



The Variety of Life

Biochemical Basis of Life

- This is similar for all organisms
- They all contain carbohydrates, lipids, proteins and nucleic acids



biODiVeRSiTy

is the range
of organisms
living in a
particular
ecological
community or
ecosystem

types of diversity

- **Genetic diversity** is the diversity of genes within a species
- **Species diversity** is the diversity of species within an ecosystem
- **Ecosystem diversity** is the diversity of ecosystems within the biosphere

measuring diversity

- Species diversity is measured using the **Simpson Index**
- Measures the probability that two individuals randomly selected from a sample will belong to the same species (or some category other than species)

$$D = \frac{\sum n(n-1)}{N(N-1)}$$

- N is the percentage cover or total number of organisms of all species
- n is the percentage cover of a species or number of organisms of a particular species
- The value of D ranges between 1 and 0
- $D=1$ no diversity
- $D=0$ infinite diversity

EXAMPLE

Species	Number (n)	$n(n-1)$
Woodrush	2	2
Holly (seedlings)	8	56
Bramble	1	0
Yorkshire Fog	1	0
Sedge	3	6
Total (N)	15	64

$$D = \frac{\sum n(n-1)}{N(N-1)}$$

$$D = \frac{64}{15(14)}$$

$$D = \frac{64}{210}$$

$D = 0.3$ (Simpson's Index)

- Use the Simpson index to calculate the diversity for the birds feeding in the field. Show your working.

Species	Number of birds of that species feeding in the field
Greenfinch	12
Goldfinch	8
Wood pigeon	3
Pheasant	1

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- Use the Simpson index to calculate the diversity for the birds feeding on the bird table. Show your working.

Species	Number of birds of that species on the bird table
Blue tit	8
Coal tit	1
Great tit	3
Robin	1
House sparrow	5
Greenfinch	3
Starling	7

0.17

- The Simpsons Index can be related to the abiotic harshness of an environment or to pollution in an ecosystem
- Generally the species diversity is greater in habitat in which abiotic conditions are less demanding or in which pollution levels are lower.
- It can therefore be used to compare ecosystems

- Compare the Simpsons Index and species diversity of a garden in central Belfast to one in Ballynahinch.

The Simpson's Index will be smaller in Ballynahinch than in Belfast

There will be more types of species and they will be more abundant

Because the environmental conditions will be less harsh - less pollution

- How would the Simpsons Index differ for The Amazon Rain Forest and The Gobi Desert?

The Simpson's Index will be larger in the Desert than in the Rain Forest

There will be fewer types of species and they will be less abundant

Because the environmental conditions will be harsher - few organisms are adapted to survive the lack of water and extreme temperature changes