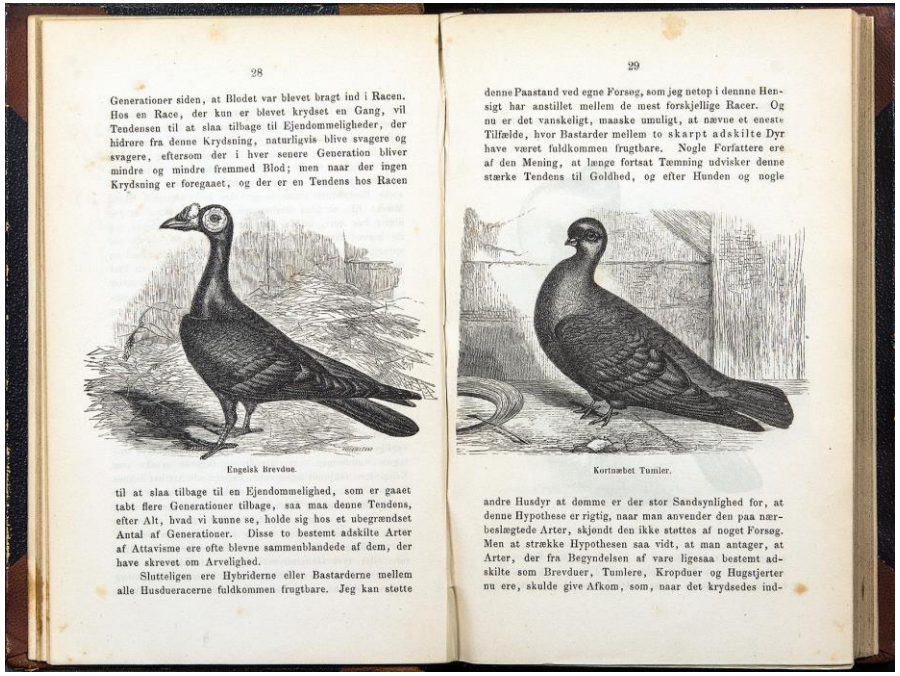
Darwin makes a case for Evolution

- 1859- Published Origin of Species
  - Based on his ideas of Natural Selection



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Generationer siden, at Blodet var blevet bragt ind i Racen. Hos en Race, der kun er blevet krydset en Gang, vil Tendensen til at slaa tilbage til Ejendommeligheder, der hidrøre fra denne Krydsning, naturligvis blive svagere og svagere, eftersom der i hver senere Generation bliver mindre og mindre fremmed Blod; men naar der ingen Krydsning er foregaaet, og der er en Tendens hos Racen

Engelsk Brevdue.

til at slaa tilbage til en Ejendommelighed, som er gaaet tabt flere Generationer tilbage, saa maa denne Tendens, efter Alt, hvad vi kunne se, holde sig hos et ubegrændset Antal af Generationer. Disse to bestemt adskilte Arter af Attavisme ere ofte blevne sammenblandede af dem, der have skrevet om Arvelighed.

Sluttelig en ere Hybriderne eller Bastarderne mellem alle Husdueracerne fuldkommen frugtbare. Jeg kan stotte

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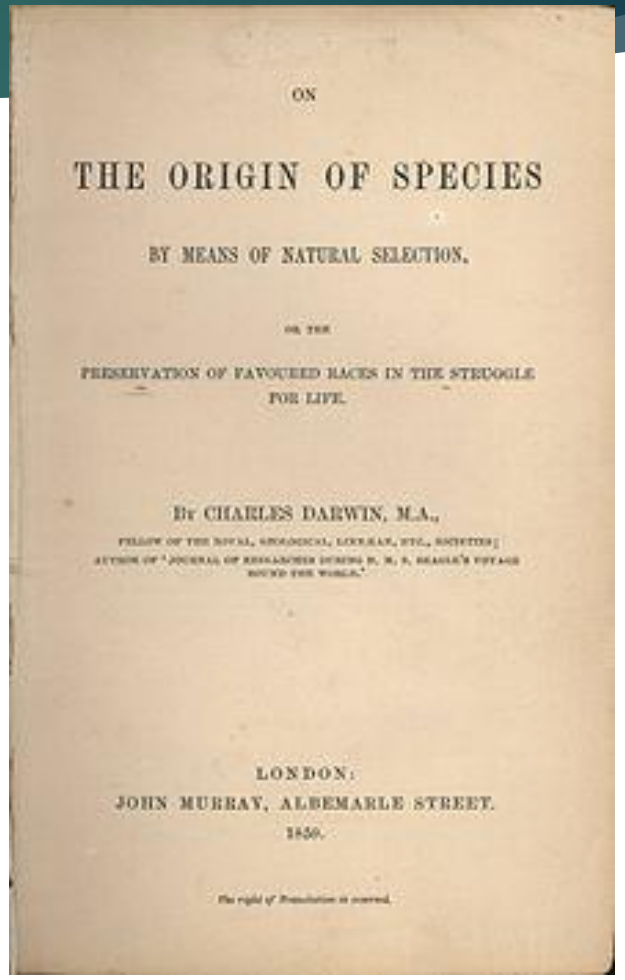
denne Paastand ved egne Forsøg, som jeg netop i dennne Hensigt har anstillet mellem de mest forskjellige Racer. Og nu er det vanskeligt, maaske umuligt, at nævne et eneste Tilfælde, hvor Bastarder mellem to skarpt adskilte Dyr have været fuldkommen frugtbare. Nogle Forfattere ere af den Mening, at længe fortsat Tæmning udvisker denne stærke Tendens til Goldhed, og efter Hunden og nogle

Kortnæbet Tumler.

andre Husdyr at domme er der stor Sandsynlighed for, at denne Hypothese er rigtig, naar man anvender den paa nærbeslægtede Arter, skjøndt den ikke støttes af noget Forsøg. Men at strække Hypothesen saa vidt, at man antager, at Arter, der fra Begyndelsen af vare ligesaa bestemt adskilte som Brevduer, Tumlere, Kropduer og Hugstjerter nu ere, skulde give Afkom, som, naar det krydsedes ind-



ON

THE ORIGIN OF SPECIES

BY MEANS OF NATURAL SELECTION,

OR THE

PRESERVATION OF FAVOURED RACES IN THE STRUGGLE FOR LIFE.

By CHARLES DARWIN, M.A.,

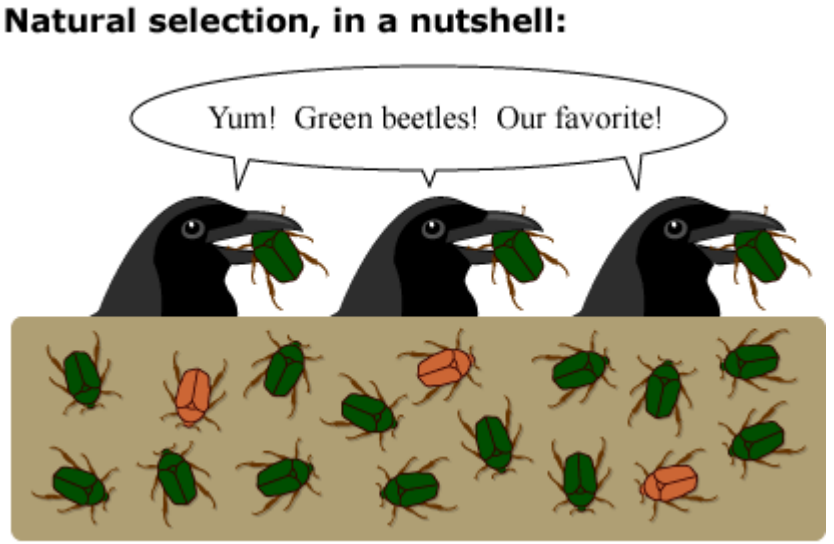
FELLOW OF THE ROYAL, GEOLOGICAL, LINNÆAN, ETC., SOCIETIES;
AUTHOR OF 'JOURNAL OF RESEARCHES DURING H. M. S. BEAGLE'S VOYAGE ROUND THE WORLD.'

LONDON:
JOHN MURRAY, ALBEMARLE STREET.
1859.

The right of Translation is reserved.

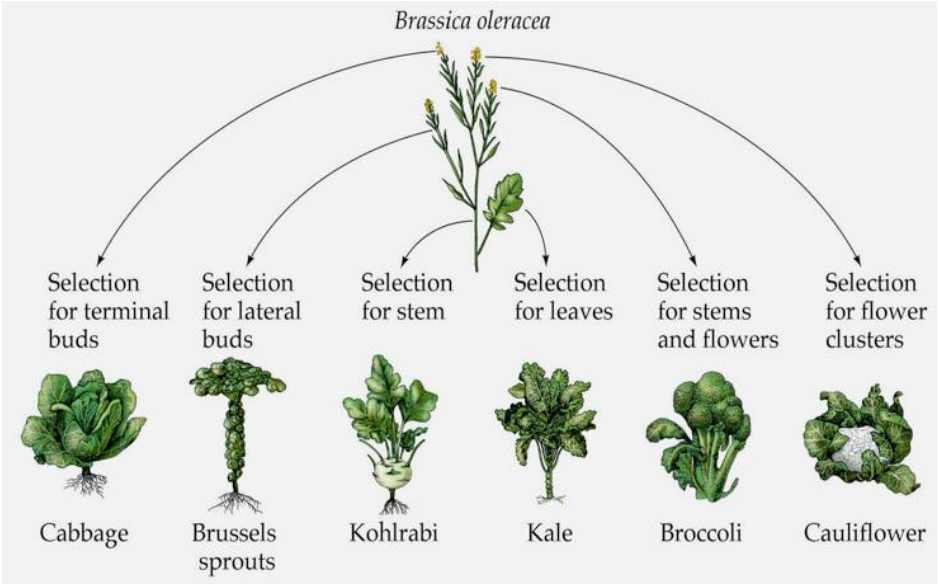
Natural Selection

- Natural Selection: Organisms that are best adapted to an environment *survive* and *reproduce* more than others



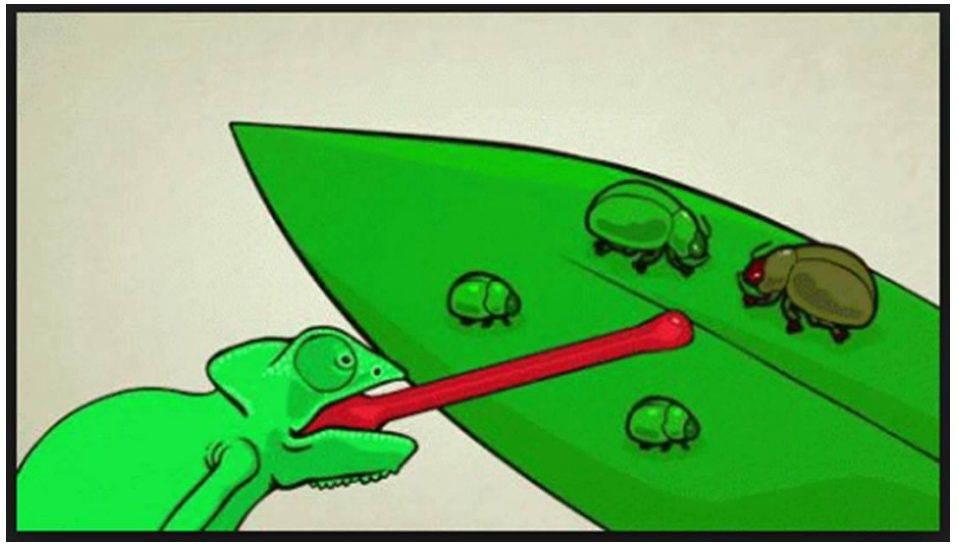
Darwin's Ideas

- Members of each species vary from each other in important ways
  - I.e. some plants bear larger fruit
  - Some cows produce more milk
    - Some of this variation is heritable
- Observed that plant and animal breeders would use heritable variation
  - Selected variations that were useful
  - Called "Artificial Selection"



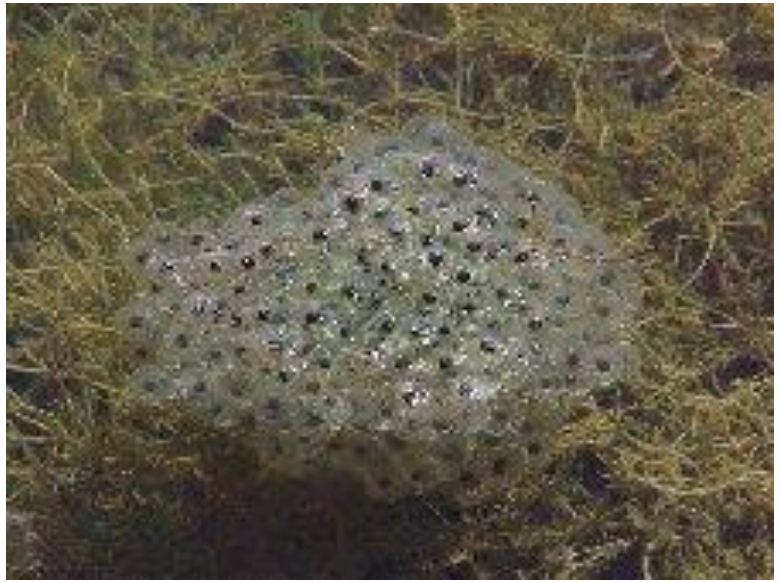
Key Ideas to Darwin's Theory of Natural Selection

- Overproduction
- Variation
- Competition
- Selection



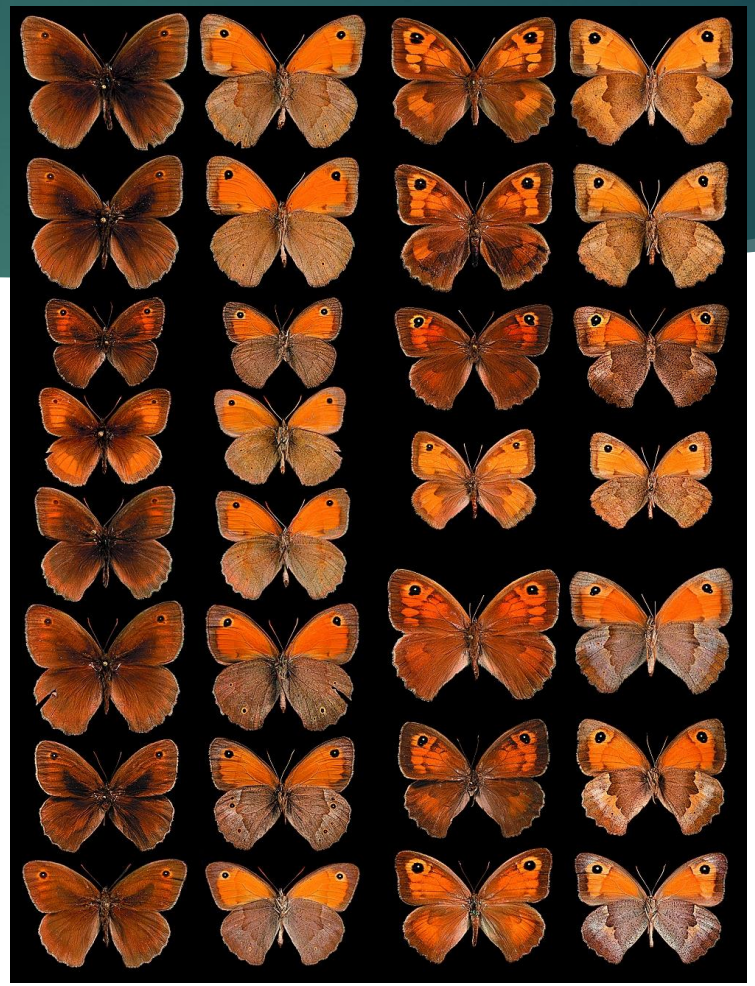
1. Overproduction

- **Each species produces more offspring that can survive**
- **Why are the population sizes not bursting?**



2. Variation

- Each individual has a unique combination of inherited traits.

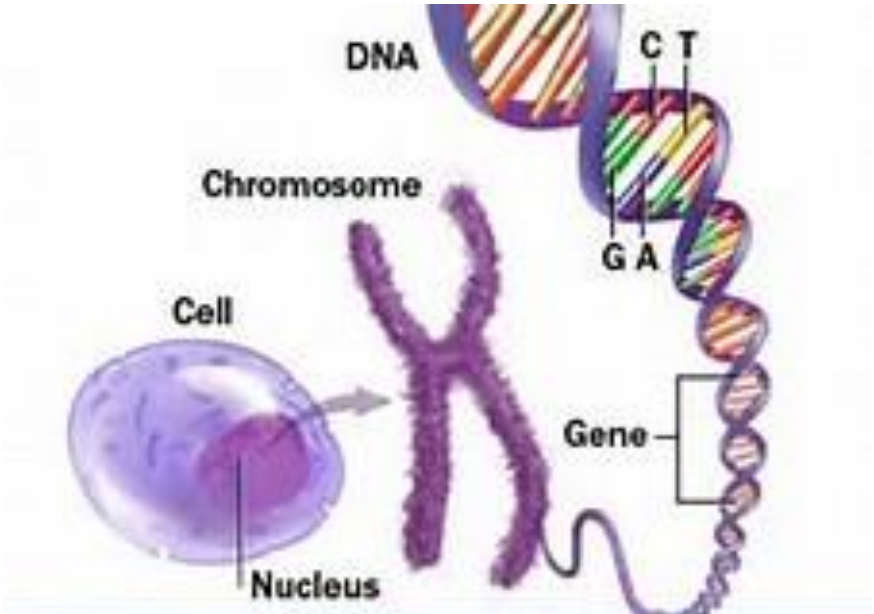


Why is Variation Important?

- **Because the environment changes.**
- **The more variation within a species, the more likely it will survive**
  - **EX: If everyone is the same, they are all vulnerable to the same environmental changes or diseases**
- **The more variation of types of species in an habitat, the more likely at least some will survive**

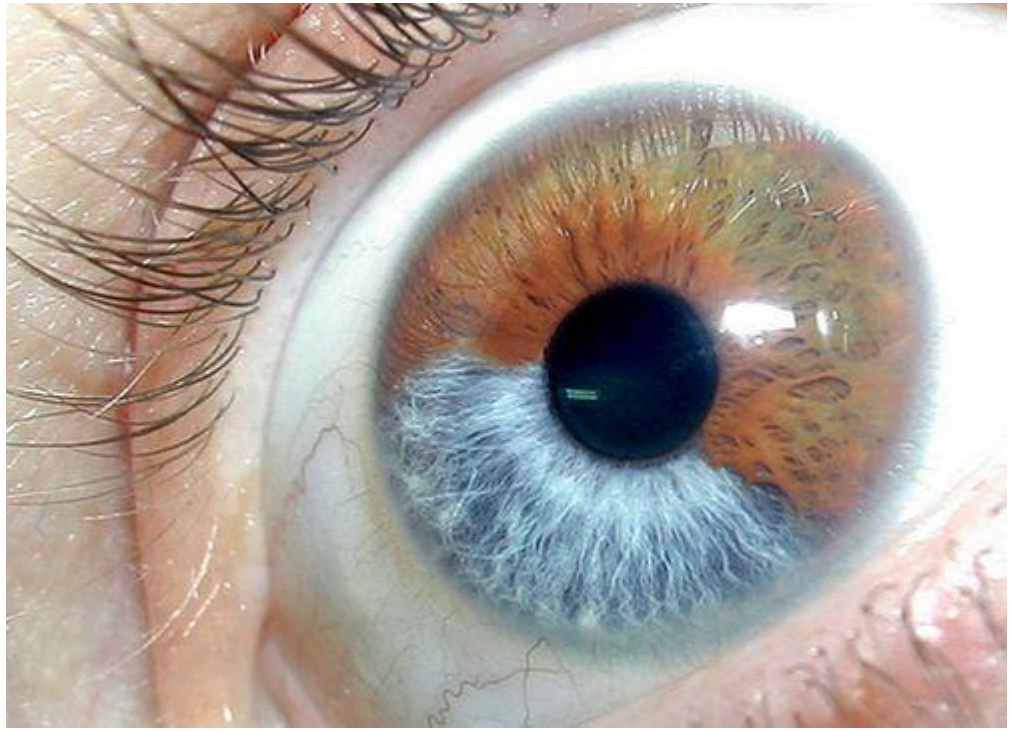
The role of Genetics in Evolution

- Darwin knew that traits were inherited, but not HOW they were inherited
- Genes provide the variation necessary for evolution.



Two mechanisms for Variation

- Meiosis:
  - Reshuffles genes creating new combinations of genes
- Mutation
  - Provides new genes
- Both result in the variation necessary for evolution to occur



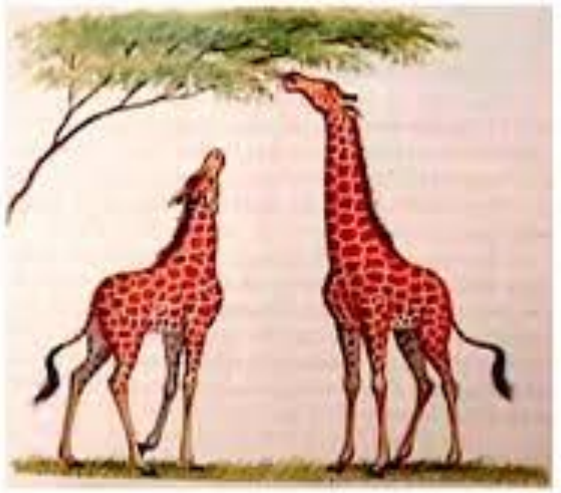
Variation

- Variation is RANDOM
- Combination of genes are determined by chance
  - As are resulting variations
- Variation provides the raw material for natural selection

3. Competition

- Process like Artificial Selection working in nature
  - "Struggle for existence"
    - Organisms compete for food, habitat and other of life's necessities

Fitness



- Fitness: The ability of an individual to survive/reproduce in its environment
  - The result of adaptations
    - Inherited characteristics that increase an organisms chance of survival
      - Structural, Physiological & Behavioural

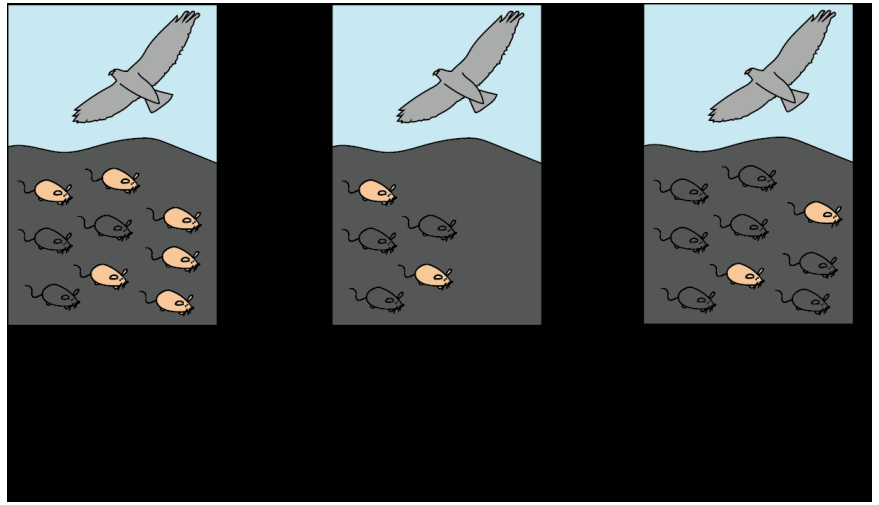
- Successful adaptations
  - Enable organisms to survive/reproduce and pass traits to offspring
- Individuals with favourable characteristics enable fitness and survive/reproduce more successfully
- Individuals with unfavourable characteristics die or have fewer offspring

4. Natural Selection

- The individuals with the best traits / adaptations will survive and have the opportunity to pass on it's traits to offspring.
- Natural selection acts on the **phenotype** (physical appearance), not the genotype (genetic makeup)
- Ex: When a predator finds its prey, it is due to the prey's physical characteristics, like color or slow speed, not the alleles (BB, Bb)

Survival of the Fittest

- Takes place without human control or direction
  - Therefore NATURAL SELECTION



- Over time natural selection results in changes in the inherited characteristics of a population
  - These changes increase a species fitness in its environment
    - Changes cannot be seen directly but it can be observed as changes in a population over many successive generations