INTERNATIONAL UNION FOR CONSERVATION OF NATURE AND NATURAL RESOURCES

SPECIES SURVIVAL COMMISSION

ANTELOPE SPECIALIST GROUP
GNUSLETTER

Volume 9 • Number 2 **May 1990**

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PUBLISHED WITH ASSISTANCE FROM THE WORLD WILDLIFE FUND–U.S.

IN THIS ISSUE

ASG NEWS

ANTELOPE SURVEY PART 3 GOES TO PRESS

Rod East sent the final versions of all the chapters to Simon Stuart in mid-April, so Part 3, covering West and Central Africa, is now ready to go to press. But which press? Maybe one of the small printing companies in or near Peterborough, which charges less than most of the large firms and which I can herd toward the deadline, in time for the IUCN General Assembly in November.

"I feel that the delay in completing Part 3, so that we could incorporate additional information on forest antelopes, has been well worthwhile," Rod wrote Simon Stuart (17 Mar 90). "As a result of the information provided by Allard Blom, Marcel Alers, Mike Fay and others, we now have much better information (although still incomplete) on the overall distribution and status of forest antelopes, plus the occurrence of particular species in individual protected areas, than has ever been published before, to my knowledge."

With the publication of Part 3, coverage of Africa south of the Sahara will be complete. This is an important milestone for the Antelope Specialist Group, which agreed at its first meeting in 1979 to make a global survey of antelopes its primary goal. It only remains now to survey North Africa and Asia(!), which should, however, require just one more volume, there being so many fewer species living at such low density. Anyone in a position to supply information about antelopes of the region or the names of people who have information is urged–in fact begged–to help us extend our coverage through all parts of the continent.

Brian Huntley

Long a pillar of CSIR, the Council for Scientific and Industrial Research, where he ran the Cooperative Scientific Program, Brian has left Pretoria to become Chief Director of the National Botanical Institute. His new address is Private Bag x7, Claremont 7735, South Africa. Congratulations and best wishes are in order.

Andrew Plumptre[ASG] is back at the University of Bristol (address in new list of ASG members), where he is writing up his field work at Karisoke, Parc de Volcans, on duiker and bushbuck (see *Gnusletter* 8(2). "My work went well in Rwanda," he writes (14 Mar 90), "and I'm looking forward to analysing the results, although I do miss the place at the moment–loads of dung analysis to determine diets to look forward to doesn't help matters!"

Clive Spinage[ASG], whose return to the UK was reported in the last issue, has meanwhile sent in a Stop-press! notice that he has returned once more to Botswana, to continue working for the Department of Wildlife and National Parks.

ASG Chairman on Assignment to Earthwatch

Starting in February, I have been working four days a week at Earthwatch (680 Mt. Auburn St., Watertown, MA 02172) as Acting Director of the Center for Field Research. CFR is responsible for finding and screening the field studies that are funded by Earthwatch members who contribute money and labor for the opportunity to participate in scientific research. The 1990 program includes 126 projects in 50 countries and 20 United States, to which grants of $2.6 million were awarded, plus the equivalent of 130 years' worth of 8-hour work days contributed by some 3,000 volunteers.

Although my responsibilities extend beyond African and Asian antelopes, projects involving antelopes or other large mammals, especially projects concerned with studying, conserving, breeding, or reintroducing threatened species, are likely to appeal to Earthwatch members. ASG members and other *Gnusletter* readers who have projects of their own or who wish to recommend colleagues, are urged to get in touch without delay (the deadline for 1991 research proposals is the end of July). Please note that we are particularly interested in postdoctoral and doctoral scientists of Asia and Africa who want to undertake environmentally oriented research within their own countries.

Executive Director Search

One of my duties as Acting Director is to conduct a search for a full-time Executive Director for CFR, whose duties include program development, administration, and fund-raising. (I have too many other commitments to work full-time for Earthwatch.) Candidates should have advanced degrees in the natural, biological or social sciences, have a global outlook and commitment to environmental problems, and preferably, prior experience in international research program management. We hope to fill the position by September. For more information, write me soon at Earthwatch. (Applicants should send CV and the names of three references.).

ASG MEETING AT PERTH, AUSTRALIA

Members who will be attending the Species Survival Commission meetings on 25 and 26 November, and the following IUCN General Assembly (28 Nov–5 Dec) should come prepared to participate in one or more sessions of the Antelope Specialist Group. If those who plan to attend will let me know in time, I'll publish a list in the September *Gnusletter*. There is a pretty good chance I'll be going myself; in any case, I hope our Deputy Chairman from New Zealand can make it.

RECENT PUBLICATIONS AND REPORTS

Island Africa, Jonathan Kingdon's[ASG] lavishly illustrated new book on African biogeography and evolution, has just been published by Princeton University Press. Anyone interested in African animals and biodiversity should have this beautiful, information-packed book.

Biodiversity in African and its Islands, Its conservation, Management, and Sustainable Use, by Simon Stuart and Richard J. Adams. IUCN and WWF, Gland, Switzerland, 1990, 145 pp.

Etude sur L' utilisation Rationnelle de la Faune Sauvage au Zaire, by Wolfgang von Richter[ASG] and Bihini Won Wa Musiti. Part of the Plan D'Action Forestier Tropical. Deutsche Gesellschaft für Technische Zusammenarbeit and Institut Zairois pour la Conservation de la Nature, Kinshasha, 1989, 143 pp mimeo.

Report on Development and Promotion of Wildlife Utilisation [in Tanzania],

based on study by the following consultants: M. Beier, V. Booth, J. Boshe, G. Caughley, K. Lindahl, W. Lyakirwa, E. Minde, I. Ndunguru. International Trade Centre, Geneva in collaboration with IUCN, on behalf of Tanzania's Ministry of Lands, Natural Resources and Tourism, 1989.

Newsletters

- The World Wildlife Fund-US and Conservation Foundation, which have been affiliated since 1985, have merged their respective newsletters into a single *Letter*, beginning with 1990, No.1.
- Jim Thorsell, Programme Coordinator of the IUCN Commission on National Parks and Protected Areas, sent a copy of the October/November/December 1989 CNPPA *Newsletter* he is now producing, "as a token of eco-solidarity" (in lit. 29 Jan 1990). Several news items of particular interest to antelope specialists are reported in the Regional Rundown (under Mozambique, Uganda, and India).

The fact that CNPPA offers training scholarships is also noteworthy for *Gnusletter* readers. E.g., two Indian students have been awarded scholarships to take the two-year wildlife course at the Wildlife Institute of India, where Alan Rodgers[ASG] teaches; during 1989, CNPPA scholarships supported students from Ghana and Guinea Bissau to the wildlife colleges in Cameroon and Tanzania.

Two other publications of interest are also noticed in the CNPPA newsletter:

- Proceedings of a conference on Nature Conservation: the Role of Corridors, held in Australia last September, will be published by Surrey Beatty, Sydney this year, and may be obtained through CSIRO, Division of Wildlife and Ecology, LMB 4, P.O. Midland, Western Australia 6056.
- In answer to widespread interest in protected areas with shared international boundaries, Jim Thorsell has edited a booklet entitled, Parks on the Borderline, which is being published as a CNPPA Occasional Paper. It contains a set of guidelines for managing transfrontier reserves.
- The Wildlife Conservation Society of Tanzania is publishing a handsome quarterly newsletter called *Miombo*, the Kiswahili term for *Brachystegia/ Julbernardia* wooded savanna. The typesetting is done by Liz Boswell using MacIntosh DTP equipment donated by J. Henderson of Bellaire, Texas. Like the *Gnusletter, Miombo* is a standard U. S. Letter size with three columnns–but is more elegant, being in two colors with an attractive green header and lots of nice drawings. Apart from Ms. Boswell, who is also Honorary Secretary of the Society, the Editorial Committee consists of C. A. Mlay, S. S. Kwiyamba,, K. M. Howell, N. E. Baker, and E. Harding. Issue Number 3 (November 1989) is 16 pages and contains many interesting short articles, among which I found ones on spotted hyenas by Heribert Hofer and Marion East, the Uzungwa Mountains by S. Wasser, and one on habitat destruction in coastal forests by Mark Huxham of particular interest. Also the news that Simon Mduma, staff member of University of Dar es Salaam, is conducting a two-year research program on the ecology of the oribi *(Ourebia ourebi)* in the Serengeti N.P., where Peter Arcese[ASG] has been studying the same species (more under Antelope News).

To find out how to subscribe to *Miombo* and/or to join the Wildlife Conservation Society of Tanzania, write P. O. Box 70919, Dar es Salaam.

- The Captive Breeding Specialist Group is now publishing its own newsletter, the CBSG News. Volume 1 Number 1 came out in March, 1990, 24 pages long, U. S . Letter size, bound and very professional looking. CBSG Chairman Ulysses Seal is the Publisher, Terry J. Kreeger is Senior Editor, and Judi Mikolai is Managing Editor.

ANTELOPE NEWS

ADDENDUM TO PART 2 OF THE ANTELOPE SURVEY

At the request of Simon Stuart, Rod East prepared the following report on antelopes that depend on wetlands, for consideration by the Contracting Parties to the Ramsar Convention when it meets in Montreux, Switzerland late in June. "In the past," Simon wrote (22 Mar 90), "the SSC and its Specialist Groups have not had very close interaction with the Ramsar Convention, which has something of a reputation of being chiefly interested in waterfowl. However, for several years now the Convention has been keen to broaden its scope, both in terms of looking at the wider issues of wetland conservation and management as well as taking non-avian species into consideration."

APPLICATION OF THE RAMSAR CONVENTION TO ANTELOPES

One of the criteria for listing important wetland sites under the Ramsar Convention on Wetlands of Internationa Importance is the so-called 1% criterion: a wetland meets the criterion if it regularly supports 1% or more of the total population of one or more species or subspecies. This has usually been applied to waterfowl, but can be broadened to non-avian species.

Information contained in the ASG's Global Survey of Antelopes and Regional Action Plans is used here to apply the 1% criterion to antelopes. In the case of lechwe and tsessebe on the Bangweulu and/or kafue Flats wetlands in Zambia, population estimates obtained by Jeffery et al. (1989a, b) are used to update the information published in Part 2 of the Antelope Survey.

Wetland Antelopes

Lechwes are the only antelopes which are restricted to major wetlands. In addition, the sitatunga is confined to swamps (large and small).

Red lechwe *(Kobus leche leche)*

The total population of the red lechwe is of the order 35,000-45,000, distributed as shown in the table.

Wetlands which meet the 1% criterionn for red lechwe: Okavango, Linyanti, Caprivi, Busanga, and possibly others such as Lukanga.

Kafue Lechwe*(Kobus leche kafuensis)*

This antelope is endemic to Zambia, where it occurs in a single population on the Kafue Flats (1989 population estimate 47,145 ± 10,483).

Wetland which meets the 1% criterion for Kafue lechwe: Fafue Flats.

Black Lechwe *(Kobus leche smithemani)*

This antelope appears to be endemic to Zambia, where it is now confined to two localities, the Bangweulu floodplain (1989 population estimate 38,994 ± 8,627) and the upper Chambeshi River (reintroduced; small numbers). It does not appear to be

Red Lechwe Distribution

COUNTRY	AREA	ESTIMATED POPULATION
Angola	Floodplains in the southeast (Cuando R.), east (Zambezi R.), and center (Cuanza & Luando Rivers)	A few thousands?
Zambia	Busanga Plain	3400
	Lukanga Swamp	600-800?
	Floodplains of Mashi and Zambezi River	Scattered remnants in the west (few 1000 or less)
Namibia	Floodplains in Caprivi Strip	4500
Botswana	Okavango Delta	20,000-25,000
	Linyanti/Chobe swamps	ca. 5000 (mainly in Linyanti)
Zaire	Lualaba R. floodplain & possibly a few other localities in the southeast	A few 1000 or less?
	TOTAL:	35,000-45,000

present in neighboring parts of Zaire.

Wetland which meets the 1% criterion for black lechwe: Bangweulu.

Nile Lechwe *(Kobus megaceros)*

This species occurs in two areas, the Sudd swamps (Sudan) and the Machar-Gambella marshes on the Sudan-Ethiopia border.

Wetlands which meet the 1% criterion for Nile lechwe: Sudd swamps, Machar marshes.

Sitatunga *(Tragelaphus spekii)*

This species is the most aquatic of all antelopes. It remains widespread and common in swamps in Zambia (northern and western plateaux), Zaire (swamp forests of Zaire basin), Congo (northern swamp forests), Gabon (coastal lowlands, less common in the interior), and Equatorial Guinea (Mbini). It is locally common in swamps in northern Botswana, eastern Angola, savanna zones of northern and southern Zaire, Rwanda, western Tanzania, Uganda, southern Sudan, forest zone of southwestern Central African Republic and southern Cameroon. The sitatunga also occurs in welands in several countries of coastal West Africa (Senegal, Gambia, Guinea-Bissau, Guinea, Sierra Leone, Togo, Benin, and Nigeria. It is rare/endangered throughout its West African range; it is probably extinct in Ghana and may also be extinct in Togo.

No estimates of the sitatunga's total population are available, but it can occur locally at high population densities, e. g. 10-15/km² within the small Saiwa swamp (Kenya), and 7/km² in the Moyowosi swamp (Tanzania). Estimated population densities are lower in other areas, e. g., 0.8/km² in the Akagera River swamps (Rwanda), 0.8/km² in the northern Okavango panhandle (Botswana), and about 0.1/km² in the Sudd swamps (Sudan) which contain extensive areas of unsuitable habitat in the form of uninterrupted papyrus beds (see Parts 1 and 2 of the Antelope Survey and Regional Action Plans for sources of these estimates). We can only guess the total number of sitatunga, but extrapolation of these estimates of population density to the species' current range suggests a total population of at least several hundred thousand.

Wetlands which meet the 1% criterion for sitatunga: A total population of 500,000 (which is conceivable) would im-

Nile Lechwe Distribution

COUNTRY	AREA	ESTIMATED POPULATION
Sudan	Sudd swamps	30,000-40,000
	Machar marshes	900
Ethiopia	Gambella swamps	A few hundred
	TOTAL:	31,000-41,000

Tsessebe Distribution

COUNTRY	AREA	ESTIMATED POPULATION
Zambia	Bangweulu floodplain	3,269
	Liuwa Plain and Sioma Ngwezi NPs, and elsewhere west of the Zambezi	<5000?
Namibia	Caprivi and adjacent areas	150-160
Botswana	Okavango Delta and elsewhere in the north and east	9,800, mainly in the Okavango
Zimbabwe	Locally distributed in the highveld and lowveld	several thousand
South Africa	Bushveld and lowveld, mainly in Transvaal	a few thousand
	TOTAL: Probably	20,000-25,000

ply that any wetland which supports 5,000 or more sitatunga meets the 1% criterion for this species. Wetlands which are known or suspected to support 5,000 or more sitatunga include Bangweulu (Zambia), Okavango (Botswana), Likouala swamp forests (Congo), Cuvette Centrale swamp forests (Zaire), and possibly others such as the Lake Victoria swamps (Uganda and Tanzania), Moyowosi swamps (Tanzania), and Sudd swamps (Sudan).

Antelopes which Utilize but Are not Restricted to Wetlands

Several species occur commonly on seasonally inundated grasslands and/or other grasslands near permanent water, but are not confined to large wetland complexes, e. g., kob, puku, waterbuck, bohor and southern reedbucks, oribi, and korrigum, topi and tsessebe *(Damaliscus lunatus* ssp). In addition, many woodland antelopes use parts of wetlands (especially floodplains) seasonally, e. g., roan and sable. Within this group, the tsessebe appears to be the only antelope for which some wetland populations meet the 1% criterion.

Tsessebe *(Damaliscus lunatus lunatus)*

The total population of this antelope is approximately 20,000-25,000, distributed as follows:

Wetlands which meet the 1% criterion for tsessebe: Bangweulu, Okavango.

Summary

The available information indicates that the following wetlands meet the 1% criterion for antelopes: Okavango (red lechwe, tsessebe, and possibly sitatunga), Bangweulu (black lechwe, tsessebe, and possibly sitatunga), Sudd (Nile lechwe and possibly sitatunga), Linyanti (red lechwe), Caprivi (red lechwe), Busanga (red lechwe), Kafue Flats (Kafue lechwe), Machar marshes (Nile lechwe). Other wetlands may also meet this criterion, e. g., Lukanga (red lechwe), Lake Victoria (sitatunga), Moyowosi (sitatunga), and the swamp forests of Likouala and Cuvette Centrale (sitatunga).

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ANTHRAX IN ETOSHA N. P.

Fortunately Mike Woodford, Chairman of the Veterinary Specialist Group, is also an ASG member and is quick to spot any inaccuracies in stories about matters in his area of expertize (see Vol. 9(1), American screwworm correction). A postcard received in March says, "Sorry to nit-pick again but see p. 11 *Gnusletter*, Vol. 9, No. 1, re anthrax. Recent work by P. C. B. Turnbull in Etosha N. P. indicates that 1) *B. anthracis* is <u>not</u> ubiquitous at substantial levels in the so-called enzootic areas in the Park, but can be readily isolated for a long time from soil known to have been contaminated by blood of animals dying of anthrax. 2) Transmision in feces of scavengers may play a role in the cycle of the disease–especially vultures and carnivores. 3) Water holes are <u>not</u> sites of multiplication of anthrax bacilli, nor are the Etosha gravel pits obviously associated with the disease. 4) Carnivores (excluding maybe cheetah) develop antibodies to the disease but herbivores do not. Work on anthrax in Etosha continues.

"Anthrax may be a 'normal' constraint on over-dense populations since it is usually associated with overgrazing."

HOW TO BE AN ORIBI

Peter Arcese[ASG] and Gwen Jongejan have forwarded the ms. of an article on the oribi, based on their observations in northern Serengeti NP, which adds a whole new dimension to bovid socioecology. Not only does the oribi break the mold of monogamously paired territorial antelopes, which all the Neotragini were thought to fit, but it fulfills the prophesy of "a marked *laissez faire* in romantic matters and cooperation in military affairs" between bull wildebeest described in Lee

and MarthaTalbot's (1963) monograph, The wildebeest in Western Masailand (*Wildl. Monogr.* No. 12, p 43). The closest confirmed parallel is the satellite males which are tolerated by territorial waterbuck (Wirtz, P.1982. Territory holders, satellite males, and bachelor males in a high-density population of waterbuck *(Kobus ellipsiprymnus)* and their association with conspecifics. *Z. Tierpsychol.* 58:277-300).

Herewith the abstract of "Cooperative territory defence and a novel ungulate social system in the oribi," which has been submitted to a leading scientific journal.

"Although cooperation in animal societies is rare, studies of cooperative species have been fundamental to our understanding of social evolution (1-3). With the exception of anecdotal reports (4-6), cooperative social systems are unknown in ungulates (3,7-11). We describe a highly-developed form of cooperative territory defence practiced by male oribi *(Ourebia ourebi)*, a small and little-known species of African antelope. Males defended permanent territories either as singeltons or with the help of one or two subordinate males. The presence of helpers was linked to a decreased probability of dominant males being overthrown by rival neighbors or non-territorial males, in strong support of the hypothesis that male oribi accept subordinates to aid in territory defence. Territorial males accompanied from 0 to 4 females, but observation suggests that all males had some mating access to females on the territory. We suggest that dominant male oribi trade off the risk of territory loss against that of being cuckolded by subordinate helpers when deciding whether to accept additional males on their territory. We reject for oribi the hypothesis that males cooperate in territory defence to increase the number of females they can defend, as occurs in lions *(Panthera leo)* (2). Since male antelopes are well-known for their intolerance toward potential rivals (7-11), oribi represent a striking departure from other antelopes, and provide the first clear evidence of cooperative territory defence in ungulates (9-11)."

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GIANT SABLE

Giant sable bulls with great sweeping horns inspire awe and the desire to come to the rescue of this long-horned subspecies, lest it go extinct in its central Angolan homeland. How many admirers, I wonder, have dreamed and schemed of mounting expeditions to go in and capture enough animals to start a captive-breeding colony somewhere outside Angola?

The latest plan to come to my attention proposes an Australian connection. Michael Kokkinn, a zoologist at the South Australian Institute of Technology, Adelaide, is trying to raise funds for an expedition to Angola, using a brochure with a drawing of a big bull under the title, "The antelope king, finally vanquished?"

Why Australia? In a covering letter (17 Apr 90), Kokkin explains that he spent part of his youth working on game farms in South Africa and studied zoology in that country before emigrating to Australia, where he completed a PhD at the University of Adelaide. "Since a recent return visit to Africa, I have come to believe that if the giant sable is to survive as a subspecies it is going to require a special effort, probably organized from outside Africa. The required expertize does exist in South Africa, but it is unlikely to be accepted by the Angolans. In the same vein, the USA, being the main supporter of UNITA, would not be regarded favorably in Luanda. Using such reasoning, I have come to think that Australia would provide the neutrality from which to coordinate an expedition to Angola."

Quoting from the brochure: "Caught in the Crossfire: For the last ten years the giant sable has been caught between the rival factions of Angola's civil war–MPLA and UNITA. The status of the species is not known . It may be extinct!

"Expedition to Angola. It is most urgent that, as soon as possible, an international expedition be sent to Angola to make an assessment of giant sable status. Members of the expedition will include: a game census expert, a sable biologist, an interpreter, a woodland ecologist, a World Wildlife representative, an antelope translocation expert and photographers.

"Aims of the Expedition:

- Make an accurate census of remaining giant sable.
- Capture and translocate some young animals to ensure survival of the subspecies.
- Make an assessment of the habitat.
- Gather data on other species present in the area.
- Film and record the activities in order to publicize the plight of the giant sable."

"It is important that the funding and organization of the Giant Sable Expedition be in place as soon as an opportunity arises. The first step is to establish the funding."

Proposals such as this one, though doubtless motivated by genuine concern, are a good example of how separate initiatives by individuals and organizations involved in international conservation often compete and can end up cancelling one another. In the May, 1988 *Gnusletter*, after reporting that UNITA forces had overrun Kangandala NP, burned the warden's house, and were shooting sable, I remarked that perhaps captive breeding was an idea whose time had come. But what I visualized was a unitary approach to the Governnment of Angola, through IUCN, with an offer of assistance, not a throng of competing proposals.

If all the different plans that I have heard about were approved and made operational at the same time, a veritable army of wildlife conservationists (and probably some animal dealers) would descend on the giant sable reserves–providing almost enough manpower to establish the equivalent of the UN peacekeeping force in Namibia. Perhaps they could intervene between the two Angolan armies and establish a *cordon sanitaire* around the sable. Hopefully, this conservation expeditionary force would proceed to capture only enough sable to

establish a single captive breeding herd–otherwise, when they finished there might be no sable left in Angola.

DAMA GAZELLE IN NIGER

John Newby[ASG], WWF Representative in Niger and the ranking authority on Sahel antelopes, writes (19 Mar 90), "Our small Aîr dama gazelle population (100-150) appears to be on the increase following 3 reasonable wet seasons. Any interest you can drum up in the States for an increase in the dama breeding programmes would be useful because, after the scimitar-horned oryx and the addax, it's the next sahelo-saharan species to go."

HYENA KILLS GNU WITH UNUSUAL DEATH GRIP

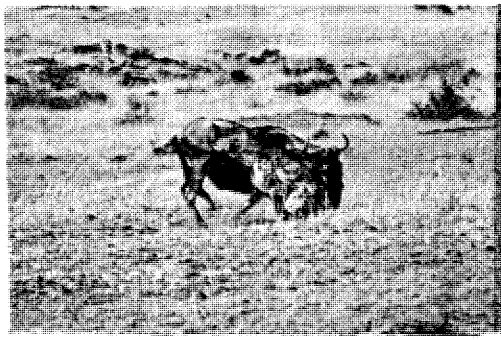
Merle Wasson, a civil engineer from Gaithersburg, Maryland, saw and photographed a spotted hyena killing a bull wildebeest in the Masai Mara Game Reserve last October, in a manner that I have never seen or heard of before. The 74 color slides Wasson sent along with a written description of the event corroborate his account, about which I might otherwise have had some doubts.

Wasson was sitting in a vehicle watching a group of hyenas, including several cubs, around a den on the edge of a creek bed at around 10:30 A.M. When a small herd of wildebeest appeared in the distance, the resting hyenas took no notice. However, 1/2 hour later, Wasson's Kikuyu driver, Nephat, suddenly shouted, "The hyena is biting the gnu!" and drove overland at breakneck speed to the scene.

"Upon arriving at the site of attack," writes Wasson, "[we found that] the hyena had separated an adult male gnu from the herd and was lunging at his right hind quarter. The remaining herd had broken into a panic run and quickly disappeared. The gnu did not attempt to run in a straight line but... ran in short erractic circles. The hyena kept attacking the right hind quarter at the hip bone point. Finally, the hyena had a firm grip just forward of the back and socket joint of the hip. The gnu was still attempting to run, and would lift the hyena completely off the ground at times. The gnu would also attempt to gore the hyena with its horns. The hyena would dodge, and when the gnu stopped moving to attack with its horns, the hyena would tear into the flank with its teeth. At this point the gnu was going in a tight circle, and was tiring. When the gnu would stop moving to gain its breath, the hyena would release its jaws, and violently thrust its head and jaws at the wound in the flank. Finally, the lower jaw of the hyena penetrated the skin and the hyena had a firm grip on muscle and tendons, with the upper jaw and teeth gripping the skin.

"After resting for 10 to 15 seconds, the gnu would again start to attack the hyena with [its] horns and/or try to run. At times the hyena would be carried 20 to 50 feet, but the hyena's jaws were firmly locked into the wound in the flank. After further tiring of the gnu, the hyena would try to cut the muscle structure supporting the hip and leg of the gnu. Finally, the gnu lost control of its right leg due to the hyena successfulliy severing the muscle structure in the hip.

"At this point, the hyena started to rip the skin covering the flank and stomach. The gnu still tried to pull itself forward, and to horn the hyena. The endurance of the hyena was clearly superior to that of the gnu. Also, the gnu was in a state of panic and shock, which reduced its effectiveness in attacking the hyena. The hyena did not ever appear to be in a hurry, and successfully avoided every atttack by the gnu. The wound was now quite large, and at time the hyena would forces its head completely into the flank and stomach cavity. At this point, the gnu was still standing at times, but fell to the ground repeatedly. Finally



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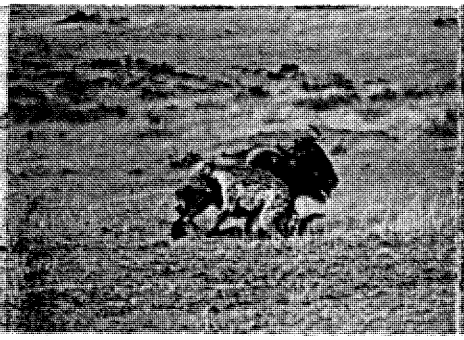

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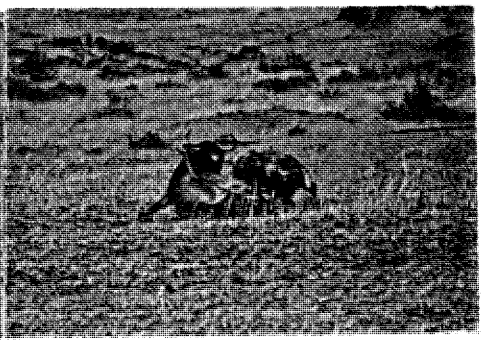

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Frame 23

Frame 25

the disembowelment was so severe that the gnu collapsed and could not rise again. The hyena patiently and systematiclaly disembowled the gnu until its lungs collapsed. A very short bellow was heard, and the gnu died.

"The hyena ate a small portion of the meat from the hip area, some of the intestines, and then walked a few steps away and rested. It cleaned its face of blood, and started trotting off toward the dens where we had initially spotted the hyena clan. After moving a short distance, the hyena was met by two larger. . . hyenas. These two greeted the one who made the kill, and licked its face and shoulders. Next all three hyenas jumped and howled, with the greeters placing their front feet on the back of the hero, and further licking its face and shoulders. After about a minute of this activity, the killer hyena trotted off toward the water holes. Nephat said, 'We shall not see that one again, he goes to drink and rest.'"

Although there is ample evidence that *Crocuta crocuta* is one of the most opportunistic large carnivores, maybe the Mara population is unusually versatile and diurnal. Morris Gosling and Marion Petrie (in press. Lekking in topi: a consequence of satellite behavior by small males at hotspots. *Appl. Anim. Behav. Sci)* found that hyenas systematically stalked resting topis at the hottest time of day, in search of napping individuals they could grab. Half a dozen (mostly territorial males) were taken in this way, and the technique was similar to that described above, in that the hyena, having secured a hold, hung on and attempted to pull the topi down.

N.B. Readers who have made similarly interesting behavioral observations involving antelopes, that may seem too anecdotal or inconsequential for more formal journals, are invited to submit them to the *Gnusletter*, where they will help to leaven the loaf of conservation-oriented stories.

CAPTIVE BREEDING

BREEDING ENDANGERED SPECIES ON RANCHES

The Chicago Zoological Society has as one of its trustees, William Lane III, who has made his 118,000 ha ranch in northeastern New Mexico available for breeding rare and endangered mammals. Quoting from a Proposal to Breed Antelopes sent to Rod East by Pamela Parker, Assistant Director, Conservation Biology, "Zoos have not yet fully exploited the opportunity of joining with the private sector to combine the resources and commitment of their trustees with the expertise and experience of their professional staff. . . Achievements of the joint efforts at the Bell Ranch between the Chicago Zoological Society and resources from the private sector within its trustee body may offer to other zoological societies a model for the enhancement of their efforts on behalf of species that would thrive under ranch conditions. Many of the Species Survival Plans of AAZPA could be augmented through the exercise of the option and as a result, more species could be offered commitments to their future by zoos able to utilize expanded resources of land."

The antelopes to be bred on the ranch are to selected from 5 categories:

1. Species not held in the US. High probability of extinction if no captive propagation efforts are undertaken.

2. Species not held in facilites in the US. Small group held elsewhere. Species in need of conservation efforts.

3. Species held in small numbers in facilities in the US. Species in need of conservation efforts.

4. Commonly held in facilites in the US. Additional numbers offer additional security for the species.

5. Species held by Smithsonian Institution (National Zoo, Front Royal) or by N. Y. Zoological Society (St. Catherine's Island) but being displaced by other programs. Species is in need of conservation.

In the case of species in category one, the plan calls for collaborating with the ASG to locate a surviving population, working out an agreement with the government to capture and import a breeding group; then to acclimate, transport, and

Species under Immediate Threat (i. e., endangered):	*Areas in Sub-Saharan Africa where Populations Are Known to Survive**
Hirola *(Damaliscus hunteri)*	Eastern Kenya, southern Somalia
Scimitar-horned oryx *(Oryx dammah)*	North-central Chad
Addax *(Addax nasomaculatus)*	Northern Chad, Niger, Mali/Mauritania border area
Slender-horned gazelle *(Gazella leptoceros)*	Niger, possibly northern Chad, Mali, and Mauritania
Dama gazelle *(Gazella dama)*	Mali, northern Bukina Faso, Niger, Chad
Dibatag *(Ammodorcas clarkei)*	Eastern Ethiopia, northern and central Somalia
Beira *(Dorcatragus megalotis)*	Northern Somalia
Species at Risk (i. e., not yet endangered, but likely to become endangered if present trends continue)	
Speke's gazelle *(Gazella spekei)*	Northern and central Somalia
Red-fronted gazelle *(G. rufifrons)*	Senegal to northern Ethiopia
Soemmering's gazelle *(G. soemmeringii)*	Northeastern Sudan, Ethiopia, Somalia

*See Parts 1–3 of *Antelopes, Global Survey and Regional Action Plans,* for details.

quarantine the animals, and finally move them to the Bell Ranch.

Rod East was invited to suggest antelopes that would be particularly suitable for this project. In his reply (12 May 90), quoted below in part, Rod wrote:

"This proposal is very exciting and worthwhile. It has the potential to make a major contribution to antelope conservation which will be of lasting international significance. I am certain that it will have the full and enthusiastic support of the members of the Antelope Specialist Group.

"I have used the information from parts 1 to 3 of the ASG's Antelope Survey and Regional Action Plans to identify the following 10 threatened species which would appear to be suitable for introduction to the Bell Ranch" (table).

"I must point out that very little is known about the biology of some of these species, especially the dibatag (which is apparently a browser) and the beira (which may also be a browser).

"Captive propagation is vital for the survival of these species, especially those which are under immediate threat. Whereas there are already substantial captive stocks of scimitar-horned oryx, addax, and to a lesser extent dama gazelle, and moderate numbers of slender-horned and Speke's gazelles in captivity, the other species listed above are unrepresented or poorly represented in captivity."

"The list of candidate species for the Bell Ranch could possibly also include the following savanna antelopes: giant sable *(Hippotragus niger variani)*, tora hartebeest *(Alcelaphus buselaphus tora)* (both endangered); western giant eland *(Tragelaphus derbianus derbianus)*, eastern giant eland *(T. d. gigas)*, and Swayne's hartebeest *(A. b. swaynei)* (at risk). Establishment of secure captive breeding populations of these savanna antelopes is a high priority, but the habitat at the Bell Ranch may be too arid. Also, the giant eland may be more of a browser than a grazer, although very little is known about it. Steve Romo and Betsy Dresser at the Cincinatti Zoo (where there is a breeding group of eastern giant eland) may be able to give some indication of the likely suitability of the Bell Ranch for this antelope. It would certainly be of tremendous importance for antelope conservation if it proved possible for any of these threatened savanna antelopes to be established at the Bell Ranch, as well as some of the 10 species from more arid habitats which I have listed above."

"P.S. The key point in relation to the savanna species and subspecies mentioned is obviously whether they can survive under the conditions of shelter, heat in winter, supplementary feeding, etc. It may well be that they can. Giant sable, giant eland, tora and Swayne's hartebeest are completely unrepresented in captivity at present (to my knowledge), apart from eastern giant eland–there may also be a very small number of western giant eland in a South African zoo. The areas where they survive in the wild are:

Giant sable–Angola (its range lies in a war zone!)

Tora hartebeest–Sudan/Ethiopia border (partly in a war zone)

Swayne's hartebeest–Ethiopian Rift Valley

Western giant eland–Senegal

Eastern giant eland–Cameroon, CAR, southwestern Sudan

"I have excluded rain forest and montane species (e. g., forest duikers, mountain nyala) for obvious reasons."

Rod asked my opinion about the suitability of this New Mexico ranch for sable and hartebeest. It should be O.K. for hartebeest (not too arid and probably not too cold–judging by *A. b. cokei* and *A. b. caama)*, but would be unusually arid habitat for sable.

DOUBTS ABOUT TEXAN DERBY ELAND

Doubts about the presence of Derby eland *(Taurotragus derbianus)* on Texas ranches, reported in the last *Gnusletter*, have been expressed by several experts on imported exotic animals. According to the Texas Wildlife Division's 1988 survey of exotic ungulates, 10 ranches have a total of 97 Derby eland.

San Diego Zoo Registrar Marvin Jones, who has probably the most extensive files on the history of animals in captivity, wrote (18 Feb 1990), "It would be interesting to know where those Derby eland are. I suspect it's a mistake, and they are really just common eland, as I never have heard of any going to the ranches, but who knows, maybe someone slipped some in that us zoo folks never heard about."

Alan Shoemaker, Curator of Mammals at the Riverbanks Zoological Park, Columbia, SC also expressed disbelief. His explanation for the mistake: "Presumably the individuals responsible for record keeping were so impressed with the animals' size that they selected the entry 'giant' instead of the more mundane one 'common.'"

According to the Derby eland studbook kept by Steve Romo of the Cincinatti Zoo, there are only three institutions in the world that presently have Derby eland, totalling 9.9 in January: Cincinatti, Los Angeles, and Lichtenburg (National Zoo of South Africa). The American zoos' 6.3 founders were caught in the Central African Republic in 1983/4

As it turns out, however, four giant eland were imported (from the Sudan) by the Brookfield Zoo between 1937 and 1939, the first *T. derbianus* to be kept in a zoo. Although this line died out by 1943, "Be aware," Marvin Jones points out, "that at this time there was *no* pre-entry quarantine of exotic hoofed animals into the USA; they went directly from the port of entry (usually by train or truck) to the destination zoo. It is possible (but highly unlikely) that Giant eland for other places may have come about this time. Certainly many private owners were bringing in rare deer and antelopes, of which there is little record."

Still, the existence of 97 Derby eland on Texas ranches does seem a tad unlikely.

MOUNTAIN NYALA

Marvin Jones has sent a copy of an article on the mountain nyala in the Rome Zoo, Osservazioni biologiche sopra tre giovani esemplari di "Niala di Monte" *(Tragelaphus buxtoni* Lid.) allevati per la prima volta in cattività, by Alulah M. Taibel, Bollettino di Zoologia 15:126-44, 1948. It is, Marvin says (in lit. 25 Mar 90) "a very interesting article [with] . . . a lot of very good data if someone can translate it out."

HIROLA

A year ago (Vol. 8, No.2), at the end of an article on captive-breeding of the hirola or Hunter's antelope *(Damaliscus hunteri)* at Dvur Kralove Zoo in Czechoslovakia, I asked if anyone knew of another zoo that was breeding this species (the last of the

Czech group died in 1981). Alan Shoemaker and Marvin Jones (see above story) both responded almost immediately, but when the time came to write the next *Gnusletter*, I forgot about everything but the mass of new material I had to report from the SSC, ITC, and Desert Antelope meetings/conferences I had meanwhile attended—even though the September issue carried Peter Kat's disquieting speculation on the decline of the hirola population in Kenya, in what is probably the only remaining refuge of one of the most vulnerable and least known of all antelopes.

According to Marvin, who has the log book of the old quarantine station at Clifton, New Jersey, in which all antelope imports to the US from 1958–1978 are recorded, a total of 18 hirolas (7.11) were released to the Gladys Porter, Los Angeles, and Busch Gardens zoos between 1972 and 1978 (and thereafter none to his knowledge). They were all imported by International Animal Exchange and went through pre-US quarantine in Mombasa.

Apparently the only zoo that has had any luck with the hirola is Gladys Porter, in Brownsville, Texas, which according to the December 1988 ISIS listing had 6 animals (3.3), 4 of which were captive-born. Marvin is unaware of any other zoo in the US that still has any, nor that any European zoo other than Dvur ever imported *D. hunteri*. But if perchance there are captive groups outside of the US or Europe, we would like to know about them.

Another effort to breed the species may be in the works, as the hirola is one of the prime candidates for the Bell Ranch/ Chicago Zoological Society captive-breeding program in New Mexico (see following story).

BLUE DUIKER LONGEVITY IN POSNAN ZOO

Jan Smielowski of the Agricultural Academy in Poznan, Institute of Applied Zoology, sent in a 1989 paper with the English title, The duikers (Cephalophinae) at Polish Zoological Gardens (Przeglad Zoologiczny 33:457-59). It is interesting to note that a wild-caught female and a captive-bred male blue duiker *(Cephalophus monticola)*, smallest of the Cephalophini (4 kg) lived over 11 years.

DIK-DIKS: GENETIC BARRIERS TO HYBRIDIZATION

Chromosomal divergence and reproductive isolation in dik-diks, by Oliver A. Ryder, Arlene Kumamoto, Barbara S. Durrant, and Kurt Benirschke, of the San Diego Zoological Society's Center for Reproduction of Endangered Species, published in *Speciation and its Consequences* (D. Otte and J. A. Endler, eds., Sinauer Associates, Sunderland, MA, 1989, pp. 208-25) describes the results of cytogenetic studies of the two species of the subgenus *Rhynchotragus*. In her letter accompanying the reprint she sent (5 Oct 89), Arlene Kumamoto writes:

"I have been working on the cytogenetics of captive populations of dik-diks in the U. S. The study has involved both Kirk's dik-dik *(Madoqua kirkii)* and Gunther's dik-dik *(M. guentheri)*. Briefly, we have found two different cytotypes among the captive Kirk's dik-dik, with hybrids between the cytotypes being sterile or subfertile. In the Gunther's dik-dik there is a fusion polymorphism among the animals studied so far [7 founder animals and 51 individuals bred in captivity]."

"We have purposefully refrained from identifying subspecies with particular cytotypes, since capture locales for the founder animals are unclear. Although we have identified two distinct cytotypes for Kirk's dik-dik, there is reason to believe that there may be other cytotypes (one specimen that came from Hanover, Germany is different from the two we have identified). It is clear that much field work needs to be done to clarify questions regarding the cytogenetics and taxonomy of the *Madoqua* genus.

"A proposal to establish a North American regional studbook for dik-dik was recently approved by the Wildlife Conservation Management Committee (WCMC) at the September American Association of Zoological Parks and Aquariums Conference. I am in the midst of collecting the data for the studbook and hope to have a first draft by January, 1990. The studbook will encompass both Kirk's and Gunther's dik-diks (separately but under one cover), and will contain the cytogenetic information, in order to be the most useful to captive management programs.

"I hope this information will be of interest to the Antelope Specialist Group. Although all our work to date has been on captive populations, it is hoped that more field work on these animals can be carried out, particularly on the South West African subspecies, *Madoqua kirkii damarensis*."

REGIONAL RUNDOWN

NIGER

At the behest of the *Chef de l'Etat*, the Ministry of Agriculture and the Environment has asked the WWF International Representative in Niger, John Newby[ASG], to take the steps necessary to safeguard the remaining populations of hippopotamus *(Hippopotamus amphibius)* and giraffe *(Giraffe camelopardalis)*. In response, John wrote a proposal for a three month-study of the conservation status of these two species, from which excerpts are quoted below (translated from the French).

"In recent years, in the sahel region and particularly in Niger, the hippopotamus has seen a good part of its riverine pasturage disappear (reduced river flood, hydro-agricultural development, surplus domestic livestock). This situation has created an inevitable conflict because, deprived of its natural diet, the hippopotamus feeds more and more on rice and other crops. Given the priority [for Niger] to become food self-sufficient and the need to develop irrigated crops, the future of the hippopotamus seems dangerously compromised.

"The giraffe has also been the victim of a major reduction of its range through desertification and drying of the sahelian lakes on the one hand, and by expansion of agriculture and consequent clearing [of land] on the other hand. It is equally well-known that the giraffe has been the victim of major poaching.

"As far as currently known, the number of hippos and giraffes only amounts to several herds localized particularly in the region of Ayorou for the hippos and in the region of Boboye for the giraffes.

"This alarming status not only implies the necessity to search for a solution to acute conservation problems. It also requires consideration of how the reduction of the numbers of wild animals constitutes one of the indices of modification of the earth/soil. "

Objectives:

- Inventory, as accurately as possible, the last hippos and giraffes currently resident in Niger and their habitat.
- Investigate the precise causes of the decline of these two ungulates in Niger.
- Recommend measures to bring about the rehabilitation of the hippo and giraffe (plantings that utilize the soils and natural resources, social and financial constraints, education, fighting poaching)."

UGANDA

Murchison Falls NP is again threatened by reconsideration of a hydroelectric scheme, planned by the Ministry of Natural Resources, that would alter the spectacular falls and riverine habitat. (From *Newsletter* No. 49 of the CNPPA)

MOZAMBIQUE

The sad state of the parks and game reserves in this war-torn country is clear from the excerpt of a story that appeared in *Newsletter* No. 49 of the CNPPA.

"Recent callers at Gland from Mozambique have spoken positively to CNPPA about management planning for the only area remaining under the control of the Wildlife Department—Bazarato NP, an archipelago where the park is made up of islands and the sea for a distance of 3 miles around them. All the mainland parks and reserves are militarily occupied and the department's Director, Eliza Wilson Chamba and Warden (management) Roberto Zolho, are anxiously awaiting a return to peace in Mozambique so that a start can be made rebuilding the system. Reports they have received indicate loss of wildlife, damage to habitat, and destruction of park buildings."

BOTSWANA

Clive Spinage has supplied some information about the status of antelopes in Botwsana (in lit 7 Apr 90):

"Recent counts by the Department of Wildlife and National Parks have shown there to be many more puku along the Chobe River water front than was supposed, with as many as 120 being counted. Maximum totals of 51 waterbuck and 162 red lechwe have also been counted. This relates only to the Chobe River waterfront and not the Linyanti, where there are many more lechwe.

"Permission has been granted to the Yale University project on the evolution of African bovids to take one puku from Chobe, and one lechwe plus one tsessebe from the Moremi area, for brain, kidney, and skin samples.

"I assume that you are aware of this project: 'Systematics and evolutionary tempo and mode in African Bovidae; tribes Alcelaphini, Hippotragini and Reduncini,' by E. S . Vrba, J. R . Powell, R. DeSalle, J. M. Marks, and J. E. Tatesy of [the] Departments of Geology and Geophysics, Biology, [and] Anthropology. If not, I suggest that you write to Elizabeth Vrba for a copy of the project, which is quite a lengthly document."

ASIA

INDIA

Manas Wildlife Sanctuary, a World Heritage Site, has been occupied by Bodo tribespeople as a result of ethnic unrest, with consequent poaching and the breakdown of the sanctuary's management. (From *Newsletter* No. 49 of the CNPPA)

MONGOLIA

George Schaller is continuing his survey of Tibetan Plateau wildlife. The following letter, dated 13 Feb 90, is an account of his work in Mongolia.

"I spent August–September 1989 and December 1989–January 1990, hosted by the Ministry of Nature and Environment Protection and the Mongolian Society for Protection of Nature and Environment, both of which are making an exceptional effort to protect the country's natural resources. Although the focus of my visit was the great Gobi National Park (its two sections total 53,000 km^2), I also had an opportunity to travel widely in other parts of the Gobi desert, as well as in the Altai Mountains and eastern steppes (see map). Total travel distance was 6,750 km. I took incidental notes on 3 species of interest to you: saiga *(Saiga tatarica)*, goitered gazelle *(Gazella subgutturosa)*, and Mongolian gazelle *(Procapra gutturosa)*. Valuable information on the first two species was provided by biologists Tulgat and Chuluunbaatar, and on the Mongolian gazelle by biologists Tsagaan, Lkhagvasuren, Ganbaatar, and Tserendeleg.

Saiga. Saiga occur in only 3 small populations in the arid steppes along the northern edge of the Altai Mountains. At most a few hundred survive, according to Chuluunbaatar.

Goitered gazelle. This gazelle is widespread in the Gobi desert and arid grasslands west of about 110°E. In December–January, we counted all gazelles within 300 m on each side of our travel route between the towns of Ulan Bator and Altay, a transect of 1775 km. In arid grassland density was 0.21 gazelles/km^2, and in the desert 0.13 gazelles/km^2. West of Altay only one gazelle was seen in 1190 km. According to Tulgat, the eastern part of Gobi park has only about 800 gazelles (0.02/km^2, whereas the western part, which is less arid, has about 1200 (0.14/km^2). Better forage conditions in the latter are reflected in the number of young in the populations during August–September. In the eastern part there were 74 males:100 females and 30 young:100 females (n=54); in the western part there were 73 males:100 females and 66 young:100 females (n=105). Winter counts during our travels gave 32 males:100 females and 67 young:100 females (n=157).

Mongolian gazelle. Once found over 75% of the country, Mongolian gazelles have declined until they now occupy only about 10%, all in the eastern part. Tsagaan and Lkhagvasuren estimate a total population of about 300,00 of which about 60% are migratory and the rest sedentary. The main concentration of gazelles is in the eastern tip of the country, where up to 30,000 animals have been seen together. During our visit in September, we commonly saw herds of 10-60 animals and a number of aggregations of several hundred; one herd of 280 was composed of 42 adult males, 13 yearling males, 157 females and 68 young. Migratory animals move south into China in April when surface water on the steppes becomes scarce and return in October. A reintroduction program has been started with a move of a number of gazelles to one site in western Mongolia.

"Mongolia has censused and studies its gazelles and it is attempting to manage the animals as an economic resource. Up to 30,000 gazelles are shot in late autumn (none were harvested in 1989) and the carcasses are exported for meat and hides to Europe. However, China neither manages nor protects gazelles well. When the migratory animals leave Mongolia, crossing gaps in a fence that traces the border there, local people, I was told, kill many of them. Unless Mongolia and China manage the gazelles jointly, both countries will lose a resource as well as a magnificent natural spectacle. Both countries should cooperate in establishing an international peace park along the border to protect the vast grass steppes with its Mongolilan gazelles, great bustards, corsac foxes and other species belonging to that unique ecoystem."

Vladimir Sokolov's comments on the status of the Mongolian populations of these species were reported in the September 1989 *Gnusletter* (under USSR).