

Artificial Weaning of Old World Monkeys: Benefits and Costs

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Permanent mother-infant separation prior to natural weaning is a common husbandry practice in monkey breeding colonies. In the United States, such colonies have been established in all eight Regional Primate Research Centers.

Under undisturbed conditions Old World monkey infants are weaned by their mothers at the age of about one year (Hall & DeVore, 1965; Southwick, Beg, & Siddiqi, 1965; Poirier, 1970; Roonwal & Mohnot, 1977). Natural weaning is a gradual process. It implies that the infant, over a period of several weeks or months, is more and more consistently discouraged by his/her mother to suck on her breasts. Once the mother stops nursing the infant for good, the affectionate bond between the two is not broken (Poirier, 1970; Lindburg, 1971; Altmann, Altmann, Hausfater, & McCuskey, 1977; Roonwal & Mohnot, 1977). The young usually remains in the maternal group at least until the age of pre-puberty.



Figure 1. Artificially weaned, single-caged rhesus macaque infant showing typical signs of depression.

Under confinement conditions, artificial weaning is an abrupt occurrence which takes place several months prior to the biologically normal age of weaning. It implies that the still nursed infant is taken away from his/her mother and subsequently reared alone (Figure 1) or with other artificially weaned infants (Figure 2).



Figure 2. Artificially weaned, group-housed rhesus macaque infants showing the biologically atypical clinging-together behavior which reflects their frustrated need to obtain the biological normal contact-comfort from their mothers.

Benefits

Colony managers often believe that premature, forced weaning of infants would help to maximize the mother's reproductive efficiency, thereby reducing the financial investment in the procurement of new research subjects. Surprisingly, there are only two data-supported reports dealing with the relationship between natural *versus* artificial weaning and maternal reproduction.

Goo & Fugate (1984) studied breeding groups [one male and seven females] of rhesus macaques (*Macaca mulatta*) in which infants were separated from their mothers at the age of 6, 8, 10, or 12 months; unfortunately, no reference group

was included in which infants were allowed to stay with their mothers until or beyond the age of biologically normal weaning. Nursing females with infants removed at six months of age had better reproductive rates than the other three groups. The authors point out that even the relatively high annual pregnancy rate of 74% in the 6-month-weaning group was conspicuously lower than that reported for wild rhesus macaques (91%; Lindburg, 1971). This discrepancy suggests that the stress resulting from losing the infant was so severe that it had an intrinsic impact on the mother's reproductive system apart of the infant's age at forced separation.

Wallis & Valentine (2001) assessed the reproductive performance records of breeding groups [10-12 females and one male] of baboons (*Papio* sp.) in which infants were either forcibly weaned [18 cases] at the age of 6-10 months or allowed to remain with their mothers beyond the age of natural weaning [21 cases]. Mothers of naturally weaned infants resumed cycling 165 days after birth, were confirmed pregnant 59 days later and gave birth to their next offspring at an interval of 377 days. Conversely, mothers of force-weaned infants resumed cycling 170 days after birth, were confirmed pregnant 63 days later and gave birth to their next offspring at an interval of 413 days. The authors point out that mothers of naturally weaned infants appeared to breed back more quickly than those of force-weaned infants, and conclude that forced infant weaning did not improve reproductivity in their colony of baboons (Cary, Valentine, & Hill, 2000). "These findings - in addition to the concern for proper psychological development - suggest the better strategy is to allow infants to be naturally weaned by mothers" (Valentine, Cary, Stanley, White, & Wallis, 1999, p. 110).

Costs

It should be self-evident that permanently removing a still sucking infant from her/his mother is an extremely distressing experience for both, the mother and the infant. The event is particularly detrimental for the infant, because the mother remains the primary source of comfort and reassurance well beyond the conclusion of nutritional weaning (Sade, 1973; Altmann, 1980; Berman, 1980; Lindburg, 1991). The psychological trauma resulting from pre-weaning maternal separation is long-lasting, perhaps permanent, and so severe that it has been used as a model of stress, immune deficiency and depression (Kaufman & Rosenblum, 1967; Reite, Short, Seiler, & Pauley, 1981; Laudenslager, Capitanio, & Reite, 1985; Laudenslager, Held, Boccia, Reite, & Cohen, 1990; Laudenslager et al., 1995; Capitanio, 1998). Needless to say that research data

collected from early-weaned animals are at risk of being altered by the uncontrolled variable of emotional distress.

Primatologists repeatedly have emphasized the deleterious effects of maternal separation on juvenile monkeys (Goosen, 1989; Mason, 1991; Poole et al., 1994; Boccia, Laudenslager, & Reite, 1995; Philbin, 1998; Baserville, 1999). The International Primatological Society aptly recommends that "The young monkey should not normally be separated from its mother at an early age (i.e., at 3-6 months) but should remain in contact for one year to 18 months, in most species. There is unlikely to be any greater productivity through early weaning, in seasonally breeding species, such as rhesus monkeys. Even in non-seasonal breeders [such as long-tailed macaques], any slight increase in productivity must be offset against the resulting behavioural abnormalities of the offspring" (IPS 1993, p. 12).

Conclusion

The perceived benefits of permanent, pre-weaning mother-infant separation are not supported by scientific findings. The only study that compares reproductive performance of mothers with naturally weaned infants *versus* mothers with artificially weaned infants failed to substantiate the rationale behind artificial weaning. This study provides data-supported evidence that non-interference in the natural weaning process enhances rather than inhibits the maternal reproductive system, presumably because it avoids the intrinsic stress that is associated with maternal-infant separation. Similar findings have been reported in Zebu cattle (*Bos indicus*), with cows showing significantly shorter birth intervals when their calves stay with them beyond the age of natural weaning than when their calves are forcibly removed in the futile attempt to enhance the dam's reproductive efficiency (Reinhardt, 1982).

Many primate research facilities are overcrowded with monkeys, resulting in a shortage of species-adequate cage space and a surplus of healthy animals who are sometimes killed in order to make room for new animals. As long as there is an excessive number of monkeys and insufficient cage space, there is no ethically legitimate reason for attempting to enhance the animals' reproductive output, especially when such measures are not proven to be effective but cause unequivocal psychological distress. It is a vicious self-reinforcing circle: Stressed animals are prone to yield stressed scientific data, which in turn necessitates a larger number of subjects needed to obtain statistically significant results. It is conceivable that maternal-infant separation for the purpose of artificial weaning flaws primate husbandry to the extent of *increasing* - rather

than decreasing - the total number of monkeys needed for research. Thus, artificial weaning is not only an avoidable source of distress but it may also be an economically unsound management practice.

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