

FIELD NOTES

Twining in the Amboseli elephant population

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On 1 April 2018, the Kenya Wildlife Service reported the appearance of twin elephant calves to the Amboseli Elephant Research Project. Since new-born elephants are known to follow other family females, especially grandmothers, confirmation of twins requires sustained observations of suckling from the same female over time. These twins, one male and one female, were subsequently confirmed as births to a 37-year-old female (Paru) from the PA family (Figs. 1 & 2; see colour plates: page v). This female is in her peak reproductive years (Lee et al. 2016), with five previous birth experiences. In Tarangire (Foley 2002) and Queen Elizabeth (Laws 1969) National Parks, twinning rates were estimated at 2.5 per hundred births and 1.35 per hundred births respectively, and such rates are common across large ungulates (Laws 1969). However, our observation is only the second successful full-term twin birth out of 2,687 births recorded in the Amboseli study since 1972 (0.2 per hundred births; previous twin record in 1980), and the female twin died from natural causes at the age of six months. In captivity twin births have negative consequences for both mother and calves (Hildebrandt 2006), but previous wild calves have been successfully reared (Foley 2002; AERP long-term records).

Twining in elephant populations has been proposed to be a function of release from density dependent suppression of reproduction; the

Tarangire population was recovering from significant poaching when high twinning rates were recorded. Queen Elizabeth records were based on pre-partum estimates recording the incidence of twin foetuses. In Amboseli however, twins did not appear during any of the population birth pulses following significant droughts, despite any potential release from competition that survivors experienced (Lee et al. in prep.). Anecdotal observations of twins from other field sites (Ruaha, Smit pers. comm. 2018) suggest that twin births are universally rare. The routine production of multiple biologically active corpus lutea during ovulation might result in more than one fertilised embryo (Seth-Smith and Parker 1967; Allen 2006), and most elephant twins appear to be dizygotic (5 of 7 twin pairs male-female in Tarangire; both sets of Amboseli twins). Despite Laws' (1969) estimates of a high foetal incidence, it is uncertain how many elephant pregnancies terminate one twin during the 22-month gestation.

In humans, another K-strategist species, twinning rates average ~ 1.2 per hundred deliveries for women in developed countries (Pison et al. 2015) and twinning probability is a function of interactions between genetics and environmental factors for both monozygotic and dizygotic twins (US National Library of Medicine 2018). There is considerable population variation in humans from 46.5/1,000 in some regions of Nigeria (Akinboro et al. 2008) to 8.4/1000 in Hong Kong (Pison et al. 2015). Twinning probability increases with maternal age, such that

women over 36 years of age have an average 15% increase (ranging from 5-28%) in the probability of twin births by comparison with women at age 20 (Pison et al. 2015). An observed increase in twinning rates in the US from 9/1000 in 1975 to 16.9/1000 in 2011 (Martin et al. 2012) is a function of assisted conceptions as well as increasing maternal age at conception in the child-bearing populations.

We suggest that being able to carry twins to term in elephants may be mediated by maternal condition (a function of food availability and food access), maternal age and size (which covary; Lee et al. 2013), and some level of genetic variation (e.g. de Flamingh et al. 2015) which remains unknown, all of which may produce the observed population variance. Recording twins across populations should provide us with greater information about genetic and ecological variance, and provide avenues to explore these influences, so we encourage sharing these observations. Twin records should be validated by behavioural observations that confirm calves of identical age (through body size and motor development; Moss 2001) and are unlikely to be confounded by rare adoption events (where calves will differ in age), or double-suckling by co-reproducing mothers and daughters where both calves suckle from both females (Lee et al. 2016).

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