

CONCEPT 1

Male and female reproductive cells combine to produce a zygote.

Activity

Why Do Offspring Look Different?

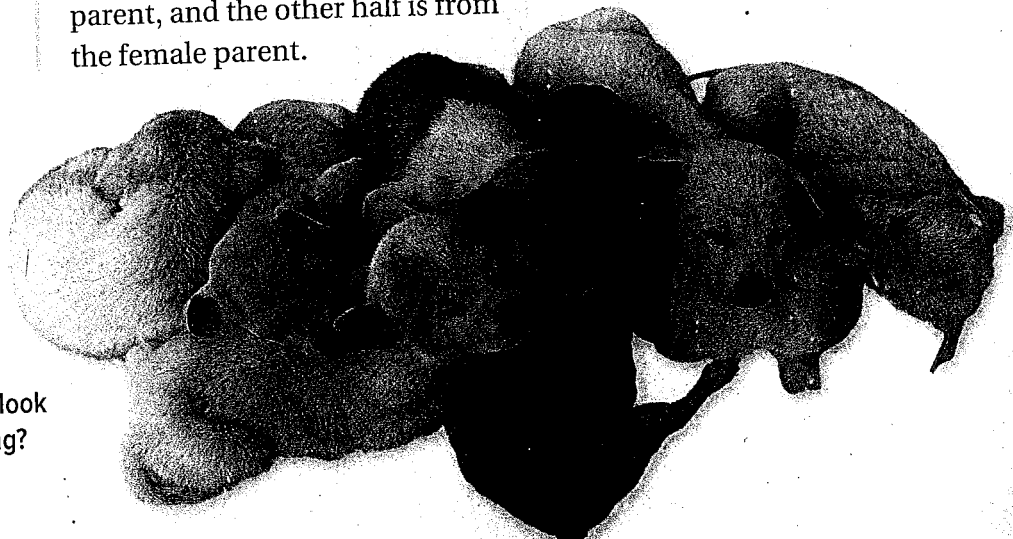
Unless they are identical twins, children from the same parents look different. Differences can include features such as eye colour, hair colour, ear shape, and height.

You and a partner will be given two paper bags that contain many different coloured beads. Each bag represents a parent, and the beads represent features that the parents can pass on to their children.

1. Open the *Male Parent* bag and, without looking, remove three beads. Record the colours of the beads that you pulled out.
2. Open the *Female Parent* bag and, without looking, remove three beads. Record the colours of the beads you pulled out.
3. The combination of male and female beads represents a child from those parents. Record the six-bead colour combination, which represents the child produced by your selections. Your teacher will collect this information from all groups in the class.
4. Compare your group's child (that is, the six-bead colour combination) with the other groups. How many different offspring did the class produce from the same parents? How do you think this activity is related to sexual reproduction?

Perhaps you have seen a litter of kittens or puppies like the one shown in **Figure 1.14**. One or more offspring might look like one parent, but others might look like the other parent. Still others might look like a combination of both parents. This happens because animals—and many other types of living things—reproduce sexually. Half of an offspring's DNA (genetic information) is from the male parent, and the other half is from the female parent.

Figure 1.14 In sexual reproduction, each of the two parents contributes characteristics to the offspring. What do you think the male and female parents of this litter might look like? What is your reasoning?



Sex Cells

In sexual reproduction, two cells and their genetic material combine to produce a cell that eventually develops into an offspring. The cells that combine are called *sex cells*, or **gametes**. The male parent contributes one gamete, which is the *sperm cell*. The female parent contributes the other gamete, called the ovum or *egg cell* (**Figure 1.15**). In humans, sperm are produced in the testes, and eggs are produced in the ovaries.

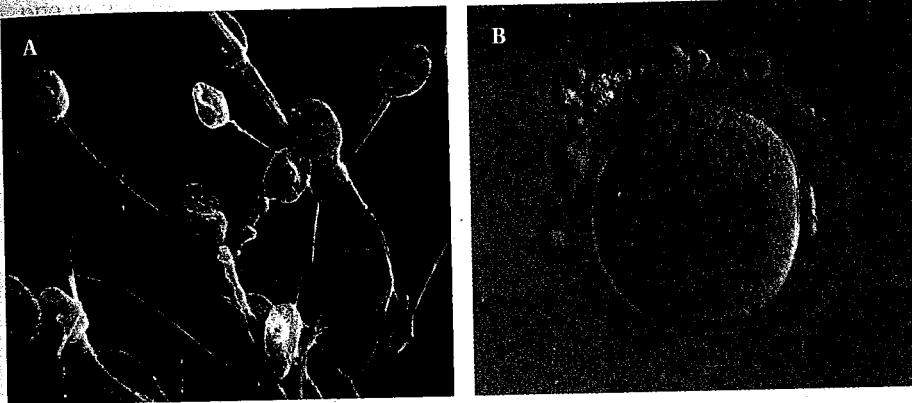
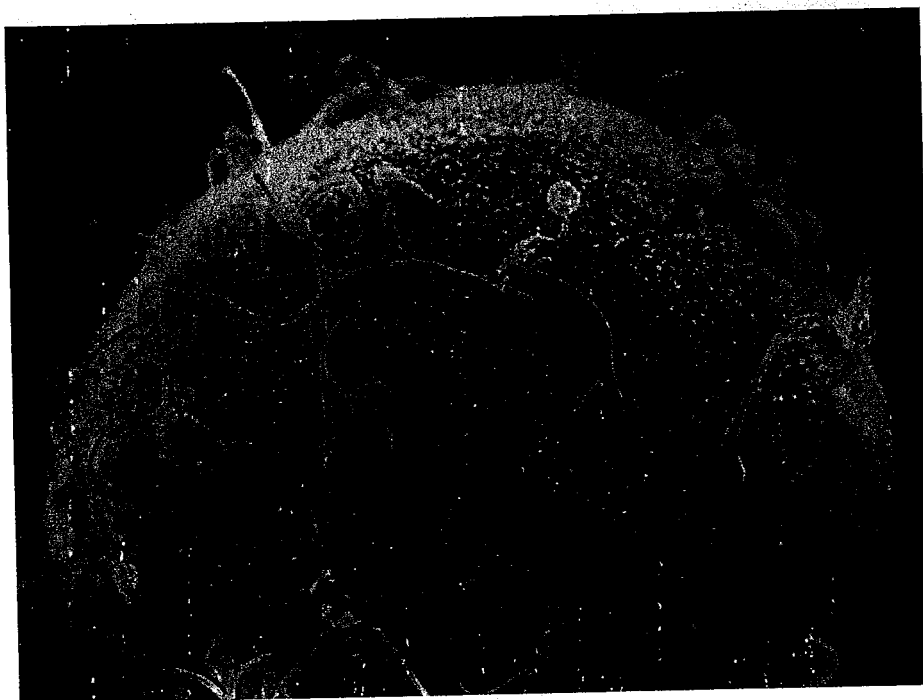


Figure 1.15 **A** Sperm cells have a unique look, with their long “tails” or flagella. **B** Egg cells are much bigger than sperm cells and lack flagella. What does the presence or absence of flagella on sex cells tell you about their mobility?

Contact between sperm and egg is the central event of sexual reproduction (**Figure 1.16**). At that moment, reproductive processes in two different individuals join together to create a single cell that will develop over a period of time into a new organism.



gamete male or female reproductive cell

Figure 1.16 Of the many sperm that approach and surround an egg, only one can fertilize the egg.

Fertilization

fertilization the combining of male and female reproductive cells

The process in which male and female gametes combine is called **fertilization**. The nuclei of the two gametes fuse together to produce a single cell called a *zygote* (Figure 1.17). The zygote is the first cell that develops into a new organism containing genetic information from both the sperm cell and the egg cell.

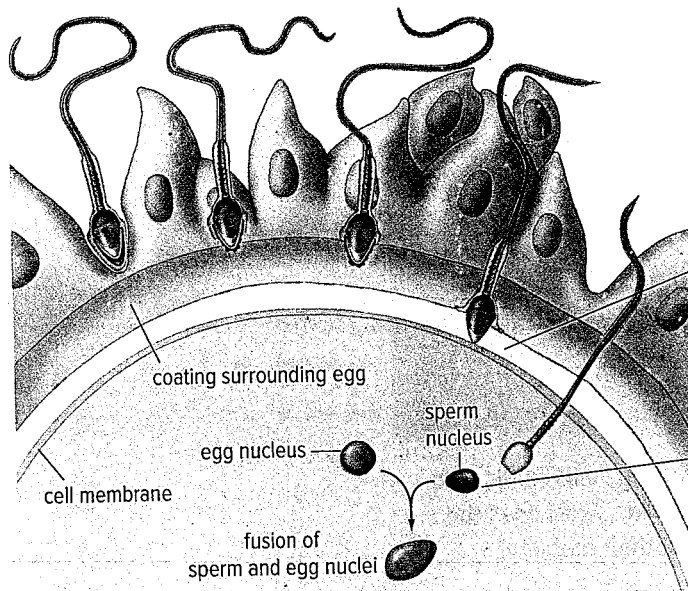


Figure 1.17 When a sperm cell fertilizes an egg cell, the two nuclei fuse and a zygote forms.

Sperm cells reach a jelly-like coating surrounding the egg cell and release substances that digest a path through the coating. This helps sperm cells get closer to the cell membrane of the egg.

The head of one sperm cell eventually enters the egg cell, where the sperm nucleus fuses with the egg nucleus.

Activity

Internal and External Fertilization

For some organisms, fertilization occurs inside the body. Males have structures, such as a penis, that deposit sperm near the egg or eggs. Other organisms reproduce by means of external fertilization, which occurs outside the bodies of both parents. The female deposits unfertilized eggs and males release sperm over the eggs.

1. Name one organism that carries out internal fertilization and one organism that carries out external fertilization.
2. How is internal fertilization an advantage over external fertilization?
3. Why do you think organisms that reproduce using external fertilization release a large number of eggs and sperm?

Before you leave this page . . .

1. How does the process of fertilization occur?
2. What is needed for fertilization to occur?