



Why so many sperm?¹ ²

Hosts: Jad Abumrad and Robert Krulwich

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JAD ABUMRAD:

Hello.

ROBERT KRULWICH:

Hello.

JAD ABUMRAD:

Hello.

ROBERT KRULWICH:

Hello...

JAD ABUMRAD:

Today I want to start the show by telling you about a guy—well, a very, very, very important man. Probably one of the most important guys in...

ROBERT KRULWICH:

...guy-dom.

JAD:

Yeah.

MATTHEW COBB:

[LAUGHING]

¹ Available at <https://www.wnycstudios.org/podcasts/radiolab/segments/91647-why-so-many-sperm>. Note that the editing style of this piece frequently mixes recordings of interviews recorded in the field, conversations recorded in the studio, and voiceovers. The disjointed character of the transcript reflects the editing style of the audio piece.

² Content warning: brief discussion of unconsenting sexual relations between animals in the second segment. Also, throughout: distracting heteronormativity, gender essentialism, and consistent trans- and nonbinary-exclusion.

JAD:

Okay, tell me the correct pronunciation on, uh...?

ROBERT:

Leew...

MATTHEW COBB:

I'm not Dutch!

JAD:

Leeu—Leeuna—Leeukenhoken?

MATTHEW COBB:

The way that you should say it is something like “LAY-ven-hook.”³

JAD:

And here, thankfully, to, uh, help with our pronunciation—and to fill in the details—is Professor Matthew Cobb.

MATTHEW COBB:

I'm the programme director for zoology at the University of Manchester...

JAD:

[CLIP] ...Leeuwenhoek...

MATTHEW COBB:

...and I've written a book about this called *Generation: The Seventeenth-Century Scientists Who Unraveled the Secrets of Sex, Life, and Growth*.

JAD:

Okay, so, Leeuwenhoek.

MATTHEW COBB:

Yeah. That's fine.

³ Antonie van Leeuwenhoek

JAD:

Okay. So what did he do?

MATTHEW COBB:

He was a draper.

JAD:

A draper?

MATTHEW COBB:

Yeah, so he just sold cloth.

JAD:

Oh.

MATTHEW COBB:

He... [LAUGHS] ...he had no scientific training whatsoever. He was interested in microscopes.

JAD:

Why would a draper be interested in microscopes?

MATTHEW COBB:

It was his hobby. It's what he did. He made these microscopes. [FLUTE MUSIC]

JAD (IN STUDIO):

And he was actually really good.

MATTHEW COBB:

That's right.

JAD (IN STUDIO):

Although you have to keep in mind that microscopes at that point in time—talkin' 1670s, here—it's not exactly how we think of them now. Back then, they were just...

MATTHEW COBB:

...tiny balls of glass. [BASSOON MUSIC] And that's it.

JAD (VOICEOVER):

And science itself was just a wee, little baby.

MATTHEW COBB:

You got—just—really, put yourself back. [RISING TONE]

JAD (IN STUDIO):

Okay, there was Leeuwenhoek doing really well with these microscopes and pretty soon, scientists all over the place were asking him to look at stuff.

MATTHEW COBB:

For example, um, what's in blood? Or what's in sweat? Or what's in semen?

JAD (IN STUDIO):

Dun dun dum! [GONG SOUND]

MATTHEW COBB:

This is where it does get, uh, rather sordid.

JAD (IN STUDIO):

Okay, so...

ROBERT (IN STUDIO):

Wait wait, Jad, before you st—I was just—this is a point where we should tell our audience that some of the references from here on in will be a bit graphic. If you don't want to hear that kind of stuff...

JAD (IN STUDIO):

It'll be fine. [CROSSTALK] Don't be—it'll be fine. It's—be fine!

ROBERT (IN STUDIO):

...No. If you don't want to hear that stuff, now go out to the garden and, you know, check out the rabbits.

JAD (IN STUDIO):

[LAUGHS] Alright. Okay... Now getting back to the story. It's 1667, just imagine. And Leeuwenhoek has just received a letter from the Royal Society of London, this big group of scientists, asking him to take a look at a drop of human semen...

MATTHEW COBB:

...Just to see what's in there...

JAD (IN STUDIO):

...and not to be graphic, but one autumn day...

MATTHEW COBB:

...Autumn, 1677...

JAD (IN STUDIO):

...he is in his bedroom...

MATTHEW COBB:

...having conjugal relations with his, uh, wife, Cornelia...

JAD (IN STUDIO):

He's got his microscope ready, plus a little vial.

MATTHEW COBB:

...and then, as he put it, within six beats of a pulse after he ejaculated, he'd got the semen, and he'd put into this very thin capillary tube, rushed over to the window. His wife's lying there thinking...

JAD:

[JOKING] "What the hell are you doing?"

MATTHEW COBB:

... "Not again! Come on, will you?! Enough with the microscopes, already!" [JAD LAUGHS] And then he looks into the—into the semen, and he can clearly see that there's a thing—there's something in there. [EERIE AMBIENT MUSIC] Some kind of small structure.

JAD (IN STUDIO):

He squints, and he focuses...

MATTHEW COBB:

...And he can see all these wriggling things. [TENSE MEN'S CHORAL MUSIC] And it's full—just absolutely full—of these tiny, eel-like things. He says, “a vast number of living animalcules...”

JAD:

“Animalcules”?

MATTHEW COBB:

“...their bodies were rounded and furnished with a long, thin tail... [CHORAL MUSIC ENDS ABRUPTLY; GONG SOUND] ...they moved with a snakelike motion of the tail, as eels do when swimming in water.” [DRAMATIC MEN'S CHORAL MUSIC]

DISTORTED LOW VOICE:

Wow.

JAD:

So what was he thinking at this point? Do we know?

MATTHEW COBB:

I don't know—I—putting myself in his place I'd think, “Wow!”

JAD (IN STUDIO):

‘Cause here's the thing. At this point in time, people didn't really understand where babies came from. They knew it had something to do with sex but the notion of heredity was still *very* fuzzy, and how a baby developed... [DRAMATIC, MURMURING CHORAL MUSIC] ...was a total mystery.

MATTHEW COBB:

What's life? How would you know if something's alive? In those days, one of the main things that they associated with life was movement.

JAD:

Movement...

MATTHEW COBB:

If stuff moved it was alive.

JAD (IN STUDIO):

So if movement is the key, you can imagine what Leeuwenhoek must have been thinking, staring at these wriggling, little beasts in the vial. Because they *moved*.

MATTHEW COBB:

That's right.

JAD (IN STUDIO):

Oh boy, did they move.

MATTHEW COBB:

These things are trying to get somewhere. They're thrashing; they're desperate.

JAD (IN STUDIO):

Maybe, in this vial, is the secret to life... [PIOUS CHORAL MUSIC; MUSIC ENDS] ...to the soul. This is what people thought. And it didn't take long before a pretty fantastic idea began to circulate, which is that not only is the sperm the vehicle of the soul, but if you could somehow zoom all the way down into its little head, you would find, in there, a little man...

ROBERT:

Hello.

JAD:

Hello...

MATTHEW COBB:

This little chap, all hunched up.

JAD (IN STUDIO):

A little, tiny guy.

MATTHEW COBB:

Tiny human.

JAD (IN STUDIO):

Thinking was that one day, when the microscopes got better, you'd actually be able to see that tiny little human...

MATTHEW COBB:

...with your own eyes...

JAD (IN STUDIO):

...because it had to be there...

MATTHEW COBB:

...because *if* the sperm was the soul's source of life, *then* there must be something in there that looked pretty much like a—a human being. [MYSTERIOUS MUSIC]

JAD (IN STUDIO):

One, uh—problem, though.

ROBERT (IN STUDIO):

What?

JAD (IN STUDIO):

If you were one of these folks who believed...

ROBERT (IN STUDIO):

Yes?

JAD (IN STUDIO):

...that the sperm *was* the soul, well then, you had to ask yourself: What does this say...

MATTHEW COBB:

...about God? Because it would mean was creating all these souls, and then he was just wasting them. [MYSTERIOUS MUSIC ENDS ABRUPTLY] Leeuwenhoek did a calculation. [MYSTERIOUS MUSIC RESUMES] He worked out that there were more semen—more spermatozoa—in an ejaculate of a cod—he got a cod and he opened it up and saw how many sperm there must be in its ejaculate—and he said there are—he was pretty much right—there are more sperm in this ejaculate than there are human beings alive on the planet. And that's just in one cod.

JAD:

What?! That's true?!

MATTHEW COBB.

Yeah.

JAD:

Holy moly.

MATTHEW COBB:

So you imagine all the men, producing all this stuff all the time. That's an awful lot of souls, if they're all potential human beings, just...

JAD (IN STUDIO):

...dying. [MYSTERIOUS MUSIC ENDS]

MATTHEW COBB:

Well, all but one.

ROBERT (IN STUDIO):

How many sperm are in, uh, a human ejaculate?

JAD (IN STUDIO):

About a hundred and eighty million.

ROBERT:

Now, see, that's nothing these days.

JAD:

Yeah, it's like Brooklyn.

ROBERT:

[LAUGHS] You just live there. Alright, this is Radiolab.

JAD:

I'm Jad Abumrad.

ROBERT:

And I'm Robert Krulwich. Our program today is about sp...

JAD:

...by the way, a hundred and eighty million is still a lot.

ROBERT:

It's not a lot...

JAD:

Considering that you only have a couple of eggs.

ROBERT:

...who has a couple eggs? 'Cause I don't...

JAD:

The lady! Has a couple of eggs. She's got a finite number. Whereas the guy is making millions every day.

ROBERT:

Oh, right. Oh, that's right.

JAD:

Anyhow, our program today is about sperm.

ROBERT:

Yep.

JAD:

Stick around.

* * *

JAD ABUMRAD:

Okay, in all seriousness, before we get started for real, just want to tell you that this program does actually contain strong sexual material. Nothing too graphic, but this is your warning. [WHISPERING] Stick around. It'll be great.

ROBERT KRULWICH:

Okay, for those of us who remain, let's get back to our basic question.

JAD:

The why-so-many question?

ROBERT:

Yes. Why is there such a startling asymmetry between the number of sexual cells produced by a male and the very relatively few eggs in the female?

TIM BIRKHEAD:

Well, of course, this is the question.

ROBERT (VOICEOVER):

I put the question to...

TIM BIRKHEAD:

One, two, three, four, five, six, seven, eight, nine, ten...

ROBERT (VOICEOVER):

...another—there's a lot of English people in this show today...

TIM BIRKHEAD:

I'm Tim Birkhead. I work at the University of Sheffield in the Department of Animal and Plant Sciences...

ROBERT (VOICEOVER):

...and he is an expert on sperm...

TIM BIRKHEAD:

...in birds. [BIRD VOCALIZATION]

ROBERT:

How do you choose this line of work?

TIM BIRKHEAD:

[CHUCKLES] Ever since I was a teenager I was obsessed by birds. I was also obsessed by sex, [BIRD SOUNDS] and I managed to combine the two in an academic career. Isn't that lucky? [LOUNGE JAZZ MUSIC]

ROBERT (VOICEOVER):

And in any case he says this question of waste...

TIM BIRKHEAD:

...why on earth did God make so many sperm? It just didn't seem very sensible.

ROBERT (VOICEOVER):

Well this question not only troubled the Church; it flummoxed scient—"flummoxed," is I think, the right word?...

JAD (IN STUDIO):

Flummoxed!

ROBERT (VOICEOVER):

...scientists for—for a very long time.

TIM BIRKHEAD:

It really wasn't until about the 1970s that finally the large numbers of sperm that males transfer to females finally began to make sense.

JAD (IN STUDIO):

What happened in the 1970s?

ROBERT (IN STUDIO):

Well, before the 1970s, bird scientists assumed that if a female chose a spouse for the season, she would stick to the spouse for the season—she would be faithful. But in the seventies when they looked a little more closely, they found there was, well, more to the story.

[SEVENTIES MUSIC]

ROBERT (MOCK DAVID ATTENBOROUGH VOICE):

Hm. Springtime in Somerset. The female bushy-tailed whip-poor-will is always present in woods like this [HUMAN IMPRESSIONS OF BIRD CALLS], always searching for that springtime joy of love. [BIRD CALLS] Her lovesong is very beautiful, as is his. Here he comes. [BIRD CALLS AND FLUTTERING WINGS] And there is the act of love, consummated rather quickly. [SEVENTIES MUSIC INTENSIFIES] And now he's off to get his new sweetheart a... juicy worm. She's alone for a time, and she... well, actually she's hopping off to—to another branch. [MUSIC STOPS] Where—erm—there seems to be another male. [BIRD CALLS] She, of course, will remain loyal to this first partner... [BIRD CALLS AND FLUTTERING WINGS] ...Oh dear. Cut the tape! ...

TIM BIRKHEAD:

Prior to the 1970s, if people saw females behaving promiscuously, they assumed that there was something wrong with them.

ROBERT (MOCK DAVID ATTENBOROUGH VOICE):

...What is wrong with this bird? Do you have another bird? H—hey, Lance, have you got another bird? ...

TIM BIRKHEAD:

Hormone imbalances or some kind of misunderstanding.

ROBERT (VOICEOVER):

But then they discovered...

TIM BIRKHEAD:

...DNA fingerprinting... [DRAMATIC WOODWIND MUSIC]

ROBERT (VOICEOVER):

...the DNA test.

TIM BIRKHEAD:

...which provided a completely unequivocal test of paternity. [FLIGHTY WOODWIND MUSIC]

ROBERT (VOICEOVER):

They'd go to a nest, say, and look at the five eggs in the nest, test the DNA, and discover that some of those eggs came... from different dads. [SPOOKY MUSIC]

TIM BIRKHEAD:

...indicating that the female had mated with more than one male.

CLIP, A MALE VOICE:

One of these four men is the father, but she don't know which one. [STUDIO AUDIENCE SHOUTS; END CLIP]

TIM BIRKHEAD:

DNA fingerprinting gave us the evidence that, in fact, the majority of animals—the females are promiscuous.

ROBERT:

Really? I mean, this is like—chimp babies, chickadee babies—uh—chipmunk babies...

TIM BIRKHEAD:

It's *almost* ubiquitous.

CLIP, A MALE VOICE:

Let's find out the truth. You are not the father. [STUDIO AUDIENCE BOOS; SINE TONE; END CLIP]

TIM BIRKHEAD:

Um—at the moment I'm only talking about non-humans.

JAD (IN STUDIO):

Right... But what does this...

ROBERT (IN STUDIO):

Yes?

JAD (IN STUDIO):

...female promiscuity thing have to do with the why-so-much-sperm question? What's the connection?

ROBERT (IN STUDIO):
Everything!...

JAD (IN STUDIO):
...What's the connection?

ROBERT (IN STUDIO):
...Everything! Because once people understood that that was going on, well, then, the level of competition between males gets, actually, much more complicated.

JAD (IN STUDIO):
What do you mean?

ROBERT (IN STUDIO):
Well, if I am chasing a lady, now not only do I have to worry about a competitor, but I have to worry about all the people I've never met who have been having sex with my girl! There's a whole level of...

JAD (IN STUDIO):
Oh! You mean, like, the *sperm* is competing!

ROBERT (IN STUDIO):
The sperm is competing!

JAD (IN STUDIO):
Not just the makers of the sperm, but the sperm itself!

ROBERT (IN STUDIO):
The sperm itself! So there's outdoor competition, but now there's indoor competition...

TIM BIRKHEAD:
Exactly. ...

ROBERT (IN STUDIO)
...if you get my drift.

TIM BIRKHEAD:

...And one very effective way of competing is simply to produce more sperm than the next guy. [CONTEMPLATIVE MUSIC] Okay I think we need to step back a little bit. If females are promiscuous, natural selection is gonna favour the male that wins and fertilises that particular female's eggs. As a consequence of that, males have evolved the most staggering array of adaptations to minimise their own chances of being cuckolded.

JAD (IN STUDIO):

What does "cuckolded" mean?

ROBERT (IN STUDIO):

"Cuckolding" means your wife is cheating on you and you don't know it.

JAD (IN STUDIO):

Oh.

ROBERT (IN STUDIO):

So what he's saying is that animals will go to elaborate lengths to be not-cheated-on. In fact let me give you three spectacular illustrations... [CIRCUS SNAREDRUM FANFARE] ...as never before heard on our program! We're going to begin...

JAD (IN STUDIO):

[LAUGHING] ...which includes most things!

ROBERT (IN STUDIO):

[LAUGHING] ...with sperm competition as displayed by, first... [FANFARE ENDS]

ANNOUNCER VOICE:

The rove beetle.

FALSETTO VOICE:

Beetle! [APPLAUSE]

TIM BIRKHEAD:

These beetles are amazing. [SUSPENSEFUL MUSIC]

ROBERT (IN STUDIO):

When the male beetle—the male rove beetle—has sex with a female, says Tim...

TIM BIRKHEAD:

...they transfer the sperm in, basically, a package of sperm called a spermatophore. Once it's inside the female, it starts to swell... [BALLOON INFLATION SOUND; MENACING MUSIC] ...expand...

JAD:

Like a balloon? [RISING TONE]

TIM BIRKHEAD:

Yeah. In swelling and expanding, it pushes out or away any rival sperm. [RISING TONE ENDS]

JAD (IN STUDIO):

Wai-hey-h-ait. But the sperm is stuck in a balloon!

ROBERT (IN STUDIO):

Uh-huh.

JAD (IN STUDIO):

It's gotta get out! [MUSIC ENDS]

ROBERT (IN STUDIO):

Oh! Yes, well, but the lady rove beetle has a little structure...

TIM BIRKHEAD:

...a structure like a tooth...

ROBERT (IN STUDIO):

...that will puncture [BALLOON POPPING SOUND] the spermatophore...

TIM BIRKHEAD:

...releasing the male's sperm.

JAD (IN STUDIO):

No kidding!

TIM BIRKHEAD:

Yes, it's kind of like science fiction.

JAD (IN STUDIO):

Wow.

ROBERT (IN STUDIO):

But if you think the rove beetle has got something going on, let's meet...

ANNOUNCER VOICE:

...the dragonfly.

FALSETTO VOICE:

Dragonfly!

CROWD VOICES:

Dragonfly! [APPLAUSE]

TIM BIRKHEAD:

In dragonflies, males have the most, um, elaborate and bizarre penis. [BACH FUGUE MUSIC, PLAYED ON A TRUMPET] It's covered with backward-pointing spines. Hundreds of backward-pointing spines.

ROBERT (IN STUDIO):

Kind of like—uh—you know, bristles on a pipe cleaner?

TIM BIRKHEAD:

And a very clever guy called Jeff Waage⁴ did a very clever experiment. He allowed male dragonflies to mate with females and separated them at different stages during their rather protracted copulation. And what he found was halfway through the copulation the male...

⁴ Actually, the scientist in question publishes as Jonathan K. Waage.

ROBERT (IN STUDIO):
...before he actually does the act...

TIM BIRKHEAD:
...is actually removing [MUSIC ENDS ABRUPTLY; TELEVISION-DEACTIVATING SOUND] his penis from the female, and it's covered with sperm from the previous male that inseminated that female.

JAD (IN STUDIO):
Oh, so he's brushing out the other guy's?

TIM BIRKHEAD:
Exactly.

JAD (IN STUDIO):
That's rather shocking!

TIM BIRKHEAD:
Yep!

ROBERT (IN STUDIO):
But better still—better still—is the duck.

JAD (IN STUDIO):
The duck?

ROBERT (IN STUDIO):
The duck.

CROWD VOICES:
Yay, duck! [CROWD CHEERING]

TIM BIRKHEAD:
Most birds don't have a penis—male birds. Ducks do. [SILENCE]

JAD (IN STUDIO):
...That's it?

ROBERT (IN STUDIO):

[UNCOMFORTABLE GIGGLING] No? It goes on...

TIM BIRKHEAD:

Across different duck species, the penis size varies from very small to about, uh, fourteen inches—something absolutely astronomical—on a relatively small duck.

ROBERT (IN STUDIO):

And the thing about the duck is—I don't quite know how to put this...

TIM BIRKHEAD:

Ducks engage in forced extrapair copulations.

ROBERT (IN STUDIO):

...What he's really saying is that the males are—are—they're raping the females.

JAD (IN STUDIO):

Oof.

ROBERT (IN STUDIO):

But wait—because the females have a strategy of their own.

TIM BIRKHEAD:

A couple of years ago, we were dissecting a female duck. And a postdoc called Patty Brennan called me into the lab and she said, "Look at this! I've just found this funny structure in the female's vagina." And what it was was a side-branch...

ROBERT (IN STUDIO):

...meaning instead of one—you know—clear highway right to the egg, this one had a kind of...

JAD (IN STUDIO):

Off-ramp?

ROBERT (IN STUDIO):

Off-ramp. Yeah...

TIM BIRKHEAD:

I phoned a colleague in France who is a duck expert and he said he'd never seen such a thing. But give him ten minutes and he'll go and check. So he obviously went off and dissected his own duck...

ROBERT:

[LAUGHING]

TIM BIRKHEAD:

...phoned me back and said, "My god, you're right!"

ROBERT (IN STUDIO):

There it was: an off-ramp in the French duck.

TIM BIRKHEAD:

By which time we'd finished our dissection. And in fact...

ROBERT (IN STUDIO):

When the British took a look at their duck...

TIM BIRKHEAD:

...in the duck that we looked at there were *two or three* separate side-branches. Patty then went on to do a comparative study of a lot of different duck species and what we found was that in species where the male had an enormous phallus, the female had the most complex vagina we'd ever come across. Some had two or three side-branches and a very long spiral, like a corkscrew, at the end of the vagina. And if you think about it, what seems very likely here is that the female has got these structures to deflect the male. [TENSE ORGAN MUSIC] If she's being raped, she might contract part of her reproductive tract to send the male off down a blind alley. If he avoids that she can just tighten up this spiral so his sperm can't get to the right place.

ROBERT (IN STUDIO):

So what you've got here is a kind of warfare. The male says, "Alright, I'm coming in there, like it or not," and then the female says, "Well, you're getting nowhere, like it or not."

JAD (IN STUDIO):

Go, female ducks.

TIM BIRKHEAD:

Remarkable case of females evolving counteradaptations to keep males at arm's length.

Or penis's length...

JAD (IN STUDIO):

[LAUGHING]

TIM BIRKHEAD:

...so to—so to speak.

* * *

[GEESE SQUAWKING]

JOANNA ELLINGTON:

So this is Maverick and Buckles. They are African geese.

ROBERT KRULWICH (VOICEOVER):

The British Male Scientists section of our program is coming, briefly, to a pause so we can an American *and* a female...

JOANNA ELLINGTON:

My name is Joanna Ellington...

ROBERT (VOICEOVER):

...uh, Joanna Ellington.

JOANNA ELLINGTON:

I'm a PhD in reproductive physiology.

ROBERT (VOICEOVER):

We spoke with her at her farm in—yes—Washington State.

JOANNA ELLINGTON:

[AT THE FARM] So we have, uh, seventy acres here. And I was a veterinarian before I did my PhD...

ROBERT:

You are an “andrologist”?

JOANNA ELLINGTON:

Yes. An andrologist, the study of male reproduction.

ROBERT:

“Andro-” for “man”?

JOANNA ELLINGTON:

And “-ology” is “study of”; yes.

ROBERT:

Yeah.

WOMAN AT THE FARM:

Where are the pigs?

JOANNA ELLINGTON:

They’re right—the pigs are over here, sleeping. They’re going to be bred today. We actually have semen flying in from Nebraska... we’re going to go down here to the chicken coop... [A DOG BARKING; DR. ELLINGTON CONTINUES TO TALK]

ROBERT (IN STUDIO):

And while she’s walking to the chicken coop, let me just say we finally come to a human sperm expert to ask about us.

JAD (IN STUDIO):

Yeah! And?

ROBERT (IN STUDIO):

And, as it happens...

JAD (IN STUDIO):

...I mean this competition thing, does it work like that with us?

JOANNA ELLINGTON:

[AT THE FARM; DOG IS STILL BARKING] ... **Ginger! Ginger! No bark. ...**

ROBERT (IN STUDIO):

Well, that's the real surprise to me. I mean, we've all seen the sex education films, you know, when you're in fourth or fifth grade...

VOICEOVER FROM SEX EDUCATION FILM:

[MYSTERIOUS DOCUMENTARY MUSIC] **The woman's own defense system attacks the sperm.**

[HEAVY METAL MUSIC FADING IN ON TOP OF DOCUMENTARY MUSIC] **They are unwelcome cells from another organism, and they are potential enemies...** [MUSIC ENDS]

ROBERT (IN STUDIO):

But when Joanna gave me her version of all this? It—it was not like that at all. [SPLASHING SOUND] **Let me start from the beginning.** [FLASHBACK CHIME SOUND] **First...**

JOANNA ELLINGTON:

The sperm have to get through the cervix. The woman's cervical mucus has a lot of fibers in it that are criss-crossed.

ROBERT (IN STUDIO):

So you think there'd be this big...

JOANNA ELLINGTON:

...mesh...

ROBERT (IN STUDIO):

...barrier they couldn't get through.

VOICEOVER FROM SEX EDUCATION FILM:

The barriers are numerous.

ROBERT (IN STUDIO):

But...

JOANNA ELLINGTON:

...when the woman ovulates the hormones in her body make all those fibers in the cervical mucus [RISING TONE] line up. [CONSONANT TONE]

ROBERT (IN STUDIO):

Ooh.

JOANNA ELLINGTON:

And they basically make a little highway that the sperm can swim through. [WATERY WHOOSHING SOUNDS] Zip zip zip.

ROBERT (IN STUDIO):

Not only is she welcoming them in, she's making sure they d—that they don't get lost.

JOANNA ELLINGTON:

They are directed to the side that has the egg on it.

ROBERT:

Oh because there are some tubes with eggs and some tubes without?

JOANNA ELLINGTON:

Right...

VOICEOVER FROM SEX EDUCATION FILM:

[MYSTERIOUS DOCUMENTARY MUSIC] One fallopian tube leads to the waiting egg. The other, to an empty tube. [MUSIC STOPS]

JOANNA ELLINGTON:

...Except for the woman's body says...

JOANNA ELLINGTON (DISTORTED):

“Over here, guys... This side...” [VOICE ECHOES]

ROBERT (IN STUDIO):

And most surprising of all is that halfway through the journey there's a—a rest period, in, eh—it's called the fallopian tube.

JOANNA ELLINGTON:

The fallopian tube says, “Oh, great, we know that you guys are here. We know that you’re pretty fragile guys. So we’re going to change the type of sugar proteins that we make...”

[MUSIC: 1950S-STYLE VERSION OF “SUGAR, SUGAR” BY THE ARCHIES] “We’re going to make sugar proteins that you’re bathed in and you just hang out here until an egg comes.”

ROBERT:

Oh, so we’re now in the waiting room?

JOANNA ELLINGTON:

Yes.

ROBERT:

And we’re being... sugared.

JOANNA ELLINGTON:

[LAUGHING] Yes.

ROBERT:

This sounds nice!

JOANNA ELLINGTON:

It is nice!

ROBERT:

Sounds like a little Roman moment. Everybody’s lying down, kind of getting a towel wash or something.

JOANNA ELLINGTON:

They’re very quiet at that point. Metabolically they’re quiet. [SOOTHING MUSIC]

ROBERT (IN STUDIO):

The female is essentially telling them, “Shhh... wait... not yet... not yet...”

JOANNA ELLINGTON:

They can live in the fallopian tube for two, three, four days. Maybe even a week.

JAD (IN STUDIO):

A week?

ROBERT (IN STUDIO):

Yup.

JAD (IN STUDIO):

No kidding!

ROBERT (IN STUDIO):

[LAUGHING] **Yeah! Until her egg is ready. That's when she says...**

JOANNA ELLINGTON:

[DRIPPING SOUND] **"Hey, we just ovulated. You need to let the guys go."** [TIMER BEEPS; WHOOSHING SOUND] **And the sperm are released and start swimming up the track...**

VOICEOVER FROM SEX EDUCATION FILM:

They swim in dense bunches...

JOANNA ELLINGTON:

...to meet the egg.

VOICEOVER FROM SEX EDUCATION FILM:

...in search of the egg.

ROBERT (IN STUDIO):

And the rest of it, of course, you know. [CALM MUSIC; SOUND OF BABY CRYING; MUSIC BECOMES DISTORTED]

JAD (IN STUDIO):

Huh. I never heard about the sugar room before. I mean, that seems like news.

ROBERT (IN STUDIO):

Yeah—in the fallopian tube:

JAD (IN STUDIO):

Yeah.

ROBERT (IN STUDIO):

Yeah, neither had I. This had been discussed by scientists but there was no evidence to prove that it was so, uh—but, Joanna...

JOANNA ELLINGTON:

As a good scientist...

ROBERT (IN STUDIO):

...she was the first to provide the evidence, she says.

JOANNA ELLINGTON:

...After I had my last son, I told my doctor—I said, “My husband and I are going to have intercourse. You’re going to do y—my tubal ligation and cut out my tube, and we’re going to get pictures of the sperm stored in the human fallopian tube. So we did.

[LAUGHS]

ROBERT:

[LAUGHS] So you counted your husband’s guys!

JOANNA ELLINGTON:

Yes! Yes.

ROBERT:

At the gate!

JOANNA ELLINGTON:

Yeah, there weren’t very many there. We—just a few.

ROBERT:

H—how many were there?

JOANNA ELLINGTON:

He had about twenty in the fallopian tube that we looked at.

ROBERT:

Oh man...

JOANNA ELLINGTON:

[LAUGHS]

ROBERT:

...that is a—that seems like a fragilely low number.

JOANNA ELLINGTON:

Well, it is but you have to remember that you only need one. [MYSTERIOUS MUSIC]

JAD (IN STUDIO):

Wow. That blows my mind. I mean, that's like twenty little...

ROBERT (IN STUDIO):

...Yeah, yeah...

JAD (IN STUDIO):

...potential souls, lost at the gate!

ROBERT (IN STUDIO):

The cool thing is that, yes, there is this level of competition still, but underneath, there is this substrate of male-female cooperation. It's much more act of teamwork than one would have supposed.

JOANNA ELLINGTON:

Hazel's sperm just arrived. Thought I'd let you guys know.

JAD (IN STUDIO):

Oh.

JOANNA ELLINGTON:

[AT THE FARM] Come here, girls!

GIRL'S VOICE:

...pregnant? Get pregnant?

JOANNA ELLINGTON:

[TO GIRLS] Yeah, they're gonna get pregnant.

JAD (IN STUDIO):

Hazel? Who's Hazel?

ROBERT (IN STUDIO):

Oh—that's her pig.

JOANNA ELLINGTON:

[CALLING] **Hazel!**

ROBERT:

Is it a big box? Or what—what is it...

JOANNA ELLINGTON:

Uh, it's a white, Styrofoam cooler.

JOANNA ELLINGTON:

[AT THE FARM] **Go ahead and scratch Hazel's back, Sagey.** [LOUD PIG VOCALIZATION; CHILD LAUGHING]

JOANNA ELLINGTON:

We'll end up putting, probably, about a half a cup into Hazel. [PIG SOUND; SOUND OF POURING LIQUID]

ROBERT:

Wow. How long did it take Mr. Pig to make a half a cup?

JOANNA ELLINGTON:

[LAUGHS] **Pigs make... a lot of sperm.**

JAD (IN STUDIO):

Robert...

JOANNA ELLINGTON:

[FADING INTO BACKGROUND] **...she is now seven hundred pounds...**

JAD (IN STUDIO):

...we gotta leave the farm.

ROBERT (IN STUDIO):

Not yet—no, come on...

JAD (IN STUDIO):

Come on, we gotta go to—we gotta go to break, sorry.

ROBERT (IN STUDIO):

So you're gonna miss some stuff about the pig.

JAD (IN STUDIO):

Radiolab will continue in a moment.

ANSWERING MACHINE VOICE:

[BEEP] Message one:

JOANNA ELLINGTON (ON PHONE):

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ANSWERING MACHINE VOICE:

End of message.