1 The menstrual cycle involves monthly changes in the ovary and the uterus.

(a) Fig. 5.1 shows the sequence of changes within the ovary that occur during the menstrual cycle.

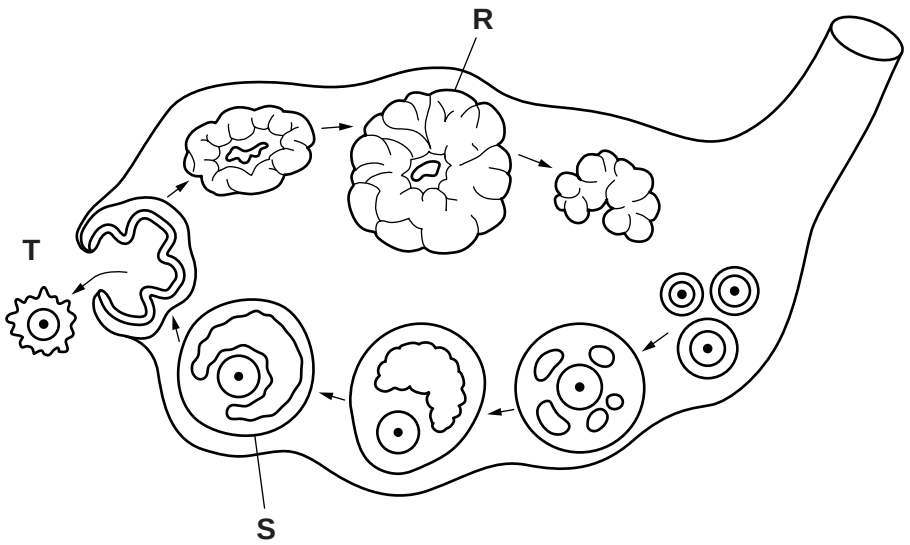

Fig. 5.1

(i) Name structures **R** and **S**.

R .....

S .....
[2]

(ii) State the name of the process that is occurring at **T**.

.....[1]

(b) The ovary secretes hormones that control the growth and maintenance of the lining of the uterus.

Name the hormone that stimulates:

(i) the growth of the lining of the uterus during the first half of the menstrual cycle

.....[1]

(ii) the maintenance of the lining of the uterus during the second half of the menstrual cycle.

.....[1]

(c) Fig. 5.2 is an electron micrograph showing a sperm cell on the surface of an egg cell.

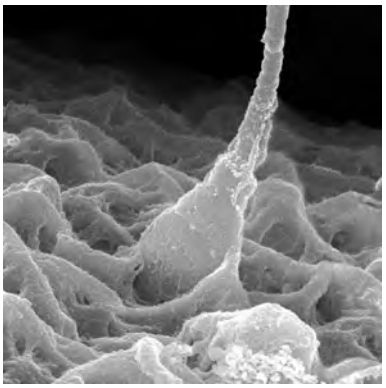

Fig. 5.2

(i) State **three** ways in which a sperm cell differs from an egg cell.

1 .....

2 .....

3 .....[3]

(ii) Human body cells have 46 chromosomes. Human egg and sperm cells have 23 chromosomes each.

What term is used to describe the number of chromosomes in a gamete, such as an egg cell or a sperm cell?

.....[1]

(iii) State the organ in which fertilisation occurs in humans.

.....[1]

(iv) Describe what happens between the event shown in Fig. 5.2 and implantation in the uterus.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....[4]

(d) Clomiphene citrate is a fertility drug that has been available for over 50 years. As part of a fertility treatment clomiphene citrate is taken once a day (daily dose) for about five days.

Researchers investigated the use of the drug in Denmark between 1974 and 1993. The results of their study are shown in Fig. 5.3.

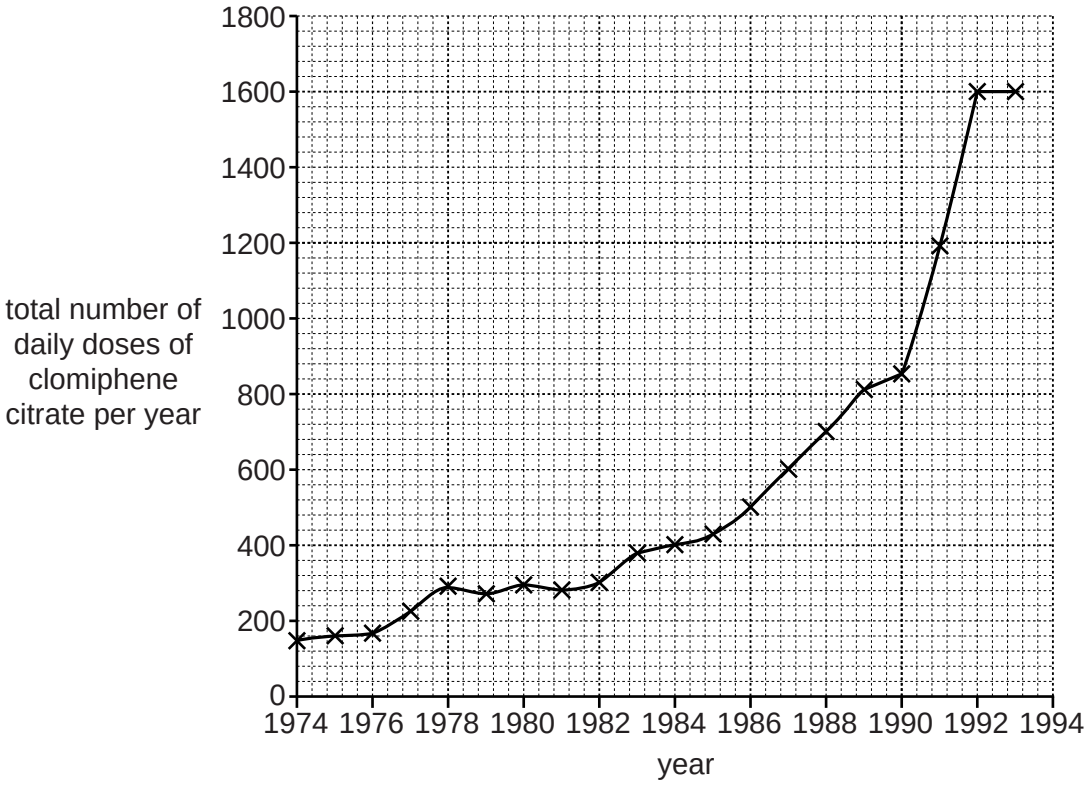

Fig. 5.3

(i) Describe the change in the use of clomiphene citrate in Denmark between 1974 and 1993. Use data from Fig. 5.3 in your answer.

.....

.....

.....

.....

.....[2]

(ii) Clomiphene citrate is used as part of a treatment cycle to help women become pregnant. Often this involves artificial insemination (AI).

Describe how a treatment cycle involving fertility drugs **and** AI would be carried out.

.....

.....

.....

.....

.....

.....

.....[3]

[Total: 19]

2 Fig. 5.1 is a diagram showing the events from pollination to fertilisation in a species of flowering plant.

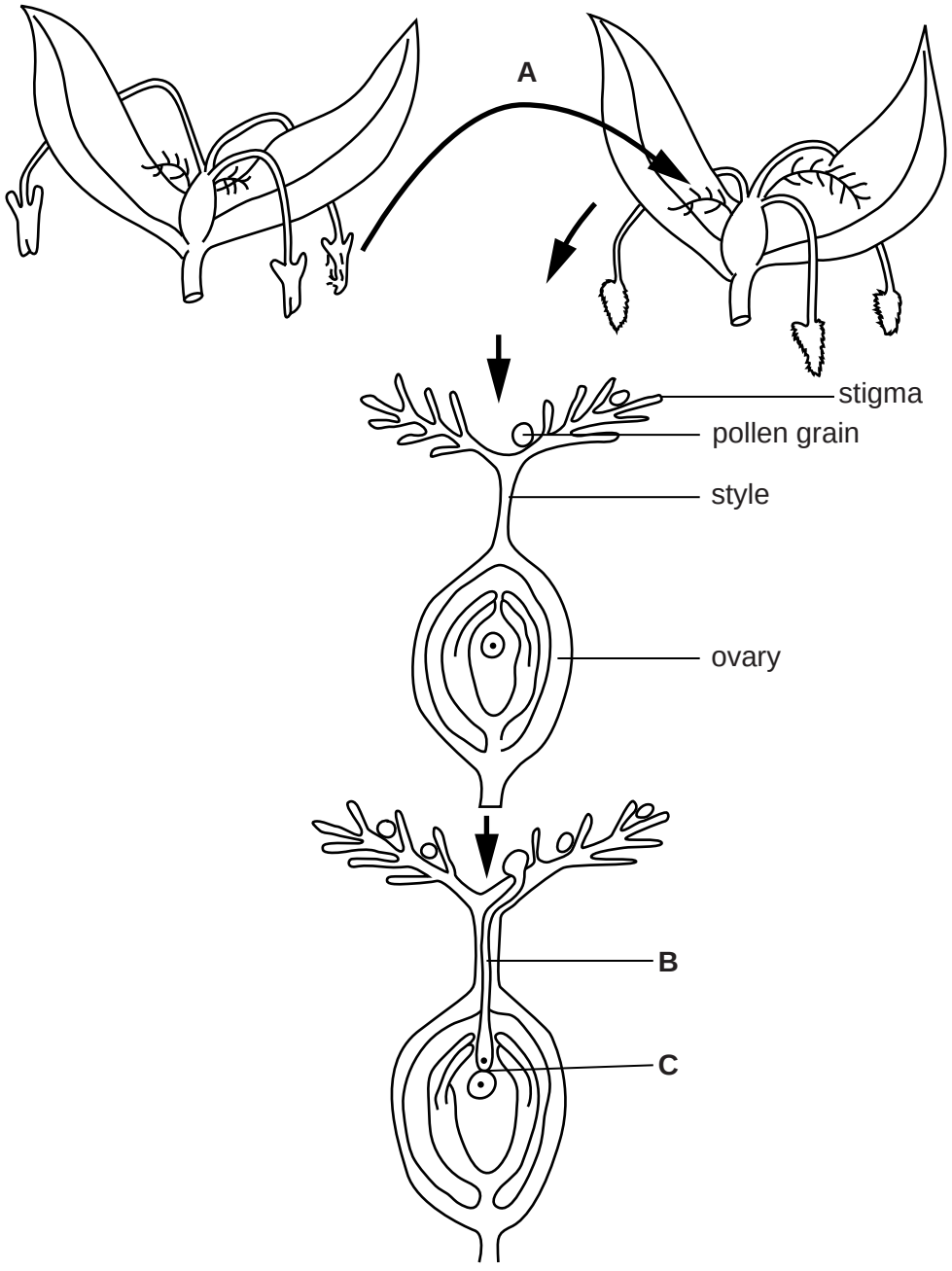

Fig. 5.1

(a) Name the likely method of pollination for the flowers shown at **A** in Fig. 5.1. Give an explanation for your choice.

method of pollination .....

explanation .....

.....

.....

.....

[3]

(b) In Fig. 5.1 pollen is transferred from one plant to another.

State the name for this type of pollination.

.....[1]

(c) Name structure **B** shown in Fig. 5.1 and state its function.

.....

.....

.....[2]

(d) Fertilisation occurs at **C** as shown in Fig. 5.1.

Describe what happens at fertilisation in flowering plants.

.....

.....

.....

.....

.....[2]

(e) Seed formation occurs after fertilisation. Seeds are formed inside the fruits and then dispersed.

(i) Name the part of the flower that develops into the seed.

.....[1]

(ii) Name the part of the flower that develops into the fruit.

.....[1]

(iii) State an advantage of seed dispersal.

.....

.....[1]

(f) Seed germination occurs when conditions are suitable.

Explain the role of enzymes in seed germination.

.....

.....

.....

.....

.....[2]

[Total: 13]

3 Bacteria can be grown on nutrient agar in Petri dishes. The main nutrients in the agar are glucose and amino acids. The bacteria reproduce asexually to form colonies. Each colony is formed from one bacterium.

(a) (i) Explain why glucose and amino acids are included in the agar medium.

glucose .....

.....

amino acids .....

.....

[2]

(ii) Describe how bacteria reproduce asexually.

.....

.....

.....

.....

.....[2]

A microbiologist collected bacteria from a kitchen which was suspected to be responsible for an outbreak of food poisoning.

The microbiologist spread the bacteria on nutrient agar and let them reproduce to form colonies. The bacterial colonies were transferred onto new nutrient agar that contained high concentrations of antibiotics **S** or **T**, as shown in the flow diagram in Fig. 5.1.

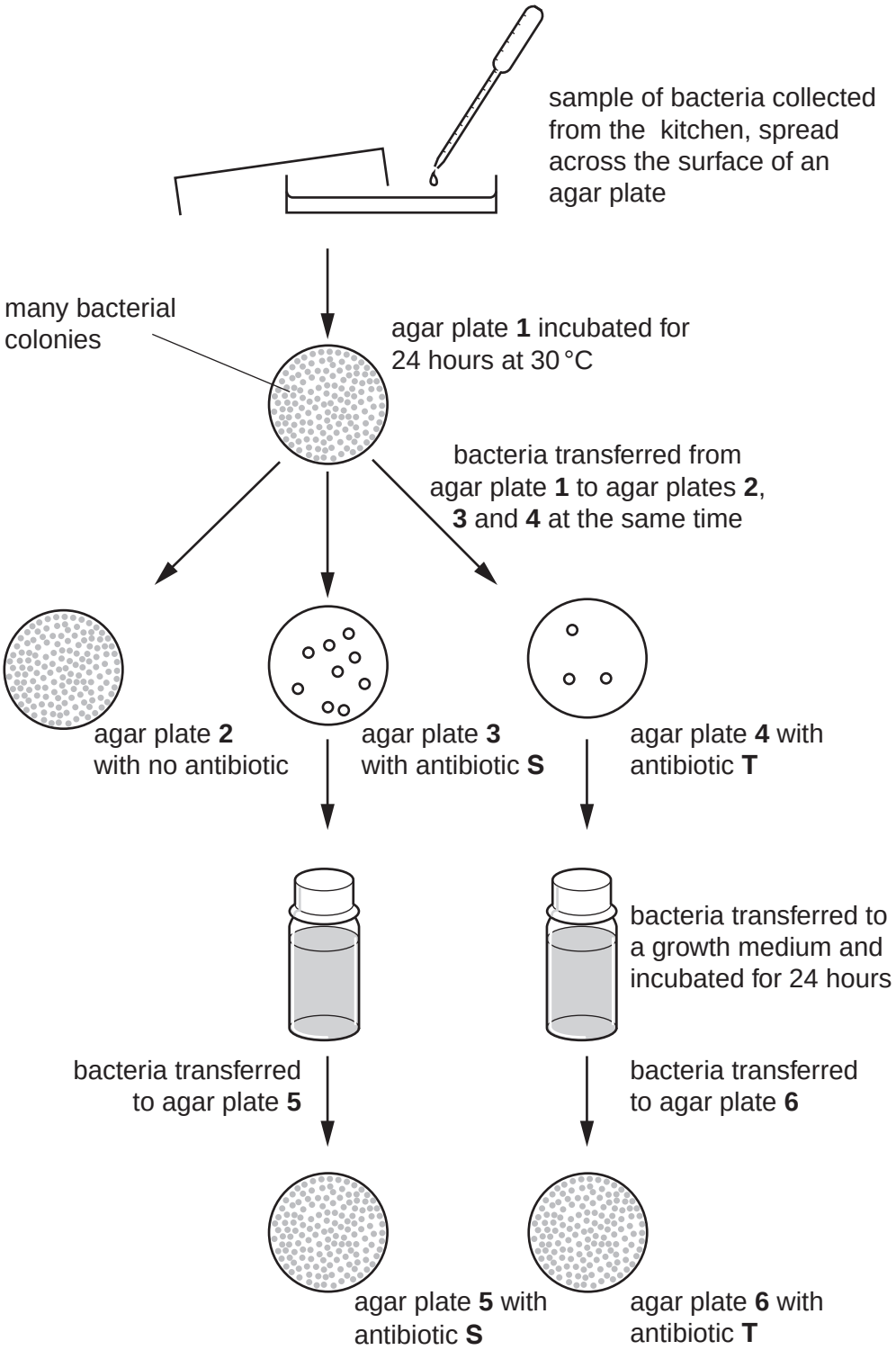

Fig. 5.1

(b) Explain the appearance of agar plates **3** and **4**.

.....

.....

.....

.....[2]

(c) Explain why many bacterial colonies were found on agar plates **5** and **6**.

.....

.....

.....

.....

.....[2]

(d) Gonorrhoea is a sexually transmitted disease. It is caused by the bacterium, *Neisseria gonorrhoeae*. Many strains of this bacterium cannot be treated by common antibiotics.

Explain how strains of antibiotic-resistant bacteria are formed **and** then spread.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....[5]

[Total: 13]