Short Communications

Group sizes of oribis in different habitats

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Data collected on group sizes of the oribi *Ourebia ourebi* at midland elevations in Natal, South Africa, were compared with available data from montane (Drakensberg) and tropical (East Africa) grasslands. Mean group sizes were lowest in montane grassland and highest in tropical grassland. In the montane areas adults occurred mainly in pairs or as single animals, whereas small harem herds predominated in tropical grassland, while the organization at midland areas was intermediate. It is suggested that the social organization of the oribi is influenced by habitat suitability, and availability and quality of food during winter. This hypothesis is discussed in relation to the three areas considered.

Data wat versamel is van die groepgroottes van die oorbietjie *Ourebia ourebi* in die middellandgebiede van Natal is met dié van berggebiede (die Drakensberge) vergelyk, sowel as met data van tropiese grasvelde (Oos-Afrika). Gemiddelde groepgroottes was die laagste in die Drakensberge en die hoogste in tropiese grasveld. In die berggebiede het volwasse oorbietjies hoofsaaklik as pare of enkellopendes voorgekom. In tropiese grasveld kom hulle hoofsaaklik in klein troppies (♂ en > 1♀)voor, en in die Natalse middellande is die sosiale organisasie tussen dié van die berge en dié van tropiese grasveld. Daar word voorgestel dat die sosiale organisasie van die oorbietjie deur die geskiktheid van die habitat beïnvloed word, sowel as die beskikbaarheid en kwaliteit van voedsel gedurende die winter. Hierdie teorie word bespreek met betrekking tot die drie gebiede.

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The oribi *Ourebia ourebi* is a small (14 kg) antelope which occurs in open grassland or open savanna on flat to gently undulating terrain, distributed in suitable habitat throughout the high-rainfall regions of Africa (Skinner & Smithers 1990). In considering the social organization of African antelopes Jarman (1974) placed the oribi, on the basis of data from Tanzania and Rwanda, in a category together with antelopes which form small harem herds, consisting of an adult male and most commonly from 2–5 females, e.g. mountain reedbuck *Redunca fulvorufula* and grey rhebuck *Pelea capreolus*. He called this social class Class B. Other East African workers similarly recognized the oribi as a Class B species (Hendrichs 1972; Leuthold 1977; Mduma 1989).

After considering data collected in the montane grasslands of the Drakensberg in Natal, Rowe-Rowe (1982a) placed the oribi in Jarman's (1974) Class A, which includes antelopes that 'live singly, or in pairs, sometimes accompanied by a recent offspring', e.g. duikers (Cephalophinae), steenbok *Raphicerus campestris*, and klipspringer *Oreotragus oreotragus*. Rowe-Rowe (1982a) suggested that the difference in social organization was possibly related to habitat quality.

During the course of a study on the effects of land management practices for oribis at midland localities in Natal (Everett 1991), data collected on social organization indicated that oribis occurred in larger groups than was the case in the Drakensberg. In this article we present these data, compare them with those from montane and tropical grasslands, and consider the possibility that social organization is influenced by habitat suitability as well as food availability during winter.

Data were collected from seven properties in Natal, labelled A to G in Figure 1. Properties D and F are Natal Parks Board nature reserves and the others are farms. Topography is moderately undulating on all properties. With the exception of Property C on which the natural vegetation is savanna, all are situated in open grassland communities, at elevations between 700 and 1500 m in the Coast Hinterland, Mistbelt, and Upland bioclimatic regions (Phillips 1973), referred to as midland areas in this article.

Each property was visited at least five times, at regular intervals, during 1990. For every group of oribi seen the total number was noted, and wherever possible, the sexes of

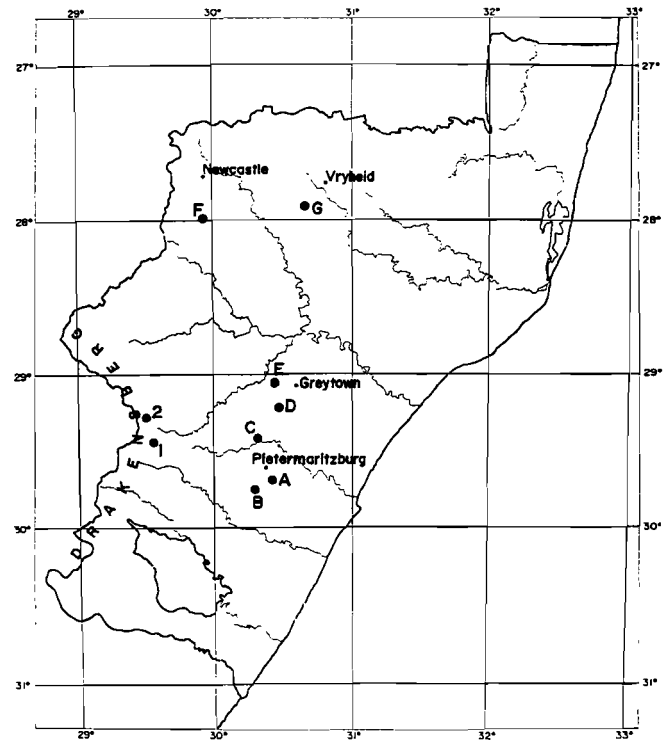

Figure 1 Properties at midland elevations in Natal on which data on oribi were collected (A = Wingrove, B = Baynesfield, C = Mieliefontein, D = Blinkwater Nature Reserve, E = Middleton, F = Chelmsford Public Resort, G = Strathcona), and the locations of Highmoor (1) and Giant's Castle (2) in the Drakensberg, where Oliver *et al.* (1978) and Rowe-Rowe (1982a) studied oribi populations.

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the animals. Age-class categorization was the same as that used by Oliver, Short & Hanks (1978) and Rowe-Rowe (1982a). For the calculation of mean group sizes all animals seen were included. Group composition details are based only on adults whose sexes were determined: the sexes of immature oribis could not always be determined with certainty.

Information on oribis in montane grasslands was obtained directly from, or calculated from data collected at Highmoor (Oliver *et al.* 1978) and Giant's Castle Game Reserve (Rowe-Rowe 1982a). These studies were carried out in the Montane bioclimatic region of the Drakensberg (Phillips 1973) at elevations between 1800 and 2200 m (Figure 1). The information on oribis in tropical grasslands originates from published and unpublished reports (references in the text).

The study areas at midland elevations and at Giant's Castle were traversed both on foot and by vehicle, whereas at Highmoor walked transects were conducted. There were no significant differences between mean group sizes in data collected while travelling by vehicle or walking.

Samples from the different habitats were compared using a Kruskal-Wallis test for non-parametric data (Statgraphics 1988).

In both the Drakensberg and the midlands of Natal groups of two oribis occurred most frequently, followed by single animals (Table 1). Groups of three or more comprised 19,5% in the Drakensberg, 29,7% in the Natal midlands, and 59,6% in tropical grassland. The general pattern that emerges from the data is that aggregations are smallest in the Drakensberg and largest in tropical grasslands. Recent studies done in Serengeti National Park (Tanzania) indicate modal group sizes of three individuals (Arcese & Jongejan 1989; Mduma 1989), whereas in Natal the mode is two.

Group sizes in the three samples differed significantly (H = 49,4387; n_1 932; n_2 1175; n_3 52; $p << 0,001$).

Amongst adult oribi in the Drakensberg, more than half of the associations comprised pairs (= adult ♂ and ♀), and typical Class B groups made only a minor contribution (Table 2). Pairs and single-animal categories (typical of Class A) in the Natal midlands were lower than those in the Drakensberg, whereas groups containing more than one adult female made up nearly one third of the observations.

Table 1 Group-size frequency of oribis, expressed as per cent occurrence, in montane and midland habitats in Natal, as well as in tropical grassland. Drakensberg data from Oliver *et al.* (1978) and Rowe-Rowe (1982a), and tropical data from Hendrichs (1972) and Leuthold (1977). Mean group sizes are given ±SD

Group size	Drakensberg n = 932	Midlands n = 1175	Tropical n = 52
1	35,1	31,2	13,5
2	45,4	39,1	26,9
3	16,2	19,0	26,9
4	2,1	7,0	25,0
5	0,8	1,9	5,8
6	0,4	1,3	0
7	0	0,4	0
8	0	0,1	1,9
$\bar{x}$	1,89 ± 0,85	2,15 ± 1,13	2,92 ± 1,34

Table 2 Comparison of group composition of adult oribis recorded in the Natal Drakensberg (Oliver *et al.* 1978; Rowe-Rowe 1982a) and midland areas of Natal (this study), expressed as per cent occurrence

Composition	Drakensberg n = 932	Midlands n = 1015
Single ♂	26,7	15,3
> 1 ♂	2,5	3,3
Single ♀	10,5	15,1
> 1 ♀	0,4	6,8
Pair	54,1	36,6
♂ + > 1 ♀	4,1	17,8
> 1♂ + ♀♀	1,7	5,2

It was not possible to obtain sufficient detail from publications on East African studies for the presentation of comparative group compositions, but statements on the mean number of adult females in groups containing adult females could be compared. These showed a gradation from lowest in the Drakensberg (1,07 ± 0,03; n = 593), to intermediate in the Natal midlands (1,43 ± 0,70; n = 827), and highest in the tropical grasslands of East Africa (1,50–2,04; Jarman 1974; Leuthold 1977). In two of Uganda's national parks, Leuthold (1977) reported that 44 and 50% of groups containing adult females included two or more adult females. In Serengeti National Park, Mduma (1989) found that the harem group was most predominant (> 30%) and that > 36% of all groups contained two or more adult females.

In the Drakensberg oribis favoured open grassland on slopes of < 10° (Rowe-Rowe 1983). At Highmoor in the Natal Drakensberg Park, Oliver *et al.* (1978) estimated that 33% of the study area was suitable for oribi, while at Giant's Castle Game Reserve, also in the Drakensberg, Rowe-Rowe & Scotcher (1986) regarded a fragmented 17% as being topographically suitable. Areas of suitable terrain in the Drakensberg are often small, patchily distributed, and separated from other suitable areas by steep valleys or hills. Rowe-Rowe & Scotcher (1986) concluded that in the Drakensberg the high summer rainfall, dystrophic soils, and food quality and availability, which drop to critical levels during the long harsh winters, contribute to the low carrying capacity of the area for wild ungulates: particularly for small, selective feeders such as the oribi. Mentis (1978) and Oliver *et al.* (1978) similarly recognized winter malnutrition as a limiting factor in the Drakensberg.

The moderately undulating terrain and open grassland (about 80%; Everett 1991) on the properties in the Natal midland areas, combined with their higher carrying capacities for both livestock (Edwards 1981) and wild ungulates (Mentis & Duke 1976), makes them more suitable than the Drakensberg for oribis. At midland elevations rainfall is not as high as in the Drakensberg, and the soils are less heavily leached (Everett 1991). Although winters are dry, they are not as long and severe as is the case at the elevations at

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which oribis occur in the Drakensberg.

In another South African study conducted on two farms in the south-eastern Transvaal, Viljoen (1982) found adult pairs to be the most common group composition (38 and 41% respectively), followed by solitary adults (30 and 37%), and harem herds (11 and 10%). The proportion of harem herds recorded is higher than that found in the Drakensberg but lower than that recorded at midland elevations in Natal (*cf.* Table 2). The south-eastern Transvaal study areas were situated in sourveld (grassland which deteriorates in palatability and nutritional value during winter), and experience a typical highveld climate (Viljoen 1982), with winters being more severe than at midland elevations in Natal, but not as severe as those in the Drakensberg. These findings appear to corroborate the suggested reasons for a predominantly Class A social organization in temperate grasslands.

The East African tropical grassland areas, from which data considered in this article originate, are suitable for oribis in terms of both vegetation and topography (Sinclair 1974; IUCN/UNEP 1987). Rainfall is similar or higher than that recorded in the midland areas of Natal, but not as high as in the Drakensberg. The tropical grasslands experience dry seasons of two or three months, but these are not as long as the Drakensberg cold, dry season of five months. Furthermore, cool, dry season temperatures are much higher in the tropical grasslands than in the Drakensberg or parts of the Natal midlands (Sinclair 1974; Rowe-Rowe & Scotcher 1986; Everett 1991). In East Africa grass is usually burnt at the start of the cool, dry season. If there is sufficient moisture in the soil, the burnt grass soon begins to grow as mean maximum cool season temperatures are generally in the region of 26°C (Sinclair 1974). Although the grass would be short at this time, it would be available to a small selective feeder such as the oribi (Rowe-Rowe 1982b). Indications are that the nutritional quality of tropical grassland herbage does not drop to levels as low as those recorded in Natal (Prins & Beekman 1989), and does not remain at a low level for as long as has been recorded in the Drakensberg (Rowe-Rowe & Scotcher 1986).

Jarman (1974) realized that anomalies in his classification were likely to occur, and cited his own data on klipspringer as an example : in most areas they were grouped according to Class A, but in very favourable habitat the groups resembled those in Class B. A similar example may be cited from South Africa where Rowe-Rowe (1973) found that in a small population of blesbok *Damaliscus dorcas phillipsi* in sub-optimal habitat, herd organization was as for Class B; whereas in a large population in ideal blesbok habitat (Lynch 1974) social organization was typical of most other Alcelaphinae, categorized as Class D by Jarman (1974).

Our conclusion is that adult oribis in the Drakensberg occur singly or in pairs, strongly resembling the composition of Jarman's (1974) Class A. In the tropical grasslands of East Africa small harem herds are formed, typical of Jarman's (1974) Class B, generally consisting of three to six animals. The social organization in the midland areas of Natal is intermediate between Classes A and B, with roughly 30% of the groups containing more than one adult female. We believe that these differences are probably related to habitat suitability, and availability and quality of food. In the less suitable habitats oribis need to be inore widely dispersed, and occur at lower densities to ensure that their nutritional requirements are satisfied.

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A new record of *Craspedacusta sowerbii* (Cnidaria: Limnomedusae) from southern Africa

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The northern hemisphere *Craspedacusta sowerbii* has been recorded recently from temperate regions of South Africa. Its introduction to southern Africa is thought to have occurred in the 1940s, when a number of exotic species were introduced, associated with man's interference in river catchments. A new record from Theewaterskloof Dam, Cape Province, suggests that its spread is being facilitated by inter-basin translocation of the polyp stage. Histological analysis of the gonads of medusae from Theewaterskloof impoundment showed that they were all females, supporting the hypothesis that only one sex of medusa is budded from any one polyp colony.

Die noordelike halfrond *Craspedacusta sowerbii* is onlangs in gematigde streke van Suid-Afrika aangemeld. Hulle invoering in suidelike Afrika het moontlik in die 1940s plaasgevind, waartydens 'n aantal uitheemse spesies, as gevolg van die mens se inmenging in rivier-opvanggebiede, ingebring is. Nuwe inligting vanaf die Theewaterskloof Dam, Kaapprovinsie, dui aan dat hul verspreiding deur die hervestiging van die poliepstadium tussen stroomgebiede vergemaklik word. Histologiese ontleding van die gonades van medusas vanuit die Theewaterskloof opvanggebied het getoon dat almal wyfies was, wat die hipotese ondersteun dat slegs medusas van een geslag van enige enkele poliepkolonie afknop.

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Craspedacusta sowerbii is a limnomedusa which is well known from the Northern Hemisphere with many records of its distribution from Europe, North America and China (Dejdar 1934; Kramp 1961). Rayner (1988) recorded it for the first time in Africa, although re-examination of earlier records from southern Africa attributed to *Limnocnida tanganjicae* has shown that some were in fact, *C. sowerbii*. Rayner & Appleton (1989), in providing additional records of *C. sowerbii*, elucidated the morphological differences between it and *L. tanganjicae*. Distributional data indicate that *L. tanganjicae* is a tropical species endemic to Africa and extending south to the Vaal River catchment, and *C. sowerbii* a temperate species which is invasive in South Africa. This present contribution assesses the significance of a new record of *C. sowerbii* from Theewaterskloof Dam, an impoundment in the Cape Province of South Africa, and inter-basin transfers. The appearance of freshwater medusae is known to be sporadic and unpredictable and dispersal appears to be limited by the fact that each colony of polyps probably buds off medusae of one sex only (Payne 1926).

Theewaterskloof (34°05'S / 19°18'E; altitude 276 m; dam wall on the Riviersonderend River completed in 1980) (Figure 1) is the seventh largest impoundment in South Africa with a catchment area of 497 km^2, a surface area at full supply level of 5082 ha, volume 433 × 10^6 m^3 at FSL, maximum and minimum depths 32,4 m and 17,0 m, and is used for potable water and recreation, mainly angling, yachting and power boating (Anon. 1986). A tower within the impoundment, some 13 km from the dam wall, houses the inlet to and outlet from a tunnel system which links the dam with the Berg and Eerste Rivers. This system thus forms part of an extensive water supply scheme designed to transfer water to and from the impoundment as well as to and from different catchments separated from one another by mountains. Water runoff from the Riviersonderend and nearby Berg River catchments is stored in the Theewaterskloof reservoir during the winter rainy season and in the dry summer season can be transferred back to the Eerste and Berg River Valleys by means of the tunnels, for irrigation purposes. The tunnels allow water to flow *in both directions* between the impoundment and the Berg River catchment. Following the appraisal of the ecological impact of inter-

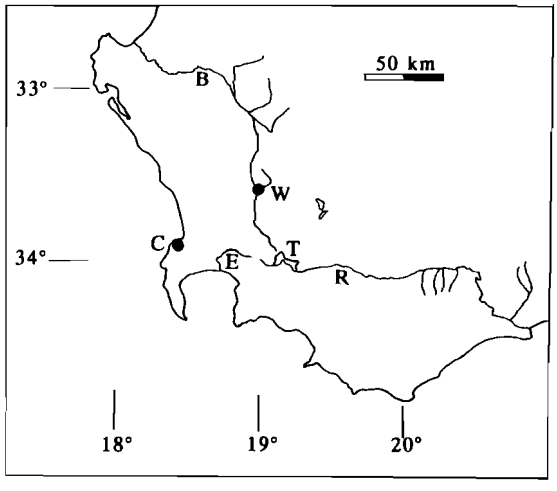

Figure 1 Map of Western Cape Province showing location of Theewaterskloof impoundment (T), the town of Wellington (W), Cape Town (C), and the rivers referred to in the text, Berg (B), Eerste (E) and Riviersonderend (R).

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