



## Correspondence

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### Cytotaxonomic considerations on the sex chromosome variation observed within *Acomys ngurui* Verheyen *et al.* 2011 (Rodentia Muridae)

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The taxonomy of the East African Muridae belonging to the *Acomys spinosissimus* Peters 1852 species complex has been recently revised (Verheyen *et al.*, 2011). Two new species have been described by means of external morphologic analysis, craniometry, enzymes, mitochondrial DNA sequences and karyological information. For one of the two new species, *Acomys ngurui* Verheyen *et al.* 2011, a polymorphic karyotype has been observed. In fact, for 19 of the 22 karyotyped individuals, the karyotype is identical to the one described for *A. spinosissimus* s. s. ( $2n = 60$ , aFN = 68), characterized by a sex chromosome constitution of the XX/XY type, with an acrocentric X and a submetacentric Y (Dippenaar and Rautenbach, 1986). The remaining three females possess a karyotype that resembles the one reported by Matthey (1965) and Barome *et al.* (2001) characterized by a unique giant metacentric X chromosome ( $X_g$ ), and by a variable diploid number ( $2n = 59–62$ ). These females were found in the three localities in Tanzania together with specimens with the typical ‘*spinosissimus*’ karyotype. Specimens carrying the  $X_g$  were not distinguishable on the basis of their mtDNA sequence or morphology from the other specimens with XY karyotype (Verheyen *et al.*, 2011). The authors concluded that the available evidence did not allow one to give taxonomic value to this chromosomal configuration, characterized by a particular sex determination, hoping for future work that will study the animals bearing this typical karyotype in more detail.

Actually, these cytogenetic studies are already available for this odd karyotype. In fact five specimens (two males and three females) have been recently studied by mean of C-G banding pattern and male diakinesis (Castiglia *et al.* 2007). For this reason we are now able to taxonomically evaluate these cytogenetic observations thanks to the molecular and morphological data presented by Verheyen *et al.* (2011).

Instead of a particular new sex determination system, the cytogenetic analysis by Castiglia *et al.* (2007) revealed that males and females with the  $X_g$  constitute mosaics for sex chromosomes (Fig. 1A). Females have an excess of aneuploid cells with one  $X_g$  chromosome. Only in one out of three females’ two cells with two  $X_g$ s were found in a total of thirty-two observed cells. Males are mosaic with  $X_gO$  or  $X_gY$  cells in somatic tissues, and only  $X_gY$  cells in the germinal lineage. The female meiosis was not studied, but the occurrence of mosaicism for  $X_g$  chromosomes ( $X_gX_g/X_gO$ ) in one female supports the hypothesis of a post-meiotic elimination of  $X_g$  in this individual. In addition, an odd heterochromatic submetacentric chromosome was found in three out of five specimens. This chromosome resembles the Y chromosome of the “*spinosissimus*” karyotype, but it is not related to sex determination because it is present in both sexes. Moreover, since it is not present in all the analyzed specimens, it can be considered as a B chromosome (Castiglia *et al.* 2007).

Since only one specimen with the  $X_g$  was sequenced (Verheyen *et al.* 2011; Barome *et al.* 2011) we sequenced the cytochrome b gene (*cytb*) of three of the specimens studied by Castiglia *et al.* (2007) (1140 bp, GenBank accession numbers: JX244273-5). A minimum spanning network was built with Network 4.6 including the *cytb* sequences of all the so far karyotyped specimens belonging to *Acomys ngurui* (Fig. 1B, Table 1). Since the two karyotypes, namely those containing and those not containing  $X_g$  chromosomes, occur also in syntopy, sequences of specimens for which no karyotypes are available are excluded from the analysis. Two groups of haplotypes are evident, corresponding to the geographically separated “MOTU11” and “MOTU20” showed in the tree in Fig. 4 of Verheyen *et al.* (2011). The mean genetic divergence between the two groups is 1.8% (p-distance), a value often reported as within the limits of intraspecific variation in mammals (Baker and Bradley 2006). MOTU20 includes only specimens with the “*spinosissimus*” karyotype, while in MOTU11, the haplotype (h7) is shared by two specimens with different karyotypes (Fig. 1B). These data confirm the coexistence of these two cytotypes without a detectable mtDNA variation. Thus, the