Investigating variation

Syllabus dot point: perform a first-hand investigation to gather information of examples of variation in at least two species of living organism

Aim: To identify examples of variation in 2 species of living organisms.

Method:

Section 1 – variations in beans

1. Collect 25 beans
2. Use electronic scales to measure the mass of each bean and complete the result table below
3. Observe the beans closely. Apart from their size, are there any other differences between the beans?

Section 2 – variations in humans

1. Measure the following:
   1. Your height in cm
   2. Your foot length in cm
   3. Your wrist circumference in cm
2. Record all the above information in the google spreadsheet linked here: <https://spreadsheets.google.com/spreadsheet/ccc?key=0Apu_rZNsM2MbdDJ6Z0pJSkNNQ19WT2tRTUU4OXM4d1E&hl=en_US>
3. Also record the following in the spreadsheet:
   1. Eye colour
   2. Whether you can roll your tongue
   3. Whether you have freckles
   4. Whether your hair is naturally straight, wavy or curly.
   5. The musical instruments you can play reasonably well (note: write “none” if you never got beyond playing “Twinkle Twinkle little star” on the recorder or “chop sticks” on the piano).

Results.

1. Complete the table below:

|  |  |
| --- | --- |
| Mass range (g) | Number of broad beans |
| 0.0 – 0.2 |  |
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1. Use excel to construct a column graph of the information in the table above.
2. Use excel to construct the following graphs:
   1. A scatter graph showing height versus foot length (hint: you may need to sort the data first!)
   2. A pie chart showing the different eye colours and hair types for our class.
   3. A column graph showing the percentage of students who can roll their tongue, have freckles and play at least one musical instrument.

Discussion questions:

1. We studied some differences between bean seeds. What are some differences that might be observed in fully grown bean plants?
2. One variation in beans is flower colour. Explain how a particular colour might become more common over many generations (hint: think about the insects that pollinate the flowers and natural selection).
3. We studied a number of characteristics in humans. List some human characteristics that are determined by:
   1. Genes only
   2. The environment only
   3. A combination of genes and the environment.

More differences

Information about some species of Australia animals is provided below. Read through the information, then for each species construct a table like the one below:

|  |  |
| --- | --- |
| Variation | How does this variation affect the organism’s chance of survival and/or reproduction |
| Size | Smaller birds require less food and are thus more likely to survive in regions that experience long periods of dry weather (thus scarcer food) |
|  |  |

**Magpies**

**Size and shape**

There has been ongoing debate as to whether magpies belong to a single species or several species. They belong to the genus *Gymnorhina* but present-day taxonomists have agreed to put all the magpie variations into one species and then divide it into subspecies. Even the subspecies are not clearly divided because mixed forms may occur in adjacent regions. The variation occurs in the shape and the size of the magpies, depending on their geographical distribution. For example, northern (top-end) magpies live in the Northern Territory and northwest of Western Australia.

The largest magpies live on the east coast, from Melbourne to Brisbane. They have long, slender bills. The differences (Alex Miligan, 1903) are thought to be due to different soil and climatic conditions and probably also due to the different food found above ground. Northern magpies which encounter long periods of dry weather may have to eat scorpions and poisonous spiders. The shortest and most compact magpies are the Tasmanian magpies—their short beaks are suitable for cracking the outer coat of hard-shelled beetles and cockroaches.

This is all speculation and other reasoning has been suggested:

■ *Different body size due to climate*. Large magpies live in temperate climates, medium to small live in tropical areas. Does climate affect food choice which in turn affects body size? (This general trend does have one exception—magpies on the mainland in Victoria, facing Tasmania, are amongst the largest.)

■ Another possibility is that *social organisation (mate attraction) may influence body size*.

**Colouration**

Black-backed magpies occur throughout Australia. White-backed magpies are largely confined to Western and Southern Australia. Some intermediate forms do exist. It is thought that their colour may be linked to their origins—the black form may have originated in the North (Torresian origin) where the climate is tropical or subtropical and the white form may be Bassian in origin (southern/temperate). The significance of the different colour plumage is not known.

**Koala—size and colour**

The koala is the only species in this family. Koalas in northern Australia have smaller bodies, shorter hair and a lighter coat colour than koalas in southern Australia. This change is very gradual, making classfication vague. (See www.thebigzoo.com/zoo/Phascolarctidae.asp.)

Following Bergmann’s Rule, southern koalas from the cooler climates are larger. A typical Victorian koala has longer, thicker fur, has a darker back and a lighter belly. New South Wales’ koala size is considered to be average. In tropical and sub-tropical Queensland, however, the koala is smaller, often rather scruffy grey in colour and has shorter, finer fur. The variation from one form to another is continuous and there are also differences between individual koalas in any given region. (See http://en.wikipedia.org/wiki/Koala.)