

Nucleolar organizer regions in *Mesocricetus brandti* (Nehring, 1898) (Mammalia: Rodentia) from the Yozgat and Tokat provinces of Turkey

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Abstract: *Mesocricetus brandti* possesses a diploid chromosome number of $2n = 42$, a fundamental number of $NF = 82$, and a fundamental number of autosomal arms of $NFa = 78$. The chromosome set consists of 17 meta-submetacentric pairs, 2 subtelocentric pairs, and 1 acrocentric pair. The X chromosome is large and metacentric while the Y is medium-sized and metacentric. The nucleolar organizer regions were located at the telomeric region of 7 biarmed autosomes and at the centromeric region of 1 acrocentric autosome.

Key words: Turkish hamster, AgNO₃ banding, karyology, Turkey

Türkiye'nin Yozgat ve Tokat illerindeki *Mesocricetus brandti* (Nehring, 1898)'in (Mammalia: Rodentia) nükleolar organizatör bölgeleri

Özet: *Mesocricetus brandti* diploid kromozom sayısı $2n = 42$, otozomal kromozom sayısı $NF = 82$ ve otozomal kromozomların kol sayısı $NFa = 78$ 'e sahiptir. Kromozom setinde 17 metasentrik ve submetasentrik, 2 subtelosentrik çift ve 1 akrosentrik çift bulunmaktadır. X kromozomu büyük bir metasentrik iken Y kromozomu orta büyüklükte bir metasentriktir. Nükleolar organizatör bölgeleri 7 iki kolu otozomların telomerik bölgelerinde ve 1 akrosentrik otozomun sentromerik bölgesinde yerleşmiştir.

Anahtar sözcükler: Türk hamsteri, AgNO₃ bantlama, karyoloji, Türkiye

Mesocricetus brandti (Nehring, 1898) (Turkish hamster) has a wide geographical range and is distributed from the western part of Turkey to the Caucasus and northeastern Iran (Yiğit et al., 2000; Musser and Carleton, 2005).

Differential chromosomal staining and conventional staining of karyotypes of *Mesocricetus brandti* were

achieved by Popescu and DiPaolo (1980), Doğramacı et al. (1994), and Yiğit et al. (2000), respectively from Turkey. However, although both Doğramacı et al. (1994) and Yiğit et al. (2000) described a constant diploid number of $2n = 42$ from Turkey, Yiğit et al. (2000) determined 2 different fundamental numbers (NFs) and fundamental numbers of autosomal arms

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(NFas). In addition, Popescu and DiPaolo (1980) recorded a different diploid number of $2n = 44$, with 3 pairs of acrocentric chromosomes, from an Ankara population of the species. The aim of this study was to present the nucleolar organizer regions (NORs) of the Turkish hamster.

This study was carried out on 3 male Turkish hamsters captured in Yozgat (39°49'N, 34°48'E) and Tokat (40°23'N, 36°04'E) provinces. The specimens were karyotyped according to the method of Patton (1969). AgNO₃ staining of the NORs was achieved using the method described by Howell and Black (1980). Approximately 10 slides were prepared and at least 20 metaphases with distinct Ag-NOR bands were examined for each individual. Definition of the shapes of the chromosomes was established according to the work of Levan et al. (1964). The diploid number (2n), NF, and NFa were also determined. All slides and skinned and stuffed specimens were deposited in the University of Kırıkkale's Department of Biology.

Karyology: All specimens examined from both provinces had $2n = 42$, NF = 82, and NFa = 78. The karyotype consisted of 17 pairs of metacentric and submetacentric autosomes (nos. 1-14 and 17-19), 2 pairs of subtelocentric autosomes (nos. 15 and 16),

and 1 pair of acrocentric autosomes (no. 20). The X chromosome was large and metacentric while the Y was medium-sized and metacentric.

No secondary constriction was encountered in the metaphases examined. The maximum number of NOR-bearing chromosomes was 8. The NORs were located at the telomeric region of the long and short arms of 7 biarmed autosomes and the centromeric region of 1 acrocentric autosome. According to the morphology and size of the chromosomes with Ag-NOR bands, the total number of NOR-bearing chromosomal pairs in *Mesocricetus brandti* is 6 (nos. 4, 9, 16-18, and 20) (Figure).

Popescu and DiPaolo (1980) described a karyotype of *Mesocricetus brandti* from Ankara Province with $2n = 44$ and NF = 82. According to the authors, *M. brandti* possessed chromosomal polymorphisms due to a variable number of acrocentric autosomes. Yiğit et al. (2000) examined conventionally stained karyotypes of the species from Nevşehir, Kırşehir, Kayseri, Van, and Ardahan provinces. These authors determined a constant diploid number ($2n = 42$) and showed geographic variability in the number of autosomal arms. Our results from Yozgat and Tokat provinces were in accordance with the data on the

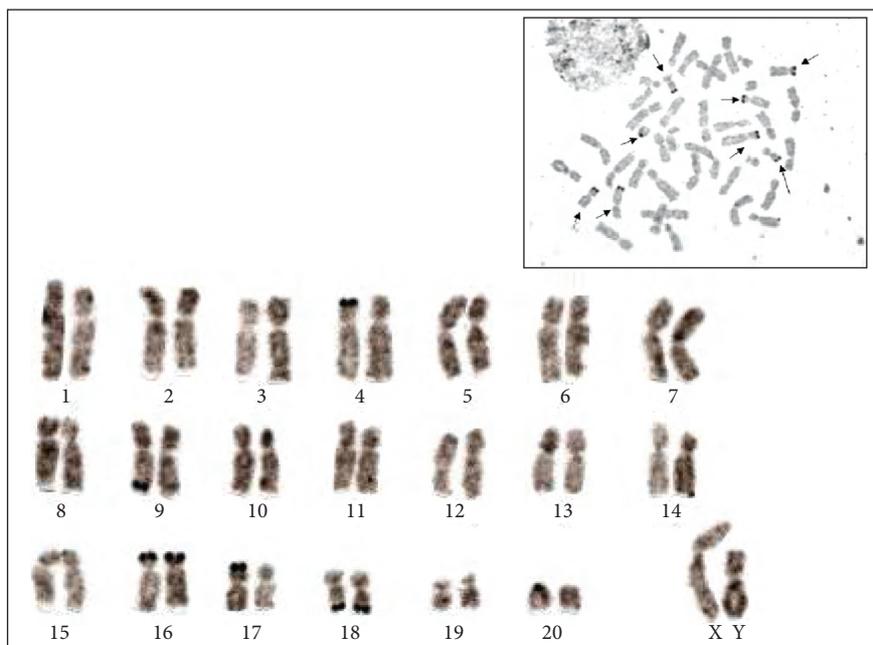


Figure. Ag-NOR stained metaphase plate and karyotype of *Mesocricetus brandti* (arrows indicate NOR-bearing autosomes).

2n, NE, and NFa values of *Mesocricetus brandti* from Nevşehir, Kırşehir, and Kayseri described by Yiğit et al. (2000).

Popescu and DiPaolo (1980) stated that *Mesocricetus brandti* had a maximum of 10 (with an average of 7 or 8) NOR-bearing chromosomes. According to the authors, the NORs were located at the telomeric regions of the long arms and the distal ends of the short arms of the autosomes. In this study, the NORs of the specimens from Tokat and Yozgat were located in the telomeric region of the long and short arms of 7 biarmed autosomes. In contrast to the findings Popescu and DiPaolo (1980), a NOR was also detected in the centromeric region of one uniarmed autosome from the Turkish specimens. This difference

is probably due to the number of NOR-bearing chromosomes at the previous interphase; therefore, as stated by Hayes and Dutrillaux (2000), not all NORs are stained at the same time. Consequently, inner cell variability of the Ag-NOR positive chromosomes was detected in the Turkish specimens. In addition, a different number of acrocentric pairs were identified in the chromosome set than was previously stated by Popescu and DiPaolo (1980).

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