

SMALL CARNIVORE CONSERVATION

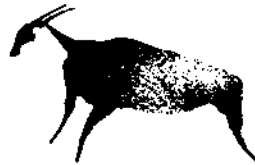


The Newsletter and Journal of the IUCN/SSC
Mustelid, Viverrid & Procyonid Specialist Group

IUCN
The World Conservation Union

Number 19

October 1998



SPECIES SURVIVAL COMMISSION



Genetta rubiginosa from the Shimba Hills, Kenia - Photo: Thomas Engel

The production and distribution of this issue has been sponsored by
"Blijdorp Zoo", Rotterdam, Holland,
"Columbus Zoo", Powell, Ohio, USA
"Copenhagen Zoo", Fredericksberg, Denmark
"Marwell Preservation Trust Ltd", Colden Common, UK
and the "Royal Zoological Society of Antwerp", Antwerp, Belgium.



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**This number is dedicated to the memory of
C.B. Powell (1943-1998)**

The views expressed in this publication are those of the authors and do not necessarily reflect those of the IUCN, nor the IUCN/SSC Mustelid, Viverrid & Procyonid Specialist Group.

We are particularly grateful to Walter Rasmussen for reading the manuscripts and improving the English style.

The aim of this publication is to offer the members of the IUCN/SSC MV&PSG, and those who are concerned with mustelids, viverrids, and procyonids, brief papers, news items, abstracts, and titles of recent literature. All readers are invited to send material to:

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Genets of the Niger Delta, Nigeria

C. B. POWELL[†] and H. VAN ROMPAEY

Introduction

The Niger Delta lies in the transition zone between the Upper Guinea (west of Togo) and Lower Guinea (east of Cross River) rainforest faunas (Fig. 1). It contains disjunct populations of a few mammals from each of those faunas, but has a greater faunal affinity with Lower Guinea. It has been considered a minor centre of endemism on its own accord (Grubb, 1990) and, as a part of the Niger system, it also figures in the traditional view of the Niger as a distributional barrier to supposed west-of-Niger and east-of-Niger species (Happold, 1987).

Very few records of mammals have been available for the delta area and almost none for the delta proper (Happold, 1987). A wildlife survey of the eastern half of the delta during the past few years has produced over a dozen new species records and highlighted internal faunal patterns (Powell, 1995, 1997). The latter includes a newly recognized 'Marsh Forest' or tidal freshwater zone with two large mammals new to Nigeria (the Black-fronted duiker *Cephalophus nigrifrons* Gray, 1871, and the Red colobus monkey *Procolobus badius* s.l. in the form of a new subspecies) and lacking some species such as the Cusimanse *Crossarchus platycephalus* Goldman, 1984, common in the more inland 'Flood Forest' zone. The more noteworthy small carnivore findings were the Long-nosed mongoose *Xenogale naso* De Winton, 1901 (previously known only east of the Cross River; see Colyn & Van Rompaey, 1994) and new information on genets. The latter includes material of particular interest to the MV&P Specialist Group and is the subject of this note. A full account of the carnivores of the Niger Delta is in preparation.

The taxonomy and nomenclature of West African forest genets is unsettled. The shortage of museum material and comparative studies requires recourse to speculative classifications with the result that recent authors have adopted a different system (see Appendix 1 in Van Rompaey & Colyn, 1996). Broadly, we are dealing with two or three groups:

- the widespread and generally large-spotted *pardina* group marked by pale coloured feet and a tail with a long un-ringed tip. They have been called: *G. maculata* Gray, 1830; *G. pardina* I. Geoffroy Saint-Hilaire, 1832; *G. genettoides* Temminck, 1853; and *G. rubiginosa* Pucheran, 1855.
- the high forest and generally small-spotted *servalina* group marked by dark feet and a tail ringed to its tip. The group includes *G. servalina* Pucheran, 1855; *G. cristata* Hayman, 1940; and *G. bini* Rosevear, 1974.
- the rare and problematic *G. poensis* Waterhouse 1838 with dark feet, a pardine-type tail with a long un-ringed tip, and many small, irregular spots some of which coalesce to form a pair of narrow, paraspinal stripes (for a photograph see Hoppe-Dominik, 1990). It may be only a variant of a pardine species, and is treated with that group here.

The most recent overall treatment of Nigerian mammals is by Happold (1987). While noting the difficulty and confusion in genet taxonomy, he tentatively recognizes distinct forest and savanna pardine species (as *G. poensis* and *G. pardina* respectively), and one servaline (*G. bini*) while assigning the other Nigerian servaline (*G. cristata*) to synonymy with the forest pardine *G. poensis*. In a widely used recent reference work,

Wozencraft (1993) includes all West African pardine genets (*G. pardina*, *G. genettoides*, and *G. rubiginosa*), as well as *G. poensis* and the servaline *G. bini*, under the name *G. maculata* which Rosevear (1974) regards as not being available (being pre-occupied by *Viverra maculatus* Kerr, 1792 = *Dasyurops maculatus*, the marsupial Spotted-tailed quoll).

The servalina group

The two Nigerian servaline genets are the Crested genet *Genetta cristata* in the Cameroon-Nigeria border area east of the Cross river (Sanderson, 1940; Heard & Van Rompaey, 1990) and the Benin genet *G. bini*, known from a single skin, from west of the Niger River far beyond the delta area (Rosevear, 1974).

They differ from the central African *G. servalina* s.s. by possessing (1) a black spinal stripe and crest running from the mid-back to the tail, and (2) a shorter nuchal crest in *cristata* and forward directed hairs on the back of the neck in *bini*. The body spots of the sole known specimen of *G. bini* are more irregular, larger and fewer than in the other two species (Rosevear, 1974). The skull of *G. cristata* is more oligostenic than that of *G. servalina* s.s. (Crawford-Cabral, 1980-81); no *G. bini* skull was available for comparison.



Fig. 2. Left: *Genetta bini*; right: *G. cristata* (specimens from The Natural History Museum, London).

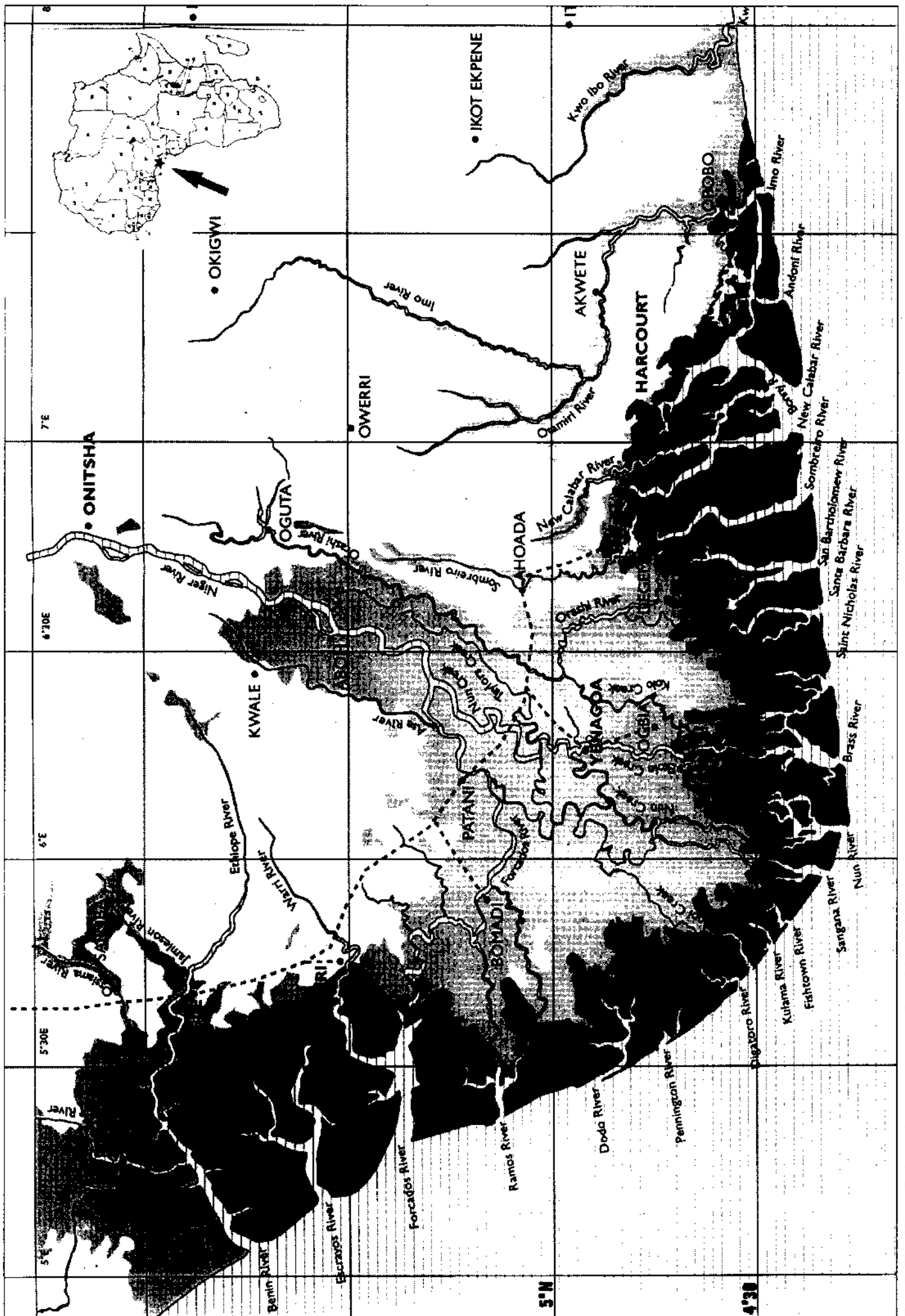


Fig. 1. The Niger Delta; white area: agricultural land; light grey: fresh water swamp forest; dark grey: mangrove forest; black: coastal-barrier island rain forest. Map by WWF-UK.

Genetta cristata was described by Hayman (in Sanderson, 1940) as a subspecies of *G. servalina*. It is now widely treated as a distinct species (Rosevear, 1974; Crawford-Cabral, 1980-81; Heard & Van Rompaey, 1990; IUCN, 1996; IEA, 1998). However Happold (1987) regarded it as "probably a race of *poensis*" (the name he used for the Nigerian forest representative of the *G. pardina* group), and Wozencraft (1993) retained it as a subspecies of *G. servalina*. Shelagh Heard obtained additional material from the Cross River area, gave information on captive juveniles (pelage, behaviour), and mapped known localities, all between the Cross and Sanaga Rivers which are often considered to be zoogeographic boundaries for other animals (Heard & Van Rompaey, 1990).

Genetta bini has not been generally recognized as a distinct species. The type specimen, a 'poor skin' (no skull) from Ohosu Forest Reserve, 65 km northwest of Benin City, was variously treated as indeterminable (Crawford-Cabral, 1980-81), or as belonging to *G. servalina* s.s. (Schlawe, 1981), or the non-servaline *G. maculata* (Wozencraft, 1993). Rosevear (1974:198) himself stated that "whether this is a species or merely a race is open to question" and that his treating it as a new species was influenced by "the wide gap of 750 kilometers separating it from its nearest recorded neighbour (*G. cristata*), across the two faunal barriers of the lower Niger and Cross Rivers". That gap is actually only about 400 km. One of us (HVR) has examined the type specimen (BMNH-50.315) and considers that except for the spots being larger, fewer, and somewhat more irregular than in *G. cristata*, the skin is similar in other aspects (Fig. 2).

In 1993 one of us (CBP) obtained a juvenile genet from Odi, within the Nun-Forcados bifurcation of the Niger river, a site between the known ranges of *G. bini* and *G. cristata*. It was tenta-

tively listed as *G. bini* in an unpublished report (Powell, 1993), using keys in Happold (1987). A photo of the specimen was identified by Daphne Hills (in litt., 11 Oct. 1993) as a probable *G. cristata*.

Genetta cristata Hayman, 1940 - Crested genet

Since 1993 CBP has collected and/or examined over 25 specimens from: **Aseingbene** (RMCA-95.53.M2); **Azama** (RMCA-98.049.M21); **Azikoro** (NDS); **Bomoundi** (BMNH-1994.196); **Elebele** (RMCA-98.049.M19, 98.049.M20); **Fangbe** (BMNH-1994.182); **Gbarantoru** (NDS); **Igovia** (BMNH-1996.317; SBP-655.23.1); **Odi** (NDS); **Ogbia** (NDS); **Okolobiri** (RMCA-95.038.2; RMCA-95.53.M3; 3 NDS's); **Okoroba** (BMNH-1996.320); **Omoku** (RMCA-97.86.M4); **Opu-Ogbogolo** (BMNH-1994.197; BMNH-1995.261); **Port Harcourt, 15 km N. of** (NDS); **Swali** (NDS); **Tombia-Ekpetiama** (BMNH-1994.183; 2 NDS's); **Tungbo** (HVR-P.6; NDS).

Comparison of the skins with Oban and Mamfe material of *G. cristata* in the BMNH does not show any significant differences, or any trend towards characters of the Benin genet. Neither do comparisons of the skull measurements with those of *G. cristata* from east of the Cross River (Table 1). Details will be published later, when material from west of the Niger is available for fuller analysis. Our expectation is that the crested genet should range across the delta and will probably encompass the Benin genet, which may represent an extreme outlier population.

One noteworthy aberrant (?) skin has been seen, which lacks a spinal stripe and thereby resembles *G. servalina*. It is from a juvenile animal obtained at Otuokpoti and kept as a pet by Mr Inemo Warton of Agudama-Ekpetiama; the skin was kept after the animal died several years ago.

Specimens from E. of the Cross River						Specimens from the Niger Delta				
VAR	N	MIN	MAX	MEAN	SD	N	MIN	MAX	MEAN	SD
GSL	5	95.3	97.4	96.1	0.8	7	87.5	98.8	93.4	4.4
CBL	4	93.0	94.4	93.8	0.6	7	87.4	96.9	92.2	4.3
ROL	5	31.0	33.3	32.0	0.8	8	26.6	32.8	30.2	1.8
PAL	5	41.1	44.2	42.7	1.2	8	39.7	45.0	41.6	1.9
MAX	5	35.6	37.2	36.6	0.6	8	32.7	37.9	34.9	1.6
TYM	5	17.3	18.3	17.7	0.4	8	17.0	18.6	17.9	0.6
CAN	5	13.8	14.7	14.3	0.4	8	13.1	15.0	14.2	0.7
ROB	5	17.3	19.6	18.7	1.0	8	16.3	20.1	18.3	1.4
IOB	5	12.0	14.4	13.0	0.9	7	12.1	13.6	12.9	0.3
PAB	5	24.7	26.2	25.3	0.6	8	22.4	26.0	24.4	1.2
ZYG	5	44.6	46.2	45.6	0.7	7	42.7	48.3	44.5	1.9
BRB	5	29.4	31.3	30.6	0.7	7	28.9	31.5	30.8	0.5
MAS	4	29.8	31.8	30.5	0.9	8	29.2	32.7	30.5	1.1
BRH	5	22.5	26.4	25.1	1.6	7	25.5	26.6	26.0	0.4
MAL	4	62.4	64.6	64.0	0.5	8	59.4	67.1	63.2	2.9
MAN	4	37.2	40.1	39.0	1.3	8	35.3	39.7	37.6	1.4
CMB	4	23.4	25.0	24.0	0.8	8	22.2	26.1	24.0	1.4

Table 1. Basic statistics (in mm) of 17 skull characteristics of 13 adult *Genetta cristata*.

Five specimens from East of the Cross River: **Mamfe**, CA (BMNH-48.796, F); **Massaka**, CA (MMNH-50.949, F); **Mkpot**, NI (BMNH-1992.352, F); **Oban**, NI (BMNH-10.61.12, M); **Okogong**, CA (BMNH-39.323, M). Eight specimens from the Niger Delta, NI: **Aseingbene**, (RMCA-95.53.M2, U); **Elebele** (RMCA-98.049.M20, M; 98.049.M19, M); **Igovia**, (Paimpont-65523.1, M); **Okolobiri**, (RMCA-95.038.2, U; 95.53.M3, F); **Omoku** (RMCA-97.86.M4, F); **Tungbo**, (HVR-P.6, M).

The new distribution records presented here show that the crested genet occurs in a minimal area of approximately 3,000 km² in the Niger Delta alone. The peripheral records are:

- Northward: eastern floodplain of the River Niger ca. 05°23'N, 06°36'E (Omoku: RMCA-97.86.M4) and 05°25'N, 06°29' (skin from Obiofu, sighted by CBP).
- Westward: Azama, Apoi Clan, ca. 04°53'N, 05°59'E (CBP) and Tungbo ca. 05°07'N, 06°10'E (HVR-P-6).
- Eastward: Opu-Ogbogolo on west bank of Orashi (Engenni) River ca. 04°54'N, 06°34'E (BMNH-1994.197; 1995.261).
- Southward: Okoroba ca. 04°38'N, 06°11'E (BMNH-1996.320) and Ogbia area ca. 04°40'N, 06°21'E (CBP).

Information from hunters who claim to recognize the crested genet as distinct from the large-spotted genet, indicate the species' range is greater and probably extends throughout heavily forested parts of the delta. The range appears to include the tidal

freshwater or Marsh Forest Zone (cf Powell, 1995, 1997) but not the mangrove zone and probably not the coastal barrier islands. In most sites where both species occur, hunters distinguish them on the basis of habitat, the crested genet being classed as the forest ('bush') type and the large-spotted genet as the riverside and/or mangrove type.

In the largely deforested zone east of the Orashi River, there is no recent record but two aged skins have been seen in villages north of Port Harcourt (Rukpokwu and Umuechem) and local hunters claim the species is still present. This is the only area (within the region where the crested genet has been collected or seen) where the local languages (Ikwerre and- Etche, both of the Igboid group) have a name for the crested genet (*nanwuri*) as distinct from the large-spotted genet (*wekpe*, with phonetic variations according to dialect). The latter is certainly more common and would appear to replace the crested genet outside closed forest habitats.

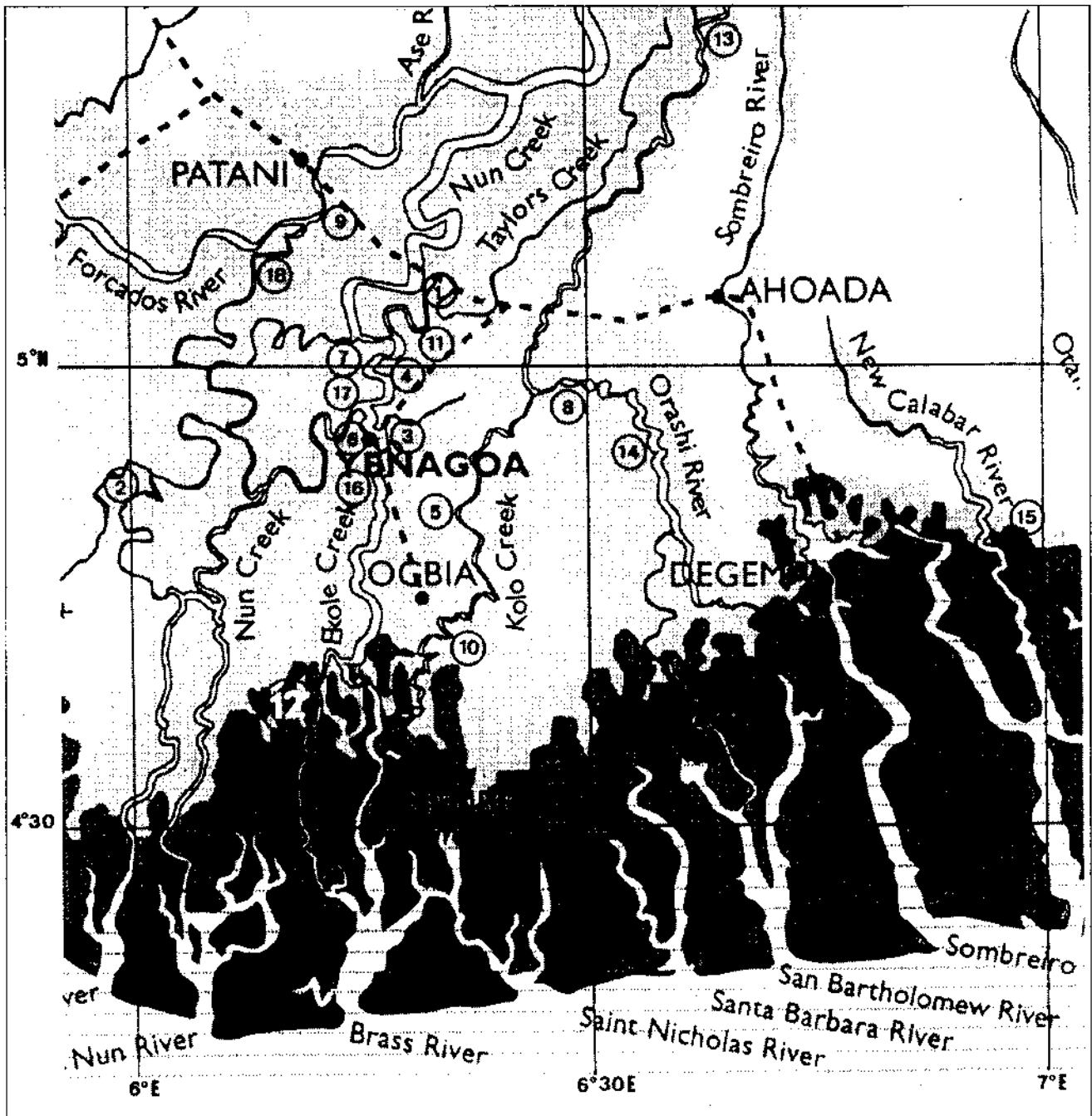


Fig. 3. Records of *Genetta cristata* in the Niger Delta, Nigeria: 1: Aseingbene; 2: Azama; 3: Azikoro; 4: Bomoundi; 5: Elebele; 6: Fangbe; 7: Gbarantoru; 8: Igovia; 9: Odi; 10: Ogbia; 11: Okolobiri; 12: Okoroba; 13: Omoku; 14: Opu-Ogbogolo; 15: Port Harcourt, 15 km N of; 16: Swali; 17: Tombia-Ekpetiama; 18: Tungbo.

The *rubiginosa* group

The identity and proper name for Niger Delta populations of the large-spotted genet *Genetta pardina* s.l. depends on their relationship to populations from wider areas. The options are:

- (a) all West African forest-zone populations are the same species *G. pardina* (type locality: Senegal)
- (b) following Crawford-Cabral (1980-81), populations east of the Volta River (Dahomey Gap) are distinct, in which case the species is *G. rubiginosa*
- (c) following Rosevear (1974), forest and savanna forms may be distinct, in which case Niger Delta population is *G. genettoides*. Rosevear pointed out that the name *G. poensis* has priority if it proves to be only a small-spotted variant of *G. genettoides*.

An analysis of the problem has been difficult due to a shortage of material, especially skulls. Until now no specimen has been available from the eastern half of the delta, two from the western delta (Sapoba FR and Warri), and only a few from neighbouring areas (Togo, western Nigeria, Cross River area, and Cameroon).

Genetta rubiginosa Pucheran, 1855 - Large-spotted genet

The present survey has produced specimens from a wide variety of habitats in the eastern delta. More than 40 specimens have been collected and/or examined from:

Bunu-Bangha (RMCA-96.47.M3; NDS); **Diebu** (BMNH-1995.319; RMCA-95.53.M1); **Etiema** (RMCA-98.049.M6; 98.049.M17); **Igbeta-Ewoama** (RMCA-96.47.M2; 96.52.M1; 97.047.M2; 97.061.M4); **Ihuaba** (BMNH-1996.4); **Odieke** (RMCA-95.010.1); **Okarki** (NDS); **Okoroba** (BMNH-1996.31-6; NDS); **Okpoama** (RMCA-97.086.M2; 97.086.M3; 97.086.M1; 98.017.M1; 98.017.M2; 98.017.M3; 98.017.M4; 98.049.M2; 98.049.M8; 98.049.M9; 98.049.M10; 98.049.M12; 98.049.M13; 98.049.M14; 98.049.M15; 98.049.M16; 98.049.M18); **Onitu** (RMCA-98.049.M3); **Opukuma** (RMCA-98.049.M4); **Opume** (RMCA-95010.2); **Opu-Ogbogolo** (HVR-P-4); **Owelli Town** (RMCA-98.049.M1); **Sapoba** (RMCA-98.049.M5); **Taabaa** (RMCA-97.047.M3; RMCA-97.061.M5); **Yae** (RMCA-96.52.M3).

A comparison of their mean skull size with available measurements from other West African forest regions (Table 2) demonstrates the dichotomy between populations on either side of the Volta River and gives support to Crawford-Cabral's (1980-81) conclusion that specimens from west of the Volta River are larger.

A comparison of the condylobasal length of the male and female specimens from the 'mangrove and tidal zone' shows that there is sexual dimorphism with the males being 5.4% larger ($t=3.45$; $df=20$; $p=0.0026$) (Table 3).

The five 'upland' specimens are smaller than the 'mangrove and tidal zone' specimens. This could be due to the more abundant food supply such as crabs and intertidal fish in the tidal zone and/or the greater pressure from trapping and hunting in the the upland zone causing a difference in age structure in both populations (Table 3).

The skins show the usual wide variation in the colour pattern, with the para-spinal spots being variously discrete or partly confluent, as wide as the spinal stripe or nearly twice as wide, and solid black or brown-centred. The relatively constant features are: a relatively short tail with only 6 to 8 pale rings and

SPECIMENS FROM W OF THE DAHOMEY GAP

	N	MIN	MAX	MEAN
Senegal (2M,1F,6U)	9	89.9	105.4	94.7
Guinea (3U)	3	88.2	98.1	94.3
Sierra Leone (4M,4F)	8	92.3	99.7	95.5
Liberia (1M,37U)	38	91.7	105.2	97.9
Côte d'Ivoire (1F,2U)	3	98.9	101.9	100.0
Ghana (4M,5F,1U)	10	92.1	102.3	95.8

SPECIMENS FROM E OF THE DAHOMEY GAP

	N	MIN	MAX	MEAN
Togo (2M,2F)	4	86.1	91.0	88.1
Nigeria, Lagos (1U)	1			88.5
Niger Delta (17M, 9F,1U)	27	83.6	97.1	90.6
Cameroon (1M,1F,3U)	5	80.6	98.5	87.4

Table 2. Measurements of the condylobasal length (in mm) of large-spotted genets from both sides of the Dahomey Gap. M: male; F: female; U: unknown.

MANGROVE AND TIDAL ZONE SPECIMENS

		Sex	CBL
RMCA-95.53.M1	Diebu	M	95.6
RMCA-97.061.M4	Igbeta-Ewoama	M	90.2
RMCA-98.017.M1	Okpoama	M	96.2
ON-t322.4	Okpoama	M	92.6
RMCA-98.049.M11	Okpoama	M	97.1
RMCA-98.049.M9	Okpoama	M	91.9
RMCA-98.049.M13	Okpoama	M	91.8
ON-t322.9	Okpoama	M	95.0
ON-t322.10	Okpoama	M	92.4
RMCA-98.049.M18	Okpoama	M	94.1
RMCA-98.049.M8	Okpoama	M	93.7
RMCA-98.049.M10	Okpoama	M	85.0
ON-t322.15	Okpoama	M	92.4
RMCA-98.049.M12	Okpoama	M	95.3

N = 14 X = 93.1 SD = 3.0

RMCA-96.52.M1	Igbeta-Ewoama	F	83.6
RMCA-97.086.M2	Okpoama	F	92.6
RMCA-97.086.M3	Okpoama	F	93.1
RMCA-97.086.M1	Okpoama	F	88.4
RMCA-98.017.M2	Okpoama	F	88.7
RMCA-98.017.M3	Okpoama	F	84.6
RMCA-98.017.M4	Okpoama	F	86.7
RMCA-98.049.M15	Okpoama	F	88.4

N = 8 X = 88.3 SD = 3.4

UPLAND SPECIMENS

RMCA-98.049.M6	Etiema	M	89.2
BMNH-1996.4	Ihuaba	M	86.7
RMCA-98.049.M1	Owelli Town	M	86.0
RMCA-98.049.M3	Onitu	M	87.7
RMCA-98.049.M5	Sapoba	F	87.5

Table 3. Measurements of the condylobasal length (in mm) of *Genetta rubiginosa* from the Niger Delta. M: male; F: female; U: unknown

a dark-coloured tip 75 to 150 mm long. There is not yet any evidence of a *poensis*-like form, such as found in Côte d'Ivoire by Hoppe-Dominik (1990).

The large-spotted genet comes from a wide variety of habitats: mangrove, tidal freshwater swamps, upland riverine swamps, and the relatively dry Ogoni-land. It appears to favour more open habitats and is rare in heavily forested areas except in riverine and tidal situations. Hunters in the mangrove and tidal freshwater zones report it to be abundant, and often refer to its habit of coming to ground at low tide to feed on crabs. The presence of genets in mangrove habitat is not generally recorded in the literature, even Rosevear (1947) did not mention them in his brief listing of mangrove mammals. The only record we can trace is the occurrence of *Genetta* sp., probably the large-spotted genet, in the mangroves of Gabon (European Communities, 1992). However, mangrove residents of the Niger delta consistently list the large-spotted genet as a common mangrove mammal (under the name *punu* or *ewere*) and rank it among the three most abundant species within the mangrove, along with the Mona monkey *Cercopithecus mona* (Schreber, 1774) and the Sitatunga *Tragelaphus spekkii* Sclater, 1863.

The *poensis* form

Genetta poensis was described in 1832 by Waterhouse from Fernando Po (=Bioko, Equatorial Guinea) but the locality was doubted by Pocock (1907) and Rosevear (1974). The type specimen together with specimens from Ghana (64 km N. of Kumasi), Liberia (W. of the Upper Cavaly River), and Nigeria (Warri) are held in The Natural History Museum, London. A specimen from Côte d'Ivoire was mentioned and illustrated by Hoppe-Dominik (1990). Crawford-Cabral (1980-81) cites a specimen (Pousargues, 1896) from Mayumba (=Mayombe), Congo (B) in the Natural History Museum in Paris.

Rosevear (1974) provisionally treats *poensis* as a distinct species and Crawford-Cabral (1980-81) does not exclude the possibility that it is a distinct species but until further evidence considers it as a subspecies of *G. pardina*.

If *G. rubiginosa* and *G. pardina* are two distinct species and the latter is distributed only west of the Dahomey Gap (Volta River) then *poensis* cannot, due to its occurrence in Nigeria and Congo (B), be a subspecies of *G. pardina*. With only a few skins (and less skulls) available the problem must remain unsolved.

Acknowledgements

We are indebted to J. Hulselmans and J. Crawford M. Cabral for reading and commenting on the manuscript.

Abbreviations

BMNH	The Natural History Museum, London, UK
CA	Cameroon
F	Female
HVR	H. Van Rompaey Collection, Edegem, Belgium
M	Male
NDS	Non-deposited specimen and specimens seen but lost or not kept
NI	Nigeria
ON	Original number
SBP	Station Biologique Paimpont, Paimpont, France
RMCA	Royal Museum for Central Africa, Tervuren, Belgium
U	Unknown sex

Gazetteer

ASEINGBENE:	ca. 05°05'N, 06°19'E, on right (W) bank of Taylor Creek
AZAMA:	04°53'N, 05°59.5'E, on west (N) bank of Apoi Creek (Aziama on maps)
AZIKORO:	04°53'N, 06°17.5'E, 5 km SE of Yenagoa
BOMOUNDI:	04°59.'N, 06°16+'E, on right (W) bank of Nun River
BUNU-BANGHA:	04°42.5'N, 07°28.5'E, about 12 km ENE of Bori, and a few km W of Imo River
DIEBU:	04°37.5'N, 06°07.5'E
ELEBELE:	04°51.5'N, 06°20.5'E, on left bank of upper reach of Otuaka Creek, 11.5 km SE of Yenagoa
ETIEMA:	04°34'N, 06°22'E, 5 km NW of Nembe
FANGBE:	04°56'N, 06°15'E, on Ekole Creek, between Yenagoa and the Ekole/Nun confluence
GBARANTORU:	ca. 05°00'N, 06°15'E, on the E bank of River Nun, upstream side of Tombia
IGBETA-EWOAMA:	ca. 04°34'N, 06°21'E on the E bank of Opume Creek downstream of mouth of Etiama tributary and ca. 7 km NW of Nembe
IGOVIA:	04°58+'N, 06°29'E, on the S side of Orashi River and 6 km E of Okarki
IHUABA:	05°01.88'N, 06°40.71'E, on the right (W) bank of Sombreiro River
OBIOFU:	05°25'N, 06°29.08'E, on the E bank of the Niger River
ODI:	05°10'N, 06°15'E, on the W bank of the Nun River
ODIEKE:	ca. 05°01'N, 06°27'E on the left (E) bank of Orashi River, about 3 km S of Mbiama
OGBIA:	ca. 04°41'N, 06°21'E
OHOSU Forest Reserve:	06°45'N, 05°15'E

OKARKI:	04°59'N, 06°26'E, on the right (W) bank of the Orashi River, at the divergence of Kolo Creek from the Orashi.
OKOLOBIRI:	05°02'N, 06°19.5'E
OKOROBA:	04°37.86'N, 06°10.45'E, NE of Nembe
OKPOAMA:	ca. 04°18.5'N, 06°17.5'E, on Brass Island
OMOKU:	05°21'N, 06°39'E
ONITU:	05°04.5'N, 06°28.5'E, on the E bank of the Orashi River
OPUKUMA:	05°5.5'N, 06°17'E, on the E bank of the Nun River
OPUME:	04°40'N, 06°20'E, S of Ogbia
OPU-OGBOGOLO:	04°54.2'N, 06°33.9'E, on the W bank of Orashi River
OTUOPOTI:	ca. 04°51'N, 06°15.5'E on the left (E) bank of Ekole Creek, 8 km S of Yenagoa (also OTUOKPOTI)
OWELLI Town:	ca. 06°11'N, 07°28'E
PORT HARCOURT:	04°43'N, 07°10'E
SAPOBA:	ca. 06°06'N, 05°53'E
SWALI:	04°54'N, 06°15'E
TAABAA:	04°44'N, 07°25'E, 8 km NE of Bori (also TABAANGH)
TOMBIA-EKPETIAMA:	05°00'N, 06°15'E, on the E bank of the Nun River, between Yenagoa and Taylor Creek entrance
TUNGBO:	05°07.4'N, 06°10.2'E, on the E bank of Sagbama Creek, 4 km SW of Sagbama/ Forcados confluence, 10.5 km SSW of Patani Bridge
YAE:	04°45+'N, 07°28.5'E, at headwaters of Masea Stream on the right (W) side of lower Imo river
YENAGOA:	04°55.3'N, 06°15.5'E, at junction of Ekole and Epie Creeks

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Obituary: C. B. Powell

Charles Bruce Powell, who died at 55 years of age on the 24th of June 1998, spent much of his life pioneering research into the ecology and biodiversity of the Niger Delta. Born on the 18th of July 1943, Bruce grew up in Moncton, New Brunswick, Canada. At early age, he developed an interest in animals when at the age of 10 a snake in his garden bit his finger and refused to let go! As a child he collected and raised all sorts of animals including birds, bats, field mice, chameleons, and a six-foot snake which the family had to feed with ground beef!

From 1962 to 1965, he attended the Acadia University where he obtained a Biology Honours Degree. He then went to the University of Alberta in Calgary where he obtained his MSc in Ecology. It would seem that it was during his stay at university that he developed an interest in the biology of shrimps, crabs, fish and amphibians. During his period as a student, he spent three long vacations with the Museum of Canada as a student research assistant carrying out a herpetological survey of Western Canada. It was through the museum that he met Rob Oldham who persuaded Bruce to travel to the University of Ibadan in Nigeria to begin a PhD on a West African frog *Bufo regularis*. Bruce agreed to go and this was a decision that was to change the course of his life.

He arrived in Ibadan in 1967 and began his PhD work on *Bufo regularis* but was never to finish his work as he became side-tracked by other areas of research that he felt were far more interesting. In 1973, he was transferred to the University of Benin where he was a lecturer for three years. During his years at Ibadan and Benin he never finished his thesis and produced numerous articles on shrimp biology, most of which have not been published to this day.

From Benin, Bruce went on to the University of Port Harcourt to become a Senior Lecturer. Later on, in 1982 he was invited by the new Rivers State University of Science and Technology to help found the Institute of Pollution Studies. At both these Universities located in Port Harcourt, he taught Systematics, Invertebrate biology, Fisheries, Freshwater and Estuarine Ecology. He was said to be an extremely conscientious lecturer who was highly respected by his students.

Besides lecturing, Bruce was able to spend a considerable amount of his time on research into the biology of the Niger Delta and it was in this area that he really seemed to flourish. The Niger Delta is a vast area of mangroves, freshwater forests and coastal areas with thick forests and innumerable creeks that change course from year to year. It is also an area of West Africa that had scarcely been studied by any biologists being riverine and rather inhospitable for travelling plant and animal collectors and indeed was practically ignored by biologists until Bruce began working there.

Bruce had a friend called Kay Williamson who was putting together a dictionary of one of the local languages; she kept coming across words for which people said "some kind of animal". Kay asked Bruce to accompany her on her field trips so that he could identify the animal in question whenever a new name came up. He discovered that the local people had names for plants and animals that had been unrecorded in the Delta or even Nigeria. This was how he made the exciting discovery of the Niger Delta red colobus monkey which has been confirmed as a sub-species new to science.

Bruce began to branch out from amphibians, shrimps and crabs to become particularly interested in mammals as well and he began to collect specimens and skins to send to museums all over the world. His house became notorious for the animal skins everywhere that covered just about every available surface! Many stories circulated around Port Harcourt about this house full of skins for "Juju" (native medicine). Many people refused to enter his house and those who did got told off if they touched any of the skins that were possibly very valuable to science!

The Niger Delta is the main oil producing area of Nigeria and is now rapidly being developed with devastating consequences for its unique wildlife. Local people accuse the oil companies of pollution and destruction to their forests and fisheries, which affects their livelihoods. Environmental issues have become very explosive and many of the environmental NGOs who championed the cause of the local people, came to Bruce for

evidence to support their claims against the oil companies. Bruce being acutely aware of how fast the Niger Delta was being degraded in places and feeling strongly about the injustice to local people, assisted key NGOs mainly by ensuring that the publicity they generated was accurate rather than being pure propaganda.

On one occasion, two environmental activists running away from the state security police came to Bruce for protection. They hid in his house for several days and then left the country. Bruce insisted in seeing them off against their advice and was later thrown into jail for three days by the state security agents. However, when they went to his house to search for evidence of seditious activity, they saw all the animal skins, decided against a search and released Bruce!

For the rest of his life that he was to spend in the Niger Delta, Bruce was involved in many activities. He began to publish many articles on shrimp and the ecology of the Niger Delta. He also carried out many ecological studies on the activities of the oil companies and the effects of oil pollution on the ecology of the mangrove forests. In the last years of his life, he was seconded by RSUST to work with the newly set up Niger Delta Environmental Survey (NDES) where he set up and guided their scientific research.

As a result of his scientific work, far more is known about the Delta now than even 10 years ago. His work on the ecology of the Delta has resulted in some very exciting discoveries. These include many new species of mammals, plants, and fish and a new vegetation classification system that has important implications for the future management of the Delta. These discoveries have elevated the importance of the Niger Delta globally as well as within Nigeria.

Even though Bruce was able to document a great deal of new knowledge about the Delta, he was always conscious of the great body of knowledge within the local people which was still largely untapped, and how much still remained to be known about the Delta scientifically. Bruce spent a great deal of time in communities in the Delta over the years developing trust with local rulers, hunters and various village groups gradually drawing out the extensive knowledge local people have of the Delta. They were only too happy to talk to someone who was prepared to listen and as a result he was able to develop much of the current scientific knowledge of the Delta. Bruce will be missed by many people in the Delta ranging from university lecturers, students and environmentalists to oil workers and people in many of the villages.

Some colleagues of his in Nigeria wrote:
"The longer we live here, the more we respect people like you who stuck it out a long time, at great personal cost. It's an inspiration to people like us and, more importantly, to young Nigerian scientists. We regret we didn't see you more but you know how weird animal people get stuck in little rat-holes of existence, work, writing, exasperation, etc.
Thanks for bringing attention to the Niger Delta with your still-astounding confirmation of the red colobus monkey's occurrence. Maybe things are screwed up, and not the way you might like to see them, but you got the ball rolling and hopefully it will be straightened out and there will be something there in 100 years for scientists to appreciate and study. The world has you to thank for getting the ball rolling, and everyone who matters knows it, whether they're willing to admit it or not. Few people are a legend in their own time, but count yourself amongst them."

Another one wrote:
"What I liked and admired about Bruce was that he lived his life on his terms and as he wanted. There really was not an inch of side to him. Because even when he was being the grumpy old bastard he seemed to be at times he was just winding you up to drop all your own pretences and pretensions. It's a lesson to us to live our lives and not waste them. His name is going to be around for quite awhile yet I suspect."

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Notes on the diet of four species of viverrid in a limited area of southern Namaqualand, Northern Cape, South Africa

Chris and Tilde STUART

Random sampling of carnivore scats was carried out on the farm « Sewefontein » (3119CA) on the western escarpment of Northern Cape Province, South Africa. The area lies at approximately 700 m ASL and falls within a winter rainfall regime. The vegetation lies within a transition zone, with elements of both 'fynbos' (Cape macchia) and 'karroid scrub' being dominant. Much of the vegetation ranged from 30 cm to 80 cm in height, with taller bushes and small trees along the water courses, and there were extensive areas in the valley bottom cleared for the cultivation of grain and lupins. The fringing ridges had extensive areas of bare, deeply incised rock.

Of the twelve carnivore species known to occur in the study area, five were viverrids but one of which was only an occasional visitor from the neighbouring plains, *Suricata suricatta* and no scats were collected.

As will be observed from the tables not all months are represented. This is the result of the authors being absent from the study area and not a reflection on the presence or absence of the carnivores on the farm during those periods. Very little has been recorded on the diet of carnivores in this region (see Stuart, 1981 ; Skinner & Smithers, 1990) and although the following notes are not complete or comprehensive we felt them still worth committing to paper.

Atilax paludinosus Marsh mongoose

Observations over a period of six years indicated that at least three individual *Atilax* occupied the study area. These are solitary and nocturnal foragers, with scats being deposited in small middens within the home range or scattered at random along pathways. This large mongoose took a wide range of invertebrate prey, with coleopterans and crustaceans (freshwater crabs) being of particular importance. Amphibian prey was dominated by two species (the most common in the valley), *Xenopus laevis* and *Rana angolensis*. The single tortoise record was of a hatchling *Chersine angulata*. The four lizards recorded (three in January and one in December) were all skinks (*Mabuya* probably *capensis*). Most bird remains were of small unidentified passerines but two samples taken in January included the feathers of *Fringilla capensis*. This latter was abundant in the study area. Although no effort was made to identify rodents to species level if only hair was present, in several cases teeth and bones allowed us to make identifications by comparison with reference material. *Otomys irroratus* and *O. unisulcatus* were present in the January, July and November samples, and the single record for May was of *Rhabdomys pumilio*. The single shrew in the July sample was identified as *Crocidura cyaneae*. In the case of the lagomorphs, all were *Lepus saxatilis*. Of particular interest was the presence of the remains of two small carnivores in the November sample, namely *Cynictis penicillata* and *Galerella pulverulenta*. Given its larger size, *Atilax* is easily capable of overpowering these two carnivores but it is possible that they had been scavenged, particularly as both are diurnal species, whereas the marsh mongoose is almost exclusively nocturnal. The same may apply to the single hyrax (*Procavia capensis*) record for January. The occurrence of sheep wool in three of the January samples and two

of those from December almost certainly indicates scavenging from dead animals. *Atilax* tracks were observed around sheep and cattle carcasses in the district on several occasions, and we surmise that the principle attractions were fly maggots and various species of beetle.

Galerella pulverulenta Cape grey mongoose

During the course of a low-key live trapping programme nine individual *Galerella* were captured and marked within the study area, probably a fairly true reflection of the population size. This is a diurnal and solitary forager, and scats are deposited at random within the home range. Insect remains made up a major part of the scats analysed in these samples, with coleopterans and termites (mainly *Hodotermes*) making up by far the majority. Lizards were sampled in all months except July, with the majority being skinks (*Mabuya*-probably *capensis*) but *Pedioplanis* sp., *Cordylus cataphractus* and *Pseudocordylus* sp. were also recorded. None of the snakes were identified to species level but the tortoise scales in a September scat were of *Homopus signatus* and those in October were from a juvenile *Chersine angulata*. Rodent occurrences were lower than expected, with *Otomys unisulcatus* and *Aethomys namaquensis* remains dominating. The single *Hystrix africaeustralis* occurrence in May almost certainly indicates a case of scavenging as this small carnivore would not attack a porcupine under normal circumstances. Both leporid records from May were of *Lepus saxatilis*. The single elephant shrew recorded in May was *Elephantulus edwardii*, one of two species occurring in the study area. Both the common duiker (*Sylvicapra grimmia*) and sheep remains are almost certainly a result of scavenging.

Cynictis penicillata Yellow mongoose

Although these mongooses are colonial burrowers (approximately eight individuals in two warrens were present in the study area) they are solitary, diurnal foragers. Scats are deposited at middens within close proximity to the warren. Invertebrates, mainly coleopterans, *Hodotermes* sp., orthopterans, scorpions and solifugids, were obviously of major importance in this species diet. From August to December lizards featured strongly in the scat samples with skinks (*Mabuya*-probably *capensis* and *variegata*) making up approximately half of the total, with *Cordylus cataphractus* and *Pedioplanis* sp. also being present. Of the eight snake records only two were identified, as *Leptotyphlops* sp. The single tortoise record, from the September sample, was a juvenile *Chersine angulata*. Birds were of considerable importance from September to December, particularly October (remains in more than half of sample) and November (slightly less than half of scats) and this coincides closely with the breeding season of many bird species in the area. Most bird remains (feathers, feet and claws) were of small passerines and included fledglings, but in several samples bird egg-shell fragments were identified. No attempt was made to identify birds to species level. Rodents were of frequent occurrence in the samples, with *Otomys unisulcatus* remains dominating. The two lagomorph records (October and November) were of leverets (teeth in scats, as well as hair and claws) and although *Lepus*, they could have been *capensis* or *saxatilis*. The presence of sheep wool in a number of

Table 1:
Atilax paludinosus Occurrence of prey items in monthly scat samples

Food item	January	May	July	August	October	November	December
Insects:							
Coleoptera	32	3	3	1	0	9	3
Hodoterme	4	0	0	0	0	3	2
Formicidae	13	0	0	0	0	4	1
Orthoptera	11	0	0	0	0	1	0
Dragonfly nymphs	3	1	0	0	0	0	2
Unid. insect fragments	2	0	1	0	0	0	1
Other invertebrates:							
Scorpions	1	0	0	0	1	0	1
Crabs	23	4	5	1	0	6	2
Reptiles:							
Lizards	3	0	0	0	0	0	1
Snakes	2	0	0	0	1	3	0
Tortoise	1	0	0	0	0	0	0
Amphibians:							
Amphibians	29	4	5	1	0	6	4
Birds:							
Birds	15	0	0	0	1	4	0
Mammals:							
Rodents	13	1	5	0	1	5	0
Lagomorphs	3	0	0	0	0	0	1
Shrew	0	0	1	0	0	0	0
Carnivores	0	0	0	0	0	2	0
Hyrax	1	0	0	0	0	0	0
Sheep	3	0	0	0	0	0	2
Vegetation:							
Grass	10	1	3	1	1	3	3
Scat totals	33	4	5	1	1	9	4

Table 3:
Cynictis penicillata Occurrence of prey items in monthly scat samples

Food item	June	July	August	September	October	November	December
Insects:							
Coleoptera	Present	10	21	62	40	77	85
Hodoterme	Present	11	23	62	37	85	82
Formicidae	Present	None	None	9	5	10	1
Orthoptera	Present	None	None	17	43	80	70
Lepidoptera	None	None	None	None	3	None	None
Unid. insect fragments	Present	1	None	10	7	14	12
Other invertebrates:							
Scorpions	Present	3	6	41	32	41	39
Solifugidae	0	1	0	9	11	26	13
Myriopoda	Present	0	0	12	5	6	6
Reptiles:							
Lizards	Present	0	4	19	11	13	17
Snakes	0	0	0	2	0	4	2
Tortoise	0	0	0	1	0	0	0
Mammals:							
Rodent	Present	8	11	42	14	24	20
Lagomorphs	0	0	0	0	1	1	0
Sheep	0	0	0	3	1	3	2
Common duiker	0	0	0	0	0	1	0
Scat totals:	Mixed	12	27	62	44	99	91

samples, and common duiker (*Sylvicapra grimmia*) hair in one November scat almost certainly indicates scavenging.

Genetta genetta Common genet

A solitary, nocturnal hunter with perhaps two to four individuals being present in the study area. Scats may be deposited on small middens or at random along pathways within the home range. Although only small samples were collected and analysed, it is clear that invertebrates and in particular coleopterans were of particular importance. Lizards were significant in the August sample, of which four were identified as skinks (*Mabuya* sp.) and two as legless lizards (*Acontias meleagris*). Rodent remains occurred in all monthly samples, with *Otomys unisulcatus* making up the majority of identifications, with one record of *Rhabdomys pumilio*. This was the only viverrid that seemed to be deliberately feeding on wild fruits, with the seeds of wild olive (*Olea europaea* subsp. *africana*) and 'skilpadbessie' (*Nylandtia spinosa*) being identified. Both fruits have large seeds with a fruit-coating, and are eaten in large quantities by a canid, *Otocyon megalotis*, occurring within the study area, as well as several frugivorous bird species.

General comment

Although the four viverrid species occurring in the study

Table 2:
Galerella pulverulenta Occurrence of prey items in monthly scat samples

Food item	January	May	June	July	August	Sept	October	November	December
Insects:									
Coleoptera	3	23	3	2	7	1	3	14	0
Hodo-Triovortemes	1	19	3	1	7	2	1	12	13
Formicidae	1	13	1	0	0	2	2	2	6
Orthoptera	0	9	0	0	1	0	2	7	9
Unid. insect fragments	0	8	2	1	4	3	5	3	7
Other invertebrates:									
Scorpions	1	2	1	0	0	1	2	3	6
Solifugidae	0	1	0	0	0	0	1	1	3
Myriopoda	1	3	0	0	0	2	1	5	
Reptiles:									
Lizards	2	4	1	0	3	1	2	1	4
Snakes	0	1	0	0	0	1	1	1	0
Tortoise	0	0	0	0	0	1	1	0	0
Amphibians:									
Amphibians	0	0	0	0	0	1	0	0	0
Birds:									
Birds	0	1	0	0	1	0	0	0	3
Mammals:									
Rodents	3	10	0	0	2	1	2	9	8
Lagomorphs	0	2	0	0	0	0	0	0	0
Elephantshrew	0	1	0	0	0	0	0	0	0
Hyrax	0	0	0	0	0	0	0	0	1
Common duiker	0	0	0	0	1	0	0	0	0
Sheep	0	1	0	0	1	0	0	0	0
Vegetation:									
Grass	0	2	0	0	0	1	2	2	0
Seeds	0	3	0	0	0	0	0	1	2
Scat totals	3	35	3	2	10	4	5	20	22

Table 4:
Genetta genetta Occurrence of prey items in monthly scat samples

Food item	January	May	June	July	August	November	December
Insects:							
Coleoptera	1	Present	3	1	11	1	4
Hodoterme	1	Present	0	0	0	0	0
Formicidae	0	0	0	0	0	0	1
Orthoptera	0	0	0	0	0	2	6
Unid. insect fragments	0	0	1	0	0	0	0
Other invertebrates:							
Scorpions	0	Present	0	0	2	1	4
Solifugidae	0	Present	0	0	1	0	1
Myriopoda	1	Present	0	0	0	0	0
Reptiles:							
Lizards	0	Present	0	0	6	1	0
Snakes	1	0	0	0	0	0	2
Birds:							
Birds	0	Present	0	0	2	1	2
Mammals:							
Rodent	1	Present	1	1	11	3	6
Lagomorphs	0	Present	0	0	0	0	0
Vegetation:							
Grass	0	Present	0	0	5	0	3
Seed	0	Present	0	0	1	0	4
Scat totals	1	ca.24	3	1	11	3	9

area have a generally similar diet, *Atilax paludinosus* is the only one to feed on quantities of freshwater crabs and frogs. *Atilax* and *Genetta genetta* are strictly nocturnal hunters, with *Cynictis penicillata* and *Galerella pulverulenta* being diurnally active. The latter two mongooses are largely separated by their favoured habitats, the former showing a strong preference for more open terrain with sparse vegetation cover (offered in the form of open agricultural land in the study area) and *Galerella* rarely venturing far from rock cover. Although far from comprehensive this brief study gives a first insight into the diet of four common viverrids occurring on the western escarpment of South Africa.

Acknowledgement

Vincent Pereboom is thanked for assisting in the collection of scats and basic processing of the samples.

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