

# Preliminary study on some rodents of southern Mauritania as reservoir of human pathogenic viruses

**Khalilou Bâ**

**Christian Mathiot**

**Mawlouth Diallo**

**Pierre Nabeth**

**Laurence Lochouarn**

**Yacoub Kâne**

**Mohameden O. Abdalahi**

**Laurent Granjon**

## ■ Introduction

Rodents are being found to be involved as reservoirs in an ever growing number of human viral diseases, the vectors of which are usually Arthropods (see MILLS and CHILDS, 1998 for Americas and GRATZ, 1997 for Africa). In Africa, *Mastomys* and *Arvicanthis* are the two main genera concerned, but a number of other murids have also been found to host viruses potentially transmissible to Man (see SALUZZO *et al.*, 1986; GRATZ, 1997). Thus, a correct identification of these rodent species and a good knowledge of their ecology (and more importantly their relations to humans) are important prerequisites for an understanding of their role in the maintenance and spread of such viruses.

The occurrence of human cases of Rift Valley Fever in the region of Ayoun El Atroûss (South Mauritania) in September-October 1998 (following previous episodes in 1987 and 1993) prompted the organization of a field survey aiming, among other things, at evaluating the potential role of rodents as reservoirs in this disease. Previous studies in West Africa were not conclusive in this respect, with the presence of antibodies against this virus having been found only exceptionally (a few positive cases in *Mastomys* sp. and *Arvicanthis niloticus*, cf. SALUZZO *et al.*, 1987a; ZELLER *et al.*, 1997). The rodents caught in this study were also tested for the presence of various other viruses. Some of these viruses have already been found in nearby Senegal (Saboya and Gabek Forest, both isolated from rodents and phlebotomes, ROBIN *et al.*, 1968), or in other West African countries (Lassa, isolated from *Mastomys natalensis* in Nigeria and Sierra Leone, in SALUZZO *et al.*, 1986), whereas others (Puumala, Seoul and Hantaan), known to be harmful to humans, have not yet been identified in Africa.

Here we present the results on rodents captured during this survey, as well as the chromosomal data that have enabled us to unambiguously determine 2 of the species caught. The results of virological analyses are also presented. These data are discussed in terms of community composition and the potential risk associated with the presence of these rodents in this region of Mauritania.

## Material and methods

Wire mesh live traps were used in domestic (inside houses and in cattle enclosures), peridomestic (small cultivated areas around villages) and natural habitats in and around 5 localities near Ayoun El Atroûss (16°40'50"N; 9°18'07"W; fig.1). Night drives (COSSON *et al.*, 1997) also enabled us to catch by hand some individuals. The rodents captured were sacrificed, and various samples were taken:

- pectoral muscle with ribs was put on culture medium and cell cultures were processed in the laboratory. Conventional karyotypes were obtained from dividing cells by the standard method.
- organs, brain, as well as blood were taken. Sera were tested at 1:100 dilution for IgG antibodies against Rift Valley Fever and Gabek

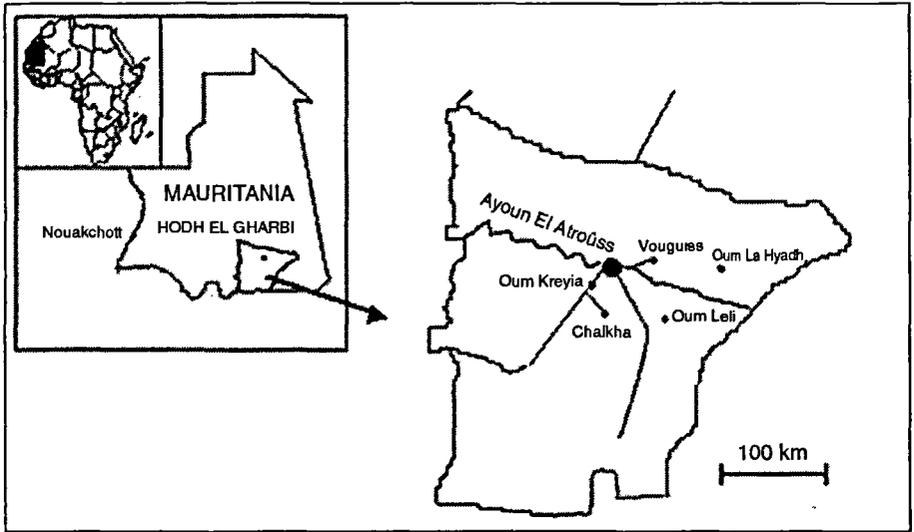


Figure 1  
Map of the study region.

Forest (Phleboviruses), Saboya (Flavivirus), Hantaan, Puumala and Seoul (Hantaviruses) and Lassa (Arenavirus) inactivated viral antigens by an indirect Elisa. The conjugate was a peroxidase-labeled anti-mouse IgG.

## Results

### *The rodent community*

Seventy-three individuals of five species were caught (tabl. 1):

– *Gerbillus tarabuli* (Gerbillinae) was by far the dominant species caught and was present in both peridomestic and natural sandy habitats. An identical karyotype with  $2N = 40$ ,  $NFa = 74$  (fig. 2a) was found for 12 individuals. This karyotype is characteristic of this species which is well known in this region (GRANJON *et al.*, 1999) where it is morphologically very similar to *G. nigeriae*.

Locality	Vouguiss			Oum La Hyadh		Chalkha		Oum Lell		Oum Kreyia	Total
	a	b	c	b	c	b	c	b	c	c	
trap nb	20	50		75	20	140	30	40	30	20	445
<i>Acomys airensis</i>	-			-	-	1	-	-	-	7	8
<i>Arvicanthis niloticus</i>	-			-	-	1	-	-	-	-	1
<i>Gerbillus tarabuli</i>	-	19		8	1	-	25 (3)	1	-	2	59
<i>Desmodilliscus braueri</i>			(1)								1
<i>Jaculus jaculus</i>			(3)						(1)		4
Total	-	19	4	8	1	2	28	1	1	9	73

a: domestic habitat ; b: peridomestic habitat ; c: natural habitat

Table 1

Rodents trapped at 5 localities near Ayoun El Atroûss.  
Numbers between brackets refer to hand captures.

- A single individual of *Desmodilliscus braueri* (Gerbillinae) was caught by hand, as usual for this trap-shy species.
- *Acomys cf. airensis* (Acomyinae) was caught mainly in rocky habitats at one locality, but one individual was trapped in a garden. The karyotype of one specimen ( $2n = 40$ ,  $NFa = 66$ ; fig. 2b) appears to be very close to what was known previously for specimens of *A. airensis* studied in other parts of the species range (VOLOBOUÉV, pers. comm.), although small differences were observed that would deserve further analyses.
- *Arvicanthis niloticus* (Murinae) was trapped only once in peridomestic habitat.
- A few individuals of *Jaculus jaculus* (Dipodidae) were caught by hand, as usual for this trap-shy species, but numerous other individuals were seen during night drives.

### *Virological analyses*

The serum of 51 rodents (16 males and 25 females *G. tarabuli*, 4 males *J. jaculus*, 1 male *D. braueri*, 1 female *A. niloticus*, 3 males and 1 female *A. cf. airensis*) have been subjected to serological analyses against the 7 viruses cited above. All attempts to find antibodies against them were negative.

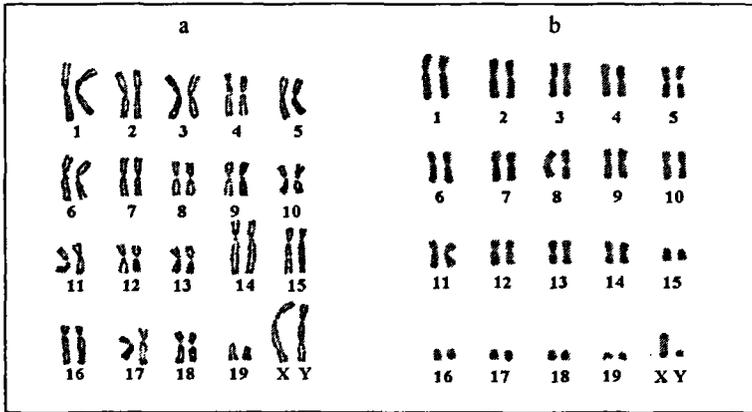


Figure 2  
Standard karyotypes of a-a male specimen of *Gerbillus tarabuli*,  
and b-a male specimen of *Acomys cf. airensis* from the region  
of Ayoun El Atrouÿs.

## Discussion – Conclusions

The species found in this study are typical of a saharo-sahelian sandy-clay environment (*J. jaculus*, *D. braueri*, *G. tarabuli*) with rocky outcrops (*A. cf. airensis*) and “enriched” by human settlements (*A. niloticus*). *Jaculus jaculus* and *G. tarabuli* are widespread species (GRANJON *et al.*, 1997), whereas *D. braueri* appears to be more localized (HUTTERER and DIETERLEN, 1986). *Acomys cf. airensis* is recorded for the first time in Mauritania, the only previous mention of *Acomys* in this country corresponds to the description of *A. chudeaui* from the Adrar Massif (KOLMANN, 1911). Further work is needed, including morphological and genetical analyses, to compare specimens from northern and southern Mauritania and check for their potential conspecificity. The presence of *A. niloticus* is probably associated with its commensalism, as natural habitats are probably too arid for this species (GRANJON *et al.*, 1997). Additional fieldwork should complete this inventory with the potential addition of other species of *Gerbillus*, *Taterillus* and possibly commensal *Mastomys*.

Many serological data exist for the Ayoun El Atrouÿs region, showing positive cases for RVF in both humans and domestic ungulates (SALUZZO

*et al.*, 1987b). The relatively high densities of rodents found in peri-domestic habitats confirms that contacts between rodents and humans are highly probable, opening an avenue for transmission of viruses to humans should the rodents be reservoirs. In this respect, the small number of individuals studied, as well as the near absence of *Arvicanthis* and *Mastomys*, which are the more regularly involved genera in such endozootics in the region, may explain the negative results of virological analyses. In Senegal, Saboya virus was found in *Tatera kempfi* (= *T. gambiana*), *Mastomys* sp., *A. niloticus*, and *Mus musculus*) and Gabeck Forest virus in *T. kempfi*, *Taterillus* sp. and *A. niloticus* (SALUZZO *et al.*, 1986). One individual of the latter species was also found to host Gabeck Forest virus in Mauritania (SALUZZO *et al.*, 1987a). As for RVF, and following the 1987 epidemic in Rosso (southern Mauritania), isolation attempts on 1478 individual rodents by SALUZZO *et al.* (1987a) were unsuccessful. In the same study, immunofluorescence tests on the serum of 268 *Mastomys* sp. only yielded 2 positive cases. Similarly, ZELLER *et al.* (1997) mentioned the presence of RVF antibodies in the serum of 2 out of 70 *A. niloticus* caught in March 1990 in the Senegal river delta of northwestern Senegal. In South Africa, evidence of natural infection by RVF virus was demonstrated in the murid rodent *Aethomys namaquensis* (PRETORIUS *et al.*, 1997).

Further studies are needed in other periods of the year (especially at periods of high vector – i.e. arthropods – densities) and including a larger sample of small mammal specimens to definitely define the role of these small mammals in the maintenance and transmission of pathogens in the region of Ayoun El Atroûss. As shown here, special care should be taken for an accurate determination of the species involved (particularly via chromosomal analyses) in such genera as *Gerbillus*, *Taterillus*, *Acomys* and *Mastomys* where morphologically similar species may coexist.

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