

## CHAPTER 6

### *Conception*

We all began life with the union of a sperm from our father and an ovum (egg) from our mother. Females produce all the ova they will ever produce early in their lives - during adolescence. One is released at roughly monthly intervals until she reaches menopause. This process is under the control of hormones produced by the pituitary gland, a small gland that sits just beneath the brain. One of these, follicle stimulating hormone, prepares the ovary for ovulation. The other, luteinizing hormone, triggers the actual release of the ovum close to the middle of the menstrual cycle.

The ovum is drawn from the surface of the ovary and propelled along the Fallopian tube by tiny hairlike structures called cilia. There it sits, close to the uterus, until it is either fertilised (within about 24 hours of release) and develops eventually into a foetus, or fails to be fertilised and is expelled during menstruation.

The male, on the other hand, produces millions of sperm regularly throughout life until a quite advanced age. This over-abundance is common in nature. In animals - like fish - with external fertilisation, it is essential to ensure that sufficient sperm survive. This is also true of animals, like ourselves, where fertilisation takes place inside the female's body.

Of the 100 million or more sperm ejaculated into the vagina during intercourse, only a few thousand make it to the Fallopian tubes and only about 40 actually reach the ovum. It certainly is a case of survival of the fittest. In the case of sperm which all derive from one male, this advantage does not relate to genetic content, but it can help ensure a lesser likelihood of old sperm with genetic defects fertilising the ovum. Where sperm from more than one male are present, genetic factors do enter the equation. So, too, does the question of the number of sperm contributed by each. Also, if the woman climaxes at, or very nearly at, the same time as one male but not the other, she is twice as likely to become pregnant to the one as to the other.

The female is by no means passive in all this. The process is helped by muscle contractions initiated by oestrogen released by the female and by oxytocin released by the female at orgasm. Prostaglandins present in the semen also help produce cervical changes which aid in the sperm's penetration of the uterus.

The story is by no means ended when the sperm reach the ovum. Both male and female sex cells continue to mature. Sperm sit around for 5-6 hours undergoing a little-understood process called capacitation, which enables them to penetrate the ovum. They retain this ability for some 24 to 72 hours, so there is at best a three day period in each menstrual cycle when fertilisation is possible. This explains why fertile couples trying to have a baby and having regular intercourse still take an average of over five months to achieve their aim. It also illustrates the luck of the draw that can occur when more than one partner is involved.

It is the ovum which finally selects which sperm will be successful, by extending tiny outgrowths called microvilli, which actually embrace the sperm. The sperm then secretes enzymes which create a pathway through the structures surrounding the ovum. The internal membranes of the two cells fuse and the cytoplasm of the ovum engulfs the entire head of the sperm. Within seconds, the egg produces an electrical shock on its surface that lasts about thirty seconds. Any other sperm in the process of attaching

detach. The ovum then produces a hard outer protein coat which further prevents more than one sperm entering. In the rare event when more than one sperm does enter, the product is non-viable.

Now the nucleus of the engulfed sperm completely enters the cytoplasm of the ovum. The nucleus of the ovum undergoes a division, and a daughter cell with half the usual number of chromosomes combines with the nucleus of the sperm, which also contains half the usual number of chromosomes, to form a single cell called a zygote.

Some thirty hours later, the zygote splits in two, each of these cells splits in two, and so on, producing a collection of cells, resembling a mulberry, that is called a morula. Over the next three or four days, the cells in the morula continue to divide as it moves down the Fallopian tube and enters the cavity of the uterus. By this time, the collection of cells is arranged as a layer surrounding a central cavity containing fluid, into which an inner cell mass protrudes, and is called a blastocyst.

Around six days after fertilisation, the blastocyst implants in the prepared (by hormones secreted in the second half of the menstrual cycle) wall of the uterus, the process being completed by about ten to twelve days after fertilisation. In some women, it may be accompanied by bleeding which may be confused with a menstrual period and lead to a miscalculation of the expected date of delivery.

The blastocyst's outer layer of cells, the trophoblast, develops into the foetal membranes and the placenta, while the inner cell mass forms the embryo proper, which goes on to produce the foetus and, eventually, a baby.