Behavioral Application in Wildlife Photography:
Developing a Foundation in Ecological and Behavioral Characteristics of the Zanzibar Red Colobus Monkey (*Procolobus kirkii*) as it Applies to the Development Exhibition Photography

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Abstract

A fundamental understanding of Zanzibar red colobus monkey (*Piliocolobus kirkii*) behavior can be used to increase the efficiency of a photographic expedition and to increase the impact and value of a subsequent exhibition of the photographs taken. Preliminary research on cercopithecine monkeys, as well as the individual species, was paired with animal behavior experience in the development and execution of a photographic expedition to Jozani Forest. Collected photographs were compiled, organized, analyzed and edited before final selection of twenty five pieces meant for exhibition. These shots were assessed for their aesthetic, documentary and educational quality both individually and collectively as an exhibition. This show will be displayed abroad in an effort to increase exposure of the status of endangered species, of Jozani Forest, and of the Zanzibar red colobus monkey as a species.

Introduction

-The Role of Exposure in Conservation-

The accessibility of endangered species represents an enormous issue for their conservation. Of course this statement seems obvious and redundant; if the animals were more common there would be no issue at all. Yet the rarity of these creatures, and the relative remoteness of their rapidly disappearing habitats, raises more issues for conservation than simple population figures. For many rare, endangered, or threatened animals, survival of the species relies heavily on perceived charisma through exposure in the global conservation community. With this exposure comes a flood of support from conservationists, governments and organizations both locally and around the world. Without this support, the creature finds itself defenseless, with nothing to protect it from the exploitation and habitat loss that accompany the pressures of ever increasing human populations. In 1986, the Eastern Canary Islands chiffchaff (*Phylloscopus canariensis exsul*), a small warbler inhabiting the islands from which it took its name, was lost to the list of recent extinctions. The Southern White Rhino (*Ceratotherium simum),* with a population hardly above twenty individuals in the early parts of the last century has recovered to a population of over seventeen thousand due to ever increasing protection. While there are many factors affecting the differing conservation of these two animals, one which immediately springs to mind is that of global exposure, of the sheer number of people familiar with and interested in a certain species. Ask any man, woman or child, anywhere on earth, and they are likely to know what a rhinoceros is and that it is threatened by human activity. But the same line of questioning substituted for the chiffchaff is likely only to meet with puzzled looks. One animal has recovered from the brink of extinction while another lost this same battle for survival. The chiffchaff, remains relatively unknown among the general global population, even within the greater conservation community. But the white rhinoceros, with massive coverage in every imaginable medium, is one of the world's most beloved and protected species.

In many cases, photographic depiction represents the primary, or only, manner in which a rare species can be experienced by the public at large. This is certainly the case with rhinoceros, which has its image plastered in books of every variation. Even in cases

wherein an animal can be experienced first hand, photographs are the most resource efficient and appropriate means with which the experience can be documented and later revisited. There is nothing which can rival a live animal encounter for its impact, for the manner in which it changes an individual's understanding of conservation issues. Unfortunately, this situation is both rare and fleeting. Although the impression of that initial impact may remain, without photographic documentation the details of the event will undoubtedly fade. The photograph represents a far reaching and undeniably effective means to spread both awareness and concern about the conservation issues that affect the natural world.

The importance of the photograph to a global conservation effort is irrefutable; there is, simply, no better way to depict the reasons for struggle. Yet despite this importance the traditional visitor to a protected area does little in preparation to capture the essence of the animal, its characteristic looks and unique behaviors. They know little about its natural history and even less about those physical and behavioral traits which grant each species its own distinctive appeal. They may come away with many photographs, perhaps even some great ones, but without understanding the underlying behaviors that resulted in that image, it will never attain its full potential to impact an observer. It becomes, simply, another memento. One more holiday snapshot in the album rather than the conservation tool it could become. This general trend is found in countless parks and reserves around the world, and represents a potential limitation for conservation efforts. This same trend is, ultimately, applicable to the current climate of conservation on the Zanzibar archipelago. The islands' most charismatic species, that which has been chosen as the mascot of conservation for the island chain, has become one among so many travel photos. A passing curiosity instead of the symbol it strives to become.

-The Zanzibar Red Colobus (*Piliocolobus kirkii*)- as a Conservation Symbol

The Zanzibar red colobus monkey (*Piliocolobus kirkii*) is just one among many colobine species across Africa. In fact it is just one of eight red colobus species to be found in the moist evergreen forests that girdle the continent. But even among these closely related species it stands out, unique among the crowd, both ecologically and as the symbol of conservation efforts. Adopted as the logo and star species of Jozani National Park, Zanzibar's first and only national park, the Zanzibar red colobus monkey is by far the most popular resident of the island's little remaining moist groundwater and coral rag forests. Tourists from around the world make the trip to visit Jozani, even if only for only a few hours, hoping to experience the animals, to snap a few photos of the monkeys for posterity. And the monkeys do not disappoint. With high population densities within Jozani Forest, it is almost impossible to not find a troop, or sub-group, of red colobus.

Representing an area of approximately 5,000 hectares (ha.) of coral rag forest, Jozani National Park represents an area of high priority for the conservation of the Zanzibar red colobus monkey. Recognized as the primary population of a unique and separate species, the population of monkeys within the park has risen to about 2,400 individuals within eight distinct troops (Mwinyi). These high densities are possible only

because of the unique nature of the red colobus. As a folivorous species (leaf-eating), the colobus survives by exploiting a highly available food resource: foliage. Due to the abundance of this resource (which quite literally grows on trees), the folivorous colobus monkeys have a social structure somewhat different than most other primates. Without heavy competition for food these monkeys lack a true territorial nature (Estes 521). The individual troops, numbering 30-70 individuals (led by up to four adult males), often overlap in their ranges and very rarely come into violent contact over feeding grounds.

The unique niche filled by the Zanzibar red colobus monkey allows it to reach much higher population densities than most other species in the forest (Gillespie et al 337). Because of this it may seem to be in easy access for park visitors willing to spend only a few hours hiking through the trees. This is not an entirely inaccurate assumption; the typical visitor to the area will be easily able to find and photograph this charismatic species. But few will leave the park with a lasting knowledge of what they saw, of what their photographs actually show. Jozani's ranger staff does an excellent job of interpreting and presenting the monkeys' behavioral ecology, but it is impossible for a visitor to gain anything approaching complete understanding within such a short time. In order to understand the animal, to comprehend its actions, and to fully grasp the conservation issues surrounding it, one must have at least a basic understanding of its natural history and behavior.

-Colobine Physiology and Natural History-

The basic ecology of the Zanzibar red colobus monkey is relatively unique among primates, and even among the colobines as a subfamily. Not least of the characteristics which set this animal apart from other closely related species is its basic physical conformation. With a ragged, tessellated hair-coat distinctly displaying three colors (white, black and the eponymous red), the Zanzibar red colobus is easily distinguishable from the other, red colobus species. The long, lank hair of the crown and forehead (forelocks) are especially distinctive as they frame the black face in high contrast. A unique pink patch splashes across the face and mouth, never quite the same in any two individuals. Less easily recognized is the shared subfamily trait that leaves the colobus with an absence of thumbs. It is from this characteristic that the subfamily gains its name, from the Greek 'colobe,' meaning 'cripple' (Kingdon[2] 18). Despite this 'handicap,' the colobus' remaining fingers align to form a very strong hook, an effective tool for climbing and grasping. The tail, though long, is not prehensile, serving only as a balance for swift movement throughout the canopy. What many first notice about the colobine morphology is the characteristic body shape, with a small head on a very large, rotund body. In fact the colobus is a relatively massive monkey, with males reaching over twelve kilograms and females approaching ten (Kingdon[1] 155). While this physiology contributes to a general image analogous to a curmudgeonly old man, it is directly related to the ability of the colobus to exploit its highly available food source.

Within that plump body is housed a very large and specialized digestive system, great in length and with high levels of sacculation in the stomach, not unlike that of larger ruminants. The similarity between tracts implies a high similarity between diets: both ruminants and the colobus monkeys rely on a diet high in cellulose, a plant polysaccharide which is highly indigestible. In both the colobus and the ruminant there is

significant pregastric fermentation. A population of gut fauna helps to break down this product, allowing the colobus to digest the complex carbohydrates found in leaves, and to convert them to volatile fatty acids (VFAs, primarily acetate) which provide the primates with caloric energy (Warren 651). The bacterial population proceeds by feeding itself on the plant product and delivering nutrients to the animal in this form. Even protein can be gained through the cyclical life cycles of the gut bacteria as it reproduces, dies and makes its way though the digestive tract. This nutritional strategy, while efficient and productive, takes significant time to complete the process of digestion and, due to the lower nutrient value of high-cellulose products, requires much input over the course of the day. This means that, at any one time, the red colobus is likely to be busy with eating or resting and digesting (McGraw 246).

Food selection can somewhat reduce this time difference, and is reflected in the dietary choices of the adult monkeys. In Jozani, the selection is focused primarily on young growth leaves, which have been shown to make up between 46.7% and 53.4% of the diet while mature leaves are rarely taken, only 6.3% to 7.3% of the time (Davies et al 111). This selection makes sense: young leaves contain significantly less cellulosic material, meaning easier and more complete digestion, and contain higher levels of digestible carbohydrates and other nutrients. Another popular food for the colobus monkey is fruit, particularly of the large exotic trees they tend to occupy (Indian almond, mango). But where other species would select for mature and easily digestible fruit, the colobus always prefers to feed on immature or 'green' fruits. The simple sugars of the mature fruit quite simply cannot be utilized by the specialized colobine digestive tract. These young fruits make up almost a third of the diet in Jozani (31.2%-31.7%) and provide another source of more digestible carbohydrates than mature foliage (Davies 111).

A diet high in immature plant products is also likely to be high in the toxins and free radicals that keep other animals from eating them. The chemicals released by immature fruits and leaves during digestion have the potential to damage the tract and reduce the ability of an individual monkey to feed itself. But for this end the Jozani colobus has a multi-pronged solution. There is some neutralization of plant toxins in the digestion of the material by gut bacteria, but not always enough to keep the system running smoothly. To supplement this ability, the Jozani troops can sometimes be found feeding on dirt (geophagy) or even on charcoal, that both naturally produced by lighting strike and man-made in kilns around the park borders. The consumption of these materials helps to absorb the plant toxins and maintain gut health, and in turn effectively increases the carrying capacity for monkeys on a territory. By increasing the ability to eat marginal or toxic food products, the geophagic and charcoal-consumptive behaviors displayed in Jozani have allowed population densities to reach higher levels than for populations elsewhere (Struhsaker et al 61). This could ultimately have negative consequences as the population reaches unsustainable limits and over-exploits the leafy resource they so heavily depend on, and there is some evidence of instability in the situation including higher aggression between individuals, a lower recruitment into the medium-juvenile size class, and overbrowsing of local trees (Struhsaker et al 70).

Ultimately though, it is this ability to exploit a highly available resource that allows the colobus to reach the population levels that exceed any other primate beside humans. In fact the direct relationship between foliage energy availability and colobus

population is a significant predictor of primate biomass (Wasserman 650). The dietary focus on leaves and young tree products both directly influences the behavioral traits that make the colobus non-territorial, and allow it to interact peaceably with other primates in the forest, such as the Syke's monkey (*Cercopithecus mitis*), while encouraging the high intra-troop interactions that make their social behavior so complex and engaging.

-Colobine Behavior-

As is typical in a highly social mammal, the Zanzibar red colobus develops a wide variety of means for communication. In fact the red colobus, as a species grouping, has a much more complex communication system than their black and white counterparts in the subfamily. Where the black and white colobus is focused primarily on loud noises and territorial displays, attempts to preserve their leafy resources in an environment of scarcity, the non-territorial reds have a vocabulary much more focused on interpersonal communication within their own large, multi-male troop as well as with neighboring troops. Because of the increased complexity of these interactions, visual, olfactory and audible, the red colobus has a much richer, more graded communication system (Estes 522). Much of the resident observation conducted regarding these forms of communication, vocal and physical, has been in regard to fairly simple influences. Vocal communication has been researched in its context to various stimuli, including threatening and non-threatening, while tactile communication information is centered more closely on reproductive behavior. In their surveys of the local colobus troops, the rangers of Jozani Park also focus on relatively simple behaviors, recording whether the monkeys are resting, eating, moving, mating, etc. (Mwinyi) rather than attempting to note behaviors that might indicate deeper complexity. Much more work, on the international scale, has been focused on the behavior of the black and white colobus, as well as the direct causes and results of this behavior. The black and white's behavior is both complex and sophisticated, with at least ten separate threat displays and four submissions, in addition to play behavior in young and mating behavior displayed by the genus. Because of their higher levels of intraspecific interaction, it is reasonable to assume that the red colobus, theorized to have an even more complex set of behaviors, is at least as, if not more, communicative (Estes 522). Even with differing levels of communicative ability, "The most remarkable fact about communication among monkeys (and apes) is the sameness of their signal systems. This applies particularly to visual, tactile and olfactoray signals, but also to many vocalizations...which sound virtually identical in various species" (Estes 478). Intensive research on the social interaction of red colobus monkeys has only been initiated in the recent past, but because of these familial similarities, in vocal, physical and olfactory communication, it is a relatively simple task to develop a basic framework for understanding these aspects of red colobus behavior.

-Physical Display-
(Visual Communication)

Physical communication between monkeys can range from quite discreet to incredibly conspicuous, with significant gradation between and within different postures and activities. The first, and most obvious, use of physical signaling is for individual

recognition. It seems as though this should go without saying, yet in a highly gregarious animal such as the red colobus these simple factors are highly important. With vision representing one of the strongest senses in primates, the combination of color patterning, genital condition, and general body carriage make up a huge part of social recognition, which in turn affects the behavior of both the observer and the observed. In the red colobus, highly individual facial features also serve in the differentiation of group members, particularly in adults. Infants are more difficult to separate through these traits, but age groups can be easily separated into the very young infants (at the stage wherein the mother is still in constant contact with the offspring) and the slightly older juveniles (semi-independent, exploratory) via coat coloration: the youngest animals have not yet developed the distinct black and red tessellation of their elders.

While coloration helps a human observer, and an anxious to wean mother, to determine age in the young, the most important physical characteristic for young colobines is the status of the genital/anal areas. Adult females, particularly those in or approaching estrous, are easily distinguished by a very apparent swelling and vivid red coloration of the genital area. This highly visual signal serves to notify the males of the group that the female is ready for breeding, and actually increases competition between the group males (ensuring that the most dominant genes will be most often passed down to the next generation). A similar occurrence takes place in the genital regions of immature individuals of both genders. “Gender may be said to be deliberately obscured in both red and olive colobus by the presence of a unique ‘perineal organ’ which mimics the bright red and swollen genitalia that develop in adult females during estrous. Mimicry of the female structure is so faithfully copied in young males, and their own genitals are so inconspicuous, that even juveniles in hand are hard to sex” (Estes 522). This faithful mimicry of the female genitalia serves a huge purpose in the life of an adolescent male. These young males, when approaching maturity at about three years of age, are increasingly attacked by the dominant males of their own group, and, when finally driven out, are also viciously attacked by the males of any group they might attempt to join. Any way to postpone ejection from the natal troop is most beneficial: an older monkey forced to leave the group will, inevitably, be larger, more powerful, and better able to fend for itself during the period of transience. The genital mimicry of young male colobines allows them to attain this greater size and fitness before the organ shrinks and they are forced out into the world. While they retain this feature, the young males act much as adult females would, by utilizing their hind ends in a social context. Relatively uniquely, the red colobus has two forms of this ‘social presenting,’ which sets it apart in the family. In addition to the traditional presentation of genitalia by females and adolescents to the dominant males, a form of submissive expression, the most dominant males also express their dominance over subordinate males in a similar presenting manner.

Social status in the colobus, as in all primates, is a highly important aspect of communication, and it is expressed in more ways than genital presentation. The display of dominance or submission pervades many of the daily activities of the monkeys, and can even be observed in the basic body language of an individual. A confident and dominant animal appears to be at ease, and walks with a sort of strut-limbs are fully extended, the back is level, and the individual glances around casually. These same traits, extended limbs and confident demeanor, are visible in a dominant individual at rest. A submissive monkey, on the other hand, walks with a hunched back and bent legs; it keeps

its head down and only occasionally casts nervous glances around its environment. The best, and often simplest, way to recognize the dominant male in a multi-male group is through this body language. This dominant animal usually assumes the role of a sentry within the group, the primary lookout for danger. He assumes an alert posture in a highly visible site. His legs are spread and, usually, he displays his half-erect genitalia proudly where other group members are sure to notice (Estes 480).

Physical communication can be highly obvious, as is the case with the "watch-dog" male among several other situations. Typically, this highly noticeable behavior is characterized as agonistic, that is associated with aggression (both offensive and defensive), submission, and fear. These displays are most evident in aggressive interactions between rival males, when a heated engagement can quickly turn into an extremely intense event. Usually beginning with more discreet behaviors, a meeting between two well matched males will quickly escalate through a series of visual cues, often facial expressions, which may establish dominance without physical violence. Staring at an opponent, with a fixed and intense expression, eyelids slightly widened, is regarded as a distinct threat. This may then intensify to staring with an open mouth, followed by staring with teeth bared in a yawn (Estes 482). This final stage is often enough to discourage violent interaction. A submitting animal will begin to glance about nervously, assume a less confident posture, begin teeth chattering or display a fear grimace (teeth bared, but clenched, distinguishable through this from aggressive teeth displays which feature an open mouth) but this is not always the case. If males find themselves evenly matched in physical presence and determination, the meeting can escalate to become more physical as a competitor shifts into a series of slapping, ground scrubbing, and striking towards the opponent, ultimately resulting in physical contact, a false charge/pursuit, or a heated chase with violent intention.

Of course visual displays are not always violent in nature, nor as obvious as the physical altercations of competing males. Submissive displays are very commonly used to avoid conflict as well as to express friendly intentions. The most common, and least obvious, of these displays is found in a displacement/supplanting interaction (Estes 480). A dominant animal, female or male, will often confidently approach a subordinate and, through sheer physical presence force them out of their position. The subordinate gives up the position with very little resistance and thus avoids any violence. Another form of submission already discussed, that of social presenting, is "the most obvious and important display of peaceable intentions among primates and probably the most effective in appeasing aggression, since aggression and sex are closely linked, both being mediate by male sex hormones" (Estes 481).

In addition to sexually linked submission displays, the red colobus often presents in two other ways, grooming-linked and play-linked invitations. The former is usually accompanied by the use of specific postures, the grabbing of the forelock (and downward pulling of the head), or with lip-smacking, a behavior likely derived from teat-sucking which signifies peaceable intentions and facilitates the approach of individuals (Estes 482). Grooming then proceeds with one individual manually caressing and combing the fur of another, immediately removing and consuming any discovered external parasites. The roles are then typically reversed and the grooming is made mutual.

Whereas grooming is a lifelong pastime, play behaviors are usually only engaged in only by young monkeys, before they have reached sexual maturity at about two years

in females and three to three and a half years in males. During the cooler hours of the day, in the morning and evening, the youngsters of a Jozani colobus troops are incredibly active, particularly in comparison to the slow moving adult counterparts. This difference is likely due to the very different diet available to the two age groups. Where the adults must subsist on low nutrient, high-cellulose (and hence hard to digest) plant materials, the adolescent monkeys' diet is comprised primarily of milk. This easily digestible, higher energy diet, combined with typical adolescent energy, leads to long games involving climbing, hanging, wrestling, and long free falls through the tree branches that serve as a jungle gym. Experts describe typical play as "a lurching, 'drunken' run, swinging from a branch, jumping, somersaulting, mouthing, and other antic behavior" usually accompanied by a typical "play face" which features a relaxed face with open mouth and teeth sometimes bared (Estes 482). The young colobines spend much of their play time engaged in heavy wrestling matches which involve grabbing, hair-pulling, and gouging. They fight each other in a manner not dissimilar to that of a bunch of hillbillies. Eventually one or more of the competitors (there can be upwards of five young monkeys involved, of all different ages under two years) is thrown from their perch and tumbles, crashing, through the foliage. More often than not the plummeting monkey manages to self-arrest before hitting the ground, but this is not always the case. When a crash landing finds the youngster on the forest floor it will glance about in a panicked fashion before scampering up the tree to rejoin the fun. Accompanying this game is often a bout of play-mounting, in which one adolescent assumes the very dominant position that would be held normally by an adult male. These games helps the young monkeys to develop many of the social graces that will affect their adult life, as well as increasing their coordination, climbing ability, and leaping skills, important capabilities if they hope to keep up with adult monkeys on their daily migrations.

-Vocal Communication-

At least as, if not more important than visual communication is the faculty of vocalization, which, in the red colobus, has reached a relatively high level of complexity when compared to other members of the colobinae subfamily. This is likely due to the unique social structures maintained by these monkeys both within their troop and in inter-troop interactions. Because they are non-territorial, the red colobus has little need for the loud, booming calls of its close relatives, the black and white colobus monkeys of mainland Africa. Where the black and white male is always defending his territory, the red colobus male must only be vocal with his own troop or with other troops in close proximity. This difference in vocal role is evident in the physiological differences of the larynx between males of each genus. "The black-and-white colobus has the largest and the red colobus has nearly the smallest larynx in the subfamily. Male red and olive colobus sound like alto and soprano choirboys compared to the rolling bass of the black-and-white colobus" (Estes 522). Because of their non-territorial nature, the red colobus males have no need for the loud-calls of their territorial relatives, but they do exhibit other types of calls when confronted with any kind of perceived disturbance. The entrance of a potential predator, or even another troop of colobus, into the proximity of a male, or any situation which elicits an aggressive or threatened response is met with one of three calls, the bark, *chist*, or *wheet.* These calls are significantly less discreet than the

calls of the black-and-white colobus and, unlike the black-and-white, intergrade, becoming more or less intense in response to the intensity of the stimulus. There is some evidence which suggests that the calls of the red colobus are individualized, with each individual having its own “voice” (Estes 522).

One of the loudest and least discreet vocalizations of the colobus male is associated with the expression of dominance towards the group, and is often linked to his ability to check the sexual status of his resident females. When a female does not allow him this right, the male will begin to scream with rising frequency and intensity before engaging in a violent chase with the female in question. This scream-rush can be heard from several hundred yards away and notifies all other monkeys within that radius of the dominant male’s virility and health status. The chase usually ends with the subordinate individual submitting to the dominant male

Of course vocal communication is not reserved for the male colobus only. Many of the calls heard from a red colobus troop originate from females or young monkeys. These, like the male calls can be complex and attain differential intensity depending on the strength of the stimulus to which they respond. The primary call heard by visitors to Jozani Forest is likely to be the ‘alerting signal,’ an attention getting noise derived from the progression call. These chirps and grunts are sounded in response to any changes in the surrounding environment, including weather shifts and animal movement through the immediate area. The frequency of the calls intensifies as the stimulus becomes greater and, unlike the loud calls of the male, serves to initiate similar calls throughout the troop, rather than subduing them (Estes 484).

If the disturbance is identified as a potential threat to troop safety, such as the appearance of a large predator or intensification of distressing stimuli such as sound, the attention gaining alerting signal is immediately abandoned in favor of the ‘alarm call.’ These calls are very high frequency and usually of a short duration. In fact these calls are structurally similar to, and probably derive from, calls which are closely linked with aggression (Estes 485), setting all group members on edge. If the stimulus is particularly strong, the group will attempt flight or retire to the safety of a large tree; if it is weak they will soon return to their normal activities. Like most forest dwelling monkeys, the colobus has two distinct calls to differentiate between terrestrial predators and airborne predators which elicits a different response, including freezing or dropping into undergrowth. Thankfully, the two most dangerous raptors of Africa, the martial eagle and crowned hawk-eagles, are rare in Zanzibar, and adult monkeys are large enough to not be at risk from smaller birds. Young are still vulnerable, and often make an alarm call in response to passing shadows or falling leaves (Estes 485).

The vocal basis for several other types of calls, as mentioned with the alerting signals, is the progression call. In the colobus this call type involves nasal grunts or a type of cough, both of which notify group members of impending group movement. This means that the call is not directed towards any one individual, but is meant as a general notification for the troop. For the Zanzibar red colobus this represents one of the only calls that in any way maintains group cohesion, as the contact- calls that serve this purpose in other species are absent in the colobines. While the colobus troops are fairly loose, with sub-groups splitting off from the main troop frequently during their daily travels, a colobus monkey never likes to be alone. This is particularly true for the young monkeys between three months of age (when they are no longer allowed to catch a ride

on their mother's belly) and weaning at one year old. When a juvenile monkey or infant is abandoned for any amount of time it will literally scream for its mother. This isolation call, which, like the alerting signal, is derived from progression calls, is quite loud, with increasing frequency as the animal in question begins to feel threatened or vulnerable. While young monkeys are the primary users of this call-type, any adult monkey separated from the troop will also utter similar calls to regain the company of conspecifics (Estes 485).

In a highly gregarious monkey, such as the colobus, the primary focus of vocal communication is slightly shifted away from responding to external stimuli. In these large troops, and even in the smaller subgroups, vocalization serves as a convenient and energy efficient way to convey purely social information. Rather than wasting energy, and potentially reducing health, through physical challenges, a vocalized system for maintaining hierarchy and interacting with other troop members. These calls, associated with peaceable individual interactions, range very widely in both in their intended purpose and in their structural composition. From aggressive calls, short, low-pitched with a rolling sonority, to the faster "greeting" grunts between a dominant and subordinate animal, to the distinct calls signifying sexual receptivity or the act of copulation itself. These sociable vocalizations represent a relatively unknown area of colobus vocalization behavior: the high levels of gradation in each type of call and the possibility of individual variation between the monkeys makes these types of vocal interaction very complex. There simply has not been enough research on red colobus social vocalization to develop a definitive guideline.

-Olfactory and Tactile- Communication

Olfaction is generally regarded as the least important of the primate senses used in social interaction, but despite this there is some evidence that odors play some role in behavior, particularly in the social realm. In the red colobus these social smells are largely reserved for reproductive behavior. "A number of highly stereotyped behavior patterns involve contact with the genital and other areas that release odors. The distinction between tactile and olfactory signals is completely unclear in such cases" (Estes 486). For the colobus, this stereotypical behavior involves the physical manipulation of the female genitalia or simple sniffing as a means to check reproductive status. When receiving the submissive genital presentation of the female colobus, the male will usually use his fingers to probe the presented area. This is followed immediately by sniffing. The combination of chemical signals, particularly a change in balance of estrogen and progesterone which is detectable through this method, and physical signals (the distinctive swelling of the female genitalia at estrous) help the male determine which females are ready to breed, which of them is most likely to pass his genetic material on to the next generation. Of course, because of the superb mimicry of the adolescent perineal organ, young monkeys are often put through a similar series of investigations despite their inability to breed.

Tactile communication among higher primates is not restricted purely to sexual exploits, and physical contact between individuals represents one way in which interpersonal bonds can be developed, maintained and strengthened. The bond between

female red colobus monkeys has been discussed: because of the high levels of female transience between troops there is little bonding between female group members. The fluidity of female troop membership makes forming these bonds impractical and generally unnecessary (Struhsaker & Pope 205). Male interaction is distinctly the opposite of this. The stability of male membership and occurrence of patrilineal succession within a troop means that males will spend much of their lives with the same few compatriots. These males are expected to act together in defense of the troop as well as in aggressive incursions towards other troops, two actions which require solidarity and stability to successfully accomplish. Thus the male troop members form tight bonds, and because of this can often be seen engaging in that most social of behaviors - mutual (or allo-) grooming. (Starin 255). Estes regards this allogrooming as the "most important kind of tactile behavior in primates…Being groomed is clearly a pleasurable experience and even if not reciprocated can be socially rewarding for the groomer. Thus it offers a way for lower-ranking animals to approach and make friendly contact with dominant individuals" (Estes 487)

One final type of tactile communication often seen in colobus monkeys could be confusing to the common observer. Often practiced not only by adult males but by juveniles and, rarely, by adult females, is a type of mounting without copulation. This behavior usually accompanies play or an aggressive interaction, although it is sometimes seen after grooming. It is generally regarded as a very direct expression of dominance. Juveniles, especially, practice mounting among themselves regardless of gender and, sometimes, regardless of species. Bouts of non-reproductive mounting have been observed between juvenile colobines, between a young colobus and Syke's monkey, and between a young syke's monkey and an (annoyed) adult colobus who was quite obviously just trying to get some rest.

-The Importance of Behavioral Knowledge-

When engaging any wild animal, for any purpose, it is vital to have some understanding of their natural history and, especially, of their common behaviors. While often times there is a guide to provide this knowledge, as is the case with the rangers in Jozani National Park, there is no substitute for personal knowledge. When an individual has developed a basic understanding of the animal's behavior he will be capable of interpreting anything he sees into an appropriate context, will be able to better experience the animal, and will avoid any misconceptions relating to that animal's behavior.

This serious need for preparatory research and knowledge is particularly true for the ambitious photographer, one attempting to document, characterize and symbolize a species for exhibit purposes. By understanding the behavior of the subject species, a photographer will be able to develop and execute a more efficient and more successful expeditionary plan. Through this foundation one will understand the reasons for any actions taken by the animal in the field, will be able to predict the next moves of the animal, and will be able to develop a shooting schedule which best matches the potential for observing and recording desired behaviors to the best conditions for lighting. In photographing the Zanzibar red colobus monkeys of Jozani Forest, this means that a schedule can be developed which matches the resting periods of the monkeys and the photographer, a schedule which allows the observation of each desired activity based on

the monkeys' habits, and a schedule which can increase the chances of photographic success as judged by both aesthetic quality and behavioral documentation. A foundation in behavioral ecology will have beneficial effects throughout the photographic process: it will increase the efficiency of a photographic study, by allowing the photographer to identify, interpret and predict behavioral patterns, and will, ultimately, increase the quality and impact of the photos taken to exhibition. When developing an exhibition, with the ultimate goal of increasing the global exposure of the Zanzibar red colobus monkey, as well as the threats it faces, this foundation in its behavior and ecology becomes indispensable, inimitable, and irreplaceable.

Study Area

Jozani Forest (6º16'S, 39º25'E, 10 to -15 m elevation), the largest holdout of the Zanzibar red colobus monkey, forms the central area of the Jozani-Chwaka Bay National Park (Struhsaker et al 63). This forest is the largest area of natural forest to be found in the entire Zanzibar archipelago, with a gazetted size of 2512 ha. Originally named a forest reserve in 1960, the forest has seen its official size increase multiple times (1965 and 1982) since its inception, reaching its current size through the Forest Resources Management and Conservation Act No. 10 which passed in 1996 (Finnie 2). Jozani-Chwaka Bay National Park was officially recognized on 1 April, 2003. Jozani Forest represents one of the primary tourist attractions on Unguja, drawing in thousands of visitors every year as they seek out the colobus monkeys and other forest attractions. In 2002 the forest hosted over 19,000 guests, generating over $100,000 in entrance fees (Finnie 2)).

The forest itself is based around a shallow trough through the coral bed between the bays of Chwaka and Uzi at the southern end of the island of Unguja. High water tables here have encouraged the growth of a groundwater moist forest, which is surrounded by drier coral rag thickets on either side, where the trough rises and water level falls. "Together with the Easten Arc Mountains and Coastal Forests, [Jozani Forest] forms one of the world's twenty five Global Biodiversity Hotspots, the most biologically rich and threatened sites on Earth" (Finnie 3).

Methodology

Equipment Used

- Canon Digital Rebel XTi – Digital SLR camera
- Promaster 70-300mm lens
- Microsoft Office Picture Manager Software

The photographic portion of this project was conducted over a period of fourteen days in Jozani Forest. Each day consisted of two excursions, with the morning session beginning (contact made with the Zanzibar red colobus monkeys (*Piliocolobus kirkii*) resident in Jozani) by 8:00 and ending at 12:00 and the afternoon/evening excursion beginning by 14:00 and finishing at 18:00. A troop of red colobus monkeys was located using opportunistic sampling (walking at random through the coral rag portion of the forest). Once the animals were sighted observation and shooting began; the photographer traveled with the troop through the surrounding forest, stopping when the monkeys

stopped to record behavior both in a notebook and photographically. Using a 70-300mm lens, photos were taken in a variety of social and environmental situations over the course of the day with particular selection for certain behaviors falling into the following categories:

-Feeding
-Resting
-Social Interaction (physical, vocal, olfactory and tactile communication including agonistic behavior)
-Mother-Infant Interaction
-Locomotion
-Alarm/Predator Avoidance
-Infant Play/Learning
-Unique behavior

Subjects were given precedence for appropriate lighting and composition at the discretion of the photographer. After fourteen days of shooting, the author compiled a total of 5,050 photographs for review. These shots were organized and separated based on the behavior displayed. Preliminary selections were made for photographs from each behavioral category with some potential for final selection with particular emphasis on focus and composition. This primary selection phase included basic editing (color correction, contrast correction) and narrowed the pool of potential final photos to about 1,000 images. Selection then proceeded within each behavioral category to select those images with higher appeal and impact as determined by the photographer, specific emphasis was placed on perceived impact and aesthetic quality as well as on the breadth of behavior intended for final display. Several similar selection rounds resulted in the final selection of thirty three photographs intended to be displayed either individually or as a series in twenty six pieces. These photos were reevaluated and then went through the final editing process (further tweaks to contrast and color, the only tools available with the limited software available) to become the final product. It must be noted that because of the artistic emphasis of the work, these photos are not representative of all colobus behaviors, but rather were selected for aesthetic quality and potential impact first, for the ability to evoke emotion and response in the intended audience, followed by behavioral exhibition and the potential for human interpretation. The behaviors displayed are still broadly distributed, but some extra weight was allowed to portrait type shots in selection due to their high visual appeal and compositional quality.

Results

See Appendix A- Photo Library

Series Contents:

- Alarm
- Dumbfounded
- Maternal Bond
- Partners
- Alert

- Seperation Anxiety
- Leap of Faith (series)
  - Baby Face
  - Frustration
    - Twine
    - Mouthful
  - Dirt Mustache
    - Manger
    - Dinosaur
  - Grotesque
    - Menace
    - Hawkeye
  - Howler (series)
    - Mojito
    - Wrasslin’
  - Curiosity Kills
- Madonna and Child
  - Prayer
  - Sentry Duty
  - Lonesome

Discussion

To evaluate the success of a photographic exhibition is not easily done prior to the first showing, yet time constraints require at least a preliminary assessment of individual photo quality as well as the role of the photo in the greater exhibit. The show as a whole is intended to engage the audience, to educate the public abroad (the global conservation community) about the current status of the Zanzibar red colobus Monkey and its diminishing habitat, as well as to develop a bond, or at least interest, between the observer and the observed. To do this each component photograph must succeed both alone and as a component of the exhibit, in attaining aesthetic appeal while displaying the characteristics of the subject species which make the animal unique, those traits which make the animal worth conserving.

-Success of the Exhibition-

In the editing of the photographs meant for exhibition, one of the most important choices was the extent to which this editing would be applied. Where a professional photographer might have access to sophisticated software capable of heavy editing, it was quickly made clear that no such power would be available for this project. Using Microsoft Office Picture Manager restricts editing to only a few elements, most significantly contrast and color balancing. With this in mind, a general editing plan needed to be developed which would both increase the appeal of the photographs while applying equally well to each of them. Experiments were conducted using different levels of saturation and contrast to determine how they would affect each of the chosen

photographs and what levels of each would generate the most impact on an audience without sacrificing the integrity with which each piece documents a behavior. Black and white represents a generally high drama approach, but was determined to be inappropriate considering the subject matter. The coloration of the *red* colobus monkeys is one of their most distinctive traits, and cannot be done without. Still, to reduce the distraction of highly color-saturated foliage there needed to be some reductions made. In conjunction with the saturation reduction came a slight increase in contrast levels, sharpening the distinct colors and patterns of the monkeys while increasing the dramatic effect of the images themselves.

-Individual Image Assessment-

For the exhibition to fully succeed, each image must be capable of standing alone on its own merit. Each must be capable of conveying the intended message of the show as a whole, that the Zanzibar red colobus monkey is an animal of great charisma and ecological importance to the islands on which it lives. Each photograph must succeed both in accurately displaying the animals and conveying this charisma to an audience unfamiliar with the species. Most of all, the photos must attain a certain level of aesthetic appeal, a beauty and eloquence with which these most important issues can be expressed, with which the message of conservation can be translated in order to appeal to those in a position to lend these special primates their aid. What follows is an individual assessment of each photograph, or series of photographs, clarifying the message they are meant to convey while discussing the visual merits of the work. Each assessment is followed by the monograph intended to accompany the photo during exhibition – simple descriptions of the behaviors captured so that an audience understands what it is they see; a small step towards building their own framework for understanding animal behavior.

Alarm

Featuring an adolescent colobus, alone and framed by foliage, this shot displays a low level alarm response to a potential airborne threat. This behavior is an important anti-predator response; since the extinction of the Zanzibar leopard (*Panthera pardus adersi*), birds of prey represent some of the foremost predators of red colobus monkeys. This alarmed behavior is generally more evident, and more needlessly used, in young monkeys. In this case it was one of these unnecessary responses, the result of what was only a falling branch. Despite this less dangerous reality, the fearful expression on the young monkey's face is immediately engaging. His look of genuine concern draws the observer's eye through the piece and elicits a similar concern in the audience. His human like face makes these emotions more evident to a human obvious and more effective at gaining this response immediately. The high contrast between the dark background and white fur sets off a series of concentric, contrasting circles which place the audience's focus directly on the young monkey's face and mouth, directly where his expression is centered. This piece was selected to lead off the exhibition because it simultaneously shares this impact while introducing an audience to the typical red colobus traits that will be featured throughout the rest of the show. His lanky white fur, dark face, doleful eyes and pink lips welcome the observer without losing any seriousness.

‘As is the case for many arboreal species, danger for the colobus is as likely to come from above as from below. With many predatory bird species inhabiting the archipelago, such as the black kite, the troop, like this young individual, must always be aware of the skies as well as the ground.’

Dumbfounded

An adult female monkey feeds herself on young leaves in the low branches of a tree. This shot is a prime example of how photographing one behavior can capture an expression which evokes a completely separate response. A human audience is prone to anthropomorphizing images of animals, something which this image takes full advantage of. The subject animal is, quite simply, in the middle of chewing her leafy meal. But captured mid-bite she appears astounded; surprised; dumbfounded. As was addressed by the author in a previous work, the perception of human emotion in non-human animals, while not always appropriate, can serve to drastically increase the impact of an image on a human audience and through this can make the first steps towards forming a lasting impression. People love to see human-like charisma in other species, and in this shot that is just what they are given.

‘The red colobus monkey has a diet based primarily on high cellulose items such as tree leaves, as well as other difficult items like immature fruit. These plant products require extensive pregastric fermentation and, even with the digestive aid of gut fauna, release relatively low levels of nutrients. This diet, similar to that of other browsing herbivores, requires that the colobus spends much of its day feeding, chewing and digesting in order to obtain all its required nutrients.’

Maternal Bond

Few relationships affect a human more than that between a mother and child. The interaction and affection between these two roles is regarded as sacred by most, regardless of species. In this shot, the strength of this relationship is implied by the close physical contact between the adult female and her offspring, their solidarity visible in their gaze. The audience is given a view of that short period of life in which a colobus mother pays close attention to her offspring, and by relating this concern to their own maternal relationship. Simultaneously, they are given a view of the origin and result of a full colobus life-this young monkey will likely grow up to bear its own young and repeat the series. Once again, the sharp contrasts between the monkeys’ fur and their skin serves to draw the observer inwards, to note where their gaze falls and the solemnity with which they look.

‘Estrous in female colobus monkeys is not seasonal, although occurrence may peak in the rainy season, and breeding conditions may occur at any time. Females reach sexual maturity around two years of age (with males reaching it around three to three and a half years) at which point they will produce one offspring every two years.’

Partners

Relatively rare in red colobus society, this image captures two female monkeys engaging in the allogrooming behavior discussed in the introduction. While it is less

common for females to groom one another than the closely bonded males of a troop, this is not the immediate impression that will be given to the audience. Most are in agreement with Estes' assessment of the importance of the sincere and intimate physical contact of grooming. For a human physical contact is both of these things, and to see such intimacy, such delicate contact between, individuals of another species is both striking and engaging. This image is one in which the true coloring of the monkeys becomes evident to the audience, the tessellated patterns of black, white and red are repeated on the back of each monkey as the hands of one draw the eye to the other. While there is less focus on facial expression in this shot, it is obvious that the grooming session has the full attention of both monkeys. Their interest and dedication to the interaction translates to become the audience's interest, to sharpen the observer's desire to see how else these striking primates are like their human relatives.

'Despite relatively loose female-female bonds (a product of female transience between troops) social grooming between females (seen here) does occur. More common in patrilineal troops is the formation of male bonds, as multiple dominant males depend on one other in sometimes violent troop interactions.'

Alert

The first of the series to have a purely portrait focus, this shot gets the audience close to a young monkey to explore the crevices and contrasts that make the colobine face so interesting and so human. The big brown eyes are bright and focused, with lids raised in an expression of wary attention. What is only a low-level response to distant sound stimulus becomes a face of concentration and concern and, after closer examination, of hope. This one individual monkey immediately comes to symbolize the struggle of the Zanzibar red colobus as a species. There is much to worry about in the future, but with the concern of the global community there is also some cause for hope. Once again, the distinctive physical features of the species direct the eye towards the face where those typical red colobus traits become more evident than in past shots-the emotional eyes, soft pink lips, lanky hair, the almost human ears. But in among these commonly shared traits comes the realization that the colobines, like humans, are individual and unique.

'While every Zanzibar red colobus monkey shares the same basic features, each one is identifiable as an individual. Different permutations of pink lips and nose, facial structure, and even in hair style ensure that no two individuals are quite the same.'

Seperation Anxiety

As a young monkey approaches three months of age, it begins to lose the privilege of riding along by the hair of its mother's belly. It begins to lose this intense and frequent contact with the mother as their time spent apart gradually increases and the date of weaning approaches. For a human child this separation would be stressful and frightening. These emotions are painted across the infant monkey's face, as clear to a human observer as they would be on a young child, despite the fact that the mother rests only inches away from him. The world reflected in his eyes is massive and overwhelming, his doleful gaze pleads for protection from so many threats that surround

him. Once again the anthropomorphization of an animal evokes a response of pity, sympathy and concern in the audience, and through this the impact of the image is increased. After recognizing in themselves this pity, the audience will notice that this very young creature does not share the distinct color pattern of the adult monkey that provides for him. It is incredibly difficult to even approach a colobus at this age, only a few weeks old, particularly in a brief moment when he is not in contact with his mother. The unique event documented combines with the emotional quality of the image to make this an obvious choice for exhibition.

'Maternal bonds in red colobus monkeys are relatively loose, with mothers and offspring sometimes losing contact for several hours or even days. Very young individuals, identified by the lack of red fur on the back, receive much more attentive care than the older young and adolescents.'

Leap of Faith (series)

The first series of photos presented in the exhibition. Once again intended to be displayed in chronological order with a single focus, this piece documents the bold locomotion for which the colobus monkey is notorious. Described as 'suicidal' by some researchers, the massive leaps taken by the red colobus generally end well, but not always. This series instills in the viewer a sense of the dramatic distances covered by the colobus on a regular basis, as this male makes a particularly gigantic attempt. From the first photo, filled with built up energy and anticipation of the jump to come, the audience begins to experiences the anxiety of flying through the air without a guaranteed landing point. A body soars through the air, accompanied only by clouds and its own bravado. Finally, quickly, they find relief as the monkey descends towards the branches of a distant tree.

'The red colobus monkey is not known for its graceful perambulation of the tree tops, but rather for its slow, clumsy climbing. Most notable, though, is its eagerness to undertake massive leaps between distant trees. Described as 'suicidal' by those who know the monkey best, these dramatic leaps usually end with the individual catching itself in the branches of its target. Usually.'

Baby Face

At no more than a few days old, this infant colobus peers out from the protection of his mother's protective embrace. His downy white hair frames a curious, and surprisingly human, face. Pink lips pursed in concentration he gazes directly into the eyes of the observer, not demanding anything but that they stay still long enough that he can register them in his memory. His mother's hand curls defensively around his fragile young body, giving him the confidence he needs not to break that intent stare. The contrast of face and fur gives his angelic face its appropriate halo, hair so fine it hardly exists at all. He represents the next generation of colobines, those that will require the assistance of the intended audience.

‘Infants less than three months old are carried by the mother on daily travels and rarely venture more than a few feet from the dam. This individual, less than a month old, will have to learn to travel on his own by the time he reaches the three month mark. He will be weaned at one year and ready to join the breeding population by two years of age.’

Frustration

As young colobus monkeys begin to venture further and further from their mothers, they begin to experiment with various materials as potential food sources or as a way to gain relief from the pain of teething. The same youngster seen challenging the audience to a game is now captured chewing on a branch, his face the definition of frustration. Once joyful and full of energy, his eyes have lost their spark and look longingly into the distance as his tiny fists grip the branches tightly. Even as juveniles, the similarities between the red colobus monkeys and curmudgeonly old men are undeniable. The line of his sight travels down and across the photo, following the arrow formed by the twigs to which he clings. An audience feels sympathy for his position, easily transferred to the plight of the Zanzibar red colobus monkey as a species.

‘Young colobines begin to explore and experiment in their world at a very young age. By feeling, tasting and chewing very young monkeys discover and test possible food sources while gaining a familiarity with their surroundings. Chewing on branches and twigs also helps to ease the pain of teething.’

Twine

As tangled as a ball of string, three adolescent colobus monkeys wrestle, seemingly unaware, or unconcerned, with the strength of their tenuous attachment to the tree branches which support them. This piece, like the others featuring young monkeys, capitalizes on their high energy and antic behavior to elicit a response from the observer. Unbounded and liberal play behavior has a certain appeal to everyone, and to see it to this great extent is almost liberating for the audience itself. Momentarily the entire bundle of young bodies will topple towards the ground, grabbing wildly at branches along the way as they attempt to arrest their rapid descent. Typically they will be able to do just that, but even those who hit the ground rarely seem affected. With a rapid glance this way and that, these young monkeys will climb back to their perches and begin the game again. This behavior increases their coordination, leaping ability and builds skills of social interaction. The audience may see this, or they may simply be happy to see some monkeys having some downright fun.

‘Groups, sometimes in numbers upwards of five adolescents and juveniles, gather in the cooler hours of the day (morning and evening) to play. Games like wrestling, racing, climbing, hanging and free falling help to prepare a monkey for life as an adult by providing experience in social interaction, locomotion, and coordination.’

Mouthful

While they may prefer eating the younger leaves on a tree, the colobus monkeys rarely seem comfortable eating them where they are plucked. This may be due to the lack

of cover from potential predators, or simply because the sites of new growth, thin branches and twigs at their tips, are rarely capable to supporting the weight of the bulky colobus body. They overcome this by carrying the young leaves back towards the tree trunk, where branches are stronger, often storing them in the mouth to allow use of all four limbs in locomotion. Once again, a single moment during the act of feeding displays as much emotion, and comedy, as any of the pure portrait shots in the exhibition. Rather than drawing focus to a typical facial expression, the concentric circles of dark background, light fur, and dark face bring the observer's eye to the eyes and mouth, the former serious in their intent and the latter humorous in its lack of capacity to store so ambitious a meal.

'Feeding does not always take place at the site of food discovery. Young growth occurs primarily at the tips of branches, which are often to flimsy to support the heavy colobus and leave them in an undesirable position of vulnerability. Food items are often stripped from the branch and carried to a more suitable location, often in the mouth.'

Dirt Mustache

Suddenly, the audience stumbles upon a young monkey with a mouth full of dirt. An explanation may not be immediately forthcoming from their own knowledge, but associations are certainly made with those childhood photographs that each person treasures. A baby sits out in the family garden munching on soil, as happy as can be to have lips stained brown by the substrate. The memories evoked are good and charming, and another link is made between the observer and the photograph's subject. The occurrence of geophagy in red colobus is less infant curiosity, of course. This behavior, along with the closely related consumption of charcoal, is engaged in by all the monkeys in the troop. With the ultimate purpose of neutralizing and absorbing the damaging toxins and free-radicals associated with the consumption of immature plant products, the behavior is no less charming for its utility. The dirt filled mouth is comical to a human observer and lends another facet to the perceived personality of the colobines.

'A diet high in plant material, particularly the leaves and unripe fruit of exotic trees, is tough to deal with. While a ruminant-like stomach aids in digestion of cellulosic material, the plants still release toxins and free-radicals during digestion. To counteract the negative effects of these molecules, colobus monkeys of all ages engage in geophagy (eating dirt) and, unique to the Jozani Forest colobines, eating charcoal.'

Manger

The French pronunciation, that is. This gourmand, like his younger counterpart featured elsewhere in the exhibition, is sampling a wider range of foods than is likely to be nutritionally useful. The clear focus of the shot falls on the mouth, surrounded by those characteristic and individual pink lips and nose. An eye landing on any dark portion of the piece is carried along the contrast of the shoulder, around the curve of the elbow, and back to the mouth, to once again experiment with the subject in his exploration. Simultaneously, the bare branch on which his attentions fall is representative of the potential for over-exploitation of a resource by the growing population on limited land.

‘The red colobus monkeys’ proclivity for stripping a tree of new growth increases the need for variation in the daily routine, with the troop altering its course to exploit multiple food sources. Combine a high population with limited available habitat, and food scarcity immediately becomes a potential issue for conservation.’

Dinosaur

The audience immediately takes a step back. What is it, exactly, that we are looking at here? A more animal approach to eating than has been previously observed reminds the observer that, although very human in many ways, these monkeys do not share every trait with their close relatives. The unique perspective of the photograph focus on the hand of the feeding individual, a contrast to the facial focus of other feeding shots, while the face grotesquely manipulates the plant material into the mouth and down the throat.

‘Red colobus monkeys feed on a variety of plant materials, ranging from young fruit to flowers to mature foliage. Young leaf growth, when available, tends to make up the largest portion of the diet.’

Grotesque

The ugliest monkey encountered during primary photography is also one of the most interesting. A particularly lumpy face, jagged features, wispy mustache, and sagging skin combine to make this female colobus particularly monstrous. In another piece the viewers were exposed to the uniqueness and individuality present in the countenances of each colobus. This shot takes that idea one step further, one step closer to connecting these animals with their human observers. Exactly like their human counterparts, each monkey is unique in its features, and inherent in this observation is the fact that some are more, and some less, immediately attractive. This is obvious even in the face of one which is so inhuman. The grotesque face, the frightening expression of this female, provide the perfect counterpoint to the unabashed cuteness present in the shots of colobine babies. The audience pauses to contemplate her individuality and in doing so begin to discover, in the cracks and crevices of her skin, a story of interest as she mildly reacts to the movement of her troop members. Ugly she may be, but boring she is not.

Menace

A favorite game of young colobus monkeys includes practicing the challenge of any and all intruders in to their ‘territory.’ This behavior mimics the behavior of the adult males as they would interact with other troops, with branch shaking and intent staring. In most cases though, these normally aggressive behaviors are set off by that distinctive facial expression involved in soliciting play. With mouth open in what could easily be a little half smile, this juvenile monkey once again makes direct eye contact with the audience, as if he is inviting them to join in on the fun. In most cases this behavior is only expressed in dense undergrowth, in quick bursts that require lighting reflexes to capture. This individual, though, found the courage to engage the photographer in the relative open. His neonate features and jovial expression are irresistible. The relative sharpness of

his facial features, surrounded by branches and limbs in movement, ensures that the focus of the shot falls on his wide, bright eyes and teasing smile.

‘Very young colobines (younger than 3 months) rarely venture far from their mother. These excursions increase in distance and duration as curiosity and a drive for discovery takes hold.’

Hawkeye

As Estes notes in his compendium of animal behavior, it is vision that the red colobus most relies on for information about its surroundings. The posture and expression of this female colobus instantly relate that importance to any audience: all the lines in the shot lead immediately and unequivocally to her one visible eye, sharp and focused on her surroundings, quietly observing as she hunches forward. She seems alert, ready at the slightest provocation to take flight. At the same time she is momentarily relaxed, hunched forward to satisfy a nagging itch on her back.

‘Colobus rely on many senses for both self-preservation and communication. Foremost among these is sight, although auditory, olfactory and tactile senses also play very large roles.’

Howler (series)

This group of three shots is meant to be displayed, in chronological order, as a single piece. This progression series documents a moment of terror in a juvenile colobus: having lost contact with his mother, he is paralyzed with fear of an approaching predator (the photographer), unable to move himself to safety, unable to do anything but cling to his perch and scream. Beginning the series with a calm face, the audience is taken through the stages of development in his isolation call, his frightened plea for the return of his mother. It is impossible to ignore his obvious anguish, his expression is unmistakable, even among humans, as one of stress and panic. As posited by researchers who note the similarity in monkey communication, this is one signal all primates, including humans can both identify and relate to. He is the child who has lost his parents at the shopping mall, he is the panicked toddler who can do nothing but sit and cry out for his mother.

‘A young colobus has lost contact with his mother and, without her, does not know how to deal with a perceived threat. Stuck to his perch by this indecision, he screams out an isolation call – a vocalization meant to bring his mother and troop members to the rescue.’

Mojito

When considering how many daylight hours the red colobus dedicates to eating, it is unsurprising that photos focusing on this behavior should be well represented in the show. Once again, this most common of behaviors yields a unique and engaging facial expression, one that recalls the commonalities between the monkey and an old man. As this (relatively young) animal gums its way through some immature fruit, his face is contorted and wrinkled into a charming lopsidedness. The contrast of his dark hand against the light fruit draws the eye to this focal point, to this inescapable charisma.

‘While they do not feed on ripe fruit, the Zanzibar red colobus monkey includes many types of unripe produce in its diet.’

Wrasslin’

Further evidence of the playtime intensity of the young colobus, this dramatic shot shows the epic struggle one juvenile monkey can have with his peers. The benefits o this behavior have been discussed, but not shown the audience in this context. The confusing free-for-all displayed earlier in the show is replaced by a simplified struggle between two individuals, developing the means and experience to establish their place in the social hierarchy of whichever troop they eventually find themselves in. The uncomplicated nature of the shot makes the struggle appear more significant, more vicious than it truly is. The darkness of the dominators face contrasts with the wide pink mouth of his victim, and through this the audience develops a connection with the underdog.

‘The favorite games of young colobines typically involve vigorous and sometimes violent wrestling matches at the tops of trees or on relatively new growth branches. After fighting like hillbillies for a moment or two, the loser is thrown off the branch and topples among the branches towards the ground. The winner usually becomes bored very quickly and usually flings itself from the branch in a similar fall. This practice at self arrest helps prepare the young monkeys for a lifetime of dangerous leaps and precarious landings.’

Curiosity Kills

The trusting nature of the Jozani colobus population adds great appeal for the many visitors that visit the park each year. But this habituation to human contact is not necessarily as beneficial to the monkeys as it is to the tourist population. Allowing close contact with humans not only exposes the population to possible dangers from poaching, but to human diseases with which the colobine immune system is not prepared to cope. This monkey inches forward, propelled by human-like fingers and a burning curiosity. As he gets closer the audience cannot mistake his startlingly human features. From his big, bright eyes to his grasping finger-nails, this individual is as startlingly human as his earlier counterpart was not.

‘The curiosity and habituation of the remaining Zanzibar red colobus population simultaneously benefits the monkey and puts it in dire risk. The appeal of experiencing these monkeys up close attracts visitors from around the world to Jozani Forest, effectively keeping the park running, while at the same time exposing it to those who might not wish it well. Worse than this minor risk is the possible exposure of the monkeys to human diseases, infections to which their bodies are ill equipped to cope.’

Madonna and Child

A final visit to the bond between mother and child reminds the audience of where life, and the exhibition, began. There is no need to reiterate the gradual loosening of this relationship between dam and offspring; it should be enough to appreciate it while it

lasts. Yet in its composition, this shot represents more than that simple connection. As the mother looks away into the distance she begins to signify the passing of her generation, she forms no connection with the audience. She simply becomes the protector of that little bundle in her lap: her infant. He stares directly into the viewer's eyes and, to them, begins to represent the future generations of colobus which will inhabit the park. His vulnerability is a reminder of the great assistance his species will need in order to survive the encroachment of human activity.

'Unlike most other primate species, the colobus mother rarely allows other females in the troop to handle her young. The loose bonds that result from high rates of female migration between troops make the potential risk of injuring or losing the young higher than the benefits of intensified relationships between adults.'

Prayer

A moment of peace in the midst of the exhibit, the viewer finally finds itself confronted with a monkey at rest, a monkey at peace. This young adult will soon assume a more horizontal resting position from which to digest. This individual seems exhausted from a day of normal life, and in his rest provides the audience with a sort of intermission from the antics surrounding him in the show. In his resting stance he typifies the basic physical characteristics of the species; the hunched back, resting his weight forward on his knee, his face revealed with those now familiar pink lips and black skin, those wispy forelocks framing him wherever he goes. He is the typical colobus, the resting colobus, sharing his moment of rapture with the observers of his photograph.

'Much of the day is spent relaxing and resting among the branches. Typical postures include ventral lying and this, the hunched sitting posture that leads to many comparisons between the red colobus monkey and a crotchety older gentleman.'

Sentry Duty

No posture better captures the essence and position of the dominant male than that of the sentry. His bulky body extended vertically, arm resting on one knee while the other leg hangs down below him. His conformation is one of a confident and dominant individual, punctuated by his half erect penis. With his broad face attentive to the world around him, he aims to protect his family troop from the many natural dangers that face them. The audience must realize through this that he is incapable of predicting, identifying, or acting to prevent the effects of those anthropogenic threats that surround his species and the forest they call home.

'When the troop has settled in an area to eat or rest, it falls to the most dominant male (troops usually include multiple males, from as few as two to as many as 10, with four being the average) to serve as the primary lookout for danger or rival troop incursion. He can be recognized as male by his wider face, and as the dominant sentry through his typical upright posture and half-erect penis. This form of physical presentation, like many forms of communication, can be seen across most species of old world monkeys (cercopithecines) '

Lonesome

There is no better shot with which to end the exhibition than this, which eloquently captures the current state of colobus conservation. These rare primates are still present in the forest, but will need as much assistance as they can find if they hope to reverse the trend of habitat loss and increasing pressure. This young monkey calls out simultaneously to its mother, to its troop members, and to the conscience of the audience. It calls out for help and protection from an immediate, tangible threat and from less distinct one. The surrounding branches draw the eye through the piece, from the clenched feet up the huddled body, to the mouth that calls out so plaintively for help.

'Jozani National Park represents the last true stronghold of the Zanzibar red colobus monkey. While the park managers, rangers and employees dedicate their lives to the protection of this treasured forest, both they and the monkeys require as much assistance as they can find. This colobus is just one among many species we find rapidly disappearing from the face of the earth. It is both a responsibility and an honor to protect these unique and beautiful creatures, to ensure that their coming generations can be appreciated and protected by ours.'

-Final Exhibition Assessment-

As each of these photographs succeeds, at least on some level, individually, it would seem a likely conclusion that the exhibition as a whole will also succeed. Aesthetically this is certainly the case: each photo contributes to a greater understanding of the unique beauty and symbolism represented by the colobus monkey, despite the fact that the animal itself is not always so beautiful. As assessed by the photographer, this series of photos will also find success in translating a message of conservation from one corner of the world to another – the human connection to primates will facilitate this. Yet to truly assess the success of the show prior to its first public display would be premature and deceptive. The true measure of success will be in the amount of aid that finds its way to Jozani Forest as a result of future showings of the work. The true measure of success will be the continued survival of the Zanzibar red colobus as a species and of the forests in which it resides.

Certainly, though, the photographs taken as a part of this project will find some utility either in Zanzibar or abroad, regardless of the success of exhibitions in the United States. Documented here in detail are many of the behaviors which make the red colobus unique in this world, and through this documentation the photographs can be used by park staff for identification, education, or for another unintended endeavor. They will find their way into future research as reliable and appealing representations of the colobus monkey as a species. Undoubtedly, they will give some satisfaction to an observer, in the present, near or distant future, and in that connection will have attained some measure of achievement.

Any of these possible successes will be the result of the pre-developed behavioral knowledge with which primary photography was planned and executed and through which photographic selection and editing progress was directed. An understanding of colobine behavior, and behavior patterns, allowed for the development of an effective schedule of shooting and the capture of at least one thousand usable images; one

thousand images which capture and relate the behavior of a species at a depth much greater than that possible through simple tourist photography. A behavioral foundation allowed the photographer to travel, unaccompanied through the forest, disturbing the resident troops as little as possible. It was through this discretion that the observation and documentation of so many behaviors was possible. Ultimately it is because of this that the final exhibition is successful in its depiction of colobine life and behavior – with each new image the audience is exposed to a new perspective on the colobine existence.

-Behavioral Foundation and Photography-

As a series of photographs, this show attempts to cover as broad a range of colobine behaviors as possible. There are, however, limitations on the extent to which this goal is feasible. The primary photography stage, while extensive, was unable to capture the full range of behaviors recorded in the current literature. It is just not possible to capture them all, and many observed behaviors were impossible to shoot due to one or many limiting factors, be it lighting conditions, weather, undergrowth density, or technical limitations in the camera equipment used.

Many of the colobus monkeys troops of Jozani Forest have been habituated to the presence of humans over many years of interaction with park rangers, native Zanzibaris, and the tourist groups which frequent the park. This habituation is not universal, however, and does not guarantee easy shooting for a photographer. The forest itself presents many challenges, not least of which are the difficult lighting conditions inherent in heavy cover. The broad canopy of the forest provides extensive shade, keeping the monkeys cool during the heat of the day while also reducing photo viability. Low light situations require either a flash system, which is inappropriate and ineffective in this condition for the negative consequences it might have on the animals or the increase in film speed settings of the camera (ISO) in order to counteract the low-light conditions which increase exposure time. An ISO of 100 represents the highest possible quality image, with the least amount of noise, but is almost entirely unusable in the forest. Because an overwhelming majority of colobus activity is restricted to the shady regions of the canopy, it is rare to find a situation where an ISO setting of even 400 is possible. Often the photographer must use ISO 800 or even 1600 speeds to get shutter speed to an appropriate level for handheld photography. When considering the lighting challenges faced in forest photography, it is also important to note the activity patterns of the subject species. The colobines of Jozani were most active, and hence most photographable, in the morning and evening, when the heat of the day was not so great. Of course the source of this heat is also the source of the photographer's light. Shooting in the forest presents plenty of challenges, but shooting while the sun is still rising or has begun its descent compounds these problems.

Of course in the heat of a Zanzibari day, the red colobus monkey is likely to spend most, if not all, of its time in the shady regions of the forest. Many sought after behaviors tend to take place exclusively in the upper reaches of the forest, a region where fluctuating light and dense floral growth obscure and confuse any photograph. Behaviors like nursing, mating, and even resting often fall into this category, making their documentation incredibly difficult and significantly decreasing the quality of an resultant photographs.

Shooting an arboreal animal presents other problems for a photographer, even when the animals make their way out into the open. Usually these excursions out of the foliage are set against the backdrop of the sky, a challenging one to shoot against. In this situation the sky will cause shutter speed to skyrocket and make exposing the animal correctly quite challenging. Oft times the result of any attempt to shoot against the sky is a silhouetted animal-sometimes an effective display, but is rarely what the photographer is attempting.

The forests that red colobus monkeys inhabit are, by their nature, moist forests. While humidity may not necessarily be an important factor in observing behaviors, it can be quite problematic in recording them. Early morning photography in the forest was almost inevitably met with severe lens fogging, completely disabling the camera until the day began to warm and the condensation dissipated.

Of course, only somewhat related to weather conditions, a primary concern addressed during primary photography was the presence of those same tourist groups which led to the current habituated state of the park's monkeys. These groups are generally large enough and badly enough behaved to set the monkeys on edge, often driving them away from an ideal shooting area into the higher canopy where photography is difficult. Without any knowledge of how to act around wild animals, these tourists are pushy in their attempts to get close to the animals and have little consideration for either their fellow tourists or the animals themselves.

The ultimate point of mentioning these complications is to make clear the external factors which affect the ability of the photographer to record certain behaviors effectively. It is clear that the project was incapable of observing and recording each and every possible behavior. At the same time these limiting factors must also insist on the role of chance in any photographic endeavor. It requires more than skill and preparation to succeed in the field, it requires substantial amounts of luck.

Conclusion

While incredibly unlikely, it is nonetheless possible that an individual with no knowledge of animal behavior, given enough time, would be able to document and interpret such a massive amount of information. Whether this would be a result of learning these behaviors as the project progressed is of little consequence, for it is unlikely that, given the same time constraints, this hypothetical individual would have attained a level of success comparable to that of the exhibition developed through this project. Ultimately, a foundation of knowledge in animal, cercopithecine, and colobine behavior drastically increased the efficiency of primary photography and allowed a more thoughtful selection for images of the final show. By understanding behaviors, the photographer was able to plan out a schedule for shooting which focused on those times during which the subjects were most likely to be active. More than this though, it allowed for a flexibility and level of improvisation that stemmed from being able to predict the movements of troops and individual monkeys throughout the course of the day. Each behavior took on significance and in conjunction with considerations of lighting, weather and other external influences affected the decisions and success of primary photography.

Unpredicted but inherent in the hypothesis was one consequence of behavioral knowledge which rapidly became clear as shooting progressed. Perhaps even more

important than time efficiency or even the ability to predict movement patterns among troops, this understanding of behavior allows one to recognize the boundaries of the animals, the lines of contact which cannot, or at least should not, be crossed. These boundaries mark the limits of animal tolerance to disturbance before this disturbance begins causing the creatures undue stress. By respecting these boundaries, and one's own limitations, it is possible to drastically reduce the possible negative impacts of photography, stress and behavioral alteration, to significantly lower levels. Lower stress results in relaxed animals, relaxed animals display more natural behaviors

It is evident that behavioral knowledge, a foundation of understanding, allows a photographer increased ability to comprehend, document, and predict the behavior of an animal subject. For the Zanzibar red colobus monkey this knowledge brings with it significant flexibility, the ability to recognize a behavior, it underlying meaning, and to adjust shooting for the behaviors which should follow close behind. The establishment of this behavioral knowledge drastically increases a photographer's ability to capture the essence of an animal subject. Even so, it must also be acknowledged that other factors affect the shooting, editing and presenting of any images.

While behavioral knowledge is vital, it must be paired with both commitment and perseverance. Understanding a behavior allows any photographer a new depth of knowledge, but does not allow him to alter the animal's behavior, to elicit the behavior which he hopes to observe and document. Only with a significant time commitment and continued sincere effort can the dream of an effective and high-impact final result be realized.

Evaluation

While generally successful in reaching its goals, this project could be improved, expanded, and reapplied in future studies. Primary photography, especially, ran into many problems during its fourteen day duration. Primary among the issues to be addressed was the seasonal timing of the study: the March-April monsoon season is a risky one for wildlife photography. The possible exposure of both camera equipment and photographer to drenching rains represents a potential disaster for the study. Additionally, seasonal weather patterns associated with the rains tend to alter colobine behavior and locomotion, making some behaviors, particularly those unique behaviors in the lower reaches of the forest, such as geophagy, somewhat less common (Gebo et al 81). While the 2009 rainy season was late in coming and exceptionally mild, unpredictable weather still occurred and had a negative effect on shooting schedules as well as colobus activity.

While adequate, the camera equipment used could have been improved with longer lenses and especially through the use of filter systems. Use of these filters would help to counteract the negative effects of harsh sunlight and contrast between shady and exposed areas.

Preliminary behavioral research, time allowing, on species other than the Zanzibar red colobus would allow for a more complete showing of the other at-risk species protected in Jozani Forest, and through this might give a different impression of the protected area than red colobus alone. More realistically, future research should continue intensive study of one species to allow a depth of focus that broad sampling could not achieve. These new studies could then be paired with that of the colobus, creating an engaging show for each new species addressed.

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