

## CHECKLIST OF KEY CONCEPTS

### Structure of DNA

1. DNA consists of repeating units, each unit being a base, deoxyribose and a phosphate group.
2. The bases are G,C,A and T. They are attached to the deoxyribose via a  $\beta$  glycosidic link.
3. The linkage between repeating units is a 3',5' phosphodiester link.
4. DNA is more stable than RNA and it is suggested that this is why it has evolved to become the genetic material for almost all organisms.
5. In the cell DNA exists in a double stranded form, with G-C and A-T base pairing. This double helical structure forms spontaneously.
6. In the helix the bases are on the inside and the deoxyribose and phosphate on the outside. The bases are stacked flat, one on top of the other.
7. The helix twists in a right handed manner and has a major and a minor groove.
8. DNA can also exist in an A form and a Z form but the biological significance of these is uncertain.
9. The 2 strands in DNA are antiparallel and each strand has a free 3' and a free 5' end.

### Folding of DNA in the nucleus

10. In eukaryotes DNA associates with histones as nucleosomes. The nucleosomes are then arranged in an ordered manner, probably a zigzag structure and these then are looped around a protein scaffold.
11. In order for the information in DNA to be used the structure must be unfolded so that it is accessible. Extremely tightly packed DNA, such as in metaphase chromosomes, is inert.

### Nature of genes

12. Genes are regions of coded information within the DNA. They are not physically distinguishable from the surrounding regions.
13. A variety of genes other than protein coding regions exist, including pseudogenes, ribosomal RNA and transfer RNA genes and transposons. The latter can move around the genome.
14. The complexity of an organism does not correlate well with the amount of DNA that is found in its nuclei.
15. A range of types of repetitive DNA exist, including macrosatellites, both long and short interspersed elements and microsatellites.
16. A large number of microgenes have been shown to exist. These code for microRNAs that do not code for proteins. The most likely function of these RNAs is in the control of development.
17. In addition there are small RNAi molecules. Each of these specifically destroys one particular mRNA.