How to Clone the Perfect Blonde

Making Fantasies Come True With Cutting-Edge Science

by Sue Nelson and Richard Hollingham

Chapter 1

Looking for love and affection? Know exactly what you want but haven't a clue how to get it? Relax. Science has the answer. All you have to do is clone the perfect blonde. Or brunette. Or redhead. You decide. With all the developing technologies of the twenty-first century at your disposal, think of the happiness cloning could bring. Provided you read the small print.

In a world where mankind's collective brainpower has invented computers, space travel and the self-cooling beer can, it makes sense to use another scientific advance for an equally life-enhancing experience. So whether your idea of perfection is a blonde or brunette, male or female, cat or dog, by understanding how to clone you could be one step ahead in that search for the perfect lifelong companion.

If playing God with genetics seems a radical way to avoid the angst of the dating game, it's time to wake up, smell the decaffeinated coffee and consider the less scientific alternatives: a course of evening classes or - if you're prone to gambling - a blind date. Even dating agencies can be too risky. Some may claim to have a scientific approach yet most rely on statistics. Tick the box and find a match. Hardly rocket science. And when that slim, blonde, blue-eyed Mensa member with a good sense of humour does reply, there's no guarantee this perfect match won't turn out to be a contact-lens-wearing brunette who lied about the IQ (don't we all) and will go to fat in five years' time (ditto). Imagine, then, if you could specify hair or eye colour, intelligence and body type by genetically selecting your ideal companion. Cloning could make this possible.

Still nervous? Then first some reassurance. Cloning, it has to be admitted, has one or two negative connotations. Mad scientists attempting to alter the world's natural order, the creation of cloned armies, babies on a conveyor belt - that sort of thing. The root cause of many of these fears is often science fiction. When genetic technology isn't being abused for personal gain (see origin of imperial storm troopers in Star Wars Episode II), it's being used to produce miniature Hitlers in the laboratory equivalent of a grow bag (see The Boys From Brazil).

However, as everyone except conspiracy theorists will concede, Hitler is dead. It's an important point to mention, because clones can only be made from a living cell. Cloning another fuhrer is therefore a technical impossibility. More importantly, even if, for argument's sake, Hitler had faked his own death and is living in a rest home in Argentina, there is no guarantee that his clone would grow up to be a fascist warmongering vegetarian. Instead, the Hitler mini-me, through any number of life-altering events, may well be a meat-loving pacifist with an aversion to facial hair. Why? Because the environment we grow up in plays an important role in why people behave the way they do.

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It is difficult to examine the full effect of environment when so many of us, despite living very different lives in different parts of the country, all watch the same television programmes, read the same newspapers and listen to the same radio stations. Yet there have been revealing studies of twins who had been separated through adoption or fostering. Some twins, even after living apart with no knowledge of the other's existence, were found to have many common events in their lives that suggested their shared genes affected the way they behaved. Other studies found that adopted children whose biological fathers were criminals are more likely to become criminals themselves, despite not living with the criminal parent.

So genetic inheritance is in some ways the key to who we are, but how we are brought up also plays a significant part in shaping our lives and behaviour. Scientists are now beginning to incorporate environment in genetic studies. It is possible to witness how environment affects people simply by watching parents bringing up children. On the whole, a loving, caring, nurturing environment produces a loving, caring well-balanced child - at least until the teenage years kick in. Childcare books promote certain types of behaviour and non-violent forms of discipline for exactly this reason. If you rear a child in an atmosphere of fear and violence it can have a negative affect on that child for life, even influencing the types of relationships he or she enters into as an adult.

Interestingly, violence is a form of social behaviour that straddles both our genes and our environment. Research has linked violence with genetic components, nicknamed the aggression genes. This finding led one lawyer in the United States to mount a genetic defence for his client, Stephen Mobley, in 1991. Mobley was sentenced to death for shooting a pizza store manager in Georgia. As the murderer's family had a history of genetic illnesses and criminal behaviour, his lawyer claimed that Mobley was 'born to kill'. The appeal failed and Mobley remains on death row.

In 2002, a study published in the journal Science looked at a particular gene associated with aggression for a thousand children over a period of 30 years but also took the environment into account. It found that children whose genes produced low, rather than high, levels of a certain enzyme (monoamine oxidize A, or MAOA for short) were most likely to be antisocial in later life, but only if they had been maltreated or abused. This crucial finding proved an association between genes and environment which, if you think about it, makes perfect sense.

There is no avoiding the fact that nature and nurture both mould our lives. Scientists agree that it is a complicated mix and no one knows all the answers. What it does mean is that even if a Hitler clone could be successfully grown, the way the clone was brought up could easily upset that delicate recipe for a dictator. This is something The Boys From Brazil's author, Ira Levin, also considered, suggesting that the teenage Hitler clone created by Nazi doctor Josef Mengele had to have a similar upbringing to the original Hitler for the cloning to be a success. The same argument applies to anyone else's clone because a clone will be a clone not a copy. And while we're on the subject of what is or isn't possible, let's get on to the subject of Jurassic Park right now.

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Michael Crichton's Jurassic Park is a great book and it made an equally entertaining film. Its premise was simple. Extract 'dino DNA' from dinosaur blood in the gut of a mosquito preserved in amber, combine with amphibian DNA (the only type of animal known to regenerate its own limbs), add a pinch of salt, heat at gas mark 4 et viola! One re-created cloned living breathing dinosaur. Can it be done? In a word, no, because unless a living dinosaur cell is discovered, the likes of T Rex and other 1970s rock bands will never roam the Earth again. Sorry.

Send in the clones

People create clones - and eat clones - on a massive scale and on a daily basis. The person sitting next to you may even be a clone because, in 2000, more than 6,000 human clones were born in the United Kingdom alone. These clones have another, more familiar, name: identical twins.

This seems as good a time as any for a quick refresher course on sexual reproduction. For the whole process to begin, a male sperm must be introduced to a female egg. Assuming that no scientific assistance is needed, this will involve more than a handshake (no innuendo intended). Anyway, we're not going into the nitty-gritty of exactly how sperm is introduced into an egg except to say that if the two eventually get along and share the same interests, they fuse together. When the sperm penetrates the egg, fertilisation takes place and that wonderful thing called life begins. The fertilised egg cell begins multiplying into two, four, eight, sixteen cells, and so on to form an embryo. Nine months later, friends and family gather round a crib to decide whom the baby looks like.

Scientists have yet to explain why most newborns resemble Winston Churchill but, genetically speaking, the baby is a genuine 50:50 mix of its parents' genes. Half the genes are from the woman's egg; the other half are supplied by the man's sperm (which, under a microscope, all look like Woody Allen in a swimming cap). These hereditary genes determine a number of the child's key characteristics, such as eye colour, size of ears and tendency to go bald, wear an overcoat and smoke a large cigar. All siblings have the same proportion of genes from their parents but the mix will be different each time - in the same way you can never quite match a pot of paint several years after redecorating. Others have likened human reproduction to shuffling genes like a deck of cards, with the resulting hand containing equal number of cards (or genes) from each parent.

Identical twins, however, are a perfect genetic match. They occur when a single fertilised embryo splits into two and each embryo develops separately. This happens naturally in about one in every 60 human births, although the odds are higher if twins run in the family. The reason, by the way, that more non-identical twins are born through in vitro fertilisation, or IVF (where fertilisation takes place artificially in a test tube - vitro is Latin for 'glass'), is that multiple eggs are fertilised to give better odds of implantation in the womb.

While identical twins are genetically identical, they are not always physically identical - they can vary in height and appearance. Identical twins don't share the

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same fingerprints either, since these are determined in the developing embryo, but they do share the exact same genetic material and this makes them clones.

The artificial creation of clones is also not as unusual as you might think. Whenever a gardener takes a cutting from a favourite fuchsia plant to grow a new one, for example, a clone has been created. This cloned fuchsia is genetically identical to the parent plant, as are any other plants produced from cuttings in the same way. Even the word 'clone' originates from the greenhouse. At the beginning of the last century professor Herbert Webber, a plantbreeder and member of the US Department of Agriculture, needed a word other than bud, graft, runner or cutting to describe the plant sections that are removed for transplantation. A Greek dictionary must have been close by, as he decided upon 'clon' from the Greek word klon, meaning 'twig'. The word 'clone' soon followed. In the 1950s the meaning of the word came to extend beyond plants to living creatures, but before that it was used exclusively to describe crops, such as strawberries, that reproduce asexually and generate plants that are genetically identical to the parent.

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