

## CHAPTER 1

# Josie and the Cakes

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THAT SATURDAY, Josie was helping her mum in the kitchen baking cakes. Dad had taken the others out to the park. Josie enjoyed those moments when she



and her mum were alone together. It made her feel more grown-up and she tried to behave like it.

“I’ll get the eggs out,” she said, and one promptly fell splat on the floor.

Her mother saw Josie’s face and chipped in quickly, saying, “Bad luck. Here’s some paper towel.”

Josie busied herself on the floor before remarking, "Beth's mother is having another baby. I wish we could have one."

Her mother laughed. "You don't think this house is full enough as it is?"

The girl stood up, scrunching the paper towel in her hand. "Mum," she asked, "where do babies come from?"

This time it was Mum's turn to be a bit embarrassed. "Well," she began. "You see these eggs?"

"Yes?" said Josie.

"They come from a hen, don't they? If they'd been fertilised by a cockerel when they were still inside the hen there would be little chicks inside. You see, women also have **eggs** deep inside them."

"Really?" said Josie, her eyes widening. "I've never seen anyone laying an egg."

Mum laughed. "People are similar but not quite the same. You may not know it, but you already have inside you all the eggs you will ever have for your own future babies. About half a million of them."

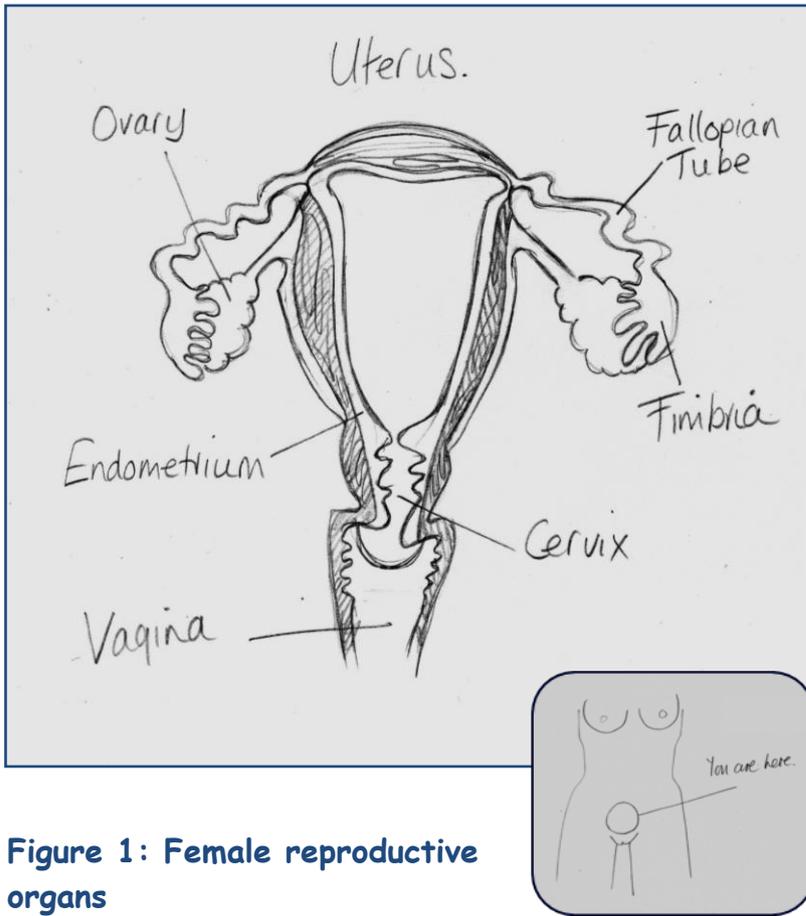
"Half a million?" exclaimed Josie. "But they'd never fit in."

"If they were as big as these eggs, certainly not. But there is a big difference between hens and human beings. Birds' eggs contain all the **genetic material** necessary to create a new bird, ..."

"That's the **DNA**?" interrupted Josie.

"Where did you learn that from? School? Yes, the DNA. But most of a hen's egg isn't DNA. When we eat an egg, what we're eating is the food which a new chick would feed off until the moment it hatches. The hen sits on the egg to keep the chick warm, but it doesn't give it more food.

"With a human mother, the egg contains only the mother's genetic material. That's why it can be so small, minute in fact. Inside the mother's womb – or **uterus** – all the food for the baby is provided by the mother's body.



**Figure 1: Female reproductive organs**

“Give me some paper from that pad over there, and I’ll draw you a diagram of what happens each month inside a woman’s body. It will begin happening to you in the next couple of years or so, probably when you are 12 or 13, though it can be earlier or later.”

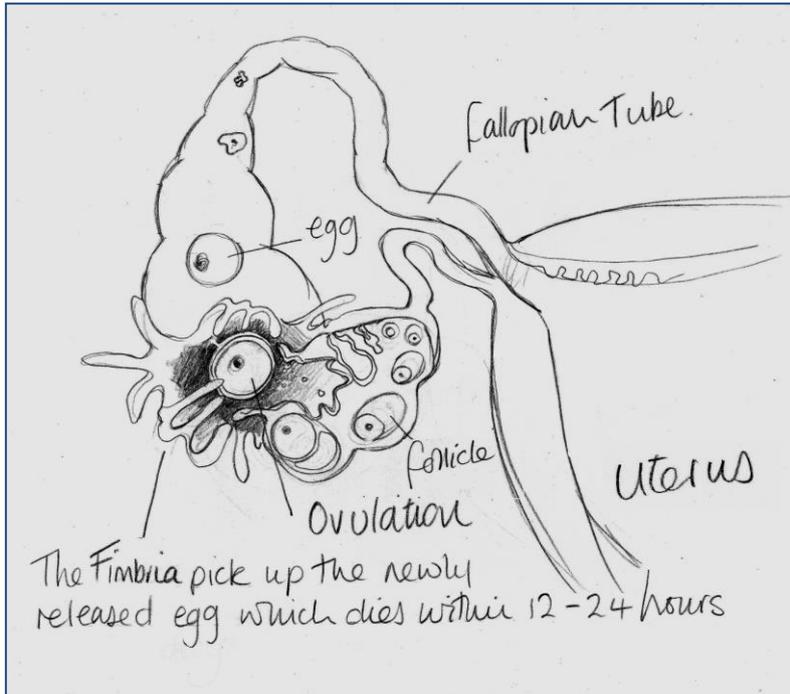
Josie brought the paper and sat

hunched up on a stool. The cake mixture by this time had long been forgotten. Her mum drew a curious diagram which looked a bit like a sheep’s head (figure 1). This she labelled as she spoke.

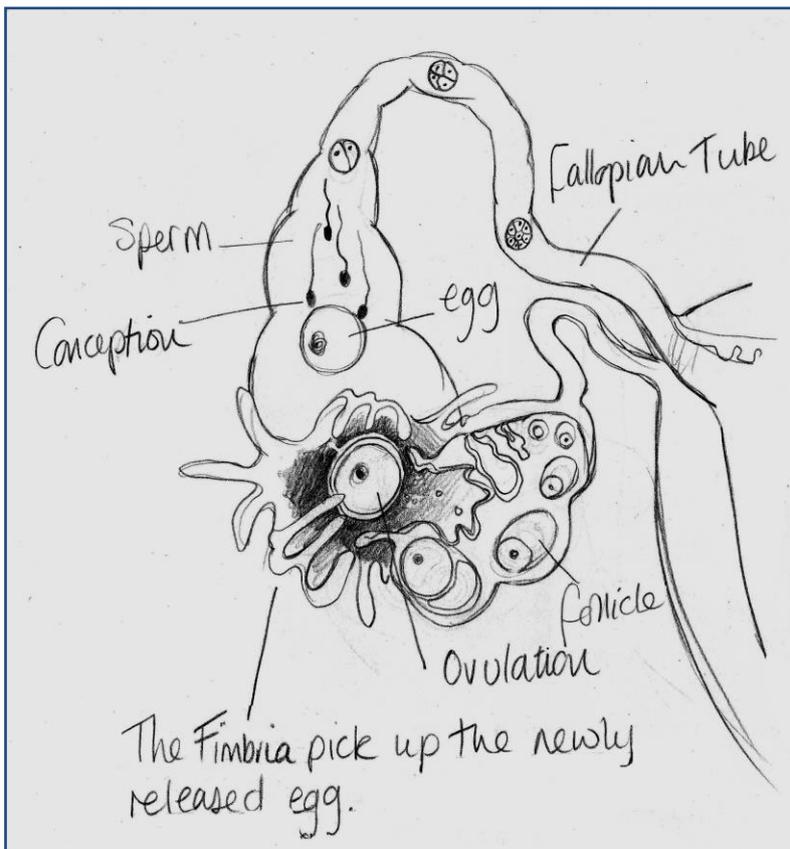
“All of these organs are right down inside your lower tummy. First of all, you have two **ovaries**, one on the left and one on the right. That’s where the tiny eggs are stored. Each month or so, a chemical messenger is sent by the brain to choose an egg, or two if there are to be non-identical twins ...”

“Or three?” chimed in Josie.

“Or three, but that’s very rare. Anyway, an egg is chosen each month from the ovary, it doesn’t matter which, and it grows very fast in a protective case called a **follicle**. The follicle grows faster than anything else in the body until it becomes the size of a walnut.”



**Figure 2: Ovulation and death of unfertilised egg**

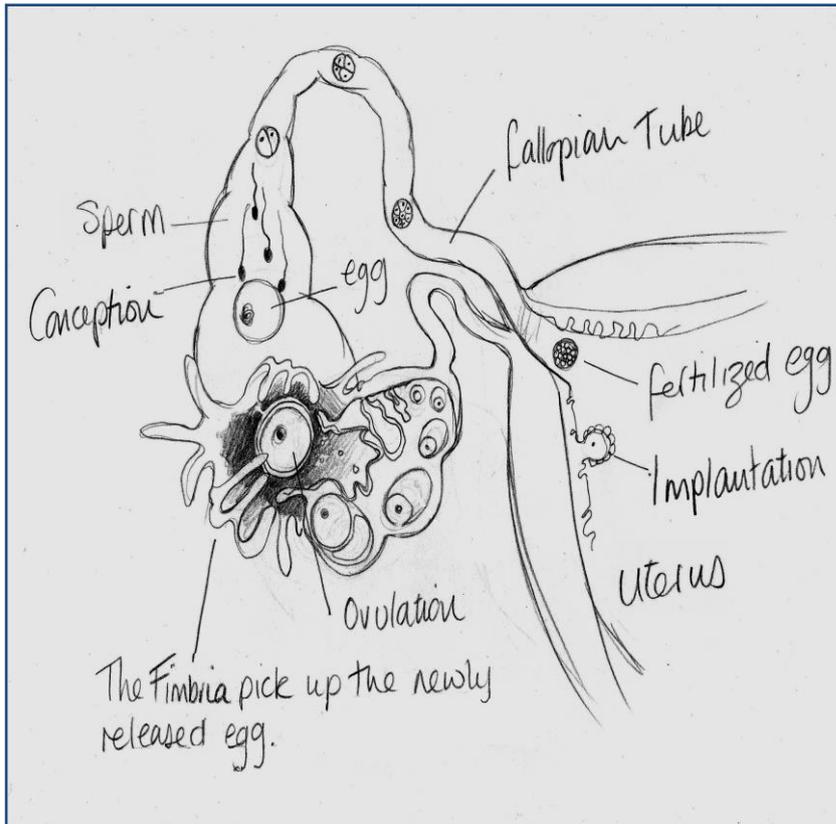


**Figure 3: Ovulation and conception**

Josie's mum drew another diagram (figure 2) to show the enlarged follicle bursting open to allow the egg to escape. "When it's released from the follicle, the egg also leaves the ovary, to be caught by the feathery fingers at the end of the **fallopian tube**." She pointed to what looked like a multi-fingered hand poised over the ovary and attached to the end of a long wiggly tube.

Her mum continued, "The egg can't move anywhere by itself, which is why it has to be picked up by the **fimbria**. The fimbria carry it into the top of the tube and, unless it's fertilised, it will die there within half a day or so.

"But now I'm going to tell you what happens when the egg is **fertilised** and



**Figure 4: Implantation of the embryo**

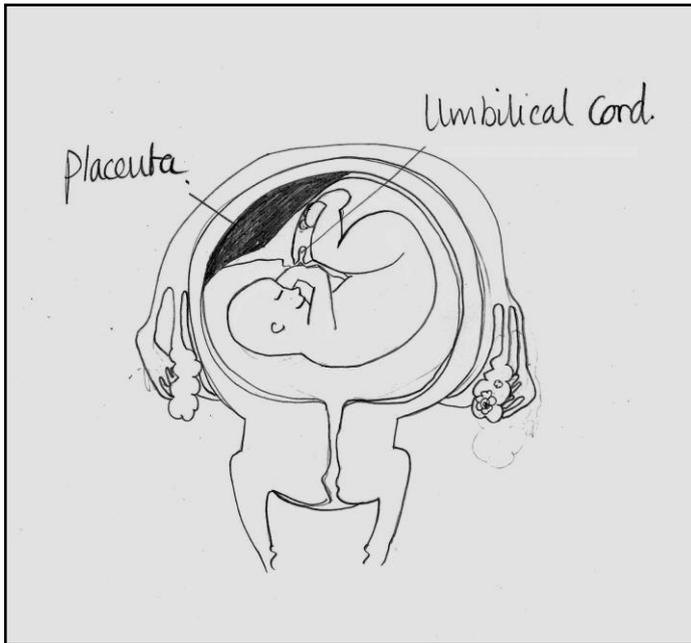
becomes an **embryo,**” she said, drawing again (figure 3 on previous page). “After conception, the embryo moves along the tube and beds down in the uterus wall” (figure 4).

“How does the egg come to be fertilised, Mum?” asked Josie, looking at the drawing and then up at her mother.

“Well, when a man and a woman love each other very much, they embrace in a special way which causes the man to release **sperm** into the woman’s body.

“The sperm look a bit like tadpoles, but they are so small you can’t see them, except under a microscope. There are lots and lots of them. Unlike eggs, they have tails and can swim fast through the woman’s organs, looking for an egg.

“If they find one, lots of sperm crowd round it. One sperm wins the race and unites with the egg (it seems that the egg chooses that sperm ... we don’t quite know how ... from all the ones surrounding it) to create an embryo and the life of a new baby begins. That’s called **fertilisation**, or **conception**, which is a really wonderful moment. It happens here, up at the end of the tube, not far



**Figure 5: Unborn child at 16 weeks**

inside the tube all the way down to the uterus, where the new nest has been made ready. That takes about 5 or 6 days. When the embryo reaches the uterus, it nestles into its inner wall and attaches itself very firmly, which is called **implantation**. The baby grows and grows and nine months later it's ready to be born (figure 5)."

Josie was amazed. "To think all this happened to make me!"

"Yes," said her mum. "That's why you are so unique and so loved. You were made from a piece of me (my egg) and a piece of Daddy (his sperm) and when you think of the enormous choice of cells, both eggs and sperm, from which you happened to be made – an infinite variety – you can see how incredibly unique you are, and your brother and sister. And yet you all come from the two of us and our love for each other."

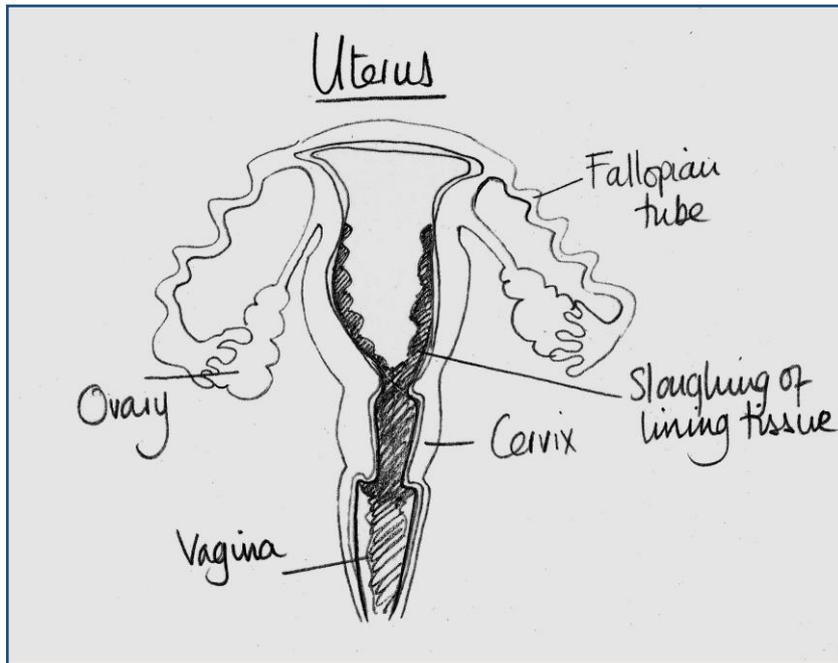
Josie looked through the diagrams again. Then she said, "But what happens to all those other eggs, I mean the ones that aren't fertilised?"

"Well, very few of the half million ever mature and leave the ovary, and, as I said, most of the ones that do **ovulate** die within 12 or 24 hours after being released."

from the ovary. The genes from the sperm and the egg mix together, which is why you're like your dad as well as like me.

Josie studied the diagram. "So conception happens right up here, does it?" she asked, pointing (see Figure 4 on previous page).

"That's right, up at the end of the tube. Then the **embryo** is squeezed along



**Figure 6: Menstrual bleeding, or period**

“It’s amazing, isn’t it?” said Josie. “Those eggs live inside me all those years, then one of them is chosen and matures, and it goes and dies twelve hours later.”

“I hadn’t thought of it like that,” her mother replied. “But yes, except for the really lucky eggs which are fertilised and

become babies, you’re right.

“It’s not only the eggs which are lost,” she added. “If the egg dies, its nest isn’t wanted either, so the body gets rid of it. It comes away very gently in the form of blood, a drip or sometimes a clot at a time. We usually call that a **period**, and it lasts between 3 to 7 days, though it varies with each woman.”

“What does it feel like?” asked Josie

“The blood itself sometimes tickles a bit, but you can also get a dull tummy ache, or even quite a strong pain in the first day or two. You see the uterus, which is also a strong muscle, is squeezing hard, to loosen the lining. Each woman is different, but it’s nothing to be frightened of.”

Josie took another look through the diagrams. “Where does the blood actually come out?” she asked.

“It drains down from the uterus through the **cervix**, which is the opening to the womb. The cervix acts like a valve, only letting in and out what it wants to, so that the womb is protected from germs. Then it goes through the **vagina**, which is the tube which connects the uterus to the outside of the body. Your bottom actually has three outlets: one for the wee, or **urine**, one for the pooh, or

**faeces**, and the third, which is between them, is the opening of the vagina. That's where the blood comes out – we call it having a **period**. The vagina is also where the sperm come in when the couple embrace in the special way I was talking about."

Josie picked up the empty bowl and began polishing it clean with her finger.

"It must be very messy," she remarked, putting the bowl down. "I mean, all that blood."

Mum went to put the oven on and started gathering things up. "There are special pads you wear inside your knickers," she said. "They're made out of material a bit like disposable nappies, and very absorbent. You change them when you go to the toilet.

"There's nothing to worry about," she added. "The blood drips out quite slowly, though it can be heavier for some women."

At that minute, they were distracted by footsteps outside, and the sound of very familiar voices.

"Quick, Josie! We haven't put those cakes in the oven yet."

"Never mind, Mummy. We have been discussing all sorts of interesting things. And there are doughnuts in the cupboard."

### Points to remember

From the moment she is born, a girl has inside her all the eggs she will ever have for her own future babies. There are about half a million of them.

The undeveloped human eggs are so small that they can only be seen with a microscope. Each egg contains all the genetic material that the mother would pass to a child born of that egg.

Babies grow and develop inside the mother who feeds and protects them for nine months until they are born.

Unlike humans and mammals, birds lay their young outside their bodies. The chicks grow and develop inside an egg's protective shell. When we eat an egg, we are eating the food on which the chick would grow.

Human eggs are stored and develop inside an ovary. Each woman has two ovaries.

Each month or so, the brain instructs one of the ovaries to develop an egg inside a protective follicle. The follicle grows to the size of a walnut.

When it is ready, a further instruction from the brain tells the follicle to burst open and release the egg out of the ovary. It is picked up by feathery fingers called fimbria and swept into the fallopian tube which attaches to the woman's uterus.

If there are sperm around, the egg may be fertilised. Conception happens at the end of the fallopian tube. The egg is carried through the tube, implants in the wall of the uterus, and nine months later the baby is ready to be born.

Most months, the egg remains unfertilised. It dies in the tube within 12-24 hours.

The uterus then sheds the lining it has prepared as a 'nest' for a possible baby.

This comes away in the form of blood and drips out of the vagina. The bleeding usually lasts for between 3-7 days and is called a period (or menstruation).

Girls usually start their periods at the age of 12-13, though it can be several years earlier or later than this.

## GLOSSARY

<b>Cervix</b>	Neck of the uterus which opens and shuts to control access to the uterus and keep germs out.
<b>Conception</b>	The start of new human life, when the egg and the sperm fuse to form a new cell with its own identity (DNA). Conception occurs towards the ovary end of the fallopian tube.
<b>DNA</b>	Deoxyribonucleic acid. DNA is present in the nucleus, or control centre, of each of the cells from which living beings are made. Inside the DNA, there are tiny <b>genes</b> which contain instructions for how cells are to grow and behave. Each person's DNA is unique, and every cell of our body is marked with that unique DNA, except for our eggs or sperm which, remarkably, each have their own DNA.
<b>Egg</b>	Female reproductive cell, which, if fertilized by the male sperm, can develop into new human life. Girls are born with about half a million tiny eggs already stored in their ovaries.
<b>Embryo</b>	Baby in the first eight or so weeks of life after conception.
<b>Endometrium</b>	The scientific name for the lining of the uterus, which thickens each cycle and comes away in a period.
<b>Faeces</b>	Waste matter from food which is expelled from the body through the anus.
<b>Fallopian tube</b>	Small tube which takes the egg towards sperm and sperm towards the egg. Conception, if it occurs, happens in the outer part of the tube. Without sperm, the egg dies in the tube.
<b>Female reproductive organs</b>	Organs inside a woman's lower tummy which, when they act in harness with a man's reproductive organs, have the potential to give life to a baby.
<b>Fertilisation</b>	Process by which the sperm becomes one with the egg to form a new human being. Fertilisation can take up to a day to complete.
<b>Fimbria</b>	Feathery 'fingers' at the end of the fallopian tube which catch the egg from the ovary and carry it into the tube. The egg has no means to move on its own.

<b>Follicle</b>	Protective case which grows up round the eggs as they mature. The main follicle grows faster than anything else in the body, and becomes the size of a walnut before breaking open the ovary to release the egg.
<b>Genetic material</b>	Collective term for the package of genes which govern the way cells behave. Genetic material is stored in DNA.
<b>Implantation</b>	The process whereby the embryo roots into the wall of the uterus, where it will feed and grow. The lining of the uterus thickens each month to prepare a 'nest' for a possible baby.
<b>Ovary</b>	Organ the size of a Greek olive which houses and matures the eggs. Each woman has two ovaries.
<b>Ovulation</b>	Moment when the egg is released by the follicle from the ovary.
<b>Period</b>	When the lining of the uterus is flushed out because there is no pregnancy. Women experience this as a periodic bleed from the vagina. It usually lasts for several days and takes place every month or so, which is why it is also called ' <b>menstruation</b> '.
<b>Placenta</b>	Organ attached to the wall of the uterus which transfers oxygen and nutrients to the growing baby, and takes away waste products. Blood flows through the placenta between mother and baby while keeping the two circuits independent. Babies can thus belong to different blood groups from their mothers.
<b>Sperm</b>	The male reproductive cell. It has a head, which contains the man's DNA, and a tail, which enables it to swim through the uterus and up the tube. Only one sperm, out of many sperm that the man releases, can unite with the egg.
<b>Umbilical cord</b>	Attaches the baby to the mother. As the baby grows bigger, it needs to be able to exercise. The umbilical cord gives it freedom of movement away from the placenta and the uterine wall. By 16 weeks, the baby is largely formed and just has to grow bigger and stronger.
<b>Urine</b>	Liquid which removes waste products from the blood.
<b>Uterus</b>	An organ made of strong muscle where the baby develops and is nourished before birth. It is also called the ' <b>womb</b> '.
<b>Vagina</b>	Tube which connects the uterus to the outside of the body.