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ON MARRIAGE AND FAMILY

LECTURE ONE:
"THE ORIGIN OF MAN"

PA: Our speaker this evening, I think, is known to most of you. He has devoted his adult life to broadening the horizon of scientific knowledge, and he has done so always at the service of the human person. For his identification of the genetic cause of Down's Syndrome, Dr. Lejeune was awarded both the Kennedy Prize and the William Allan Memorial Medal for the highest international award for discoveries in genetics. In his address to the American Society of Human Genetics on the occasion of his receipt of the Allen medal and remains until today as an extraordinary testimony to his commitment to the ethical vision and ethical obligations of the scientist. Those of us who have been active in the pro-life movement, and I see a number of you here this evening, remember still Dr. Lejeune's remarkable testimony in 1981 before the Senate Judiciary Committee hearings on the beginnings of human life. I know that many of us have read and reread his testimony in the Tennessee Frozen Embryo case, which has recently been published by Ignatius Press. There is so much that could be said about Professor Lejeune. His work on behalf of children with Down's

Syndrome at the Sick Children's Hospital of Paris and at his L'Institute de Progenese, his research and teaching on the faculty of medicine of Paris and his approximately 400 scholarly publications, his membership in eight national academies of science, including the Pontifical Academy of Science, there is so much that could be said about this remarkable man that we are honored, privileged to have him here with us here this week, and without further encrochen on his time, I am honored to introduce to you Professor Jerome Lejeune.

JL: Merci beaucoup. During this talk, I am supposed to discuss with you first this evening the origin of man. It is a very complex topic, and I decided to use what Mr. Merit was telling to his students at the beginning of his talk about physiology, and he said that "All my stories are true, but some of them are truer than others." That's what really what we can tell about the origin of man. All those stories are supposed to be true, but probably some of them are partially true. To begin with, I would remember you of the very nice description of the theory of evolution by a great Danish poet, Hans Christian Andersen. He wrote a very charming novel that is called *The Nightingale* of the emperor that's in China, and it begins that way. In China, the emperor is Chinese, and all the people around him are also Chinese. Then he continued to the talk, but a storyteller of

the Darwinian obedients would continue telling us that the Chinese with the time will become more Chinese because they will adapt themselves to China. And on the reverse, Americans will become more American because they will adapt to America. And after awhile, Chinese will be that much Chinese and American will be that much American that no cross would be any longer possible between a Chinese and an American girl, an American man a Chinese girl. That way, supposedly, species are coming by the narrow Darwinian principle. While, admittedly, no professor of genetics is teaching the story of the nightingale of the emperor of China, but still it's what is written in the books. We are not obliged to tell that Chinese will not cross with Americans because we know they can and they do. But because it cannot speak and cannot say to the contrary, it is taught about the seagulls. Mr. Meyer, who is a great evolutionist, especially in this country, has studied the seagulls around the North Pole. Seagulls are different in Asia and in America, and they meet together in Northern Europe, and they don't crisscross. They don't make eggs together. Mr. Meyer considered that it was a very good example that adaptation to Asiatic north of Siberia and adaptation to American north of Canada was so great that finally the two species were emerging by separation of the genus models. Well, that's written in every textbook of genetics. But around 15 years ago, a very keen experimenter, Mr. Smith,

had the idea to look about the matter, and because the Asiatic seagull do not mate with American seagull, he was wondering how they could recognize that they were Asiatic or American. He discovered that it was because of the color of the rim of the eye, which was different in the two varieties that they could recognize each other. Then he took a female from Asia, and with a very nice makeup around the rim of the eye, he painted her in the American way, and he took an American seagull boy and painted in the Asiatic way. So then by double mistake, the two relatives were supposedly recognizing each other, and they got very nice little seagulls. That was an exceedingly interesting experiment because for the first time they had the proof that ? is an animal fault which is present in animals. Unfortunately, a careful makeup is not sufficient all the times to suppress it. If we are left now with the experiment, we are in a very difficult situation to try to understand what can be the basis of variation from one species to another one. From all that we know, the mutations occur at random, and what we mean "at random" it means that it's not a special flavor, a special tendency of the surrounding milieu which will change a gene but it will be a sudden shift in the formula of the DNA which cannot be foreseen, which cannot be directed, so that any mutation is fortuitous. The second phenomenon we know that selection is playing a big role in the science that if that new mutation is

no good the new mutant will disappear because it cannot survive or will not have a great progeny just because of the selective mating system it will be the loser. And finally, we are supposed to believe that mutation by random chance and selection would explain evolution, would explain the origin of the species, but it is exceedingly interesting because we have to swallow that chance and necessity can explain everything in nature. That reminds you probably of an old aperee, an old saying, of Democritus, who was saying that everything in nature is a fruit of chance and necessity. And with the knowledge which was available in his time, Jacques Monod, who was the last of the Darwinians of strict obedience, was proposing that really all of the history of life could be summarized by chance and necessity has the two factors at work and he called his book *Le Hasard et la Necessite* and it was translated in English *Chance and Necessity.* He had to come that far to pretend that blind chance playing with matter and selecting matter by necessity was even able to invent this closed-circuit television that we have in our head which is the eye. It is difficult to believe that. But before trying to find how we can think about the real origin of man, I would like to study with you one evolution of species which we know entirely, in which we know every step and every mechanist. This has happened partly in this country and started partly in Europe, but it has been very much continued in the

little town of the United States called Detroit. In that little town, they were manufacturing automobiles, and if you look at all the records, you will really find the whole history of this particular mode of locomotion. It is particularly interesting for the geneticist because a factory looks very much like a reproduction organ. A modern factory is made with very complex systems. They have special machines doing special tools. We know that in a cell there are some protocols written on long tape bands on big computers. We know that in life that the DNA coiled inside the chromosomes, and even we know how the models have succeeded one after the other. Few persons here remember possibly the horse-drawn carriage. This place is not that old, and I would take it at the moment that the old mare was replaced by the horsepower. Then it became soon automobile. And to try to throw some light on the argument, I would study with you the history of the lanterns. This is a little project to us. Well, at the beginning, just at the moment that the horse became horsepower, the lanterns were on the side of the machine, and progressively they went up to become the headlights. At that moment, they were submitted through a sudden mutation from acetylene to electric system. And curiously, in different species of cars, this change occurred at different times. But finally, in the long run, all the acetylene was replaced by electric light. But if you regard the morphology, it becomes

exceedingly biological because at the beginning they were lateral then they become in front. And on some species, they stayed there for more than 40 years, and they were extremely well set there. It was a very successful model. I speak about Rolls Royce and about Mercedes. But there were already mutations, and some system, because of the aerodynamic laws, selection provoked that the projector were putting themselves, hiding themselves inside the fenders between the motor and the fenders. They are covered by the radiator. There were three models, and there was competition between them, but finally a compound of those three makes was happening so that now the headlights are mixed with the fender and with the bumper in what we called a model with just a little shift of physiognomy is present in every care and we call it autosapiens. The interesting phenomenon about this emergency of autosapiens that we can explain it in two words. One is to tell we know everything. All those tiny change were made all by chance but they were selected by the law of the market. If a model was hot selling, they were increasing the factory, the stock goes up in the stock exchange, and the shareholder were very glad so that the model was produced in enormous number. Think about the millions of Volkswagens for example. Then we have the whole story of the evolution of the cars -- change randomly and selection by the market. It is extremely keen to the

explanation of the Darwinist and it is remarkable because it can be demonstrated to be correct. But in order to demonstrate that, I have to introduce to you a very interesting person which I would call a Darwinian bookkeeper. In Detroit, there was the Darwinian bookkeeper and reading about the whole story of automotive evolution, he decided "I know everything." Novelty and market; that's the whole story." Then he went to the director of the biggest factory and he told him, "Well, now we know what is the story of the evolution of the cars. You have to disband all those ingenious drawing boards and all that stuff which cost a lot and which is not interesting because just you have to change at random some tiny pieces of the car. You put it in the market, and if it is agreeable to the customers, then you will make a fortune. If not, you junk it. That's it." To convince Mr. Ford, he told him that he had a good friend who was professor of genetics somewhere and who told him that the game that nature had played, and he said then, "Look, from amoeba to the tetrapods, nature has played that game, and look here we are. So you will, in a very rapid future, build a dream car, and you will take all the market." I told you that all my stories are true, but I am not entirely sure that it happened that way because I suppose that even a banker would not incur on such a fancy system that to feed the money and to be rewarded is by chance some novelty has some interest because I suppose that

some bankers do have on their desk an electronic computer, and if they are experimentalists, they can open it and change blindly two connections inside the heart of the machine. Now, they will very rapidly discover that their blind shift, which is a novelty, which is a mutation, probably does not increase the performance of their computer but probably would spoil the machine definitely. And it would be exceedingly rare that by a random chance they will get a new network that had escaped the sagacity of the electronic engineers. Then our very naïve Darwinian bookkeeper was really making the demonstration that looking at the entry, which is thenew model, and the output which is the selling system, he was telling the whole story but he had just forget about the engineers. Then the question we have to ask ourselves is whether there was somewhere an engineer. Now, I would like just to remember you of a very interesting piece of reflection by Mr. Darwin. It is written on his own autobiography. He had never heard about the history of cars unfortunately, but he wrote "After the age of 30 or beyond it, poetry of many kinds gave me great pleasure, and even as a schoolboy, I took intense delight in Shakespeare, especially in the historical plays. I have also said that formerly pictures gave me considerable and music very great delight. But now for many years I cannot endure to read a line of poetry. I have tried lately to read Shakespeare and found it so interminably

dull that it nauseated me. I have also lost almost any taste for pictures or music. My mind seems to have become a kind of machine for grinding general laws out of a large collection of facts, but why this should have caused the atrophy of that part of the brain alone on which the higher taste depends, I cannot conceive. The loss of those tastes is the loss of happiness and may possibly be injurious to the intellect and more probably to the moral character by enfeebling the emotional part of our nature." I think any student in biology should agree those words, written by Darwin himself, telling how just grinding fact in order to make a general theory is really splitting your own brain and having the best part of it just unused and getting atrophied. When I read again those words of Darwin, I consider he was really a very good biologist and a very precise neurologist, even I would say autopsychologist. Well, what we need is not to make the bookkeeper count, which is correct but which does not explain anything. What we need is to try to know whether we can discover where is the engineer in life. Life is extraordinarily ingenious, and if you want to get convinced of that, you just have to go and find an egg of a frog, bring it home and put it in a bowl of water. A little tadpole would come out very soon. A tadpole is a very intriguing animal. It's a fish. It's a fish by the gene. It's a fish by the conduct of the aorta and the conduct of the veins around the neck. It has

even a sensitive line on the side of the body so that by any taxonomic system he is a fish, and if we do not know that he has come from the egg of a frog, he would be classified forever as a fish. But look at him; after 15 days, he will begin to develop legs. He will invent lungs, and it will progressively, in the space of 10 days, climb up the scale of the animals a few millions of years in 10 days. Because we are said by the theory that one day a fish was increasing the power of his fins and progressively he hauled himself out of the sea and he was the origin of all the tetrapods. It's a story that you have to learn to get your exam now in most of the universities of the world. But not in nature because the tadpole does become immediately by himself a tetrapod from a fish, not in millions of years but in 10 days. Now, how does he do that? First, he read all the blueprints who are inside his genetic makeup, and he reads in it how to build a fish, the easiest way to read it. But after he had become a fish, there is a little trigger where thyroid is involved in which tells him to reread the whole thing and to see how to build a tetrapod. Then we have under our eyes that metamorphosis by itself is the demonstration that there is no reason of why the very small changes postulated by Darwinist should have been the matter of the evolution. And we know that now very precisely. Because the blueprints I was talking about in the factory of cars which was in the safe of the director is

also in our cells, which is the nucleus of ourself. From the blueprint, we take a copy, a photocopy so to speak; we call it RNA. We send it inside the cytoplast, and the cytoplast, it will manufacture special message tool which will manufacture what is needed by the cell and tell to the cells how to divide, how to construct an individual. But this, those blueprints, which are similar to a film so to speak or to a band that we have in a magnetiform, are not floating randomly inside the nucleus like noodles in a bowl of soup. They are, in fact, very tightly coiled to make what we call a chromosome, which, rudely speaking is the equivalent of a mini-cassette for listening to a symphony. That is it is the coiling that makes the possibility of handling the thing. Otherwise, if you had only the band it will make knots and be very difficult to use it. Studying the chromosomes is very relevant to the study of evolution because we suddenly discover that each and every species has its own carrier type. That is, the language of nature is universal -- not entirely because there are some intonations -- you can recognize people coming from Dutch country or from another country, as you can suppose that I am not born in Boston, but nevertheless, the language is roughly the same. But the way the words are put together in strings, which we call the chromosomes, is very typical of each species. That's so simple that in my lab when we have the examination of cytogenetics I

give pictures of orangutan, gorilla, man, chimpanzee, anything, and if the student is not able to tell me this one is a gorilla or this one is a man, he would fail the exam. It's just as simple as that because, in fact, the chromosomes are coiled in little roads and those roads are the equivalent of the table of the law of life. We have a given number in a given species. We receive half from mother, half from father, but each and every member of our species, if no mistakes arise, has 46 chromosomes, 23 from dad and 23 from mom. For a long time, human genetics was in a very difficult position because we discovered rapidly that the gorilla had 48 chromosomes, two more than human being. Then chimpanzee also has 48. Orangutan also has 48. And for maybe 10 years, it was a kind of topic that was too much talked about because the king of the creation having two chromosomes less than big chimp, it was not very palatable. Well, the discovery was finally that it is a matter of style. There is a piece of chromosome which is cut in two parts in all the three primates which are united in one chromosome in man, and then we have not less chromosomes than they have, we have not less genetic material, but we have written it in a different way. If we look about the similarities and the differences between those four species -- orangutan, gorilla, humans and chimpanzee -- we will find that they differ from each other by their chromosomes. They are equidistant to each other so that they are very far

from each other. We cannot say that the orangutan is coming out from a gorilla or that the chimpanzee is coming out from a man. What we have to recognize is that each species has taken a particular style that we see in the chromosome so that each species is using the words of life to make a very special poem that we call a man or a chimpanzee. This explains certainly why species do exist because there is no reason in the Darwinian theory that species should exist. Because if it is small changes by point mutation which makes the difference, then the continuum would not stop from the amoeba to the elephant or from the mouse to the elephant, and there would still be the possibility of having some gene going from one to the other, and that does not occur in nature. Then we have to realize by the very simple example of the horse and the donkey that it is not the small mutation that makes the difference between horse and donkey because the mule is possibly a better animal than a horse and a donkey. It's very safe; it's very resistant. It is an extraordinary equilibrium. But it is sterile. Then the reason why we cannot have genes from the donkey going inside the horse, because if the mule was not sterile, there would be no donkey and horses. There would be donkhorse. And if there are two species, it is just because the hybrid cannot be the origin of a new species. And this is true all the way in all the higher living systems -- that they are defined by the style they use to

spell their own patrimony, and what makes a barrier between two species is not the color of the rim of the eye that we were talking about with seagulls, but it is the shape of the chromosome so that the pairing of them would not be correct among the hybrids. That's a long story which is very easy to show on a blackboard, but a little boring, so you have to believe me it's in every textbook; it's not one of my story. The hybrid sterility is the touchstone of the difference between two species. Now, if it is like that, we have to understand why. If the donkey chromosome is a big one for a given system and the horse chromosome is two separate little bodies, like I said about the orangutan compared to man for example, then in the hybrid you would have the big chromosome and two tiny ones carrying the same type of information. Now, at the moment of producing reproductive cells, normally the two chromosomes from dad and mom come together and then they separate and progressively the two cells will contain only half of the chromosomes, but exactly the half of the real number. Now, if the two chromosomes -- if there are three of them instead of two to contain this special information, three cannot be divided by two, so some of the cells would receive less and some of the cells would receive more of the chromosome then the hybrid would be sterile and what happens is a mule and all the hybrids later on. Now, the interest is we know that species are different by

their chromosomes. We know that one change in the chromosome if occurring in a hybrid that is the old model, the new model together it impair enormously the fertility. Then any chromosomal change makes a bottleneck which is extremely difficult to go through and it makes a barrier between the species. Then how species have occurred, have changed? Because we know by those enormous centuries which are the geological strata that the form of life have succeeded one another. How is that possible if we have demonstrated that any change should be rejected by natural selection? Well, it is obvious that there is a trick, and the trick could be very simple. If the novelty is present together in the first carrier with the old model, there is a big reduction of fertility; it does not work. But let's suppose we invent a trick so that the novelty becomes now represented as two exemplars so that those two can fit together. Then we have suddenly jumped over the barrier and we have built a new species because they will become fertile immediately, just with themselves but not with the species of origin. This speciation by the first step, by one-step speciation, can be demonstrated to be the only solution to the mechanics of chromosomes. That's not fancy. It's just a very simple demonstration. Then to overcome the difficulty you have to use for at least for one generation a very strict consanguinity so that you have some chance of obtaining at least one novelty and

a double exemplar. And we know that every new species which has been produced artificially -- not in animals; no one has been making animals, but in plants -- have been made by that trick, by an extraordinarily close consanguinity. The best would be that to have one individual carrying a novelty on an equilibriated state and to take out of it the other sex. That seems very complex to do, but there are very rare mistakes occurring in our species which contain that. Around 20 years ago, we discovered in Paris a young lady who was a twin. Her brother was a healthy male and she was an incompletely developed female. She had no ovaries and she was suffering what is called the Turner Syndrome. The reason why was at the beginning they were identical twins. At the beginning, there was one egg. It was carrying one x and one y, which are the chromosomes of masculinity. When it split in two, one of the blastomeres kept x and y and continued its destiny as a male, but the other by a mistake did not receive the y, so she had only one x chromosome, and it produced an imperfect feminine constitution in our species. What was very moving when we first understood what was the mechanics of this difference between those two real twins, and we could demonstrate that we could graft the skin from one to the other so they were really identical twins, and there are now 15 cases of that type known around the world, this young girl was 17 years old at the moment she was examined, and she

was suffering from a very curious psychological symptom. She was saying that she did not want to look at herself in the mirror because she was afraid that she was looking at her brother. Psychoanalysts were making some delirium about it to try to explain it, but this was a very typically feminine insight and feeling that she was really a piece taken out of her own brother. She was really a female taken out of the male. Then this story of the couple made with the same genetic makeup and the female being taken out of the male during the embryonic sleep, is a phenomenon which is recurring in our species. It is very rare. It comes maybe once in every ten millions of births, but it is still existing. That is of a great interest because if the egg of this young lady and this young man had been remolded for other chromosomes they would have been eventually the beginning of a new species. For example, in mouse, the female mouse who has not received the y chromosome is perfectly fertile, and in mouse with that manipulation, you could really play Adam and Eve very easily to build a new species of mice. That is to say, that we know how more or a less how a jump over the species barrier could occur in complex living systems like us. But I know that unfortunately the story of Adam and Eve has been published few thousand years ago so that although it is totally revolutionary as an hypothesis in genetics, it's not received like that because it makes some mixed feelings about

remembrance that they have heard something about a story looking like that. Science is very reluctant to recognize truth that is already established. Science prefer to propose new truth even if they are not totally true. The second phenomenon we have learned those years is that the time is written inside the chromosomes. That the order in which the genes are put one after the other in the same chapter is in some case the same order of the use of one then the other in the embryonic development. That is very evident for hemoglobins and different hemoglobins which are not the same during the embryonic life, during the fetal life, and we know now that, in fact, this comment of the time at which a gene should be used in the history of the individual is written inside the long message. But now look, if two little portions have to be under the comment of a common event, the easiest way would be to have them close together geometrically inside the nucleus for that one molecule would have them fixed together and react at the moment that another molecule is coming in. That is what is happening in the chromosomal rearrangement that we know now, for example, in cancer, when we see that chromosomes have been reshifted, reshuffled by neoplastic process it is not random but what is reshuffled is this part which is by physiology close to the other one but can separate, and in cancer, they hook together and stay there so that the cell cannot regulate any longer,

everything is put at present instead of being in the future. But on the contrary, if there is a geometry which define the time, then you understand why remolding the chromosome is, in fact, putting the discovery of life and projecting them in the future, which explains why the progression of the species is so obvious during the times. Nevertheless, man is a curious phenomenon. First, it talks, and you can to some extent believe what he says, but he has an extraordinary peculiarity. Man is the only living on this Earth which feel some connivance between himself and the universe. Admiration is the typical virtue of man. Only man can admire. We have never seen a dog enjoying the fragrance of a rose because it does not eat roses. We have never seen a chimpanzee looking at the starry sky. We have never seen a man not being impressed by the splendor of the night or by the color of the sundown. Where is it coming from, this extraordinary resonance between the outside nature and the fact that we are human being? A very curious phenomenon, this one who was appearing maybe 40,000 years ago, maybe 100,000 years ago, no more than that, a very recent newcomer who first invented art, who first discovered that we will die and was building tombs, who was able to help the disabled, and we know the fossils that some have survived who would have been really entirely at the care of their families. This one had some spark of intelligent love, and that is what possibly makes the

admiration possible in man, which is really the human virtue. Now, I was explaining that one day and discussing that when a scholar who was a cleric asked me, "Well, that's interesting, what you pretend, but let's suppose that you have obtained by the strength of taking the female out of the male that you obtained your first couple, without fur, without claw, without fangs, and how would you protect the couple from the first predator?" "Well," I said, "with your permission, I would build a very kind little garden reserve in which I would have something growing very easily," and he said, "Yes, why not, but you will have to take very precise care that they are not getting some food that could disassemble their spirit." I was very much thinking about that. I did not answer him because we do not know yet the answer, but we know part of it. We know that what makes the original flaw in our nature is a phenomenon that everyone knows. That the heart and the reason in our nature cannot speak to each other easily. Mr. Darwin was describing it very well when he said "grinding theories, I lost the love for poetry." If heart and reason have difficulty to live in good intelligence -- all the philosopher are telling that -- then maybe it was because at the beginning there was some harmony between the heart and the reason which got destroyed by a kind of LSD trip or something of that kind which suddenly destroyed the very fine structure in the brain together

with the very fine structure in the chromosome which was producing this harmony. And maybe that's the reason why we have not lost entirely the faculty of admiration, but it is possibly the reason also why the little instance during which we really admire are so small and then so precious. There was a little part I was not talking about which is purely anatomical. My contradictor told me but "What did you do about the little flat bones somewhere?" And I just said, "Oh, it's a very curious phenomenon. It has no importance in evolution. Just we know that gorillas and chimpanzees have certain ribs and we have only twelve, but it's just a little phenomenon of anatomy." Can we never really be able to understand nature at the same time with our heart and with our reason? As you see, it is very rare, and as you see that is the human condition. But I know one case in which it has happened. It has happened once in science. Once a delegation of astronomers came to visit a very potent king. It was in the Middle East. They had seen, they had observed in the sky some symptoms that they had analyzed as being the sign of the Good News, and looking at the phenomenon, they had discovered that they should go to Jerusalem, but they did not know exactly where to look for. But the king summoned all of the scientists of that time, and to forget nothing, all the Meserites who came with their books. Nobody was really understanding what those three astronomers were talking about,

the birth of a little king, but you know a good news for the people is not very often the good news for the establishment, so they were a little afraid. And to let no stone unturned, they decided to look in the book, and one of the Meserites told them that there was a little town called Bethlehem, which means the house of the bright, in which maybe this little king will be born. I was not there, but I have heard about the story, and I suppose that Herod and all his court did not go out to see about the phenomenon, and I suppose the Meserite were still with their nose in their book and not looking about the sky, and they were right doing so because they would not have seen anything. You need to be an astronomer to see slow movements in the heavens, but by fitting both, I mean the scientist and the religious man, to their own way of knowing -- one is by reason, which is science, the other is by heart, which is revelation. And they were honestly saying what each of them were knowing so that both of them to make the real discovery, the discovery of the woman conceived as a perfection who had given birth to the new Adam, they finally met the virgin had a child. That's the only case in which we know that science and religion were cooperating usefully, but unfortunately, the political power was not convinced either by science nor by revelation, and the political power did at that time exactly what they do today. They decided the massacre of the innocents. There is nothing new about this

evolution, only we begin to feel that if we were listening honestly both to the last development of science and to the everlasting truth, we would be in a better shape than today.