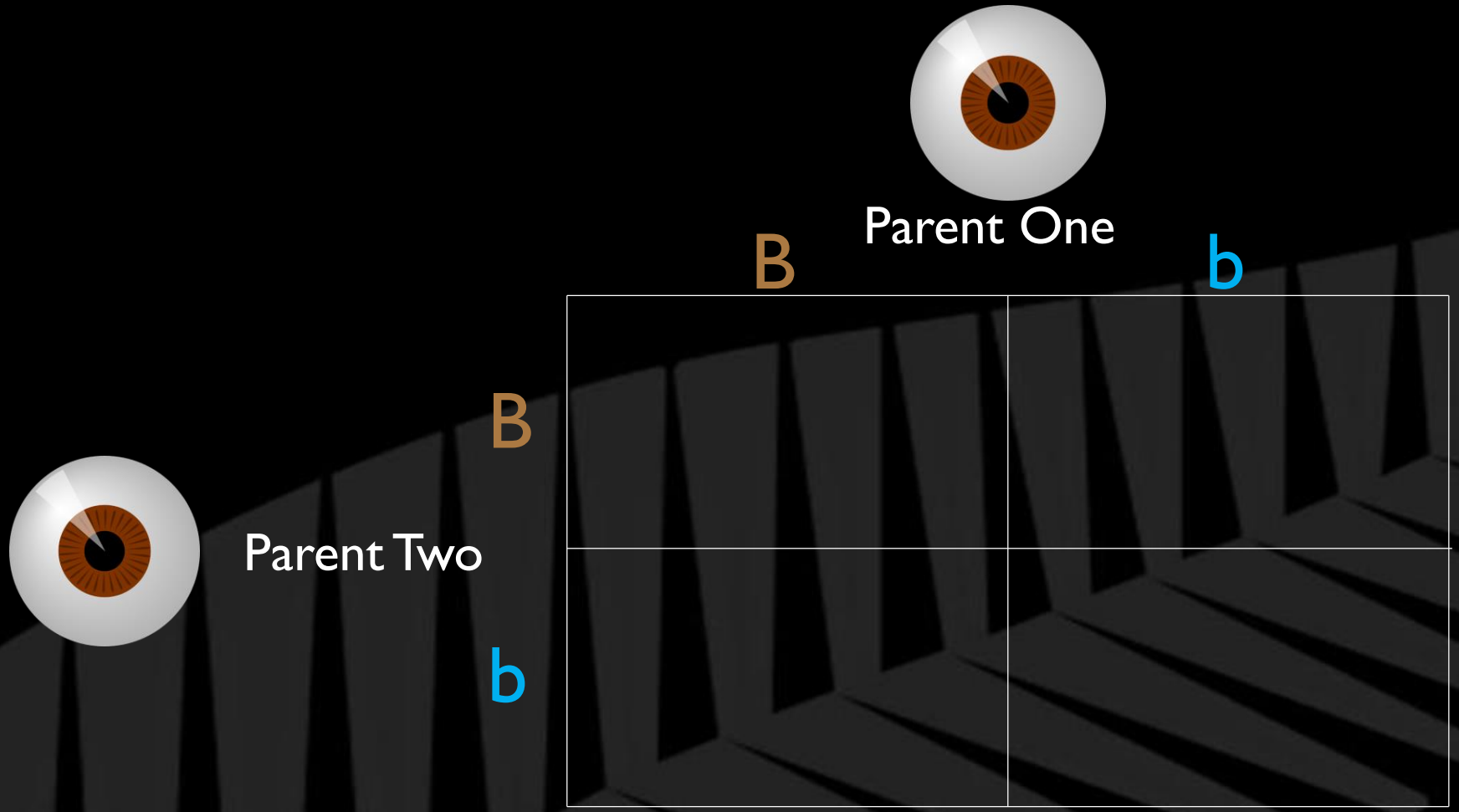
- B – Brown eye allele
- b - Blue eye allele


- BB - Homozygous dominant

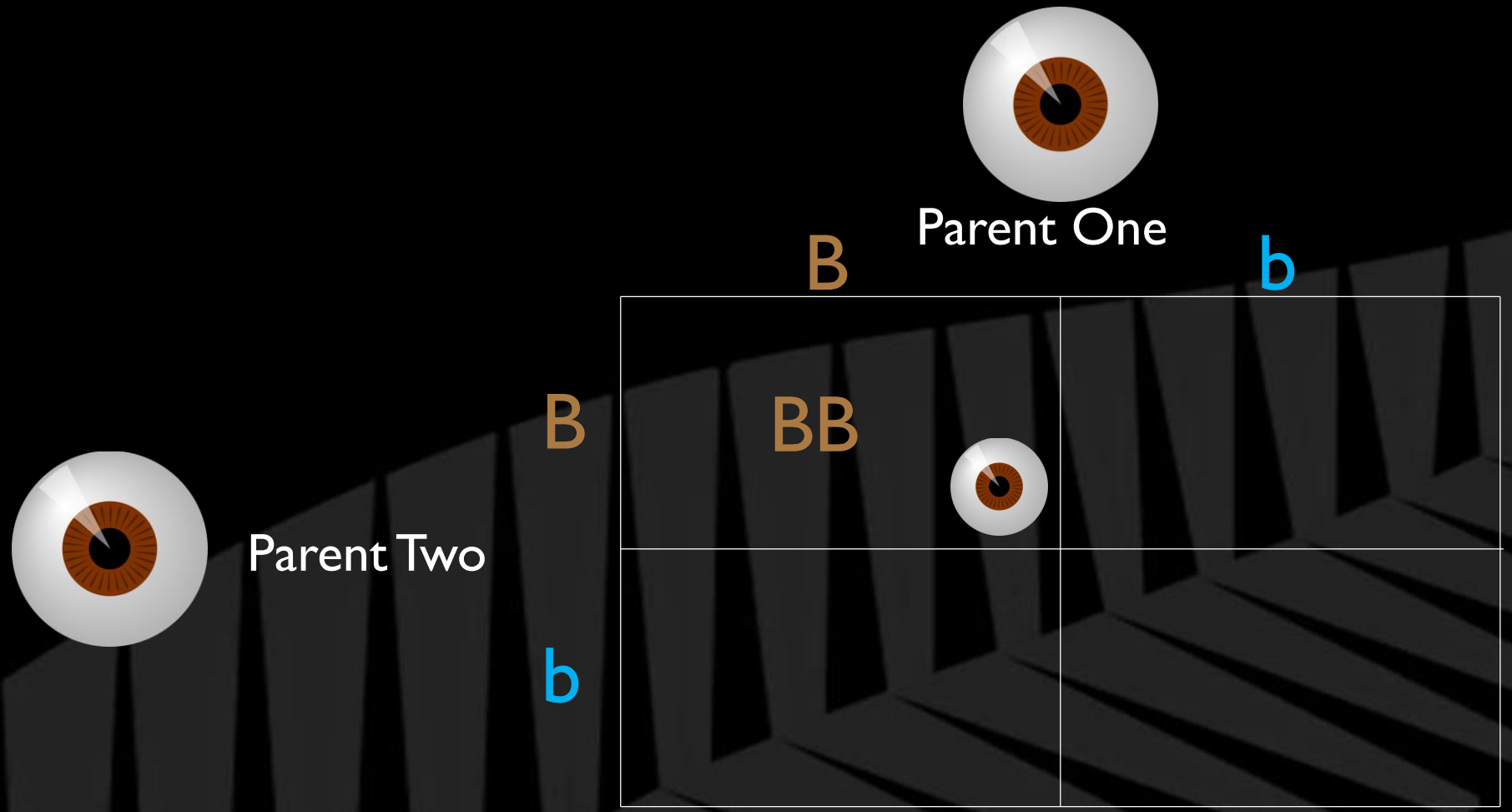

- Bb - Heterozygous


- bb - Homozygous recessive

Mendelian Trait:



Mendelian Trait:



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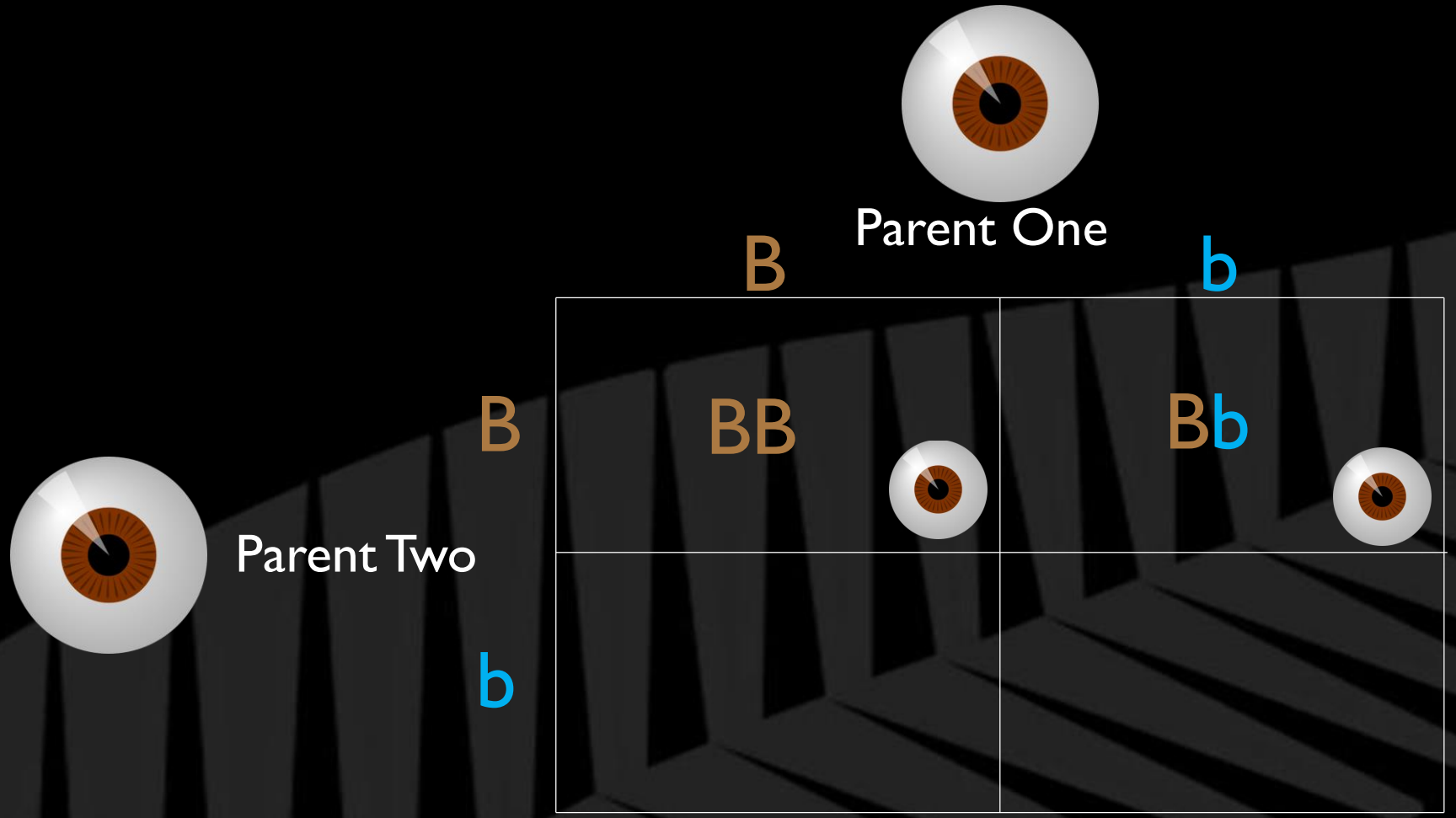

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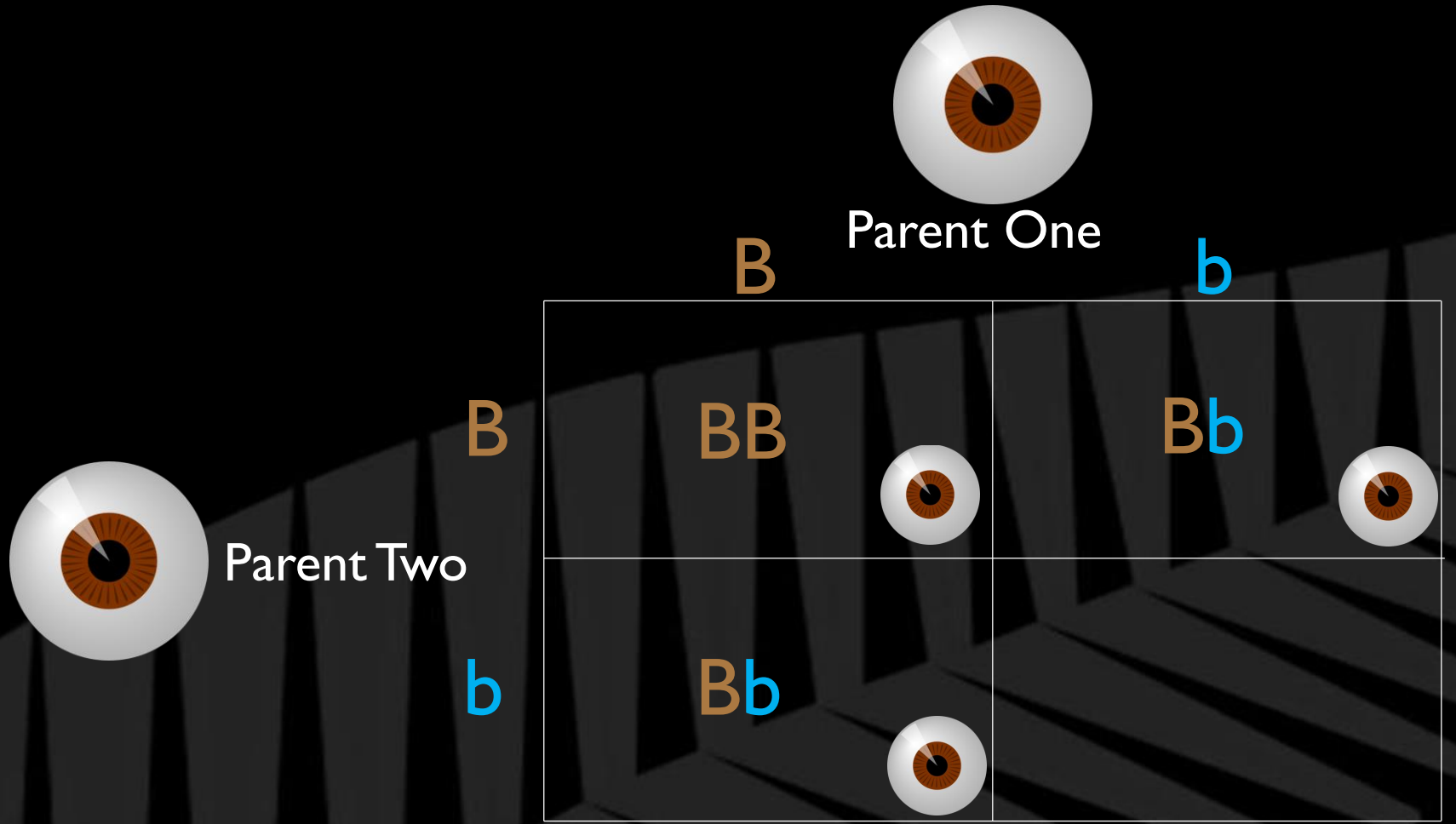

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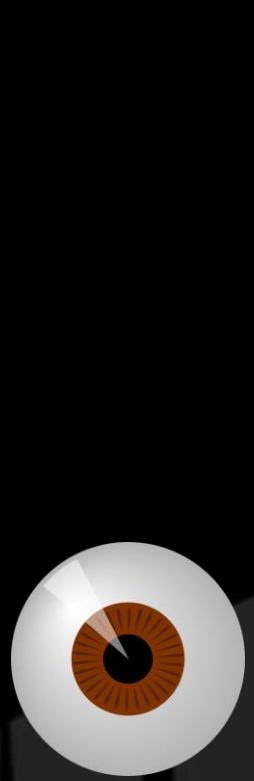
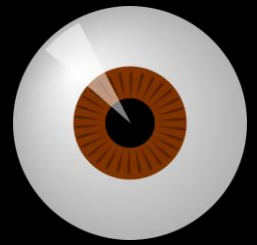


Parent Two



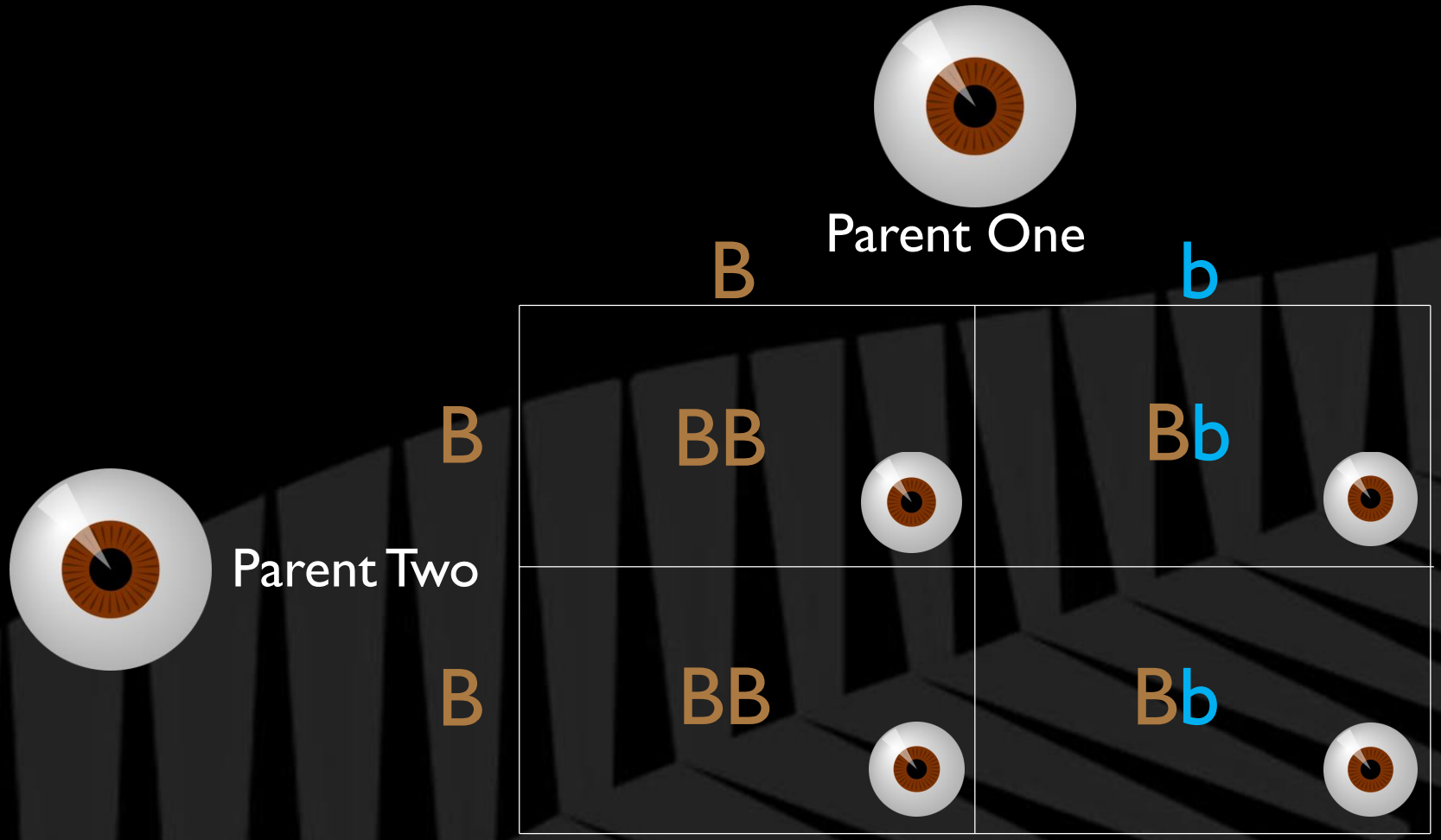
Parent One

	B	b
B	BB	Bb
b	Bb	bb

3 Brown : 1 Blue

75% Brown
25% Blue

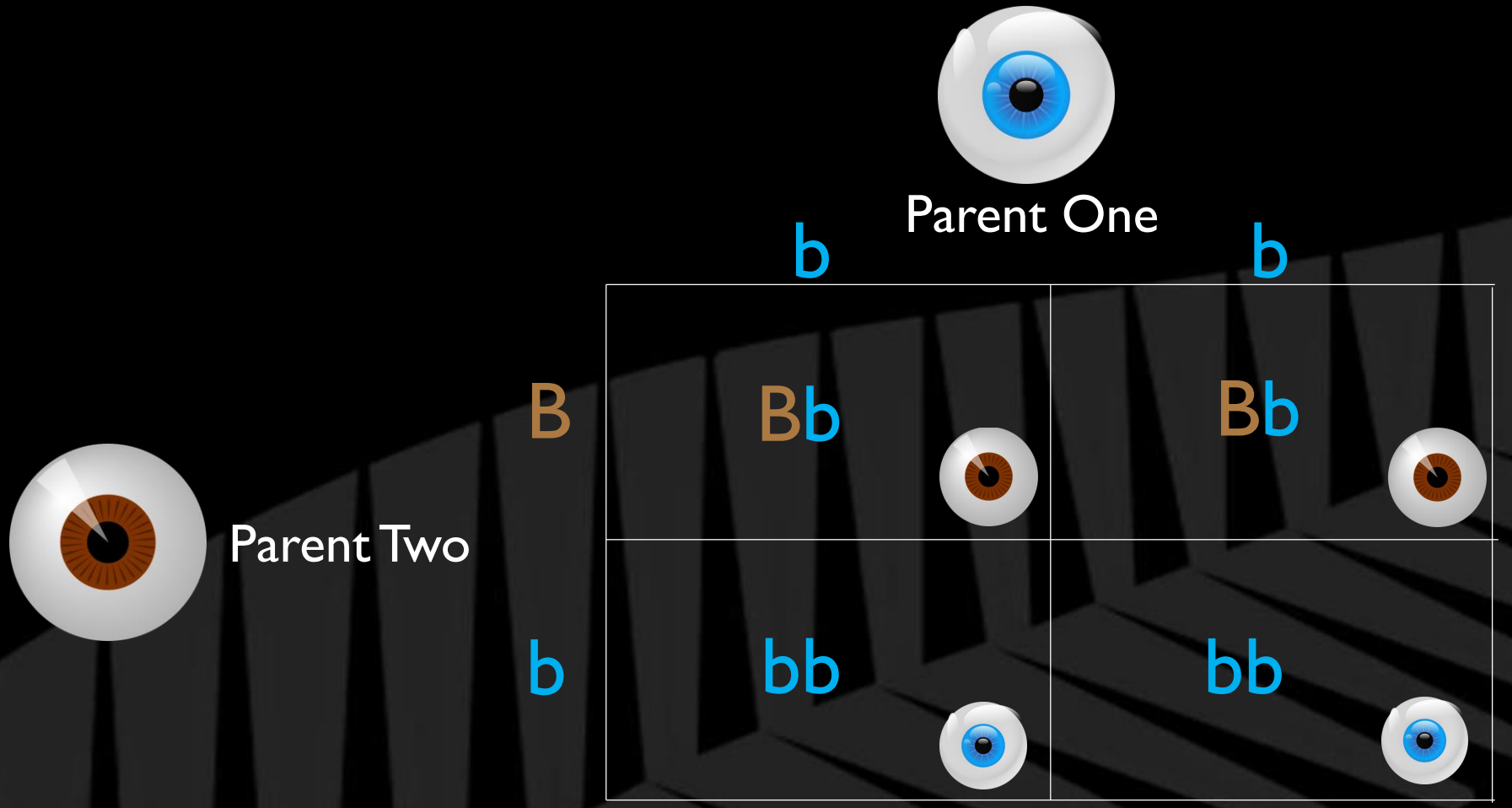
Mendelian Trait:



1 Brown : 0

100% Brown

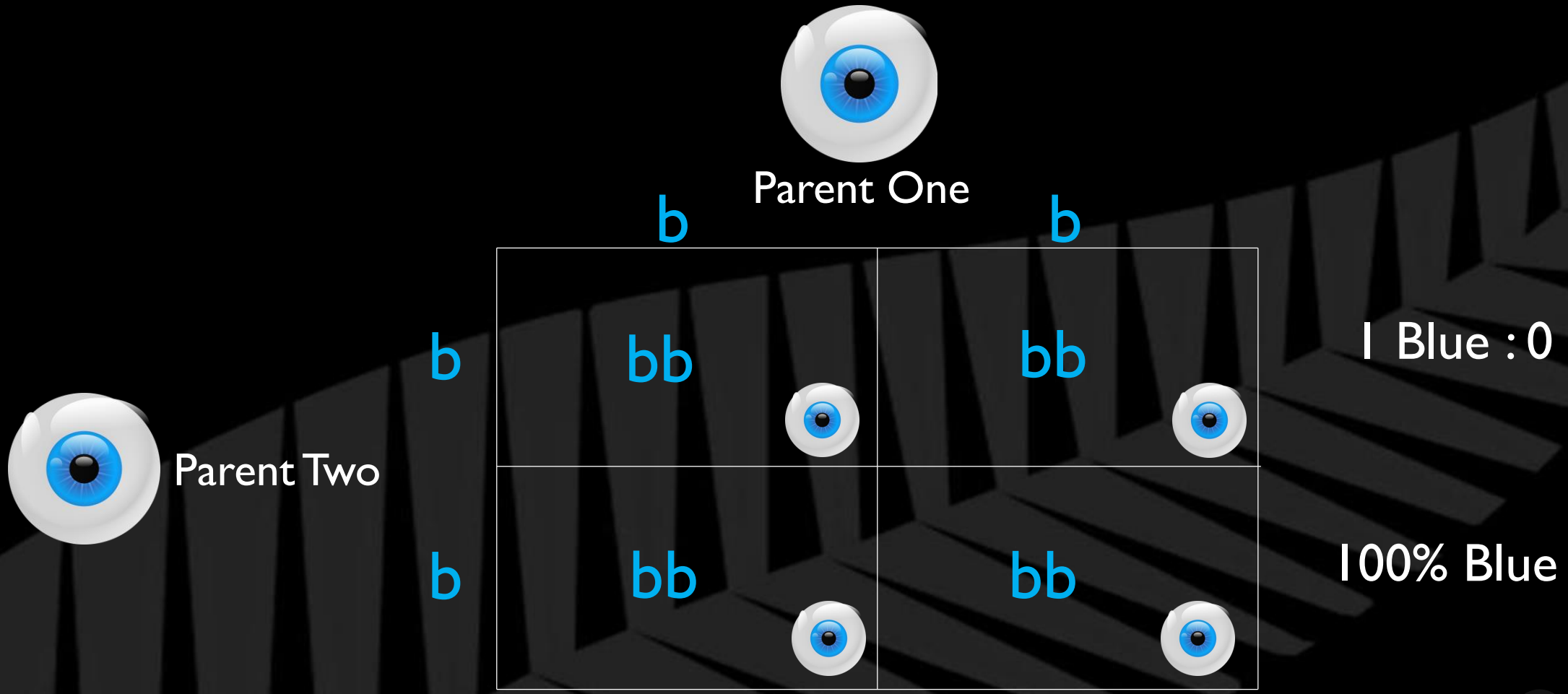
Mendelian Trait:

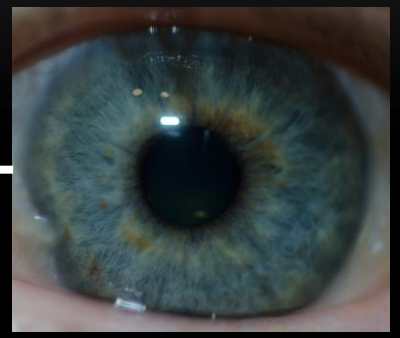


1 Brown : 1 Blue

50% Brown
50% Blue

Mendelian Trait:

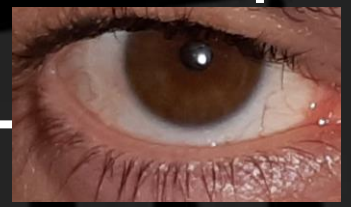


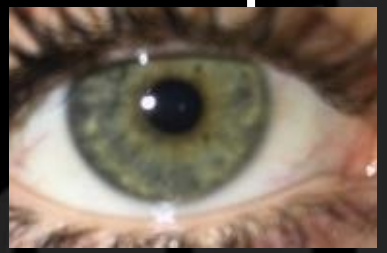



Blue

Brown



Brown

Brown

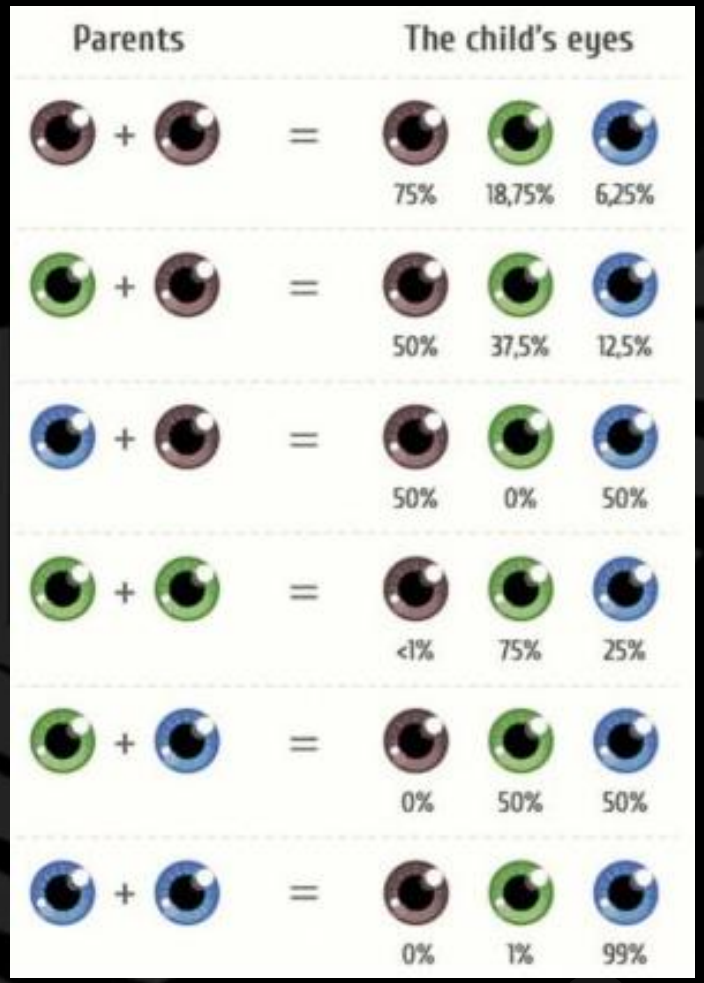
Brown





What Determines Your Eye Colour?

- Melanin
- OCA2 and HERC2
- Scattering of light



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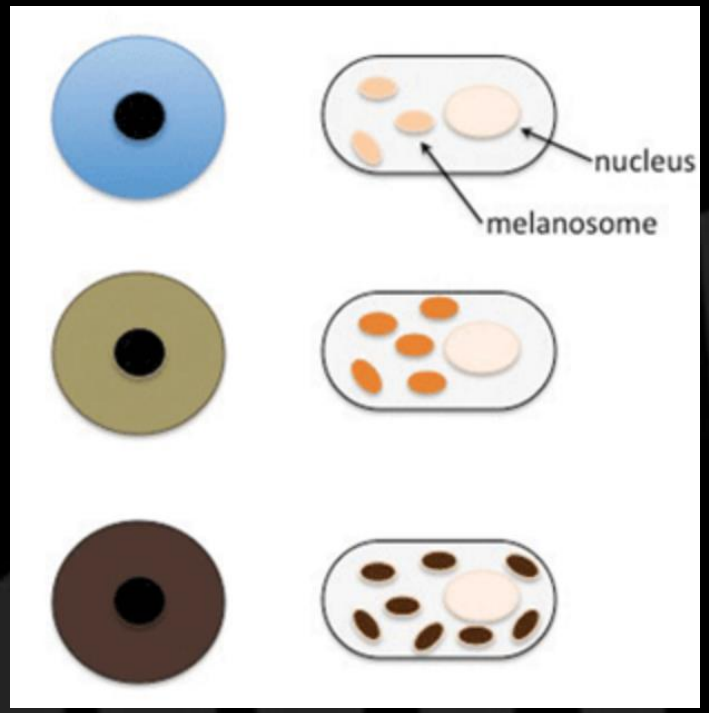

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Photo Credits: www.allaboutvision.com/conditions/eye-color-blue.htm

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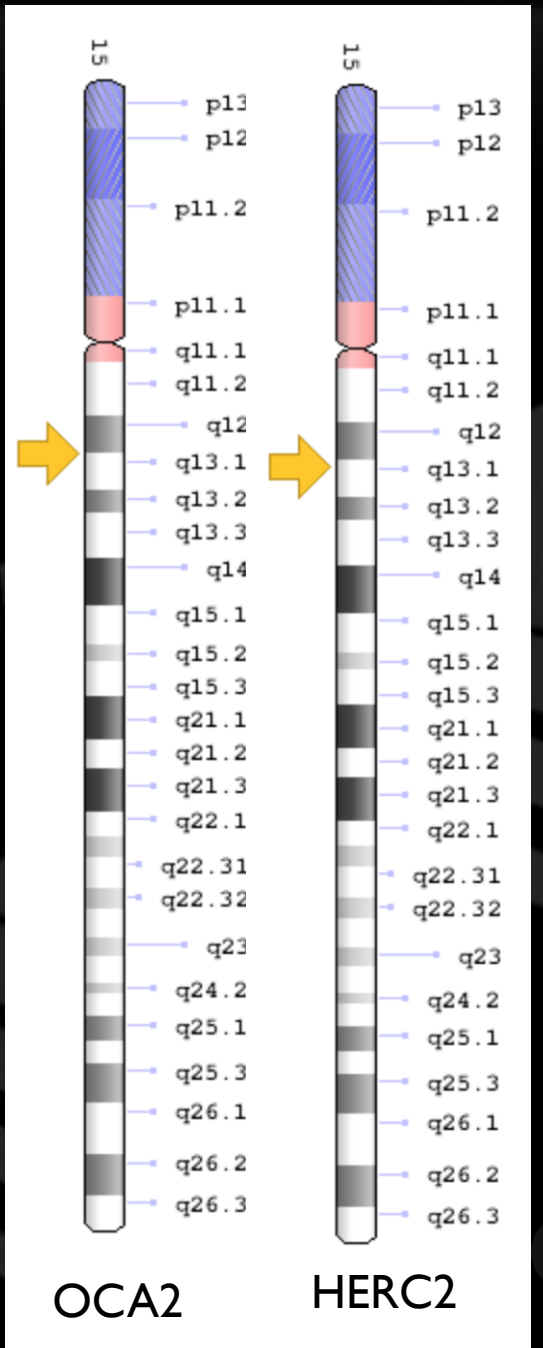
What Determines Your Eye Colour?

- OCA2 and HERC2

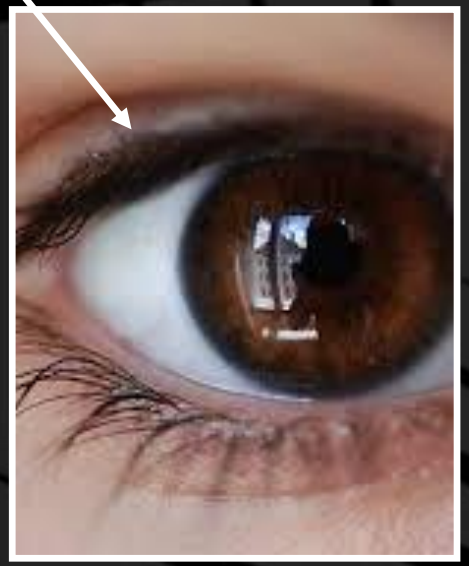


What Determines Your Eye Colour?

- OCA2

Photo Credits: www.allaboutvision.com/conditions/eye color-blue.htm

Brown eye have up to 70% more melanin than other eye colours



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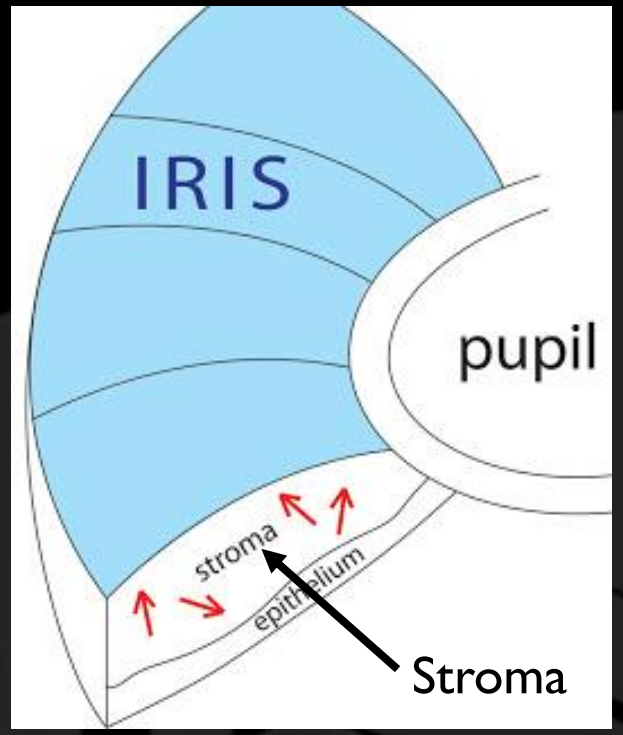
What Determines Your Eye Colour?

- HERC2 SNPs

rs1800407	rs1408799		rs2733832	rs1003719	rs1003719	rs1847134	rs1393350	
GG	CC	CT	TT	AG	AG	AC	GG	Greenish blue with darker blue ring on outside and yellowish green in the middle
GG	CT	GG		GG	GG		GG	Hazel
CC	CC	GT	CT	AA	AA	AA		
GG	CT	CC	CT	AG	AG	N/A	AA	Gray/green/blue with darker blue ring on outside and flecks of yellowish green in the middle.
CC	CC	N/A	TT	AA	AA	N/A	AG	Blue
GG	CT		CT	AG	AG		AA	Predominately blue, maybe blue-grey, with a very slight hazel tinge near iris aperature.
GG	CT	GG	CT	AG	AG	AA	GG	Grey outer ring, Yellow-green main color with blue-gray around the pupil
GG	TT	GT	CC	GG	GG	AA	GG	Light blue-gray

What Determines Your Eye Colour?

- Scattering of light



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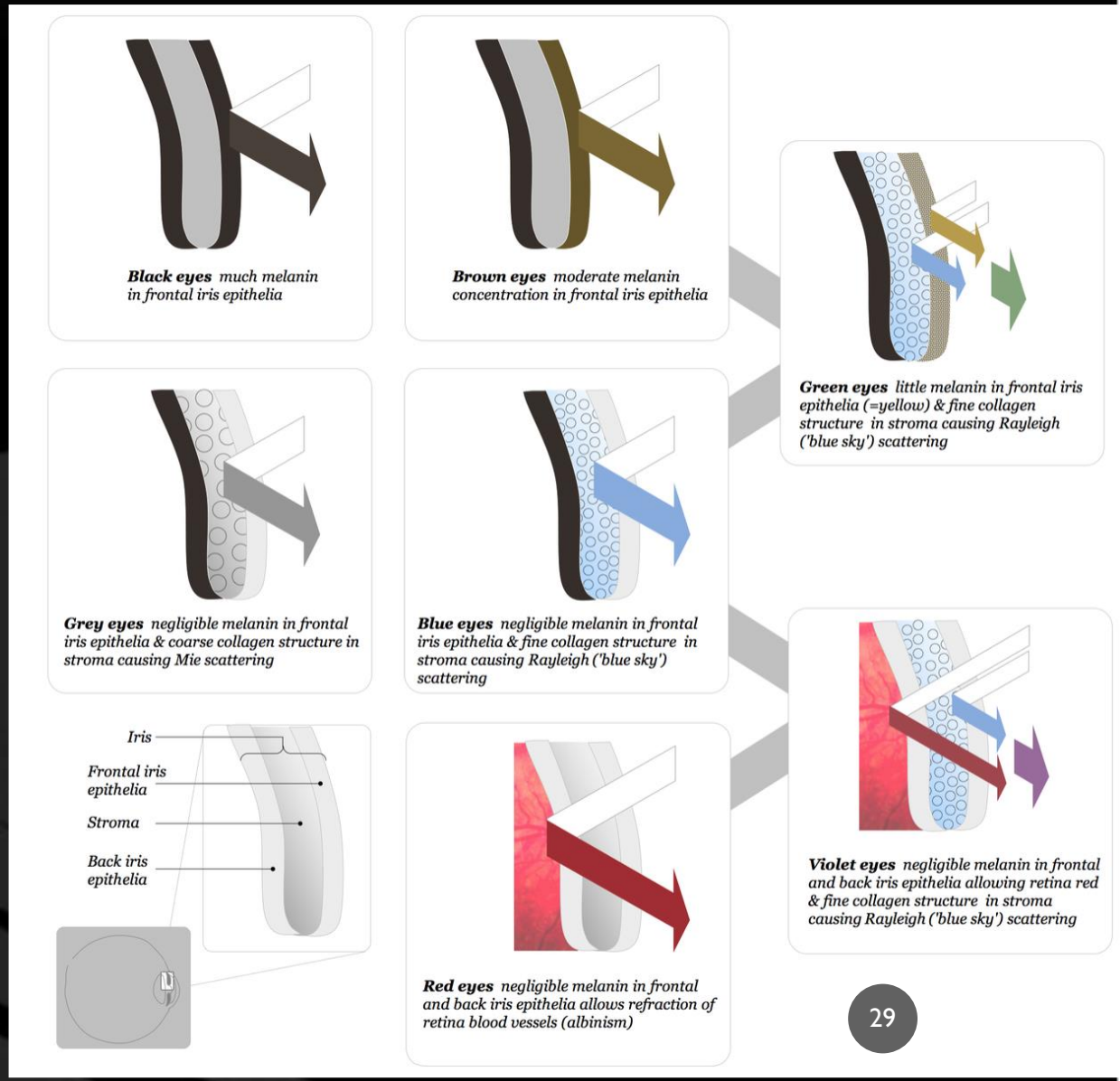
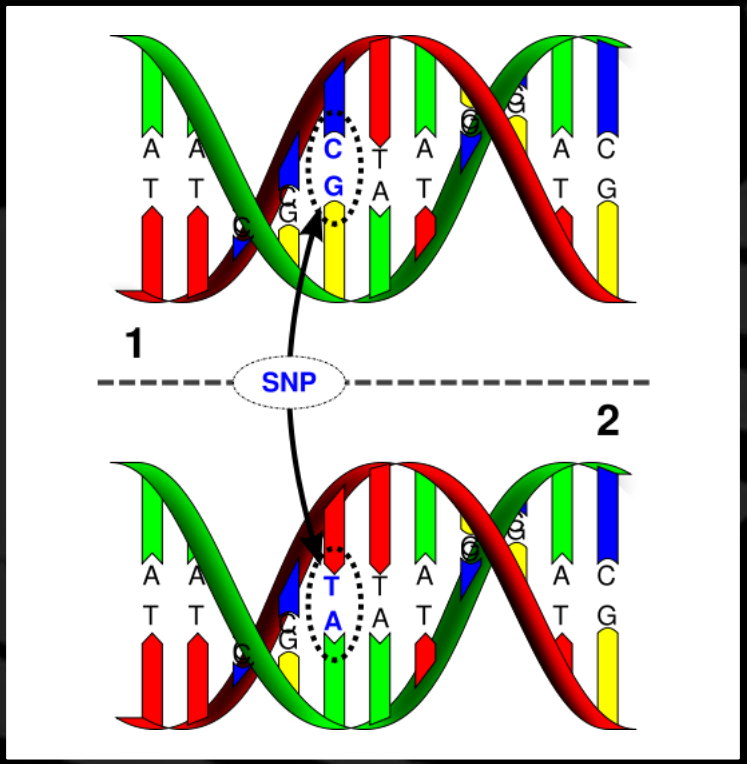


Photo Credits: eyemakeart.files.wordpress.com/2009/06/human_eye_color.png

Using SNP's To Look At Ancestry

- What are SNP's



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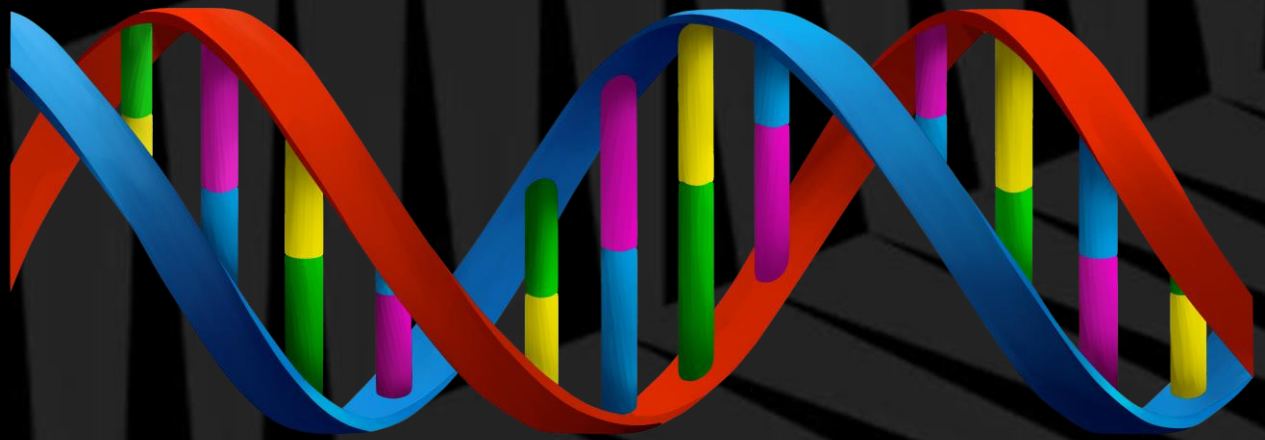
Using SNP's To Look At Ancestry

- Genetic markers



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Geographically Looking Where People Are From

Certain populations with
same/majority of the same eye colour

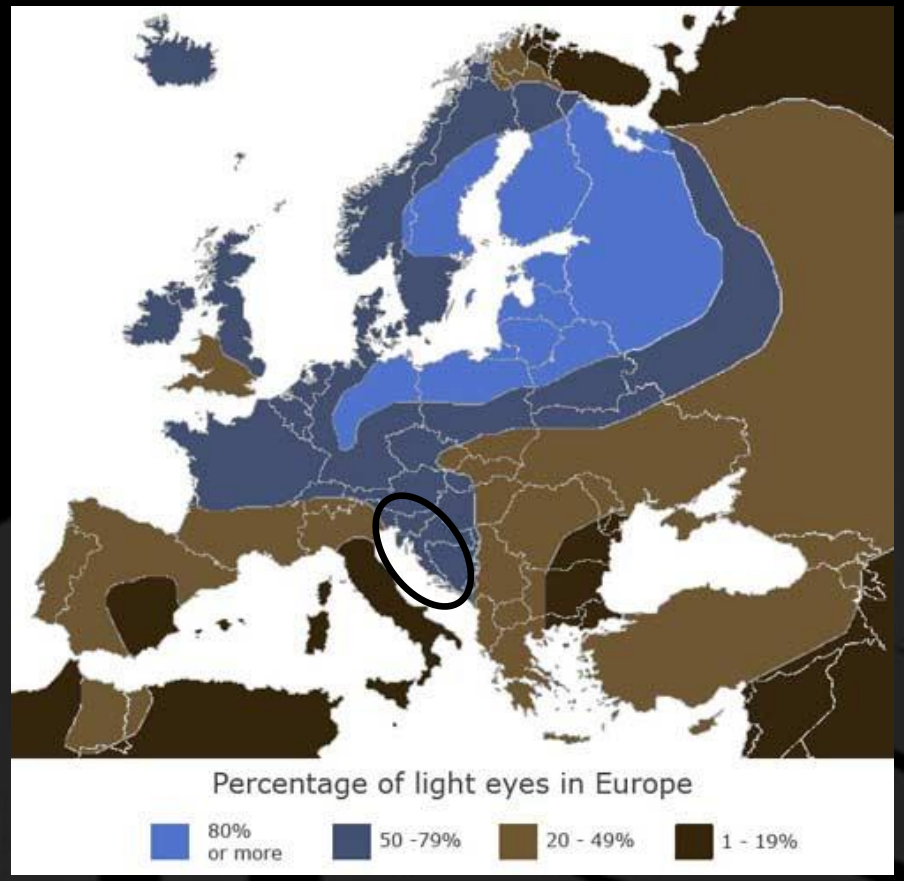


Photo Credits: https://westernparadigm.files.wordpress.com/2008/02/blue_eyes_map2.jpg

Country/Nation	Light Eyes	Blue Eyes
1. Finland	89%	72%
2. Sweden	88%	72%
3. Norway	88%	72%
• *Sami*	*68%*	*50%*
4. Estonia	85%	69%
5. Denmark	85%	69%
6. Latvia	83%	66%
7. Netherlands	76%	58%
8. Germany	70%	53%
9. Lithuania	78%	61%
10. Scotland	80%	63%
11. England	74%	55%
12. Belarus	74%	55%
13. Australia	73%	55%
14. USA	69%	50%
• *Midwest*	*72%*	*55%*
• *West*	*70%*	*50%*
• *South*	*71%*	*53%*
• *Northeast*	*61%*	*45%*
15. Ireland	82%	66%

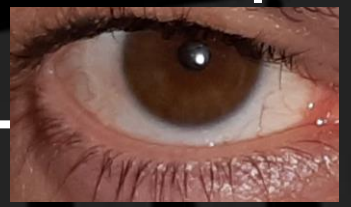
Photo Credits:
http://www.forumbiodiversity.com/showthread.php?t=27957&s=d80257eeb1b86c0ca391a33ec729ee45

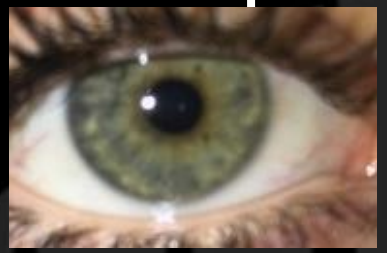
Croatian Descent: Large Blue Eye Population







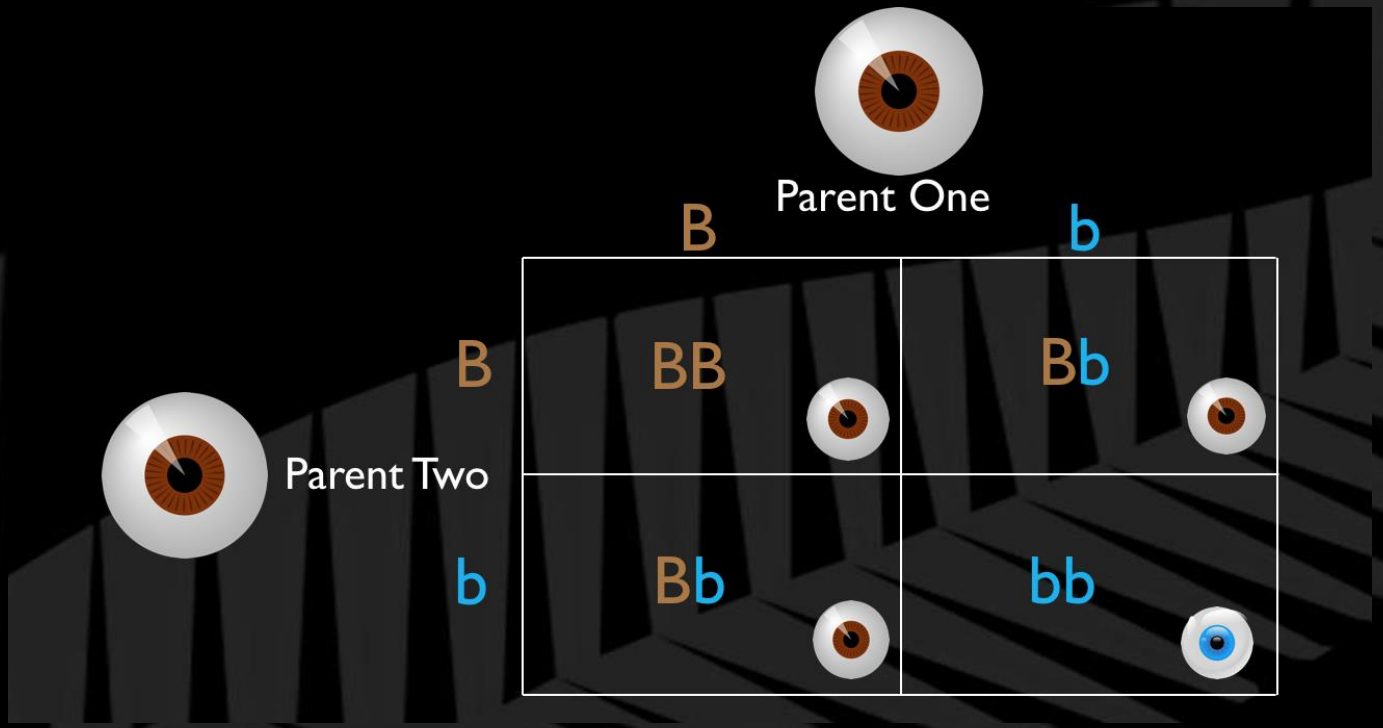






Conclusion:

"In certain human populations, genetics allows predicting inheritance of eye colour among family members. In other populations of the present day World, nearly everyone has the same eye colour. What information is it possible to determine about the eye colours in both distant and close ancestors, descendants, and relatives of one living person?"



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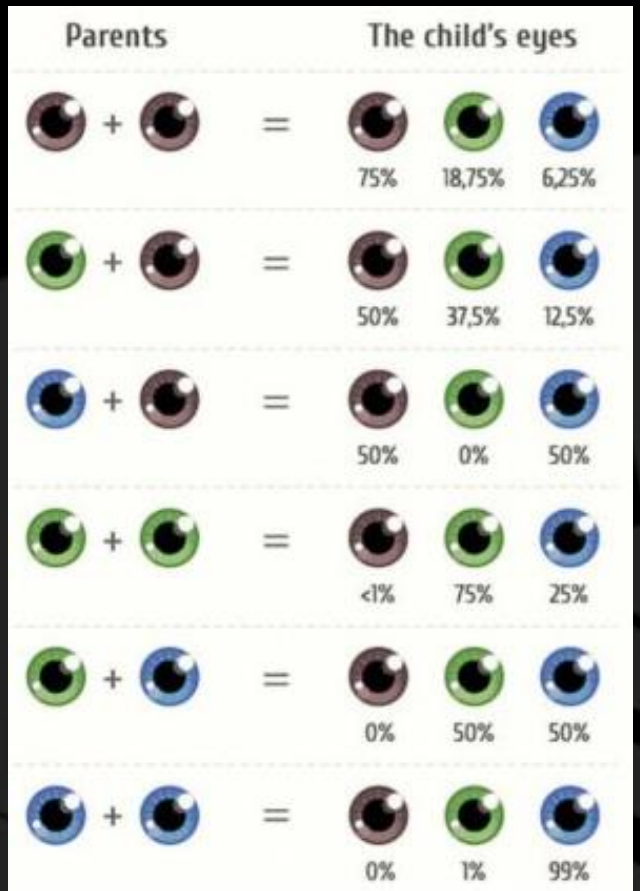

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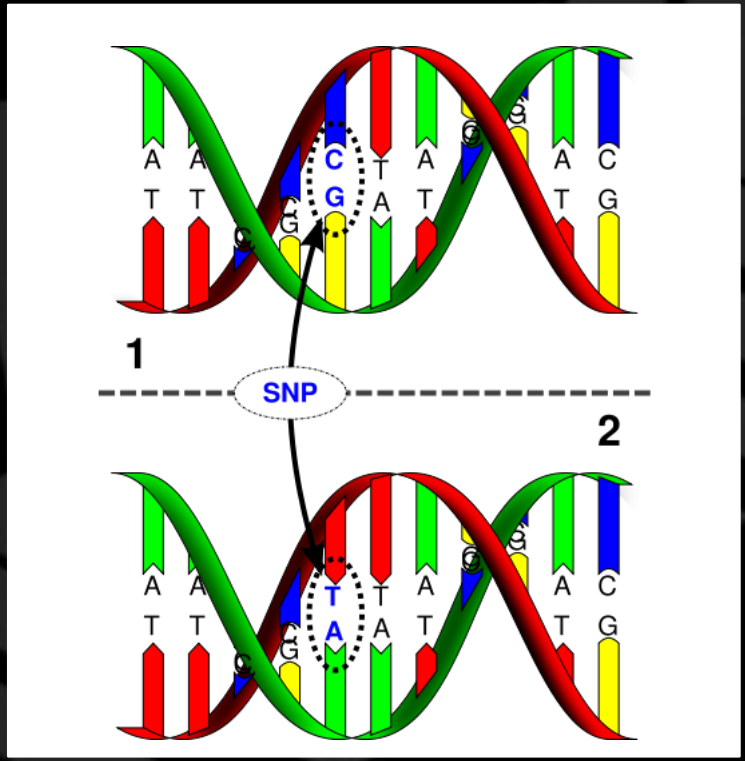

Acknowledgements:

- Carmel Gillman
- Jackson Martin
- Murray Chisolm
- Kerry Parker
- The NZ IYNT team
- Family

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