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Harold Gouzoules; Linda Fedigan; Sarah Gouzoules; Laurence Fedigan

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COMMENTS ON REPRODUCTIVE SENESCENCE AMONG FEMALE JAPANESE MACAQUES

HAROLD GOUZOULES, LINDA FEDIGAN, SARAH GOUZOULES, AND LAURENCE FEDIGAN

Rockefeller University Field Research Center, Tyrrel Road, Millbrook, NY 12545 (HG, SG)
Anthropology Department, University of Alberta, Edmonton, Alberta, T6G 2E1, Canada (LF, LF)

Wolfe and Noyes (1981) reported on the relationship between age and fertility among female Japanese monkeys (*Macaca fuscata*) of the Arashiyama West troop. One analysis they performed revealed that old females (18 years and older) of the troop during 1976–1979 had a significantly lower reproductive rate than did the young females (defined as 6 to 17 years of age) of 1979. A computational error in that analysis should be brought to attention: Wolfe and Noyes failed to subtract births to 5-year-old females from the total births to young females (as they had done in all similar analyses). This error has a bearing on the conclusions drawn by Wolfe and Noyes. Young females during 1979 produced 37 (not 42) infants, and the number of females of this age class was 59 (not 58). These corrected figures yield a birth rate that is not significantly different from that of Arashiyama West old females during the period (1976–1979) considered by Wolfe and Noyes (1981) ($G = 0.72$, $P > 0.30$, d.f. = 1). As a result, none of the comparisons between Arashiyama West old and young females during periods discussed by Wolfe and Noyes (1981) yielded significantly different birth rates.

A further point should be clarified to avoid conflicting published statements on the Arashiyama troop. Wolfe and Noyes (1981) stated that between arrival in Texas (in February 1972) and December 1973, the Arashiyama troop experienced a 29% decrease in size, "from 184 members including those born during the 1972 birth season to 129 members just before the 1973 (sic) birth season," (p. 700). Wolfe and Noyes (1981) clearly meant to refer to the 1974 birth season here because December 1973, the point in time they were considering, came after the 1973 birth season. It is not clear to us how Wolfe and Noyes arrived at their figure of 184 monkeys. The troop produced 27 infants in 1972, and 150 monkeys were transported to Texas originally. At no time during the stated period did the troop actually number 184 individuals: in the first six months in Texas the troop decreased from 150 to 146 monkeys, through a loss of 31 individuals and recruitment through births of 27 infants in the 1972 birth season (Clark and Mano, 1975). Between transplantation in February 1972 and February 1974, just prior to the 1974 birth season, the troop actually experienced a decline of only 12%, from 150 members to 132 members.

The possibility of reproductive senescence among aged female Japanese monkeys, as well as females of other species of nonhuman primates, is a question deserving continued attention. However, the present evidence from the Arashiyama West population of *M. fuscata* does not indicate such a decline in fertility occurred.

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FOOD AND HABITAT USE BY TWO SYMPATRIC *SCIURUS* SPECIES IN CENTRAL PANAMA

WILLIAM E. GLANZ

Department of Zoology, University of Maine, Orono, ME 04469

Although several studies of tropical tree squirrels in Africa and Asia have documented complex patterns of resource partitioning among species (MacKinnon, 1978; Emmons, 1980; Payne, 1980; Whitten, 1981), comparable studies of Neotropical sciurid communities are lacking. In this paper I report preliminary observations on food and habitat use by sympatric *Sciurus granatensis* and *S. variegatoides* at a locality in central Panama. The specific objectives of this study were: 1) to characterize the types of food and habitat resources utilized by these species; 2) to compare the dietary specialization of *S. granatensis* at this site with patterns found in a more intensive study of this species elsewhere in Panama (Glanz et al., 1982); 3) to determine if these species show consistent ecological separation in their use of either foods or habitats; and 4) to compare these patterns of resource use with those in other communities of tropical squirrels.

Sciurus granatensis ranges from Costa Rica to western Ecuador, northern Venezuela, and Trinidad. Recent intensive studies of this species on Barro Colorado Island, Panama (Heaney and Thorington, 1978; Glanz et al., 1982), have found this population to have a very specialized diet. Although *S. granatensis* was recorded feeding on 58 species of plants in this diverse forest, 73% of all feeding observations involved just four species of fruit: the hard-shelled nuts of the legume *Dipteryx panamensis* and the palms *Astrocaryum standleyanum* and *Scheelea zonensis*, and the large, firm fruits of *Gustavia superba* (Glanz et al., 1982). Most other observers in central Panama (Enders, 1935; Chapman, 1938; Fleming, 1970) have also noted this squirrel using palm habitats and hard-shelled fruits. Elsewhere in its range, however, it occurs in other types of forest (Hershkovitz, 1947; Handley, 1966, 1976; Eisenberg et al., 1979), but only Handley's (1976) studies in Venezuela quantified habitat selection, and no studies have monitored diet.

In contrast, very little ecological information has been published on *S. variegatoides*. Harris' systematic monograph (1937) outlined its range, which extends from southern Mexico to central Panama, and correlated pelage coloration with habitat. Handley (1966) and Fleming (1970) gave additional information on habitat. Several studies of Costa Rican tree species (Janzen, 1971, 1972, 1982*a*, 1982*b*; Bradford and Smith, 1977; Boucher, 1979; Hutchinson, in litt.) included observations of *S. variegatoides*, but no intensive field studies have focused on the squirrel species itself.

While doing a 15-month research project on the population of *S. granatensis* on Barro Colorado Island (Glanz et al., 1982), I conducted the less intensive study described here, in a drier forest 30 km SE of Barro Colorado. My study site was the Gold Hill and Cucaracha Slide area between the E side of the Panama Canal and the Gaillard Highway, 1 to 4 km NW of Paraiso (50 to 200 m elevation). Annual rainfall at Pedro Miguel, the nearest weather station, averages 2,000 mm, placing it at the boundary between the Dry Tropical Forest and Moist Tropical Forest life zones of Holdridge (1967). The vegetation of the site is a complex mosaic resulting from topography, and human disturbance during construction and maintenance of the Canal. I distinguished four habitat types: 1) open-woodland, characterized by a grassy understory (much of which burned in the dry season) and clumps of trees which formed an irregular, disconnected canopy; 2) successional forest, with an irregular canopy height (2 to 15 m) dominated by early-stage successional trees, such as *Cecropia obtusifolia* and *C. peltata*, *Cochlospermum vitifolium*, *Ochroma py-*