Belgian Advisory Committee on Bioethics

Opinion No. 10 of June 14th 1999 concerning reproductive human cloning

The President of the Senate, and through him ten members of his Assembly, the President of the Chamber of Representatives, the Minister for Science Policy and the President of the Council of the French Community asked the Advisory Committee on Bioethics to submit an opinion on the ethical and legal implications of the cloning technique used to create the ewe "Dolly". This technique is called "cloning by somatic nuclear transfer". Some of these requests included a desire for the cloning of vegetables and animals to be considered as well as that of humans. Whilst the Committee examined the different cloning techniques and their current applications in research and veterinary medicine, it did however limit itself to considering human cloning and particularly reproductive human cloning, i.e. the question of transposing to humans the experiment that led to the birth of Dolly.

CONTENT OF THE OPINION

PRESENTATION OF THE OPINION

In the first Chapter, the Committee recalled the main discoveries that had led to the development of the cloning technique by somatic nuclear transfer through which Dolly was born. It considered the technical developments that followed the birth of Dolly, especially the implications for the development of embryonic stem cells, together with the questions that had remained in abeyance concerning the long-term health of animals born through cloning.

In Chapter II, the Committee analysed the question of cloning from the legal point of view.

In Chapter III, the Committee considered the ethical arguments concerning the possible application of this technique to human reproduction. It began by defining the scope of the deliberations. Bearing in mind the significant opinions expressed on the subject of human cloning since the birth of Dolly, the Committee first of all looked at its own role in the debate on reproductive human cloning and on the form that its opinion should take.

The Committee observed that at the moment many uncertainties remain on the medical, psychological and social consequences of applying cloning by somatic nuclear transfer to human reproduction (point 3.2). As a result, the Committee unanimously considered that ***as things stand at present and regardless of any other consideration, it is out of the question for these techniques to be applied to human cloning.***

As regards the different views expressed concerning reproductive human cloning, the Committee observed that there are some interesting methodological differences. This diversity can be seen in particular when comparing the opinion of the French *Comité Consultatif National d'Ethique* (CCNE) with the report by the American *National Bioethics Advisory Commission* (NBAC).

The members of the Committee agree that a broad debate (going beyond the domain of experts and public representatives) has to be held on the issue. They consider that this opinion is therefore only the first stage in a process that they would like to see continued. In effect, it is observed that reproductive human cloning has not yet been the subject of any real public debate in our country. Neither the mass media nor decision-makers have laid down the groundwork to allow such a debate to take place. The Committee regards it as its duty to promote the development of this pluralist debate allowing both sides to be heard, based on scientific and technological data but also on the ethical, social and legal dimensions.

Consequently, the report outlines the ethical arguments most often used in the different positions adopted on the subject of this technique. The points of view expressed within the Committee concerning these arguments are then set out under points 3.4.2., 3.4.3. and 3.4.4.

As a conclusion to this analysis **(Chapter IV)**, a consensus emerged on two points.

1. Given the scientific, technical and ethical uncertainties surrounding the technique of reproductive human cloning, a clear prohibition of any attempt in the relatively short term at carrying out cloning of this kind is to be recommended.

2. If ever a human clone was to be born - albeit as a result of an illegal act - it should be regarded as a complete human being. None of the arguments put forward could be used to call into question its dignity as a human being.

As regards the ethical evaluation of cloning considered as such in absolute terms, **three positions** emerged within the Committee. They are indicated below by the letters **A, B and C**.

Those supporting **position A** consider that the proposed prohibition must constitute a ***moratorium to be reassessed after a clearly determined period of time.*** It would thus be possible to avoid running totally unacceptable risks, from the point of view of medical safety first and foremost, whilst opening up the possibility of establishing the conditions for a democratic reflection or debate on the issue and of continuing with scientific and technical research. This transitional prohibition period would lead to an informed and lucid position being adopted among the population as a whole. This final position could be extension of the moratorium, a definitive prohibition of reproductive human cloning or acceptance of the technique on specific conditions, which would obviously imply the establishment of a suitable monitoring system to control developments.

The members supporting **position B** consider that with the current state of knowledge, representations and social relations and in view of:
- the problems raised concerning the construction of the identity of the clone;
- the disruption of the relationship between genetic identity and phenotypic identity, particularly through the outward identity introduced by reproductive human cloning;
- the intergenerational relationship problems to which this technique could give rise;
- the problems of social perception of the clone and, conversely, self-perception of the clone;
- the instrumentalization logic contained in the hypotheses in which the use of this technique is envisaged;

it would be wiser to ***prohibit cloning by legislative means.***

For the members of group B, this prohibition by legislative means would have a legal scope aimed at clearly penalizing the use of this technique in the absence of unambiguous standards on the subject and a political scope consisting in calling upon the democratic authorities to state a position on the issue.

Other members of the Committee consider that they have enough arguments, irrespective of those put forward by the supporters of Positions A and B, to declare themselves in favour of the ***radical and definitive prohibition of human cloning***. Their point of view is set out as **position C**.
The supporters of position C consider that any application of reproductive human cloning would constitute a serious attack on the fundamental dynamic of human existence and would cut off the child from the symbolism carried in the body's data and, in particular, in the act of procreation itself. In so far as they also feel that the purpose of criminal law is to guarantee the fundamental and formative values of human existence and society, they consider that the use of this technique must be definitively prohibited and criminally penalized.

CHAPTER I. SCIENTIFIC AND TECHNICAL PRELIMINARIES: REPRODUCTIVE HUMAN CLONING TECHNIQUES

1.1. DEFINITIONS

Blastocyst. Stage of the embryo characterized by differentiated cells in an inner cell mass and an outer cell mass and the formation of a segmentation cavity. The cells in the inner cell mass will form the foetus and those in the outer cell mass will form the placenta and the foetal membranes. The blastocyst becomes embedded in the mucous membrane of the uterus during implantation.

Cumulus cells. Mass of cells surrounding the ovum in the follicle. During the follicular growth stage, these cells protect and nourish the ovum. On ovulation, they leave the ovary with the ovum.

EG cells (embryonic germ cells). Cells from cultures of primordial germ cells (precursors of the ova and spermatozoa, taken from foetuses). These cells give rise to stem cells with characteristics similar to those of ES cells.

ES cells (embryonic stem cells). Cells derived from the internal mass of the blastocyst. These cells are pluripotent and may differentiate to give rise to all the cell types in the adult.

Germ cells. Lines of gametes (ova and spermatozoa) in a living being.

Sertoli Cells. Cells of the seminiferous tubes in the testicle of the mammal. They play a nutritive role for spermatozoa and their precursors.

Somatic cells. All the organism's non-sexual cells.

Chimera. Individual composed of cells of different genetic origins, for example, through the fusion of two embryos from the same couple or different couples.

Cloning. Applied to an organism, cloning consists in producing an individual or a population of individuals having in the nucleus of their cells a set of genes identical to that of the organism from which the cloning operation was performed.
The production of whole genetically identical organisms is a common phenomenon in the vegetable kingdom. These collections of organisms are called "varieties" rather than clones. At present, the propagation of numerous important varieties of plants is done from pieces of a plant of the same variety. In the animal kingdom, this reproduction is only possible with a few species at a low level of evolution.
In vertebrates, the birth of identical twins is a form of natural cloning. Monozygotic twins are formed by the separation of the embryo into two halves at an early stage of development. These twins are identical because they come from the same zygote resulting from the fertilization of an oocyte by a spermatozoon; they are different from the parents.

Cellular cloning. Allows copies of somatic cells to be produced by cultivating them in the laboratory. The genetic baggage of the cells produced in this way is identical to that of the original cell. This technique is extremely useful for both research and medicine.

Molecular cloning. A technique that has become routine in molecular biology, consisting in cloning fragments of DNA, the molecular basis of heredity. The fragments of DNA are copied and amplified in a host organism, generally a bacterium, a yeast cell or a mammal's cell. This technique has allowed molecules of great therapeutic importance to be produced, such as the growth hormone, erythropoietin (for the treatment of anaemia associated with renal insufficiency) and tPA (to dissolve blood clots).

Clone. From the Greek ⌛🖱❄🖫 (klon): twig, and by extension young shoot, cutting, graft. In science (originally): group of cells formed by an animal or vegetable individual and all its descendants through asexual multiplication. At present, the word clone designates a genetically exact copy of a gene, molecule, cell, plant or animal.

Embryo. Result of the fertilization of an ovum by a spermatozoon. Although this term sometimes designates all the stages in the development of an animal from fertilization until birth, the use of the term for humans is generally limited to the first eight weeks of development. After that, it is preferable to talk of foetus; sometimes the term "pre-embryo" is used for the first fifteen days of development. In the appropriate environment, an embryo has the potential to develop into a complete organism and forms each of its parts. The first stage in the development of an embryo is the fertilized oocyte, the **zygote**. The zygote begins a series of cell divisions. During the first divisions, the overall size of the embryo hardly changes until a compact mass of cells called a **morula** is formed; the morula then develops an internal cavity to form the **blastocyst**; this blastocyst establishes itself in the mucous membrane of the uterus during **implantation**. The cells formed from the first divisions of the embryo are called **blastomeres**. Until a certain stage (8 in humans), these blastomeres are **totipotent**: they all have the capacity on their own to develop into a complete organism.

Fibroblast. Cell in a connective tissue found, for example, in the skin, the lungs and the kidneys.

Oviduct. The tube through which, in animals, the ovum or the oocyte leaves the ovary. In humans, the oviduct is called the Fallopian tube.

Polyspermia. Abnormal phenomenon in which several spermatozoa penetrate an ovum.

Asexual reproduction. Reproduction not involving any of the components of sexual reproduction. Asexual reproduction is the rule among bacteria and many single-celled organisms with a nucleus (protozoa and single-celled fungi). A good deal of multicellular organisms (plants and animals, for example) have alternating phases of asexual and sexual reproduction, thus taking advantage of the rapid growth in the population allowed by the former and the advantage of genetic variation permitted by the latter. Asexual reproduction among multicellular beings is ensured by one or more somatic cells which have the ability to divide in accordance with a programme of spatiotemporal differentiation which it seems can only be done by the zygote of species having exclusively sexual reproduction. This property is called totipotency.

Sexual reproduction. For biologists, this involves the fertilization of a female gamete by a male gamete, thus forming a zygote and then an embryo. In human beings, the nucleus of the haploid oocyte, containing 23 chromosomes, and the nucleus of the spermatozoon, which is also haploid, containing 23 chromosomes, merge to form a zygote whose nucleus is diploid and contains 46 chromosomes. During the formation of the gametes, a special process (meiosis with genetic recombination through "crossing-over") allows the one-off selection of half of the chromosomes (made up at random) of the maternal and paternal germ cells. Each embryo thus contains an independent and unique mixture of chromosomes from both parents.

Spermatogonia. Male primordial germ cells, diploid (with 46 chromosomes), present in the seminal tubules that will produce the haploid spermatozoa (with 23 chromosomes).

Totipotency; totipotent cells. The ability of (embryonic) cells to contribute to the development of all the parts and organs of an entire organism. Only the zygote and the initial embryonic cells are totipotent in vertebrates. On the other hand, all vegetable cells are totipotent.

Zona pellucida. Envelope surrounding the egg or embryo before implantation in mammals.

1.2. REPRODUCTIVE CLONING

The term "reproductive cloning" refers to the techniques allowing genetically identical individuals to be obtained. We distinguish between two types of reproductive cloning: cloning by separation of blastomeres and cloning by somatic nuclear transplantation.

1.2.1. Cloning by separation of blastomeres

The cells of an embryo produced by classic sexual reproduction, i.e. by the fusion of a spermatozoon with an ovum, are separated at the stage of "2 to 8 cells".
Each cell, called a blastomere at this early stage, is capable of producing a separate organism. These blastomeres, as we have said, are totipotent. The embryos and organisms produced in this way are identical to each other but are different from the parents that provided the gametes.
In sheep and cattle, it is possible to produce twins experimentally by splitting embryos at 5 to 6 days. The two semi-embryos, reimplanted in a suitable female, will each grow into a normal lamb or calf.

An experiment to separate blastomeres of human embryos was presented at the Congress of the American Fertility Society in October 1993. The researchers used polyspermic embryos at the "2-8 cells" stage (these were abnormally fertilized embryos that were incapable of developing to form a child). The blastomeres were separated, surrounded by an artificial *zona pellucida* and cultivated *in vitrio*. The blastomeres derived from the embryos at the "two cells" stage developed as far as the *morula* stage. The blastomeres from the embryos at the "four cells" stage did not go beyond the "16 cells" stage; the others did not divide at all due to an insufficient cytoplasm volume. Blastomeres from different embryos co-cultivated without a *zona pellucida* fused and could produce chimeras[1].

1.2.2. Cloning by somatic nuclear transplantation

1.2.2.1. Introduction

The nucleus of human somatic cells is diploid: it contains 23 maternal chromosomes and 23 paternal chromosomes. On the other hand, germ cells (oocyte or spermatozoon) are haploid, i.e. they contain only 23 chromosomes, of maternal or paternal origin. Cloning by somatic nuclear transplantation consists in replacing the haploid nucleus (the chromosomes) of an oocyte by the diploid nucleus of a differentiated somatic cell from a donor. In this type of cloning, there is only one "genetic parent"[2]: the donor of the nucleus. Before the birth of Dolly, only cloning by transfer of the somatic nucleus of embryonic cells at an early stage in development was successful. Few identical animals were obtained in this way, because the embryonic cells quickly lost their totipotency (i.e. their ability to direct the development of an entire animal).

The first experiments in the transfer of nuclei of somatic cells in the oocytes of vertebrates were successful on toads during the 60s. It had become possible by using this method to produce tadpoles and then adult toads, all genetically identical (Gurdon and Uehlinger, 1966, *Nature* 365: 463). Experiments of this kind carried out in mammals resulted in failure for a long time. It was not until 1986 that Willadsen managed to obtain lambs by merging enucleated ewe cells with isolated blastomeres at the 8-cell stage (Willadsen, 1986, *Nature*, 320: 63-65). Subsequently, a growing number of reports were published recording the birth of pigs, calves, lambs and rabbits following nuclear transfers. Improvements in different aspects of the nuclear transfer method allowed progress to be made in this technique. One of the most significant improvements was the insertion of the nucleus into the cytoplasm of the ovum by electrofusion, which resulted in activation of the egg in the same way as by a spermatozoon).

Significant differences were observed between species, however: in sheep and cattle, embryonic cells which had multiplied *in vitrio* for 4 weeks could be used as nuclei donors. In mice, on the other hand, it was not possible to go beyond the "8-cell" stage. Of the other parameters that seemed to influence the result of the nuclear transfer, the state of the cells providing the nucleus proved to be particularly important.

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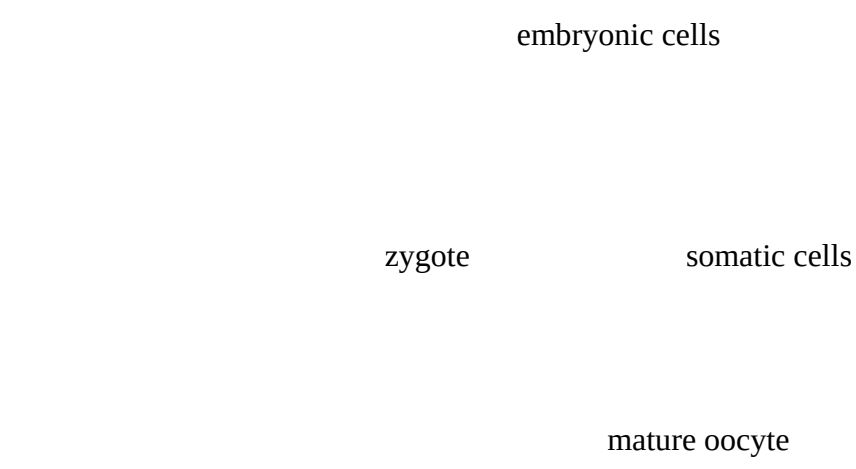
[1] HALL et al., *Experimental cloning of human polyploid embryos using an artificial zona pellucida. Abstract. The American Fertility Society conjointly with the Canadian Fertility and Andrology Society*. October 11-14, 1993.

[2] This concept is challenged by Erik Parens because it does not take account of the mitochondrial genome from the ovum (*Hastings Center Report on human cloning*).

Campbell and Wilmut therefore had the idea of keeping cells cultivated *in vitrio* in a state of nutritional deficiency before using them for nuclear transfer, which prevented them from dividing. This team thus recorded the birth in 1996 of 3 lambs obtained through the transfer of nuclei from relatively differentiated cells from the skin of a 26-day old foetus (fibroblasts) and a lamb (Dolly) by transferring a cell obtained by multiplication of adult mammary cells *in vitrio*.

Dolly was not obtained by asexual reproduction comparable, for instance, to the budding of a hydra. She was not produced by the development of a totipotent somatic cell but of an egg whose genetic material had been replaced by that of a somatic cell. Dolly is therefore the result of an embryonic development similar in every way to that of other lambs, although this development was not started by fertilization.

Nuclear transfer therefore consists in inverting the normal sexual reproduction cycle which starts with fertilization, followed by embryonic development, differentiation, production of gametes and fertilization of the following generation, as illustrated by the black arrows in the diagram below. Willadsen's experiments demonstrated that the embryonic cells, already involved in this cycle, could take up development at a later stage (cf. diagram: +++>). In the experiment that resulted in the birth of Dolly, the step backwards is much bigger since the somatic cells used have already accomplished most of their differentiation cycle (cf. diagram: - - - ->). This experiment showed that the genetic material of a differentiated somatic cell could be reprogrammed to enable it to direct the complete development of a new animal.



1.2.2.2. Comparison between the two reproductive cloning techniques

	Somatic nuclear transfer	Separation of blastomeres
Number of genetic parents	1	2
Resemblance to genetic parent	Strong	Slight
Number of animals	Infinite (in theory)	Limited

1.2.2.3. Reproductive cloning by somatic nuclear transfer after Dolly

The company Advanced Cell Technology (Worcester, Mass. USA) uses genetically modified foetal fibroblasts (foetal cells that are already relatively differentiated) as donors of nuclei for the cloning of cows and sheep. In this way, they hope to create animals producing human proteins of pharmaceutical value.
Recently, calves were successfully cloned by transferring nuclei of fibroblasts taken from 55-day old calf foetuses[3].
Ian Wilmut and his colleagues were the first to succeed in producing a live mammal, a *ewe* in this particular case, from the nucleus of a somatic cell taken from an adult animal. Since then, cloning by transfer of an adult somatic cell nucleus has been achieved in mice and cattle, with an improved success rate.

Mice
A Japanese team has succeeded in cloning a mouse by transferring adult cell nuclei. They tested the nuclei from cumulus cells, Sertoli cells and neurones. The 3 types of cells providing the nuclei are blocked naturally at the G0/G1 stage of the cell cycle. Positive results, with a success rate of 2-3% were obtained only with nuclei taken from cumulus cells. The embryos obtained by transfer of nuclei of Sertoli cells or neurones divided *in vitrio* and were implanted, but they stopped developing on day 8.5 after fertilization[4].

Cattle
Kato et al.[5] published the announcement of 8 calves obtained after cloning by transferring nuclei of oviduct and cumulus cells from an adult cow. To date, it is this team that has had the highest success rate: 18% of merged oocytes developed up to blastocyst stage; 8 calves were born after the transfer of 10 blastocysts, 4 of which survived.

[3] CIBELLI et al., in ***Science*** 280, 22 May 1998, 1256-1258
[4] WAKAYAMA et al., *Full-term development of mice from enucleated ovocytes injected with cumulus cell nuclei,* in ***Nature*** 394, 369-374, 1998.
[5] KATO et al., *Eight Calves Cloned from Somatic Cells of a Single Adult,* in ***Science*** 282, 1998, p.2095-2098

1.2.2.4. Experiments on primates

Monkeys
Rhesus monkeys have been cloned by transferring nuclei taken from blastomeres of embryos fertilized *in vitrio*[6].

Man
Landrum and Shettles[7] enucleated human oocytes by aspiration; they inserted spermatogonium nuclei into them and obtained an embryo that divided into two *in vitrio* up to the *morula* stage.
Recently, a Korean team reported an attempt at cloning by transplantation of the nucleus of a human somatic cell. The experiment was stopped at the "2-cell" stage.

1.2.2.5. Improvements in the technique leading to the birth of Dolly

Essentially, the cells providing nuclei are deprived of nutritional substances and are in a vegetative state (G0). This state increases the chances of successful fusion and reduces the risk of chromosomal aberrations.

1.2.2.6. Numerous questions remain concerning animals born through somatic nuclear transfer

Generally, it is striking to note a high level of perinatal mortality among these animals.
The ageing of these animals will have to be closely monitored. So far, Dolly has given birth twice normally. However, she is too young at the time of preparing this opinion (she was born in 1996) for it to be possible to determine whether she is ageing normally. The calves born by transfer of the nucleus of somatic cells are even younger. It will be necessary to follow the development of the greatest possible number of animals and several different species born as a result of these manipulations. The observation time must be long enough to judge whether there are sufficient technical guarantees before contemplating the application of cloning by somatic nuclear transfer to human reproduction.

1.3. ESTABLISHING LINES OF HUMAN ES AND EG CELLS

Human ES and EG cells have been propagated in cultures for several months. These cultures were obtained from the internal mass of the embryo (ES cells) or primordial germ cells (EG cells). The existence of stem cells of this type could prove to be extremely useful in medicine.

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[6] L. LENG et al., *Rhesus monkeys produced by nuclear transfer*, in ***Biol. Reprod.***, 57, 454-459, 1997
[7] B. LANDRUM AND SHETTLES, *Diploid nuclear replacement in mature human ova with cleavage* in ***Am. J. Obst. Gynecol.***

In fact, in theory at least, it will be possible to induce the differentiation of all types of adult cells from ES cells. These could be used for grafts[8].

[8] THOMPSON et al., *Embryonic Stem Cell Lines Derived from Human Blastocysts*, in ***Science***, 282 6 Nov. 1998, pp. 1145-1147, SHAMBLOTT et al., *Derivation of pluripotent stem cells from cultured human primordial germ cells. Proc. Natl. Acad. Sci. USA*, 10 November 1998, p. 13726-31.

CHAPTER II. LEGAL ASPECTS

The day after the birth of Dolly, and therefore in the midst of all the excitement that followed and that has already been described, some people suddenly realized that it would be advisable legally to prohibit cloning with a view to human reproduction.

It would be a good idea to begin by observing that this particular technique is already prohibited and obviously remains so under certain laws - albeit few in number - which generally ban any medically assisted procreation or just some forms of it, which could include cloning. The latter could also be implicitly prohibited by legislation containing a prohibition of any manipulation of embryos or any research on gametes or embryos.

Nevertheless, without worrying about the more or less directly and certainly prohibitive effect of State laws that already exist, some international institutions have used their traditional power of exhortation to have the numerous States involved place a ban on reproductive human cloning.

In this way, for instance, at its 29th General Conference held in Paris on 11 November 1997 the important forum represented by the United Nations Educational, Scientific and Cultural Organization (***UNESCO***) adopted a text entitled "Universal Declaration on the Human Genome and Human Rights". This text, after referring to a vast number of general principles on the universal protection of human rights and democratic ideals, begins by recognizing that research on the human genome and its applications open up immense prospects for improvements in the health of individuals and mankind as a whole. However, the body of the text is devoted above all to underlining the limits and dangers of this research. Article 11, for example, states that "practices that are contrary to human dignity such as cloning for the purpose of the reproduction of human beings must not be permitted"; consequently, the States are called upon to "take the necessary measures".

For its part, the ***European Parliament***, after all sorts of relatively old resolutions on the use of embryos, genetic engineering, artificial fertilization "in vivo" and "in vitrio" and cloning, adopted a resolution on cloning on January 15th 1998. This calls upon the Member States of the European Union to adopt binding legislation that prohibits on its territory any research into the cloning of human beings and makes any offence liable to legal penalties. It also calls upon the Member States and the European Union to take all necessary measures to establish a legally binding, explicit and universal prohibition of the cloning of human beings. In addition, it recalls its previous request for none of the Community's financial resources to be used directly or indirectly in favour of research programmes using human cloning.

It is worth noting that the preceding recommendations and resolutions, regardless of the importance of the organization in which they are formulated, are not of a legally binding nature in the proper and precise sense of the term. This is also why it is appropriate to pay particular attention to the work carried out at the ***Council of Europe***, which is aimed at genuine normative unification to be achieved through international law, which itself must be "received" or incorporated into the domestic legislation by law or via the constitution.

In effect, on ***12 January 1998*** an ***Additional Protocol to the Convention on Human Rights and Biomedicine*** was signed in Paris prohibiting the cloning of human beings.

This protocol is specifically aimed at prohibiting the cloning of human beings. Article 1 prohibits any intervention aimed at creating a human being genetically identical to another human being, alive or dead; and Article 2 reinforces the peremptory nature of the prohibition by stating that no derogation will be permitted.

The Explanatory Report on this Protocol distributed by the Legal Affairs Directorate of the Council of Europe indicates that the absolute prohibition that it contains is based on the fact that it is essential to protect the human race against any predetermination of the genetic constitution of a human being by a third person: otherwise, the identity of the human being and his or her dignity would be compromised.

It should also be noted that this same explanatory report observes that the Protocol does not adopt a specific position on the acceptability of the cloning of cells and tissues for the purpose of research leading to medical applications. Its provisions should not, therefore, be interpreted as a ban on cloning techniques in cellular biology.

A number of States that are relatively close to Belgium politically or sociologically, including France, Luxembourg, the Netherlands, Denmark, Sweden, Finland, Portugal, Spain, Italy, Greece, Norway and others, have signed this Protocol. Other Member States of the Council of Europe, as significant as the former, have not signed this Protocol, such as the United Kingdom and Germany in particular.

For its part, Belgium has not signed the protocol in the same way as it has not signed the Convention on Human Rights and Biomedicine to which this Protocol is attached. The Advisory Committee on Bioethics also gave an opinion on this Convention and the advisability of signing it, on July 7th 1997.

The previously mentioned exhortations and the treaty drafted at the Council of Europe led some personalities from various Belgian political parties to table ***bills*** prohibiting cloning either specifically or within a relatively wide context. These bills have now become null and void with the recent dissolution of the legislative chambers.

Finally, it should be noted that a State often has an instrument allowing it to prevent research in this field, or at least to make it difficult; it can in fact prohibit its own financing of such research or even prevent anyone else from financing it.

CHAPTER III. THE ETHICAL DEBATE

3.1. DEFINING THE SCOPE OF THE DELIBERATIONS

The Committee was asked to examine an extremely wide question, since it was called upon to consider the ethical and legal aspects of the cloning of living beings and, more particularly, living human beings. It therefore inquired about the state of the question of both animal cloning and human cloning. It quickly agreed to address only the issue of human cloning.
Discussions were then held on the scope of its deliberations. The essential point of these discussions was to ascertain whether or not a distinction should be made between research on *cloning for cognitive purposes* and that on *cloning with reproductive objectives*. For some members of the Committee, the distinction between these two kinds of cloning of human embryos is artificial. In their view, there is a *continuum* between these two types of research and any attempt to distinguish between them and treat them separately would make it necessary to inquire about the intentions of the researchers, in order to determine whether it was one particular case or another. Furthermore, certain members observed that those regarding the embryo as a human person are also more inclined to make no distinction between the two aspects of this practice. They also consider that the issues involved in this division are not purely formal and that, leaving aside the question of the status of the embryo, they also represent a way of distinguishing between research and its medical applications and between the economic aspects of cloning and its existential aspects.

Other members feel that it is necessary to restrict the Committee's work to reproductive human cloning and, therefore, to cloning with a view to obtaining a child. They think, in effect, like the members of the French and American Committees, that scientific research on cloning limited to the embryo, along with other forms of research that do not lead to reproduction, raise ethical problems similar to those relating to other fields of research on the embryo. In addressing the problem within this context, there would be a risk of unnecessarily duplicating the work on the opinion currently being prepared concerning experiments on human beings.

Without considering that this choice resolves the ethical question posed by the status of the embryo, it was finally decided to limit the present opinion to *reproductive human cloning*, i.e. cloning from nuclei of human somatic cells with a view to the birth of a child conceived in this way. Needless to say, the technical steps taken may be essentially the same as those in cloning with no reproductive objective. In the latter case, however, the major difference is the fact that the process is strictly limited to one stage in the *in vitrio* development of an embryo and the exercise is not prolonged by an attempt at reimplantation. It should be noted in passing that those accepting research on embryos in principle are not opposed to the cloning of embryos for research purposes if relevant arguments are put forward to justify each specific research activity.
For instance, the recent development of cultures of human embryonic stem cells (ES cells) (Thompson et al., in *Science* 282, 6 Nov. 1998, pp. 1145-1147) and germ cells (EG cells) (Shamblott et al., 10 November 1998, *Proc. Natl. Acad. Sci. USA*, pp. 13,726-31) may have an effect on the possible applications of human cloning. Derived from an embryo engendered by nuclear transfer, such cells could be at the origin of differentiated cells, tissues and organs of use in transplants and grafts, especially as they would not pose any immunological problems.

3.2. THE UNCERTAINTIES

Dolly was the first viable mammal born by adult somatic nuclear transfer. From 277 embryos obtained *in vitrio*, only Dolly grew to adult age. Since then, the efficiency of the cloning technique has been improved considerably. In effect, a success rate of 2-3% has been announced for the cloning of mice. To date, the highest success rate has been obtained for cattle, approaching 8%.

Consequently, numerous scientific and technical problems remain concerning reproductive cloning. The success rate is low. It could be expected that these same problems would arise with human beings. Each attempt implies the use of an ovum; but it is difficult to obtain human ova. Mortality during gestation and after the birth of cloned animals is considerable. Moreover, it is impossible to predict the result of applying to human beings the technique of cloning by transferring the nuclei of somatic cells. The first stages of embryonic development have particular characteristics peculiar to each species. For instance, the success rate in the *in vitrio* fertilization of farm animals is much higher (40%) than with human beings (15%) (A. Kahn and F. Papillon *"Copies conformes", Paris, 1998*). The results of experiments carried out so far indicate that the success of cloning by somatic nuclear transfer depends, among other things, on the type of cell from which the nucleus is taken. The scientific bases that can explain or predict the success of this technique are unknown. Even for the cloning of farm animals, there is a clear need for a better knowledge of the fundamental mechanisms involved in the transfer of nuclei. And when it comes to applying this technique to man, it should be underlined that the existence of even a minimal risk of this kind would make this procedure ethically unacceptable.

Consequently, even before analysing the various positions held as regards the arguments for and against reproductive human cloning, it is important to emphasize the following. Even though differences of opinion remain within the Committee on the general principle of the possible acceptability of reproductive human cloning and on the arguments put forward, all the members of the Committee agree on the risks currently involved in the technique of reproductive cloning through nuclear transfer.
As a result, as things stand at present and regardless of any other consideration, the application of this technique to man is out of the question.

3.3. PRESENTATION OF THE ARGUMENTS

The ethics of reproductive human cloning have been analysed in numerous texts. The reports by the French and American advisory committees on bioethics contain detailed, albeit different, analyses of this problem. It was the analysis of a large number of these texts that gave rise to the discussions forming the basis for the opinions expressed within the Belgian committee. To make these positions more understandable, the main ethical arguments in the literature have been placed in two categories: the arguments of those definitively opposed to cloning (3.3.1.) and the arguments of those in favour of authorizing cloning (3.3.2.). Point 3.4. of the opinion sums up the three positions that emerged on the basis of the analysis of these arguments.

3.3.1. Arguments in favour of the definitive prohibition of reproductive human cloning

These ***arguments*** can be placed in ***seven categories***, even though these may overlap as far as some aspects are concerned.

a. Some arguments refer to ***general concepts*** whose content and specific relationship with reproductive cloning are often poorly explained: reproductive human cloning would constitute an affront to human dignity, the human condition, the sacredness of human life, morality, integrity and equality.
b. A number of ***arguments*** seem to be of a ***biological nature***: reproductive human cloning would detract from genetic mixing, which would imply a reduction in genetic diversity, or even, for some, "ethnic diversity". It would be detrimental to the human genome as a common heritage. The claim that reproductive human cloning would be a form of *eugenics* is regarded by some as a biological argument and by other as a social argument.
c. Several arguments can be placed in the category of the ***determinism*** characterizing reproductive human cloning: by introducing asexual reproduction (i.e. non-gametic), this would be detrimental to the genetic lottery whose unpredictability is of intrinsic value for the individual, being a source of freedom and uniqueness.
d. Unpredictability and uniqueness are seen either as values in themselves or as values helping to form the bases of the ***identity of individuals***, which itself constitutes an essential dimension of their ***human dignity***. To detract from this identity or singularity (uniqueness) would be damaging to the ideals of liberty, equality and fraternity.
e. The use of reproductive human cloning would result in children no longer being given but chosen. It would lead to the ***instrumentalization*** of a human being (the clone) by others who produced it for their own ends. Through such an act, the "parents" would be committing a serious offence (here, reference is regularly made to the ethics of Kant, who advocates that a human being can never be used solely as a means; it is always necessary to take account of the fact that human beings are an end in themselves).
f. For the clone himself, this instrumentalization, linked to the absence of the random factor, would result in a ***negation of his autonomy***, of his self-determination. This attack on freedom would be exacerbated by the knowledge that he is the copy of another.
g. Alongside these arguments, which all seem to imply that reproductive human cloning could constitute a serious violation of ***Human Rights***, there are others stemming from problems of a medical, psychological and sociological nature that can arise for a clone and the people around him. In these three fields, the first clones would in any case be experimental human beings with all the risks that this involves. (1) There are *medical* risks (e.g. malformations) due to the complexity of the process and its numerous uncertainties. (2) From the *psychological* point of view mention is made, as regards the parent(s), of the danger of narcissism and fantasies (of immortality, for example); from the point of view of the clones, difficulties in developing a relationship with the parent(s) since the child may feel himself to be a copy of one of them, which could make the formation of the child's own identity difficult and introduce some bias into the triangular relationship. (3) From the *sociological* and *legal* point of view, there are various uncertainties as regards filiation, for instance.

3.3.2. Arguments in favour of authorizing reproductive human cloning

The following arguments are found in the literature.

a. The use of reproductive human cloning would be a matter of individual liberties in general and the right to procreate in particular and could not, therefore, be prohibited unless its negative effects were really proven.
b. Research concerning reproductive human cloning would fall within the scope of freedom of scientific research.
c. The introduction of reproductive human cloning would only be another stage in the process that has already begun with contraception and in vitrio fertilization (IVF) and consists in the possible severing of the natural and traditional links between coitus and procreation as well as between genetic father, coital father, social father, genetic mother, coital mother, uterine mother and social mother.
d. Reproductive human cloning could help to replace a child who has died (in an accident, for example), remove the risks of genetic illnesses or make reproduction possible for couples suffering from infertility, for homosexual couples or for single mothers who do not want any involvement of the opposite sex. The repugnance currently felt for such practices is comparable to the rejection of artificial insemination with donor sperm forty years ago.
e. Cloning of the genome of a person endowed with particularly "useful" characteristics could give rise to a new, different person but one predisposed to a promising development for himself and for society.
f. In a number of cultures; reproductive human cloning would be regarded as a legitimate means of carrying on the family line in the event of sterility.
g. Since it is a question of taking account of all the "arguments" put forward, and even if it is not strictly a matter of reproductive cloning, it should also be mentioned that in some texts it is proposed to "produce" (by somatic nuclear transfer) embryos and even (anencephalic) foetuses to a fairly developed stage in order to have organs with a view to subsequent transplantation which would not pose any immunological problems.

3.4. ANALYSIS OF THE ARGUMENTS

3.4.1. The different points of view expressed

In the discussions concerning the arguments for and against cloning, three types of approach emerged within the Committee, without it being possible to say that there are three groups whose members hold clear-cut positions. We present them as three "positions" represented in each case by a core of a few members whilst others hesitate to opt "en bloc" for one or other of these positions.

Position A

Those holding this position A propose prohibition of reproductive cloning for a limited period of time. They observe in effect that the peremptory statements concerning reproductive human cloning that are found in a good many texts, including official texts, are not the result of sufficiently broad debates and lack a solid line of reasoning. They conclude that, to say the least, no solid argument has been developed in favour of absolute and definitive condemnation of all forms of cloning. They nevertheless consider that there remain so many problems to be resolved from the scientific, psychosocial and ethical points of view that a moratorium of several years should be imposed. Instead of closing the debate, this period should be used in all fields to clarify the different aspects of the problem. The idea of a moratorium is that it is a provisional ban compatible with the continuation of scientific and technological research and the ethical debate.

Position B

The supporters of position B express major reservations as regards any application of this technique, considering that, in the current state of social relations, representations and knowledge in the field of genetics, reproductive human cloning could be seriously detrimental to the quality of relations between human beings and could lead to some undesirable paths being followed.

Whilst the definitive prohibition of reproductive human cloning presupposes absolute and definitive reasons to reject it, the position of the second group is based on a different ethical viewpoint consisting in assessing cloning in the light of the values and representations contained in social relations today.

This type of ethical assessment leads the members of group B to consider that, with the present state of knowledge, representations and social relations, application of this technique within a reproductive perspective seems highly problematical.
For this group, the issue of applying this technique to man depends not only on a better knowledge of the scientific, technical and medical aspects involved or even only a better formulation of ethical positions on the subject but also on the wishes of society and its members and, along with these wishes, on their ability to accept such a method of reproduction and its probable consequences from the psychological point of view.

The considerations set out in the rest of the opinion led the members of group B to consider that, as things are at present, it would be wiser to prohibit reproductive human cloning. The possibility of going back on such a decision would depend on a process that it is impossible to anticipate for the time being and on a series of scientific, social and other developments which cannot be foreseen at this stage.

Although formally this position may be linked to the idea of a moratorium and the members of group B acknowledge that this has the advantage of encouraging a debate, they do however feel that it implies a relatively short period intended to verify the harmlessness of a technique that it is envisaged to use, which is why they prefer to refer to their own position B as a "moratorium".

Position C

The supporters of position C consider that any application of reproductive human cloning would constitute a serious attack on the dynamics of human existence and would cut off the child from the symbolism written into the data of the flesh and, in particular, in the act of procreation itself.

In addition, they think that the arguments used to justify the possible use of this technique stem from a fascination with scientific progress. For the supporters of this position, using this technique for reproductive purposes would lead to a process of scientific manufacturing of children with no human density.

They also think that most of the considerations put forward to oppose the prohibition of cloning are of an observational nature and do not constitute an ethical evaluation.

They therefore consider that a definitive ban should be placed on reproductive human cloning.

3.4.2. Position A

3.4.2.1. General

Whilst the members of the Committee who support Position A consider that reproductive human cloning must be prohibited at present, they underline above all the fact that many of the objections expressed to reproductive human cloning are characterized by a *lack of rigour* in the arguments, as shown for example in the use of peremptory statements made in an almost dogmatic manner. They apply to cloning in general objections that are valid only for a few specific cases, or even put forward objections that apply just as well or even more so to other human acts and decisions, although these are not prohibited.

All this seems to be the result of a feeling of confusion, which some have even called panic, which spread with the announcement of the birth of Dolly. It must be acknowledged that neither society in general nor even the world of biologists was prepared for this news. Indeed, summarizing a long series of failures in the field of cloning by somatic nuclear transfer, researcher Davor Solter wrote in 1984 in *Science: "The cloning of mammals, by simple nuclear transfer, is biologically impossible."*

But even, and especially, when it is a matter of serious problems and solutions fraught with consequences, ethical research must never leave its own level, that of rationality, a rationality which itself must be based on a calm and detailed evaluation of all the arguments *for* and *against*.

3.4.2.2. Critical analysis of the arguments put forward in favour of definitively prohibiting reproductive human cloning

3.4.2.2.1. Human dignity and identity (arguments 3.3.1. a and d)

In the arguments put forward against cloning there are numerous references to *human dignity* and *identity*. But the reference to "human dignity" alone does not constitute an argument unless it is explained how this dignity is violated. The content of this concept should therefore be examined more closely (it is also used in other fields of bioethics, as in the debate on euthanasia for instance).

The original meaning of the dignity (*dignitas*) of a person refers to the respect that is due to that person. Originally, it was not an egalitarian concept: the more dignity a person had, the more the respect due to him or her. But a trend in ancient philosophy (as summarized by *Cicero*) considered "human dignity" (*dignitas humani generis*) to be a characteristic common to all human beings: it marks the enormous distance between man and animals. This dignity (this right to special respect) is due to him because man alone possesses reason. The Church Fathers (Origen, Clement of Alexandria, etc.) deduced this dignity from the fact that man is created "in God's image" (Gen. 1.26) and they also saw this divine image in reason. This notion of "human dignity" developed during the Renaissance (Marsile Ficin and Pic de la Mirandole) and in the Age of the Enlightenment, and finally it was linked to that of *Human Rights*: it summarizes the fundamental characteristics of the human being as the subject of these rights. These characteristics are:
1) man's reason, which implies self-awareness, self-determination and autonomy;
2) his capacity for being happy or for suffering.
Any violation of this dignity therefore essentially constitutes an attack on his autonomy or his happiness. Obvious examples are: slavery, forced indoctrination (brainwashing), torture, rape, etc. It is true that some people do not have full possession of the faculties based on reason, but there is nevertheless a universal consensus extending this dignity to all human beings born alive and viable. Recently, there has been a tendency to take it beyond this limit to a certain extent as, for instance, in guaranteeing respect for corpses, foetuses or animals capable of suffering.

As a result, it is a serious mistake to link the concept of human dignity to *uniqueness* (or singularity). The fact that two human beings were exactly identical would not detract in any way from their human dignity since they would be entitled to the same respect for their self-determination and the same regard for their capacity for suffering. To deny full human dignity to persons with these two characteristics, on the grounds that they are "identical" - and therefore not unique - would be a horrible discrimination. Furthermore, the very fact of their autonomy, their freedom of decision, implies that they would not remain identical for a minute: every action, internal or external, would make them diverge.

But not only is the notion of identity alien to that of dignity: it also has only a tenuous link with reproductive human cloning. In fact, whilst this argument referring to identity seems plausible at first glance, it is because it is implicitly based on an underlying fantasy. Any mention of "uniqueness" in the debate on clones seems to presuppose that identical genomes produce identical human beings. This opinion is wrong because it takes no account of the enormous influence of the biological, social and cultural environment on ontogenesis and

therefore ignores the fact that it is impossible for two individuals to develop the same personal identity.

Cloning therefore constitutes no danger at all for the uniqueness of man. Furthermore, this argument is particularly discriminatory for identical twins, who could deduce from it that their human dignity is a little diminished by their genetic identity. The biological identity of a person is not determined solely by nuclear DNA: there are interactions between genes and with the cytoplasm and there is mitochondrial DNA. Moreover, biological identity alone falls far short of constituting the identity of the individual as a human being: above all else, the identity of a person is psychological, social and cultural. As the clone is much farther away from the person he is cloned from than monozygotic twins are from each other (if only due to the time lapse between the two births), the clone would have enough scope to develop his own personal identity.

Whilst being aware of this difference between the genome and personal identity, the French *Comité Consultatif National d'Éthique* (CCNE) nevertheless considers that reproductive human cloning would call into question "the unique character that establishes the identity" due to the fact that clones "*would be seen*, literally and metaphorically, as replicas identical to each other and to the cloned individual of whom they would effectively be a copy. This would undermine the symbolic value of the human body and face as the vehicle for the person in his uniqueness". Whatever else the CCNE may say, this sentence - if it was true - would be applicable literally to monozygotic twins and would therefore presuppose that the fact of being twins would be an affront to their human dignity. But it obviously exaggerates the symbolic importance of the resemblance of a face (doubles suffer little from this) and the CCNE also overlooks the fact that two persons (clone and cloned person) with an age difference of, for example, 25 years would at no time have the same face or the same body.

It should not be deduced from these comments that problems of a psychological nature are generally negligible. On the contrary, there are already many problems of identity (i.e. awareness of oneself and of one's reference points), of recognition and of autonomy for children born through ordinary sexual procreation, in relation to their father and mother, the family and society. It could therefore be expected, in the specific cases considered within the context of cloning, that similar problems would arise, essentially linked to the self-perception and social perception of clones. But what has already been said about IVF children? *"What are the psychological implications of growing up as a specimen, sheltered not by a warm womb but by steel and glass, belonging to no one but the lab technician who joined together sperm and egg? In a world already populated with identity crises, what's the personal identity of a test tube baby?"* (Jeremy Rifkin, 1977); and yet this has not happened and, by spreading, has gradually become commonplace. Instead of proclaiming "certainties" concerning things or symbols that ultimately we know nothing about, we should rationally re-examine the question of whether there really are valid reasons definitively to oppose a change, a different method of reproduction. This method of reproduction could in fact remain strictly limited and only be acceptable at the deliberate request of persons or couples for specific reasons. Position A consists in suggesting that there is still not a final answer to these questions and that simply mentioning a number of problems and difficulties is not enough to conclude that this is an affront to "human dignity".

3.4.2.2.2. Genetic intermixing (argument 3.3.1. b)

According to the supporters of position A, the argument of genetic intermixing is only valid on the scale of populations: the decline in genetic diversity, with its risk of the loss of creativity and adaptability and, above all, the weakening of resistance against viruses would be a danger only if the human race was composed of large groups of people who were the clones of each other in their hundreds of thousands. But even with millions of people each with a single clone, this risk would be negligible. Because, like identical twins, these clones would only be offspring that were random "doubles".
The eugenics objection does not apply here because, in the case of single clones, there are no implications for the population in general (the "human race" is not improved).

3.4.2.2.3. Determinism (argument 3.3.1. c)

According to this argument, the danger for the clone would be that his personality and behaviour would be genetically predetermined. This person would therefore inevitably, with no free choice, follow in the steps of the person whose genome he shares. This argument therefore takes up the debate on the part played by genes and the environment in forming the personality. This problem is under discussion within the scientific community and different schools attribute a bigger or smaller part to the innate (the genes) or the acquired (the environment) in forming the personality, without it being possible to break this down with the current state of knowledge. However, in the texts that the Committee has been able to read the specialists agree that the human personality cannot be reduced to its genes. The two French and American ethics committees also agree on this.

The French committee writes : "The idea that perfect genetic similarity would lead to perfect physical similarity is without any scientific foundation. An individual's biological identity cannot be reduced to his nuclear genetic identity, because of the role played by cytoplasmic heredity and, above all, by epigenesis in development. We know, for example, that in adult identical twins neither the cerebral organization nor the immune system is identical in its detail."

According to the American committee: "The idea that the transfer of somatic cell nuclei could be used to produce whole teams of Michael Jordan clones or physics departments made up of Albert Einstein clones is quite simply wrong. Knowing the complete genetic identity of an individual would in no way make it possible to predict what sort of person that individual would become. Even identical twins who have been brought up together and who therefore share not only the same genes but also a similar environment can have different tastes and even different talents. The increasingly sophisticated studies being produced from research into human genetics show that we are gradually gaining a better understanding of how genes work and are realizing more and more that we shall probably not be able to produce at will a person possessing a given complex genetic characteristic".

It should also be underlined that ideological or religious indoctrination, the conditioning techniques of behavioural psychology and certain mass media practices seem to offer ways of confiscating someone's autonomy, along with the risks of individual and collective behavioural predictability, which are much more fearsome than reproduction by cloning.

Finally, the objection of determinism postulates that human freedom is directly dependent on indeterminism, on random combinations and genetic mutations. Physical indeterminism and human freedom are two very different if not opposing concepts. Far from letting himself be governed by chance, the individual makes free choices.

3.4.2.2.4. Instrumentalization and autonomy (arguments 3.3.1. e and f)

Arguments e and f no doubt constitute the most important objection to allowing human cloning, but in this case too the thesis may be put forward that it is not a question of absolute objections but of serious points for discussion.
The basic reference is the Kantian doctrine that a human being can never be reduced solely to the status of means or instrument. He must also and first and foremost be seen as an end in himself.

The reply to this massive objection of instrumentalization comprises two arguments:
1. the frequency of instrumentalization in "normal" situations;
2. the variability of the degree of instrumentalization.

1. In "natural and normal" situations of reproduction, the question of the instrumentalization of the child through parental desires also arises to a greater or lesser degree. Parents and society impose on children many alien objectives that can relatively seriously curb the development of the child's autonomy.
2. The degree of instrumentalization varies considerably from one specific case to another. Any objection that only takes account of extreme and caricatured cases in which instrumentalization seems total and final is abusive. And where there are degrees of instrumentalization there are also areas of autonomy.

Here are a few particular scenarios, purely as a guide, that can fuel the future debate.
1. Bringing up a clone in a non-parental environment where he would be raised by a State-controlled organization or a private entity (ideological or commercial). This is reminiscent of "Brave New World". Only too often we think first of all, if not exclusively, of this type of science fiction example.
2. Replacing a child who has died in an accident.
3. An infertile couple wanting a child as close as possible to them biologically.
4. Various hypotheses of "private" eugenics (as distinct from State eugenics of the *"Brave New World"* type) driven, rightly or wrongly, by the desire for a child with what are considered to be promising characteristics.
5. Reproduction for homosexual couples.
6. The "dynastic" clone: an individual wishing to perpetuate himself on his own.

One can think of many other cases, situations, aims and fantasies. Without speculating as to exactly what the hypotheses are that imply a minimum or maximum degree of instrumentalization, it is clear that there is a big difference between State-controlled eugenic cloning and cloning to overcome infertility in so far as this instrumentalization is concerned.

Furthermore, in all hypotheses in which the clone is raised by one or two parents, the blossoming or stifling of his autonomy will depend on the personalities of these parents and the relationship that he establishes with them.

3.4.2.2.5. Medical, psychological and sociological problems (argument 3.2.4. g)

For those supporting position A, it is the medical, psychological and sociological problems above all, together with those linked to even relativized instrumentalization, that demonstrate the need for a more thorough discussion and, therefore, a moratorium. Even if this discussion was to result in a consensus in favour of total prohibition of reproductive human cloning, it would not have been pointless. Ethics has everything to gain from an open debate in which each position is taken seriously and the arguments are examined in detail until conclusions are reached that can form the basis for a sufficiently broad consensus.

3.4.2.3.Critical analysis of the arguments put forward in favour of reproductive human cloning

The arguments of a "negative" nature (i.e. arguments refuting those of the advocates of cloning) have been sufficiently developed above. As far as the "positive" arguments are concerned, position A calls for the following comments.

Arguments ***a and b*** refer to individual liberties, to the right to procreate and freedom of research. These liberties and rights are not absolute and are therefore not enough in themselves to permit reproductive human cloning, but it can be deduced at least that a technique of this kind cannot be prohibited without a solid argument proving the unacceptable nature of this process.

Argument ***c***, according to which reproductive human cloning can be regarded as another step in the process of the development of reproduction techniques beginning with contraception and passing through IVF and ICSI to the donation of gametes and embryos, highlights the need for a discussion not limited to reproductive human cloning alone but weighing up the pros and cons of the arguments concerning each stage in this development.

As regards the arguments concerning the use of cloning to various ends (***d, e and f***), one should beware of caricatures and simplistic generalizations that demonize cloning without taking account of the diversity of situations and objectives or of the resemblance with more familiar forms of reproduction and instrumentalization.

Argument ***g*** mentioned the possibility of creating anencephalic foetuses for transplantation purposes. It should be pointed out at this point that recent developments in the field of stem cells could do away with the therapeutic value of such "production" of foetuses. Since the stem cells could be obtained from an embryo (possibly created by somatic nuclear transfer) in an initial stage (stage in which the blastomeres are still totipotent), the ethical reservations would be of an entirely different nature.

Position B

3.4.3.1. General

Position B is completely different from position C, which is based on the idea of a symbolism intrinsically involved in sexual generation and totally rejects reproductive human cloning, and position A, according to which there are no sufficiently sound reasons to prohibit the use of this technique straightaway.

Position C is developed from the idea that reproductive human cloning constitutes an attack on the symbolism intrinsically involved in sexual generation and the wealth of sense contained in the act of procreation itself. According to the supporters of this position, cloning would cut off the future child from this wealth of sense because he is produced without the link between the child and his father and mother and because the tender words exchanged between a man and a woman to give meaning to the arrival between them of a child born of their flesh will never be written into the flesh of that child. Even though they acknowledge that physiological data play an important part in the creation of sense, the supporters of position B do not consider that interpersonal sense is immediately incorporated into the data of the flesh and the physiology, whose inexhaustible wealth is to be deployed. For them, the sense, values, autonomy and identity of individuals are constructed in the practical interaction of human liberties. To this extent, they see reproductive human cloning from the point of view of its impact on the relational and cultural development of these different dimensions in today's society.

Unlike the supporters of position A, who think that there are no sufficiently sound reasons today to reject the use of this technique out of hand, the supporters of position B consider that the use of cloning for reproductive purposes carries major risks with it from the point of view of the well-being and autonomy of children born through this technique, along with the quality of the relational and social dynamics to which this could give rise.

Moreover, whilst considering that individual liberties and freedom of research are important dimensions to defend, they underline the fact that other dimensions must also be taken into account when considering the advisability of applying a technique such as reproductive human cloning. Such an evaluation must take into consideration such values as reciprocity, mutual recognition and solidarity but also has to include reflection on the conditions governing the emergence of autonomous individuals in contemporary society.

3.4.3.2. Analysis of the arguments

Those who support position B consider that whilst a number of arguments put forward against reproductive human cloning are far too peremptory, this technique nevertheless raises some extremely important problems.

3.4.3.2.1. Uniqueness

For the supporters of position B, it is clear that the individual emerging from the use of reproductive cloning, presuming that this technique has been perfected, would have nothing of a "human substitute" about him. This individual would not be in any way subhuman or superhuman.

They also underline that the image according to which the clone would be a carbon copy of the person from whom he was cloned is wrong. These two people will obviously not be identical. Firstly, they would only be strictly identical from the genetic point of view in the case of the self-cloning of a woman. Otherwise, at the very least, the mitochondrial genetic material would not be common to the two of them. Secondly, from the psychological viewpoint, they would inevitably be different as regards their phenotype in so far as the development of their physiology and their psyche is a long way from depending solely on their "genetic baggage" as it also depends on a complex interaction between this "baggage" and the environment in the broad sense. In this respect, the individual deriving from the application of this technique would be unique.

On the basis of these observations, some fail to understand how it can be said that cloning threatens dignity, uniqueness or even the fact of the clone having his own identity.
In this respect, position B is characterized by considering these dimensions from an existential and dynamic point of view, i.e. the actual acquisition of these attributes by individuals. From this point of view, the concepts of identity, dignity and autonomy are also linked.

3.4.3.2.2. Dignity

They therefore approach the concept of dignity from a relational viewpoint and as the result of a process of interaction between individuals.
In everyday language, dignity characterizes both a person's attitude (that is considered dignified) and the recognition or respect that is due to him. This double significance can be interpreted as reflecting the idea that dignity is the result of a dialectic between someone's attitude and the fact that one recognizes that person and particularly the fact that he can be what he is or what he wants to be. Dignity is therefore a function of an interactive process of recognition by others and affirmation of the self. The affront to human dignity can be characterized as being that which threatens this process. In fact, dignity is not only a function of an intrinsic capacity or the formal recognition of a status but a collective creation of human beings and the result of a concrete process in which a relational and social space is created which allows a dignified life.

The supporters of position B consider that, as things stand at present, the necessary conditions for a dignified life for the clone do not exist by a long way. They think in this respect that it is not enough to declare the full and entire dignity of the person, that one must also ask oneself about the possibility for the clone of forging an identity of his own and effectively being able to use his capacity for self-determination.
Given the way in which the status of the genome is seen and the influence of the genetic dimension on mentalities at present (among laymen and even among more informed people), the perception of the clone will be stamped with the belief in a genetic determinism. To realize

this, one only has to look at the hypotheses in which cloning is envisaged: cloning of a dead child, reproduction of oneself (cf. the case of Richard Seed) or the idea of offering the possibility of a new existence to a "promising genome".
For the supporters of position B, it is essential to take account of the social conditions in which such a technique would be used, and it cannot be a question of postulating that these conditions would merely have to adapt.

3.4.3.2.3. Identity

In addition, the supporters of position B wonder whether the cloned person will actually be able to acquire an identity of his own, understood as the set of characteristics and circumstances that allow a person to be recognized as being that person and not confused with another. The identity of a person is constructed and recognized within a concrete process of interaction between individuals.

As a continuation of the questions raised by the social perception of clones, it must be underlined that the ideas conveyed concerning genetic determinism could have implications as to the possibility for the clone of forging his own identity. In this respect, it must also be emphasized that the representations both of the man in the street and of more informed people are largely imbued with the mechanistic belief that the genome is a black box which, once every corner of it has been examined, will give us the key to the human being.

The belief that the destiny of human beings is determined by their genome right down to their symbolic and cultural dimensions reduces these dimensions to their biological substratum. The argument in favour of cloning is also sometimes based on the idea of this exclusive efficacy of the biological. The supporters of position B see in this idea a serious weakening, of the scientistic type, of the role played by the symbolic dimensions in the formation of the human person, and thus a threat to the concepts of autonomy and human dignity. In fact, they consider that faith in a biological determinism taking over most of the role of the symbolic in human beings is one of the major sources of the instrumentalization of mankind.

Even those who think that cloning must not be rejected acknowledge the need to introduce a far-reaching process of education as regards genetics (J. Harris 1999, 111). For the supporters of position B, who obviously subscribe to the necessity of this education, one cannot imagine that this will just come about on its own. They feel that it is of prime importance to take account of the social mentalities that exist in practice. Even when it becomes technically possible, they are opposed to cloning being carried out which, through its tangible success and the immediate satisfaction that it may bring to some, could help to instil a mechanistic view of the human person in the collective mentality.

Whilst we know that the genetic material falls a long way short of entirely determining what the individual will be, it does nevertheless play a part in the formation of his identity. Today, there is still a lot of uncertainty as to the way in which genetic determination operates. This great uncertainty must also be taken into consideration. At the very least we know that individual identity is constructed in a relationship with oneself and with others, with the body being an important mediator in this. Whilst referring in this respect to the existence of twins no doubt makes the practice seem less extraordinary, the fact still remains that for twins the

construction of their own identity poses numerous problems linked to their actual and postulated resemblance and calls for very careful work on the part of the parents. As far as cloning is concerned, the construction of this own identity could well be much more difficult in so far as the cloned person will be the "virtual genetic replica" - through his physical appearance - of a person that already exists and that it will not be a question of two contemporary beings. Furthermore, unlike the case with twins, the clone will be the result of an explicit medical act which, due to its technical nature, encourages the idea of having been instrumentalized.

As regards this reference to twins, and also, for that matter, saying that the situation with clones will become normal like the situation with IVF children, which is gradually becoming commonplace, the supporters of position B partly share the views of group C to the effect that the existence of certain *de facto* situations and certain practices does not in itself call into question the relevance of a normative evaluation of these practices and identification of the specific problems that they may pose. Furthermore, the growing use of medically assisted procreation comes nowhere near resolving the problems encountered by certain couples placed in such situations. Clinical science shows that for some people artificial fertilization by a donor outside the couple, and even IVF using the gametes of a couple, can cause relational difficulties in their finding their position once more as partners and as parents bringing up children born in these conditions.

Identity is therefore a construction in which there is a complex mixture of the way in which one views oneself and the way in which one is viewed by others, particularly the "creators" of the clone, i.e. not only the person from whom he has been obtained genetically but also all those who took the decision to use this technique. For the supporters of position B, this view on the part of the creators of the clone, the impact that it may have in the construction of the identity of the clone and the possibility of autonomous development therefore very clearly constitute the most worrying issue raised by the use of this technique.

3.4.3.2.4. Autonomy and instrumentalization

Against the background of the comments made with regard to the fact that a mechanistic representation of genetic determination is still largely shared, it can be considered that the basic problem with human reproductive cloning is the fact that for the clone there is a risk, as Holm[9] puts it, *of living in the shade of the person from whom he was obtained*. In this respect, the hypothesis of cloning a child who has died in an accident is a paradigmatic illustration of this desire to produce an identical replica. This case in point is a caricatured demonstration of the possibility of forming one's own identity being obliterated by the fact that the cloning is accompanied by a desire for the clone to be the same, in this case, as the dead child. In this specific hypothesis, the clone will be entirely caught up in the desire of the person who conceived him. Some claim that this is an extreme case in which the desire to replace the dead child is unacceptable. If, for the parents, it is a question of seeking the future happiness and autonomy of the child, why try to replicate the genome of a dead child ?

[9] *Cambridge Quarterly of Healthcare Ethics, 1998;* 7, 160-162

Those who consider that this risk of instrumentalization is not enough radically to oppose the use of this technique indicate that most of the time those who bring children into the world do so within a relatively self-interested and therefore instrumental perspective. In effect, (as the members of group A say), "who does not have plans for his offspring?". The latter nevertheless admit that the motivations of people bringing children into the world cannot constitute a major attack on the basic right to self-determination of the individual who is created.

The risk with reproductive human cloning is probably not that of its leading inevitably to the elimination of any capacity for self-determination in the clone, but it does generally carry with it the risk of a substantial obliteration of the possibility of the clone actually exercising his right to self-determination. The supporters of position B recognize that relationships between humans are never "pure" and always have an instrumental dimension to them. According to them, the real question in this connection is that of the degree of instrumentalization and obliteration of autonomy to which reproductive human cloning could give rise.

In actual fact, knowledge of genetics, the representations that one has of the role of the genome in the creation of individuals and the hypotheses in which the use of reproductive human cloning is envisaged reveal a search for identical reproduction. Compared to other parental plans, the specific feature of cloning is the fact that in one way or another the clone is produced in order to be identical and, moreover, this plan is "nourished" by material support. The difference with twins is that they are identical without human intervention whilst the clone is produced more or less explicitly with this in mind. With this dynamic of identicalness there is a risk not only of obliterating the necessary space for the formation of the clone's own identity but also of rendering more perilous the parent's task of accepting the otherness of their child.
In the hypothesis that reproductive human cloning consists in enabling a sterile couple to have a child, this search for identity is also present, at least in the fact that a choice has to be made between cloning the mother or the father. From this point of view, there is also a risk with cloning of introducing a number of problems linked to the structure of the parental relationship and to intergenerational relations.

The other factor highlighting the instrumentalization that reproductive human cloning could well carry with it is that the purpose for which the clone is produced is prior, explicit and exterior to him. This is particularly clear in the case of the clone being produced to allow a graft for a brother or sister. It should be underlined that this second aspect feeds on the first in so far as the purpose is largely linked to the supposedly identical characteristics of the clone. Applied today within the framework of widely conveyed representations concerning the genome, reproductive human cloning would unduly radicalize the imaginational concept of wanting a child of such and such a type.

3.4.3.2.5. Psychological and sociological aspects

The supporters of position B consider that, according to the ethical point of view that they have developed above, no strict distinction should be made between the ethical issues involved in the psychological or sociological approaches. In so far as the studies have not been directly backed up by observation (studies which would run up against serious ethical reservations), it

is clear that the deliberations conducted from a psychological and sociological point of view are closely linked to the ethical questions that are posed concerning reproductive human cloning. They consider that these deliberations must be encouraged. As was said earlier, they find it essential for these deliberations to make a clear distinction between the biological determinisms and the symbolic components of the human person, without confusing the two levels. In effect, autonomy and human dignity belong to symbolic creations like creations of culture and ethics, and therefore civilization. As such, they are fragile and often threatened by concrete social practices, particularly when they result from the application of heterogeneous techniques to the living world. It is therefore the ethical duty of a human community to ensure that they are protected and consolidated in the social mentality. Apart from the technical reservations shared by all and reservations as to the problems that would arise in the individual development towards autonomy of children born through cloning, the supporters of position B consider that current human conceptions in our society would be threatened by the generalized practice of reproductive human cloning. The idea of reducing the majority of the characteristics of the human being to his biological determinisms - genetic in this case - is widespread, even among informed people. And this idea insidiously undermines and weakens the attribution to humans of a dimension of autonomy and, therefore, of dignity. The deliberations that ought to take place would most certainly be of a nature to lead mentalities either towards more clear-cut opposition to cloning or possibly towards a slightly more open attitude. Whatever the case may be, one can only emphasize the need for more and more places and methods of reflection on scientific and technical developments concerning cloning and genetics in general.

3.4.4. Position C

Other members of the Committee consider that they have enough arguments, apart from those discussed above, to state a position in favour of the radical and definitive prohibition of human cloning. Their point of view is presented as position C.

Three arguments are put forward here in favour of a definitive - and not merely temporary - ban on reproductive human cloning. This position is based first of all on the symbolism involved in sexual generation guaranteeing the freedom of the person conceived. By linking up natural data with the evolution of history in accordance with this human symbolism, it places scientific progress in an ethical framework. Finally, it stresses the need always to bear in mind the distinction that ethics makes between fact and law.

3.4.4.1. Sex and the symbol

By definition, our generation precedes us. This "precedence" presents itself to us not only as the fact that time zero is before time X but also as the inexhaustible reserve of sense contained in the act of procreation itself. Generation never lets itself be laid flat out in front of us; it is the act that immediately places us, in our very flesh, in the sense experienced by the man and the woman - our parents - when they gave themselves to each other. And sense that is also inexhaustible because neither of the couple controls it on his/her own: it is a gift and nothing more, from the man to the woman and from the woman to the man, and from both to the child.

This gift formed our personality within a symbolism in which the data of the flesh, of the physiology and of the gametes are expressed straightaway in an interpersonal sense whose inexhaustible richness can always be deployed, from one surprise to another, but above which one can never rise as if to take a good look round.

Let us suppose, on the other hand, that a scientific assembly, after studying the various sorts of cloning by presenting blastocytes here, stem cells there and the cell nucleus somewhere else, then passes on to the ultimate method of human reproduction, this time explaining that a man and a woman swear their love for each other, then want a child and then decide to procreate, etc. Unless we are trying to be funny, it is obvious that this argument has nothing to do with science. In fact, scientists have no control over the interpersonal sense that the man and the woman give straightaway to begetting their child. The position that reproductive human cloning should be definitively prohibited is based on the point that has just been mentioned, i.e. the gap between the symbolic and the technical and, correlatively, the weakening of the symbolic which would then only be perceived from the technical angle.

Whereas cellular exchanges between male and female gametes already form part of an interpersonal relationship in which sense is divided (between the man and the woman, and between them and the child) without ever becoming exhausted, cloning cuts off the child to come from this wealth of sense: he is "produced" outside the link that binds the child to his father and mother. In the flesh of this child will never be written the delicacy of the words that the man and the woman exchange to give sense - exactly that - to the arrival between them of a child of their flesh.

No doubt the supporter of cloning could challenge the importance of the symbolic by asserting that ultimately the way in which the child came into existence is of no importance since the only thing that counts is the result - his presence. But we must then see what sort of barrier is created to understanding the body that will no longer be read in terms of the symbol. To be consistent, the supporter of cloning should maintain this strictly untenable proposition: "we have explored desire, speech, otherness and the symbol in the sexual generation of the human being and we think that these data are not important enough for it to be impossible to do without them". Fortunately, such a proposition is unjustifiable because the human being cannot exhaust desire, speech, otherness or symbol; cloning cannot, therefore, claim any legitimacy, either now or in 10 or 20 years, since the symbolic definition of man would be undermined.

To put this in other words, we shall start with the fullness of sense offered by sexual reproduction in the procreation of the child and ask ourselves who bears the burden of proof as to the advantages of another form of "reproduction" of humans. Rather than enjoining the supporters of the prohibition of cloning to justify their position by explaining the reasons on which the symbolism of human sexuality is based, would it not be better to take the inexhaustible nature of this symbolism and, on this basis, ask the supporters of cloning not to go ahead with the act of cloning before having considered this wealth from all angles - which it is impossible to do ?

3.4.4.2. Nature and progress

The position in favour of a definitive ban on cloning is considered to be extremely peremptory, when everything encourages our modern societies to construct ethics as history moves along, especially in keeping with the most recent scientific discoveries. Some moratorium or other may well be adopted - temporarily - guided by prudence, but mankind cannot be held back in his progress by ideologies of the past which, through all kinds of animism or nostalgia, are used to justify the constraints that the cosmos has imposed on man until now. In so far as technical progress allows human beings to produce other human beings outside sexual relations, should one not accept, cautiously for sure but favourably, this development that would make it possible to release man from a major - and sometimes intolerable - constraint that is part of his natural condition?

Here too, however, it is necessary to check whether the philosophy of the body involved in such a conception will not ultimately prove to be a threat to humankind itself. Because if the human individual transcends nature, thus providing himself with the possibility of culture and, in particular, science, he does not however exercise this transcendence unless deeply immersed in it through his bodily condition, which is the very source of all the subsequent symbolism. So when a scientific discovery is presented as "progress" it is important to see in which direction this "progress" is moving. Towards greater control by man over the conditions of his own existence? It must then be accepted. Towards a breakdown of the symbols that the bodily condition establishes in man? In this case it must be rejected. Because not every innovation necessarily constitutes progress, and ethics also opens up culture and indeed serves to identify the criteria that will judge this difference.

In other words, the position in favour of pure and simple prohibition of cloning is not based first and foremost on the data of nature, which will always impose its "natural law" on human beings, and which science will constantly have to defy; it is based on this eminently cultural fact which has seen this other - albeit natural - fact of the human body as the guardian of the symbolism into which man and woman enter in sharing sense.

Sharing sense, but also the tradition of sense, by parents with their children. And on this last point cloning raises another difficulty. Because by depriving the child produced by means of this technology of the words exchanged in the flesh, male and female, cloning also deprives him, symbolically, of the approach to time that is called history, culture. As far as they can, the man and the woman pass on to the child that they have engendered the heritage of knowing how to do and how to be that they themselves received. But in cloning it is no longer tradition that acts but (attempted) repetition: the child has no father or mother to teach him about the challenge that time and death lay before human endeavour; because the cloned child repeats another individual and, ultimately, could repeat himself indefinitely.

This is science, fascinated by its own development, finally convincing itself that it is right in its own practice; because the scientist, defying the prohibition of a "pre-scientific" culture that banned cloning - in the name of quite what symbol we do not know - will end up demonstrating, proof at the ready, that ethics is no longer necessary since the cloned being will no longer need a father or a mother to pass it on to him. All that will matter will be to explain to him - a new but non-sexual initiation - the scientific know-how behind the cloning technique that will allow humankind to be taken, with no birth and no death, with no history

and no symbol, with no culture other than scientific, to the stoppage of time that we regard as immortality.

Is this pessimistic presentation of the future an apocalyptic vision? No doubt at all, but here the apocalypse reveals what is at stake in the act of "reproduction" outside all those generations which, succeeding each other, have made up the history of humankind.

Until now, our ethical traditions have encouraged us to give the best of ourselves to our children, because they will carry with them, further than us, the strange question that makes us men, the enigma to which we are always seeking the answer. To introduce reproductive human cloning into this long chain that precedes us would be to impoverish this transmission of the human question. Scientific "manufacture" of a child would no doubt be presented as progress, but it would lose the specifically human density of the relationship in which a man and a woman give themselves to each other in order to bring a child into the world, a child who will base himself on their past in order to invent his future. In the name of humanity, we do not have the right to bring into the world a child to whom we have not given our entire selves for him to become himself.

3.4.4.3. Fact and law

The position in favour of the pure and simple prohibition of reproductive human cloning uses arguments that no doubt place outstanding value on symbolism, sense or culture but, let us admit, do not however compel acceptance through the evidence. Consequently, should we not prefer the lessons learnt directly from the facts? The conclusions drawn from practice would in any case provide all citizens, of all persuasions, with a common basis for reflection. Indeed, are not the various philosophical ideologies too different from each other to establish an ethics shared by all?

According to this sort of pragmatism, children are not all born of the flesh of a man and a woman who will then see their responsibilities through to the very end: how many children in the world are engendered without love? How many are ill-treated, abandoned, orphaned? So if reality itself reveals the fault lines in the symbolism of bodies supposed to express the gift (to the child) within the gift (between the man and the woman), should we not draw the conclusion that this symbolism does not necessarily belong to man's reality? As a simple projection by some individuals who overvalue certain contingent data of the bodily nature of man, it should therefore be acknowledged that this symbolism passed on by a particular cultural tradition is really a personal preference, a preference that those who share it cannot possibly impose on their fellow citizens.

Another example: the various ideologies discuss the unique nature of the human being and base themselves on this uniqueness to prohibit reproduction of the same individual by cloning. But has not nature herself confounded this objection by creating twins, since we know that the identity of their chromosomal heritage does not prevent these twins from leading an existence in keeping with human dignity? From which we must draw the conclusion that, according to the facts, belief in the strict biological uniqueness of the human being is as false as the belief that there must be a link of flesh between man and woman to safeguard the human nature of the child.

In reality, these objections disregard the distinction that ethics makes between the observation of what is and the obligation that freedom must respect. Certainly, some children are born as a result of rape and, equally certainly, children have been abandoned or deprived of parents, but these facts call for an ethical evaluation requiring them not only to be arranged in the best possible way so that their victims suffer as little as possible but also to be prevented in the future so that such suffering does not occur again.

From another angle entirely, that of twins, the accent is placed on the difference between the natural contingency that is the division of a fertilized ovum at the beginning of the pregnancy, on the one hand, and the creation of an individual similar to another due to human decision, on the other hand. For in this second hypothesis freedom must question itself as to the meaning of its own action - that is the ethical question - whereas in the first hypothesis it merely had to accept this situation of twins which arrived without actually being wanted. The personal act of freedom reflecting on the good of its own humanity (and the humanity of others) makes all the difference here.

But the supporter of cloning referring to de facto social data (such as rape or abandonment) or physiological data (such as the situation of twins) to justify his scientific practice of asexual reproduction of humans apparently misses out this ethical moment. After reproaching the supporters of pure and simple prohibition of cloning for being too closely influenced by the data of nature - in this case procreation through sexual encounter - everything happens as if he had fallen into the state of confusion that he denounces since he too identifies what is with what ought to be. In reality, just as not every innovation necessarily constitutes progress, as we have said, not everything that is done should immediately be approved without any ethical examination: everything must be judged on its merits.

On what basis? That is what the pragmatist will stress, seeing what is real (social or natural) as confirmation of the cloning technique. To find this basis, he must go back before cloning to the transmission of sense by parents to their children, born of their flesh. Go back, therefore, to the symbol that refuses to see bodies other than in physiological reality born of the scientific approach. Because the symbol reads straightaway in sexual bodies the interpersonal exchange in which human dignity is recognized.

CHAPTER IV. CONCLUSIONS

4.1. CONSENSUS

The analysis of these arguments led all the members of the Committee to the conclusion that, regardless of any other consideration, it is out of the question at present to contemplate reproductive human cloning.

In effect, in view of the scientific, technical and ethical uncertainties surrounding the technique of reproductive human cloning, an outright ban on any attempt to carry out cloning of this type in the near future is to be recommended.

All the members of the Committee would like the psychological, philosophical, medical and ethical studies on this subject to be developed in greater depth, in order to help citizens form an enlightened opinion of the phenomenon of cloning.

All the members of the Committee also agree that if a human clone was to be born - even if it was due to an illegal act - he would still be a full human being and none of the arguments put forward could challenge his dignity as a human.

4.2. POSITION A

Those who support position A consider the above-mentioned prohibition to be a moratorium which, whilst preventing unacceptable risks in the near future, opens up the possibility of establishing the right conditions for reflection and a democratic debate on the issue, which could result in an informed and lucid position being adopted by the community. This final position could be extension of the moratorium, a definitive ban on reproductive human cloning or acceptance of the technique on specific conditions, which would also mean setting up a control system to monitor developments.

Three types of reasons led this group to favour the moratorium solution (which is also that favoured by the commission set up by President Clinton).

a. Knowledge as regards the possibilities and implications of reproductive human cloning from the biological, psychological, social and ethical points of view is so limited at present that no sound argument in favour of the definitive prohibition of any form of reproductive human cloning has or can be put forward. The advantage of a moratorium lies in the fact that, temporarily, it has the same effect as absolute prohibition but, in addition, it may lead to a broader consensus among researchers, with the arguments in favour of a temporary ban being much more convincing than those tending towards absolute prohibition.

b. The members of this group criticize the lack of rigour in the peremptory arguments which, before this opinion, pleaded in favour of an absolute ban. This shortcoming led to biased and incomplete presentations, to a rejection of any nuances and to questionable statements. It was observed that concepts such as "human dignity", "uniqueness", "identity", "determinism" and "instrumentalization" were used without an in-depth analysis and without a comparison with their application in other spheres of human behaviour. There is a certain advantage in being able to observe this now: an analysis and a fresh debate can follow concerning a good many bioethical problems. But this advantage would be lost if definitive prohibition was to close a debate that has not really been opened.

c. These members are also of the opinion that the problems linked to cloning have so far been discussed above all within restricted circles of "specialists". They therefore want wide discussion forums to be organized, at which the different aspects of cloning should be openly debated before a democratic decision is taken, perhaps even at international level.

4.3. POSITION B

Those who support position B consider that:

- with the current state of knowledge, representations and social relations and in view of:
- the problems raised concerning construction of the clone's identity;
- the disruption of the relationship between genetic identity and phenotypic identity, especially through the identity of appearance that reproductive human cloning would introduce;
- the problems of intergenerational relationships to which this technique could give rise;
- the problem of the social perception of the clone and, conversely, the self-perception of the clone;
- the instrumentalization logic to be found in the hypotheses in which the use of this technique is envisaged,

it would be wise to prohibit cloning.

This prohibition by legislative means would have a political dimension consisting in calling upon the democratic authorities to state a position on the question and a legal dimension aimed at clearly penalizing the use of this technique in the absence of clear standards in the matter.

In so far as they do not necessarily see this prohibition as an absolute and definitive ban, they would like a democratic control process to be introduced, reinforced by research linked to cloning. They endorse position A in that it calls for the creation of the right conditions for reflection and a democratic debate on the question. They also consider that the problems connected with cloning have so far been discussed above all within restricted circles of 'specialists' and they therefore call for the organization of broad discussion forums. They underline in this respect the fact that creativity should be shown in instilling a real collective awareness of the issues involved in cloning. In this connection, they take up the proposal made by the Danish Bioethics Committee for a competition in news reports concerning cloning to be organized among secondary schools and welcome the initiation of debates by the *Rathenau*

Instituut[10] in the Netherlands. These various initiatives should allow the community to adopt a position in time in a more lucid and democratic manner on all proposals to apply the cloning technique that may be made in future.

4.4. POSITION C

Those who support position C consider that any application of reproductive human cloning would constitute a serious attack on the fundamental dynamic of human existence and would cut off the child from the symbolism written in the data of the flesh and, in particular, in the act of procreation itself.
Since they also think that the purpose of criminal law is to guarantee the fundamental formative values of human existence and society, they consider that the use of this technique must be prohibited and penalized as a crime.

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[10] Independent organization with the task of supporting the expression of opinions at social and political level on questions relating to scientific and technological developments.

The opinion was prepared by select commission 97/2, consisting of :

Joint chairpersons	Joint reporters	Members	Member of the Bureau
J. Colaes	G. Kiebooms	G. Binamé	E. Vermeersch
J.-P. Cobbaut	R. Winkler	K. Bonduelle	
		E. Eggermont	
		G. Hottois	
		I. Liebaers	
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		M. Somville	
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External permanent expert:

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The working documents of select commission 97/2 – request for opinion, personal contributions of the members, minutes of meetings, documents consulted - are stored as Annexes 97/2 at the Committee's documentation centre, where they may be consulted and copied.