

# Maternal Responses to Offspring Death: Insights from Studies on Anthropoids

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*Om tryambakam yajāmahe sugandhim pushtivardhanam Urvārukamiva  
bandhanān mṛtyor muksiya mā 'mrtāt*

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*-Rigveda (7.59.12) and Yajurveda (TS 1.8.6.i; VS 3.60)*

The *maha mṛtyuñjaya* mantra or *Mrita-Sanjivni* mantra invokes *Tryambaka* (the 3-eyed one; in the image above) or Shiva as part of a life-restoring practice that the great sage, *Shukracharya* was endowed with. In Greek mythology too, similar power of bringing the dead back to life laid with Asclepius, son of Apollo and Coronis. Anthropological literature covering animalistic tribal societies propounds shamans being capable of rejuvenating the dead and sometimes sealing the soul in a subverted human state such that the body was neither dead nor alive, termed zombie.

In effect, death has always fascinated us since our very beginning. Sages, philosophers,



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\* Mr. Sayantan Das, Ph.D. Scholar from University of Mysore, Mysuru, is pursuing his research on “Epimeletic Behavior in Nonhuman Primates.” His popular science story entitled “Maternal Responses to Offspring Death-insights from Studies on Anthropoids” has been selected for AWSAR Award.

poets and scientists have equally pondered over the mysteries of death in an attempt to comprehend and conquer it. In modern times, advances in anatomy, physiology and cellular and molecular biology have triumphed in providing intriguing insights into the mechanisms of ageing and death. A branch of psychology even investigates near-death experiences, which records and analyzes personal accounts associated with death and impending death. It encompasses a variety of sensations including detachment from the body, mid-air levitation, being pulled into vacuum, dissolving into a void, etc. Regardless, the psychosocial manifests and consequences of death continue to elude us. The discipline of human thanatology has been instrumental in this regard by describing emotional antecedents of death and mechanisms of coping post mortem.

Findings from human thanatology are increasingly being applied in nursing for management of bereavement-induced grief. A crucial factor however, missing from our understanding of our own emotional responses to disruption of attachment to the deceased, and attachment in general is its evolutionary origin. And, that is where such complex, unmanageable and acute emotions emerge from.

In his book, *The Expression of the Emotions in Man and Animals* (1872), Charles Darwin wondered about the possibility of an emotional continuity from animals to man, similar to an evolutionary one. Despite such early advances and propositions, scientists have always kept human expression of emotions, especially compound emotions (like anger, jealousy) separate from that of

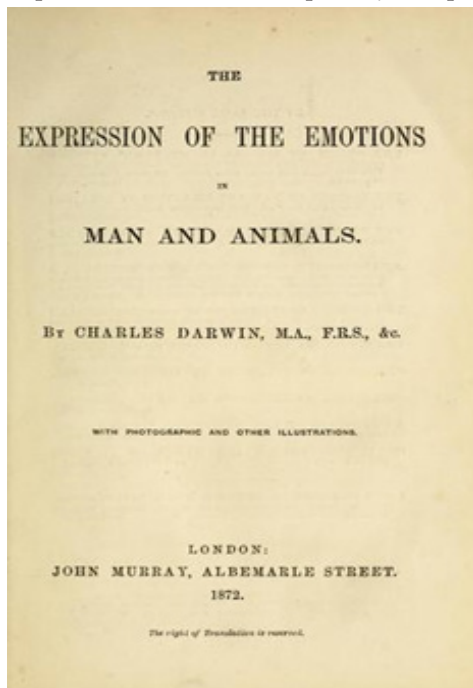


Figure 1. Title page of Charles Darwin's *The Expression of the Emotions in Man and Animals*, 1872

animals, coining analogies even if similar behavioral manifestations to a stimulus is observed. Although animal models became popular for studying human diseases, human physiology and even human behavior, a scientific comparison of emotions between the two was never embarked on. Very recently, this Pandora's box was opened to explore probable commonality in the emotional make-up of human and animals. Based on a flurry of reports on animal responses to dead and dying conspecifics, researchers have emphasized the study of animal responses to death for a better understanding of our own psychologies surrounding grief, mourning and bereavement.

The quintessential relationship that depicts emotional attachment in its strongest form is the one between mothers and their offspring. As a consequence, we expected mother-offspring pairs to display the most intense responses to premature disruption of attachment by means of transient or permanent separation. In the context of the most extreme form of cessation of this bond, primate mothers were observed to stay close and transport the dead bodies

of their offspring for days and sometimes, months. Moreover, what was odd was that the cases even within the same species varied widely. For example, one chimpanzee mother carried her deceased baby for 2 days whereas another carried hers for over 127 days despite the corpse morphing into an unrecognizable inanimate object. We were firstly interested in unearthing the reasons for this variety of responses within and between various species of non-human anthropoids, which include species of macaques, langurs and apes and secondly, wished to examine how behavior of the bereaved mother differed from that of other mothers. To decipher diversity in deceased infant portage, we amassed detailed information on every available case which included details about the nature of the death, like due to sickness, human or animal-induced death called unnatural, etc., offspring, like age and sex, about the mother, like age, how many times she has had babies previously, etc. and characteristics of the troop and the species, like whether the troop lives in the wild or is held captive, their degree of arboreality, etc.

Since, few researchers had previously suggested that the duration of a deceased infant portage could be influenced by temperature conditions; we also found temperature to be a contributing factor in every instance. The second portion of the study was relatively challenging since it involved building a network of informants who lived close to troops of monkeys and could notify us immediately as soon as the behavior of the interest occurred. After days of patient waiting, we received our first call and we successfully managed to document the entire incident in as much detail as possible. Within the next 4 months, we encountered our second case quite accidentally while conducting our regular observations of monkeys. By contacting primatologists closely associated with us, we were able to document several cases in the Bonnet monkey and in the Lion-tailed monkey. Through analyses of the behavior, we compared time allotted to feeding, looking for food, movements, socialization with group mates, etc.

In the first phase of the study, we found that anthropoid species that showed deceased infant portage were evolutionarily related to each other, which meant species that are genetically related to each other showed similar levels of behavior. As expected, we quantified the diversity in the responses within each species. Unexpectedly, our results showed that duration of infant portage was strongly determined by mother's age, context of offspring death, living condition and degree of arboreality. In the second phase, we found that Bonnet mothers carried their deceased offspring for 3.56 days (averaged over 7 cases), showed reduced feeding, long period of inactivity and solitude though they intriguingly continued to care for their dead offspring similar to other mothers with live offspring.

To interpret the behavior of the bereaved mother directed towards her deceased offspring, we used the conceptual layout of 'death perception' described by Anderson et al. (2016). As a consequence, we interpreted repeated investigation of offspring body by mothers and group members as collating physiological information following death ('causality' of death), peculiar support of dead offspring by mother and communal defending of infant bodies as comprehension of 'non-functionality', the dead cannot feel, think or see. And lastly, the mother allowing intrusive exploration of her offspring corpse followed by a progressive disinterest in it as perceiving 'irreversibility' of death, i.e., the dead cannot come back to life.



Figure 2.(a) Bonnet macaque mother with the withered carcass of her offspring 10 days post-death and (b) Another mother investigating the mouth of her deceased son.

By comparing studies on bereavement-induced grief caused in similar scenarios (death of an infant) in humans, we demonstrate that reduced feeding and passivity are hallmarks of grief. We surmised that deceased infant portage can be integrated into existing models of attachment if it is recognized as post-death attachment mediated by ‘bereavement-induced maternal grief’ whose strength is incumbent on the quality of mother-infant attachment history.

Finally, to describe the maternal portage of corpse comprehensively, we proposed a system-inspired conceptual model along with its causal factors. We divided the behavior into three phases: ‘onset’ of deceased infant portage governed by hormonal and non-hormonal condition (like

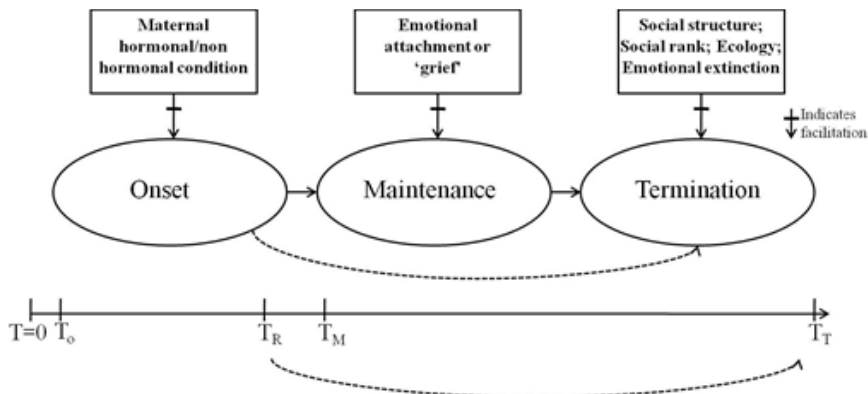


Figure 3. Schematic of an analytical model explaining deceased infant carrying behavior, beginning with the ‘onset’ of the behavior ( $T_o$ ) facilitated by maternal hormonal or non-hormonal condition, followed by recognition of death ( $T_R$ ) of infant. Recognition of death can either lead to ‘termination’ of infant carrying ( $T_T$ ) in the absence of ‘emotional attachment/grief’ or ‘maintenance’ ( $T_M$ ) of the behavior in its presence. The behavior finally reaches ‘termination’ owing to emotional extinction and/or socio-ecological constraints. The time axis designates the temporal order of the stages of the behavior beginning with the ‘death’ of the infant at  $T=0$ . The dotted lines signify the possibility of voluntary carriage abandonment immediately after awareness of death.  $T_o$ : Onset of deceased-infant carrying (DIC) behavior;  $T_R$ : Instance of recognition of infant death;  $T_M$ : Instance of the maintenance of DIC;  $T_T$ : Instance of the voluntary termination of DIC resulting in abandonment of infant carriage.

physiological state) of the mother, recognition of absence of agency in offspring corpse resulting in either continuation or abandonment of body (termination); 'maintenance' if a mother continues to carry her dead offspring followed by voluntary 'termination' as a result of extinction of grief, avoidance by group members and/or constraints due to living conditions.

Most importantly, our study took a plunge into the deep unexplored space of the Pandora's box and helped initiate an international dialogue among researchers interested in studies on animal sentience, animal emotions and specifically, animal and evolutionary thanatology. The study further demonstrated how our emotional capacities are not unique and are shared with other species. If not anything, it ought to at least help us co-exist peacefully and accord animals their right to the planet.