Class 6 – 09 April 2025, 1pm

LS1201

Introduction to Biology II

Part B - Evolution

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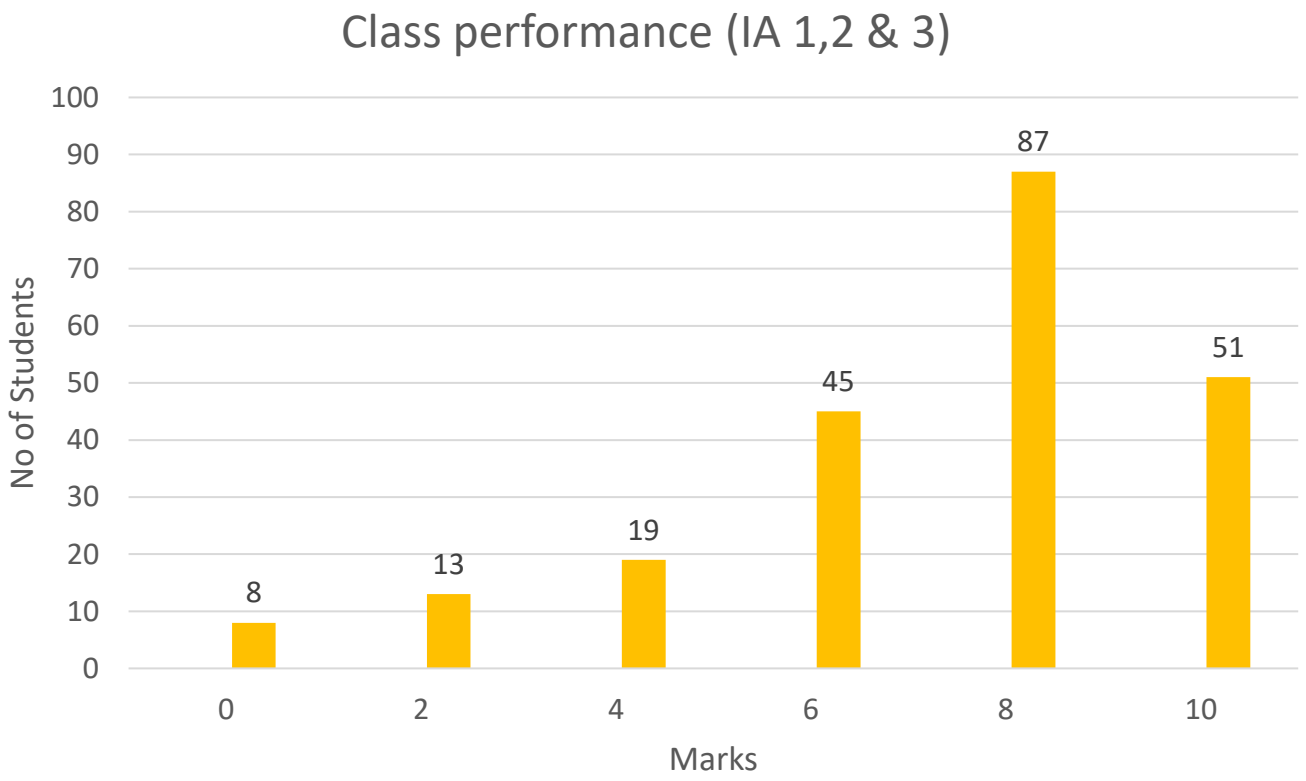
Internal assessment – so far

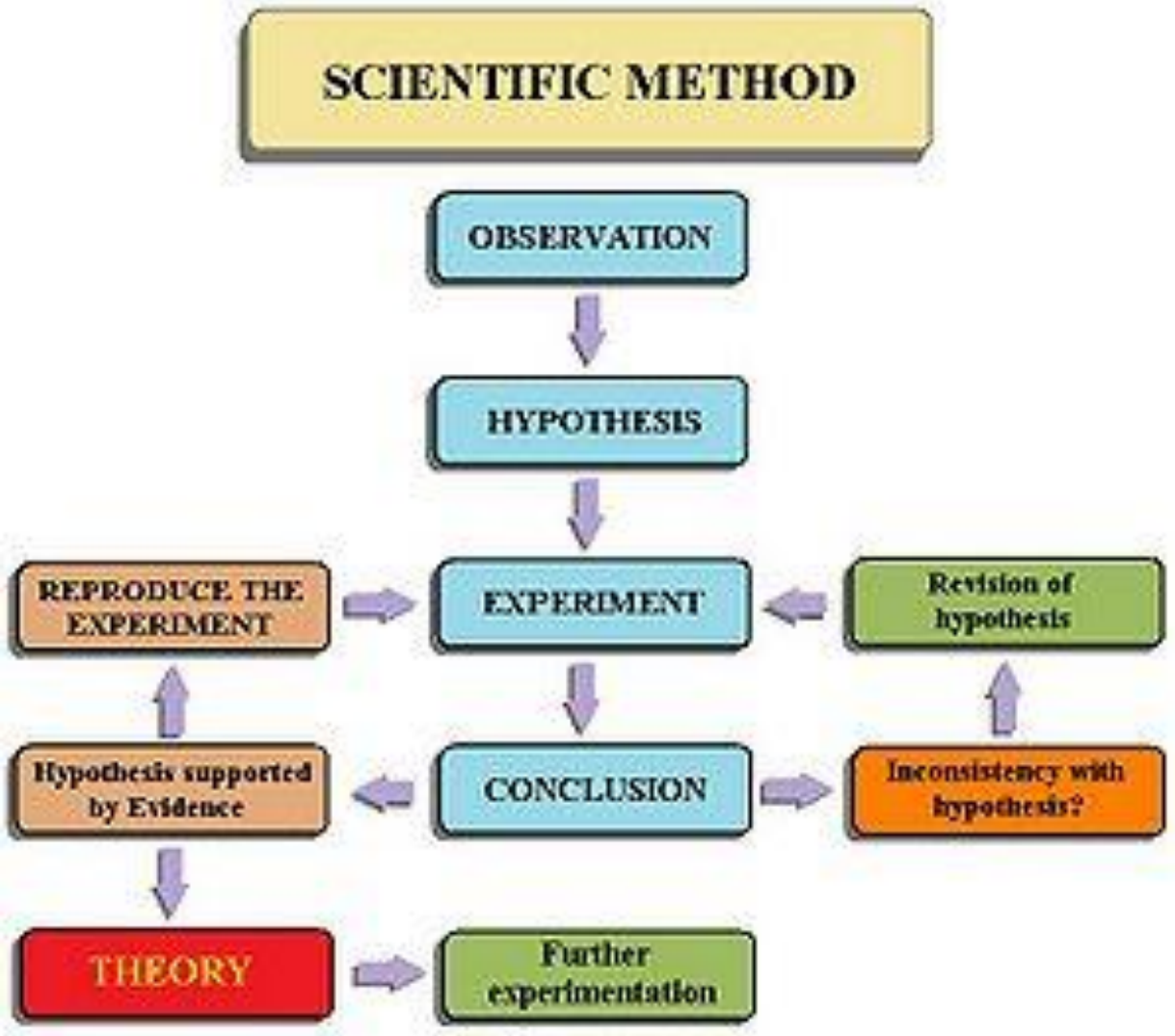


Evolution in Action

Field crickets – males sing. This phenotype was very common. In the presence of maggots, singing males selected out, with time the population mostly has silent variety.

Bacteria causing ear infection – as we use more and more antibiotics, % of bacteria that are resistant to penicillin has drastically increased over 20 years of study.

Basic premise of science



Implications of Natural Selection

Organisms that are better adapted to their environment get an advantage

Adaptive advantage

Silent field cricket has adaptive advantage

Bacteria that is resistant to Penicillin has adaptive advantage

Implications of Natural Selection

Fitness

The number of offspring that themselves reproduce

Differential fitness

Survival of the fittest

1864, *Herbert Spencer book Principles of Biology*

Implications of Natural Selection

Individuals that have variations that give them an

Adaptive advantage

If this variation is heritable

Differential fitness

Organisms carrying these variations will increase in the population and with time this variant will become the most common variant within the population

Natural selection in action

Industrial Melanism

Example 3

Biston betularia (typica)

Biston betularia (carbonaria)

First found in 1848, near Manchester, England. Most of the population was light colored with dark dots on them.

In 1950, 90% of the population was melanic (Dark).

The Peppered Moth

Kettlewell's Experiment

Figure 3. Adult male Redstart (*Phoenicurus phoenicurus* Linn.) with the light-coloured Peppered Moth taken from a Birmingham tree trunk. There were two concealed Black Peppered Moths on the trunk at this time. (Reproduced from Kettlewell 1955c, p. 508.)

Rudge (2003), Science & Education 12: 261-287

The Peppered Moth

The phenotype with higher fitness in the current environment is favoured by natural selection

Kettlewell's Experiment

- In an unpolluted forest we released 984 moths: 488 dark and 496 light. We recaptured 34 dark and 62 light, indicating that in these woods the light form had a clear advantage over the dark.

- We then repeated the experiment in the polluted Birmingham woods, releasing 630 moths: 493 dark and 137 light. The result of the first experiment was completely reversed; we recaptured proportionately twice as many of the dark form as of the light (Kettlewell, 1959).

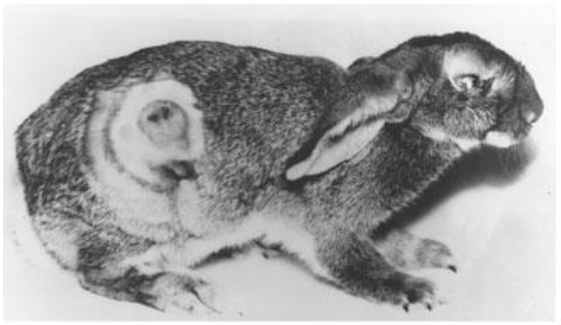
Natural selection in action

Vs.

Population control

Population control

- Australia – Kangaroo vs. Rabbits



Myxoma virus

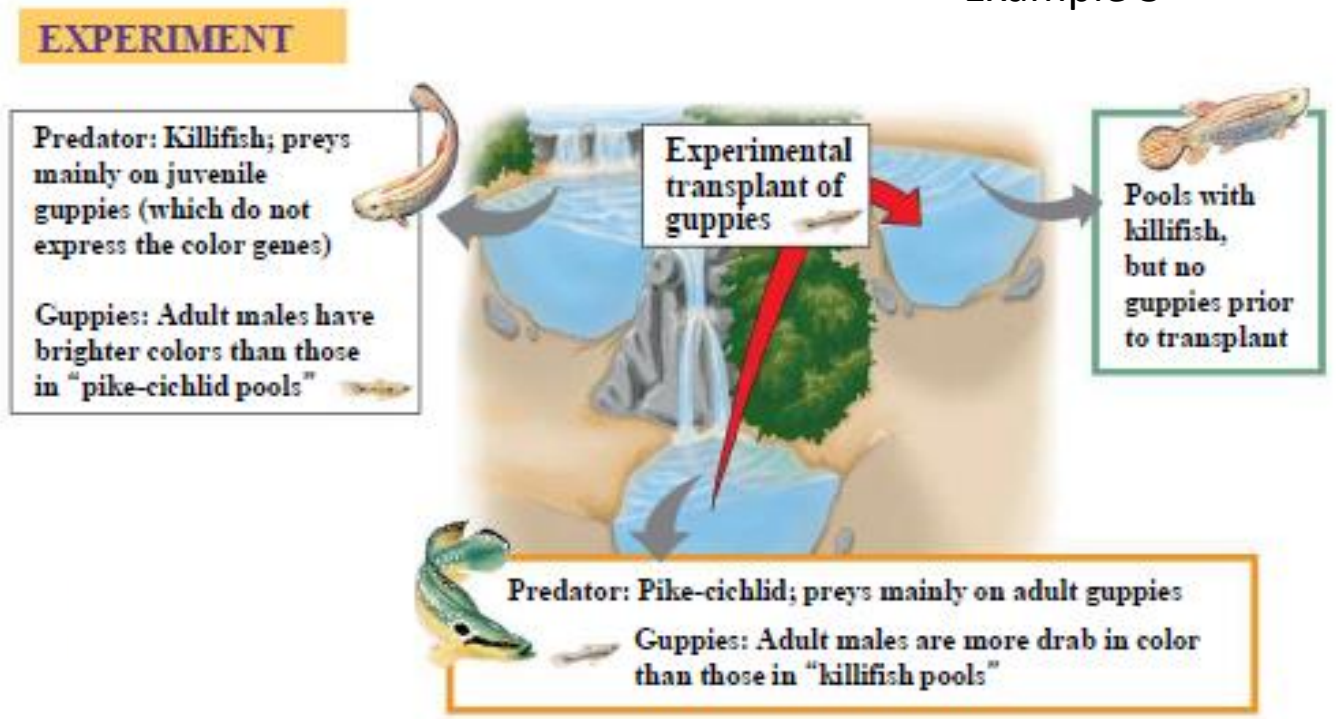
90% of the rabbit population was wiped out (1950)

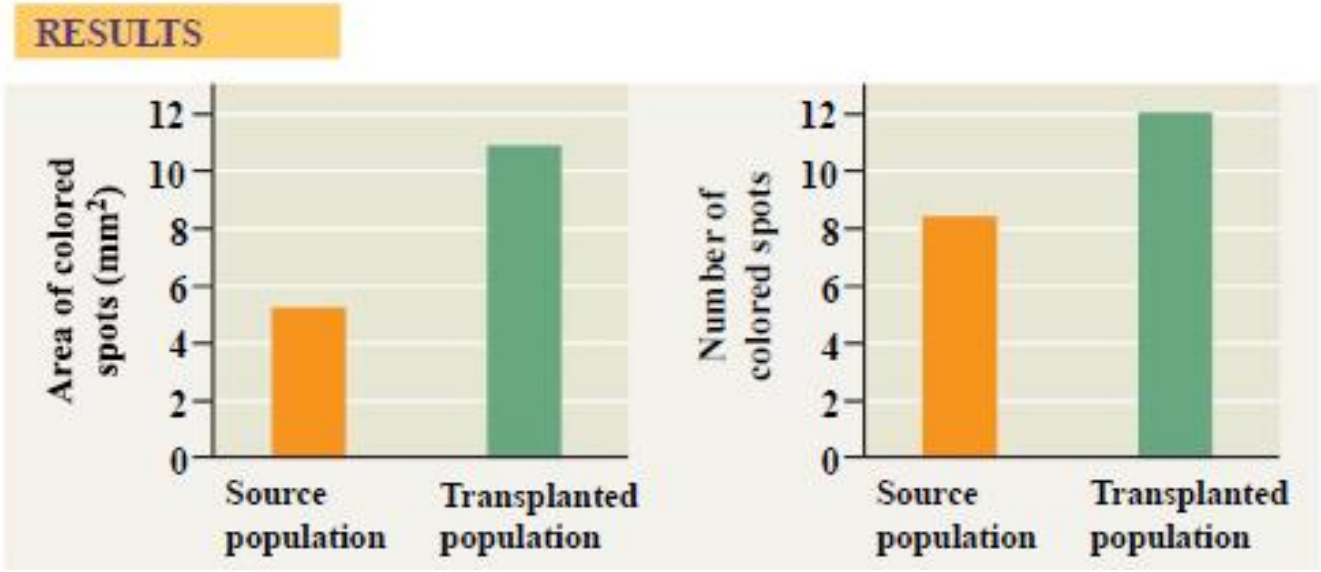
but

in 10 years the problem was back.

Guppies

Example 5





Adult male guppies are larger than females and have more coloured spots on their tails

Killifish – eat small guppies
Pike – eat large guppies