Brookfield Zoo's Baby Watch

Jeanne Altmann, Ph.D. Research Curator
Brookfield Zoo

The birth of an infant is not only an event of obvious biological significance; as many of us know from direct experience, it is also one that initiates enormous changes in the daily life of parents, siblings, and others who care for relatively undeveloped and dependent youngsters. Among group-living mammals, newborns usually attract excited attention from other group members, and we humans extend our sense of wonder and interest to the infants of other species.

Birth is more than a time of celebration, however. It is the beginning of the most dangerous time in an infant's life. Even at Brookfield Zoo, where animals are protected from many hazards such as predators and droughts, infancy is still the life stage with the greatest risk of death. Partially for this reason, the zoo has developed a program of formal behavioral observations that focuses on infants. Close observation can alert keepers to congenital or newly emerging problems, and early warning is often the best way to avert life-threatening problems. The trick in successful early warning, however, is the ability to identify small and subtle signs of future problems. This might not be difficult if normal infants all followed the same course of development, but how can we know which developmental differences are signs of trouble and which are not? Should we worry when an infant seems to spend a lot of time nursing, or a little? When it tries new foods at a very young age or not until it is quite old? Among healthy human infants, for example, a few experience the appearance of their first tooth at four months of age, a few not until twice that age, and most are somewhere in between. Likewise, some infants start to crawl several months later than others do and some bypass the crawling stage altogether. As a result, we must start by understanding the range of developmental patterns that are experienced by healthy infants. Only by knowing more about the range of normal developmental and behavioral variability can we begin to evaluate any new infant's situation.

Can we restrict our attention to the infants themselves? For many young animals, parental care, primarily maternal care in the case of mammals, is essential for the infant's survival, and so Brookfield Zoo's observation program also focuses on the behavior of these caregivers. We observe the interactions between the infants and their mothers for ungulates (grazing animals) such as okapi, giraffe, rhino, and addax. For mothers, too, behavioral variability may be considerable without being a source of worry. Some baboon mothers, for instance, are very restrictive of their infants, while others allow their infants much more opportunity to explore. Among giraffes, one mother may return from feeding often to check her infant, another may do so rarely. Not surprisingly, among nonhumans and humans, mother-infant pairs follow somewhat different patterns and timing of interaction, and most of this variability poses no risk to the infant—it may even be advantageous.

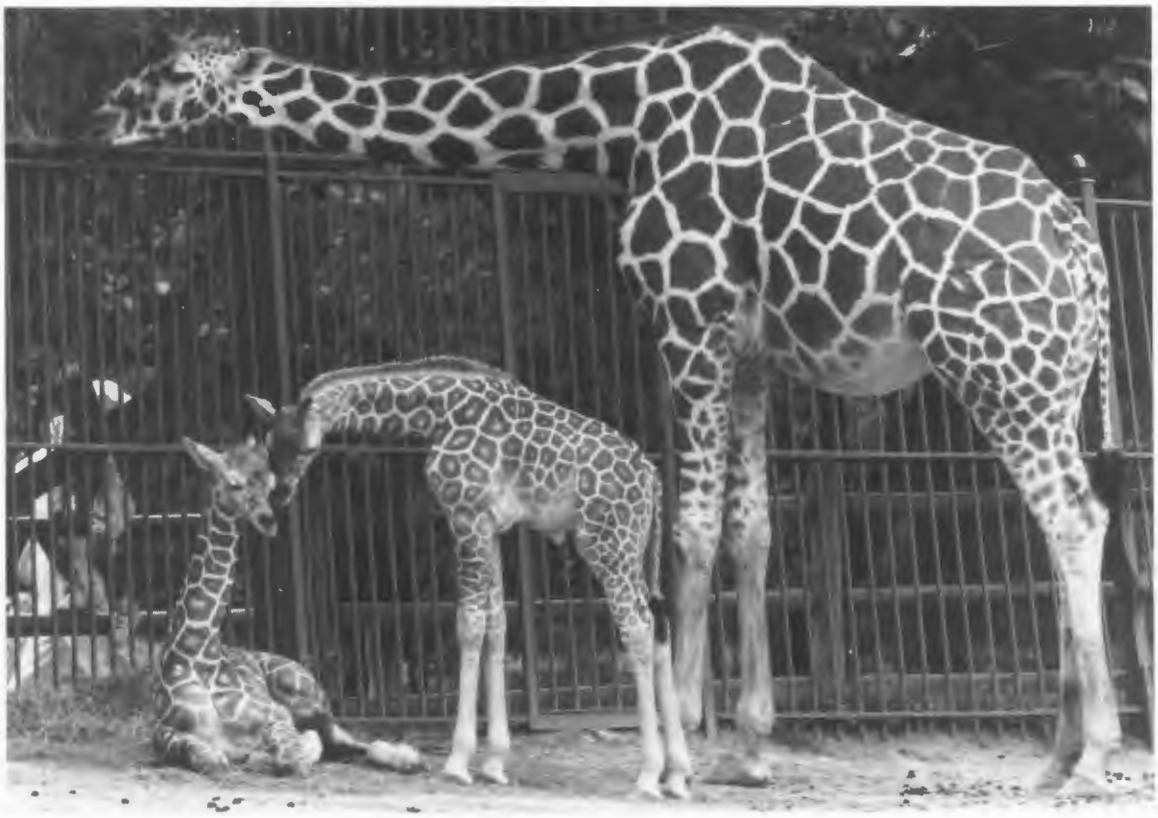
The development of Brookfield Zoo's infant observation scheme has been a collaborative effort in which I have been joined primarily by Conservation Biology staff and Animal Collection keepers, but also by other volunteers and student observers. In developing Brookfield Zoo's formal behavior observation program, particularly with young ungulates in mind, we were able to benefit from our field research on baboon mothers and infants and the close observation of several okapi infants at Brookfield Zoo. The latter were conducted mainly by Dr. Richard Bodmer, Dr. Mary Rowen, and governing member Sandy Manne, with guidance from Brookfield Zoo's director, Dr. George Rabb. Neither of these existing systems fully met our goal, however, which was to have a program whereby adequate information could be gathered by observers who received relatively little training and supervision, and for which the essential data could be easily and quickly tabulated and visualized.

The program that we sought to develop does not produce a moment-by-moment record of an infant's every move, but neither does it require the intensity of labor and time that such a record demands. The program does not enable us to answer the more subtle or complicated questions about infant development, but neither does it eliminate all but the most highly trained and experienced observers. Using my experience in developing such a scheme with non-university-level Kenyan assistants on the baboon

J. Schulz

Brookfield Zoo's behavioral observation program focuses on mother-infant interactions in grazing animals such as Grant's zebras.

Brookfield Zoo monitors the behavior and progress of all of the infant reticulated giraffes. Here, at the old Giraffe House, a female "babysits" for another mother's offspring.



R. Pomaro

project, we first modified the plan for Sandy Manne to observe siamangs in Tropic World. Sandy and I then developed an ungulate version for an okapi birth, made modifications for giraffes, and then rhinos, zebras, and finally groups of addax, until we felt that we had a program general enough to encompass observations of most ungulates, and flexible enough that we could make small modifications for important special characteristics of any particular species.

The main information that we gather in this simple plan relates to the general activities of mothers and of infants—the proximity of the two, nursing time, and special social interactions. The plan involves two key characteristics. First, all recorded categories of activity, spatial relationships, etc., are clearly defined so that any observer at any time will score the behavior in just the same way. Second, the records for most behaviors—such as moving, resting, or feeding—are made at regular, predetermined time intervals, such as once a minute, which enables us to make good determinations of the percent of time spent in various activities. By having most information gathered in this way, the observer can then collect more detailed information accurately and completely on a few selected behaviors, such as the exact timing and who initiated suckling, contact, and particular social behaviors. Finally, as time allows, information about some interesting special tidbits or unusual events is recorded in a separate part of the scoring sheets as necessary. By separating these three types of data and by placing certain priorities on the two more systematic sets of data but not precluding the third type, we have struck what we consider a reasonable balance between quantity and quality of information, between information on common and rare events, between ease of access to information and level of detail of that information. With each new species or housing situation, or when Sandy worked with multiple observers instead of doing all of the observations herself, we discussed and modified the scheme as needed until we were satisfied that we had a system that could be used by zoo keepers or others as husbandry concerns arose.

What about all of the differences that we see in the development of normal infants, the behavior of competent mothers, and the interactions between mothers and infants? Why does such variability occur and what are its

consequences? Documenting the range of developmental variability and identifying factors that account for some of that variability, along with the outcomes that follow, allows us to go much farther than detecting individual health problems. With this information, we may begin to understand how, and within what limits, mothers and infants modify their behavior to adapt to diverse conditions.

It is at this point that we begin to move beyond the initial short-term management motivation for our information gathering and toward one in which we can investigate the issues and fundamental scientific questions that are of importance to long-term management. In zoos and in the wild, these issues are important because variability, its sources and consequences, are exactly what ecologists and evolutionary biologists seek to understand, and what conservation biologists must understand if we are to make the right decisions about management of wild populations now and in the future.

Field studies of mothers and infants suggest that variability in maternal behavior is not only okay but perhaps an essential characteristic of the best mothering. For example, in studies of baboon mothers and infants in Amboseli, Kenya, Brookfield Zoo biologists found that mothers of weak infants were much more protective than mothers whose infants were strong. Mothers who were very high in the dominance hierarchy and whose infants had little to fear in the way of harassment by other families did not restrict their infants' movements, whereas low-ranking females kept their infants close by until the infants were older and better able to fend for themselves. For the Amboseli baboons and for a number of monkeys studied elsewhere in Africa and Asia, mothers provide more care for their infants (and do so longer) in seasons or years of little food or of very long daily treks for food, and they provide less care in times of abundance when infants can better fend for themselves. Mothers of a number of species seem to tailor the care of their infants to provide enough care to reduce risks but not so much as to hamper the development of independence or compromise their own immediate needs or future reproductive opportunities.

H. Greenblatt

The zoo's Grevy's zebras, a threatened species, are monitored as infants. The move from mother's milk to solid food marks an important developmental milestone.

M. Gwyn

Giraffes give birth standing up—and it's a long way to the ground! Outside the old Giraffe House, this mother coaxed her calf to stand within an hour of birth.

Because only a small fraction of mammalian infants usually survive in the wild, and because parental care and effective parent-offspring coordination are important factors in infant survival, the ability of infants and mothers to adapt their behavior has important implications for conservation in an ever-changing world. The role of behavior, and behavioral flexibility, is also critical for the potential success or failure of conservation-motivated captive breeding, reintroduction, or translocation for genetic reasons. What factors determine whether a mother is flexible in the care of her infants—will she be so only if she experienced a variety of conditions during her own development? Do species differ in their ability to make behavioral adjustments? Within any species, are some aspects of care or development quite flexible and others not? The answers to these questions are part of Brookfield Zoo's ongoing research, both at the zoo and in the wild.