13.65: Fertilization

How far does a sperm have to swim?

Sperm swimming to an egg. If fertilization occurs, the egg will have all the "instructions" to grow into a new organism. That one cell will become two, then four, then eight, then sixteen, and on and on and on. And after about 9 months, that one cell will have become a new baby. But it all starts with the sperm swimming to the egg. A sperm cell is about two thousandths of an inch long. And although they are small, they can swim roughly 8 inches in an hour. To reach an egg, they will ultimately they have to swim around 192,000 times their own length.
Cleavage and Implantation

A day or two after an ovary releases an egg, the egg may unite with a sperm. Sperm are deposited in the vagina during sexual intercourse. They propel themselves through the uter us and enter a fallopian tube. This is where fertilization usually takes place.

When a sperm penetrates the egg, it triggers the egg to complete meiosis. The sperm also undergoes changes. Its tail falls off, and its nucleus fuses with the nucleus of the egg. The resulting cell, called a zygote, contains all the chromosomes needed for a new human organism. Half the chromosomes come from the egg and half from the sperm.

Morula and Blastocyst Stages

The zygote spends the next few days traveling down the fallopian tube toward the uterus, where it will take up residence. As it travels, it divides by mitosis several times to form a ball of cells called a morula. The cell divisions are called cleavage. They increase the number of cells but not the overall size of the new organism. As more cell divisions occur, a fluid-filled cavity forms inside the ball of cells. At this stage, the ball of cells is called a blastocyst.

The cells of the blastocyst form an inner cell mass and an outer cell layer, as shown in Figure below. The inner cell mass is called the embryoblast. These cells will soon develop into an embryo. The outer cell layer is called the trophoblast. These cells will develop into other structures needed to support and nourish the embryo.

Blastocyst. The blastocyst consists of an outer layer of cells called the trophoblast and an inner cell mass called the embryoblast. The blastocyst fluid-filled cavity is also known as the blastocoel or blastocoele.

Implantation

The blastocyst continues down the fallopian tube and reaches the uterus about 4 or 5 days after fertilization. When the outer cells of the blastocyst contact cells of the endometrium lining the uterus, the blastocyst embeds in the endometrium. The process of embedding is called implantation. It generally occurs about a week after fertilization.
Summary

• Fertilization is the union of a sperm and egg, resulting in the formation of a zygote.
• The zygote undergoes many cell divisions before it implants in the lining of the uterus.

Review

1. What happens during fertilization? Where does it usually take place?
2. What is implantation? When does it occur?
3. Describe a morula and blastocyst.