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Rearing of Plateau Pika (Ochotona daurica) Captured in Mongolia

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Abstract: We attempted to rear and breed Plateau pikas (*Ochotona daurica*) captured in Mongolia in 1994 and 1995. In rearing indoors, though coitus was observed, none of the females became pregnant. In rearing outdoors, males began to make high-pitched, continuous cries and the first offspring (3 newborns) were obtained in June, 1997. The body weight averaged 8.4 g at birth, and 75.8 g at 4 weeks of age. They were weaned at 4 weeks of age. In August the testes, which had descended into the scrotum, atrophied. In September, the atrophied testes returned to the abdominal cavity. These results indicate that breeding of plateau pikas is possible when they are reared outdoors, and they have a specific reproductive season.

Key words: *ochotona daurica*, outdoor rearing, plateau pika

Pikas belongs taxonomically to the *Ochotona* of the *Ochotonidae* of the *Lagomorpha* [1]. They have been attracting close attention as experimental animals because they are small and easy to handle. Puget [7–9] succeeded in breeding Afghan pikas (*Ochotona rufescens rufescens*) by rearing them indoors in 1969. The Central Institute for Experimental Animals began to develop Afghan pikas from Puget as experimental animals [5]. Since pikas do not show signs of cannibalism, they have often been used for teratogenicity

studies [6]. In basic reproductive studies, pika fecundity is outstanding and it has such features as excessive ovulation and excessive luteinization [12]. Taking note of the fact that pika usually live at high altitudes and in relatively cold climates, it has been suggested that pikas may be useful for studies of the mechanism of body heat generation and temperature regulation [2–4] or adaptation to high altitudes [10, 11].

We captured plateau pikas in 1994 and 1995 with the permission of the Mongolian government. The captured

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plateau pikas were of the species *Ochotona daurica* (1776, Pallas), the same as pikas living widely in the Qinghai Province of China, and in Tibet and Russia. They are gentle and obedient by nature and seem to be suitable as experimental animals. This paper reports our attempts to breed Mongolian plateau pikas in Japan.

We visited a grassy plain in the suburbs about 60 km from Ulaanbaatar, Mongolia twice (in July, 1994 and August, 1995) to investigate populations of plateau pikas (*Ochotona daurica*). Twenty-five plateau pikas of both sexes, captured during our stay, were immediately transported by air from Ulaanbaatar to the Central Institute for Experimental Animals. After quarantine inspection at the institute, the pikas were kept in the animal room of the National Institute of Neuroscience in the National Center of Neurology and Psychiatry.

The pikas were reared according to the method used for Afghan pikas [5]. The animal room was kept at a temperature of $22 \pm 2^\circ\text{C}$ and a humidity of $55 \pm 5\%$. The air was replaced with fresh air 10–15 times per hr. The lighting conditions were a 16 hr light period (6.00 a.m.–10.00 p.m.) and a 8 hr dark period. Aluminum cages ($60 \times 50 \times 25$ cm) with a metallic net floor were used to house the animals. A wooden nesting box ($28 \times 17 \times 15$ cm) was placed in each cage. Dry grass was placed in each nesting box. At the beginning, one pika was allocated to each cage. All pikas were daily given appropriate amounts of commercial solid diet for pikas (CIEA-117), fresh vegetables, edible roots and fruits. A 200 ml water supply bottle was used to allow each animal free access to tap water. During the mating period one male was housed together with one female. Each pair was observed for coitus. During coitus, the male mounts the back of the female, and the female raises the lower part of the body to accept the male. Each pair which showed coitus was left in the same cage overnight. For the pairs which failed to show coitus, the male was separated from the female on the same day, and these animals mated again after a few days.

Since plateau pikas were unsuccessfully bred by the method mentioned above, we then attempted to rear the pikas outdoors in May, 1996. Four pairs of pikas, which had been reared indoors, were moved to an outdoor cage. The outdoor cage measured 180 cm in width, 90 cm in depth and 90 cm in height. The floor and front of the cage were made of metallic net, and the other portions made of wood. The cage was divided into

four segments by partition boards. A wooden nesting box was placed in each segment to be used for parturition and nursing. Green grass and a commercial solid diet (CIEA-117) were given to the animals. A 500 ml water supply bottle was used to allow the animals free access to tap water. One male and one female were always housed together in each segment of the cage. The outdoor cage was placed in a sunny and well-ventilated location on the south side of the building. In summer, a reed screen was used to shield the cage from direct sunlight. In winter, a vinyl sheet was put over the cage to protect the animals from cold.

Indoor rearing: Table 1 show changes in the body weight of plateau pikas during indoor rearing. The initial body weight of the first colony (8 females and 7 males) was 117.8 ± 19.8 g (mean $\pm$ SD) for females and 121.7 ± 20.9 g for males. Five months later, it averaged 128.0 ± 23.9 g for females and 131.0 ± 16.7 g for males. In one female (No. p-6), the initial body weight (148 g) increased to 174 g in two months. In one male (No. p-13), the initial body weight (152 g) increased to 178 g. In the second colony 2 females and 3 males were almost mature (body weight: 120–160 g) when introduced, and the other 2 females and 3 females were juvenile with lighter body weights (38–66 g). Five months later, 1 female and 1 male from the mature group had a body weight of 174 g, and 2 juvenile females grew to 110–112 g.

Table 1 shows the period (in days) for which the captured pikas were reared indoors. In the colony first introduced, 2 females and 3 males died 1.5 months after introduction, 4 females and 1 male died within one year, and the remaining 2 females and 3 males survived for 1 to 2 years. In the second colony, 3 juvenile males died 2.5 months after introduction, one female died within 7 months, and the remaining 3 females and 3 males survived for more than one year (more than 3 years for one female and male). In some animals, weight gain caused by consumption of solid diet and vegetables had continued normally up to death. Several animals (females Nos. p-1, p-6 and p-7, and males Nos. p-9, p-13 and p-14) died a few days after mating although no trouble with their partner had been noted. The exact cause of death in these animals was unknown. In one female (No. p-5), infestation by warble fly larvae (*Hypoderma bovis*) induced anorexia and severe weight loss, leading to death from marasmus.

Table 1. Indoor and outdoor rearing periods of the Plateau pika (*O. daurica*)

First colony						Second colony							
No.	sex	weight (g)		Rearing days			No.	sex	weight (g)		Rearing days		
		at intro- duction	five months later	In door	Out door ¹⁾	Total			at intro- duction	five months later	In door	Out door ¹⁾	Total
p-2	♀	120	120	36		36	P-25	♂	54	82	9		9
p-3	♀	100	110	36		36	P-26	♂	56	82	25		25
p-15	♂	92	108	36		36	P-27	♂	66	111	73		73
p-10	♂	124	120	47		47	P-21 ⁴⁾	♀	142	174	270		270
p-11	♂	140	134	47		47	P-20	♂	144	134	330	60	390
p-5 ²⁾	♀	130	102	106		106	P-23	♀	140	136	335	65	400
p-9	♂	120	126	220		220	P-22	♂	160	158	361	91	452
p-7	♀	100	120	274		274	P-29	♀	38	110	754	519	1273
p-8 ³⁾	♀	90	76	334		334	P-24 ⁵⁾	♂	120	174	754	575	1329
p-6	♀	148	162	335		335	P-28 ⁵⁾	♀	44	112	754	575	1329
p-1	♀	120	114	368		368							
p-14	♂	100	112	422		422							
p-13	♂	152	152	452		452							
p-4	♀	134	142	675	33	708							
p-12	♂	124	134	711	69	780							

1): Days after changing from indoor rearing to outdoor rearing. 2): Died from parasiticon larvae of *Hypoderma bovis* larva of the warble fly. 3): Died from leg fracture. 4): Died from water leakage. 5): Breeding pair.

The coitus seen in the plateau pikas during the indoor rearing period was as follows. In the first colony randomized 1:1 mating among 6 females and 5 males resulted in coitus 19 times in 15 pairs. In the second colony, coitus was observed 12 times in 7 pairs, but none of the females in either colony became pregnant.

Outdoor rearing: Four pairs of pikas from the indoor rearing were moved to an outdoor cage on May 4, 1996. The pikas, which were fed green grass and a solid diet, created a number of tunnel-shaped holes within the piles of grass. In mid-October, 1996, 5 months after they were moved to the outdoor cage, the male pikas began to make long-lasting high-pitched cries, like the chirping of small birds. They produced two or three and sometimes five or six such cries a day between 7:00 pm and 11:00 pm. The cries were also heard around 4:00 in the morning. These cries ceased around mid-July of the following year. About August of the same year, the testes which had descended into the scrotum, atrophied. In September the atrophied testes were detected in the abdominal cavities of these males.

Coitus was not observed in the plateau pikas during the outdoor rearing period, but the first three offspring were born to one of the continuously mating pairs on June 15, 1997. These pups were nursed in the nesting

Fig. 1. Changes in body weight of the *O. daurica* during outdoor rearing.

box. The pups were completely hairless, and their eyes were closed. Seven days after birth, their skin became black. By ten days after birth, brown hair had grown all over their bodies.

At 13 days of age, the offspring opened their eyes and walked out of the nest box. At 21 days of age, they began to eat green grass and solid diet. Figure 1 shows the changes in body weight. Their body weight,

which was 8.4 g at birth, increased to 52.3 g on average at 3 weeks of age and to 75.8 g at 4 weeks. They were weaned at 4 weeks. Their body weight increased linearly thereafter, being 117.5 ± 14.2 g at 8 weeks of age, 136.7 ± 11.4 g at 10 weeks and reached a plateau (156.5 g) at 13 weeks.

We attempted to breed captured plateau pikas (*Ochotona daurica*) indoors. Plateau pikas are gentle and obedient by nature and were easy to handle. Their body weight was 38–152 g at the time of introduction. During the rearing period, the maximum body weight was 174–178 g for both males and females, and did not exceed 200 g. The body weight of mature plateau pikas is therefore estimated to range between 140 and 170 g, which is slightly less than that of Afghan pikas whose average body weight is reported to be 250 g [5].

It is known that the breeding season for *Ochotona daurica* in China is April through September, and that they deliver pups twice a year (5 or 6 newborns at a time). Randomized 1:1 mating of 10 females and 8 males in indoor cages in the present study resulted in coitus in 31 pairs, but none of the females became pregnant. He Xingiao (Prof of Shanghai Laboratory Animals Center) attempted to breed plateau pikas of another species (*Ochotona curzoniae*) indoors, and found traces of implantation in the uteri of 3 dead females (personal communication, 1992). These results suggest that when pikas fail to adapt themselves to the environment, even if they are successful in coitus, implantation or other steps after fertilization are disturbed by stress and lead to failure to become pregnant.

Outdoor rearing approximates the natural environment more than indoor rearing. It involves changes in the outdoor air temperature, the duration of sunshine and feeding on green grass. These things are thought to lead to the breeding of plateau pikas.

In mid-October (5 months after some plateau pikas were moved from indoor cages to outdoor cage), males began to produce cries. Their high-pitched, continuous cries, like the chirping of small birds, continued to be heard until mid-July of the following year. Subsequent birth of pups suggests that the pikas successfully adapted themselves to the outdoor environment, and are able to become pregnant and deliver pups. The typical cry of male pikas is thought to play important roles in announcing their presence, maintaining their territory and

forming a pair with a female. The cries of males ceased at the end of July. In August, the testes which had descended into the scrotum, atrophied. In September, the atrophied testes returned to the abdominal cavity, suggesting that they were in the period of reproductive rest at that time. It therefore appeared that plateau pikas have a specific breeding season.

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