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Introduction: Migration and Dispersal

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The papers in this issue were presented at the XIIIth Congress of the International Primatological Society in Kyoto, Japan, July 1990, in a symposium on "Migration and Dispersal: Behavioral, Ecological and Genetic Correlates." The purpose of this symposium was to bring together field researchers, who have studied a wide array of primate species, to take a careful look at dispersal in nonhuman primates. As evidenced in the following papers, new and interesting findings are emerging from long-term studies of several species, which would not be apparent from short-term projects. Only when we have long-term data from a variety of species that represent a broad array of primate taxa with varying ecological and life history parameters can we attempt a new integration of field data with theory.

Several major points emerge from these papers. Increasing evidence is accumulating that for a variety of species, a substantial number of matings are accounted for by extragroup males. This is particularly true for seasonally breeding nonhuman primates in which there is an association between male dispersal and the mating season (Moore, 1992; Sprague, 1992; Sussman, 1992). Where there is substantial opportunity for extragroup mating, the costs and benefits to dispersal are changed significantly. In fact, it could be the case that "visiting" other breeding groups for short periods of time may actually be a preferred strategy under certain ecological conditions or for certain age groups. These observations highlight the plasticity of behavior and are further reinforced by Phillips-Conroy and her

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colleagues (1992); who found that while hamadryas baboons (*Papio hamadryas*) have been classified as exclusively philopatric, new data from their study site in the Awash Valley in Ethiopia show clearly that hamadryas males are frequently found in anubis groups in the hybrid zone. This work has major implications for understanding the flexibility of behavior and reproductive strategies.

Melnick and Hoelzer (1992) provide a new perspective on dispersal through their work on mitochondrial DNA where they focus on the consequences instead of the causes of dispersal. They conclude that sex-biased dispersal differentially affects the population structure of nuclear vs mitochondrial DNA because of the correspondingly sex-biased inheritance patterns of mitochondrial DNA.

In his study of howler monkeys (*Alouatta palliata*), Glander, (1992) points out the necessity of collecting longitudinal data on several adjacent primate groups in order to determine the proximate factors associated with dispersal. Conclusions reached after 3 years of observation were subsequently not supported by longitudinal data collected for over a decade.

The papers in this volume highlight many of the difficulties of studying the life history of long-lived, slowly maturing, large-bodied mammals. Difficulties arise from semantic, practical, and theoretical sources. We feel that the research presented here goes far toward overcoming these difficulties.

Semantic difficulties have plagued the study of dispersal. Vague and inconsistent definitions often make communication difficult. While we have not demanded consistency in the use of terminology across the various contributions in the symposium, we (and the reviewers!) have asked each author to make their definitions clear.

Practical difficulties center on the task of the long-term monitoring of populations of known free-ranging individuals. Typically, observations of life history have become studies of individuals which failed to leave the social groups under observation. Comparisons with individuals which opt to leave or move frequently between social groups are difficult. Moreover, it is much easier to study factors that are implicated in the decision to leave a group—"push" factors- than it is to identify factors influencing a decision to move to a particular group—"pull" factors. This is due to the ability to study push factors in a single group, while observations of multiple groups are required to illuminate pull factors.

Theoretical difficulties center on untangling the many factors implicated in dispersal. Considerable debate exists over the proximate and ultimate causes of dispersal, which have been reviewed extensively for mammals in general (Greenwood, 1980, 1983; Shields, 1982, 1987) and for nonhuman primates in particular (Pusey and Packer, 1987). We suggest

that the papers in this issue may contribute to a consensus pointing toward female life-history strategy as the key to understanding dispersal by both sexes. In fact, one can view dispersal as the solution to a problem posed by females, with females dispersing themselves or controlling the rate of male dispersal through patterns of female mate choice. Alternatively, some have suggested that dispersal is determined by the length of male tenure and the age of females at sexual maturity (Clutton-Brock, 1989). However, we feel that this view of dispersal diverts attention away from the idea that dispersal may be conceived of as a coevolutionary process with the strategies of the dispersing sex coevolving with those of the philopatric sex.

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