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## *Short Communications*

# Karyotype of *Microtus fortis* (Rodentia, Cricetidae) from extreme south of Far East Russia

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**Abstract.** We examined karyotype of 9 reed voles, *Microtus fortis*, collected from extreme-southern part of Primorsky territory. All animals had 2n=52, but we found polymorphism in No. 7 pair with homomorphic acrocentric (A/A), heteromorphic acrocentric and subtelocentric (A/ST), or homomorphic subtelocentric (ST/ST) type. The karyotype with heteromorphic No. 7 pair (A/ST) was the first report in this species, suggesting that reed voles with A/ST No. 7 pair were developed by hybridization between voles with A/A and ST/ST type No. 7 chromosomes, and that reed voles in the extreme-southern Primorsky territory were mixed population with the three types of polymorphic No. 7 pair. Centromeric C-bands appeared in 13-15 acrocentric pairs in which 6 had telomeric heterochromatic segments. Biarmed chromosomes were C-band negative. The X chromosome had centromeric heterochromatin and the Y chromosome was entirely heterochromatic.

**Keywords**: *Microtus fortis*, Karyotype, G- and C-bands, Heteromorphism

### Introduction

The reed vole *Microtus fortis* Buchner 1889 is widely distributed in Asia. Chromosome analysis of this species has been made from specimens collected from 26 geographical areas in Transbaikal region, Primorsky territory, Mongolia and Korea (Meyer *et al.*, 1967; Meyer, 1978; Orlov *et al.*, 1978; Kovalskaya *et al.*, 1988; Kang and Koh, 1976), and all showed a diploid number of 52 with fundamental number of 62. Similar G-banded karyotypes are shown in the reed voles from West Transbaikalia, Northeast Mongolia and Primorsky territory (Radjabli *et al.*, 1984; Kovalskaya *et al.*, 1991). However, geographical variations in number and distribution of heterochromatin are found in their karyotypes from animals collected in different regions above mentioned (Kovalskaya *et al.*, 1991). The present report describes the G- and C-banded karyotypes of reed voles derived from extreme southern part of Primorsky territory, and polymorphism of No. 7 chromosome pair.

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### Materials and methods

Nine reed voles of 7 males and 2 females were trapped in Primorsky territory, Khasansky district, 8 km to the southeast and 12 km to the north from the settlement Khasan. Chromosome preparations were made by direct bone marrow method. G- and C-bands were induced by the methods described by Seabrigtht (1971) and Sumner (1972), respectively.

### Results and discussion

All specimens had a diploid chromosome number of 52. Karyotype in seven specimens contained 4 pairs of metacentric (M) or submetacentric (SM), 3 pairs of subtelocentric (ST), and 18 pairs of acrocentric (A) autosomes. The X chromosome was the largest metacentric and the Y chromosome was the smallest acrocentric (Fig. 1). However, the two males had a different constitution of No. 7 pair; one had heteromorphic pair with acrocentric and subtelocentric (A/ST type) (Fig. 1a), and the other homomorphic with two acrocentrics (A/A type) (Fig. 1b). Seven animals had homomorphic with subtelocentrics (ST/ST type) in the No. 7 pair (Fig. 1c). Thus, the present results revealed that reed voles collected from Primorsky territory had

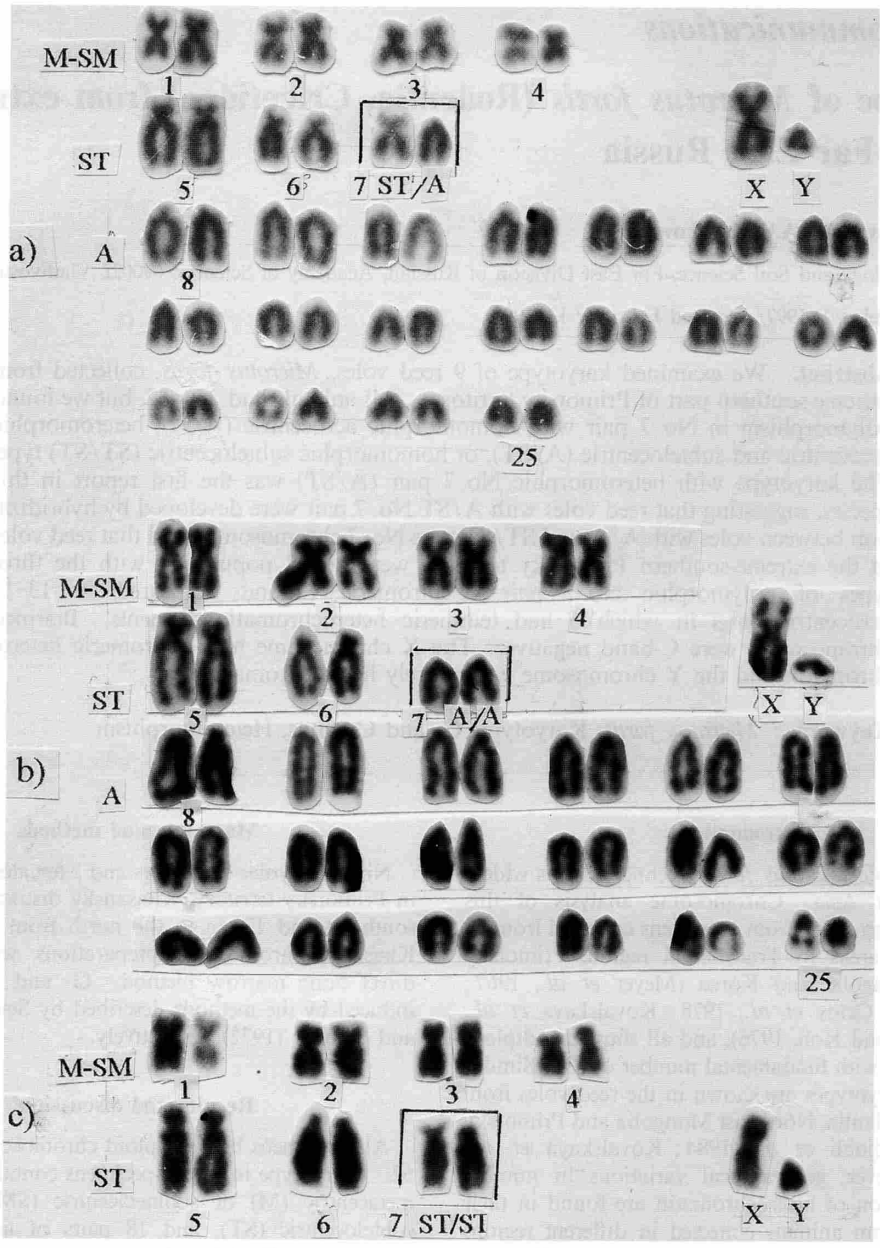


Figure 1. Karyotype showing polymorphism in reed voles, *Microtus fortis*, from extreme-southern Primorsky territory. a) A/ST type of No. 7, b) A/A type of No. 7, c) partial karyotype showing ST/ST type of No. 7.

three types of No. 7. pair, indicating polymorphism of chromosome 7. Since so far in literature reported the karyotype of the reed voles collected from several localities contained either A/A type or ST/ST type in the No. 7 pair (Radjably *et al.*, 1984), the present finding was the first report for heteromorphic feature of A/ST type of No. 7. The size of acrocentric and subtelocentric chromosomes of the 7th pair was almost the same, and the G-band analysis suggested that pericentric inversion would result in the formation of an acrocentric or subtelocentric chromosome (Fig. 2a).

C-bands located in centromeric regions of 13-15

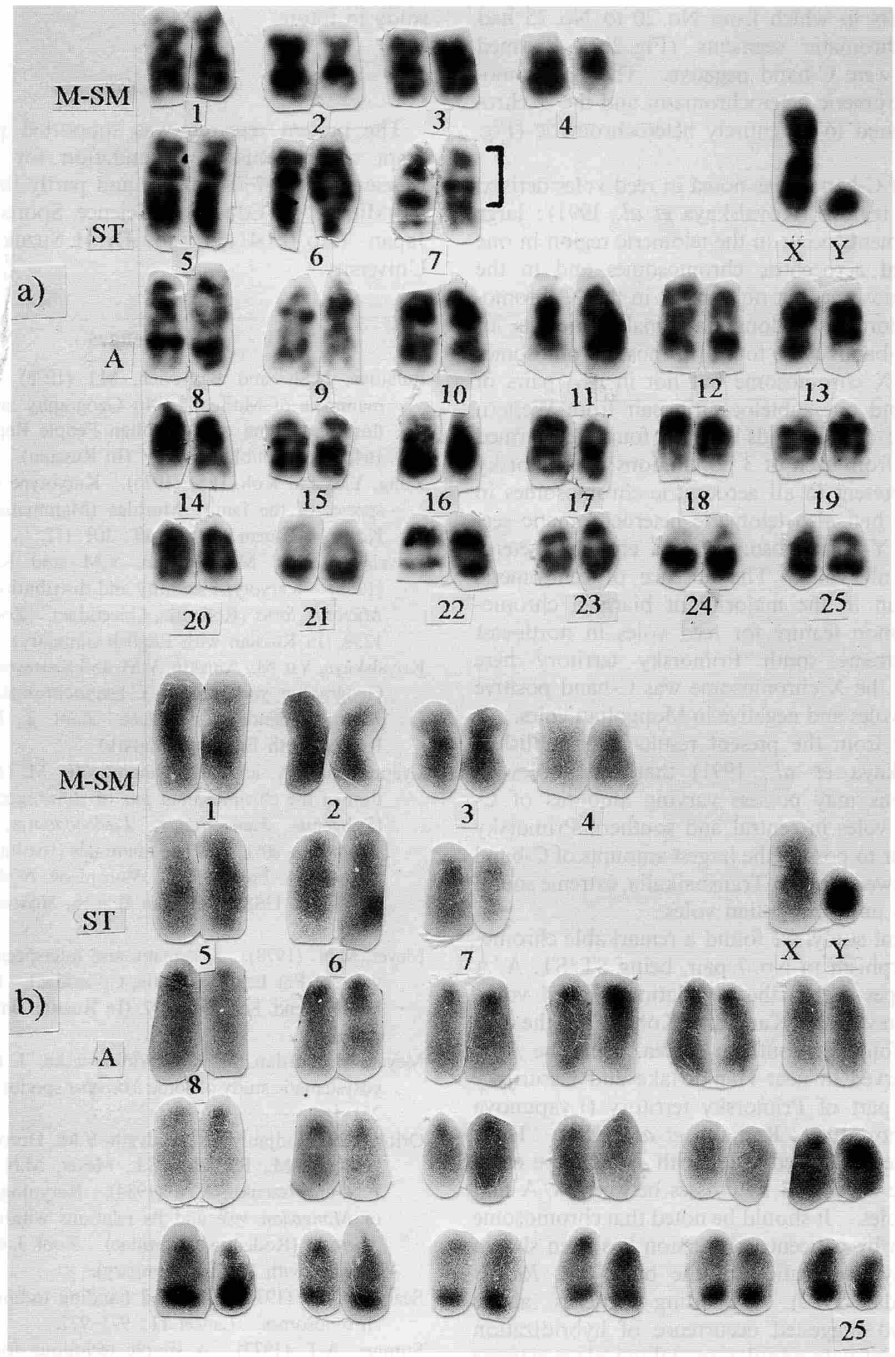


Figure 2. Karyotype of reed vole, *Microtus fortis*, from extreme-southern Primorsky territory. a) G-banding. A bracket indicates presumed pericentric inversion, b) C-banding.

acrocentric pairs in which from No. 20 to No. 25 had distal heterochromatic segments (Fig. 2b). Biarmed chromosomes were C-band negative. The X chromosome had centromeric heterochromatin and the Y chromosome appeared to be entirely heterochromatic (Fig. 2b).

Variation of C-bands was noted in reed voles derived from different regions (Kovalskaya *et al*., 1991) : large C-positive segments occur in the telomeric region in one of middle-sized acrocentric chromosomes and in the entire Y chromosome, but no C-band in the X chromosome from northeast Mongolia ; small amounts of centromeric C-bands were found in most chromosomes including the X chromosome but not in two pairs of metacentrics and one subtelocentric pair from Western Transbaikalia ; and C-bands were not found in biarmed chromosomes from each of 3 populations in Primorsky territory but present in all acrocentric chromosomes in which 7 pairs had also telomeric heterochromatic segments. The Y chromosome was entirely heterochromatic in all voles. The absence of centromeric heterochromatin in the majority of biarmed chromosomes is common feature for reed voles in north-east Mongolia, extreme south Primorsky territory here examined, but the X chromosome was C-band positive in Primorsky voles and negative in Mongolian voles. It would appear from the present results and published data (Kovalskaya *et al*., 1991) that reed voles in different regions may possess varying amounts of C-bands. Reed voles in central and southern Primorsky territory appear to possess the largest amounts of C-band materials followed western Transbaikalia, extreme southern Primorsky and Mongolian voles.

In the present study, we found a remarkable chromosome polymorphism in No. 7 pair, being ST/ST, A/A and A/ST types within the population of reed voles. As reported previously (Kang and Koh, 1976), the ST/ST type was found in southern Korea, while the A/A type was observed in near Hanka lake and Ussurijsky city in cetral part of Primorsky territory (Lyapunova and Mirokhanov, 1969 ; Radjabli *et al*., 1984). These results suggested that reed voles with A/ST type chromosomes were developed by crosses between A/A and ST/ST type-voles. It should be noted that chromosome polymorphism by pericentric inversion has been shown in the karyotype evolution of the black rat, *Rattus rattus* (Yosida, 1980). C-banding patterns above mentioned also suggested occurrence of hybridization between different vole populations taking place extreme south of Primorsky territory, Khasan district. Therefore, reed voles in south Primorsky territory are mixed population with three polymorphic types (A/A, A/ST and ST/ST) of No. 7. It is not known which voles have adaptability in this region and this remains to study in future.

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