

Karyotype description of the Semicollared nighthawk, *Lurocalis semitorquatus* (Caprimulgidae)

Mercival Roberto Francisco^{1,2}, Vitor de Oliveira Lunardi¹, Caroline Garcia¹ e Pedro Manoel Galetti Junior¹

¹ Departamento de Genética e Evolução, Universidade Federal de São Carlos, Caixa Postal 676, CEP 13565-905, São Carlos, SP, Brasil. E-mail: mercivalfrancisco@uol.com.br

² Autor para correspondência

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RESUMO. Descrição cariotípica do Tuju, *Lurocalis semitorquatus* (Caprimulgidae). Os estudos sobre os padrões evolutivos dos cariótipos têm revelado importantes informações sobre as relações taxonômicas em diversos grupos de aves. No entanto, a ordem Caprimulgiformes é uma das menos conhecidas citotaxonomicamente. Diante disso, o objetivo deste trabalho foi descrever o cariótipo de *Lurocalis semitorquatus* (Caprimulgidae) e contribuir com novos dados que possam auxiliar no esclarecimento da citotaxonomia deste grupo. Foi analisado um indivíduo jovem, de sexo indefinido, encontrado no *campus* da Universidade Federal de São Carlos, São Carlos, SP. Os cromossomos mitóticos foram obtidos a partir de células de tecido dérmico de penas em crescimento. Cinquenta e seis metáfases foram analisadas através da coloração convencional de Giemsa. O número diplóide observado foi $2n = 82$ cromossomos. Os pares 1, 6, 9 e 11 foram submetacêntricos, os pares 2, 4 e 5 subteloacêntricos, os pares 7, 8, 10 e 13 metacêntricos, os pares 3 e 12 telocêntricos e os demais foram microcromossomos com morfologia indefinida. Embora o número de espécies de Caprimulgiformes citogeneticamente conhecidas até o momento seja ainda muito pequeno para o estabelecimento de padrões citotaxonômicos gerais, dados preliminares demonstram uma grande variação cariotípica entre os táxons, tanto na morfologia quanto em número. Isto indica que os cariótipos possam ser uma ferramenta adicional para os estudos das relações taxonômicas das aves deste grupo.

PALAVRAS-CHAVE: Citogenética, cariótipo, Caprimulgiformes, citotaxonomia.

KEY WORDS: Cytogenetics, cariotype, Caprimulgiformes, cytology

The Caprimulgiformes (nightjars, potoos and oilbird) are nocturnal birds mainly found in the Neotropical region (Sick 1997). This order traditionally includes five extant families: Caprimulgidae, Nyctibiidae, Steatornithidae, Aegothelidae and Podargidae (Mayr 2002). However, recent cladistic analyses of morphological characters have provided strong evidences that the Caprimulgiformes compose a paraphyletic group, which is supported by the monophyletism found between the members of the families Caprimulgidae, Nyctibiidae and Aegothelidae with representatives of the order Apodiformes (Mayr 2002). Besides, a monophyletism between the Trogoniformes and the representatives of the families Steatornithidae and Podargidae has also been proposed (Mayr 2003, Mayr and Clarke 2003). The phylogenetic relationship between Steatornithidae and Podargidae with the clade Caprimulgidae, Nyctibiidae, Aegothelidae/Apodiformes remains unresolved (Mayr 2002, 2003, Mayr and Clarke 2003), as well as the taxonomic relations within each of the families.

Studies on the evolutionary patterns of karyotypes have revealed information concerning the taxonomic relations in many bird groups, often becoming an important tool for systematics (Takagi and Sasaki 1974, Christidis 1986a, b, Francisco *et al.* 2001). However, Caprimulgiformes is one of the less citotaxonomically known orders (Belterman and De Boer 1984, Nieto and Gunski 1998).

In Brazil, this group is represented by 30 species distributed into three families: Caprimulgidae, Nyctibiidae and Steatornithidae (Sick 1997). Of all the Caprimulgiformes species known in the world, only seven present detailed karyotypic descriptions, five of them occurring in Brazil (Belterman and De Boer 1984, De Lucca and Waldrigues 1986, Nieto and Gunski 1998).

All this considered, the objective of this work was to describe the karyotype of *Lurocalis semitorquatus* (Caprimulgidae) and to contribute with new data that may help in the elucidation of the citotaxonomy of this bird group.

A nestling of unidentified sex was analyzed. It was found in the *campus* of São Carlos Federal University, São Carlos, southeastern Brazil (21°58', 47°52'). The mitotic chromosomes were obtained from dermal tissue cells of growing feathers following the technique described by Sandnes (1954), with the modifications suggested by Giannoni *et al.* (1993). The morphometric analyses of the chromosomes were performed according to Levan *et al.* (1964).

Fifty-six metaphases were analyzed through conventional Giemsa staining. The observed diploid number was $2n = 82$ chromosomes. Pairs 1, 6, 9 and 11 were submetacentric, pairs 2, 4 and 5 subteloacentric, pairs 7, 8, 10 and 13 metacentric, pairs 3 and 12 telocentric and the others were microchromosomes with undefined morphology (Figure 1). The identification of a sex chromosome pair was not possible. A comparison between the karyotypes of all cytogenetically known Caprimulgiformes species is presented in table 1.

Although the number of cytogenetically known Caprimulgiformes species is still very small, the preliminary data grouped in table 1 regarding both morphology and number demonstrate a large karyotypic variation between the taxa. It permits the use of karyotypes as an additional tool for taxonomic studies on this group.

Nieto and Gunski (1998) classified the chromosomes with subterminal centromeres as acrocentric, in substitution to the subteloacentric category. In order to make comparisons compatible, these chromosomes were considered as subteloac-

Table 1. Diploid number and morphology of the different chromosome pairs of Caprimulgiformes species already karyotyped.

Family / Species	2n	1	2	3	4	5	6	7	8	9	10	11	12	13	Z	W
PODARGIDAE																
<i>Podargus strigoides</i> (Belterman and De Boer 1984)	72	SM	T	T	T	T	T	T	T	T	T	T	T	T	-	-
CAPRIMULGIDAE																
<i>Nictidromus albicollis</i> (De Lucca and Waldrigues 1986)	78	ST	ST	ST	ST	ST	ST	SM	T	T	T	T	T	T	M	M
<i>Hidropsalis brasiliiana</i> (Nieto and Gunski 1998)	74	T	ST	T	ST	ST	SM	SM	M	SM	M	T	T	T	ST	M
<i>Chordeiles pusillus</i> (Nieto and Gunski 1998)	68	ST	T	T	SM	T	T	ST	M	ST	T	-	-	-	SM	T
<i>Caprimulgus parvulus</i> (Nieto and Gunski 1998)	72	M	SM	SM	SM	M	M	SM	M	M	M	-	-	-	SM	T
<i>Caprimulgus rufus</i> (Nieto and Gunski 1998)	78	ST	ST	T	ST	ST	ST	ST	M	ST	ST	-	-	-	M	M
<i>Lurocalis semitorquatus</i> (present work)	82	SM	ST	T	ST	ST	SM	M	M	SM	M	SM	T	M	-	-

2n = diploid number, M = metacentric, SM = submetacentric, ST = subtelocentric, T = telocentric.

tric. Still, Belterman and De Boer (1984) used the acrocentric category to classify the chromosomes with terminal centromeres. Here, these were considered as telocentrics.

In *P. strigoides*, even for an individual anatomically confirmed as a female, the identification of a sex chromosome

pair was not possible (Belterman and De Boer 1984). These authors suggest that the Z and W chromosomes are microchromosomes, which would hinder their identification. In *L. semitorquatus*, the sex chromosomes were not identified, probably due to the fact that the only analyzed individual could be a male (ZZ), or, like in *P. strigoides*, the sex chromosomes are microchromosomes. Future studies using a larger number of individuals may confirm the localization of the sex chromosome pair in this species.

Even though the phylogenetic relationships of Caprimulgiformes with other bird groups are still controversial (Mayr 2002, 2003, Mayr and Clarke 2003), some authors have suggested that Podargidae, together with Steatornithidae, are closer to the Strigiformes than to Caprimulgidae, Nyctibiidae and Aegothelidae, being more plesiomorphic within the Caprimulgiformes phylogeny (Mayr 2003). If this is ever confirmed in the future, the predominance of telocentric elements in *P. strigoides* would make up a basal karyotype that would have originated karyotypes with variable numbers of elements with median or subterminal centromeres. The great variation observed between the diploid numbers of the different species suggests that chromosomal fusions and fissions may have been responsible for the divergence. However, only the analysis of a larger number of species considering not only morphology and diploid number, but also chromosome bandings, will allow a clear elucidation of the cytotaxonomical relationships of the Caprimulgiformes.

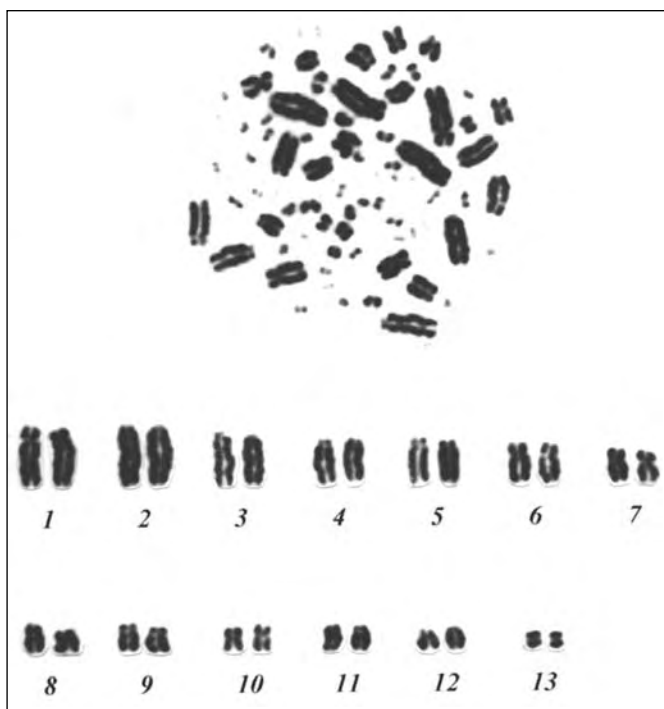


Figure 1. Karyogram of *Lurocalis semitorquatus* (Caprimulgidae).

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