

Sex in the Future: Ancient urges meet future technology

As humankind begins the twenty-first century armed with ancient urges and cultural bric-a-brac from millennia of biological and social evolution, the brave new world of reproduction that beckons is very different from the one left behind. Imagine the scenes. A woman persuades her teenage daughter to be sterilised and to bank eggs for reproduction by In-Vitro Fertilisation (IVF) later in life. A mother and son sit in a *Reproduction Restaurant* choosing his ideal gamete partner from an Internet database. A man who cannot produce sperm sires a child on the other side of the world—with another man. Is this the future of human reproduction? Is this what will happen when ancient urges meet future technology?

'Ancient urges'—a powerful phrase conjuring up thoughts of wanton promiscuity and public sex. Of course, most of us don't run our reproductive affairs this way—but the beast is in us nonetheless, a sexual legacy from the past million years. Yet in the twenty-first century, the old animal within us is under threat. How *will* the beast cope with those developments that almost without warning have become part of our reproductive destiny: IVF, cloning, surrogate mothers, surrogate testes, nucleus transfer, gamete banks and frozen embryos, or even with simple paternity testing and child support enforcement? The prediction is that these developments will trigger a social revolution as far-reaching as any so far in human history.

Two major developments are expected. First, lone-parent families—and the blended families that arise when lone-parent families cohabit—will become the social norm. Secondly, the divorce of sex from reproduction—which is already *nisi*—will become absolute.

The lone-parent society—a new era in human social evolution

The 20th century spawned an institution—the lone-parent family—destined to change the face of society. One in five children already live in such families in Britain and the United States and everywhere the proportion is increasing. If the trend continues, lone-parent families—over 90 per cent of which have lone-*mothers*—will soon replace the traditional nuclear family as the social norm.

It is true that current social and political attitudes to lone-parent families are negative. It is also true that lone-parenthood for the moment has undesirable consequences *on average* for both mother and children: survival, health, fertility, performance at school and delinquency rates all suffer. But a disadvantageous past and present does not necessarily herald a disadvantageous future. Biologically, the environment is changing—and it is changing in a way that will make lone-parent families as successful as any institution that has gone before.

To understand this change, we need to ask why in the past lone-mothers have often struggled to match their nuclear counterparts. The answers are obvious—weaker finances and elusive, unaffordable day-care. When these financial factors are under control, the negative facets of lone-parenthood disappear. It is not lone-motherhood *per se* that causes the problems, but the lack of money and help. Children do not suffer

from the simple absence of a live-in male. There are no negative social or psychological consequences when children are raised by a financially secure mother or by a mother and grandmother. Nor does *how long* a live-in adult male is missing make any difference. We should not be surprised; we should not exaggerate a man's traditional contribution to parenthood. Of 80 non-industrial human cultures in a world survey, fathers were 'rarely' near their infants in 18 and were 'close' to them in only 3. Even then, fathers spent only 3 hours per day with their children. In industrial societies some fathers may spend as little as 45 minutes *per week* in direct interaction. A man's main contribution to successful parenthood is not via his presence or masculinity but via the resources he generates.

Lone-parent and nuclear families are *biological* institutions and these mostly form under certain conditions and disintegrate under others—whatever moralists, traditionalists and legislators might wish. To the romantic, men and women live together and sleep together because they love each other. To the cynical biologist, however, they do these things to make it difficult for their partner to have sex with anybody else. Nuclear families form when females need male live-in help to raise offspring and males need to protect sexual access and paternity via mate guarding. In humans, mothers are vulnerable to being left destitute and men are vulnerable to being cuckolded. This vulnerability—mutual fear of both infidelity and desertion—is biological cement, binding couples together. Independence is the opposing force, weakening couples' biological bonds. Beyond a certain point, these bonds disappear altogether—and this is where the modern environment is leading. *Child Support Legislation* will free women from the fear of destitution. Routine *Paternity Testing* will free men from the subconscious fear of unknowingly raising another man's child. Together, these two developments will free people to pursue their *individual* ambitions, hastening the demise of the nuclear family and promoting the lone-parent family still further. We stand on the brink of a new age in human social evolution—an age in which lone- and blended-families, not the nuclear, will dominate society.

There are two main groups of lone-mothers: those who are the victims of rape, desertion, or separation and those of independent means who choose lone-parenthood, are happy with their situation, and can afford to raise their children without disadvantage. Currently, the former, more vulnerable, group is in the majority. Over the next few decades, though, the second group should mushroom—because the main factor that has recently changed and will change even more is the level of women's financial dependence on *living* with a man.

Which brings us to a modern irony. The crusade for Child Support enforcement had an undeniably punitive element, aimed at making men suffer when they left their families. In all the polemic, it was expected that Child Support legislation would pressurise nuclear families into staying together. In the hands of biological urges, however, Child Support and the increasingly associated Paternity Testing have the opposite effect. No longer will a woman need to tolerate an inept, perhaps violent, and increasingly undesirable man simply to avoid becoming destitute. Child Support legislation will see to that. No longer will a man need to spend his life with a woman simply to guard against cuckoldry. Paternity Testing will see to that. Biological cement will crumble and couples will simply separate once initial feelings of love and excitement disappear.

Today, the lone-parent lobby is still only a minority voice—but it is growing louder and will soon crescendo. Eventually lone-parents will become the bulk of the electorate; governments will become *their* hostages. From that moment, lone-parent families—and the blended families that arise when lone-parents cohabit—will become the social norm, heralding a new era in human social evolution.

Divorcing Sex from Reproduction

But the collapse of the nuclear family is only the beginning of the social revolution. The burgeoning lone-parent society will find that technological developments ease reproductive life, enhancing rather than eroding the new social structure. Most importantly, these developments will inevitably lead to foolproof contraception and a final separation of sex from reproduction, fewer and fewer babies being conceived via intercourse.

The chance to completely sever sex from reproduction is the jewel in the future's creative crown. Sex can become purely recreational—and reproduction can become purely clinical, the product of In-Vitro Fertilisation (IVF). Already over half a million people—the oldest now 22—owe their origins to a Dish rather than parental union, and like the first swallows of spring they are the harbingers of a new summer. Modern reproductive technology is leading us headlong into a new phase of human social evolution. How will we cope? Is this the end of relationships as we know them? Undoubtedly, we *shall* cope—just as we coped with the contraceptive pill, artificial insemination and IVF in the Twentieth Century. In fact, *psychologically* the separation of sex from reproduction needs no adjustment. It is nothing new. The human psyche has *always* been able to divorce the two; any link seeming so tenuous that our ancestors had more trouble connecting than separating them. We can easily see why. In cultures lacking contraception, an average of about seven children is produced from about 3,500 acts of intercourse—a link of around one in 500. Little wonder, then, that to many of our ancestors a relationship between the two seemed absurd.

Our own society has recognised for a few millennia that *some* link exists between sex and reproduction. Even so, we acknowledge that our sexual urges are separate from and much more frequent than our urges to reproduce. Hence the popular notion of sex as a recreational activity. But any claim that humans are the only species for which sex has a recreational role is biological nonsense. Lions, for example, have sex 3,000 times for the production of each lion and our two nearest relatives, chimpanzees and bonobos—the latter in particular—are forever having sex. For them, intercourse is virtually a greeting—a handshake. Clearly, natural selection weakened the link between sex and reproduction long before technology came on the scene. All that modern technology has found the potential to do is sever the link completely—something natural selection could never quite have managed.

Assisted conception techniques—IVF, surrogate motherhood, surrogate ovaries and testes, gamete manufacture and cloning—herald an end to infertility. That is, after all, why they were developed in the first place. But just as bottle feeding began as a treatment for those who *could not* breast feed, then rapidly transformed into a commodity for those who *did not want to* breast feed, then so too will assisted conception techniques be grasped by lone-parents and transformed from treatment into commodity. The process has already begun—and before long the trickle of single women to sperm donor and IVF clinics will become a flood.

The BlockBank system

The future separation of sex from reproduction will be the technological end-point of a drive for foolproof contraception and family planning that gained increasing momentum during the past century. Even this drive, though, has its roots firmly embedded in our biological past. Life has always been a roller-coaster of highs and lows, good times and bad—and parenthood has always been a demanding occupation. The very effective system of family planning that natural selection produced for our primate ancestors and which we inherited was to intersperse periods of *stress-induced*

infertility during the hard times with periods of high fertility during the good times. Until the twentieth century, stress was most women's only contraceptive—as to some extent it was men's. Nowadays, though, couples naturally prefer to rely on biotechnology than stress—but do so at a price. Current contraceptive methods are either decidedly 'unfriendly', inefficient or a danger to the user's health. We might even predict that barrier methods can *never* be user-friendly and chemical methods based on altering the body's hormone or immune system can *never* be free of health risks.

Part of the problem for contraception technology has always been the primary need for users to retain their fertility so that they can reproduce later if they wish. Modern reproductive technology, though, could make this requirement redundant, thus paving the way for a completely new approach to contraception and family planning. Combine the demand for assisted conception with that for a foolproof, user-friendly and health risk-free method of contraception and we produce the *BlockBank* system

By the middle of the twenty-first century, men and women will *bank* (i.e. cryopreserve or freeze-store) their sperm or eggs at some time early in life and have their tubes (vasa deferentia or oviducts) cut, tied or otherwise *blocked*. The avoidance of unwanted pregnancies, unwanted abortions—and unwanted Child Support Payments—will be guaranteed. At the same time such people will give themselves total freedom to have a family *anytime* they wish—and increasingly with almost *anybody* they wish. To have a baby, all a person needs to do is arrange to have their gametes united with those of the person of their choice via IVF. The age-old search for a gamete partner (the genetic other-parent of one's next child) would take on a radical new meaning. And in the hands of the ever-more competent medical technology of the future, the result will be greater *sexual freedom* and an ever-burgeoning range of *reproductive choices*.

The way will be open for individuals to become lone-parents by *commissioning* children when and with whom they want or can afford. They could negotiate to obtain gametes from people they know or—according to finance—from the rich and famous, and then use them to reproduce via IVF with their own gametes. The freedom to integrate family planning and mate-choice with a successful career will become total.

But if a person is commissioning gametes but not necessarily living with the baby's other parent, there is little incentive to have every child with the same person. Increasingly, each person's family will be from a mixture of 'second' parents. And because the technology of gamete manufacture will allow sperm to fertilise sperm and eggs to fertilise eggs, for those who wish it homosexual reproduction could be commissioned as readily—though probably not as cheaply—as heterosexual.

Of course, love, pragmatism and the need for companionship will often lead two (or more) lone-parents to live together to raise children within blended families—as many do already. Also as now, cohabiting couples will probably have sexual relations—but because of the *BlockBank* system they won't necessarily have children ('mutuals') together. This separation of sex from reproduction, combined with computer technology, will open up a bewildering range of choices.

In the United States, donor sperm and eggs can already be obtained with relative ease and couples living elsewhere are taking advantage of the fact. Some services even combine express-mail delivery with World Wide Web sites that allow prospective parents to screen for donor characteristics such as height, weight and eye colour. Assisted reproduction technology is already a growth industry in the United States thanks to the market forces of supply and demand.

In the future, most such gamete selection is likely to take place over the Internet. Not least because there will be a need for worldwide regulation of the selection process—

for example, to prevent the biological effects of inadvertent incest. The establishment of something like an international *Gamete Marketing Board (GMB)* would seem to be essential. Then, just as the twentieth century saw the formation of Internet Cafés, so too could the commissioning process of the twenty-first century literally see the establishment of *Reproduction Restaurants*. Places where people could go to eat, drink and browse their reproductive possibilities—and maybe even commission a child from the GMB web-site over a gourmet meal and a bottle of wine.

Imagine the options. Should a person reproduce with somebody he or she knows—a joint venture? Or should they go it alone and purchase the gametes of somebody famous—or even dead? Should they reproduce with somebody the same sex as themselves or the opposite sex? If they are female, should they gestate the child themselves or should they commission a surrogate or hire an artificial womb? And when should they have their first child - in their teens, or in their twenties, thirties, forties, fifties—or even sixties? Advertised on the Internet and browsable from *Reproduction Restaurants*, people's reproductive choices will be almost endless—as, of necessity, will advice and counselling.

Men will be able to commission a family—by purchasing a woman's eggs from the GMB and hiring a surrogate mother—just as well as women. Biologically, though, the beast within men is programmed more for itinerant sexual activity than for long-term commitment to parenthood. For most men, reproduction will stem from negotiation—persuading women to purchase their sperm in exchange for financial support (after paternity testing). Famous men—and women—though, will have little need of such negotiations. Families will be scattered worldwide as far-flung admirers forego child support in exchange for the chance to purchase their gametes.

The process raises many intriguing questions. Will genetic parents want to keep in touch with their global family? Will people show an interest only in the children *they* commission and raise—or also in the children other people commission from them? What financial and contingency arrangements will be needed for the raising and safeguarding of commissioned children? Should people pay for the maintenance of children other people have commissioned from them or only for the children they themselves commission? Would all reproduction become a matter of financial negotiation before the child's conception is initiated?

In principle, the BlockBank system is the perfect form of family planning—no unwanted pregnancies, but instead babies to order. In addition, to judge from people who have already been blocked, there should be none of the side effects associated with modern contraceptives. Maybe this isn't surprising, because unlike other modern forms of contraception, blocked tubes are 'natural' in at least one sense—they do occur naturally! Around three per cent of men and women inadvertently acquire blockages via urogenital infections. And until such people discover that they cannot reproduce, they have no indication from their libido, sexual performance, health or general behaviour that their tubes *are* blocked.

Of course, it is easy to imagine problems with the BlockBank system—but are they real or do they simply stem from a reflex distrust of anything new? For example, as with any banking system men and women might not trust the Gamete Banks with their sperm and eggs. What if people's gametes get mixed up or cannot be traced when needed? In theory, of course, thanks to DNA fingerprinting, bar code labelling and computer technology there should be little danger of such mishaps—but past experiences with monetary banks do not inspire *total* confidence. Reassurances will be essential—such as DNA testing to confirm genetic parenthood before embryos are placed in the gestation-mother's womb.

What if a person falls behind in the payment of his or her gamete storage premiums, or if the Storage Company goes out of business? Payment protection policies will undoubtedly be needed, as will government underwriting of any private storage companies. What if a person's gametes are really lost? Or, even worse, what if a malevolent government mistakenly destroys a person's gametes as punishment for supposed social misdemeanours? We can relax. No such calamities are terminal; there is a safe fallback. After all, both men and women continue to produce gametes even *after* their tubes are blocked—it's just that they never find their way to a place where fertilisation can occur. So if a person's adolescent deposit into their gamete bank account does happen to be lost or destroyed, further deposits can be made later in life, if necessary. The BlockBank scheme won't immediately appeal to men or women who dislike all medical invasion, no matter how trivial. Tube blocking currently requires surgery, albeit minor. In addition, women would need to go through induced ovulation and egg harvesting when initially banking eggs. Finally, the fertilised egg needs to be inserted directly into the woman's womb—another uncomfortable procedure. All of these processes are unpleasant and such discomfort is a definite minus on the balance sheet of user-friendliness.

So—will the men and women of the future be prepared to put themselves through such discomfort in the name of contraception and family planning? The indications are that many might. After all, in the pursuit of health, women have been prepared to suffer the discomfort of cervical smear tests for years. In the pursuit of family planning, they have been prepared to tolerate the discomfort of being fitted with Intra Uterine Devices (IUDs)—and later having them removed. They have even been prepared to risk their lives with back-street abortionists. And in the pursuit of reproduction, *infertile* men and women have been prepared to put up with the discomfort of a wide range of treatments, such as Testicular Sperm Extraction (TESE) and IVF. Finally, in the pursuit of contraception, both men and women have already been prepared to have their tubes blocked - and in surprising numbers. In Britain 15 per cent of women of childbearing age and 16 per cent of their partners are already sterilised, with most men having their vasectomies in their thirties. In Asia, half of all couples who need contraception choose the sterilisation of one partner; in India alone this figure rises to three-quarters.

It seems highly likely, then, that if the BlockBank scheme were on offer *now* a significant number of people *would* opt to use it in their quest for foolproof and risk-free control over their reproductive lives. They would tolerate three or four moments of discomfort in their lifetime for the freedom to reproduce when and with whom they wanted with no risk of accident or misfortune. And in the future, with all elements in the scheme becoming increasingly user-friendly, reliable and socially acceptable, BlockBanking's future seems assured; it is destined to become the favoured form of family planning for the majority of people.

BlockBanking is most advantageous when performed early in a person's life—such as soon after puberty. Not only does the blocking provide contraceptive protection at a most vulnerable age but also the banking of eggs and sperm during adolescence is of extra value. First, it provides early insurance against accident and disease—ovarian or testicular cancer for example—later in life that could threaten a person's reproduction. Secondly, sperm and eggs produced while young perform much better in IVF than those produced when older. And for women in particular, eggs produced when young are much less likely to create children with genetic disabilities, such as Down's syndrome. The chances are, therefore, that when the scheme finally gains public confidence, many a parent will urge their post-pubescent child to join as soon as possible. Dastardly though such parental coercion might seem at first sight, it is a much more responsible

and caring act than, say, the acts of circumcision that parents in many cultures, including our own, have for centuries happily inflicted on unwitting sons and daughters. Who would pay for the BlockBank scheme, given the undoubted costs of blocking, banking and IVF? Is this just one more sign of a future society in which only the rich can afford the advantages that technology will offer? Maybe—but maybe not. Governments already spend large sums of money on free contraception and then on the medical and social problems that arise when contraception is neglected or fails. Subsidising the BlockBanking scheme to make it available to as wide a cross-section of people as possible may well be cost-effective.

Love in the future

Many people are already worried—even terrified—by the potential consequences of any such social revolution. ‘Unnatural’ say many people. ‘Demeaning,’ ‘a threat to human dignity’ or ‘contrary to the will of God’ say others. Opposition to change is immediate, almost instinctive—a knee-jerk reaction.

A similar furore greeted women who opted not to breast-feed in the seventeenth century—and also greeted bottle-feeding, artificial insemination and IVF in the twentieth. But society has survived and even progressed on the back of such dastardly innovations. Humans are adaptable and have an unflagging ability to cope with social change and an even greater ability to be eclectic over what they consider to be natural and dignified. After all, clothing, shaving, depilatory creams, deodorants and bottle-feeding are all ‘unnatural’. So, too, are supermarkets, cars and aeroplanes. Yet how many people, in the name of natural human dignity, walk naked, hairy and smelly into the countryside each day to forage for food?

It would be easy to be pessimistic about the future—to lament the passing of the familiar. But there is probably no need. The human species *will* continue and will probably even be enriched by the changes to come. The people who live in future societies will look back on ours as quaint and underprivileged, much as we look back on previous societies. When ancient urges meet future technology, there should be no winner or loser. Instead the two are likely to join forces and, with a little help from the immortal power of natural selection, should propel human reproduction through the next hundred years of its evolution with profit, not cataclysm. Such is the prediction. And what of relationships? What does the future hold for the ancient magic of love, procreation and the raising of children? Life—particularly family life—is bound to change in the future but nothing will stop people from experiencing sexual and parental emotions. These are ingrained—genetically programmed into body chemistry and psyche by millennia of natural selection. Nevertheless, when set against a future *social* backdrop of ever more numerous lone-parent and blended families and a future *medical* backdrop of increasing supremacy over sexually transmitted diseases, the separation of sex from reproduction will undoubtedly release many biological brakes. More dramatically and lastingly than followed the contraceptive revolution of the 1960s, women in particular will be freed from the constraints of their gender. Inevitably, relationships will become shorter-lived and promiscuity will increase; it will become the norm for a person to have children with more than one partner. Half-siblings will abound and increasingly people will think of their family as *theirs* rather than as *theirs and a partner's*. But of course people will still experience the whole range of life's emotions. They will still fall in and out of love and still dote on—and argue with—their children and parents. The divorce of sex from reproduction is destined to create a social revolution as great as any humankind has ever seen—but it cannot kill the ancient urges that made us human in the first place.