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ANTHROPOLOGY

INCLUSIVE FITNESS AND THE PRACTICE OF POLYANDRY AMONG THE SKIDI PAWNEE

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The ethnohistorical record of the practice of polyandry among the Skidi Pawnee of the 19th century is examined from the perspective of the inclusive fitness model. The practice of temporary polyandry may have allowed males to maximize their inclusive fitness by insuring high paternity certainty. Younger brothers and nephews may have guarded the wives of older male relatives to prevent the wives from bearing children of unrelated males.

† † †

Temporary polyandry was practiced among the Skidi Pawnee of the 19th century. The "inclusive fitness" model (Hamilton, 1964a and 1964b) is a possible explanation for the practice and social structure of the polyandrous mating system. Hamilton's notion of inclusive fitness is defined by Irons (1979:17) as "a measure of an individual's genetic representation in descending generations. It takes into account both an individual's own reproduction and that of relatives who share some of the individual's genes." An individual can make a genetic contribution to the next generation by investing in its own offspring or in the offspring of relatives. An investment is anything done to increase the offspring's chance of surviving (Trivers, 1974:249). Investment in a relative's offspring is referred to as an altruistic act. To be adaptive, the investment or cost (C) of an altruistic act must be less than the benefit (B) received as a result of that act. This can be expressed mathematically as $(B_s - C_s) + r(B_k - C_k) > 0$. "Where B_s and C_s are the benefits and costs to self, B_k and C_k are the benefits and cost to the related individual, and r is the coefficient of relatedness between the two individuals" (Irons, 1979:25). For a more complete discussion of Hamilton's inclusive fitness model, see West Eberhard (1975).

Polyandry has been traditionally defined as the marriage of one woman to two or more men. In a critical review and

discussion of traditional theories of polyandry, Berte (1977) divided the anthropological discussions of polyandry into the following three basic types:

1. Unilineal evolutionary schemes which tend to be primarily descriptive and largely speculative, and which use polyandry as an element in their construction.
2. Particularistic causal explanations that invoke factors, or a combination of factors, such as sex ratio biases, lineality, ecological stress, economic constraints, etc., to explain the situational occurrence of polyandry.
3. Structural explanations of polyandry that interpret the phenomenon as an inherent feature of the overall social organization of the society or family unit.

An empirical test of the inclusive fitness model as it related to Tibetan fraternal polyandrous marriages was conducted by Beall and Goldstein (1981). They concluded:

. . . that Tibetan fraternal polyandry does not appear to enhance the (individual or inclusive) fitness of the individuals who practice it and in fact seems to entail significant reproductive sacrifice, i.e., can perpetuate mating systems that decrease the individual and inclusive fitness of the individuals who practice it.

This finding by Beall and Goldstein started a debate in the anthropological literature. Abernethy's (1981) review of Tibetan fraternal polyandry criticizes Beall and Goldstein for using the mean number of children born instead of the mean number of surviving children in their calculations. After substituting the mean number of surviving children, the advantage

of monogamously married males is not as great. Abernethy went on to state that group selection is the proper way to view Tibetan polyandry, not individual selection.

In another review, Fernandez (1981) pointed out that in order to test the theory of kin selection data spanning several generations, instead of the one generation studied by Beall and Goldstein, would be required. Fernandez also pointed out that there are resource constraints on the size of the Tibetan population studied, and that polyandrous marriages may help to maintain a low birth rate.

In another review of Tibetan polyandry Weigel and Taylor (1982) stated that Beall and Goldstein used only population statistics in their study. To test the inclusive fitness model as it relates to polyandry, it is necessary also to have quantitative data on factors affecting individual choice. Weigel and Taylor concluded that sociobiology may "prove to be a relatively unusable theory for human behavior because it is difficult to test," but they rejected the notion that Beall and Goldstein have demonstrated that the theory is incorrect.

In the most recent review of Beall and Goldstein's position, Fleising (1982) addressed a problem with the inclusive fitness model. The problem centers on a reconciliation of two views of selection. One view is that selection favors the maximization of resource utilization, and the other view is that selection favors the optimization of reproductive fitness. Fleising contended that there must be a merger of aspects of optimal foraging theory and the inclusive fitness model.

These arguments are presented so the reader may be aware of the controversy surrounding the use of the inclusive fitness model to explain human polyandry. It is beyond the scope of this paper to make another empirical test of this model. Within the limits of the data available it may be useful to apply the model to the polyandry practiced by the Skidi Pawnee.

In the 19th century the Pawnee practiced village endogamy (Dorsey, 1906:71; Lowie, 1935:90; Dorsey and Murie, 1940:75, 97). However, marriage did occur outside of the village on rare occasions (Lowie, 1935:90). Chastity among women was very important before marriage (Dorsey, 1906:73; Dorsey and Murie, 1940:96-97) and fidelity after marriage was of equal importance. The only reason cited for divorce among the Pawnee was infidelity on the part of women (Dunbar, 1880:267; Grinnell, 1891:279; Dorsey, 1906:73; Dorsey and Murie, 1940:101).

The Pawnee practiced levirate marriage (Grinnell, 1891:279; Lesser, 1930:99; Dorsey and Murie, 1940:85) and sororal polygyny (Dorsey and Murie, 1940:84). The man indicated at the time of marriage to the oldest sister if he intended to marry her younger sisters as well (Lesser, 1930:99).

Pawnee kin relationships were very fluid and not at all rigidly structured (Weltfish, 1965). A form of temporary polyandry was sometimes entered into between brothers and between uncles and their nephews (sister's sons) as long as they were friends and would not become jealous (Dorsey and Murie, 1940:85). The polyandrous relationship lasted several years (Dorsey and Murie, 1940:85), from the time the younger brother or nephew reached puberty until the time of his marriage to another woman. The younger brother or nephew upon reaching puberty moved into the household of his older brother or maternal uncle. Some Pawnee say that the older brother would allow his younger brother to have sexual relations with his wife after he had demonstrated his bravery and prowess on the warpath (Lesser, 1930:99). From the perspective of the male, it would appear that any polyandrous relationship constitutes an altruistic act, i.e., benefiting another male's Darwinian fitness and decreasing his own fitness. However, when looked at from the perspective of the inclusive fitness model, under favorable circumstances, the very act may improve his inclusive fitness. The Pawnee man (older brother or maternal uncle) may in fact be improving his inclusive fitness even though he may be lowering his Darwinian fitness. In order for Pawnee polyandry to be adaptive (i.e., non-altruistic, and maximizing the inclusive fitness of the older male), the formula $(B_s - C_s) + r(B_k - C_k) > 0$ (Irons, 1979:25) must apply. In this application, B_s equals the benefit that the older male receives in terms of inclusive fitness, i.e., passing genes to the next generation. C_s equals the cost to the older brother or uncle in terms of Darwinian fitness. The cost to the older male in this relationship is allowing his wife's reproductive capacity to be utilized by his younger male relative.

A Pawnee woman, on the average, had four children. No birth control was practiced and the reason for the small number of children was long lactation periods (Dunbar, 1880:266-267).

According to Weltfish (1965), paternity determination was biologically calculated by the Pawnee, and children with unknown biological fathers were social outcasts. In the following passage, Weltfish (1965:17-18) related how the biological determination was accomplished:

. . . The Pawnee were very literal about fatherhood. For a child to be accepted in the community with any decent status, its physiological father must be known. In any given month from one menstrual period to the next, a woman had to confine her sexual activities to one man only, and when she was aware through the cessation of menstruation that she had conceived, she was required to notify the man and point out on what occasion of intercourse together the child was conceived. The man was then

obligated, until the child reached full maturity of eighteen or more, to provide it with fresh meat in whatever household it might be residing and in other ways to be concerned with its wellbeing. A woman who departed from this iron-clad rule was unable to convince a man of his paternity, and her child would then be a social outcast. . . .

This passage demonstrates that certainty of paternity was high among the Pawnee. The older male in the polyandrous relationship would know which children were his and which were fathered by the brother or nephew.

The number of children a younger brother or nephew might have had by an older brother's or maternal uncle's wife is unclear. However, the following passage from Weltfish (1965:40) indicates that older brothers did not take responsibility for a child fathered by a younger brother:

. . . The chief (Leading Chief) believed that the baby was not his own but that of his younger brother, and when it was born he took the infant by the legs and was about to dash its head against a tree, when Victory Call rescued the baby. . . .

It would be fair to say that the cost in terms of Darwinian fitness to a man could be substantial if a brother or nephew had a child by one of his wives, since a woman might have been expected to have only four children in her lifetime. However, because the biological father was responsible for providing protein to his child for at least 18 years, the investment of the older male in the children of his wife or wives that were fathered by younger brothers or nephews would be reduced. Because the Pawnee were matrilocal (Fletcher, 1907:215; Lesser, 1979:263), all of these children probably resided in the household of the older male. It could be assumed that the older male probably made an investment in the children because of their close proximity. However, the iron-clad paternity determination probably resulted in his investment not being as great as in the children he had fathered.

Under the polyandrous relationship, all of the older brother's or maternal uncle's wife's children would be related to the older brother. If he fathered one of his wife's children, he would be related to that child by 1/2 genetically. If one of his wife's children was fathered by a full brother, that child would be related to the older brother by 1/4. If a half brother fathered one of his wife's children, it would be related to the older brother by 1/8. Children fathered by the son of a full sister would be related to the maternal uncle by 1/8, and those fathered by the son of a half sister would be related to the maternal uncle by 1/16. The offspring of an older brother's wife would always be related to the husband by 1/2 (if he

was their father) to 1/16 (if they were fathered by the son of a half sister).

There was a possible advantage to the older male in the polyandry practiced by the Pawnee. From early childhood, a younger brother was taught to think of his older brother's wife as his wife (Lesser, 1930:99 and 1979:265). Whenever his older brother was away from the village for an extended period, the younger brother was sent by his parents to care for his older brother's wife. In this pattern of behavior, the younger brother may have served as a guard against other males outside of the polyandrous relationship inseminating an older brother's wife. According to Lesser (1981, personal communication), this was never expressed as a reason for the behavior by the Pawnee. Whether or not the Pawnee consciously thought of it as a reason makes little difference because it still could have fulfilled the function of insuring that males unrelated to the brothers did not have sexual access to the wife.

As mentioned previously, Pawnee men were very guarded about access to their wives. Sexual promiscuity in wives was a very serious matter and a Pawnee woman could be killed for such a transgression (Grinnell, 1891:279).

It is now possible to write in some qualitative values to the formula $(B_s - C_s) + r(B_k - C_k) > 0$. B_s equals the benefits to the older male. B_s equals guardianship of this wife while he is away from the village to insure paternity certainty. C_s equals the cost to the older male. C_s equals the possibility of his wife having a child by the younger male. The coefficient of relatedness is r and equals 1/2 (for a full brother) to 1/8 (for the son of a half sister). B_k equals the benefit to the younger male. B_k equals the possibility of fathering a child by the older male's wife. C_k equals the cost to the younger male. C_k equals providing meat to the child he may have fathered. So the formula would read: (paternity certainty - wife have a child by the younger male) + 1/2 to 1/8 (fathering a child - providing meat to the child) > 0 .

Unfortunately it is not possible to quantify the values to solve the equation.

CONCLUSION

An inclusive fitness model is offered as a possible explanation of the practice of temporary polyandry among the Pawnee.

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For the practice of polyandry to be adaptive for the older brother or uncle, he would have to be absent for long periods. In this way, he would receive the benefits of the younger brother's or nephew's guardianship of his wife. The model, then, predicts long periods of absence on the part of the males.

There is evidence for prolonged absence on the part of males, and this supports the model presented here. Champe and Fenenga (1974:101, 103) stated that the Pawnee were in "a continuous state of armed aggression. . . ." The men were involved in frequent raiding and war expeditions. Murie (1981: 156) stated that one war party traveled for many months before finding a village which they attacked.

An empirical test of the inclusive fitness model is not possible in this case due to the limitations of the data set from the ethnohistorical literature. In order to test the inclusive fitness model empirically, one would need to know the frequency of polyandrous marriage, the number of children the younger males fathered from the older male's wives, the set-up and dissolution procedures of polyandrous marriage, and the extent to which socio-economic factors influenced the practice of polyandry. It would also be useful to know how many wives the older male had before he entered into a polyandrous marriage, and if the polyandrous marriage was extended to all of his wives or just to one wife. Demographic information about the Pawnee would also be necessary for an empirical test of the inclusive fitness model.

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