

Karyotype of the Small-eared dormouse (*Graphiurus microtis*) from the Nyika Plateau, Malawi (Rodentia: Gliridae)

Karyotyp plcha malouchého (*Graphiurus microtis*) z náhorní plošiny Nyika, Malawi (Rodentia: Gliridae)

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Abstract. Karyotype of the African Small-Eared Dormouse (*Graphiurus microtis*) from Nganda (Nyika Plateau, Malawi) consisted of $2n=52$ chromosomes: 11 pairs of metacentrics, 14 pairs of acrocentrics and subtelocentrics, the X-chromosome being a metacentric, Y-chromosome a small acrocentric. It represents a new karyotype reported for African dormice (Graphiurinae). Regarding the scarcity of data (thus far karyotypes of only four species representing five populations, including the present data, out of currently recognized 13–14 species, distributed throughout Sub-Saharan Africa have been described) it is worth of being published but any efforts to derive conclusions regarding chromosomal speciation in graphiurines would be preliminary and speculative.

INTRODUCTION

Within the Gliridae, the genus *Graphiurus* Smuts, 1832 is unique in being an African endemic widely distributed from south of the Sahara to the Cape Province in South Africa, and in being the most specious genus of the family (13–14 species are currently recognized, whereas other glirid genera consist of a maximum of three species; HOLDEN 1993, ROSSOLIMO et al. 2001). *Graphiurus* constitutes one of the three major lineages identified among the Gliridae, justifying its subfamilial rank. The lineage is assumed to have radiated rapidly, following colonization of Africa at ca. 8–10 Myr ago (MONTGELARD et al. 2003). It is assumed that high rate of speciation was driven by adaptive radiation into diverse habitats ranging from dense forests to rocky areas (MONTGELARD et al. 2003). Still, the genus appears to be morphologically quite homogeneous (GENEST-VILLARD 1978, HOLDEN 1996), and the question arises whether speciation may have been driven by and/or is reflected in, chromosomal diversification, as for instance is assumed to be the case in the adaptive radiation of blind mole-rats (*Spalax* Guldenstaedt, 1770 spp.; cf. NEVO et al. 2001). So far karyotypes, ranging from $2n=40$ to $2n=70$ chromosomes, of only four species, representing five populations have been reported in the literature (Table 1). These results indicate high karyotypic variation within the genus, and its potential to become an interesting model for the study of chromosomal speciation accompanying either adaptive radiation (as exemplified by the *Spalax*-model, cf. NEVO et al. 2001) or by vicariance and genetic drift (as

Table 1. Known karyotypes (diploid numbers of chromosomes) of African dormice (*Graphiurus* sp.)
Tab. 1. Popsané karyotypy (diploidní počty chromosomů) afrických plchů rodu *Graphiurus*

species	2n	country	authors
<i>G. hueti</i> de Rochebrune, 1883	40	Ivory Coast	TRAINER & DOSSO 1979
<i>G. murinus</i> (Desmarest, 1822)	70	Ivory Coast	TRAINER & DOSSO 1979
<i>G. parvus</i> (True, 1893)	70	Niger	DOBIGNY et al. 2002
<i>G. microtis</i> (Noack, 1887)	52	Malawi	CHITAUKALI et al. 2001, this paper
<i>G. murinus</i> (Desmarest, 1822)	46	South Africa	KRYŠTUFEK et al. 2004

exemplified by the African mole-rats of the genus *Fukomys* Kock, Ingram, Frabotta, Burda et Honeycutt, 2006; cf. VAN DAELE et al. 2004).

Within the context of a more general report on results of a faunistic survey of small mammals in the National Park Nyika in Northern Malawi, 1997, we named the diploid number of chromosomes we found in two dormice captured in the region, yet we did not provide any further information on this aspect (CHITAUKALI et al. 2001). Regarding the fact that African dormice in general are poorly known karyologically, in contrast to most of the European species, the karyotypes of which have been studied in detail in many localities (ZIMA et al. 1994) as well as regarding the potential importance of this kind of information (see above), it is worthy to publish additional data on this finding.

MATERIAL AND METHODS

Two dormice were captured (in Sherman live traps) in Nganda (S10.26, E 33.51, grid 1033-B4, altitude 2,200–2,300 m a. s. l.), National Park Nyika, Northern Malawi, on alpine meadows in the vicinity of shrubs and rocks in April 1997. One further animal was trapped in the Chipome Valley (S10.20, E33.50, grid 1033-B4, altitude about 1,530 m a. s. l.), surveyed in July 1998. Dominant vegetation type at Chipome is *Brachystegia* woodland. In 1999, W. N. CHITAUKALI captured also two dormice in Mzuzu (in the garden of Mr. R. J. MURPHY) (1,350 m a. s. l.). Animals were sacrificed, examined using standard mammalogical procedures. Voucher specimens (preserved in ethanol) have been deposited in the Senckenberg Museum

Table 2. Measurements of small-eared dormice (*Graphiurus microtis*) collected in Nyika, Malawi. LC = head and body length, LCd = tail length, LTP = length of the hind foot; under breeding state either the number and distribution of embryos in uterine horns (L = left, R = right) or size of testes are given

Tab. 2. Rozměry plchů malolouchých (*Graphiurus microtis*) chycených na náhorní plošině Nyika, Malawi. sex = pohlaví, mass = hmotnost, LC = délka těla, LCd = délka ocasu, LTP = délka zadní tlapky, pinna = délka ucha; breeding state = buď počet a umístění embryí v děložních rozích (L = levý / R = pravý) anebo rozměry varlat

ID	locality	date	sex	mass (g)	LC (mm)	LCd (mm)	LTP (mm)	pinna (mm)	breeding state
69/97	Nganda	10.04. 1997	F	24.0	88.6	57.4	15.6	12.0	L2 / R1
72/97	Nganda	10.04. 1997	M	16.0	61.4	64.5	15.0	14.0	
55/98	Chipome	22.07. 1998	M	14.0	72.6	93.2	16.8	13.2	5.6×2.6
61/99	Mzuzu	09.08. 1999	F	38.0	101.0		12.0	11.5	
62/99	Mzuzu	09.08. 1999	F	46.0	100.0		18.0	15.0	

in Frankfurt am Main, Germany. Both individuals from Nganda were karyotyped using the standard preparation of bone marrow chromosomes from long bones (LEE 1969, LEE & ELDER 1977). The slides were stained by Giemsa.

RESULTS AND DISCUSSION

Basic biometric data are given in Table 2. Dormice from Nyika were preliminarily identified (on the base of morphological features and biogeography) as *Graphiurus microtis* (Noack, 1887) (determination by Dr. D. KOCK, Frankfurt am Main). The specimens from Mzuzu are distinctly larger (Table 2) and may belong to a different species.

Finding of a pregnant female (with two embryos) in April in Nganda suggests that the breeding season involves at least the end of the rainy season.

The karyotype of two specimens from Nganda consisted of $2n=52$ chromosomes (Fig. 1): 11 pairs of metacentrics, 14 pairs of acrocentrics and subtelocentrics, the X-chromosome being a metacentric, Y-chromosome a small acrocentric.



Fig. 1. Karyotype of a male *Graphiurus microtis* from Nganga, Nyika Plateau, Malawi.

Obr. 1. Karyotyp samce plcha malouchého (*Graphiurus microtis*) z lokality Nganga, náhorní plošina Nyika, Malawi.

The karyotypes of dormice are characterized by the prevalence of biarmed autosomes (ZIMA et al. 1994). This is also the case in *G. murinus* studied by KRYŠTUFEK et al. (2004). In this respect, karyotypes of *G. microtis* in our study are somewhat unusual being composed of more acrocentric and telocentric chromosomes rather than by clearly biarmed chromosomes. Sex chromosomes (larger metacentric X, and dot like Y) correspond to the pattern known also from other dormouse taxa.

In absence of comparative data on karyotypes of other populations of *G. microtis*, no conclusion about the taxonomic status of the Nyika population can be made at the present. Regarding the fact that so far, only five populations (representing at least four different species) of *Graphiurus* were karyotyped, and in absence of any chromosome banding studies, it would be very speculative to discuss differences between karyotypes from taxonomical or evolutionary point of views.

SOUHRN

Karyotyp afrického plcha malouchého (*Graphiurus microtis*) z lokality Nganda (Nyika Plateau, Malawi) (obr. 2) sestává z $2n=52$ chromozomů: 11 párů metacentrických, 14 párů akrocentrických a subtelocentrických, X-chromozom je metacentrický, Y-chromozom malý akrocentrický. Vzhledem k tomu, že v rámci



Fig. 2. Small eared dormouse (*Graphiurus microtis*) from the Nyika Plateau, Malawi.
Obr. 2. Plch malouchý (*Graphiurus microtis*) z náhorní plošiny Nyika, Malawi.

podčeledi Graphiurinae byl karyotyp dosud popsán (včetně této práce) jen u čtyř druhů z pěti oblastí, přičemž je uznáváno 13 až 14 druhů rozšířených v celé subsaharské Africe, představuje každá nová studie cenný příspěvek k poznání ne zcela jasné systematiky a evoluce celé čeledi. Diskuse chromozomové speciace afrických plchů na základě dostupných omezených dat by ale byla předčasná a spekulativní.

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