A Comparative Perspective on the Evolution of Tamarin and Marmoset Social Systems

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Tamarins and marmosets (callitrichids) present an unusual opportunity for study of the determinants of primate social systems, because both the mating and infant care patterns of callitrichids are variable, even within individual populations. In this paper, I briefly describe three characteristics of callitrichid social systems that distinguish them from most other primates: extensive male parental care, helping by nonreproductive individuals, and variable mating patterns. I then discuss the evolution of these characteristics and of the frequent twinning exhibited by callitrichids. I suggest that an ancestor of modern callitrichids gave birth to a single offspring at a time, mated monogamously, and had significant paternal care. The idea that males of this ancestral form must have provided paternal care, even though only single infants were born, derives from a comparison of litter/mother weight ratios in modern primate species. Twinning perhaps then evolved because of a combination of dwarfing in the callitrichid lineage, leading to higher litter/mother weight ratios, and a high infant mortality rate, and because the extensive paternal care already present facilitated the raising of twins. I propose that the helping behavior of older offspring may have coevolved with twinning, because helpers would have increased the chances of survival of twins, and the presence of twins would have increased the benefits of helping. Finally, the high costs of raising twins and the variability of group compositions, especially the fact that some groups would not have had older offspring to serve as helpers, may have selected for facultative polyandry in saddle-back tamarins (Saguinus fuscicollis) and perhaps in other callitrichid species. Both help-

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ing and cooperative polyandry have been extensively studied in bird species, and I apply some of the conclusions of these studies to the discussion of the evolution of callitrichid social systems.

KEY WORDS: callitrichids; polyandry; helping; twinning; paternal care.

INTRODUCTION

It is generally accepted that most intraspecific variation in social systems is neither random nor maladaptive but is, in fact, adaptive. Indeed, the possible adaptive significance of different mating patterns and social systems is probably best studied by intraspecific comparisons within species that exhibit a variety of reproductive strategies. In such comparisons, phylogenetic histories are less likely to complicate interpretations, and many demographic and ecological factors are controlled for.

Tamarins and marmosets (Callitrichidae) are particularly interesting for intraspecific comparisons of reproductive strategies because they have unusually variable and flexible patterns of infant care, and in some species, of mating (reviewed by Sussman and Kinzey, 1984; Goldizen, 1987a, 1988; Snowdon and Soini, in press). The social systems of callitrichids differ in three major ways from those of most or all other primate species. (1) Breeding males provide at least as much infant care, and perhaps even more, than do breeding females. (2) Nonbreeding individuals, both before and after the age of potential sexual maturity, provide substantial help with the rearing of their infant siblings. (3) Members of some callitrichid species may only mate monogamously; but, saddle-back tamarins (and possibly other species) exhibit the following mating patterns: monogamy, cooperative polyandry, and polygyny and/or polygynandry.

Unfortunately, studies of reproductive strategies in wild primates are hampered by many difficult logistical problems. (1) Most primates live at quite low population densities, often in dense forest, so that many field studies only involve between one and three social groups. (2) Primates are often difficult to habituate and to mark individually for long-term recognition. (3) For methodological, ethical, or political reasons, it is usually not possible to move individual primates around or otherwise to alter group compositions in order to test hypotheses about the causes of specific strategies or social systems. (4) It is often either not practical or illegal to trap wild primates for collection of tissue samples to test paternity or genetic relatedness.

Many of these problems are absent in studies of other taxa, such as birds, amphibians, and insects. While field studies of primate social systems and alternative reproductive strategies are indispensible, our understanding