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Notes on cloning

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Notes on cloning

The term 'cloning', both in thought and experimental practice, has taken on different meanings which in turn presume different procedures from the technical viewpoint as well as different aims.

The term in itself means the *reproduction of a biological entity which is genetically identical to the one from which it originated*. The Greek term '*klon*' makes us think of a sprig from a plant which when inserted into mature soil can reproduce the plant from which it was taken.

1. From the viewpoint of the technical procedures for carrying it out

The term is used to indicate:

- a.** the reproduction of a cell line starting from a single cell: the cells produced are histologically identical to the ones from which they originated. Cloning is also spoken of for the reproduction of DNA fragments starting from a single DNA fragment;
- b.** the reproduction of embryos by disaggregating or subdividing an embryo (*embryo splitting*) in its early stages of development when the cells are totipotent or pluripotent, i.e., capable of developing into a complete organism. The embryos obtained are then transferred *in utero*;
- c.** the reproduction of genetically identical individuals through the *nucleo-transfer* of a somatic cell from an embryo, fetus or an adult individual, to a denucleated oocyte. The embryos obtained are later transferred *in utero*. The procedure can be repeated with several nuclei taken from the somatic cells of the same individual and inserted into denucleated ova;
- d.** the transfer of the nucleus of an oocyte to the cytoplasm of a second denucleated oocyte, as a form of "prevention" of mitochondrial diseases. This, however, is not cloning in a strict sense. The modified oocyte is later fertilized *in vitro* and transferred *in utero*.

2. From the viewpoint of the aims

The following aims have been highlighted in written works:

- a.** the "reproductive" aim: to obtain individuals with a genetic patrimony identical to that of the donor of the nucleus;
- b.** the "therapeutic" aim: to obtain an embryo immune from mitochondrial diseases or chromosomopathies by cloning through *nucleo-transfer* or by transferring the nucleus from one oocyte to another and subsequent fertilization;
- c.** the "productive" aim: to obtain selected organs, tissues and cell lines. The product of cloning would always be an organism-individual (with or without encephalon) obtained by cloning through *nucleo-transfer* having the selected genetic patrimony. From this organism-individual it is thought to then obtain organs, tissues or cell lines of the required genetic quality;

d. an "experimental" aim": to simply leave the possibility of doing research open.

3. From the ethical viewpoint

Whereas all the international organizations (Council of Europe, European Parliament, WHO, UNESCO) have made statements on this subject and agree that cloning by *nucleo-transfer* is illicit when carried out for reproductive purposes, there is no unanimity and above all no clarity regarding the other techniques and aims.

In relation to the dignity of the human person, however, any type of cloning is to be considered illicit which implies the creation or splitting of embryos, no matter what techniques are used or what aims are pursued because it is not licit to do evil even to bring about good.

The illicitness of cloning is derived from the relationship of domination over the corporeity of the cloned subject, from the absence of a personal act of procreative love since it involves asexual, agamic reproduction and, in short, from the offence to the Creator's design.

Only the reproduction of cells starting from cells taken and separated, without doing any damage, from a human individual (who is procreated naturally and not purposely cloned to provide cell lines), is to be considered licit, as well as the reproduction of DNA fragments for which, however, the cloning of a human individual is not foreseen as a premise or an aim in order to obtain them.

