Stanton B, Black M, Keane V and Feigelman S (1990). HIV risk behaviors in young people: can we benfit from 30 years of research experience? *AIDS and Public Policy Journal* 5:17-23.

Talmadge LD and Talmadge WC (1990). Sexuality assessment measures for clinical use: A review. Special Issue: Marital and family measurements. *American Journal of Family Therapy*. 18:80-105.

Trussell J (1988). Teenage pregnancy in the United States. *Family Planning Perspectives* 20:262-72.

Waldby C, Kippax S and Crawford J (1990). Theory in the bedroom: a report from the Macquarie University AIDS and heterosexuality project. *Australian Journal of Social Issues* 25:177-85.

Winter KC (in press). The development of an adolescent alcohol and other drug abuse screening scale: Personal Experience Screening Questionnaire. *Addictive Behaviors*.

Zibert E and Howard J (1989). *Curious, bored, and wanting to feel good: a survey of drug use and related perceptions in a detained young offender population in New South Wales*. New South Wales Department of Family and Community Services. Petersham.

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INCEST. WHY NOT: ON THE HUMAN SOCIOBIOLOGICAL STUDY OF INCEST AVOIDANCE

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The study of human incest avoidance has become one of the major fields in which sociobiology is being applied to human social behaviour. This has produced several lines of investigation based on the understanding that inbreeding depression (King, 1972:148) constitutes a selective pressure against mating between primary kin, that inbreeding between individuals whose coefficient of relationship (defined in Harrison, 1988:189) is 0.5 is largely avoided or prevented in many other species, and that the tendency to avoid incest is near universal (Westermarck, 1921; Shepher, 1983; van den Berghe, 1983; Brown, 1991; Thornhill, 1991).

In this paper I will discuss some attempts to explore the extent to which natural selection affects the reported cross-cultural tendency to avoid incest.

One possible approach could be to identify proximate (ie causal) mechanisms that contribute to behavioural strategies and then proceed to analyse them for their adaptive value and possible natural history. Some scholars have gone down this track and studied the possible existence of a sensitive period in childhood during which co-socialisation causes sexual indifference at puberty (eg Westermarck, 1921; Wolf, 1966, 1968, 1970; Shepher, 1971, 1983).

However, attempts to identify the role of natural selection in specific proximate causes of incest avoidance seem frustrated by the limited understanding of such causes.

Shepher, van den Berghe and Welham, some of whose contributions will be discussed here, have attempted to overcome such difficulties by setting the question of proximate mechanisms aside, and showing that human incestuous behaviour (that is, the patterns of practice and avoidance of incest) conforms to predictions that assume that individual humans act so as to maximise their genetic fitness. These authors felt that if they were successful, the possibility that natural selection has shaped incestuous strategies would be very strongly supported (eg Shepher, 1983:85-86).

Paradoxically, the attempts to demonstrate the role of natural selection in shaping the avoidance of incest have focused on the patterns of its practice.

The line of argument I shall criticise here stemmed from the theory of parental investment. Parental investment theory states that optimal male and female reproductive strategies differ (Trivers, 1972; Wilson, 1980). When a parent invests in an offspring, his/her ability to invest in another offspring is reduced. In humans, female investment is said to be higher than male investment, which

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means that she has more to lose in cases of bad investment, and that she is therefore more committed to protecting and securing the investment (for a sociobiological exposition see Trivers, 1972; for an explicit statement in the context of incest see Shepher, 1983; van den Berghe, 1983). It should be pointed out here that sociobiologists analyse the consequences of individual action in terms of genetic fitness regardless of whatever conscious process may have been taking place and despite the descriptive language sometimes used (Dawkins, 1989).

Shepher and van den Berghe adopted the position that these unequal patterns of parental investment lead to a situation whereby female sexual promiscuity, which includes incest, is more heavily selected against than male sexual promiscuity and incest. Hence human females are sexually much less promiscuous and resist incest more strongly than do their male counterparts. Following from this is the prediction that incest would be rarer in the dyads in which females are dominant than in those in which males are dominant. Thus mother-son (M-S) incest is said to be extremely rare, father-daughter (F-D) incest most commonly practised, while brother-sister (B-Z) incest is in between (Shepher, 1983; van den Berghe, 1983).

Welham added the aspect of paternity confidence to the possible factors which may encourage fathers to initiate incestuous relations with their daughters. He pointed out that paternal investment is costly too. A man whose mate's offspring are not his own is faced with three alternatives: he can abandon his mate; he can practise infanticide; or he can mate with the unrelated female offspring of his mate's thus recovering as much benefit as possible from his investment. Hence Welham predicted that the incidence of F-D incest is inversely related to the degree of paternity confidence, and that the risk of child sexual abuse is invariably greater from paternal male relatives than from their maternal counterparts (Welham, 1990).

Welham (1990:108) used this explanation to account for another phenomenon, namely, girls' age at the onset of incestuous relations. He cited several studies that show that the physiological development of a young girl, particularly the development of secondary sexual characters like menarche and development of breasts, are the instigatory factors in most cases of F-D incest in the 'West' (he relies on Maisch, 1972, Meiselman, 1978 and Justice and Justice 1979). According to Welham this is so because the father strives to minimise the costs of incest to himself. When the female is too young to conceive it would be a total waste of resources. Waiting too long might result in the daughter's mating with someone else. This is the reason timing is crucial (Welham, 1990).

Shepher, van den Berghe and Welham's application of sociobiology to incest avoidance brings together different empirical data, namely, differential rates of the practice of incest based on the gender of the initiator, reduced viability of offspring of incest, close inbreeding avoidance among non-human mammals, and the seeming universality of the tendency to avoid incest. I have some serious concerns, both theoretical and empirical, about these analyses. I will begin with my empirical concerns.

The biosocial analysis is premised on the understanding that F-D is by far the most commonly practised form of incest, followed by B-Z with M-S lagging way behind (Shepher, 1983:125-128). This perception is based on studies of **reported** incidents of incest (Shepher, 1983). However there are statistics both from America and Japan that challenge this basic understanding. Shepher, van den Berghe and Welham seem to be unaware of these data.

Gebhard and his colleagues (1965) embarked on a large-scale analysis of sex offenders. Their study is unique in that it included samples of the general population in addition to samples of sex offenders (cf Hyde, 1986). It compared three sample groups as follows: 1356 convicted sex offenders; 888 inmates in prison who had never been convicted of sex offences; and a control group of 477 who had never been convicted of anything beyond traffic violations. The two latter groups are of importance here. The researchers estimated that the control group was a representative sample of white urban American males with less than college education and no prison experience, and that the prison group was not badly biased (Gebhard et al, 1965).

In the control group, 406 members had been studied for their possible incestuous experience. Only one of them reported having been involved in incest. It was B-Z incest. In the prison group fourteen cases of B-Z were reported and one of M-S, while no F-D incest was reported (the data are arranged in percentages in Gebhard et al, 1965:572, Table 63). This study raises the possibility that in the general population of the United States B-Z incest is more common than F-D incest.

A search through the literature failed to yield even a single study of the rates of incest in the general community. There is virtually no information on the extent of the practice of incest within societies. This is probably due to the sensitivity of the topic, and to the fact that in most societies it is illegal. (There are rough estimates in various places about the rates of child sexual abuse [eg Laurance, 1988, and Baker and Duncan, 1985 in Britain]. But in addition to methodological difficulties stemming from the sensitivity of the matter, the concept of child sexual abuse includes many acts other than intercourse, refers to many perpetrators other than primary kin, and excludes consensual sexual relations between adults. Therefore, estimates of child sexual abuse are of little use here.)

Reported incidents of incest in Japan do not concur with Shepher's and van den Berghe's expectations either. M-S and older Z-younger B incest are by far the most commonly reported. Younger Z-older B and F-D incest are rarely reported (Hartcher, 1989; Minami, 1984; Kawana, 1980).

The question of who initiates the incestuous relationship in Japanese M-S dyads is important. Shepher and van den Berghe would predict that males do. In the representative examples described by Kawana, and according to both Kawana and Minami, it is the mother who typically initiates and maintains M-S incestuous relations (Kawana, 1980; Minami, 1984).

These data suggest that an essential element of what was perceived to be the common reality, namely the putative relative rates of F-D, B-Z and M-S incest, may not be what human sociobiologists believed it to be. Obviously more research is needed to establish what the situation among humans actually is.

To these empirical concerns I would like to add some theoretical misgivings.

The focus on the practice of incest when the major element to be explained is its avoidance raises some difficult questions. An important consideration that Shepher, van den Berghe and Welham have not addressed is the possibility that the causes of the patterns of the **practice** of incest may be very different in nature from those behind the **avoidance** of incest. Their explanation of the relative strengths of the drives towards incest may explain the difference between individuals who practise incest at different rates, but fails to account for those who avoid it altogether. For instance, the rationale that explains why men stand more to gain or less to lose from incest may explain why men who practise incest do so more often than women who do. But this explanation does not account for the majority of men and women who avoid incest altogether. It could be that humans avoid incest because of some hypothetical mechanism called 'conformity'. In each society there may be a certain part of the population which lacks this mechanism. Among those, gender may well play an important role in determining the rate of the practice of incest. This does not mean, though, that gender plays any role in causing the avoidance of incest among the rest of the population.

Welham's theory that compares societies, rather than individuals, yielded a prediction, namely that everything else being equal, in societies which are characterised by low paternity confidence, F-D incest would be higher, and vice versa (Welham, 1990). However, an inter-cultural correlation between paternity confidence and incest could be accounted for by a third factor as well, namely conformity to rules. In societies in which rules are adhered to more rigorously, we could expect fewer people to break the rules concerning adultery, and fewer people to break the rules concerning incest avoidance. In societies in which conformity to rules is weaker, it could be expected that both rules against adultery and rules against incest would be more frequently broken.

Another point should also be kept in mind, namely that statistics of the practice of incest are not necessarily a numerical expression of the relative inclination towards various forms of incest. In order to give a fair assessment of incestuous tendencies, the actual rates of incestuous activity in the various dyads need to be calculated against the opportunities of its practice in those dyads. If an inclination towards one form of incest is twice as strong as the inclination towards another, and yet there are twice as many opportunities to carry out incestuous relations of the second type, we may end up with statistics that show that both types of incest are practised at identical rates. Statistics about the opportunity of incest should be provided alongside statistics on its practice for analysis. An evolutionary study of incest avoidance should ideally, then, include a study of the changing opportunities for incest. This point is

important because it could be argued that mate selection strategies had been fine-tuned at an earlier phylogenetic stage (ie an earlier stage of the species' natural history), and as social conditions changed to create new opportunities for incest and eliminate old ones, the emergent empirical picture was distorted. Thus, the prevalence of female-initiated incest in Japan, if indeed it transpires that female-initiated incest is more common than male-initiated incest, can be explained away as a situation in which new forms of proximity between M-S have arisen, changed the environment, and consequently caused incestuous strategies not to conform to the predicted patterns of behaviour.

There are also theoretical difficulties associated with the study of behavioural strategies and tendencies in general (cf Kitcher, 1987, and see responses there). Incestuous strategies may be affected by other proximate mechanisms which may have survival value in their own right, but whose effect on incestuous behaviour is to reduce genetic fitness. One example could be conformity to rules, which may drive people to avoid incest in situations in which it is genetically profitable, or risk-taking behaviour which according to some sociobiologists is advantageous in males (eg Zahavi, 1975) and which can push young males to defy rules in general, such as those banning incest.

Kitcher argued that human sociobiologists who had written on incest avoidance did not rule out the possibility that explanations other than those proposed by them are responsible for human incestuous strategies. He suggested a possible alternative explanation. He pointed out that cultural forms of transmission can account for the spread of the tendency to avoid incest, and it may have derived from an original situation in which incest was avoided because of environmental factors or causes other than individual genetic fitness maximisation (Kitcher, 1985). Durham (1991) pursues a similar line of argument concerning the forces that have shaped incest taboos. However, Shepher, van den Berghe and Welham were not describing actual evolutionary processes or natural histories that resulted in the behaviours they describe. A minimalistic argument could be advanced, namely that genetic factors did not contribute to the whole of these behaviours, but whenever these behaviours were maladaptive, natural selection modified them by mechanisms such as the Westermarck effect. To use the metaphor of the genes holding culture on leash (Lumsden and Wilson, 1981) it could be argued that as long as the dog is walking spontaneously in the right directions it needs no correction. This does not mean that the master is not ultimately responsible for the direction. Thus, the relevance of natural selection to behaviour does not require that proximate mechanisms should have been selected for or should be somehow genetically grounded if the behaviour is adaptive.

In addition, the fact that other primates seem to avoid close inbreeding (Packer, 1979; Pusey, 1980; Gray, 1985; Jolly 1985; Goodall, 1986; Read and Harvey, 1988; Quiatt, 1988) suggests that in a pre-cultural evolutionary stage inbreeding was probably avoided owing to natural selection. It is therefore plausible that such a behaviour would be further transmitted even if only cultural transmission is involved. Whereas the contribution of natural selection in early, pre-cultural as it were, hominid evolution seems plausible, the crux of the debate is whether

human incest avoidance has been maintained by natural selection in our recent evolutionary past, after humans had become distinctly cultural animals. Ideally, to substantiate a claim to the relevance of natural selection along the minimalistic lines described above one will have to provide a credible description of incestuous behaviour, demonstrate empirically that the strategies of incest avoidance are adaptive, and finally demonstrate that in cases where maladaptive behavioural strategies arose, they were selected against by natural selection. In the latter case natural selection would act on the gene pool, and genetically grounded mechanisms would be selected for. If such instances are absent, as seems to be the case with human incest avoidance, it is impossible to determine whether natural selection is a relevant factor to human incest avoidance (cf Caro and Borgerhoff Mulder, 1987).

At any rate, Shepher, van den Berghe and Welham did not pursue this line of argument. Shepher and van den Berghe have explicitly committed themselves to the position that the proximate and ontogenetic (ie developmental) factors behind human incest avoidance were selected for and shaped by natural selection.

My general theoretical argument is that even if incestuous strategies were shown to be maladaptive, the role of natural selection in their shaping would not be disproved. Equally, if incestuous strategies were conclusively shown to be adaptive, it would still be very hard to discern the exact role, if any, played by natural selection in their evolution. This is so because the information we have on human natural history is very scarce, and generally, there is a great difficulty in identifying the role played by natural selection in the evolution of any human behaviour (Caro and Borgerhoff Mulder, 1987).

To sum up, I believe that there is little promise in the attempts to study incestuous strategies in the way that has been criticised above. There are serious theoretical flaws in the project and the statistical picture Shepher, van den Berghe and Welham take for granted is far from evident. Data about the general behavioural tendency is obviously lacking, and research is needed into the prevalent forms of incestuous behaviours in different societies at different times. To my mind the correct way of approaching the task of analysing the factors behind human incestuous behaviour is the laborious and tedious way of first identifying specific ontogenetic and proximate causes, and then moving on to advance phylogenetic and ultimate explanations (ie explanations in terms of survival value).

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REFERENCES

Baker AW and Duncan SP (1985). Child sexual abuse: a study of prevalence in Great Britain. *Child Abuse and Neglect* 9(4):457-467.

Brown DE (1991). *Human universals*. Philadelphia, Temple University Press.

Caro TM and Borgerhoff Mulder M (1987). The problem of adaptation in the study of human behavior. *Ethology and Sociobiology* 8:61-72.

Dawkins R (1989). *The selfish gene*. Oxford, Oxford University Press, new edition.

Durham WH (1991). *Coevolution: genes, culture and human diversity*. California, Stanford University Press.

Gebhard PH, Gagnon JH, Pomeroy WB and Christenson CV (1965). *Sex offenders: an analysis of types*. London, Heineman.

Gray JP (1985). *Primate sociobiology*. New Haven, HRAF Press.

Goodall J (1986). *The chimpanzees of Gombe: patterns of behavior*. Cambridge, Massachusetts, Belknap Press.

Harrison GA (1988). Human genetics and variation. In: Harrison GA, Tanner JM, Pilbeam DR and Baker PT (eds). *Human biology: an introduction to human evolution, variation, growth and adaptability*. Oxford, Oxford University Press, 3rd edition.

Hartcher P (1989). Dark secret of Japan's mothers. *Sydney Morning Herald* 5th April:1,10.

Hyde JS (1986). *Understanding human sexuality*. New York, McGraw-Hill, 3rd edition.

Jolly A (1985). *The evolution of primate behavior*. New York, Macmillan, 2nd edition.

Justice B and Justice R (1979). *The broken taboo: sex in the family*. New York, Human Sciences Press.

Kawana K (1980). *Misshitu No Haha To Ko* [Mother and Child behind Closed Doors]. Tokyo, Asahi Shuppan.

King RC (1972). *A dictionary of genetics*. New York, Oxford University Press, 2nd edition.

Kitcher P (1985). *Vaulting ambition: sociobiology and the quest for human nature*. Cambridge, Mass, MIT Press.

Kitcher P (1987). Precis of vaulting ambition: sociobiology and the quest for human nature. *Behavioral and Brain Sciences* 10:61-100.

Laurance J (1988). Statistics of a taboo. *New Statesman and Society* 1(4):33-34.

Lumsden CJ and Wilson EO (1981). *Genes, mind and culture*. Cambridge, Mass, Harvard University Press.

Maisch H (1972). *Incest*. London, Andre Deutsch.

Meiselman KC (1978). *Incest: a psychological study of causes and effects with treatment recommendations*. San Francisco, Jossey-Bass.

Minami H (1984). *Kateinai Seiai* [Sexual love in the family]. Tokyo, Asahi Shuppan.

Packer C (1979). Inter-troop transfer and inbreeding avoidance in *Papio anubis*. *Animal Behaviour* 27:1-36.

Pusey AE (1980). Inbreeding avoidance in chimpanzees. *Animal Behaviour* 28:543-552.

Quiatt D (1988). Regulation of mating choice in nonhuman primates. In: Mascie-Taylor CGN and Boyce AJ (eds). *Human mating patterns*. Cambridge, Cambridge University Press.

Read AF and Harvey PH (1988). Genetic relatedness and the evolution of animal mating patterns. In: Mascie-Taylor CGN and Boyce AJ (eds). *Human mating patterns*. Cambridge, Cambridge University Press.

Shepher J (1971). Mate selection among second-generation kibbutz adolescents and adults: incest avoidance and negative imprinting. *Archives of Sexual Behavior* 1:293-307.

Shepher J (1983). *Incest: a biosocial view*. New York, Academic Press.

Thornhill NW (1991). An evolutionary analysis of rules regulating human inbreeding and marriage. *Behavioral and Brain Sciences* 14:247-293.

Trivers RL (1972). Parental investment and sexual selection. In: Campbell B (ed). *Sexual selection and the descent of man*. Chicago, Aldine, pp136-179.

Van den Berghe PL (1983). Human inbreeding avoidance: culture in nature. *The Behavioral and Brain Sciences* 6:91-123.

Welham CVJ. (1990). Incest: an evolutionary model. *Ethology and Sociobiology* 11:97-111.

Westermarck EA (1921). *The history of human marriage*. London, Macmillan, 5th edition, Volume 2.

Wilson EO (1980). *Sociobiology: the abridged edition*. Cambridge, Mass, Belknap Press.

Wolf AP (1966). Childhood association, sexual attraction and the incest taboo: a Chinese case. *American Anthropologist* 68:883-898.

Wolf AP (1968). Adopt a daughter-in-law, marry a sister: a Chinese solution to the problem of incest taboo. *American Anthropologist* 70:864-874.

Wolf AP (1970). Childhood association and sexual attraction: a further test of the Westermarck hypothesis. *American Anthropologist* 72:503-515.

Zahavi A (1975). Mate selection -- A selection for handicap. *Journal of Theoretical Biology* 53:205-214.