

CLONING : SOCIAL OR SCIENTIFIC PRIORITY ?

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The ethical issues involved in biotechnology in general, and cloning in particular, are exceedingly complex. The term 'biotechnology', which is in vogue now, is comparatively newly-coined. In a broad sense any technology involving biological materials should come under the ambit of biotechnology. However, the term is presently delimited to certain specific manipulations of biological material in the sterile culture in the laboratory and their application of various areas of life. Today's biotechnology has taken a new dimension and a new identity with the development of molecular biology and genetic engineering techniques involving r-DNA (recombinant Deoxyribose Nucleic Acid) transfer technology. Molecular biologists and genetic engineers are now capable of transferring genes across the species which could not be done earlier. The prospects of emerging biotechnology are indeed great but what has brought this particular branch of applied science to the forefront is not merely the scientific appeal but the lucrative commercial potential of the technique and the ethical issues involved with it. In order to deal with this almost a new branch of ethics, known as bioethics, has come into being. It is a discipline that deals with moral principles and values in biological experiments and innovations and their societal acceptance. A major objective of this branch of ethics is to set up ideals and codes of conduct for scientists working in different branches of biology and orient them to do things that would be good for man as well as for the earth as a whole. More importantly, a new dimension has been added to bioethics with the unforeseen developments in biotechnology, especially in recombinant DNA technology and transgenesis, gene therapy

for somatic and reproductive cells and more recently mammalian cloning, particularly possible in man. Unless bioethical issues are resolved properly consumer acceptance of biotechnology may fall short of the expectations of the biotechnologists and biotech business enterprises.

Among the bioethical issues most recent and most discussed one is cloning. Cloning means the technique of producing a clone. A clone is an individual obtained from somatic cell/organ of the parent organism. As such, production of clone is asexual and does not involve mating. Genetically the clone is a copy of its parent (single) organism. Large scale cloning is being done in plants employing organs, tissue and cell culture techniques. Embryo cloning and more recently somatic cell cloning has been successful in mammals also.

Most of the major ethical issues arise directly or indirectly from the genetic knowledge and correlated technologies that are concerned with human procreation. Procreation in the Living system is a unique natural phenomenon and infringement of the same especially in case of higher order mammals is considered by most people to be unethical. We know that agrarian civilization has for long continued denied sexual rights of farm animals particularly in the case of cattle, sheep etc. through castration for ploughing, load bearing and meat production, and even went up to interspecific and intergeneric crosses for production of sterile and more labour efficient animals (e.g., the mule, a cross between horse and donkey.)

In fact, cloning has been there since the beginning of agrarian civilization in the form of vegetative propagation of plants. Cutting of branches and twigs of trees to establish new trees are nothing but cloning. But the same technique would not work in higher animals like man, and a chopped off finger of a man has not as yet been used to create a clone. With organic evolution and growing complexity, totipotency and regeneration become increasingly difficult. As long as the process of cloning was used in case of plants and lower order animals it did not give rise to much ethical noise. But what triggered off the intense debate is the success of mammalian cloning. The first ever successful cloning of a mammal from differentiated somatic cell by Wilmut and coworkers was published in the February 27, 1997 issue of the prestigious journal *Nature*. The success of Wilmut *et al* electrified both the research community and the public in general, for

although animals had been cloned before, creating a sheep (known as 'Dolly') from a single cell of a six year old ewe was a stunning technological feat that many had thought impossible. According to conventional wisdom, adult cells cannot give rise to new, mature organisms. So after Dolly's debut researchers scrambled to understand how she was created. But what is more important is that this success triggered off an explosion of concern about the cloning of humans. The ethical question that was hotly debated : can human cloning ever be justified?

Incidentally, it may be noted that even before Dolly's birth Gurdon, Laskey and Reeves in 1975 experimented successfully the cloning of cells from skin of adult frogs upto the stage of advanced tadpole. Although Gurdon *et al* (1975) could go upto the tadepole stage, their work should be regarded as a major foundation stone for adult animal somatic cell cloning work. But it is the birt of 'Dolly' that elicited rather strong reactions mainly because it gave a signal that cloning of the most evolved mammal, man, is not very distant.

Like many other technologies cloning has both positive and negative aspects. We shall consider these aspects later. When ethical aspects of cloning and other biotechnological issues are discussed the touchstone of our ethical choices is simply our judgment of whether it is right and good for man. We agree that it is right and good to reduce misery and improve the quality of life for all those who live, by using environmental and social means. We now debate whether it is right and good to use genetic means as well. Our conceptions of what is ethical, right, and good change in the light of new knowledge and new conditions. Apart from this, when we take ethical decisions on such a complex matter, we shall have to keep in mind the matter of human dignity also.

The Impact of Dolly

The ethical issues underscored by Dolly's birth prompted the then U.S. President Bill Clinton to ask for a review of experiments on cloning and in the interim period banned the use of federal funds for mammalian cloning. He directed the National Bioethics Advisory Committee (NBAC) to review the associated legal and ethical issues and report back within 90 days. J. L. Fox¹ in an analysis of the bioethical aspects of cloning writes

about two meetings of experts in Washington. The NBAC invited experts, clergy, ethicists, philosophers, lawyers and other interested individuals to deliberate on the issue. The views of the assembled experts ranged very widely - expressing everything from enthusiasm over the medical prospects of such work, to scepticism about whether mammalian cloning is practicable, to repugnance. Some individually expressing these views refer to their own instinctive responses, whereas others cite either religious or secular sources for their conclusion. While analytic approaches to the ethical issues were provided by the religious group, the views of the ethicists have been more philosophical. Some of them say that all efforts to reduce human suffering should go forward but cloning research that tampers with human reproductoin must be stopped. After the 90-day analytical sprint, in its 107-page report the NBAC says that it did not base its policy recommendations on any particular religious or moral view of cloning, because no single set of values enjoys universal acceptance. Instead it focuses on safety. Noting that it took Wilmut 277 attempts to clone a single healthy lamb, the report concludes that an attempt to clone a child would be a premature experiment with unacceptable risks. It might also do psychological harm. This in itself is sufficient to justify a prohibition on cloning human beings.

President Clinton accepted the recommendations. Human cloning, it has been cited, has the potential to threaten the sacred family bonds at the very core of our ideals and our society. There is nothing inherently immoral or wrong with these new techniques, if they are not used to clone humans, as they hold the promise of revolutionary new medical treatments and lifesaving cures.

But scientists got divided on the evident purpose of the President's ban. Some scientists and bioethicists reacted with alarm to moves by the politician to ban human cloning. They held the view that politicians were 'shooting from the hip'. For them the ban imposed could also stifle exploration of the promising avenues opened by the scientists in Scotland. On the other hand, some called the ban commendable. Others point out that such work is not currently feasible. Some argue that ethically defensible cloning of human might occur in the future, citing its potential use in infertility. Such cloning if ever to be used would be used incredibly sparingly. Again,

some others suggest for referendum. Those who are in favour of referendum held the view that it is the duty of researchers to let people know what is possible, and then to let society judge whether those possibilities should be turned into reality.

Is Referendum Possible?

Recently the controversial Italian scientists, Dr. Severino Antinori, has published his plan to clone a human being, to much approbrium from the public and from other fertility specialists. But he is hailed as a hero by couples desperate to have a baby that is genetically related to them². This instance only unfolds the two opposite facets of the problem. Some experts opine that they are better informed and therefore better equipped to make ethical decisions. Some other scientists, e.g. Kevin Shakesheff, a Professor of tissue engineering at Nottingham University, disagree with this view. They say that if they describe their research work well enough, the vast majority of people will be able to understand that information and act on it. But there are not adequate ways of getting feedback. It is here that the question of public referendum on such a contentious issue becomes relevant. We may mention here such an opinion poll, which was conducted by *ABC News Nightline* among 591 Americans. 87 percent of the respondents said that human cloning should not be allowed, 82 percent said that it would be morally wrong, and 93 percent said that they personally would not choose to be cloned³.

But Prof. Michael Reiss, a specialist in scientific ethics, does not believe that courting the public vote is the way of shaping scientific policy. He maintains that MPs and other elected representatives should be able to make decisions on people's behalf, pointing out that democratic representation has served society well for centuries. "Should we have had a referendum over Louise Brown (the first test-tube baby) or the first heart transplant?" he asks. "I do not think so," he writes. The professor notes that ethics has become a modern preoccupation of scientists. He does not want scientists to be oblivious to the consequences of their research. He opposes the researchers who hold the view that scientists should be concerned with just the science, not with moral philosophy. Against both the extreme views he makes a way for middle ground. Many funding

councils, he opines, require scientists to outline the benefits and value of their work to society and we don't need a Ph. D. in moral philosophy to do that. As a professional ethicist, Professor Reiss says it is not his job to arbitrate on whether we should clone, but to think of new ways to approach the debate. He compares himself to a travel agent, who does not decide which country customers visit but helps them to come to a decision.

Another important point is the role of such a bioethics committee as NBAC. Bioethics committees should not have a monopoly on ethical issues, but should promote public debate. Such committees should refrain from offering solutions to ethical problems; rather it should focus on clarifying the issues. Moreover, bioethics committees are excessively elitist and not sufficiently representative of public opinion. It is also a matter of concern, that pressure on such committees to reach conclusions could force an unnatural consensus that masked dissenting opinion.

In India also, mammalian cloning success in the west has sparked off wideranging debates especially in the print media, and as expected, views differ sharply on the subject. It, however, appears that so far as human cloning is concerned those calling for a ban far outnumber the other side favouring such work for various reasons. It is true that cloning can never be a substitute for natural procreation, but positive aspects of animal cloning also hold good in many respects of man as well.

Positive Aspects of Cloning

- i) Scientists will have a more clear understanding of the effect of environment on physical and mental development which would enable a separation of genetic and environment factors.
- ii) A better understanding of genetic deficiencies (congenital birth defects) would give clues to combat the same.
- iii) Elucidation of mechanism of ageing and age-related disorders will be easier.
- iv) The genetic and environmental basis of diseases like cancer can be better understood.
- v) Cloning will bypass sex, mating and fertilization and will therefore overcome male or female infertility because in case of cloning copy

(or copies) of the single parent may be obtained employing body cells and, if necessary, surrogate mothers. This is a strong point in support of cloning. It is argued that what is the objection if a wife prefers to have a clone of her husband suffering from azoospermia, oligospermia or similar problems instead of opting for artificial insemination with semen from an anonymous donor? If the genome of a somatic cell of the husband is transferred to an enucleated egg of the wife there should not be any major ethical objection to that. Anyway, the unbound joy of the couple of having a child would far outweigh other considerations.

- vi) Another aspect which is being discussed in various quarters is cloning of great men. The birth of the cloned American calf 'Gene' reported on August 7, 1997 is significant in this connection. Scientists can now have unlimited number of cells, freeze them indefinitely and then thaw them and make identical animals possessing a certain desired trait. What has been possible for 'gene', the cloned calf, is definitely possible in man.
- vii) Currently single parenthood is being legalized in some countries in the west and that may follow suit in the developing countries. If such prospective mothers prefer to bear clonal babies from frozen and subsequently thawed somatic cells of great men and women who excelled in various fields of human activities, the same, it is argued, cannot be termed totally unethical and immoral. Ethical and moral actions do not infringe upon basic human rights and values and in a broad sense they are intended for short and long term human welfare. Judged from that perspective bearing clones of great personalities cannot be termed as unethical so long as single motherhood and such events remain legally and socially acceptable.
- viii) Cloning may help to save beleaguered species. The technology of cloning could be used to increase the genetic diversity of a dwindling species. Oliver Ryder⁴, a geneticist, reasons that for species that are down to just a few surviving individuals, clones grown from frozen fibroblasts could provide an invaluable source of lost genes. It must allow us to go back and recover the genetic diversity.

- ix) Cloning could be especially useful tool for biologists trying to save species that either do not breed well in captivity (e.g. giant pandas) or even never breed in captivity (such as giant armadillo) by allowing biologists to asexually reproduce the creatures. It could possibly guarantee genetic immortality.
- x) Cloning would permit the preservation and perpetuation of the finest genotypes that arise in our species - just as the invention of writing has enabled us to preserve the fruits of their life's work.

Negative Aspects

- i) Diversity is a crucial factor in the perpetuation of a species or type. Uniformity, as would be expected in clonal propagation, may prove disastrous if the particular genome becomes susceptible to external debilitating factors. A broad genetic base is an important survival stragagem for a species and narrowing down the base would be definitely counterproductive.
- ii) It is expected that cloning will be commercially useful in transgenic farm animals. Such animals are viewed upon as efficient bioreactors for the production of specific proteins or pharmaceuticals. However, such transgenic animals often suffer from physiological disturbances. For example, transgenic pigs with gene hGH (human growth hormone gene) would grow much faster by taking more feed but are prone to ulcer, arthritis and several other constraints.
- iii) If highly efficient clones are produced in abundance, and if they consume more food from the available food chain, the less efficient type may become extinct. Such an effect on the ecosystem will be most undesirable.
- iv) Cloning endangered species could distract people from saving habitats. There are many who think that cloning is not a solution to a major problem. They do not want cloning to minimize or supplant current conservative effort.
- v) Another important philosophical consideration is the question of determinism. When one brings back the clone of a man the physical and mental make up of the cloned offspring are to a great extent predetermined. The 'chance factor' inherent in the randomness of

genetic recombinations in the offspring in sexual reproduction, is apparently non-existent in cloning. A cloned human offspring may in due course squarely put the blame on the parent (s) for a predetermined genome.

Can Human Cloning Ever be Justified?

We have delineated in brief the positive and negative sides of cloning. A little reflection will make it evident that it is not the prospect of the application of the new knowledge to the biological world in general that frightens thoughtful men. If we can clone prize cattle to improve our food supply; if through designed genetic change we can produce more nutritious crops which make more effective use of sun and water, if we could, for instance, greatly expand the range of plants with the capacity to serve as hosts for nitrogen-fixing bacteria; if we can engineer viruses or microbes to curb steps or to destroy cancer, these innovations might produce ecological concern, but not dire doubt. It is the possible application of genetic intervention to man that generates the shock wave. For this possibility illuminates from a new direction all that is encompassed in the word 'human', and thereby challenges traditional concepts in every area of human activity. And much of the alarm is that scientists-- with their clever tools--could crudely disrupt much of our social order with scant regard for its replacement. So it was thought that using the technique of 'Dolly' cloning of adult human could become feasible. It is for this reason we hear about ban on federal funds, legislative action, public outrage and so on.

If we apply the nonconsequentialist ethical approach to cloning we find that creatoin of human clones solely for spare cell lines would, from a philosophical point of view, be in obvious contradiction to an ethical principle. Would Kant approve of cloning of humans? Would he not raise the issue of infringing upon the point of human dignity? The principle of human dignity demands that an individual human life - should never be thought of only as a means, but always as an end. Creating human life for the sole purpose of preparing therapeutic material would clearly not be for the dignity of the life created. Again, the use of cloning as a means of combating sterility is much more difficult, as the explicit goal is to create a life with the right to dignity.

In this regard we may mention the creation of headless frog in the post-Dolly period, in October 1997. The scientists who created these hapless creatures while studying developmental genes had speculated about their practical use. Sometimes in the future, they said, organs grown through nuclear transfer might provide compatible transplant material for people who otherwise could not get organs. This again set off a spirited discussion of the ethics of creating brainless humans for medical purposes. In the brief but intense media splash, ethicists are quoted saying that the whole idea is deplorable. It treated lives as a means and not ends, they said. On the other side, some developmental biologists say that there are not serious moral problems at all raised by cloning organs. If the donor is never sentient to begin with, they ask, what could be the harm?

Let us recall the point about the infertile couple. On this point debates have paid insufficient attention to the current strong social trend towards a fanatical desire for individuals not simply to have children but to ensure that these children also carry their genes. It is true that human descent is not only biological, as it is in all other species, but also emotional and cultural. The latter is of such importance that methods of inheritance where both parent genes are not transmitted such as adoption and insemination with donor sperm - are widely accepted without any major ethical questions being raised. But today's society is characterized by increasing demand for biological inheritance, as if this were the only desirable form of inheritance. A person's personality is increasingly perceived as being largely determined by his or her genes. Moreover in a world where the culture is increasingly internationalised and homogenized people may ask themselves whether they have anything else to transmit to their children apart from their genes.

The implications of cloning technology go much further, opening up new avenues of research in cancer, development, and even ageing. Dolly forces a reexamination of what it means to grow old, for although she was a newborn, her DNA, taken from the donor cell, was almost 6 years old. Whether welcomed or feared, cloning in 1997 forced scientists and the public alike to rethink their basic ideas about life, and to confront the implications of our growing ability to manipulate life's blueprint. To a startled public, Dolly made the horrors of science fiction clones seem all too possible.

If she could be cloned from an udder cell, people wondered, then why not a dictator from her nose, as was attempted in the movie *Sleeper*, or a spare self as a reservoir of replacement body parts. Such things are safely in the realm of fiction, but many people became concerned that cloning people would dehumanize our species and spoke out against it.

Professor Reiss characteristically prefers to provoke rather than pronounce. Let us imagine a situation where a highly educated couple in their forties, driving along with a 12-month old daughter in the back seat. The mother is a top reproductive scientist and the father is a highly respected ethicist. The car crashes and the baby dies. They take a sample of the child's tissue in the hope of cloning her. Given their ages, a clone is the neatest hope they have of having a child of their own. They realise that genes are not the whole story, and emphasize that the clone will never be identical to the child they have lost. "In many other culture, if a child dies early, the next child of the same sex takes on the name of the dead sibling. This is very common - there must be millions of children named in this way, and not all suffer psychological damage. Is not this a partial precedent?" writes Professor Reiss. Thus he puts us in tricky situation.

Indeed as with all breakthrough, it is not possible yet to foretell exactly where cloning will lead. Although initial reactions were universally against all human cloning, there have been whispers that such cloning may one day have a place in giving infertile couples genetic offspring. Whatever direction the research takes, however, the public is likely to demand a say in how cloning is applied. Biologists, and others will be wrestling with the implications of the birth 'Dolly' in a barn for years to come.

Social and Scientific Priority

By now it has become obvious that there is a tension between the freedom of science and the social responsibility of scientists. The question arises: can scientific liberty be absolute? There is no gainsaying the fact that no research is neutral and its potential social and moral impact should be considered from the outset. Scientific freedom should not be given priority over risks to safety or human rights. It is true that fundamental research itself has an ethical value. Still a balance has to be struck between the economic prospects of new technology and the human and social dimension.

To the point regarding priorities the relevant questions are: (i) Should society at this stage try to develop priorities in this area; (ii) (assuming an affirmative answer to the first) can society develop priorities? With respect to the first, I note only that many of the developments are so new that it is not clear that we are yet ready to set priorities. Genetic knowledge regarding cloning is at nascent stage whose implications have yet to sink in most of us. With respect to the second, at this very moment the willingness of our society to assign priorities is being severely tested. It is indeed inconsistent with our goal of individual self-fulfillment to suggest that society should deny to any individual the right to seek basic knowledge in any area. Still the setting of scientific priorities must have its foundation in social priorities. We acknowledge that research not consciously or explicitly related to any immediate practical application has on many occasions led to acquisition of knowledge which has subsequently proved to be of great importance in solution of social problems. Hence time is not ripe to give any conclusive answer. We may conclude our discussion by quoting a line of Paul Ramsey. He says: "men ought not to play God before they have learned to be men, and after they have learned to be men, they will not play God."⁵ We should not loose our nerve; we are just realizing how complex the situation really is.

NOTES

1. *Nature Biotechnology*, Vol. 15, 1997.
2. *The Times*, London, Source : *The Statesman*, Nov. 19, 2001.
3. *Nature*, Vol. 386, 13 March, 1997, p. 97.
4. *Science*, Vol 276, 30 May 1997, p. 1324.
5. *Ethical Issues in Human Genetics*, ed, by B. Hilton and others, p. 366.