

Karyotype and species diversity of the genus *Delomys* (Rodentia, Cricetidae) in Brazil

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Cytogenetic analyses were performed in 39 specimens of *Delomys* trapped in six localities distributed along the Atlantic forest range of the genus. Only two karyotypic forms were found: $2n = 72$, $FN = 90$ to the north and $2n = 82$, $FN = 80$ to the south, with an overlapping area in São Paulo and Paraná states. No hybrids were found and given the large difference in karyotype it is likely that any hybrids produced would be infertile. Based on the skin coloration and type localities of the species described it is suggested that the $2n = 72$ taxon corresponds to *Delomys sublineatus* and the $2n = 82$ form to *D. dorsalis*.

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Introduction

The genus *Delomys* was proposed to include two species of *Thomasomys* from the southeast coast of Brazil: *T. sublineatus* and *T. dorsalis*, the latter incorporating the subspecies *collinus* (Thomas 1917). Ellerman (1941) questioned the status of this genus, considering it to be no more than a species group within *Thomasomys*. This opinion was followed by Moojen (1952), Cabrera (1961), and Honacki *et al.* (1982). Nevertheless, Avila Pires (1950a, b) and Reig (1981, 1984) believe that *Delomys* is a valid genus. Avila Pires (1960a, b) suggested the following nominal forms: *D. dorsalis* (type locality: Rio Grande do Sul), *D. collinus* (type locality: Itatiaia, Rio de Janeiro), *D. sublineatus* (type locality: Engenheiro Reeve, Espírito Santo) and *D. peblejus*, based on an incomplete fossil skull of a young animal collected in Lagoa Santa (Minas Gerais, Central Brazil). *Hesperomys sub-*

flavus Wagner, included in *Delomys* by Tate (1932), belongs to *Oryzomys* according to most modern authors (Cabrera 1961, Honacki *et al.* 1982, A. Langguth, unpubl. data). *Hesperomys dorsalis obscura* Leche from Taquara do Mundo Novo, RS is probably the same as *D. dorsalis* (Gyldenstolpe 1932). Cabrera (1961) and Honacki *et al.* (1982) recognize only one species of *Delomys*, *D. dorsalis*, which includes the subspecies *collinus* and *sublineatus*. Thus, the genus *Delomys* is variably considered as including one, two or three living species, and the validity of the genus itself is questioned.

Specimens of *Delomys dorsalis* (2 males and 2 females referred to "*Thomasomys*") studied by Yonenaga (1975) and of *D. sublineatus* (named "*Thomasomys* sp.") investigated by Kasahara and Yonenaga-Yassuda (1984), from Casa Grande, near Salesópolis, São Paulo, had diploid numbers ($2n$) of 82 and 72 respectively.

The genus has been recorded in the Atlantic Forest of Brazil between 20° and 30°S latitude, and Massoia (1962) reported *D. dorsalis* as far west as Misiones in Argentina. In this paper, we report additional cytogenetic data from 39 specimens

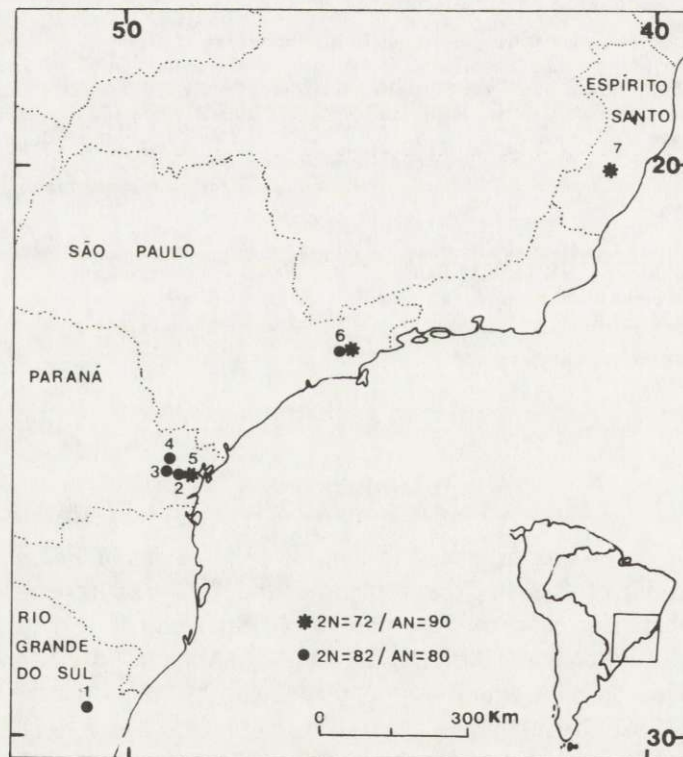


Fig. 1. Collection points of *Delomys*. 1. Saporanga (Rio Grande do Sul state), $2n = 82$, FN = 80. 2. 3. and 4. Piraquara, Morretes, and Quatro Barras (Paraná state), $2n = 82$, FN = 80. 5. Antonina (Paraná state), $2n = 72$, FN = 90. 6. Casa Grande (São Paulo state), $2n = 72$, FN = 90 and $2n = 82$, FN = 80 (Yonenaga 1975, Kasahara and Yonenaga-Yassuda 1984). 7. Monte Verde (Espírito Santo state), $2n = 72$, FN = 90.

of *Delomys* representative of the whole Atlantic Forest range of the genus including, for the first time, modern banding techniques. The results suggest that the genus consists of a northern taxon ($2n = 72$) and a southern one ($2n = 82$).

Materials and methods

Mitotic preparations were made by the technique of Baker et al. (1982). G- and C-bands were obtained by the Seabright (1971) and Sumner (1972) methods, respectively. Sample sizes and geographical locations of the specimens analysed are given in Table 1 and Figure 1.

Table 1. Localities, species, number of males and females analysed and diploid ($2n$) and fundamental (FN) numbers observed.

Locality and species	Number studied		$2n$	FN
	Males	Females		
<i>D. dorsalis</i>				
1. Sapiranga, RS, 29° 35' S, 51° 02' W	1	2	82	80
2. Piraquara, PR, 25° 25' S, 48° 55' W	3	—	82	80
3. Morretes, PR, 25° 25' S, 48° 59' W	7	5	82	80
4. Quatro Barras, PR, 25° 20' S, 48° 50' W	1	1	82	80
<i>D. sublineatus</i>				
5. Antonina, PR, 25° 15' S, 49° 15' W	—	1	72	90
7. Monte Verde, ES, 19° 53' S, 41° 57' W	15	3	72	90

Numbers correspond to those of Figure 1. Site number 6 was assigned to the locality of Casa Grande, the collecting site of Yonenaga (1975) and Kasahara and Yonenaga-Yassuda (1984). RS, PR, and ES refer to Rio Grande do Sul, Paraná, and Espírito Santo states, respectively.

Skins and skulls of the specimens karyotyped were deposited in the following Brazilian institutions: material from Espírito Santo in Departamento de Sistemática e Ecologia, Universidade Federal da Paraíba in João Pessoa; specimens from Rio Grande do Sul and from Piraquara are kept at the Departamento de Genética, Universidade Federal do Rio Grande do Sul in Porto Alegre; all other specimens from Paraná are kept at the Museu de História Natural "Capão da Imbuia" in Curitiba.

Results

Nineteen specimens (localities 1 – 4) of *D. sublineatus* had a diploid number ($2n$) of 72 and a fundamental number (FN) of 90 (Fig. 2A). The autosomes comprise three pairs of large submetacentrics, seven pairs of metacentrics to submetacentrics decreasing gradually from medium to small, and 24 pairs of acrocentrics varying from large to small size. The X is a large submetacentric chromosome and the Y is a small acrocentric. Constitutive heterochromatin (C-bands) is absent

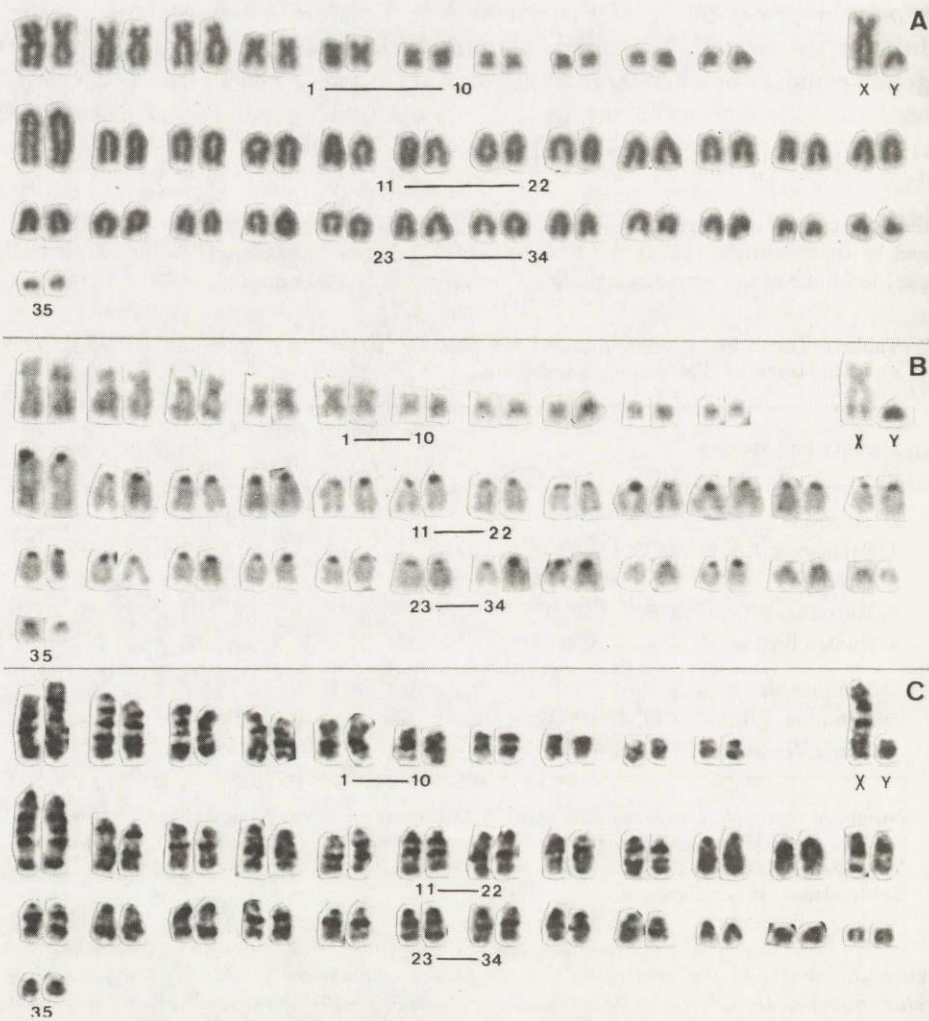


Fig. 2. A – *Delomys sublineatus*, male, Giemsa staining; B – male, C-banding; C – male, G-banding.

from the three large and one medium submetacentric and occurs as small blocks in the remaining biarmed pairs (Fig. 2B). It is present in the pericentromeric regions of the acrocentric pairs, and of the X chromosome. The long arm of the Y is totally heterochromatic. Fig. 2C presents the G-bands pattern of this karyotype.

A $2n = 82$, $FN = 80$ karyotype was found in 20 specimens (localities 5, 7) of *D. dorsalis* (Fig. 3A). All the autosomes are acrocentric with a gradual variation in size. The X chromosome is a large submetacentric and the Y is the smallest acrocentric of the karyotype. The constitutive heterochromatin occurs at the

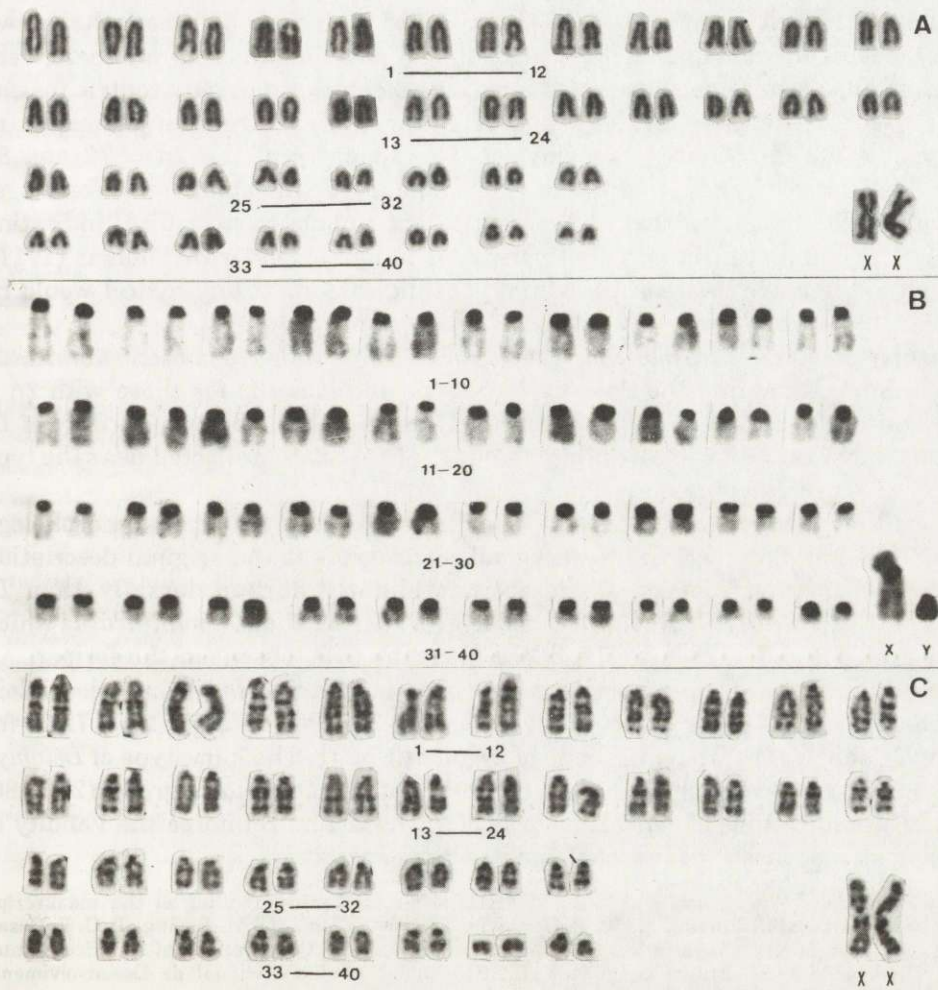


Fig. 3. A – *Delomys dorsalis*, female, Giemsa staining; B – male, C-banding; C – female, G-banding.

pericentromeric regions of all autosomes, and of the X chromosome. The long arm of the Y is heterochromatic (Fig. 3B). G-bands are shown in Fig. 3C.

Discussion

The collection points for this study span virtually the whole range of the genus *Delomys* (Fig. 1). Only two karyotypic forms were found: $2n = 72$, $FN = 90$ at north (from Espírito Santo to Paraná states) and $2n = 82$, $FN = 80$, at south (from

São Paulo to Rio Grande do Sul). These forms overlap around São Paulo and Paraná. Although comparison of the G-band patterns between these two karyotypes is difficult due to their high diploid and fundamental numbers, very few elements seem to be shared by them. This means that not only centric fusions but pericentromeric inversions and/or other complex rearrangements are responsible for the different karyotypes. The sympatry of the $2n = 72$ and 82 animals of Casa Grande, São Paulo (Yonenaga 1975, Kasahara and Yonenaga-Yassuda 1984), suggests that these entities are unable to hybridize, indicating that *Delomys* may consist of only two species in agreement with Thomas (1917). The large difference between the karyotypes indicates that any hybrid would be infertile.

Among the names available for species of *Delomys* we have chosen *sublineatus* for the animals bearing the $2n = 72$ karyotype and *dorsalis* for those with $2n = 82$, because all specimens collected in Rio Grande do Sul, the type locality of *D. dorsalis*, have $2n = 82$ and all animals from Espírito Santo, collected near the type locality of *D. sublineatus*, have $2n = 72$.

It is difficult to identify the two species on the basis of the cranial morphology alone. The skin, however, is different, and corresponds to the original description given for the type species. *D. dorsalis* is slightly darker dorsally than *D. sublineatus*. Ventrally *D. dorsalis* is mouse-grey, darker than *D. sublineatus* which shows a bright yellow-reddish (buffy) band on the side, absent in the former.

The differences observed between *Delomys* and *Thomasomys* include diploid number ($2n = 42 - 44$ for *Thomasomys*, Gardner and Patton 1976; $2n = 72, 82$ for *Delomys*), shape of palate, and shape of zygomatic plate. The karyotype of *Delomys* ($2n = 82$) is more similar to that of *Oryzomys* of the *O. nitidus* group ($2n = 80$, FN = 86) than to that of *Thomasomys*. These characters reinforce the validity of *Delomys* as a separate genus, that includes two species.

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