

BIOSOCIAL SOCIETY

Infertility in the Modern World: Present and Future Prospects

The eleventh Annual Workshop of the Biosocial Society will be held on Friday 8 May 1998 from 10.00 to 16.00 hours at the Department of Biological Anthropology, University of Cambridge, Downing Street, Cambridge.

Further information about the Workshop can be obtained from Dr Gillian Bentley, Department of Biological Anthropology, University of Cambridge, Downing Street, Cambridge CB2 3DZ. Tel: 01223 335454. Fax: 01223 335460. e-mail: grb20@cam.ac.uk

Abstracts of papers

Environmental pollutants and infertility. GILLIAN R. BENTLEY. *Department of Biological Anthropology, University of Cambridge.*

Two books, a spate of articles and several television documentaries have recently focused on environmental pollutants that appear to be affecting human reproductive potential. Data on this issue are highly contentious and subject to emotional debate. For example, xenoestrogens—substances present in many human-made products, such as plastics—have been linked to apparent dramatic declines in sperm-counts among Western populations. They have also been suggested to account for recent increases in reproductive developmental abnormalities, as well as cancer rates of the reproductive tract. This paper examines the relevant data, as well as proponents' and critics' arguments for and against changes in male and female reproductive function and physiology in relation to manufactured environmental agents. In addressing these topics, the paper takes an explicitly ecological approach to human fertility. It stresses the issue of natural variation both within and between human populations that may arise from a variety of environmental, genetic, temporal, and even behavioural factors, and that may obscure our understanding of any single environmental factor suspected to affect human reproduction adversely. At present there is insufficient evidence to support the theory that environmental pollutants are primarily responsible for such adverse changes.

The genetics of infertility. A. H. BITTLES AND P. L. MATSON. *Centre for Human Genetics, Edith Cowan University, Perth and Concept Fertility Centre, King Edward Memorial Hospital, Perth.*

The various forms of maternal–fetal red cell incompatibility and their effects on fertility are well understood, and during the last 15 years there has been a vigorous debate as

to whether couples who share specific HLA alleles exhibit subfertility. Studies conducted in highly endogamous communities have suggested that genes at the HLA-DR and -B loci are important in determining the ability to initiate a pregnancy and in fetal losses respectively. However, paternal cell immunization to achieve a successful pregnancy in cases of repeated abortion remains controversial.

The most common genetic disorders associated with primary infertility in females are Turner syndrome (monosomy X), and polycystic ovarian disease, which has a more complex and as yet ill-defined genetic aetiology. A much wider spectrum of genetic defects can cause infertility in males, including Klinefelter syndrome, X-autosome reciprocal translocation, Y-chromosome microdeletions, congenital absence of the vas deferans most commonly observed as part of the cystic fibrosis phenotype, and obstructive azoospermia in patients with Young's syndrome. An elevated prevalence of mitochondrial DNA deletions has also been claimed in cases of male infertility.

Pregnancies can be initiated in the majority of individuals with these disorders, for example, using donated oocytes or embryos in women with Turner syndrome, and intracytoplasmic injection of sperm (ICSI) collected from men with Klinefelter syndrome and congenital absence of the vas deferans. In some disorders, such as Y-linked microdeletions, there may be a high risk of transmission to progeny following fertilization via ICSI, which has resulted in more general concerns on dysgenic grounds. Pre-implantation diagnosis has been developed in part as a means of monitoring these embryos and thus alleviating such concerns. While rapid progress in this area is underway, to date the number of individual cases examined is too low and diverse in nature to allow firm conclusions to be drawn on the feasibility of the method for this purpose.

Sexually transmitted disease and reduced fertility in the modern world. JOHN C. CALDWELL AND PAT CALDWELL. *Australian National University, Canberra.*

The formation of a global economy and society has been accompanied in developing regions of the world by an upswing in sexually transmitted disease (STD). This has resulted from changing patterns of living and movement and changes in sexual relations. This paper will examine why and how these changes occurred and their impact on fertility. The focus will be on sub-Saharan Africa but Asia, the Pacific and Latin America will also be considered briefly. The paper will then examine the emerging evidence that HIV/AIDS have both a biological and social impact on fertility. Some attention will be given to the older STDs as cofactors of AIDS, and evidence that the AIDS epidemic will lead to successful campaigns against these STDs in an effort to control HIV/AIDS. There will be a stress on the role of cultural, social and behavioural factors.

Sexual orientation and fertility. CHARLOTTE J. PATTERSON. *University of Virginia.*

Although controversies about the role of sexual orientation in parenthood have been common in Western European countries in recent years, reliable information about lesbian, gay and bisexual parents and their children has been limited both in nature

and scope, and many intriguing issues have as yet been little studied. For example, until recently, basic issues such as the influence of sexual orientation upon fertility have gone almost entirely without systematic investigation. Are lesbian, gay and bisexual adults less likely than heterosexual adults to become parents? Although 'common sense' might suggest an answer in the affirmative, results of recent research suggest that this may not be the correct view. In this paper, I offer a review and critique of early attempts to estimate the size of lesbian/gay parent populations, describe recent efforts to make such estimates based on data from representative samples of American adults, and comment upon the likely biases inherent in different estimation processes. When all available data are considered together, the resulting estimates of fertility among lesbian and gay adults are lower than many of the figures offered in early papers, but higher than those expected by many observers.

Reproductive possibilities for infertile couples: present and future. SIMON FISHEL. *CARE at The Park, Centres for Assisted Reproduction, Nottingham.*

Infertility affects at least 14% of the reproductive population world-wide. Modern technology can provide genetically related offspring to 80% of couples seeking treatment, and pregnancy to a further 10–15% using donated gametes. However, that only a small proportion are able to acquire suitable treatment, even in the West, highlights the social, economic and political difficulties surrounding available resources for assisted conception technology.

Before 1992 approximately 95% of severe male-factor infertility cases were offered sperm donation—unacceptable in many cultures. Since the development of intracytoplasmic sperm injection (ICSI), 90–95% of male factor cases can now be offered the chance of their own genetic offspring. The use of egg donation and of surrogacy further expands opportunities for infertile couples to have children. In the former the recipient gestates and delivers her child, albeit genetically unrelated to herself, whilst in the latter the commissioning couple can have their genetic offspring via host surrogacy. These technologies remain ethically challenging. Developments in embryology technology have helped couples whose problem is that of implantation rather than conception, and this includes Assisted Hatching and zygote/embryo repair. The alliance of such technologies to the development of molecular genetics permits the biopsy of an 8–10 cell embryo for chromosome/genetic analysis on the extracted cells. This procedure has both social and economic advantages and makes it possible for couples to refrain from embarking on a pregnancy should the embryo carry a feared hereditary disorder.

More recently, techniques to preserve germ cells, both mature and immature, and the potential in prepubertal male cancer sufferers for ipsigeneic germ cell repopulation offer considerable opportunity to preserve fertility in these boys. The technique of oocyte grafting after cryopreservation provides similar opportunities for females of all ages. The inherited disease of mitochondrial DNA cytopathies, passed on through the maternal line via the egg cytoplasm, poses serious health risks to offspring, including epilepsy, deafness, blindness and muscular atrophy. Potential developments in embryo/zygote micromanipulation could provide the opportunity to preserve the

genetic complement of the parents, while protecting the future offspring from diseased cytoplasmic mitochondria. Similar technology might help those couples who are infertile as a result of habitual miscarriage, rather than any problem with conception and implantation *per se*.

Hence, in the future, IVF and embryology technology will not only provide children for the subfertile, but will encroach on health and disease issues unrelated to infertility.