FIELD NOTES

High incidence of elephant twin births in Tarangire National Park, Tanzania

Charles A.H. Foley

Tarangire Elephant Project, PO Box 2703, Arusha, Tanzania
email: foley@bushlink.co.tz

Twinning in African elephants is relatively uncommon. Evidence from population culls in Uganda (Laws 1969) indicates that on average, 1% of conceptions produce twins. Data from a long-term demographic study in Amboseli National Park, Kenya (Moss 2001), suggest that twinning may be rarer still; only one set of twins was recorded from 1192 births over 30 years. In Tarangire National Park, Tanzania, a group of 139 individually known adult females has been studied since 1993, with accurate demographic records kept. Among 291 recorded births, 14 (5%) have been twins. Of the seven twinning cases, five produced one male and one female infant, and in the other two cases both infants were females.

One remarkable female elephant, named Willow, has produced three consecutive sets of twins within a period of seven years. Her first set was born in mid-1992, the second set in the second week of April 1996, and the third on 21 April 1999. Interbirth intervals were therefore approximately four years between the first and second set, and exactly three years between the second and third set. On each occasion one of the infants was male and the other female. The male of the first set of twins died in unknown circumstances in 1997 at age five, and the male of the third set of twins died within six months of birth, again for unknown reasons. The twins born in 1996 have survived to date. A second female within the family group (assumed to be a close relative of Willow, possibly a sister) also produced twins, both female, in 1991. Her next calf, a single male, was born in May 1995—an interbirth interval of approximately four years. The birth dates and sexes of the seven twin births are summarized in table 1.

Evidence from humans suggests that twinning is genetically influenced, with some families and individuals being more predisposed than others (White and Wyshak 1964). While little research has been conducted in this field on non-domesticated animals, observation of multiple occurrences of twins within a family group suggests that a similar pattern might also occur in elephants.

Table 1. Data on birth date, sex and mortality of the seven twin births in Tarangire

Mother	Birth dates of calves	Sex of twins	Infant deaths
Willow	1992	female/male	male 1997
Whisper	1992	female/male	—
Fiona	1993	female/male	female/male 1993
Willow	April 1996	female/male	—
Willow	April 1999	female/male	male 1999
Eleanor	March 2000	female/female	female/female 2001[a]
Pandora	April 2000	female/female	—

[a] mother died June 2000

The 1996 set of Willow's female and male twins has been closely monitored over the past six years. Competition levels between the male and female infants were high during the weaning period, with the male directing all aggression towards the female. If the female attempted to suckle when the male was suckling on the other breast, the male would run over and push her away with his head and then suckle on that breast himself. The male was also seen preventing the female from suckling when not suckling himself, again by running up and ramming the female with his head. The female had to wait until the male was sleeping or playing before suckling. Despite these persistent feeding interruptions, the female infant remained in good physical condition, with fat covering the entire lumbar region and no lumbar depression visible (Albl 1971). There was very little competition between the pairs of female twins, and in both sets the infants were repeatedly seen suckling at the same time.

Despite monopolizing their mother's milk, Willow's male infants in the sets of twins proved to be the more vulnerable, with two of the three dying before age five. Mortality among all twins was high, with 6 of the 14 infants (43%) dying by the age of five. In two cases both the twins died (in one case following the death of the mother), and in two other cases, one twin died (table 1). This is a far higher mortality rate than the 13% (35 deaths among 277 infants) recorded for single infant births ($c^2 = 7.32$, $p < 0.007$). It is probable that mothers of twins are less able to meet their infants' nutritional requirements, and the fact that there are two infants may also increase the chance of one becoming separated from the family group. Male infants, with their higher growth rates and greater milk demands (Lee and Moss 1986), are likely to be particularly vulnerable.

In a highly unusual incident, one set of three-month-old female twins was adopted by their eight-year-old brother, following the death of their mother. The young male guided the infants, adjusting his travel speed to suit theirs. The trio of siblings spent most of their time apart from their family group. Remarkably, the male would allow the infants to allo-suckle. An infant would initiate the suckling by pushing the male's front leg forward with her head, causing the male to pause. In each case, the infant terminated the allo-suckling. On several occasions both infants were seen allo-suckling at the same time. The infants learned what to eat by feeding from the same vegetation as the male and remained in good physical condition throughout the dry season. This unusual group was seen for a period of six months, after which all three disappeared (November 2001).

It is unclear what underlying factors were responsible for the surge of twins recorded in Tarangire. The Tarangire elephant population has been growing extremely rapidly since 1994, with females and infants increasing at an average rate of 10% per annum. Two factors are probably responsible for this rapid growth spurt: first, the marked reduction in poaching following the ban on ivory trade in 1989, and second, a period of several consecutive extremely wet years. The elephants within Tarangire and the surrounding areas suffered heavy poaching during the 1970s and early 1980s (Foley et al. 2001). This caused the elephant groups to cease their traditional seasonal dispersal to areas outside the park and remain in the park year-round. In apparent response to the poaching, some elephant families formed large herds of 300 or more animals that moved as a single unit, presumably as a defense mechanism. When poaching ceased after 1989, the majority of the elephant family groups resumed their normal movement and aggregation patterns. With this release from the human-induced behavioural change, most external stressors that had contributed to restricting reproduction were removed, and the reproduction rate increased dramatically.

From 1996 to 1998 Tarangire experienced very heavy rainfall, linked in part to the El Niño phenomenon. During these three years, an average of 1000 mm per year fell, compared with the normal yearly average of 680 mm. The resulting abundant vegetation meant that females maintained excellent body condition year-round, and thus the time required to achieve post-partum oestrus was reduced. The average interbirth interval for non-twinning females in 1996 was 3.37 S.E. 0.14 ($n = 60$). This compares with an average interbirth interval of 4.5 years found in the Amboseli population (Moss 2001). There are no published records for interbirth intervals for females with twins, although these would probably be higher than the average interval for single offspring given the increased physiological demands on the mother. Of the seven twinning events, only four have been followed by another birth thus far. The interbirth intervals following the twin births were 3, 3, 4 and 6 years. While the abundant vegetation may have reduced interbirth intervals for twin-bearing females, the high incidence of twinning found in this study could not be attributed solely to rainfall. Four of the

seven sets of twins were born before or during 1996, before the females were able to take advantage of the good forage conditions.

Acknowledgements

This work was funded by the Wildlife Conservation Society, the African Wildlife Foundation, and USAID. I would like to thank the Tanzanian Wildlife Research Institute and the Commission for Science and Technology for permission to conduct research in Tanzania, and the Tanzania National Parks for permission to work in Tarangire National Park. Thanks to Dave Balfour for his comments on the manuscript.

References

Albl, P. 1971. Studies on assessment of physical condition in African elephants. *Biological Conservation* 3:134–140.

Foley, C.A.H., Papageorge, S., and Wasser, S.K. 2001. Noninvasive stress and reproductive measures of social and ecological pressures in free-ranging African elephants. *Conservation Biology* 15:1134–1142.

Laws, R. 1969. Aspects of reproduction in the African elephant, *Loxodonta africana. Journal of Reproduction and Fertility* (supplement) 6:193–217.

Lee, P.C., and Moss, C.J. 1986. Early maternal investment in male and female African elephant calves. *Behavioral Ecology and Sociobiology* 18:353–361.

Moss, C. 2001. The demography of an African elephant (*Loxodonta africana*) population in Amboseli, Kenya. *Journal of Zoology of London* 255:145–156.

White, C., and Wyshak, G. 1964. Inheritance in human dizygotic twinning. *New England Journal of Medicine* 271:1003.