What's In the Fridge?

Jerome Lejeune's Expert Court Testimony regarding the nature of human embryos

This full 32-page version of the testimony of Dr. Lejeune is available at www.sedin.org/propeng/embryos.htm

In February 1989, a very unusual case was argued before Judge W. Dale Young in Blount County, Tennessee. In that case, Junior L. Davis filed suit against his ex-wife, now Mary Sue Davis Stowe, over the custody of seven cryogenically frozen embryos that the two of them had created at a fertility clinic prior to their divorce. In his suit, Davis asked the court to 1) give Davis and Stowe joint custody of their embryos; or 2) prohibit Stowe or anyone else from using the embryos for implantation until he could decide about their disposition; or 3) if nothing else, consider Stowe the only suitable party for implantation. After hearing almost three days of testimony, Judge Young ruled last September that Stowe be given temporary custody of the embryos for the purpose of bringing them to term through implantation. One of the expert witnesses testifying in this remarkable case was Dr. Jerome Lejeune, a world-renowned expert in human genetics. In his stunning testimony, Dr. Lejeune brings to light some recent scientific findings that bear directly on the topic of human origins. Although not all of Lejeune's testimony is pertinent to origins, and although a good deal of it strays beyond the borders of science, we believed it would be worthwhile to reproduce his testimony in its entirety. In the first place, reproducing the entire testimony provides important context for understanding Lejeune's scientific remarks. Second, we believe that it underscores the profound relevance of science for many issues that confront us in the late twentieth century--issues that touch on important ethical and metaphysical considerations. Because some of the scientific findings that Lejeune presents are still fairly new, we welcome comments from those who have a background in genetics or embryology. Please send your comments as a letter to the editor for publication in the next issue of Origins Research. Meanwhile, enjoy!

TESTIMONY OF DR. LEJEUNE

THE COURT: For the record, ladies and gentlemen, let the record reflect that prior to these proceedings being placed of record, that the Honorable Martin Palmer, a member of

the Maryland Bar, had been introduced to the Court and welcomed, and that Dr. Lejeune, a witness in this case, had been given the oath to testify. Is there any need, gentlemen, to readminister the oath for the record?

MR. CLIFFORD: No, your Honor.

MR. CHRISTENBERRY: No, your Honor.

THE COURT: You may proceed.

The Witness, JEROME LEJEUNE, M.D., having been first duly sworn, testified upon his oath as follows:

DIRECT EXAMINATION

BY MR. CHRISTENBERRY:

Q.: Would you state your name for the record, please, sir?
A.: My name is Jerome Lejeune.
Q.: And to help the court reporter if she doesn't understand the French pronunciation you spell your name, J-E-R-O-M-E, capital L, little e, little j, E-U-N-E?
A.: Perfect.
Q.: Thank you. Dr. Lejeune, from your accent, I take it that you live elsewhere than East Tennessee?
A.: Well, born on the river of the Seine, you know.
Q.: And that is probably situated in another country, I hope?
A.: It's a little country called France, and the little town is Paris.
Q.: Thank you, Doctor. I guess you're a French citizen?
A.: I'm French citizen, Parisian born.
Q.: And you've traveled to this country, to Maryville Tennessee, to offer what you have as a witness in this trial?
A.: Yes.

Credentials

Q.: Okay. Tell us, Doctor, What you do, what your profession is.
A.: I am a M.D., that is Doctor in medicine, I'm also a Ph.D., Doctor in science, and after getting my degree in the University of Paris in medicine and also in genetics in the Sorbonne, Faculty of Science, I was research worker for ten years, and then I was appointed professor of fundamental genetics in the Faculty of Medicine of Paris. My special field is children, all the constitutional diseases of children, and more especially mental retardation.
Q.: Okay. Doctor, you practiced medicine, I take it, as maybe a pediatrician?
A.: Well, I started as a pediatrician, but I specialized in genetics, and we have the biggest consultation of the world in l'Hospital des Enfants Malades, Sick Children Hospital in Paris. We have the biggest consultation of the world for children with mental retardation

due to congenital diseases due to chromosomal mistakes.
Q.: Have you been an educator as a result of your background? Have you been a teacher?
A.: Well, I have been professor of fundamental genetics now for twenty years, but I began-- my first teaching was not in France, it was in America. I was invited by Professor Beadle in Caltech, California Institute of Technology. It was just before I discovered the first diseases of man--first chromosomal diseases in man, but I was already involved in medical genetics, and Beadle invited me to give the first course of human genetics in Caltech. That was long ago. At that time my English was even rougher than it is today, and I came with all my course written in French. In the evening I was translating them with the dictionary, and in the morning I was delivering the course to the students. They were very kind, they helped me very greatly. That is the way I have learned to speak English, and I hope the way they have learned a little about human genetics.
Q.: You remember the year that you went to Caltech?
A.: Well, it was in '58.
Q.: Did you remain there for some time as a professor?
A.: I was a visiting professor from the OTAN, professorship from the OTAN; NATO, you say NATO, excuse me.
Q.: You have been accredited with helping in human genetics with identification of some chromosome; will you tell us what that is about?
A.: It happens that I discovered the first disease due to a chromosomal mistake in man which is Down's Syndrome which was called previously Mongolism because these children have a special odd look which is a little remembering for European some type of the Mongol features. But in Mongolia they don't like to call the disease Mongolism, they call it European Imbecility. I discovered that they had one chromosome too much. That was long ago, thirty-two years, if I calculate well, and for that discovery I received the Kennedy Prize from the late president here in United States. And also for that discovery, I got William Allen Memorial Award which is the highest award that you can get in genetics in the world. It's given also in United States.
Q.: I see. Have you followed with your genetic discovery even as you sit here today? Have you continued to study?
A.: Oh, yes.
Q.: Could you probably give us an enlightenment on what's happened over thirty-two years?
A.: Well, I want not to speak too much about myself, it's not the subject. But we have discovered ten different diseases due to chromosomal errors, and I would say the first chapters of this enormous pathology was written in French by us. Now, we are dealing with mechanisms of mental retardation due to chromosomal diseases, and we are beginning to understand why having one chromosome too much, that is, normal information but repeated, makes a nuisance for the development of the intellect. And, for example, very recently we demonstrated that in trisomy twenty-one, Down's Syndrome, previously called Mongolism, the cells of the children are more sensitive to some drugs which are used against cancer. It seems totally unrelated, but, in fact, it's defining a new field of research, because very likely this peculiarity is related to a deficiency in a chemical system which is used especially in our neuron, and it's probably one of the main reasons why they do not develop a normal intelligence. So, for the moment, you asked me what we are doing now: We are working on this particular hypothesis because it

allows us to make experiments on cells, taken from the children, we cultivate, and we can manipulate, we deprive them, we follow them and we play with them, and we use a lot of drugs to see how they react, and that is the first time we can make experiment in human cells so that to try to cure a neuronal disease, a nervous disease, so it's a very exciting field, but the job is not yet finished.
Q.: I trust you can do all that without harming the children?
A.: Oh, well, you just take a few drops of blood, and you cultivate the cells, make cultures. We play with the cell; we do not play with the child.
Q.: Thank you, Doctor. I understand you're on the boards of various academies in this world. Could you tell us about that?
A.: I have the honor of being a member of the American Academy of Arts and Science, I'm member of the Royal Society of Medicine in London, Royal Society of Science in Stockholm, of the Science Academy in Italy, in Argentina. I'm a member of the Pontifical Academy of Science, and I'm a member in Paris in the Institut de France of the Academie des Sciences Morales et Politiques, that is, of Moral and Political Sciences, a special academy in France; and also the Academy of Medicine in France.
Q.: The Academy that deals with moral and political sciences
A.: Yeah.
Q.: Tell us what that academy's function is about, doctor.
A.: That academy was made around two hundred years ago to give advice to the government about moral and political questions, and essentially to give advice to the government about the use of new techniques, considering that the respect of man is one of the bases of our constitution. We have five academies in the Institute de France, it's one of them.
Q.: And then you mentioned another that gave me some interest. You said the Pontifical Academy, where is that academy located?
A.: The Pontifical Academy of Science is located inside the gardens of the Vatican, a very nice location. We are seventy members and no more than seven of any country, so that we're coming from all the world around. Our percentage of Nobel Prize is more than sixty percent. There is no difficulty because we choose the members in the whole earth, and so it's not difficult to choose good ones. The interest is many of them have been selected by another committee long after they had been elected by our academy. I would say it's the only scientific international academy of science, the only one which is truly international.
Q.: How long have you been on that academy?
A.: Twelve years if I remember well, something like that.
Q.: Tell us a little bit about the topics or research that is done there. What have you all considered?
A.: In the academy?
Q.: Yes, sir.
A.: Well, for example, we are given the question: What is danger of the use of atomic energy? For example, we had four sessions about the danger of atomic weapons and their numbers, the use of them, the possibility of survival of humanity after an atomic war and how medicine could do something. And when we did the report, the Holy Fathers asked the academy to designate members to produce that report to the powers who head the atomic power. It was sent to--in Moscow, to the late Mr. Brezhnev. This was a very

interesting interview during one hour discussing with Mr. Brezhnev in the Kremlin about the danger that humanity would feel if there was an atomic exchange.
Q.: Did you find that interview interesting to say the least with Mr. Brezhnev?
A.: I'm not a diplomat, I'm just a scientist, and it was very interesting for me, at least.
Q.: I understand that in this country, you're familiar with our man that is in charge of our health and welfare of all the citizens of this state?
A.: C. Everett Koop, yes, we are good friends. I know him since long.
Q.: How long have you known him now?
A.: I'm not good at counting the number of years, I know people--maybe fifteen years, something of that kind.
Q.: Do you visit with him and speak with him?
A.: Yes.
Q.: Does he call your bureau or your agency or your scientific on the phone in Paris?
A.: No, we have discussions when we meet together. We don't use phone for very important matter. It's better to have a chat.
Q.: What are his interests in you? In other words, what areas have you all chatted about?
A.: Human genetics, which is my field.

MR. CHRISTENBERRY: I believe at this time, your Honor, I would ask the Court to recognize Dr. Lejeune as an expert witness in the field in which he's here to testify.

THE COURT: Any objection?

MR. CLIFFORD: Your Honor, we certainly recognize Dr. Lejeune's expertise in the field of genetics.

THE COURT: All right, he's qualified.

MR. CHRISTENBERRY: Thank you, your Honor.

In Vitro Fertilization

BY MR. CHRISTENBERRY:

Q.: Dr. Lejeune, as you sit here today, it's fair to say you have come quite a distance, is it not, sir?
A.: Pardon?
Q.: It's fair to say you have come quite a distance to testify today, is it not?
A.: Well, it's not that far, you know. I have been farther than that.
Q.: You're familiar with the issues, the profound issues this Court is considering, aren't you, Doctor?
A.: Yeah, and that is the reason why I accepted to come.
Q.: Thank you. With respect to the issues in this case, you understand thewhat we would say is the factual understanding of how Mr. Davis feels and how Mrs. Davis feels. There has been some publicity about this, has there not, Doctor? You have heard something about their dilemma?

A.: I heard something, but very little. I must be very honest, I don't look at television, I don't listen to the radio, and I only knew when Mr. Palmer telephoned to me, that was the first time I heard about it. So I would not say I'm really knowing the whereabouts, no. I know there are babies, there are human beings in the fridge, this is the only thing I know.
Q.: Thank you, Doctor. So let's start with that aspect of this case. You're familiar with in vitro fertilization?
A.: Yes.
Q.: When did you write your first article about it, if you recall?
A.: Oh, you are terrible with dates; I'm not good with the answers. It must be fifteen years ago, something.
Q.: Okay.
A.: Before it was used.
Q.: Before it was used. So before it was used it had been conceived in man's mind, had it not?
A.: Well, you have to understand that artificial fertilization is something rather old in biology, and it was used for animals long before it was applied to man. And what seems today extraordinary, that is freezing a human embryo, it was not extraordinary for a cow. There is a lot of time that cows have been frozen and used and sent by air mail in little containers. And the novelty is to consider that the technique which was devised for husbandry was good enough for mankind.
Q.: Tell us about in vitro fertilization and your view of it and your perspective that you could offer today.
A.: Well, could I speak more about nature--
Q.: Yes.
A.: --of the human being, than specifically the condition in vitro, because to understand what means the fertilization in vitro, we have to understand what means fertilization at the beginning of a human being.
Q.: All right.
A.: And if I can say so, I would say that life has a very long history, but each of us has a unique beginning, the moment of conception. We know and all the genetics and all the zoology are there to tell us that there is a link between the parents and the children. And this link is made of a long molecule that we can dissect the DNA molecule which is transmitting information from parents to children through generations and generations. As soon as the program is written on the DNA, there are twenty-three different pieces of program carried by the spermatazoa and there are twentythree different homologous pieces carried by the ovum. As soon as the twenty-three chromosomes carried by the sperm encounter the twenty-three chromosomes carried by the ovum, the whole information necessary and sufficient to spell out all the characteristics of the new being is gathered.
Q.: Is what, sir?
A.: Gathered.
Q.: Gathered.

The Law of Life

A.: Gathered. And it's very interesting, if I can say, your Honor, to remark that natural sciences and science of the law, in fact, speak the same language. In that sense that when we see somebody healthy, well built, we say he has a robust constitution, and when we see a country in which every subject is protected by the law, we say it has an equitable constitution. In the phenomenon of the writing a law, you have to spell out every term of the law before it can be considered to be a law, I mean in the science of the law. And secondarily, this information written in the law has to be enacted, and it cannot be before it has been voted for.

Now, life does exactly the same thing. Inside the chromosomes is written the program and all the definitions. In fact, chromosomes are, so to speak, the table of the law of life. If you get the right number of your table of the law of your life, then you begin your own life. Now, the voting process does exist as well. It is the fertilization itself, because there are a lot of proposals, many, many sperms. Only one got in; that is the voting process which enact the new constitution of a man. And exactly as would say a lawyer, once a constitution exists in a country, you can speak about it in the same way, when this information carried by the sperm and by the ovum has encountered each other, then a new human being is defined because its own personal and human constitution is entirely spelled out.

There exists a lot of minute differences in the message given by father and the one given by mother, even by the same person; we do not give exactly the same minute information in each sperm or in each egg. It follows that the voting process of the fertilization produces a personal constitution which is entirely typical of this very one human being which has never occurred before and will never occur again. It's an entire novelty. That was sure--that was known for let's say not a hundred years but more than fifty years. But the bewildering was the minuteness of the writing of those tables of the law.

You have to figure out what is a DNA molecule. I would say it's a long thread of one meter (sic) of length, cut in twenty-three pieces. Each piece is coiled on itself very tightly to make spiral of spiral of spiral so that finally it looks like a little rod that we can see under the microscope that we call a chromosome. And there are twenty-three of them carried by father, twenty-three of them carried by mother. I said the minuteness of the language is bewildering because if I was bringing here in the Court all the one meter long DNA of the sperms and all the meter long of the ovums which will make every one of the five billions of human beings that will replace ourselves in this planet, this amount of matter would be roughly two aspirin tablets. That tells us that nature, to carry the information from father to children, from mother to children, from generation to generation has used the smallest possible language. And it is very necessary because life is taking advantage of the movement of the particles, of molecules, to put order inside the chance development of random movement of particles, so that chance is now transformed according to the necessity of the new being.

The Reproductive Process

All the information being written they have to be written in the smallest language possible so that they can dictate how to manipulate particle by particle, atom by atom, molecule by molecule. We have to be with life at the real cross between matter, energy and information.

Now, I would like, your Honor, to give you an impression of what happens normally. Most of the human beings have been conceived before the fertilization in vitro was used, and most of the humanity will still be made the old good days' fashion for a long time I do hope. Normally, when the ovum is ripe, that is, once a month, fifteen days after the menses, there is a rupture of the follicle, and the ovum is so to speak taken by the fallopian tube, which has a special expansion--we call it le pavillon--I don't know the name in English. And it can move, and if you take a picture it looks like as a hand making a slow palpation of the ovary to find where the egg will be laid and to take it. Normally, the egg is a big cell, round, not mobile, floating quietly inside the fluid in the tube, and the tube will manage to carry this big cell towards the uterus by ciliate movements. On the contrary, the sperm is an indefatigable navigator. It has been deposited in the entry of the genitalia of the mother, and normally it goes up through the cervix of the uterus, he swims during the whole uterine cavity, and it is inside the fallopian tube that the encounter between few thousands, ten thousands, hundred thousands of sperm and the one egg can occur. And it is because every human being has been conceived in nature inside the little tube, a tube of flesh that we call the fallopian tube, that test tube babies are indeed possible. The only difference is that sperm and egg are meeting inside a tube which is now a tube of glass because the egg has been removed from the body of the woman, and the sperm has been just added to the little vessel. And it's because normal fecundation--I should say fertilization in English--normal fertilization is occurring inside a tube that if you put the proper medium...It is not at all the inseminator who makes fertilization, he just puts on the right medium, a ripe ovum, active sperm, and it is the sperm who made the fertilization. Man would be unable to make a fertilization. It has to be done directly by the cells. And it's because they were normally floating in the fluid that this extracorporeal technique is at all possible.

Reproducing Information

Now, the reproduction process is a very impressive phenomenon in the sense that what is reproduced is never the matter, but it is information. For example, when you want to reproduce a statue, you can make a mold and there will be an exact contiguity between the atoms of the original statue and the atoms of the mold. During the molding process there will be again between the plaster and the mold contact atom by atom so that you reproduce the statue. But what is reproduced is not the original because you can make it out of plaster, out of bronze, about anything. What is reproduced is the form that the genius of the sculptor had imprinted in the matter. The same thing is true for any reproduction whether it is by radio, by television, by photography, what is printed or reproduced is the information and not the matter. The matter is a support of the information. And that explain to us how life is at all possible, because it would be impossible to reproduce matter. Matter is not living, matter cannot live at all. Matter is matter. What is reproduced and transmitted, it's an information which will animate matter. Then there is nothing like living matter, what exist is animated matter. And what we learn in genetics is to know what does animate the matter, to force the matter to take the form of a human being.

To give you an idea, I would take a very simple example, I would take the example of this little apparatus here, a recorder.

Q.: Yes, sir.
A.: Now, chromosomes are a long thread of DNA in which information is written. They are coiled very tightly on the chromosomes, and, in fact, a chromosome is very comparable to a mini-cassette, in which a symphony is written, the symphony of life. Now, exactly as if you go and buy a cartridge on which the Kleine Nachtmusik from Mozart has been registered, if you put it in a normal recorder, the musician would not be reproduced, the notes of music will not be reproduced, they are not there; what would be reproduced is the movement of air which transmits to you the genius of Mozart. It's exactly the same way that life is played. On the tiny minicassettes which are our chromosomes are written various parts of the opus which is for human symphony, and as soon as all the information necessary and sufficient to spell out the whole symphony, this symphony plays itself, that is, a new man is beginning his career.
In vitro fertilization does not change at all what I have said. It's just a technique sometime used to bypass a difficulty in the encounter of the egg and the sperm, so it's a--it's a derivation. It does not change at all the basic mechanism, the basic mechanism is just the same.
Now, if I could continue a little more, it's not about fertilization that we are discussing. It's about freezing of embryos. I'm not a specialist at freezing embryos. Your Honor, I have never played with embryos. But in my laboratory we are freezing cells, we are thawing them, we are using a lot of those process, so we know about it, we use it on another system than embryos, but all cells are very similar in their reactions. Now, you have to realize--I don't know if it is true in English, but I think it's quite true, and it is true at least in all the Latin language, we use the same word to define the tempo that we measure with a clock and the temperature that we measure with a thermometer. We say in French temps and temperature; in English you say time which is a change of tempo, which a temporal thing, and temperature. And that is not a mistake of the ordinary language; it's a definition of the basic phenomenon. I don't know how they have recognized it so long ago to build it into the language. What means time" is the flux of the agitation of the molecule, the flux of the particle which is continually going on. And temperature is just a measure of the speed with which the molecules are running in a given medium.
Now, if you diminish progressively temperature, you diminish the speed and the number of collisions between the molecules, and so to speak without any joke about the words, you are progressively slowing down, slowing down the temperature, you are freezing time. And, in fact, we are wrong telling that we are freezing embryos. In a sense it's very true like you deep freeze the meat in the supermarket, very correct. But in the fundamental sense what we are doing by lowering down the temperature is stopping not totally but very deeply the movements of the atoms and molecule so, in fact, inside the can, the thermal can in which we put in tiny cannisters the cells or the embryos, we have more or less arrested the flux of the time. This seems to be rhetorical, but it is not because otherwise we could never understood why it is possible to freeze a cell, to have it entirely not moving, not respirating, not having any chemical exchange, and just if you have done it with precision (so that no crystals have been made inside the cells which could have ruptured its very minute architecture), if you thaw it, thaw it progressively and carefully, it will again begin to flourish and to divide. Then it's obviously sure that we have not arrested life and started life again. What we have arrested is the time for this particular

organism which is inside this can.
If we could put a cell down to the minus two hundred seventy-three centigrade, that is, to the absolute zero, every movement would be stopped. And if the temperature would be maintained at that level, it would be kept unchanged for indefinity. I would not say eternity but indefinity. We are not achieving that when we freeze a cell in my laboratory (and you do the same here); we use not liquid hydrogen because it's very costly and very explosive, and it's used only in NASA for the rockets. We use mostly liquid nitrogen because it cannot explode, and it's rather cheap, and it's easy to manage. But it's only minus a hundred ninety degrees that we have inside the cannister. Well, it's rather cool, but it's not absolute zero, so the preservation is not a hundred percent.
And probably you could not preserve the cells for more than a number of years, that nobody knows because it depends on the cells. For example, to the best of my knowledge for ordinary cells which are very resistant, they are examples of more than fifteen years in the cannister and being thawed and being correctly surviving and alive. For mouse embryo it's some ten years. In our species I think there are no long time, maybe one or two years, no more than that. And nobody knows with the actual technique how long the preservation would be real preservation. It's a question I could not answer, and I think nobody can answer precisely today.
But what I could say, that the information which is inside this first cell obviously tell to this cell all the tricks of the trade to build herself as the individual, this cell is already. I mean it's not a definition to build a theoretical man, but to build that particular human person we will call later Margaret or Paul or Peter, it's already there, but it's so small that we cannot see it. It's by induction that we know it for the moment. And I would say I would like to use the felicitous expression of the mathematicians. They would say that man is reduced at its simplest expression like you can do with an algebraic formula if you manipulate it intelligently. If you want to know what mean that formula you have to expand it to give value to the various parameters, and to put in use a formula, you expand it. It's what is life, the formula is there; if you allow this formula to be expanded by itself, just giving shelter and nurture, then you have the development of the full person.
Now, I know that there has been recent discussion of vocabulary, and I was very surprised two years ago that some of our British colleagues invented the term of pre-embryo. That does not exist, it has never existed. I was curious, and I went to the encyclopedia, to the French encyclopedia, the one I inherited from my great father so it was fifty years ago it was printed. And at the term of embryo it was said: The youngest form of a being," which is very clear and simple definition, and it stated: It starts as one fertilized cell, (fertilized egg which is called also zygote), and when the zygote splits in two cells, it is called a two-cell embryo. When it split in four it is called a four-cell embryo." Then it's very interesting because this terminology was accepted the world over for more than fifty years by all the specialists of the world, and we had no need at all of a sub-class which would be called a pre-embryo, because there is nothing before the embryo. Before an embryo there is a sperm and an egg, and that is it. And the sperm and an egg cannot be a pre-embryo because you cannot tell what embryo it will be, because you don't know what the sperm will go in what an egg, but once it is made, you have got a zygote and when it divides it's an embryo and that's it.
I think it's important because people would believe that a pre-embryo does not have the same significance that an embryo. And in fact, on the contrary, a first cell knows more

and is more specialized, if I could say, than any cell which is later in our organism. Now, I don't know if I can abuse of your patience, your Honor?

THE COURT: You're doing fine.

The Mystery of Three Cells

THE WITNESS: The very young human being, just after fertilization, after it has split in two cells and then in three cells because curiously we do not split ourselves in two, four, eight and continue like that, no, at the beginning we don't do that. We split in two cells of roughly equal dimension and one of the two cells splits in two. There is a moment in which inside the zona pellucida which is a kind of plastic bag, which is, so to speak, the wall of the private life of the embryo in which it is protected from the outside, we have a stage in which there are three cells. This has been known for fifty, sixty years, and it was remaining a mystery for embryology, because after that stage of three cells, it starts again, it comes to four, and it continue by multiples of two.

What could be the meaning? We do not know yet the accurate meaning, but it is of great importance about the discussion we have today because we can manipulate non-human embryos like, for example, mices. We can disassemble the cells which are inside the zona pellucida of a sixteen cell embryo of mice and take few cells of it, take few cells from another embryo, of another type of embryo, if you wish, and put all that together inside a new zona pellucida from which you have expelled the legitimate occupant. Now, what happens? Most of the time it fails, but sometimes a chimera comes out. For example, if you have chosen a black embryo, a white embryo and you have mixed them together, you find a little tiny mouse which can run on your table but which has a chessboard on the body. Parts are black, parts are white because she has built herself of two type of cells that you had put together in the same zona pellucida. It has to be done with a very small number of cells.

We have tried, and when I say we, I should say geneticists, have tried to put three different lines, and they have got few mice with three different type of cells that they can see on the fur. They have tried four, does not work; five, does not work. It's only possible with three cells. And that remembers that when we split at the beginning of our life (two cells and then one cell in two), we go at a three cell stage. It's probably at that time that a message goes from one cell to the two other cells, come back to the first one and suddenly realize we are not a population of cells. We are bound to be an individual. That is individualization, that makes the difference between a population of cells which is just a tissue culture and an individual which will build himself according to his own rule, is demonstrated at the three cell stage, that is very soon after fertilization has occurred.

If we stop the process, if we slow down the movement of the molecules, we progressively come to a relative standstill, and when the embryo is frozen, these tiny human beings, they are very small, one millimeter and a half of a dimension, a sphere a millimeter and a half, you can put them in cannisters by the thousands. And then with the due connotation, the fact of putting inside a very chilly space, tiny human beings who are deprived of any liberty, of any movement, even they are deprived of time, (time is frozen for them), make them surviving, so to speak, in a suspended time, in a concentration can. It's not as hospitable and prepared to life as would be the secret temple which is inside the female

body that is a womb which is by far much better equipped physiologically, chemically, and I would say intellectually than our best laboratories for the development of a new human being.
That is the reason why thinking about those things, I was deeply moved when you phoned to me, knowing that Madame, the mother, wanted to rescue babies from this concentration can. And to give to the baby--I would not use term baby, it is not perfectly accurate, not good English--would offer to those early human beings, her own flesh, the hospitality that she is the best in the world to give them. And because Mr. Palmer told me on the phone that it had been said that if you, Madame, were not entitled to give this shelter to the baby--to the early human beings, (being perfectly correct in what I mean)--you would prefer that they would be enjoying another shelter and not being left inside the concentration can, or destroyed. And I was impressed because it remembered me of an extraordinary trial which has occurred more than two thousand years ago, and I could not believe it could occur again, that two persons will discuss whether it's better to have an early human being alive and given to a certain person or another person would prefer the baby not being alive at all. And to the best of my recollection this judgment has been considered as a paragon of justice when Solomon did it. I was not thinking I would come from Paris to speak in Tennessee about a two thousand years old trial. But I realized when you phoned to me, it was the first time it was arising in this earth with a very early human being, because before early human beings were not in our reach, they were protected inside the secret temple. And then I felt it was opportunity that a geneticist was going to tell you what our own science tells us.
If this trial had taken place two years before, I would have stopped because I would have told you all that we knew at that moment. But with your permission, your Honor, I will continue a little further, faster and faster.

THE COURT: Yes.

Individual Uniqueness

THE WITNESS: We know much more, since the last two years, we know that the uniqueness of the early human being I was talking at the beginning, which was a statistical certainty (but an inference of all we knew about the frequency of the genes, about the difference between individuals) is now an experimentally demonstrated fact. That has been discovered less than two years ago by Jeffreys in England, the remarkable manipulator of DNA. And Jeffreys invented that he could select a little piece of DNA, of which he could manufacture a lot of it, which is specific of some message in our chromosomes. It is repeated a lot of times in many different chromosomes and which is probably a regulation system. Some indication to do something or do another thing, but not a kitchen recipe, but a precision about what to do.
And because it's only telling the cells that this should work and this should not work, it can assume a lot of tiny change, so that there are so many of those little genes and there are so many little changes in them that we receive from father and from mother an array of those genes that we can realize very simply, you get the DNA, you put it in solution and you have it spread in a special medium. Then you put this special probe made by Jeffreys, and what you see it looks exactly like the bar code that you have probably seen

in the supermarket, that is, small lines of different breadth and different distance from each other. If you put that bar code and you read it with an electronic device, it tells the computer what the price of the object and tells a lot of other things.
Well, it's exactly what it tells us that when we look at the DNA bar code, and we detect every individual is different from the next one by its own bar code. And that is not any longer a demonstration by statistical reasoning. So many investigations have been made that we know now that looking at the bar code with his Jeffreys system, the probability that you will find it identical in another person is less than one in a billion. So it's not any longer a theory that each of us in unique. It's now a demonstration as simple as a bar code in the supermarket. It does not tell you the price of human life, it has a difference with supermarket.
The second advance has been that we know now that in one cell we can detect its originality. That has been due to the discovery of a new system which is called PCR, which is becoming extraordinary popular. It started two years ago. You can take a tiny piece of DNA, one molecule taken from one cell, you see how little this is, you can with that technique reproduce it by billions, and when you have enough you can make the analysis of Jeffreys and see again that we have the whole demonstration of uniqueness, not only in a sample taken from the individual, but in one cell, in one nucleus of one individual.
Another is a third discovery which is by far the most important of all, which is that DNA is not as dull as the magnetic tape I was talking before. Nature is imitated by our discoveries, but she has known much more than we have yet discovered. In that sense, that the message written on DNA is written by change of the various bases which come one after the other in that one meter long molecule. But now it happens that twenty years ago it was described with certainty that some of the bases of DNA were carrying an extra little piece we call a methyl, (which is CH3) which is just hooked on it and change a little of the form of one of the bars of this long scale which is the DNA molecule. Nobody understood what it was meaning. And it's only four years ago (especially by the discovery of Surani) that we have begun to understand that we were up to something extraordinary, which is that those tiny little bits of methyl which are put on the base, cytosine, which is transformed in methyl--cytosine--I'm sorry to be technical, your Honor, but I cannot translate it, it's chemical slang.

THE COURT: I understand.

Underscoring Life

THE WITNESS: Is exactly comparable to what does an intelligent reader when he wants with a pen to underline, to highlight some passage or to scratch, delete another sentence. That is with the methylation, one gene which is still there is knocked out, put to silence, but if it is demethylated on the next division, on the next cell, then it will speak again. Now, the basic discovery was that this is possible because this tiny change on the DNA, changes the surface of the big groove of the helix of DNA. It is inside this big groove that some molecules, some proteins will hook on different segments specific of the DNA. It is a kind of language telling to the chromosome: You have to tell this information or for this information, shut up, do not speak this one for the moment. It's very necessary, because

there is so many information in our cells that if they were expressing everything, every time, to have the energy spent by one cell would be much more than the energy of our whole body. So it's necessary that we have some silent gene and some gene giving expression, expressed.
Now, the basic discovery is the following, and it is directly related to our discussion: That the DNA carried by the sperm is not underlined (or crossed) by this methylation on the same places which are not equivalent in the DNA chromosomes carried by ovum. During the manufacture of the sperm there are indications, it's penciled, so to speak. It's underlined, you should do that. But on the equivalent gene, on the equivalent chromosome manufactured by the mother, the underline is in a different place, and it underlines something different. So that at the moment the two sets of chromosomes carried by the sperms and the egg are put together, they are not as we believed for years identical. We knew there was a difference with the X" and Y" chromosomes, but for the others they were believed to carry the same information; that is not true. Some information is to be read on as coming from the male chromosome, and another information from a chromosome coming from the mother. Now, the reason is that the fertilized egg is the most specialized cell under the sun because it has a special indication underlining segments of DNA which shall be expressed and others that shall not be expressed that no other cell will ever have in the life of this individual. When it's split in two we know that exchange of information comes from one cell to the other one. When it's split in three it receives information we are an individual. And when it continues progressively, the underlining system is progressively changed so that cells do differentiate, and cells become specialized doing a nail, doing hair, doing skin, doing neurons, doing everything.

The Master Program

And the very thing is that during this process, the expansion of the primary formula which is written in the early human being, nothing is learned but progressively a lot of things are forgotten. The first cell knew more than the three cell stage, and the three cell stage knew more than the morula, than the gastrula, than the primitive streak, and the primitive nervous system. In the beginning it was written really not only what is the genetic message we can read in every cell, but it was written the way it should be read from one sequence to another one. Exactly like in the program of a computer, you don't put only the equivalent of the Algebraic formula, but you tell to the computer do that; if you get that result, then go at that and continue that program; or if you don't get the result, continue and go to the other program. That is written in the first cell; is progressively forgotten in the other cells of our body.
At the end of the process when the organism has grown up, it produce then its own reproductive cells, it puts the counter to zero again, and hence the rejuvenation. A new life will begin when a female and a male cell will encounter to produce the next generation. So I would say very precisely, your Honor, that two years ago I would not have been able to give you this very simple but extremely valuable information which we have now, beyond any doubt.
I would give you an example of why it's not theoretical. We can manipulate with mice--not me, but my colleagues. And with mice they have been able to make pseudo zygote,

that is, to take one egg, expel its own legitimate nucleus and put, for example, two nuclei coming from sperm, so they have diploid cell, a diploid zygote containing only two sets of paternal origin; it fails to grow. They have tried to do it with two maternal original nuclei, that is, two maternal chromosomal cells and no paternal cells. It's diploid; by the old theory it should grow, but it does not. But curiously both of them do something; they don't build a full imago, that is, the whole form. But they specialize. If there is only male nuclei, two male nuclei making what is called an androgenote, it produce little cysts which are looking like the membranes and placenta that the child is normally building around himself to make its space and time capsule so that it could take the fluid from the mother vessels. An early zygote containing only male chromosome does only that.

If a zygote contains only chromosomes from female origin, it makes the spare parts. It makes pieces of skin, it makes piece of teeth, it can make a little nail, but all that in a full disorder, not at all constructed it makes the spare parts. We know this directly by experiment in mice done by Surani last year. But we knew that but we could not understood it before.

We knew that already in man, because in man we know that there are what is called dermoid cysts which is a division of a non-fertilized egg inside the ovary of a virgin girl. It cannot grow. It's rare, but it is well known. It will never give a little baby, but it makes the spare parts, teeth, nails, all that mixed in incomprehensible disorder. On the reverse we knew that sometime after apparently normal fertilization the product does not divide correctly but makes cysts, little balls again and again and again, and it's called a mole, hydatidiformis mole, and it's very dangerous because it can give the cancer to the pregnant woman.

Now, we have discovered--(not me), you have to know I'm professor and when I say we, it's all the professors of the world, it's not me. We have discovered that in those hydatidiformis moles, there were only paternal chromosomes. There were two sets of paternal chromosomes and the maternal pronuclei had died, we don't know why. So we know by the mice experiments that it is related to methylation of the DNA.

Hence, we know by the human observation, that there is a specialization of information carried by the sperm compared to the information carried by the ovum. And I would say I was wondering, not surprised, but wondering that we were discovering at this extraordinarily tiny level of information built into the chromosomes, that paternal duty was to build the shelter and to make the gathering of the food, to build the hut and the hunting. And that the maternal trick was household and building of the spare parts so the individual can build himself. And it's a kind of admiration that we have for nature that since we have seen in the grown up that the man is going hunting and the mother is doing the kitchen, it is just the same deeply written inside our own chromosomes at the very beginning at the moments the first human constitution is spelled out.

Well, I have abused your kindness, your Honor. I have spoken maybe too much, but I would say to finish that there is no, no difficulty to understand that at the very beginning of life, the genetic information and the molecular structure of the egg, the spirit and the matter, the soul and the body must be that tightly intricated because it's a beginning of the new marvel that we call a human.

It's very remarkable for the geneticist that we use the same word to define an idea coming into our mind and a new human coming into life. We use only one word: Conception. We conceive an idea, we conceive a baby. And genetics tell us you are not wrong using the

same word; because what is conception? It's really giving information written in the matter so that this matter is now not any longer matter but is a new man.

Frozen Embryos: Life or Property?

When we come back to the early human beings in the concentration can, I think we have now the proof that there are not spare parts in which we could take at random, they are not experimental material that we could throw away after using it, they are not commodities we could freeze and defreeze at our own will, they are not property that we could exchange against anything. And if I understand well the present case and if I can say a word as geneticist, I would say: An early human being inside this suspended time which is the can cannot be the property of anybody because it's the only one in the world to have the property of building himself. And I would say that science has a very simple conception of man; as soon as he has been conceived, a man is a man.

THE COURT: Before we go further, let's take a break, a very brief break, actually a little longer one than we usually do. As most of the representatives of the media know, there is some hospitality being furnished you by the Blount County Chamber of Commerce. I want you to have an opportunity to enjoy that if you care to, so we will stand in recess about twenty-five or thirty minutes at which time our testimony will resume.
Parties may excuse themselves and Dr. Lejeune you may come down.

(Parties and counsel leave the courtroom.)

THE COURT: Ladies and gentlemen, we'll stand in recess.
(Brief recess.)

THE COURT: Dr. Lejeune, if you would come around and take the witness stand. Mr. Christenberry.

MR. CHRISTENBERRY: Thank you, your Honor.

BY MR. CHRISTENBERRY:

Q.: Dr. Lejeune, suppose that--as a hypothetical question, but suppose that we had heard testimony in this hearing that indicated that each mom and each dad contribute identically the same to the embryo, and that there is no differentiation between their contributions, could you tell us what your opinion is about whether or not cells are differentiated?
A.: It's difficult to answer that because once you know something in science, it's very difficult to tell what you would think if you were not knowing it. If the paternal and maternal chromosomal share of the baby was the same, we wouldn't have any idea how this differentiation of cells do occur, so if I had testified two years ago, I would have said that the mystery of cell differentiation was complete, and we did not know where it was written. Now we begin to know where it's written. It's the only difference, but it's a great difference that we begin to know. It tells us definitely that what was an implication that it must be written in the first cell, (this type of differentiation must occur at this time and at

the other time another differentiation should occur). We knew it should have been written, but we did not know at all how it was.
Q.: Okay. And so you testified at great length about the differentiation.
A.: Yeah.
Q.: And you did that for what purpose?

Differentiation Prewritten

A.: For the purpose of understanding how from an apparently undifferentiated cell which is the one cell of the fertilized zygote, the full imago can emerge. If science cannot say anything about the mechanism of it, it just remains a pure constitution but no knowledge about it. It's the reason why I wanted to put on record those new findings about the methylation of DNA, because it proved that the implication which was as all of genetics, that differentiation is, so to speak, prewritten in the first cell, is now having an understandable physical support. Now, it cannot be said that the first cell is a non-differentiated cell. It must be said now the first cell is knowing how to differentiate the progeny, the cell progeny.
Q.: Okay. And for me to understand--
A.: To make it clearer, if I am looking at the mass of cell growing, I know by my own experience in my lab for twenty years that never a baby will form itself in our bottles because we are growing cells taken from the body. On the contrary we know that if the cell which is dividing is a fertilized zygote, a new individual is just now beginning to emerge.
Q.: What ethical considerations do you have about freezing?
A.: I think love is the contrary of chilly. Love is warmth, and life needs good temperature. So I would consider that the best we can do for early human beings is to have them in their normal shelter, not in the fridge. The fridge is not a second choice, I would say it's a third choice. And typically I would not be surprised that in a few years from now, this long way outside the female body which is artificial insemination and this long stay in concentration can will be considered as not very efficient. It will be much better to make graft of the tubes to repair the difficulty of the tubal incapacity, or to use antibiotics--new antibiotics to prevent special difficulty with the mucosa of the tubes, or find chemicals which will help find why certain couples, although they have normal production of cells, cannot manage to get fertilization, or to get implantation. It's surely some chemical thing which is not yet discovered which will be the real solution. Then I would consider that the extracorporeal fertilization, it's, so to speak, an emergency proposal of medicine on the present stage of medicine, but it's not good treatment. The good treatment is yet to be found in each of the cases. It's not the final answer, so to speak, not at all. That is my feeling, but it's a feeling.
Q.: One moment, please. Doctor, I would ask you this question, and I'm going to read it to you so I'll understand how to ask it. It has been stated that once you get to blastomeres and they are unequal in size, that nobody knows for sure why division of these cells might be equal in some conditions and unequal in other conditions. Do we now know why the unequal and equal nature exists?
A.: That is a very difficult question. We know that normally, as I said, the stage of three cells is due to inequal division of the first blastomeres, and that seems to be the basic

normal phenomenon. But why nature do that it's still to be discovered, but it seem to be, the starting phenomenon. Then I would say that obivously there must be something written in the egg, telling the egg you split in two, then one of the cells split in two, then you can discuss together all three to know what to do, the three cells together. It's not a surprise, it's an obvious phenomenon known for a long time it was not explained at all, which has now found explanation. We know that in any typical chimera, made from different embryos, only three line of cells can manage to build an imago together. That means that the individualization is at the three cell stage.
Q.: Within your knowledge, Doctor, can you tell us what we know and what we can tell about these human beings from three cells forward? What knowledge do we gain and at what rate do we gain it? Do you understand my question?
A.: No.
Q.: Okay. We have heard testimony that at three weeks you have got this, the nervous system starts at this stage--
A.: Yeah.

Embryonic Development

Q.: This starts when -- and it's been confusing, because we have tried to eliminate--we tried to identify body parts, we're thinking in terms, and you come to us with a different perspective. Can you tell us once again what it is we have and how it progresses in development?
A.: Well, from the very beginning we have a embryo. We have first a zygote and a two cell embryo and then a three cell embryo and then a four cell embryo, and then eight, and sixteen, and all the power of two. This embryo, growing progressively, is inside the zona pellucida and suddenly at around six days or seven days it begins to hatch." The zona pellucida is, in fact, the protection, or privacy, so that if they are twins, for example, they will not mix together because each of them is in its own zona pellucida.
At the moment the embryo begins to hatch and make trophoblast which will anchor itself on the mucosa, there is already so much commitments we cannot see. There is already so much committed to build the individual that it will not mix with a possible twin.
Otherwise, in species in which you have a lot of pups in a litter of five, ten, like in kittens or in dog, if they were not protected, each of them at the beginning in their own plastic bag (in their own zona pellucida), they would not make different animals, they would mix and make a kind of chimera. But when it's so well committed, when all the cells are so well committed to continue to cooperate with each other, then nature has invented that embryo will hatch and rupture the zona pellucida and begin to anchor on the uterus.
The second step, we can describe around twelve days after fertilization; that is the very beginning of the little line which cells begin to draw on the embryo; this little line will progressively become a kind of gouttiere--I don't know the word in English--and finally will close itself in a tube, and it will be the beginning of the neural tube.
Then well, let's say, what I should say more? I will describe the whole development of the imago, let's say at three weeks, the cardiac tubes will begin to beat, so that the heart is beginning to beat three weeks after fertilization. And progressively you will reach the end of the embryonic period at two months after fertilization. At that moment the little fellow will be just size of my thumb. And it's because of that that all the mothers telling fairy

tales to the children are speaking about Tom Thumb story because it's a true story. Therefore, each of us has been a Tom Thumb in the womb of the mother and women have always known that there was a kind of underground country, a kind of vaulted shelter, with a kind of red light and curious noise in which very tiny humans were having a very curious and marvelous life. That is the story of Tom Thumb.
Well, after Tom Thumb is visible, that is, two months of age, it has two centimeters and a half from the crown to the rump, and if I had it--if I had him on my fist, you would not see that I have something, but if I was opening my hand you would see the tiny man with hands, with fingers, with toes. Everything is there, the brain is there and will continue to grow.
It's from that moment which is two months after fertilization, that we don't call any longer human being embryos, we call them fetuses. And that is very true to change the name just because it tell a very plain evidence: Nobody in the world looking for the first time at a Tom Thumb bag, looking at an embryo of two months of a chimpanzee, of a gorilla, of an orangutan, or of a man, nobody in the world would make a mistake just looking at him. It's obvious this one is a chimpanzee, this one is an orangutan, this one is gorilla, this one is a man.
The reason why we change the name, and we call it fetus, it means only something to be carried because the full form is already present. But the man was there before everybody could tell the difference with a chimp. For example, if we were taking one cell--I would not do that because it's dangerous for the being, but if we were taking one cell of a four cell embryo, it would probably survive and compensate. We know it in mouse. Now, let's take one cell of a chimpanzee embryo, of a human embryo, of a gorilla embryo and give it to one of my students in the Certificate of Cytogenetics in Paris, and if he cannot tell you this one is a human being, this one is a chimpanzee being, this one is a gorilla being, he would fail his exam; it's as simple as that.
Q.: When you see the development of three cells--
A.: Yeah.

Biggest Computers Not Enough

Q.: And if we used the most intricate computers, let's say, that would be used in our space program, NASA we call it, could those computers be programmed to keep up with what is going on?
A.: No, totally not. The amount of information which is inside the zygote, which would if spelled out and put in a computer tell the computer how to calculate what will happen next, this amount of information is that big that nobody can measure it.
I have to explain that very simply. You have the two meters of DNA, one coming from father, one coming from mother, that it means ten to the eleven bits of information, just to spell out what is written on this DNA. If you add the subscript that I was talking about methylation, then it will increase this number by ten to the power four or to the power five. Thus, we will go very soon, just for the DNA, at ten to the fifteen. It's an enormous number. To give you an idea, just to print letter by letter all what it is written in the DNA of a fertilized egg, you would need, writing G, C, T, A, and all the string of symbols, you would need five times the Encyclopedia Brittanica just to spell out the DNA, five times Encyclopedia Brittanica. But nobody could read it. You could fit it into the computer. But

now you would have to take care of all the molecules that are inside the cytoplasm which will recognize the message, which will send a message to the next cell. And to spell out this amount of information which is absolutely necessary, (otherwise no life would be possible), I think you would need a thousand, a million times more bits of information. No computer in the world would have a storage enough just to fill the amount of data. Now, to tell to the computer the algorithm to use it, nobody knows how to do it. You have to realize that this enormous information which makes a man is enormous compared to the information which makes a computer, because it's a man who has made the computer; it's not the computer which has made the man.

MR. CHRISTENBERRY: You may ask him. I would like to interject at first if the Court-- while it's fresh on the Court's mind, would have any questions of the Doctor. He's used to facing a judge after he's told his side of the story, and sometimes we do that in our system.

THE COURT: I have no questions at this point.

MR. CLIFFORD: Thank you, your Honor.

CROSS EXAMINATION

BY MR. CLIFFORD:

Q.: Bon jour, Dr. Lejeune.
A.: Merci.
Q.: Now that we have exhausted my French, we'll hopefully proceed in English. Let me first thank you very much for being willing to come here on Maryville, Tennessee, to appear in this trial. I believe, in fact, you come at your own expense, is that correct?
A.: Uh-huh (affirmative).

Previous Court Case

Q.: Now, please bear with me, Doctor, if you're not familiar with what I may be doing, in France they have civil law and we, as you may know, take our law from the British system, the common law. Please interrupt me if you're not sure where I'm going. Let me ask you this: Have you testified before in an American Court?
A.: Yes.
Q.: Could you tell me what testimony, what cases you have testified in?
A.: Well, in American Court I have testified especially on those questions. It was--I don't remember the Court it was.
Q.: Do you remember maybe testifying in 1981 in the state of Maryland?
A.: Yeah.
Q.: You recall that?
A.: Yeah, yeah.
Q.: What was that trial about?
A.: Well, if I'm well remembering, the trial was about a baby who was inside the womb,

a very different case. And if I remember exactly the story because I am not a lawyer, you know, I was not invited giving my opinion about the case, but giving opinion about another question which was whether this baby who could have been, I suppose at that time, somemust have been three months old, was really a human being. It was a very simple question, but it had to be as well answered with the available knowledge at that time.
Q.: I believe, Dr. Lejeune, in that case the question was whether or not a woman should be allowed to have an abortion?
A.: I think the question was whether the husband should say he did not want the baby to be expelled. That was the question.
Q.: And I believe, and correct me, of course, if I'm wrong that in the proof of that case the child had a chromosomatic, chromosome defect which would likely lead--
A.: No, I don't know that. I've not been aware of that, I have not heard about that. It was not said at the trial, no.
Q.: In that case you testified, I believe, that in your opinion the fetus in that case was a human being?.
A.: It was not my opinion. It was the teaching of all the genetics that I was giving. It's no doubt it's a human being because it cannot be a chimpanzee being, so it's a human being.
Q.: And you opposed abortion in that case?
A.: I dislike to kill my--a member of my kin, no doubt. And beside that I'm a French Doctor, I have sweared the oath of Hippocrates. Hippocrates four hundred years before Christian era made an oath that, thou shall not give poison, thou shall not procure abortion." It's very interesting for us doctors because at the time in which slavery was the law, at that time in which the father of the family was allowed to kill a baby at birth, or even later, he founded medicine by preventing new doctors to give poison or to give abortion. That was meaning that does not matter what the size of the patient; a patient is a patient. That is Hippocratic oath.
Q.: I believe that perhaps the first commandment is first do no harm?
A.: Thou shall not kill, yes, I have heard something about that.
Q.: Let me understand what your expertise is. You are obviously an expert in genetics.
A.: Yes.
Q.: Do you recognize the scientific field of embryology? Do you recognize there is a scientific field called embryology?
A.: Oh, yes, no doubt.
Q.: Do you claim to be an expert in the field of embryology?
A.: I claim to be not entirely ignorant.
Q.: But do you offer yourself as an expert in the field of embryology?
A.: No, I'm not an expert in the field of embryology by itself.
Q.: Let me ask you if you are offering yourself as an expert in the field of psychology?
A.: In the case of genetics I would have said yes because I have been so much involved in so many cases that I have learned about human psychology more than I should have in the faculties.
Q.: But you, I take it, do not claim to have a degree in the field?
A.: No, I have not a degree.
Q.: Do you claim to have expertise in computer science?
A.: Partly, sir.

Q.: Do you claim to have academic credentials in the field of computer science?
A.: No, not academy credentials. I have written things which were agreeable to some academicians.
Q.: Finally, do you claim any expertise in law?
A.: Oh, not. I have some heredity about it, my father was.
Q.: You may be more of an expert than you wish you were. But you do not claim any academic training in the law?
A.: Oh, no.
Q.: Or experience with the law.
A.: Experience, yes, a little experience.
Q.: Dr. Lejeune, I take it it has been known for quite a considerable length of time that the genetic material that started out in the ovum and the sperm combined, of course, into the zygote?
A.: Oh, yes.
Q.: How long has that been recognized?
A.: It's difficult to tell because fertilization has been discovered by Spallanzani, but he did not know about DNA, he did not know about chromosomes, then it was just the mixing of two cells. It was at the end of the 17th century. You asked me to tell you the whole story of genetics--
Q.: No, no.
A.: I agree, but it will take a month.
Q.: Doctor, I'm asking you approximately how long it has been known by the science of genetics that it was the coming together of genetic material, regardless of whether the precise material was known by its nature or not?
A.: I would say more than fifty years, going back to the early nineties.
Q.: Early nineteen nineties?
A.: Nineteen.
Q.: 1920's?
A.: Earlier than that. Eighteen, nineteen--I cannot explain.
Q.: I think we would agree it's been a long time.
A.: A long time. Three generations of students.
Q.: And I take it at some point it became understood in the field of genetics, that the genetic code or blueprint for the mature entity was contained obviously in that first cell?
A.: As I said it was known by inference, the inference was made, but the demonstration was not there.
Q.: Of course, often we refer in science to the concept of a theory.
A.: Uh-huh (affirmative.)
Q.: A theory being, of course, and you correct me if I'm wrong, a proposed explanation of how a system, in this particular case genetics, works, and then we do experiments to see if our theory holds water or whether it needs to go back into the shop?
A.: Yeah. I would say model.
Q.: Model, yes. Now, in genetics, I would take it, it has been believed on the theoretical level, all of the genetic material, all of the information as you referred to it was in the zygote, that has been believed theoretically for a very long time?
A.: No doubt.
Q.: And that what you have described to us at such length today has been the working out

of the precise mechanism of how that works?
A.: In a sense, yes, but it's a little change that previously it was an inference and now we begin to have a demonstration. For a scientist it makes a lot of difference.
Q.: Of course. But if I had come to you, Dr. Lejeune, ten years ago, and I had said, please help me with my genetics, Doctor, do you believe that all of the information that's necessary for the development and maturation of a chicken--
A.: Yeah.
Q.: Is contained in that zygotic cell we first see in the egg--
A.: Yeah.
Q.: Would you have told me that you believed that?
A.: Well, to be perfectly correct, I would say I believe it; now I would say I know it. That's a small difference.
Q.: But I take it it would be true that, again, ten years ago had I asked you this question about the chicken that your level of conviction about all that information being in the zygotic cell would have been very high?
A.: Yes, pretty.
Q.: And certainly if in genetics we had discovered that some information was coming into cells from some other source than the genetic material and having an impact, we would have all been stunned, scientific world would have been stunned?
A.: Yeah, yeah.
Q.: Now then, you described at great length this morning, the precise nature of the development of embryos as far as the mechanics of the genes and chromosomes and information that is passed from each gamete into that zygote, and you, of course, described it as an incredibly complicated procedure?
A.: Uh-huh (affirmative).
Q.: I take it that your questions, you were answering specifically about human embryos, zygotes, sperm, ova, but I take it that is also true of chimpanzees, gorillas, mice, they are--in those species it's also a very complicated fascinating complex mechanism?
A.: Yes, but not exactly the same mechanism.

Humans and Chimps

Q.: Certainly. I think I have read somewhere, and I'm sure if I'm not right you'll correct me, that genetically as far as the chromosomes, as far as the contents of the DNA in the chromosomes, for instance, man, Homo sapiens, and the higher mammals, particularly the gorillas, chimpanzeeshelp me look for that species.
A.: Orangutan.
Q.: There is a remarkable similarity?
A.: Well, it depends what you remark. You can remark the similarity, or you can remark the differences. And difference is incredibly interesting. I don't know where you want to ask me.
Q.: Well, I have heard it said or read that approximately ninety-eight percent of the genetic material that is found in a chimpanzee or gorilla is identical to what may be found in a human being.
A.: It has been written, and it has been written by statistical calculation of the DNA but not about the meaning of it. Now, what makes ninety percent similarity in the number of

words in two different texts? They can mean something very different by the way the sentence are made. It's what makes the difference between the species.
Q.: But there is a similarity in the DNA?
A.: Oh, yes, exactly like the similarity in the fact they have two hands like us, not the same thumb, but they have hands, we have feet, but they are the most similar to us, no doubt. It's no surprise that the DNA also has some similarity.
Q.: But the same basic process that we observe in human beings we also observe in chimpanzees?
A.: Oh, yes.
Q.: Mice?
A.: Mice, I would not go that far but partly.
Q.: Mice have zygotes?
A.: Oh, yes, I mean--I want to make clear when we speak about basic mechanism we have to know what we mean by basic. For example, I told you the enormous importance of methylation of the DNA we discovered those years. But, for example, Drosophila does not methylate the DNA.
Q.: That's the fruit fly?
A.: That's the fruit fly but it's a very complex organism. It's makes a differentiation of cells that makes me believe that with methylation we have unveiled one of the tricks used by nature, but there are other tricks we are still using, we men, that were sufficient to build a Drosophila but would not be sufficient to build the human being. I would not agree that basic mechanism are the same in the whole living system. Surely it's much more complicated to build a human being, to determinate on one cell the wiring of his brain so that he will some day invent machine to help his own brain to understand the law of the universe. There is something peculiar to the human beings compared to others, you know. I will tell you one thing, very simple: I'm traveling a lot, and as far as I can I visit two points which are very important for me when I go in a new town: One is the university and other is the zoological garden. In the university I have often seen very grave professors asking themselves whether after all their children when they were very young were not animals, but I have never seen in a zoological garden a congress of chimpanzees asking themselves whether their children when they are grown up will become universitarians. I feel there is a difference somewhere.
Q.: Doctor, I forgot to ask you a couple of questions about your expertise, and please pardon me for having to come back, but I take it from your testimony when Mr. Christenberry was asking you questions that you have not worked in the field of what is called in this country in vitro fertilization?
A.: No.
Q.: I believe in France there is a different term for that.
A.: No, it's called also fecundation in vitro.
Q.: But you have not been involved any in in vitro fertilization clinics?
A.: No.
Q.: You have not been asked to advise in vitro fertilization clinics on matters of genetics or anything else?
A.: Not directly, but I have advised a lot of my patients who consider whether they should have or not this type of investigation.
Q.: I suppose I should ask you this, I understand in vitro fertilization is done in France?

A.: Oh, yes.
Q.: How long has this procedure been carried out in your country?
A.: Well, I think Amanda has been six years, now, six years and a half, she was the first test tube baby in Paris. I think she is six years, seven years maybe.
Q.: Let me see, Dr. Lejeune, if I understand the point you are making this morning. It is your belief as a geneticist, that all the information that is necessary to create a human being, a unique individual human being, we could go in and find in a nucleus of a zygote?
A.: No, I never said that. In the zygote I would say, not in the nucleus. You need the nucleus and whole cytoplasm. The zygote cannot be reduced to the magnetic tape. We have also to have the tape recorder working.

Computers and Fertilized Eggs

Q.: We can take if we wished on a perhaps philosophical scientific experiment here, we could take a zygote, look at it, look at the DNA, look at the other structures in that one cell and assuming that we had the knowledge to be able to do it, tell everything about that human being?
A.: I would say yes, beside accident, which cannot be predicted, but I would say no machine is big enough to put in it this information, it is purely hypothetical.
Q.: Right.
A.: It's not practical.
Q.: We're engaging on a philosophical experiment.
A.: To be frank and to give you my belief I'm not sure we'll be any time able to build a machine big enough to do that job. There is no evidence about that.
Q.: Dr. Lejeune, then theoretically--
A.: Otherwise this machine would be a fertilized egg itself.
Q.: But if we had such a machine on our philosophical experiment, we could look into the zygote, and we could tell what color hair this person would have?
A.: No doubt.
Q.: What color eyes this person could have?
A.: Yes.
Q.: Could we look into the zygote and, either in the structure or chromosome or DNA, and tell what language the person would speak?
A.: I don't believe so, sir, because language is a basic phenomenon built in. We could say, in your example, theoretical example, this being will be able to speak, but he will speak Japanese if he is in Tokyo. But we could say conversely with your same system, looking at a chimpanzee first cell, this being will never speak.
Q.: Could we look into the zygote, into the genes of the chromosomes, into the DNA structure and tell whether this individual would like the music of Beethoven?
A.: Partly, yes, sir, because we could in your hypothesis be sure that he is perfectly normal, and if he is perfectly normal he would like Beethoven.
Q.: Dr. Lejeune, do you intend to investigate to find the defective chromosomes for those who do not like Beethoven?
A.: No, no, but you were asking me about normality.
Q.: Could we look into the zygote, into the chromosomes, DNA, into the balance of the

structure, and tell whether this individual would grow up to be a person of liberal or conservative persuasion?
A.: Well, even looking at the grown-up I cannot tell that, sir.
Q.: Of course, as you realize, Professor Lejeune, I'm trying to make, I guess, a philosophical point, and that is while some information, a great deal obviously of information is contained in that zygote, that there would obviously be things we could not detect with our philosophical machine about the individual when he or she was twenty, forty or sixty?
A.: Uh-huh (affirmative).

Defining Humanity

Q.: Dr. Lejeune, let me come I guess to what is the heart of the matter here and the heart of your testimony. You mentioned using the word conception and defining it in two different ways, defining it as the point where a zygote comes into existence and the point where we have a thought, and really would you agree with me, Dr. Lejeune, that what we're concerned about in this case and in the great debate about human life are definitions? How do we define a human being?
A.: Oh, yes.
Q.: Now, of course, when you define a human being, what we're assuming there is that a human being has certain rights whether God given rights or legal rights?
A.: That is not what define a human being.
Q.: Of course not. I understand. But I take it and I will ask you directly, Dr. Lejeune: You have referred to the zygote and the embryo as quote early human beings.'
A.: Yeah.
Q.: Do you regard an early human being as having the same moral rights as a later human being such as myself?
A.: You have to excuse me, I'm very, very direct. As far as your nature is concerned, I cannot see any difference between the early human being you were and the late human being you are, because in both case, you were and you are a member of our species. What defines a human being is: He belongs to our species. So an early one or a late one has not changed from its species to another species. It belongs to our kin. That is a definition. And I would say very precisely that I have the same respect, no matter the amount of kilograms and no matter the amount of differentiation of tissues.
Q.: Dr. Lejeune, let me make sure I understand what you are telling us, that the zygote should be treated with the same respect as an adult human being?
A.: I'm not telling you that because I'm not in a position of knowing that. I'm telling you, he is a human being, and then it is a Justice who will tell whether this human being has the same rights as the others. If you make difference between human beings, that is, on your own to prove the reasons why you make that difference. But as a geneticist you ask me whether this human being is a human, and I would tell you that because he is a being and being human, he is a human being.
Q.: And I take it you would believe from your testimony today that it is morally very wrong to intentionally kill a zygote?
A.: I think it's no good, it's killing a member of our species.
Q.: And it would be the same as if we were to kill twenty years later the person, human

being, that the zygote would become?
A.: It's difficult to tell because you ask me a justice question; I'm a biologist.
Q.: Now, but those are your beliefs?
A.: My belief is that it's no good to kill a member of our kin, very simple belief.
Q.: There is not much difference to you between whether it's at the zygote level, the fetus level?
A.: There is a great difference as they have not the same age. Some of them are very youthful ones, others are old ones. But it doesn't make for me a great difference, in the true sense of the fact it is discarding a member of my species. It's the only reason why I don't kill people, it's because they are human. Otherwise, some of them--some difficulty in life...
Q.: Dr. Lejeune, you, of course, are a scientist, and I'm sure that in the large part, you base your convictions and feelings upon your knowledge of genetics and other sciences. Will you concede, Dr. Lejeune, there are other very distinguished scientists, men who are as learned as you, who have thought and who have access to the same scientific information that you have, who come to a different conclusion?
A.: About what?
Q.: About the moral rights or moral duty to the zygote.
A.: Oh, in that case yes, but not about the fact it's a human being or not.
Q.: I understand that.
A.: But that's the point.
Q.: I understand that. There are even, I believe, individuals in your own country who differ with your view of what ethical duty is owed to the zygote.
A.: Well, I think in France we are divided in forty million opinions about that.
Q.: But you do recognize there are men in your own country of great learning who differ with your view on the ethics of the embryo and zygotic levels?
A.: Oh, that's obvious.
Q.: I believe, Dr. Lejeune, in the earlier--or I'd say slightly mid-nineteen eighties, your country set up a commission to study the ethical concerns raised by the technology of in vitro fertilization. Are you aware of the national commission?
A.: Well, you can call it a national commission, it's specially appointed by the president of France, so all the people have been nominated by the president. It's a presidential thing. It's not really a national thing. It's called national, but it's not elected so it's not representative at all.
Q.: Well, I believe it was called national commission.
A.: They have called them national commission, but you have to know they are not representative. They are not elected by bodies.
Q.: Were you on that committee?
A.: No, and I can tell you why, because I'm a member of the Academie des Sciences Morales et Politiques, moral and political sciences, and normally a member of this academy should have been appointed ex officio. Deliberately in the constitution, the by-laws of this committee, our academy was not put on it because they knew that the Academie des Sciences Morales et Politiques would appoint me. Just an interesting phenomenon.
Q.: So you feel--
A.: I don't feel anything about it. It's just a fact. I don't feel anything.

Q.: You believe you were intentionally kept off this committee?
A.: I believe that our academy was kept off, no doubt.
Q.: Since they knew that it would be you that was appointed you were intentionally kept off?
A.: That is a scientific hypothesis, not demonstrated.
Q.: But you do, I take it, recognize that the members of the national commission that were appointed were distinguished persons in their fields?
A.: I have never seen somebody in a committee who is not distinguished, sir.
Q.: And regarding those individuals even if you disagree with them, I take it you would recognize their integrity?
A.: Case by case.
Q.: Case by case.
A.: Case by case.
Q.: Do you know all the members of the committee?
A.: No.
Q.: But you would, in general, agree they are persons of integrity and learning?
A.: Case by case.
Q.: Are you familiar with the report of the national commission?
A.: Yes, I have read it.
Q.: You have read it?
A.: Yes.
Q.: The report of your national commission expresses some very grave reservations about the technique we know here as cryopreservation. Are you familiar with that?
A.: Uh-huh (affirmative).
Q.: Let me ask you this, Dr. Lejeune: Do you share those reservations about cryopreservation?
A.: I have many reservations. Probably it's not very good.
Q.: We heard testimony from Dr. Shivers, who was the embryologist who worked in this case, that with cryopreservation there was a statistical loss of the frozen embryos in the range of, I believe he said, fifteen to thirty percent.
A.: He's a better specialist about this attrition percent than I am.
Q.: So that you can expect, therefore, by the rules of statistics if we freeze one hundred pre-embryos, and we come back to thaw them at any point, we know the odds are very, very high we'll only have seventy, seventy-five or eighty?
A.: Uh-huh (affirmative).
Q.: We knew that before we put them in the frigidaire?
A.: Yes.
Q.: Would you regard that as an intentional killing of embryos?
A.: No, but I would consider that it's making the embryo running a risk, and whether this risk was in the best interest of the embryo or not is an open question. I explain. When we do an intervention in a baby for a heart disease, in some intervention we know that around twenty percent of them will be killed by the intervention. And in this case the intervention is made only if we know if we don't operate the child will be killed by the disease at ninety-nine percent of probability. Then we say in the real interests of this patient the best for him is to operate even if the operation is still dangerous, the danger is much greater if we don't operate. That is a way you can make indeed some choices in

medicine which are dangerous but which are, in fact, the best that you can do in the interest of this particular patient.
Now, in the case of an embryo, I am not sure it is in his own interest that this choice is made.
Q.: In fact it's made in a choice that as Dr. Shivers and Dr. King testified previously, that it merely gives the woman a better chance since she won't have to go through the stimulated cycle having shots and medication, hormones injected into her, it simply gives her a better chance of becoming pregnant. You're aware of that?
A.: I am aware of that.
Q.: So in cryopreservation we know that we are going to kill ten, twenty, thirty percent of these early human beings merely so the woman has a better chance of getting pregnant?
A.: That would be one of the reservations that I would have, but I dislike you say you kill. It's not killing.
Q.: If we were to take the members, the individuals seated in the jury box and I were to have a room I could put them in where we would know that thirty percent of them would come out dead, would you not agree I would be guilty of murder?
A.: Well, it depends, sir, because if the room you were talking about were a shelter during a bombing time and if remaining in that room all of them will be dead, but in the shelter some of them will survive, even if thirty percent of them will be dead, you did well. So it depends on the reason why you did it.
Q.: What if I did it not to take them out of a position of greater harm but merely for the benefit of some person other than themselves, not one of them but Mr. Palmer?
A.: I suppose he would refuse you do it, I'm sure.
Q.: You recognize the ethical and moral dilemma I'm raising, of course?
A.: No, I don't recognize it, sir.
Q.: You don't?
A.: No, because you use the word killing. And if you take a embryo which has been frozen and you put him briskly at normal temperature so that he will die, you are killing the embryo. If you are freezing the embryo you are not trying to kill him, if I understand what you have in your mind is to help the embryo surviving so he could be implanted in the womb of the mother. So your technique is not good because you lose part of them, but you are not killing. And I would not say that my colleagues who are freezing embryos are killers. It's not true. Otherwise, maybe it's because I don't understand English, but I would not use the word kill.

Misleading Terminology

Q.: The national commission in its report used a term which in English is supernumerary?
A.: Yeah.
Q.: Referring to supernumerary embryos, referring particularly to cryopreservation, embryos which are not to be used with a particular patient, woman, who has undergone IVF. Are you familiar with that term, first of all?
A.: I know that term, and it's a wrong term. Can you tell me a man who is supernumerary?
Q.: Maybe just a lawyer.

A.: I don't believe that, as a man he is not supernumerary. Maybe--I'm not saying anything.
Q.: But that is the term that is used in the report of the national commission?
A.: Yes, but it is a very misleading term, exactly the same thing as preembryo. You change the name because you will change your behavior, and I dislike that. I like to call a cat a cat, and a man a man. It's Wendell Holmes who said a man is a man is a man.
Q.: And a dog a dog and chicken a chicken?
A.: No, but a man is a man is a man," is a saying in your country.
Q.: Well, rather at this point debating whether the term was wise or not, I'm asking if that was the term that was used.
A.: Right.
Q.: Now, as I think I asked you and you told me awhile ago, the French commission did have reservations about the whole process of cryopreservation, because, of course, it leads to the precise problem that we have in this case. Of course, you know that regular IVF the woman is implanted or pre-embryos--excuse me, the embryos are inserted within forty-eight hours?
A.: As soon as you can, yes.
Q.: Whereas with a cryopreserved embryo, it might be six months, it might be a year. In fact, I believe that you are aware that the French guidelines provide for a year for the first child, recommend that a cryopreserved embryo should not be saved longer than twelve months for the first child?
A.: Could I tell you because you speak about what is said in French that this committee is consultative. It means that what he says as guidelines is for himself.
Q.: But these are the guidelines published by the national commission that was appointed by your government--
A.: It's consultative. It has no law, no force; just an opinion.
Q.: But you are aware that the commission recommended one year for the first child?
A.: Yes.
Q.: And then with an extension of an additional twelve months if a second child was desired?
A.: I don't follow you.
Q.: One question that was raised in the commission was how long you should keep a cryopreserved embryo?
A.: Yes.
Q.: Now, and the committee recommended that it should not exceed twelve months without very special circumstances and without a great deal of thought by people concerned with the ethical dilemma of IVF, do you recall that?
A.: I know about that, but I don't see the meaning.
Q.: I'm just asking you about the report at this point.
A.: Yes. Nobody knows from where it was coming, the time of one year. Out of the air?
Q.: Now, the French commission recognized that one of the dilemmas that was posed by cryopreservation again was the open ended time, time during which, as in this case, things could change, is that correct?
A.: I have to be very precise, I don't know by heart the whole document you are talking about.

Commission Recommendations

Q.: I'm not going to ask you to quote it. But let me ask you this: Are you aware that the national commission of France that spoke on this subject recommended that in the case where the project of the couple, that is, the IVF project of this couple is abandoned in the meantime, and that meantime refers to cryopreservation being used or is unfeasible because, for example, of the separation of the couple, the only solution retained by the committee by way of the least evil consist in the destruction of the embryos with the reservation of the possiblity of donation for research?
A.: I'm not aware of that at all, sir, because the consultative committee said it would not give any indication because they have not reached any opinion. I don't know what document you are talking about, but the one I have read was not this one. If you talk about this document, the opinions saying that it's better to kill the frozen embryos, it's just in my opinion wrong, I disagree with it.

MR. CLIFFORD: Your Honor, may I approach the witness?

THE COURT: You may.

BY MR. CLIFFORD:

Q.: Let me show you a page here which unfortunately for me is in French.
A.: That's good for me.
Q.: And ask if you could read the title of the document?
A.: (Reading in French.)
Q.: Could you--
A.: I'll try to make a translation. Advice concerning research on human embryos in vitro and their utilization for medical and scientific purposes.
Q.: Could you continue to read the page? If you would rather not--
A.: Well, what interest?
Q.: Just the headings.
A.: Recommendation to the use of in vitro fertilization as answer to infertility--it's very long.
Q.: Well, that is, in fact, the report of the national commission, is it not?
A.: Well, I'm sorry, sir, but it's not printed. It's something made on a computer. I don't see any important document there because it's--probably it has been a project of it, but it has not been published as a final advice because as I know, what I have heard on television, they said they have not reached an opinion on that. I'm sorry, but it doesn't matter anyway. It's a consultative party.
Q.: I'm somewhat surprised by that answer, Dr. Lejeune, because I'm given to understand-- you can correct me here--in December of 1986, a committee of distinguished French scientists made their report to the government. The report was started 1983.
A.: No, no, there is no final advice given by this body on this particular problem. They have discussed it, and they said we will continue to discuss it, as far as I know.
Q.: As far as you know?

A.: Uh-huh (affirmative).
Q.: You are not familiar with the national commission report?
A.: When it is published, yes, I read it, but that is not published matter. I don't see where you want to go with this question.
Q.: In fact, Dr. Lejeune, will you agree with me, sir, that there are distinguished, learned men and women in your own country of France who take the view that when a couple separates or is divorced that any embryos that may be in cryopreservation should be discarded or destroyed?
A.: That there exists people thinking that, no doubt, because if they say that it's probably because they think it. But it does not prove they're right.
Q.: Of course, not. Of course, not. And, of course, I take it because you have your feelings, you would concede that it does not prove that you are right?
A.: On that, I would not agree entirely with you.
Q.: Okay. All right. Would you agree with me, Dr. Lejeune, that really, of course, we're talking about what will become in this Court a legal question?
A.: Yeah, partly.
Q.: And that legal question is what quote rights,' if any, an embryo should have legally?
A.: Disagree with that. I'm not thinking about the rights of the embryos; I'm thinking about the duty of the parents and of society. Duty is a different thing.
Q.: Let's talk about duty because that is a word that courts can understand. You believe, in fact, there is a duty, and a strong duty, to bring, or attempt to bring an embryo to term and birth?
A.: The embryos have been frozen for that purpose.
Q.: I'm not so much talking about the particular seven embryos in this case, but any embryo that's been produced by IVF or in vitro fertilization.
A.: It if it has been produced, it has been produced in the view that it could be put somewhere in which it could be developed, that is the womb.
Q.: So you would believe that the man has a duty to bring it to life, bring it to birth rather, is that correct?
A.: What man?
Q.: This man, the man who is the donor of the sperm.
A.: Yeah.
Q.: That he has a duty, a moral duty to bring it to term?
A.: Yes.
Q.: And you would believe that the woman has such a duty?
A.: I would believe that if she was not feeling having that duty, she would not have accepted the beginning of the process.
Q.: Now, you, of course, are best known for your discovery of the chromosome connected with Down's Syndrome?
A.: That is long ago.
Q.: You have researched since that point other conditions or diseases, abnormal conditions which relate to the chromosomes that are passed on by heredity, is that correct?
A.: Yeah.
Q.: If I understand what you also told us this morning, it is possible to tell at the zygote level whether--

A.: Not at the zygote level.
Q.: At the embryo level?
A.: Yes, and late embryo.
Q.: Late embryo level whether or not this early human being will suffer from Down's Syndrome?
A.: Oh, yes, yes.
Q.: And as--
A.: In fact, it's essentially for a fetus. It is after two months.
Q.: But there is no reason that you know of, I take it that we could not at some point in the not very distant future even make that diagnosis in the embryo level?
A.: In some future, might not.
Q.: I take it from your testimony, Dr. Lejeune, you would believe that even if the embryo, that early human being, was going to suffer from Down's Syndrome or some other very serious condition or abnormality, that it would still be the duty of the mother and the father to bring it to term?
A.: I would say the duty is not to kill, and that duty is universal. And I would say that if by technique I was looking at the chromosomes of this baby, and I see the chromosomes abnormal, say for example, he has a trisomy twenty-one, I would say that this is the disease. But if I look at the other forty-six chromosomes that are normal I would see the mankind of the baby. And I don't condemn a member of my kin.
Q.: You would believe that the donors of that embryo would have a moral imperative, a duty to bring that--
A.: Not to kill the embryo.
Q.: That early being into a later stage of human being?
A.: Not to kill him. Relative Contributions
Q.: Now, let me drop back down to a bit more normal level of questions, Dr. Lejeune. Bear with me. Let's take a embryo in general, just statements that we can make about all embryos that would be true. That there is obviously a genetic contribution both by the woman and by the man?
A.: Yes, there is a contribution by the father and by the mother.
Q.: By the father and by the mother?
A.: Yeah.
Q.: And without the contribution of either there would be no embryo?
A.: Correct.
Q.: So on that sense the contributions of the mother and contribution of the father--
A.: Are both necessary.
Q.: Are equal?
A.: No, they are not equal. They are different, but they are both necessary.
Q.: Both--
A.: Necessary, absolutely.
Q.: And now let's talk about a particular embryo, early human being, and let's look at this early human being when it's became a later human being. Obviously, as far as the genetic makeup of this particular individual, it might be, in fact, more strongly influenced by the mother's contribution, at least in some areas, or might be more strongly influenced by the father's contribu-tion.
A.: Who knows.

Q.: Who knows. And, of course, unless we were to examine it, we wouldn't know.
A.: Uh-huh (affirmative).
Q.: And certainly you are not in this Court saying that women contribute more genetic material?
A.: In fact, I'm obliged to say, yes, they contribute more genetic material. For example, all the DNA on the mitochondria is coming from the mother, not from the father. Makes a little difference. It's a fact.
Q.: It's a fact?
A.: It's a fact.
Q.: But it's also a fact without both contributions--
A.: They are both necessary, no doubt.
Q.: But you are not here today saying, Dr. Lejeune, that the reason, the sole reason that Mrs. Davis should win this case and prevail is because her DNA contribution may have been slightly more than Mr. Davis' DNA contribution?
A.: I don't understand your question. I cannot see how you can solve a judicial problem with DNA contributions.
Q.: You are saying that it's your opinion that these embryos should be allowed to develop in this young lady because you believe they're early human beings?
A.: I do believe they are early human beings, and I have been told that their mother offered them shelter. Who could refuse that?
Q.: But not because of DNA contribution?
A.: Because they're her own flesh.
Q.: Well, they're his own flesh, too, aren't they?
A.: Yes.
Q.: And obviously he will be their father forever, for the rest of his life if there are children?
A.: (Witness nods head in the affirmative).
Q.: You will not deny that would have an effect?
A.: I would not deny anything.
Property vs. Life
Q.: I take it, Dr. Lejeune, therefore, if you believed that a embryo was not a human being as that term is used in ethical or legal or moral or philosophical or religious way that your view of this case may well be different?
A.: Totally. If I was convinced that those early human beings are, in fact, piece of properties, well, property can be discarded, there is no interest for me as a geneticist. But if they are human beings, what they are, then they cannot be considered as property. They need custody.
Q.: What it really turns on is what philosophically, ethically, legally that embryo may be. In your mind, sir, you have come to the very firm conviction that the early embryo or that the embryo is a human being, early human being, as you described it?
A.: Yes.
Q.: And you do recognize in other men's minds, after long and deep thought, learned men, they come to the opposite conclusion you do?
A.: No, I don't agree with that.
Q.: You don't agree with that?
A.: I have not yet seen any scientist coming to the opinion that it is a property. It is what

is the case. It's whether they are property that can be discarded, or whether they're human being who must be given to custody. That is it. You ask my question, I answer precisely; I have never heard one of my colleagues--we differ on opinion of many things, but I have never heard one of them telling me or telling to any other that a frozen embryo was the property of somebody, that it could be sold, that it could be destroyed like a property, never. I never heard it.
Q.: Just so I understand what you're telling us, I take it, Dr. Lejeune, from your testimony that you would be opposed to abortion?
A.: Oh, I dislike to kill anybody. That is very true, sir.
Q.: You would believe that abortion should not be legal?
A.: That is another point which is different. I think abortion is killing people, and I think in a good jurisdiction would make those killing people become rare. You cannot prevent everything.
Q.: I take it, again, your basis of that belief would be that the fetus or embryo is an early human being?
A.: Exactly. If it was a tooth, I would not worry about it. Chicken or Egg?
Q.: Finally, Dr. Lejeune, I'd like to thank you very much first for coming here to Maryville, Tennessee, to share your scientific and philosophical views with the Court. I hope that you enjoy your stay and that your trip back is enjoyable. I have only one final question for you. Okay? What is this?
A.: Well, from here I suppose it's an egg, but I'm not sure.
Q.: Let me get a little closer.
A.: It looks like an egg.
Q.: It's an egg?
A.: It looks like.

MR. CLIFFORD: Thank you, Doctor, I thought you were going to tell me it was an early chicken.

THE WITNESS: Oh--

MR. CLIFFORD: I have no further questions.

THE WITNESS: Your Honor.

THE COURT: You may respond, if you wish.

THE WITNESS: Yes, I would respond to that because I have never pretended that I could see through a shell. I don't know if it's has been fertilized so I cannot know whether it's an early chicken.

BY MR. CLIFFORD:

Q.: All right. Let's talk about the difference for a moment. If I had in this hand a live chicken, would you agree with me if I were to take it and squeeze its head that it would feel pain?

A.: Oh, probably.
Q.: That it will be frightened?
A.: Yes.
Q.: And it would suffer psychological, if you can use that term with a chicken, stress?
A.: I'm not competent in psychology, you told me, and especially not about chickens.
Q.: But if I take this egg and assuming it is fertilized--I wouldn't really do this, Jay--but if I were to crush it in my hand, this egg would not feel pain, it would not be aware in the slightest of what was happening to it?
A.: Yeah. But it would be still a chicken and only a chicken.
Q.: I thought you told me it was an egg?
A.: You told me it was a chicken.

MR. CLIFFORD: No further questions.

(A brief discussion was held off the record.)

CROSS EXAMINATION

BY MR. TAYLOR:

Q.: Dr. Lejeune, I have just a very few questions. You testified earlier that in the case of freezing human embryos, the temperature is lowered only to, I think, a hundred and eighty or ninety degrees below centigrade, is that correct?
A.: Yes, generally.
Q.: And because that is not absolute zero there are still certain processes that continue within those embryos?
A.: Very slowly.
Q.: And because of that, it is your opinion that life or the processes are not suspended completely, and therefore the embryo continues to age or develop, is that right?
A.: No, it does not continue to develop, but it can age in the sense of losing some properties because of the agitation of the molecule and not being able to repair it. It's the reason why if you freeze cells, ordinary cells in tissue culture, and if you thaw them, after one month you will get ninety percent groove, after ten years you will get fifty percent, so eventually some of them have died in the process.
Q.: Is it then your opinion if these embryos are left in this frozen condition indefinitely, ultimately they will perish?
A.: If they were to be protected for a long time, I would put them in liquid hydrogen, but it will cost very much.
Q.: If they're in liquid nitrogen which is not absolute zero, is it your opinion that they would ultimately perish?
A.: I cannot tell time but ultimately.
Q.: Is it your opinion that the ultimate effect of storage in cryopreservation ultimately would have the same effect as destroying them now?
A.: In the ultimate, yes, but I dislike to speak about very long time because I'm not sure of what would happen in between.
Q.: Yes, sir. You indicated that you do not object to in vitro fertilization as a process, do

you?
A.: I do not favor it for theoretical reasons. I guess it's a trick we use now in the present stage of knowledge, but it's not the best answer. If you read the newspaper it seems to be the last word about helping reproduction, and I guess it's a wrong idea. But that is a technical opinion.
Q.: Even though it may not be the ultimate solution, the ideal solution, you would concede that many, many infertile couples have been helped by in vitro fertilization, would you not?
A.: I would consider some have been helped, but the number that have been helped by other methods is much greater. But some have been helped, no doubt.
Q.: Doctor, you indicated that one of the reasons you objected to cryopreservation was because there is a mortality rate, certain percentage of the embryo do not survive the process, is that correct?
A.: It's not only that. That is one of the reasons, but it's not the only reason.
Q.: Are you aware, Doctor, in a normal cycle, a natural reproductive cycle that as many as sixty percent of the ova produced by a mother undergo actual fertilization? Are you familiar with that particular statistic?
A.: No, I don't understand what you mean.
Q.: We have been told that as many as sixty percent of the eggs produced by a mother may be actually fertilized, but statistically only about twentyfive actually result in a birth.
A.: You mean about the early death of early human beings. Well, it has been a very disputed field. To the best of our knowledge, we can rely on experimental animals because we can look at the number of yellow corpus which develops on the ovary and tells us how many eggs have been laid and look at the litter, for example, in mice or any other animals. It seems that thirty percent of the conceptus die, but that more than sixty percent of conceptus come to birth and to normal--that has been established in many wild animals. Then it seems that the number of early deaths has been overestimated recently in our species. I would guess it around the order of thirty percent. Some of them said sixty percent; I would guess myself it's around closer to thirty than to sixty, but that is--
Q.: You do recognize--
A.: A sizable number.
Q.: You do recognize, do you not, though, Doctor, that when a man and woman attempt to have a child by normal sexual intercourse, there is a percent of embryo human beings, in your terminology, that are created that never result in a birth; that is a risk they undergo?
A.: It's difficult to answer your question because some of those fertilizations are probably abnormal fertilizations that can be early cysts and what we call empty cysts which are probably not really true fertilizations. It is very complex, but I agree with you that the road of life is dangerous, even at the very beginning.
Q.: I guess my question is, Doctor, then even in natural intercourse trying to achieve a pregnancy, there are going to be some risks that some of the embryo will not survive just like in vitro fertilization?
A.: Yeah.
Q.: Finally, Doctor, as I understand your testimony here today, if you were advising his Honor on a solution to this very troublesome problem, your first preference would be that the embryo be returned to the mother, Mrs. Davis, in this case, is that correct?

A.: I would go step by step, if you ask me. May I, your Honor?
THE COURT: Yes, you may.
THE WITNESS: I would first say it's not a property so they must not be destroyed. Secondly, they have been put into suspended time in the hope that some day they will be given shelter by their own mother, and their mother offers them shelter. I don't see any reason not to grant it to them and to her.
BY MR. TAYLOR:
Q.: Let me take that one step further: If his Honor should decide for some reason that it is not appropriate that Mrs. Davis, the mother, should have these embryo, would you then agree that the second preference, the second best solution would be to donate them to some other couple, some other mother who would bring them into being, or attempt to bring them into being?

The Wisdom of Solomon

A.: I would agree with that because that would preserve the life of the embryos, but then if you agree with that, you are coming back to the Solomon decision. The true mother is the one who prefer the baby given to another than the baby being killed. Then I would suppose that the justice would be on the side of Solomon.

MR. TAYLOR: We all hope his Honor has the wisdom of Solomon. Thank you, Doctor.

THE COURT: Do you have anything?

MR. CHRISTENBERRY: No, thank you, your Honor.

THE COURT: Any recross?

MR. CLIFFORD: No, your Honor.

THE COURT: Dr. Lejeune, you may come down and have a seat over here with Mr. Palmer and Mr. Christenberry.
(The witness was excused.)

Editor's note: Judge Young's ruling, giving Mary Sue Davis Stowe sole custory, was appealled by Junior Davis when Stowe sought to donate the embryos to other childless couples for implantation. The Tennessee Court of Appeals in Knoxville awarded Junior Davis joint custody of the embryos. Since Junior Davis has said that he would rather see the embryos destroyed than brought to term by another couple, the new ruling effectively gives him the authority to ensure that the embryos remain in a forzen state until they perish.