ON THE ULTIMATE CAUSES OF PRIMATE SOCIAL SYSTEMS

by

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(With 2 Figures)

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Introduction

During the last 15 years considerable attention has been given to the relation between social organization of primates, their diet and ranging, and features of their environments (Crook & Gartlan, 1966; Crook, 1970; Eisenberg et al., 1972; Jolly, 1972; Altmann, 1974; Jorde & Sphuler, 1974; Hladik, 1975; Clutton-Brock & Harvey, 1977). Most of this work has been concerned with finding correlations between diet, ranging, group size and body size of primates. Relatively few authors have addressed the question whether, and if so, how the social structure (group composition, mating system) of a species is determined by the external circumstances (Alexander, 1974; Clutton-Brock & Harvey, 1976, 1977; Wrangham, 1979). The purpose of this paper is not to search for correlations and explain them a posteriori, but is to present hypotheses about causal mechanisms by considering the social organization as the evolutionary response to a set of selection pressures. In this way we try to develop a coherent explanation of the various types of primate social

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systems. Because social organization (or structure) is a group characteristic, and as such is not subject to the more potent forms of natural selection, it is best to consider it as the outcome of the strategies that individuals employ to meet their three basic requirements: obtaining food, avoiding predators and reproducing. Where these basic requirements are best pursued in the company of others, groups will form.

Along with Alexander (1974) and Bradbury & Vehrencamp (1977) we assume that it is mainly ecological factors which determine the spatio-temporal distribution pattern of individuals (i.e. permanence and cohesiveness of groups) because these factors influence the strategies employed to meet the first two basic requirements. Certain mechanisms of social behaviour which provide the individuals with the optimum distribution pattern and the optimum position in it will evolve, and a certain mating system will arise as individuals try to optimise their reproductive strategies. Fig. 1 illustrates this evolutionary model with respect to non-human primates. In this model we adopt the distinction made by Rowell (1972) between social organization (in the strict sense), which consists of the processes of social interaction and their patterns of distribution over group members (i.e. the social relationships), and social structure, being the composition of the group and the spatial patterns of individuals. Social organization can be regarded, in the ultimate sense, as the instrument used by individuals to achieve that social structure in which their three primary interests are best served, namely feeding, predation avoidance and reproduction. Hence the social structure and social organization are related, although one kind of social structure can result from different kinds of social organization (cf. Hinde, 1974).

Traditionally, primatologists distinguish the following types of social structure (e.g. Eisenberg et al., 1972):

1. Solitariness/polygyny. Individuals range singly, except when they have sexual consorts. Home ranges of males overlap with those of one or several females.

2. Monogamous groups. Family units of one permanent pair with offspring, who, if still present as adults, do not take part in breeding.

3. Single-male groups. Groups of females and their offspring with one reproductively active adult male (hence including the age-graded male group of Eisenberg et al., 1972).

4. Multi-male groups. Groups of females and their offspring with, in principle (not necessarily always), several adult males, all of whom can be reproductively active at the same time.