

Karyotyping

The process of studying human chromosomes and chromosomal abnormalities.

This activity has been designed to address components of the NSW Stage 4 and 5 Science and HSC Biology syllabi. Completing the activity and pursuing discussion in class relates particularly well to:

Stage 4 and 5 Science

- Prescribed Focus Areas 4/5.1, 4/5.3 & 4/5.5
- Values and Attitudes 4/5.23, 4/5.25 & 4/5.26
- Skills 4/5.13, 4/5.16, 4/5.21
- Knowledge and Understanding 4/5.8 & 4/5.12

HSC Biology

- Prescribed Focus Areas 1, 2, 3, 5
- Values and Attitudes 16
- Skills 14, 15
- Blueprint of Life 9.3.3
- Genetics: The code broken 9.7.6

The study of chromosomes by microscopy is called **cytogenetics**. By staining chromosomes with Giemsa dye and looking at them with a light microscope, we can see the unique banding patterns of each chromosome (see page two). The dye stains chromosomes according to the predominant DNA bases in different regions. The dark bands, called G bands, are rich in adenine (A) and thymine (T); the light bands, R bands, contain less A and T.

An organised profile of a person's matching chromosomes is called a **karyotype**. Chromosomes are arranged and numbered by size, from largest to smallest based on banding patterns and the position of the centromere. Karyotyping is one of many techniques that can detect chromosomal abnormalities, by looking at the number and structure of chromosomes.

The following pages can be used as a classroom cytogenetic activity by cutting out and sorting the chromosomes then pasting them onto a new sheet of paper.

Using a pair of scissors, cut out the chromosomes, referring to the master karyotypes sort and match the chromosomes to produce karyotypes for each different page- male, female, male with Edward syndrome, female with Down syndrome, male with Klinefelter syndrome.

Other examples of chromosomal abnormalities and karyotypes can be found at <http://www.pathology.washington.edu/Cytogallery/>