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GNUSLETTER

In this issue. . .

ASG News

Who's Going to Montreal?

The 68th meeting of the Species Survival Commission will be held in Montreal on 11-12 October, followed by the World Conservation Congress, 13-23 October. The SSC's theme will be: "communicating the value of the SSC—its worldwide presence, scientific knowledge, expert advice, and ongoing work—and its relevance to the conservation of biodiversity."

Since Montreal is close to Peterborough (compared to Rio or Perth!), I'm hoping to be on hand for the SSC meetings and part of the Congress. If ASG members who are going to Montreal will notify me, I would like to hold a meeting of our group. Otherwise, I won't know who's there and a rare opportunity to exchange ideas and get acquainted or reacquainted will be lost. That's what happened at the last SSC meeting/General Assembly I attended (in Perth, 1990), although then as now, I had asked in the *Gnusletter* to be notified. Consequently the ASG meeting I called was attended by five people, of which just two (of possibly 6-12 in town) were ASG members.

1996 Gnusletters

I'm giving up the struggle to produce three issues of the Gnusletter, at least for this year, as I predicted in the last issue might happen. After returning in mid-March from six weeks in East Africa, I planned to produce vol. 15 no. 1 by the end of April, no. 2 in August, and no. 3 in December. But first I had to write two grant proposals, a couple of book reviews, and attend to other accumulated tasks. By the time I got started on the newsletter, it was already the end of April, and now it is approaching the end of May and I'm not quite finished. If one or more of the grant proposals I submitted is funded, I'll be going back in July to continue the research in Ngorongoro Crater I began in July 1995.

Ergo, it would be difficult if not impossible to produce three newsletters in 1996. In terms of the total number of pages, there will probably be as many in these two as three issues of average length. Tom Thurow's paper on the behavioral ecology of Speke's gazelle, and Chris Magin's conservation plan for the hirola take up a large

continued on next page

factors limiting population growth. We have also been collecting data on behavioral ecology in western Etosha, near a base camp which we built in the bush just outside the park.

In 1993, together with the area nature conservator, we proposed that the government reintroduce black-faced impala to Kaokoland. In July of that year this was implemented: 16 animals were caught in western Etosha, eartagged, radio-collared (9 adults) and released in northern Kaokoland. Since then we have been monitoring these animals.

Some of them moved to Angola the next year, when the level of the Kunene River (which forms the border) dropped to an unusual extent. Some of the Himba trackers with whom we work live in Angola as well as Kaokoland, and found the body of one of the translocated animals. They only found tracks of others. Meanwhile, those that remained near the release site have produced six lambs.

As we had hoped, there has also been some contact between them and the small native population, which consisted of 7 individuals in 1992. A native male joined the translocated females almost immediately, and in 1995 one of the radio-collared females led us to the native females. They are otherwise very hard to find, as they hide in the mountains (black-faced impala are largely invisible in this bush, anyway). Thus we discovered that the native group has doubled in size since 1992. On the other hand, the translocated animals have suffered some predation and poaching; this year this work led to specific evidence of poaching incidents.

Our findings suggest that black-faced impala continue to face severe problems in Kaokoland. Populations remain severely fragmented, and habitat fragmentation increases as human/livestock communities expand. Recent evidence also indicates that poaching, believed to be under control, remains a serious threat. To control poaching here, Garth Owen-Smith established the auxiliary game guard system in 1983, in which a man is selected in each area by the headman to keep track of wildlife and poaching activities, and to report his findings to both the headman and the nature conservator. In return, he is given monthly rations and a small salary by local NGOs (previously Namibia Wildlife Trust and Endangered Wildlife Trust; currently Integrated Rural Development & Nature Conservation).

This system has been successful; we find that the game guards offer invaluable help in finding and monitoring black-faced impala populations. Recently, however, the effectiveness of this system appears to be threatened by a decrease in government staff (particularly the removal of the nature conservator) as well as socio-economic changes associated with a sudden influx of outsiders (i.e. tourism and development) to this isolated communal area.

We are also working on genetic analyses in collaboration with Dr. Jean Dubach of the Brookfield Zoo, to examine variability within and between populations (and comparisons of black-faced vs. common impala—see below). Because poaching and competition from livestock have been most intense where impala populations were historically concentrated (Joubert 1971), the decline in impala numbers may have been hastened by loss of genetic variability as subpopulations shrank or went extinct. Moreover, dispersal rates appear low, exacerbated by short, erratic rainy seasons and distances between water holes. These analyses should indicate the extent of gene flow among the small and apparently isolated subpopulations.

RACIAL MIXING

In 1995, we added a new part to the project: a survey of both black-faced and common impala on Namibian private game farms. Since the establishment of translocated black-faced impala populations outside of Kaokoland, their increased numbers had suggested that they may be out of danger (albeit outside their natural habitat). However, a new threat has emerged: interbreeding with common impala. We have found that this is far more widespread than previously believed. Common impala are introduced in large numbers from South Africa to Namibian trophy-hunting farms; there are now about 7000 common impala on Namibian farms.

All of the black-faced impala in Etosha are now close to common impala on neighboring farms. Meanwhile 33% of all black-faced impala (about 1200) occur on private farms. One third of those on farms are in mixed herds, consisting of black-faced, common impala, and, presumably, hybrids. Other farm populations are adjacent to common impala populations. While the Ministry of Environment and Tourism (MET) has guidelines prohibiting transfer of black-faced impala to farms where there are common impala, there is no legislation in Namibia to control introduction of impala on farms. Thus the MET has not been able effectively to stop farmers from mixing common with black-faced impala, nor can farmers on the Etosha border be prevented from introducing common impala. To address these problems, a workshop is planned next year on impala management.

The development of a genetic marker distinguishing black-faced, common impala, and hybrids would significantly aid management efforts to limit hybridization. It would remove the profitability of mixing the two impala types by aiding identification and registration of pure herds through the Namibian Professional Hunting Association. An immediate goal in the genetic analyses is to find such markers.

This issue also underscores the urgency of conserving black-faced impala in their natural range, Kaokoland. This is a communal area, far removed from private farms and the threat of hybridization.

Ecology and Behavior of Speke's Gazelle *Gazella spekei* Blyth

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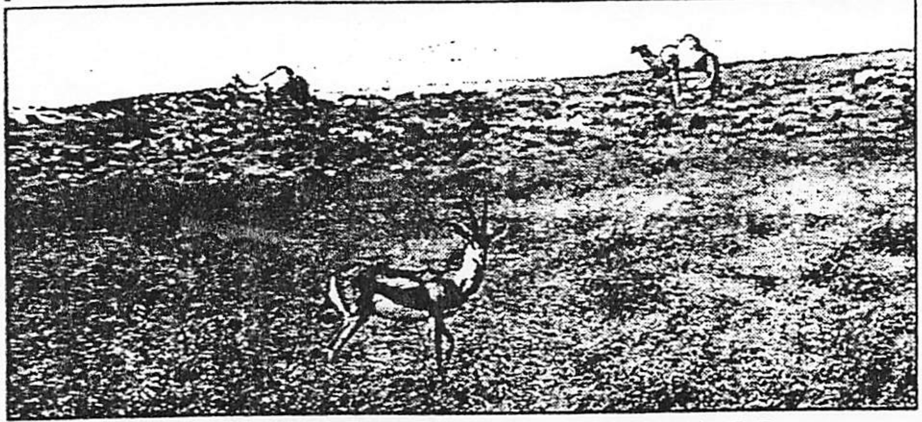
[N. B. This paper deserves to be published in a proper scientific journal. But Thurow cannot find the time to make revisions, e. g. to read up gazelle papers published in the years since he wrote his paper, and therefore is willing to let readers of *Gnusletter* gain access to the information he gathered.]

Summary. Speke's gazelle has become rare or extinct throughout most of its historical range on the grasslands and deserts of Somalia and Eastern Ethiopia. Research to document ecology and behavior of this species was conducted on the coastal grassland of Somalia, which represents the remaining stronghold for the species. Speke's gazelle diet was composed of 60% monocots and 40% dicots. Population composition, habitat preference, and behavior are discussed.

Résumé. La gazelle Speke est devenue éteinte ou rare à travers ses prairies et déserts historiques de la Somalie et de l'Ethiopie. Une investigation à été conduite sur la prairie côtière de la Somalie qui reste la place forte pour cette espéce pour documenter poue écologie et son comportement. Le régime alimentaire de la gazelle Speke était composé de 60% de monocotyledones et de 40% de dicotyledones. La composition de la population, son habitat de préférence et son comportement sont discutés.



Speke's gazelle. Camels and sand dunes in the background. Photo by T. Thurow.

INTRODUCTION

Little is known about the ecology and behavior of the Speke's gazelle despite an urgent need for information and conservation action regarding this species and eight of the other 11 *Gazella* species (Ryder 1987). Speke's gazelle is listed in the World Conservation Union's *Red List of Threatened Animals Book* (IUCN 1990) as a vulnerable species whose exact status is unknown. Information on Speke's gazelle is limited to anecdotal field observations and to genetic and fertility research conducted in zoos (cf. Templeton *et al.* 1987). Information on the ecology and behavior of Speke's gazelle is needed to provide the insight required to help devise appropriate management policies. This need is increasingly important as human and livestock land use pressure intensifies throughout the Speke's gazelle range. The objective of this research was to gather information on the ecology and behavior of this species.

The distribution of Speke's gazelle is restricted to the Somali coastal grassland (a 10-35 km wide strip along 800 km of Indian Ocean coast between approximately 2°0'N and 6° 20'N), the grasslands and deserts of the Somali Central Plateau and the Ogaden Desert of Eastern Ethiopia. Personal observation throughout Somalia and interviews with nomads from both Somalia and Ethiopia indicated that the central and northern portion of the coastal grassland (i. e. North of 3° N) is the remaining stronghold for Speke's gazelle. It has become extinct or is severely reduced throughout the rest of its range.

Speke's gazelle is one of the smaller members of its genus (height at shoulder 61 cm; weight 18 kg (Jarman 1974)) and is most obviously differentiated from other gazelles by the presence of a flabby, corrugated patch of pale gray inflatable skin on its muzzle. The horns (30 cm long) are strongly S-shaped backward with tips curving up. The dorsal pelage is light tan and the ventral pelage is white with a dark brown to black flank band.

Dietary and behavioral research was conducted on the coastal grassland in the Ceel Dhere District of Central Somalia (3°50'N, 47°10'E). The grassland at the study site was 22 km wide with sandy soils and a gently undulating relief ranging in elevation from 0-50 m. The grassland was bordered inland by dense *Acacia/Commiphora* shrubland. The local pastoralists differentiated the grassland into three segments: ecotone, plain and coastal dunes. These zones were useful in understanding Speke's gazelle distribution throughout the year. The ecotone was about 5 km wide and was characterized by grasses interspersed with trees and shrubs. The largest components of relative foliar cover were *Cenchrus ciliaris* (15%), *Indigofera intricata* (12%), *Leptothrium senegalense* (11%), *Panicum pinifolium* (10%) and *Cyperus chordorrhizus* (9%). No trees or arborescent shrubs existed between the ecotone and the coast.

The coastal dunes extended about 5 km inland from the ocean and were characterized by sparse vegetation and unstable soils. The largest components of relative foliar cover were *Cyperus chordorrhizus* (27%), *Cenchrus ciliaris* (20%), *Indigofera intricata* (13%) and *Aristida kelleri* (6%).

The plain which lay between the ecotone and the coastal dunes was about 12 km wide. The largest components of relative foliar cover were *Cyperus chordorrhizus* (20%), *Indigofera intricata* (19%), *Cenchrus ciliaris* (13%), *Panicum pinifolium* (7%) and *Leptothrium senegalense* (6%) (Herlocker and Ahmed 1986).

Rainfall at the study site averages about 300 mm/yr and is restricted to two seasons (*Gu'* = April to May; *Dayr* = November). Annual precipitation is only 3 to 20% of evaporative demand. The temperature (20 to 30°C) and relative humidity (75%) are fairly consistent throughout the year (UNSO 1984). The grassland was unfenced and communally used by semi-nomadic pastoralists as grazing land for their livestock herds (composed of cattle, sheep, goats and camels). The livestock stocking rate was moderate at 8.9 ha/SSU (1 SSU = 1 camel or 2 cattle, or 10 sheep and goats). Most of the grassland was in fair to good condition (Herlocker and Ahmed 1986).

METHODS

Seasonal distribution and density of Speke's gazelle was determined along three 22 km census routes that were oriented perpendicular to the ocean and the grass/shrub ecotone. The censuses were conducted by driving overland and counting all large herbivores that were within 500 m of either side of the vehicle. Practice prior to each census was used to maintain proficiency at estimating this distance. The absence of obstructions allowed a near absolute census of all gazelles within the 1

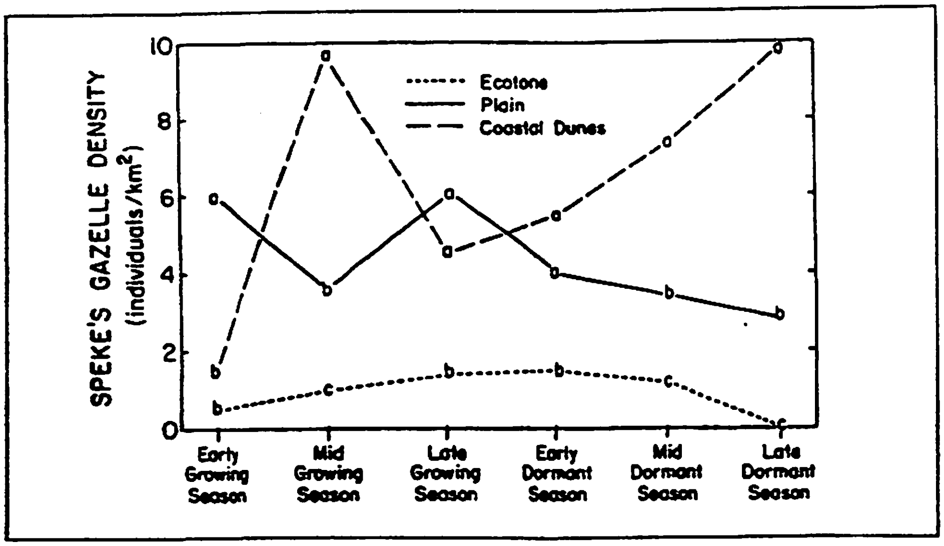


FIGURE. 1. *Density of Speke's gazelle in different locations within the coastal plain throughout the year. Means with the same letter for the same date are not significantly different (p<0.05).*

km wide transect. Fifty-four censuses were conducted from September, 1985 to March, 1988. The location and sex of each individual was plotted on a map of the transect. Census means were separated by Duncan's multiple-range test (Duncan 1955) at the $p<0.05\%$ level.

Females were distinguished from males by their thinner, straighter and less deeply annulated horns. Neonate fawns were distinguished by their small size and their dark brown pelage. This color fades after about two weeks to the light tan which characterizes older gazelles. A juvenile class (age between 2 weeks and about 6 months) included those between neonate and half the size of an adult. Gazelles at this stage of development could not be reliably sexed by normal field observation because horns were not well enough developed.

Behavioral data were obtained by observation from the vehicle with 7x35 binoculars and a 15-60 power scope. Since Speke's gazelles were not hunted in the region, they could be approached by a vehicle to within 50-100 m without altering their behavior; thus it was from this distance that most observations were made. Observations were concentrated during the daylight hours since it was found that the gazelles did not shift locations after bedding down at dusk.

Fecal samples were used to determine the botanical composition of the diet. Fresh defecations were collected in November, 1985 and January, March and May, 1986. The November and May samples were collected during the growing season and the January and March samples were collected during the dormant season. About 5 g of fresh feces were collected from each of at least 30 fresh defecations during each sample period. These were composited in a labeled paper bag and were oven-dried at 65°C before they were ground in a mill through a 1-mm screen.

The 20 most common forage plants from the study area were collected and made into microscope reference slides. These 20 species composed 85% of all grassland foliar cover (Herlocker and Ahmed 1986). Diet was determined by the microscope microhistological procedure described by Sparkes and Malechek (1968). Five microscope slides were made from each composite sample. Twenty microscope fields were examined per slide. The slide preparation and analysis was conducted by experienced technicians at the Kiboko Range Research Station, Kenya. Practice with mixed slides of known composition confirmed the reliability of the analyses. Chi-square analysis (Snedecor and Cochran 1967) was used to determine if selection of forage was significantly different ($p<0.05$) from foliar cover estimates obtained by Herlocker and Ahmed (1986). The Sorensen Similarity Index (Sorensen 1948) was used to estimate the percent dietary overlap between seasons.

RESULTS AND DISCUSSION

Population Composition and Habitat Selection.

The adult sex ratio was 57% females and 43% males. This differential sex ratio is common among territorial antelopes (Bourlière and Verschuren 1960). Eight percent of the population was composed of fawns less than approximately 6 months old. The total Speke's gazelle population density in the study area remained fairly constant throughout the study period, averaging 3.9 ± 0.4 gazelles/km². Forage was available throughout the year. Water supplies were restricted to dew and green forage since no surface water was available. Speke's gazelle was apparently independent of the need to drink so there was no need for migration from the region. This conclusion is supported by the consistent Speke's gazelle density estimates and the consistent observation of distinctive individuals with broken or malformed horns throughout the study period.

The population density and sex ratio distribution along the transects were not evenly dispersed (Fig. 1, Table 1). The ecotone had a consistently low population density and the mean harem size was significantly smaller than in the treeless portion of the grassland. The percentage of males as part of the population was greatest in the ecotone, with most of the males appearing to be young (i. e. less developed horns). Interviews with nomads and personal observa-

TABLE 1. Percent population composition of adult and immature Speke's gazelle and harem size associated with different locations within the coastal plain. Means followed by the same letter in the same row are not significantly different (p< 0.05)

LOCATION	ADULT ♂	ADULT ♀	IMMATURE (< 6 MTS)	HAREM SIZE
Grass/shrub Ecotone	47a	52b	1b	2.0b
Grass Plains	29c	64a	7a	4.5a
Coastal Dunes	38b	59a	3ab	4.1a

TABLE 2. Mean percent of the plant in the diet of Speke's gazelle during the growing season and dormant season on the coastal grasslands near Ceel Dhere, Somalia. (+) and (-) respectively indicate a significantly ($P < 0.05$) greater or less portion of diet than would be expected if forage was selected based on foliar cover.

tr = trace. Botanical nomenclature follows Hubbard et al. (1981)

PLANT SPECIES	GROWING SEASON	DORMANT SEASON
Cenchrus ciliaris	1^{-2}	3^{-}
Leptothrium senegalense	2	6
Panicum pinifolium	1^{-}	3
Aristida sp.	0^{-}	2
Heteropogon contortus	1	tr^{-3}
Afrotrichloris martinii	1	1
Digitaria nodosa	1	6
Cymbopogon commutatus	2	tr
Enneapogon schimperanus	4	11^{+}
Cynodon dactylon	5^{+}	tr
Brachiaria ovalis	2	3
Coelachyrum stoloniferum	2	1
Sporobolus brockmanii	7^{+}	6^{+}
Dactyloctenium scindicum	2	tr
Cyperus chordorrhizus	26	15
Other Sedges	0^{-}	1
Other Monocots	4	2
Tephrosia sp.	8^{+}	12^{+}
Leucas sp.	tr	3^{+}
Indigofera intricata	18	14^{-}
Jatropa obbiadensis	3	1
Euphorbia cuneata	1	2
Other Dicots	9^{+}	8^{+}

tions indicated that Speke's gazelle did not enter the adjacent closed canopy thorn forest. This aversion to tree cover may make the scattered trees of the ecotone a less preferred habitat than the open grassland. This assumption of lower habitat preference is consistent with the low population density and the large proportion of young adult males who could not hold harems elsewhere.

Shifts in population density between the plain and coastal dunes occurred along the transect in a predictable manner. The presence of a biting tabanid fly (*Haematopota* sp.) during mid-growing season caused many gazelles to move to the coast where the ocean breeze dispersed the flies. The vegetation on the coastal dunes was more sparse than on the plain but stayed green longer into the dormant season, possibly because the roots could access soil moisture stored deeper in the dunes. Thus, there was a gradual movement of gazelles to the coastal dunes as the vegetation on the plain dried during the dormant season.

DIET

Speke's gazelle diet was 60% monocots and 40% dicots, which did not significantly differ from foliar cover of 67% monocots and 33% dicots (Table 2). Species composition of the diet overlapped 56% with foliar cover composition in the growing season and 57% in the dormant season. In the growing season, stoloniferous/rhizomatous species (e.g. *Cyperus chordorrhizus* and *Cynodon dactylon*) formed a short, lawn-like sod on disturbed sites which were highly preferred. In the dormant season, bunchgrasses (e.g.. *Enneapogon schimperanus* and *Sporobolus brockmanii*) were important forage species. *Tephrosia* sp. and other forbs were preferred forage throughout the year.

HOME RANGE AND TERRITORY

Adult males generally restricted their movements to a home range. Home ranges varied in size from about 1.5 km^2 to 5 km^2 and were broadly overlapped by home ranges of neighboring males. The home range was not defended but represented an area in which a gazelle concentrated his activities. They were marked throughout by dung heaps that averaged 0.7 m in diameter and were several centimeters deep. The feces of Speke's gazelle are similar in appearance to sheep or goat; however, when crushed they have a distinctive herbal odor which readily distinguishes them from domestic livestock. When males approached a dung heap they would smell it, then urinate and then defecate. Females normally did not deposit feces on dung heaps. Dung heaps appear to function as sources of information about which males are in the area rather than as territorial markers. This conclusion is based on the fact that dung heaps were shared by neighboring males and were used by bachelor males moving through an area. Bachelor herds also confine their movements to a home range in which dung piles are shared by all males.

An adult male would attempt to retain a harem of females and young within the home range. Harem size ranged from 1 to 18. Each male sought to claim all females which entered his home range. The male defended his harem from all intruding males by maintaining a 50 to 100 m territory around the mobile harem. Thus, while the male's home range itself was not defended, the strongest males possessed the females of the area. Therefore, to have access to females, weaker males had to establish a home range which did not coincide with stronger males.

Adult females determined the direction in which the harem would graze and the male followed. If the direction of movement took the harem near the edge of the male's home range, the male would attempt to turn them back. This attempt was usually successful if the harem was casually grazing. If, however, females were intent upon leaving the male's home range, they could readily evade his attempt to turn them back. Horn deformities or unique pelage markings were useful for individual identification of 13 females and 7 males. Of the females, one was observed within 1 km of a particular area on each visit over the entire study period. Four other females were identified with other sites for greater than one year. Thus, females may remain in the same locale for long periods. In contrast, none of the distinctive males remained in the same home range for over 10 months. Two of the males were sighted later, one a member of a bachelor herd and the other alone and limping. Harems were constantly maintained since females may come into estrous at any time throughout the year. The stress and energy involved in this effort probably contributes to a turnover of males controlling harems. Bachelor herds may offer an exhausted male the chance to rejuvenate and yet fulfill his herding instinct.

WARNING, DOMINANCE AND THREAT DISPLAYS

The male defended the area around his harem by first giving warning signals to the intruding male, followed if necessary by a sequence of dominance displays, threat displays, and physical contact. If a male approached within 100–200 m of a harem, the defending male positioned himself between the harem and the intruder. The defending male would stand rigid, staring at the intruder while holding his front legs straight and hind legs normal. Occasionally, several snorts would also be given by inflating the nasal sac to the size of a human fist and then expelling the air to produce a sharp snort. The pale gray color of the inflated sac may also provide visual stimuli. Air sac inflation and the subsequent snorts were produced by both sexes as an alert to an approaching predator (see predation section). However, when an interloping male approached, it was only the defending harem male that snorted. If the intruder's advance persisted, the harem male would stamp and sometimes paw the ground with his foreleg. If the intruder continued to approach, the defending male would quickly lower and raise his head several times. The defending male would also tear at bunchgrass or shrubs with his horns. In 76% of all male/male encounters, this series of warnings was sufficient to deter further advance by an intruder.

If the intruder continued to approach, the next step in the escalation of conflict depended upon how evenly matched the opponents were. If the intruding male was obviously smaller in size or development, the harem male would lower his head slightly, holding his horns perpendicular to the ground and gallop toward the intruder who would either turn and flee (the most common response) or fight. In 18 cases where the smaller intruder chose to fight, he quickly lost.

In cases where the males were evenly matched, the prelude to threat and fight was much more ritualized. After the initial warning displays, the males approached each other with their front legs stiff and head erect. This approach was not direct, but rather was a maneuver to provide simultaneous broadside presentation with the two gazelle ending up standing about one meter apart facing opposite directions. As these broadside positions were taken up, they inclined their necks sideways in a variety of positions (i. e. head-flagging). Twenty-eight percent of the encounters between males involving head-flagging were terminated by one of the opponents walking away. Head-flagging has been observed in many Bovidae species and may be an emphasized ignoring of the opponent (Geist 1971), a ritualized swing-out movement (Walther 1965), or a broadside display designed to show off neck and horn size (Estes 1967).

If neither male left the site after head-flagging, they would both back away and directly face each other at a distance of several meters and then lower their heads so that the horns were perpendicular to the ground. When this signal was given, sometimes done several times in a head-bobbing motion, a charge occurred. They would either lock horns low to the ground in a clash lasting several seconds or one would run away. If the contest was inconclusive, they would back off and charge again, often preceded by more head-flagging. If the confrontation was terminated during head-flagging, the subordinate would walk away and might stop to graze within 100-200 m. If, however, the subordinate chose to flee after the perpendicular horn threat, he would often be chased for several hundred meters.

Another type of dominance display was broadside blocking whereby the body was positioned at a right angle to an oncoming gazelle, forcing it to alter its course. This was most often used by males to turn females who were straying from the male's home range. If the female was casually grazing, this display would often succeed in turning her back. If, however, she was intent upon leaving, she would try to run past him. The male would then lower his head, with nose extended and horns held back, and attempt to chase her back. If she persisted, the male seldom prevented her leaving. Aggressive males in bachelor herds also used broadside blocking to displace a resting or grazing male.

COURTSHIP

Copulation and newly born fawns were observed in every month of the year. Sexual activity (as measured by numbers of copulations) was bimodal with the peaks coinciding in the mid growing seasons (i.e. late May and mid-November). Peak fawning coincided with the onset of the growing season (i.e. early May and early November). These data are consistent with the approximate six-month gestation period documented in zoos (Furley 1986). A male investigated a female's reproductive status by following the female with nose extended and horns laid along its back [lowstretch]. Females responded to this attention by urinating. Males exhibited typical flehmen behavior (i.e. standing with head erect, mouth open and ears back). Depending upon the female's reproductive status, the buck either continued or broke off courtship. Copulation was preceded by the female responding to sexual pursuit by running in a zig-zag pattern which then slowed to trotting and finally to a slow walk. In the latter stage, the female would walk in a defensive/submissive posture of lowered head with its posterior towards the male. During pursuit, the male may deliver occasional stiff leg kicks (*Laufschlag*) to the female's hindquarters and emit short cough-like grunts. Males frequently combined these actions with a nose upward posture. During copulation, the female continued to walk so the male had to accomplish intromission with a single ejaculatory thrust. The male accomplished this by taking several steps while walking erect on his hind legs. The front legs normally did not contact the female. When copulation was completed, the male immediately lost all apparent interest, but after about an hour the cycle of courtship would be renewed.

When a female was ready to give birth, she lagged behind the harem and eventually drifted away on her own. This process of disassociation took place gradually over several days. The fawn (twinning was not recorded) was usually born in the cover of tall bunchgrass. The female ingested the fluid and membranes of the birth process immediately after parturition. The fawn was then thoroughly licked clean and was able to stand and suckle within 30 minutes of birth. Afterward the fawn would lie quietly in a hiding place while the mother moved away to graze. When the female was ready to suckle she would approach the location of the concealed fawn and after a brief pause the fawn would come to its mother. It is possible (though not substantiated) that the mother called softly to the fawn (as documented for Thomson's gazelle by Estes (1967)).

Feces and urine of fawns were ingested by their mothers. Defecation and urination by the fawn was apparently triggered by the stimulus of the mother's licking. Mothers often shaded fawns during the hottest part of the day.

For the first few days after birth, the fawn would lie still even if discovered and handled by a human. As with Thomson's gazelle (Estes 1967), the seeming lack of development of flight response at this stage was presumably an advantage since it prevented the mistake of premature exposure of its position to a predator which would result in almost certain capture. After about one week, the fawn would flee from approaching danger. This usually involved stotting and running for 50 to 200 m before dropping to the ground to hide. While running, the fawn would inflate its nasal sac and snort alarm calls.

Females remained apart from a harem for several weeks after the fawn's birth. After 3 to 4 weeks, the female and fawn would join a harem. Females were observed copulating while fawns of 2 to 3 months were at their side. Young male fawns were tolerated by the harem male until they were about one year old after which they were chased from the herd.

INTERACTIONS WITH OTHER UNGULATES

Speke's gazelle would freely intermingle with domestic livestock when the herds were unaccompanied by humans, but such associations were temporary and seemed to be neither sought nor avoided. Speke's and Soemmerring's (*Gazella soemmerringii* Cretzschman) gazelles grazed in mixed herds during the late dormant and early growing season when Soemmerring's gazelles were present on the grasslands. Both species responded to each other's warning signals, but there was no interspecies courtship or aggression displays. The substantial size difference along with the rump/tail coloration (white rump/black tail on Speke's gazelle; white rump/white tail on Soemmerring's gazelle) may be sufficient signals to prevent interbreeding. A similar means of breeding separation has been postulated to function between Thomson's and Grant's (*Gazella granti* Brooke) gazelles (Walther 1965; Estes 1967).

PREDATION

The only predators of the Speke's gazelle on the study site were the common jackal (*Canis aureus* L.), black-backed jackal (*Canis mesomelas* Schreber) and man. Larger predators (i.e. large cats, hyenas and large raptors) have been virtually eliminated throughout Central Somalia by the pastoralists. When a predator approached, Speke's gazelles would stand with straight legs and stare intently, occasionally inflating their nasal sac and snorting. Their tails, which were generally flipped back and forth throughout the day, were flipped at a much more rapid speed when a predator was near. This rapid movement of a black tail across a white rump may serve as a visual warning to distant gazelles or may be the result of heightened excitement prompted by a variety of stimuli (e.g. the tail was also flipped more rapidly during courtship). Other visual warning signals include stotting, brief erection of body hair producing a contrasting flash of pelage color (occurred only when suddenly alarmed), and perhaps the light gray bulge produced by the inflated nasal sac.

CONCLUSIONS

Speke's gazelle is similar to the well-studied Thomson's gazelle (Brooks 1961; Maloiy 1963; Walther 1964, 1978; Estes 1967) in that both avoid forested areas, have predominately herbaceous diets, and have similar forms of expressive behavior. An obvious morphological difference between them is that Speke's gazelle has a unique patch of flabby skin on top of the muzzle which can be inflated and expelled to produce a sharp snort used as a warning call. Another key difference is that during the breeding season male Thomson's gazelles establish and defend a territory of about 0.3 km^2 that is temporarily visited by females. In contrast, Speke's gazelle males attempt to retain a harem throughout the year. The male Speke's gazelle defends the harem and attempts to restrict its movement within his undefended 1.5 km^2 to 5 km^2 home range.

Native ungulates which dominated the desert and grassland of the Somali Central Plateau and coast were historically Speke's gazelle, Beisa oryx (*Oryx beisa* Rüppell) and Soemmerring's gazelle. Both these latter species are now quite rare in Somalia due primarily to poaching pressure and degradation of rangeland habitat associated with heavy livestock use. This has left the Speke's gazelle as the sole native ungulate inhabiting most of its range. Speke's gazelle can coexist with livestock on moderately grazed rangeland but has been eliminated from most of its historic range where human and livestock pressure is more intense.

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Captive Breeding and Genetics

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Antelope TAG Meeting at 1995 AZA Conference

By Arlene Kumamoto[ASG], Center for Reproduction of Endangered Species, Zoological Society of San Diego, POB 551, San Diego, CA 92112-0551, USA.

The Antelope Taxon Advisory Group (TAG) convened prior to the annual conference of the American Zoo and Aquarium Association (AZA) in Seattle 13-19 September 1995. The goal of the Antelope TAG is to provide guidance and recommendations to zoological institutions regarding captive management of antelope in North America, and to support *in-situ* and *ex-situ* conservation and research efforts for antelope worldwide. Bill Zeigler, TAG chair, conducted an informational meeting, reviewing actions taken at the mid-year meeting (see *Gnusletter* 14(2-3):20). Introduction of subgroup chairpersons and advisory committee members (listed below) preceded a progress report on development of the North American Regional Action Plan for Antelopes.

A first draft was distributed for comments and further review. The Action Plan identifies conservation, education, and exhibition priorities on a species-by-species basis; makes recommendations regarding establishment of studbooks, Population Management Plans, or Species Survival Plans; and outlines the Antelope TAG Five Year Plan. The next TAG meeting is scheduled for this month (May 1996) during the AZA Western Regional Conference in Denver, and the group hopes to finalize the Regional Action Plan.

ANTELOPE TAG SUBGROUP CHAIRPERSONS:

Arid Antelope/Gazelles: Scott Carter, Detroit Zoo
Forest/Woodland Antelope: Ed Spevak, Wildlife Conservation Park
Hartebeest: John Iaderosa, St. Catherine's Wildlife Conservation Center
Lechwe/Waterbuck: Randy Fulk, North Carolina Zoo
Small Antelope: Joe Christman, Phoenix Zoo

ADVISORY GROUP:

ASG: Dick Estes
Chief Financial Officer: Mike Kinsey, Denver Zoo
Education: Nancy Hotchkiss, Miami Metrozoo
Nutrition: Susan Crissey, Brookfield Zoo
Research: Steve Monfort, National Zoo Conservation and Research Center
Veterinary: Doug Page, Jacksonville Zoo

Current Antelope Studbooks

Captive breeding records for 24 taxa of antelopes are currently being kept through a number of international and regional studbooks. The following is a list of international (I) and regional (R) antelope studbooks, studbook keepers, and their institutional affiliation.

Addax nasomaculatus
- Terrie Correll (I), The Living Desert
- Simon Wakefield (R), Marwell Zoological Park

Cephalophus (Philantomba) monticola
- Joseph Roman (R), Virginia Zoological Park

Cephalophus silvicultor
- Linda Rohr (R) ,Franklin Park Zoo

Damaliscus dorcas
- Charles Brady (R), Memphis Zoological Garden & Aquarium

Gazella cuvieri
- Juan Manuel Escos (I), Estacion Experimental de Zonas Aridas
- Karen Sausman (R), The Living Desert

Gazella dama mhorr
- Mar Cano Perez (I), Estacion Experimental de Zonas Aridas
- Karen Sausman (R), The Living Desert

Gazella dorcas neglecta
- Teresa Abaigar (I), Estacion Experimental de Zonas Aridas

Gazella gazella arabica
- Colin Hill & Eileen Skinner (R), Dudley & West Midlands Zoological Society

Gazella leptoceros
- Steve Kingswood (I), Zoological Society of San Diego

Gazella spekei
- Martha Fischer (R), St. Louis Zoological Park

Gazella subgutturosa
- Scott Carter (R), Detroit Zoological Park, Desert Antelopes