

sound, that's a strong clue that he's dead. So if someone is dead when he *stops* moving, perhaps we should say that he is alive when he *starts* moving. Anyway, back then they didn't have ways to see into the womb to really tell when a baby starts moving. By 18 weeks the baby can kick hard enough for the mother to feel it, but of course he's moving before then, though they weren't sure exactly when. Today we know that babies start moving at about six weeks, the age of the baby shown here.

Brain Waves

Of course today we're more sophisticated than the simple "not moving" test. Today we usually declare someone to be clinically and legally dead when we can no longer detect brain waves using an electroencephalogram (EEG).

So if we say that someone is dead when brainwaves *stop*, perhaps we should say that he is alive when brainwaves *start*. When do brainwaves start? We can measure them at 6 weeks.

Heartbeat

Before the idea of "brain death" came along, we used to declare someone dead when his heart stopped beating. So if you're dead when your heart *stops* beating, perhaps you're alive when your heart *starts* beating. When does this happen? At just three weeks after conception. (Sorry, I don't have a picture this early.)

Our Story So Far...

What we've just said is something of a quick summary of development in the womb -- albeit in reverse. So let's summarize some highlights of fetal development:

At 20 weeks the baby is viable.

At 6 weeks we can measure brain waves.

At 6 weeks he begins to move his arms and legs.

At 3 weeks his heart begins to beat.

A Single Cell

But each of us began life as a single cell.

A single cell does not look much like what we normally think of a human being looking like. Some say that clearly this is not a human being, because it doesn't *look* human. But can we judge entirely by appearances? (Beauty is only skin deep; perhaps humanness is too...) What really makes someone human?

A Plan for a Man

These are human chromosomes. They are found in every cell of your body. Every one is a copy of the set found in that single cell that you began as. They make up the complete plan, the blueprint, for a person. Modern science is only beginning to understand the code that this plan is written in, but a skilled lab technician with the proper equipment could examine these chromosomes and tell a few simple things.

I'd hate to have you read this article and go away without learning something practical. So I decided I could show you something useful: how to tell boys from girls. This may

come in handy next time you're thinking of asking someone out on a date..Chromosomes come in pairs. Just

take the chromosomes and put together the ones that look the same, like I've done here. I literally made this picture by cutting up the previous picture and gluing the pieces back together -- no magic, no high tech. (Hint: The easiest way to match chromosomes is by simply looking at the length.) If every one has a match, then this is a girl. If you end up with two that don't match, like here, then this is a boy.

There are supposed to be exactly 46 chromosomes. If you have too few or too many, than this person has some serious physical deformity. Downs' syndrome is caused by an extra chromosome.

With some recent advances, it is now possible to do chemical tests to determine if this child will have certain hereditary diseases, like Huntington's disease or sickle-cell anemia.

The government presently has a huge project underway, the "Human Genome Project", to decipher the code that this blueprint is written in. Perhaps in time people will figure it out, and with the proper equipment one could examine chromosomes like those pictured here and determine what hair color this person will have, his height, his favorite salad dressing, whatever. (Or maybe the idea of someone being able to tell all that about you from a tissue sample disturbs you, but that's another subject.)

Suggested Answers to the Question

So when does human life begin? A number of answers have been proposed.

Some have tried to find an answer in a religious belief, such as suggesting that human life begins when the soul is created. Others object that such answers cannot be used as a basis for law, because that would be a violation of "separation of church and state". But I'm not going to bother debating this point, because the objection is largely irrelevant. There is a far bigger problem with such a definition of life: no one knows when the soul is created, and it is difficult to see how we could find out. If someday, someone invented some kind of machine which could detect and measure a soul, this might become a useful definition. Until then, it can only be a subject for speculation.

There have been a number of suggestions which could be referred to as philosophical arguments. For example, Human life begins when there is consciousness of self. But what about someone in a coma? Is he no longer human? Indeed, each of us spends about 8.hours a day unconscious, while we are asleep. Do we cease to be human? And like the "soul" definition, this one may be philosophically interesting but is of little practical use, as it is not at all clear how we could determine when someone first becomes conscious. Or consider, Human life begins when one is capable of giving and receiving love. This brings to mind Planned Parenthood's famous slogan, "Every child a wanted child". It sounds very profound and romantic, but think about what it really means. There are many unloved people in the world: refugees, the homeless, and minorities. Would you say that because these people have suffered misfortune or oppression, that that makes them no longer human, and no longer entitled to human rights? Suppose a man was accused of murdering his wife, and in court he admitted that he had done it, but he explained that he

didn't love her anymore, and so he figured that as she was unloved, she was useless and had no right to live. If you were the judge, would you accept such a "defense"? It is surely a tragedy if a person is unloved and unwanted, but that does not make them any less human.

No discussion of a person's state of mind, or how others feel about them, has anything to do with that person's essential humanness. It seems, then, that the question of when human life begins is not really a religious, moral, or philosophical question at all, but a scientific one. When does physical, material, biological life begin? So we should really turn to medical science for an answer.

Some suggest drawing a line at some presumably crucial point in the unborn child's development. As I have mentioned, some would use viability, the age at which the child can survive outside the womb. For at least several centuries the most popular theory was that life began at quickening, when the baby begins to move. In the middle Ages a popular theory was that the baby becomes human when he or she has recognizable sex organs. (And you thought it was just the 20th century that was obsessed with sex...) Our Supreme Court has ruled that a person is alive when he takes his first breath. The point when the baby's heart begins to beat or when he first has brain waves seem like significant points, though I don't know of anyone pushing for such a definition.

The problem with all such "developmental" definitions, though, is that they are essentially arbitrary. Note that I've just rattled off half a dozen plausible choices. How do we decide just which development is the crucial one, whose "completion" means that this is now a living human being? What makes, say, breathing more important than heartbeat? How do we decide?

Can we point to one event as being truly unique? Is there one magic moment? Some time when we can really say that before that point, you did not exist, but after that point, you did?

Yes.

Medical science has given us that answer. The magic moment is: conception. It is at that moment that the unique combination of chromosomes that define **you** first came into existence. Before conception, that blueprint did not exist anywhere; after conception, it did. From that point on, your body grew and developed, but -- unless you get an organ transplant or some such artificial addition -- nothing new is added except food, fluids, and oxygen. Scientifically, biologically, and medically, life begins at conception.

Much as I might like to claim credit for brilliant deduction and originality, I did not figure this out myself. The medical researcher Karl Ernst von Baer first theorized it in 1828. Over the next several decades doctors and researchers were able to observe the process of conception in the laboratory, first in animals, later in humans, and by the 1850s this was well-recognized scientific fact.

An acquaintance of mine who is a doctor once commented that when his grandfather went to medical school in the early 1900s, he was taught that life begins at conception. When his father went to medical school in the 1920s he was taught that life begins at conception. When he himself went to medical school in the 1950s, he was taught that life begins at conception. Now his daughter is going to medical school, and she is being taught that no one knows when life begins.

How have we become more ignorant, when medical science has advanced so far in almost every other way imaginable? Did new medical discoveries somehow bring the old conclusions into doubt? Hardly. Ultrasound, intrauterine photography, genetic engineering ... all have confirmed and reconfirmed what was discovered in the 1800s.

What's changed is that the medical establishment has changed its "knowledge" to conform to the prevailing political winds.

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Ohio Right to Life
2238 S. Hamilton Rd, Suite 200
Columbus, OH 43232-4382
Telephone: 614-864-5200