151. A Chromosome Survey of the Red-backed Mouse,
Clethrionomys rufocanus bedfordiae, in Hokkaido,
with a Note of a Karyotypically
Abnormal Specimen^{*)}

By Shin-ichi SONTA,^{**)} Isamu HAYATA,^{**)}
and Tsuneaki KOBAYASHI^{***)}

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Since the first description of chromosome polymorphism in the common shrew, *Sorex araneus*, (Sharman 1956, Ford *et al.* 1957), several types of intra-specific chromosomal variations have been known to occur not infrequently in some mammalian species, particularly in the rodent. The most extensive studies of this sort have been carried out in the African pigmy mouse, *Mus minutoides*, and detailed discussion has been presented from the karyotaxonomic and evolutionary stand point (Matthey 1963, 1966, 1967).

The red-backed vole, *Clethrionomys rufocanus bedfordiae*, is the most dominant species of voles in Hokkaido. On account of certain individual differences in certain external as well as cranial characteristics there have been some discrepancies in the classification of this species (Ota 1956, Imaizumi 1960). The species name in the present report was referred to Tokuda (1941). Shimba *et al.* (1969) studied the somatic chromosomes of this in 12 specimens collected from 3 different localities in Hokkaido, and found no evidence of chromosomal polymorphism in this species. The karyotype of an allied species, *C. rutilus mikado*, however, was found to be slightly different from that of the former with regard to the centromeric position of the Y chromosome. Two isolated forms of *C. rufocanus bedfordiae* in the Rebun and Daikoku islands were found to be karyotypically identical to the standard form, but the number of specimens studied was not large enough to make any generalization. The situation has enhanced us to extend the chromosomal survey of this interesting species in a large scale. This report deals with new

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^{**)} Chromosome Research Unit.

^{***)} Institute of Applied Zoology, Faculty of Agriculture, Hokkaido University, Sapporo.

chromosomal data so far derived from 72 specimens collected in 4 different localities, among which one specimen was remarkable by having a slight karyotype different from the standard one.

Materials and methods. A total of 72 specimens including 31 males and 41 females were collected from 4 different localities in Hokkaido during May to September of 1970 (Table I). They were trapped alive and injected intraperitoneally with 0.5 ml of 100 μ g/ml colchicine solution for 2 hours. The bone marrow was taken from the femur and suspended in a hypotonic KCl (0.075 M) solution for 30 minutes at 37°C and fixed in a mixture of methanol and acetic acid (3:1). Chromosome slides were made by the routine air-drying method and stained with Giemsa. In each specimen 18 to 35 reliable metaphases were analyzed.

Results and remarks. As shown in Table I, all of the 72 specimens studied showed the diploid number of 56. The karyotype, except for one specimen, was identical to that reported by Shimba *et al.* (1969): there were 2 metacentrics and 54 acrocentrics in both sexes (Fig. 1). Among the 54 acrocentrics the X chromosome was

Table I. Chromosome counts of *Clethrionomys rufocanus bedfordiae* from several localities in Hokkaido

Locality	Number and sex of specimens	Chromosome count										Total no. of cells counted
		50	51	52	53	54	55	56	57	4n		
Naganuma	4♂			1	2	2	4	100			109	
	7♀					2	6	158	1		167	
Sarobetsu	5♂			1	1	9	11	106		1	129	
	7♀	1			2	7	15	154		1	180	
Yukomanbetsu	3♂		1		1	2	6	72		1	83	
	7♀			1	1	10	14	165			191	
Akkeshi	19♂			1		11	25	303	1	1	342	
	20♀		1	1	3	18	17	321	2		363	
Total	72	1	2	5	10	61	98	1379	4	4	1564	

Table II. Measurements of external and cranial characters of an exceptional specimen having an abnormal chromosome constitution

External measurements:	
head and body length.....86 mm	ear length.....11 mm
tail length27 mm	hind foot length18 mm
Cranial measurements:	
basal length.....20.0mm	breadth of first upper molar.. 1.2mm
palatila length.....10.7mm	length of auditory bulla..... 5.6mm
diastema 6.7mm	breadth of rostrum.....58.8mm
zygomatic breadth 6.2mm	hight of skull..... 8.4mm
interorbital breath..... 3.9mm	breadth of braincase.....11.0mm
length of upper molar series 5.2mm

Fig. 1. A standard karyotype of a male red-backed mouse, *Clethrionomys rufocanus bedfordiae*. Fig. 2. Karyotype of an exceptional male having an unusual medium-sized submetacentric chromosome, indicated by an arrow.

apparently one of the large acrocentrics, while the Y the smallest element. The exceptional animal with an unusual karyotype was a young male trapped in Akkeshi. This specimen was characterized by an acrocentric element which was substituted by a medium-sized submetacentric chromosome (Fig. 2). This character was consistent from cell to cell in this specimen. A tentative interpretation of pericentric inversion in one of acrocentric autosomes was made for this abnormality. The body of this young animal was covered with juvenile pelage, blackish brown on the back and deep mouse grey on the belly. Its posterior part of the third upper molar was not worn. Although the age of this animal was not determined with certainty, careful examinations and measurements of some external and cranial features failed to detected any deviation from the standard pattern

of the usual one (Table II). A mention should be made here that 5 of the 10 individuals collected in the Yukomanbetsu area were slightly different in external features from the others, by having darker pelage, longer tail and a complicated enamel pattern of posterior loop of the third upper molar, and so on (Abe *et al.* 1971). No chromosomal difference was detected, however, between this form and the standard one of *C. r. bedfordiae*.

In the genus *Clethrionomys*, the following 5 species have been studied karyotypically: *C. rufocanus bedfordiae*, *C. gapperi*, *C. occidentalis*, *C. rutilus mikado* and *C. glareolus* (cf. An Atlas of Mammalian Chromosomes 1969, 1970; Shimba *et al.* 1969). Comparison of the data presented in these reports may lead to the conclusion that the karyotypes of the above 5 species are very similar and no definitive numerical and morphological differences are detectable among them, except for a slight difference in the centromeric position of the Y chromosome in the latter 2 species. In this context, the exceptional specimen here concerned is to be worth-mentioning on account of a possible inversion heterozygote. Further studies with many specimens from the same and different localities are requested for decided statements.

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