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Book Review

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Reproductive Decisions: An Economic

Analysis of Gelada Baboon Social

Strategies

Monographs in Behavior and Ecology

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The two most thorough studies yet undertaken of wild gelada baboons are that of the Japanese investigators (led by Kawai) in June 1973-March 1974, and that initiated by Robin Dunbar and his wife in July 1971. Although Dunbar spent a total of only some 2 years in the field (in 1971/72 and 1974/75), the excellent observational conditions in the high-altitude grasslands of Ethiopia and the tameness of the study animals allowed the collection of a mass of data that has been the basis for a major series of papers, of which this book is the culmination.

The author provides an analysis of the lifetime social and reproductive strategies used by individual gelada to maximize their contribution to the species' gene pool. Since gelada may live for 20 years, how can such strategies be understood from only a few years' study? Dunbar shows how long-term reproductive outcomes can be mathematically modeled from short-term samples by using multivariate techniques borrowed from economic and operations research. This approach obviously requires good-quality data, which Dunbar has, on many variables of demography, reproductive biology and social behavior, and a knowledge of how these variables interact.

The first five chapters of Reproductive Decisions outline basic features of gelada society, demography and ecological niche (as most readers of Folia Primatologica will know, gelada live in small harem groups that share a common range with other harems, thus forming a 'band' that is the ecological equivalent of a social group of savanna baboons or macaques). Dunbar then examines the reproductive strategies and tactics of females and, subsequently, of males. The very different strategies followed by the two sexes emerge clearly. Females build and maintain (especially by grooming) coalitionary-support relationships whose most significant function, Dunbar argues, is to reduce the frequency of anovulatory estrous cycles brought on by the stress of harassment from more dominant females. Dunbar models the outcomes of different coalitionary relationships and so derives predictions about what females should do in different social circumstances. These predictions fit well with his observational evidence (e.g., where mothers and daughters are available, females show a clear preference for them as grooming partners).

The social context in which both females and males find themselves is strongly influenced by demographic factors, which in turn are influenced by the environment (especially weather conditions). But whatever the context, a gelada male must acquire control of a harem if he is to have any serious chance of reproducing. Males adopt one of two distinctly different strategies to acquire a harem: Joining as a low-status 'follower' and establishing relationships with females who may eventually split off with the male to form a new group; or taking over a harem aggressively from an incumbent male. The follower strategy is typically used by younger animals. Dunbar's models indicate that the average reproductive outcome of each strategy is similar, and that their relative frequencies are stabilized by frequency-dependent processes. Dunbar argues that an individual male's choice between strategies is determined not only by the social context that he finds himself in, but also by his particular attributes and life-history experience.

This is a very simplified summary of the elegant and complex argument put forward in *Reproductive Decisions*, which also includes thoughtful and thought-provoking discussions on such issues as the relative impact of kin versus individual selection, methods of analysis and hypothesis-testing in biological science, and the process of decision-making in animals. While I was impressed by the intelligence of the author's approach both to these general issues and to the specifics of gelada behavior, he did not convince me that

60

Book Review

we must resort to modeling the reproductive outcome of different behavioral strategies in long-lived species like the gelada because we have 'no prospect' of carrying out proper empirical studies. It is indeed hard to find the personnel, funds and conditions of political stability that will allow long-term primate field studies in tropical countries. But it is not impossible; some such studies are in progress. Even a field study just a few years longer than Dunbar conducted might have provided answers to some of the questions that he has not been able to fully resolve, and really long studies will become feasible if we can get a larger number of scientists from primate-habitat countries into the field. But even with longer studies it is always going to be much more difficult to conduct the kind of detailed analysis on the social strategies of rain-forest primates

(i.e., the majority of species) that is proving possible on the species inhabiting the much better observational conditions of grassland and woodland.

That said, I recommend this book strongly to anyone interested in understanding the social behavior of primates and its evolutionary substrate. As with the earlier volume in this series (Terborgh's *Five New World Primates*), the publishers are to be congratulated on making an affordable paperback available from the outset. However, undergraduate students would probably require a good familiarity with statistical techniques and a strong grounding in the evolutionary study of social systems if they are to get maximum benefit from this book. Without that background they will probably find it hard going.

J.F. Oates, New York