A Note on the Somatic Chromosomes of the Japanese Pika, *Ochotona hyperborea yesoensis* Kishida[1)]

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(*With 1 Text-figure*)

According to Simpson (1945), living lagomorphs are divided into two families, Ochotonidae and Leporidae. It was stated that late Eocene and subsequent fossils recorded as *Eurymylus* are prototypes of both the Ochotonidae and the Leporidae, and they all fall properly into one or the other of the living families. Because of their interesting palaeontological and morphological characters and also of ecological distinction having peculiar habits, crying, leading strong social life, bounded habitat preference, pikas or ochotonids have attracted attentions of many naturalists, and their ecological studies are frequently referred to in the literature (Kishida 1930, Inukai 1932, Hamilton 1939, Loukashkin 1940, Hayward 1952, Sakagami *et al.* 1956, Haga 1960, Kawamichi 1969). Notwithstanding their evolutionary interest, cytogenetic investigaton of ochotonids has not been made so far as the present authors are aware. Pikas generally live as alpine mammals in the holarctic and rather inaccessible regions. The distribution of the Ochotonidae was known to cover Eurasian Continent to the north of the Himalayas, the Rockies in North America and Hokkaido (Grassé et Dekeyser 1955, Kishida 1930). The pika, *Ochotona hyperborea yesoensis* Kishida recorded from Japan as a sole representative of the Ochotonidae, is a rare alpine mammal and inhabit around central heights of Hokkaido, Mts. Taisetsuzan, Mts. Hidaka and Mts. Ashibetsu, being restricted to inaccessible talus and forest zones (Haga 1960). The present paper deals preliminarily with the somatic chromosomes of the pika collected in the talus zone of Mt. Midoridake of Mts. Taisetsuzan.

Methods

Immature adult pikas of both sexes were shot on the top of the rock, and immediately after killing marrow samples were taken from the femur. The specimens thus obtained were placed into 15 ml glass centrifuge tubes containing 8.5 ml of culture medium (TC–109), 1.5 ml of calf serum and 2.5γ of colchicine. The tubes were put into breast-pocket (20–

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30°C) to incubate for 1.5 hours. Then they were centrifuged. The sedimented marrow cells were treated with a hypotonoic solution (0.075 M KCl) for 15 minutes in the pocket and fixed with Carnoy's solution (3:1). Chromosome spreading was achieved through

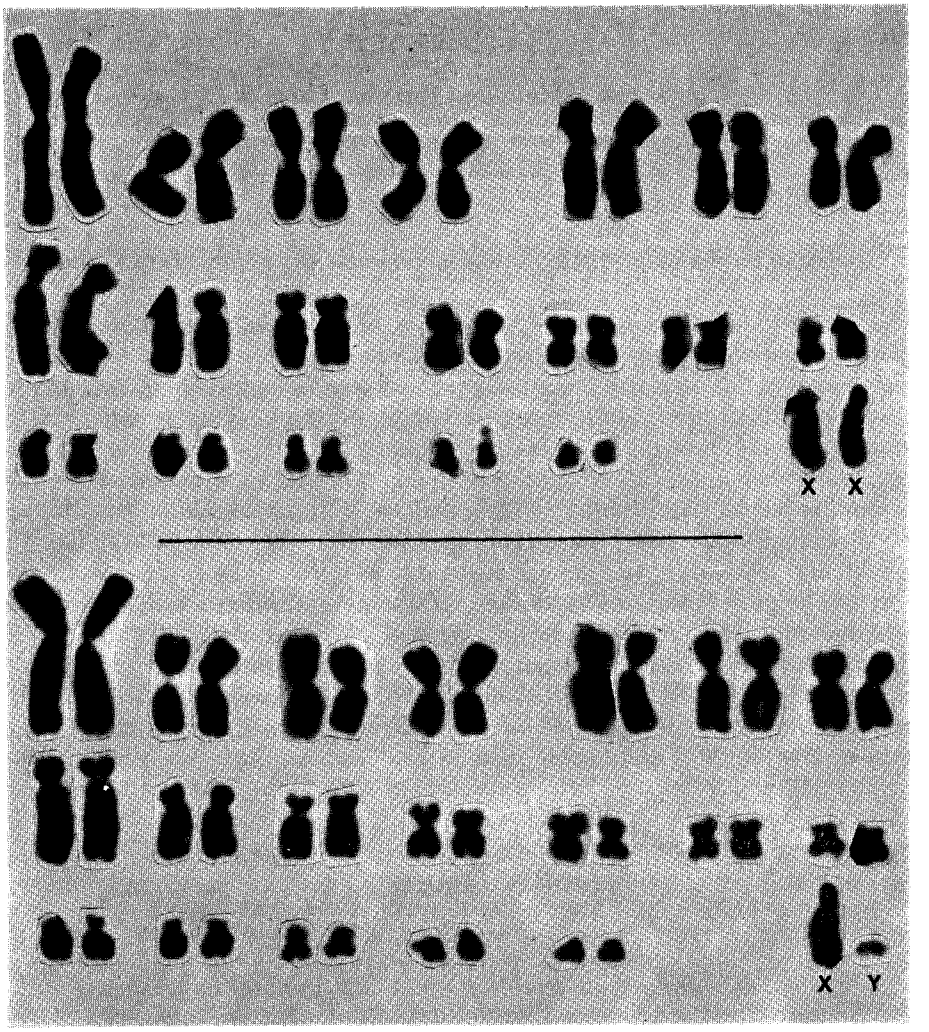

Fig. 1. Karyotypes of female (top) and male (bottom) *Ochotona hyperborea yesoensis*, from bone marrow metaphases.

the routine air-drying method of Rothfels and Siminovitch (1958) with a slight modification in combination with Giemsa staining. Metaphase chromosomes were serially arranged according to the descending order of length with particular consideration toward the position of centromeres (Fig. 1).

Results and Discussion

On the basis of chromosome counts in 48 well-spread metaphase plates, the diploid chromosome number was determined as 40 for this species. The larger autosomes consist of 4 pairs of metacentrics, 3 pairs of submetacentrics and 3 pairs of subtelocentrics. The smaller autosomes are composed of 4 pairs of meta- or submetacentrics, 3 pairs of subtelo- or submetacentrics, one pair of satellited submetacentric chromosomes, and the remaining smallest pair difficult for morphological analysis. On account of their well-defined size-relation, the largest pairs of metacentrics and subtelocentrics can readily be identified from others. A remarkable secondary constriction near the centromere was observed in the second largest pair of metacentrics. Sex chromosome constitution was XY for the male and XX for the female. The X chromosome seems to correspond to one of the large-sized subtelocentrics, ranking second or third in this group. The Y chromosome seems to be represented by the smallest acrocentric. In reference to the karyotypes of lagomorph mammals so far reported, the karyotypes of the pika here concerned are considerably different from those reported by some investigators (Dave *et al.* 1965, Worthington and Sutton 1966). The X chromosome of the present species is of subtelocentric structure, but that of leporid species is submetacentric or metacentric in nature. While the acrocentrics are almost absent in this species, larger acrocentrics are prominent and frequent in occurrence in leporids so far reported, with the diploid number larger than this species. The difference in the karyotype between the Japanese pika and leporid mammals is apparently difficult to be explained on the basis of the Robertsonian mechanism. Then the cytogenetic features here obtained support the taxonomical view that there is no close phylogenetical kinship between them (Simpson 1945).

Summary

The chromsomes of the Japanese pika, *Ochotona hyperborea yesoensis* Kishida, were studied. The diploid chromosome number of 40 with an XX-XY sex-mechanism was established. The larger autosomes are represented by 4 pairs of metacentrics, 3 pairs of submetacentrics and 3 pairs of subtelocentrics. The smaller ones consist of 4 pair of meta- or submetacentrics, 3 pairs of subtelo- or submetacentrics, one pair of satellited submetacentrics and the remaining smallest pair. The X chromosome is represented by the large-sized subtelocentric, while the Y chromosome by the smallest acrocentric. The karyotypes of the pika are considerably different from that of leporids so far reported, suggesting no close phylogenetical kinship between them.

Acknowledgements: It is the authors' pleasure to express their sincere appreciation to Professor Sajiro Makino for his guidance and improvement of the manuscript, and to Drs. Motomichi Sasaki, Fusao Yamasaki, Hisashi Abe and Takeo Kawamichi for their important advice and helpful suggestion.

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Addendum in proof: After this paper went to press, the authors found a short paper by Nadler *et al.* (1969) in which the chromosomes of *Ochotona rufescens* were reported as 2n, 60 (Nadler C. F., D. M. Lay and J. D. Hassinger 1969: Chromosomes of three Asian mammals, Experientia 25: 774-775). It seems to the authors that the chromosomal difference between *O. rufescens* and the present species can not be explained on the basis of Robertsonian mechanism.