

Reconfiguring Nature

Issues and Debates in the New Genetics

Edited by

PETER GLASNER
Cardiff University

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Sarah Franklin

One of the most interesting claims in Gina Kolata's *Clone: the Road to Dolly and the Path Ahead* comes at the very end of her highly informative and engaging narrative. According to Steen Willadsen, the embryologist whose work paved the way for Ian Wilmut's eventual success, humans may have already been cloned – accidentally. Now working part-time in a private IVF clinic in the United States, Willadsen suggests that a procedure for infertile men involving the removal of immature sperm cells that are then microinjected into the egg may result in the transfer of too much DNA. To mature, sperm cells must become haploid – they must shed one of their two sets of chromosomes. If they are immature when they are injected into the egg, and if the egg subsequently sheds its own nucleus, the resulting embryo will be a clone of the father. According to Kolata, Willadsen considers this occurrence unlikely, but not impossible. Indeed, he argues that it is simply a matter of time: “even the most unlikely event will eventually occur if you wait long enough”.

What would it mean if this were true, if a human had already been cloned? Probably very little, which is probably why no one seems to have noticed this rather startling anecdote in what is still (April, 1999) the only single-authored book available about the cloning of Dolly the sheep. Maybe it wouldn't matter, because that would mean the first human clone was created unintentionally, and it appears a great deal of concern about cloning is not just about a new-found technological capacity, but the forms of human intention and choice that will shape its future. Or perhaps it is because there is no easy way to verify Willadsen's speculation, and so it will never make the headlines.

Two years after Dolly, the cloning debate offers a benchmark case-study of late-twentieth-century public debate about reproductive technology and the new genetics. In particular, this debate offers a chance to observe the relationship between highly technical biological science and the arguments of a wide range of critics, commentators and policy makers. Traditionally, the authoritative account of some new biotechnological possibility, such as gene therapy or IVF, begins with a recitation of 'the scientific facts'. Hence, for example, almost all official reports from advisory committees begin with pithy summaries of current scientific understandings, like preludes to the subsequent symphony of diverse viewpoints and opinions. Such scientific descriptions are presented as the neutral, objective, factual basis that constitutes a shared, undisputed territory.

However, one of the problems with 'cloning' is that the birth of Dolly challenged the stability of biological facts. Dolly jumped right out of the biology rule book, and this is one of the features of her birth that has caused anxiety. Her very existence is counterfactual. Or at least it used to be.

Only one published response to the cloning episode has responded to this paradox, and that is the highly informative report by the Wellcome Trust Medicine and Society programme, entitled *Public Perspectives on Human Cloning*, which presents the results of a specially commissioned study. Mutating a well-established method of qualitative research, the focus group, by convening serial sessions of the same group and introducing focus briefings, which provided a sophisticated account of the science of cloning, this study presents 'the scientific facts' in a more fluid, relational manner. "The aim is to measure attitudes and any changes during a longer deliberative process", note the study's authors, Suzanne King, Ian Muchamore and Tom Wilkie. In turn, the report offers the intriguing finding that public acceptance of cloning is not enhanced by public understanding of the new genetics. In fact, the more people understood about the science of cloning (which they proved very good at assimilating), the more distrustful they became: "as participants' awareness increased so did their concern and apprehension", the study concludes. Participants in the focus groups viewed regulation with scepticism, and "were unconvinced public opinion would have any effect on

what research was done". While their expectations of medical research were "high", the study revealed frequent turns to "conspiracy theory" and found that "suggestions that secret research was taking place were common".

Two other British reports on cloning were also published in December 1998, from the joint Human Fertilization and Embryology Authority (HFEA) and Human Genetics Advisory Commission (HGAC) (1998) consultation exercise, and from the Farm Animal Welfare Council (1998). Both of these reports are more conventional, although the former offers a helpful summary of international law on cloning, and the latter provides a level of technical detail about the processes involved in animal cloning that is not found elsewhere. The HGAC/HFEA report presents the findings of a consultation exercise based on soliciting views from individuals and established organisations (200 responses were received) along with recommendations. The main proposal is a ban on cloning as a means of human reproduction, alongside a widening of licensing arrangements in order to explore the therapeutic benefits of nuclear transfer, including "the development of methods of therapy for mitochondrial disease" (this technique is both germline gene therapy and highly experimental). Similarly, the Farm Animal Welfare Council calls for a moratorium on the use of cloning by nuclear transfer in commercial agricultural practice, or its introduction as a routine technique, while calling for further research to improve this method's safety and efficiency.

Evident in all three British reports, and prominent in the 1997 Report of the US National Bioethics Advisory Commission on "Cloning Human Beings", are the problems posed by the term 'cloning' itself. As the HGAC/HFEA report puts it: "There are often difficulties over finding mutually acceptable and agreed definitions for even quite simple concepts". There are several reasons for these difficulties in relation to 'cloning'. To begin with, it has become an especially emotive term as a result of the image of clones and cloning from literature, such as Huxley's *Brave New World*. Gina Kolata helpfully documents more recent occasions in which cloning has "sullied science", such as the David Rorvik controversy in the 1970s. It is also technically confusing because 'cloning' is something of a basket category for a range of quite

different phenomena. Some of these are as uncontroversial and ubiquitous as mitosis – the most common form of organic reproduction, which is asexual, and which not only occurs among micro-organisms and plants, but among vertebrates, such as fish, reptiles and amphibians. Other cloning techniques, such as the splitting of an embryo in half, are both naturally occurring and technologically induced. With the development of modern molecular biology techniques such as polymerase chain reaction, cloning has arguably become the single most important research technique in contemporary biogenetic science. Twins can be described as clones, if genetic identity is the measure of what a clone is, but cloning is also used to describe complex procedures, such as nuclear transfer, a form of cell fusion.

Cloning by nuclear transfer does not involve the production of a new offspring from a single cell, or bud, of an adult, the way a gardener creates a new hydrangea from a cutting. Several individuals are involved in this form of reproduction, including the nuclear donor, the egg donor and the surrogate, or sometimes two surrogates—one to culture a large number of fertilized oocytes *in vivo*, and another to carry two or three blastocysts to term. Some developmental anomalies are associated with the use of nuclear transfer in sheep and cows, and many unknown factors are suggested by the very few live births that result, and the presence of deformities affecting some offspring that do survive. Technically speaking, it is somewhat misleading to refer to the technique that produced Dolly as ‘cloning’. As an eminent British biologist recently said to me, nuclear transfer is a very sophisticated piece of reproductive biology, but it is not cloning.

In the original article on Dolly in *Nature*, the terms ‘clone’ or ‘cloning’ do not appear. ‘Clone’ and ‘cloning’ were also not used by the research scientists Robert Briggs and Tom King for their famous experiments on frogs in the 1950s, in which they confirmed the viability of what they called “nuclear transplantation” (although John Gurdon did use the term ‘clone’ to describe his frog experiments in the 1960s). Arguably, the term ‘cloning’ belongs less to scientific than to popular discourse, where it has increasingly come to be used as a condensed signifier for the potential of genetic science to produce unnatural kinds. ‘Cloning’ may be a term scientists such as

Wilmut deliberately avoid, precisely because it has become a kind of popular shorthand for science ‘gone too far’. Like the term ‘test-tube babies, which is seen to carry a negative connotation, ‘cloning’ is associated with iconic images of Frankenstein monsters, Nazi medicine, and *The Boys From Brazil* – which are among the most commonly encountered idioms of public scepticism and distrust toward science, and especially the life sciences. This capacity for clones and cloning to function as potent symbols of the dangers of modern science, and indexes precisely the public mistrust of scientific research documented in the Wellcome report. As Gina Kolata writes: “Today, the public is both drawn to, and often frightened by, the new powers of medicine and technology”. In contrast to the generally positive and hopeful view of science and scientists in the decades just after the Second World War, which saw the discovery of penicillin, the development of vaccines for smallpox and polio, and the dawn of the space age, Kolata argues, “this is an era that many have described as anti-science”, in which the public increasingly “views scientists as isolated technocrats who rather high-handedly attempt to argue from positions of authority”.

The visceral and volatile effects of the very term ‘cloning’ may be one source of the unexpected public reaction to the birth of Dolly the sheep. At the Roslin Institute, for example, public reaction to Dolly came as a total surprise. Especially in the wake of the dim fanfare surrounding the announcement of the births of the cloned sheep Megan and Morag a year earlier, no one in out-of-the-way Roslin anticipated even vaguely the scope of international response, its speed, or its intensity. Understanding the impact of cloning requires appreciating its symbolic capital, as well as its biological significance. Indeed, the cloning debate could not have provided a better indication of how powerfully ‘biological facts’ operate as natural symbols stabilizing the order of things, or destabilizing them. It requires a U-turn from the literal to the symbolic to explain how quickly a novel form of impregnating a sheet could generate such intimate anxieties about human kinship, personhood and identity.

Once Dolly had become international headline news, the stage was set for what has become not only a public debate, but a global one, with echoes of the ‘miracle birth’ of Louise Brown in 1978. Since Dolly was announced two years ago, the cloning of mice,

monkeys, cows and even humans have been announced from laboratories in Europe, North America and Korea, and governments around the world have strained to keep pace with the rapid developments in the field of cloning. A book that is yet to be written could very productively compare these international responses at the level of media and legislation.

Three anthologies published in the USA in 1998 offer a selection of pieces by various commentators on cloning and public reactions to it, and give a good sense of the range of views expressed both in the media and before Congress. While many of the positions are familiar, there are some interesting juxtapositions. In *The Ethics of Cloning*, published by the American Enterprise Institute (Kass and Wilson, 1998), for example, two conservative academics offer opposing views of cloning – both based on the ‘natural facts of family life’. For Leon R. Kass, cloning is wrong because it violates “the profundity of sex”. As if writing in support of a fundamentalist Christian view of life as a divine gift, only with a lot more emphasis on gametes instead of God, Kass argues that the culmination of coitus in procreation is a deep and meaningful mystery, the sanctity of which we violate at the cost of our very humanity. Right back at Kass comes James Q. Wilson, arguing it is in fact not the heterosexual bond, but the mother-child bond that is “the most powerful in nature”, and consequently cloning is fine, as long as it is restricted to within marriage. This text illustrates neatly the flexibility of biological determinism as symbolic currency, in perfect concert with the constant remoulding of biology itself to which it responds.

The bioethics community is represented in *The Human Cloning Debate* (McGee, 1998), edited by Glenn McGee, a member of the Penn Centre for Bioethics. Two opening chapters, by *Nature* journalist Potter Wickware and philosopher Ina Roy, offer introductions to the science and ethics of cloning, respectively. Wickware’s busy tour of biology is full of vivid metaphors for DNA and cloning (he asks “is a reissue of David Copperfield using the original 1850 plates new or old?” and concludes with a demonstration of the difference between genetic essentialism prominent in many discussions of cloning). Ina Roy stresses a fundamental difference between consequentialist approaches to

ethics, which stress outcomes, such as utilitarianism, and ‘deontological’ frameworks, which stress intention, as in the work of Immanuel Kant, who stressed the morality of ends in themselves. John Robertson, a legal scholar, combines these two approaches in his argument that cloning should be allowed as an expression of procreative liberty for couples, as long as they intend to rear the child themselves, thus limiting the practice to those with good intentions, while preserving the maximum benefit for the widest range of people, including the child. Arthur Caplan considers the question of whether ethical objections have ever stymied scientific and technological progress, arguing that, while it is difficult to identify a case where they have, this is perhaps to underestimate the slow effect of ethics in shaping public policy, which is he suggests “more akin to detecting the processes of evolutionary change, being aware of barometric pressure, or being alert to the presence of gravity”. If there were ever a better case for cloning for ethics to catch up with public policy, he suggests, it would be hard to find. A chapter by Glenn McGee and Ian Wilmut argues for an adoption model to prepare the way for cloning as a means of creating new families. Philip Kitcher also supports cloning-for-families on behalf of stable lesbian couples who would like to have a child, and who could, if one partner donates the egg and the other the nucleus, more closely emulate the heterosexual ideal of conjugal and procreative unity (arguably not the most widely shared aspiration among lesbian couples). This volume also reprints the Leon Kass essay, “the Wisdom of Repugnance”, as well as several short anti-cloning pieces representing religious traditions including Islamic, Judeo-Christian, and Buddhist perspectives, and the Pro-Life movement. A critique of religious dogmatism by bioethicist Ronald Lindsay concludes this section of the book, which itself concludes with a short fictional piece by Richard Kadrey. Despite many typographical errors and a hurried unevenness of tone and clarity, this is a useful anthology that contains many pieces written for submission to Congressional hearings and consultation exercises, as well as helpful extracts reprinted from the Report of the National Bioethics Advisory Committee (NBAC).

Clones and Clones: Facts and Fantasies about Human Cloning (Nussbaum and Sunstein, 1998) is also a US-based publication,

edited by Martha Nussbaum and Cass Sunstein. In this volume, too, are reprinted extracts from the NBAC report, which has been widely praised for its clarity and scope. Helpfully, this volume also includes the original *Nature* article, "Viable offspring derived from fetal and adult mammalian cells". Twenty additional chapters cover a wider range than the McGee anthology, including contributions from sociology, lesbian and gay studies, feminist theory, and history, as well as the staple triumverate of theology, philosophy and law. In stark contrast to the telegraphic style of Wilmutt and his colleagues, biologist Stephen Jay Gould provides a characteristically lucid, informative and engaging chapter in which, like Lewontin and Wickerware, he reminds us of the many differences between genetics and biology. Protesting that the nature-nurture dichotomy is as unhelpful as it is tenacious, he compares the pendulum-like swings of public opinion from one extreme to another to the vagaries of fashion, and argues we are currently witnessing a resurgence of genetic essentialism. Unfortunately, few of the chapters in this volume are as well-written or thoughtful as Gould's. Richard Dawkins writes about a bad experience he had on a radio talk show, which confirmed his views that many religious spokespeople are lacking in intelligence. Andrea Dworkin imagines cloning her cat but decides it would be complicit with "the absolute power men have wanted over reproduction and have destroyed generations upon generations of women to approximate". William Eskridge and Edward Stein defend cloning as "the next logical step in queer people's formations of families of choice", and thus a more "queer friendly society" in general. Incredibly, Eric and Richard Posner provide a numerical tabulation of "the private benefits and social costs of human cloning", illustrated by a table entitled "Genetic endowment of offspring under alternative reproductive regimes" (which demonstrates, in economic terms, "the payoffs" of different kinds of mating).

Wendy Doniger's historical account of proto-clones in mythologies and traditional beliefs about conception is indicative of how well the cloning question is served by widening the frame historically and culturally. William Miller's chapter on sheep jokes, cloning and the uncanny is also refreshingly original, and suggests that another worthy project would involve collecting all of the sheep

cartoons from the past two years. On the whole, however, beside too much earnest philosophical explanation is too little attention to cloning from further afield, from other disciplines, and in particular from a cultural perspective. Popular film, for example, is full of images of clones, as is literature and science fiction, and these sources can be very productively explored (although it should be noted that fictional pieces are included in both anthologies). Contemporary art is another source of powerful imagery of changing definitions of life and death, such as the work of Damien Hirst or Helen Chadwick, in which sheep and human embryos are respectively deployed in pieces directly addressed to science. Other gaps are theoretical. It is odd, for example, not to see at least some reference to the work of Foucault, one of the century's most prominent interpreters, on biopower and the changing interrelation of life, labour and language evident in the new genetics. Curiously, the fact that the cloning of Dolly was financed by a pharmaceutical corporation also goes largely unexamined, as does the creation of her transgenic companion, Polly, and the unusual forms of property protection through which they are both owned as bio-wealth.

Without undervaluing some truly thoughtful work and some excellent science writing, the cloning debate as it appears in these volumes contains many arguments we have seen so often before they have become clichés. This is especially ironic, given the way in which cloning has itself been decried as a source of endless similarity, the reduction of individuality and the antithesis of creativity. Repeated again and again, concepts such as procreative liberty, the sanctity of the nuclear family, the right to a unique genetic identity, the value of scientific progress, the need for rational argument, and the maximization of personal freedom and happiness end up sounding more like stereotypes than analysis. At the core of the cloning debate is a familiar question about limits: everyone agrees we should have them, but it is very hard to agree on how they will be defined, by whom, and on what terms. Some people, like Leon Kass, seem to think this is almost a matter of instinct. Others, such as Dawkins, want only pure reason as a guide. Historians look to the past, philosophers imagine the future, lawyers rehearse courtroom dramas. One begins to feel it is time to start being a bit more imaginative.

The appealing feature of the Wellcome report is that it begins and ends in uncertainty: there is something very appropriate and reassuring about examining how much we do not know about public responses to Dolly. One of the main suggestions of the Wellcome report (which, like all qualitative research, is not representative, but may be indicative) is that members of the British public believe they are largely ignorant about what is going on in science laboratories. They are distrustful, and do not believe what they are told by the government, by policy makers, or by regulatory bodies. They feel scientists are themselves often high-handed and dismissive of their concerns, and they feel their own opinions matter very little in debates over controversial subjects such as cloning. Why is this message important to the debate about cloning, or scientific innovation more generally? Because it suggests that the problem is not that a new kind of cloning has become possible, but that the social process of coming to terms with such developments is compromised by the reproduction of persistent forms of inequality and exclusion. This view is also supported by the Farm Animal Welfare Council, who recommend "as a matter of some urgency" that, in addition to promoting public understanding of issues such as cloning, it is also necessary "to improve politicians' and scientists' understanding of the fundamental public concerns which undoubtedly exist".

The inequality between scientific expertise and 'lay' opinion is re-enacted in the generic format of official reports, which privilege authoritative versions of scientific facts before turning to the controversial matter of how to govern them. This format is itself a kind of representational technology, not only securing a prominent boundary between science and its publics, but sending a message about the power relations that structure their relation. Most accounts of cloning define it in relation to the emergence of a new form of scientific and technological capacity.

But 'the cloning debate' is about society, not technological systems. Many people who have no scientific training whatsoever may well know a great deal about what society is, how they think it should be, and how people should treat one another. Many people with no scientific training have children, we all have parents, it matters to most of us how animals are treated, we know not everyone

thinks the same things we do, we agree there have to be certain rules about how things are done, even if they sometimes are broken, or need to be changed.

The Wellcome report thus identifies an important and persistent social deficiency, and it is to be commended both for documenting the degree of public mistrust of genetic science, and for developing means of exploring it in greater depth. Scientists who already feel beleaguered, misunderstood and underfunded may not embrace this finding, but it is significant the study is itself scientific: it is empirical, analytical and rigorous. In a sense, the Wellcome Trust conducted an experiment, and they have certainly identified some significant findings. An implication of their findings is that the 'problem' posed by cloning is often misplaced: the real challenge is not what to do about it, how to regulate it, whether to permit it or not, but how more democratically to conduct a less exclusive conversation about such questions. And this is clearly something very difficult to do, almost unimaginable, like getting rid of prisons (even though everyone knows they don't work). But then, the first step to cloning was imagining something very clever that no one else thought would ever succeed.

Amidst the current debate in Britain about genetically modified foods, and the continuing BSE controversy, it is clear that agricultural technologies are becoming a subject of increasing public concern, and this point is especially clear in relation to the cloning debate, which concerns a technique developed for sheep breeding. In contemporary British society, as elsewhere, the politics of food production, animal breeding and human health have become profoundly inter-woven along some novel connecting threads, such as Monsanto's relationship to chocolate-covered biscuits, Prince Charles's affection for beef-on-the-bone, and a frozen cell line's connection to a young Scottish ewe. These are the same newly meaningful connections that lie at the heart of a new politics of the supermarket aimed at goals such as preserving old English orchards, through mechanisms such as the Soil Association's kite-mark for organic foods. At the root of such quotidian consumer activities as selecting organic foods (now a world-wide consumer trend) is a sensation of permeability and exposure to risk – to hidden risks that are only further obscured by a noisy gaggle of befuddled experts. It

is a mistake to discount such concerns as manifestations of ignorance or misunderstanding. It is equally a mistake to underestimate the importance of an emergent symbolic vocabulary in which cattle feed stands for brain diseases or soy beans represent corporate conspiracies. The way in which biological science has increasingly become part of a sophisticated public language of protest and critique directly challenges the view that expert knowledge can be siphoned out of the fray and set alongside it, or above it, as though shepherd to an unruly flock. That separation is as out-of-date as the idea that you can't combine an adult cell nucleus with an egg to produce a higher vertebrate. The fusion has happened, and like Dolly, the newly biologically literate British public is stamping its feet when it is annoyed with its dinner.

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