InkBiology

ANSWER BOOK

Specialisation: how one genome becomes two hundred kinds of cell

Cells, microscopy and biological organisation · Unit B01

AQA 3.2.1.1, 3.8.2.1 · OCR A 2.1.6 (a)-(d) · Edexcel A Topic 3.13-3.17 · CAIE 1.2, 5.1, 7.1

5 questions · 16 marks

NAVY EDITION

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SECTION A · Short, 1 to 2 marks

A1 **B1** a tissue is a group of similar cells working together to perform a particular function. **B1** an organ is several different tissues working together to perform a particular function. [2]

SECTION B · Standard, 3 to 5 marks

B1 **B1** every cell holds a complete copy of the genome, so the genes present in the two cells are the same. **B1** only a fraction of those genes is transcribed in any one cell, so different proteins are made and different structures develop. **B1** which genes are expressed is set by the signals a cell receives, such as hormones, growth factors, its neighbours and its position in the embryo. **B1** once established the pattern of expression is maintained through subsequent divisions, so a cell's daughters stay the same type. [4]

B2 **B1** losing the nucleus and most organelles clears the centre of the tube, so sap flows through with little obstruction. **B1** the end walls survive as sieve plates perforated with pores, through which the contents pass from one element to the next. **B1** with no nucleus and no ribosomes the element cannot make its own proteins, so the companion cell makes them and passes them through plasmodesmata. **B1** the companion cell has dense cytoplasm and many mitochondria, and supplies the ATP for loading sucrose actively into the sieve tube. [4]

B3 **B1** a totipotent cell can produce any cell type in the organism and the extra-embryonic tissues such as the placenta, and is found in the zygote and the first few divisions. **B1** a pluripotent cell can produce any cell type in the body but not the placenta, and is found in the embryonic stem cells of the blastocyst. **B1** a multipotent cell can produce only a limited range of cell types, and is found in adult tissues such as bone marrow. [3]

B4 **B1** cilia normally beat in a coordinated wave that sweeps mucus up towards the throat to be swallowed. **B1** with the cilia damaged the mucus is not moved, so it collects in the airways and coughing is the only way left to shift it. **B1** that mucus holds trapped dust and bacteria, which now stay in the airway and can multiply there, so infections are more likely. [3]