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# Social Relations among Young Yezo Brown Bears in Captivity<sup>1)</sup>

By

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(With 3 Text-figures and 2 Tables)

The brown bear is one of the largest carnivorous animals in the Palaearctic region, and is divided into various subspecies within its wide distribution range. Several writers have recently published excellent works on the habit (e.g. Krott 1962, 1962a), but there are still unsolved problems especially with reference to their social behaviour.

In Hokkaido (the northern Japanese island) and the southern Kurile Islands, there is one subspecies of *Ursus arctos*, *U. a. yesoensis* Lydekker, whose population has recently been estimated at about 3,000. Except for a few observations on its general habits (Inukai 1933, 1955), there is no closer study of the social behaviour of this subspecies. This is apparently due to various traits which obstruct detailed observation: viz. the solitary and nocturnal nature of their life, the relatively wide home range in wild forests which makes them difficult to survey, and above all their formidable power which occasionally produces dangerous results especially when man is encountered suddenly.

As the first step in studying the sociology of wild Yezo<sup>3)</sup> brown bears, the author tried to observe their social habits in captivity at the Noboribetsu Bear Garden. Obviously the behaviour which animals show under artificial conditions may deviate considerably from that seen under natural conditions. Yet it is also true that even such animals can provide us with many valuable suggestions as to the basic behavioral trends which likely govern their mode of life, whether in a wild or captive state.

The observations were started in February, 1963, but were interrupted the following January due to circumstantial difficulties. Therefore this paper only deals with the social dominance established in two groups of different age.

## Animals and Method

All the bears kept in the Garden were captured at many different places, although

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3) Yezo is the ancient name of Hokkaido.

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mainly in the Taisetsu and Hidaka Mountains, from late February to May. After arrival they were reared in a small fenced area. Each individual was chained separately, yet close enough together to make possible individual recognition of one another. After a half year of such confinement they were released together in a large open enclosure. While they were in chains milk was at first supplied several times per day to each individual, and then gradually replaced with various solid foods such as rice, biscuits, vegetables etc. according to their growth.

After they were transferred into the large enclosure, food was usually placed only once a day on the floor of a small room adjoining the enclosure. Every evening the bears were driven into it to feed them. They spent the night there until the gate of the enclosure was opened the next morning.

One of the groups, in captivity since 1961, consisted of 14 individuals, 6 males and 8 females, and was named group S (-enior). J (-unior) group was caught in 1962 and contained 10 individuals, 7 males and 3 females. All of them, with the exception of one pair of females in group J, likely came from different parents. Their exact body size and weight were very difficult to measure under these circumstances, but even among individuals of the same age there appeared to be considerable difference.

The Noboribetsu Bear Garden is located on the southern slope just below the peak of Mt. Shihôrei, at about 560 m, and is near the town of Noboribetsu-onsen which is known for its hot springs. There are two main enclosures, 1,000 and 700m<sup>2</sup> respectively, and the small fenced area mentioned above. Both enclosures are surrounded by concrete walls about 2.5-3.5 m high, and each has an attached cage where the bears spend every night (Fig. 1).



Fig. 1. Bear enclosures of the Noboribetsu Bear Garden. Upper, the large enclosure with group S. Lower, the smaller one with group J.

The ground of the larger enclosure was originally only a bare muddy surface except for a small cemented part. However it was all paved with cement late in the summer of 1963. In the smaller one, which remained untreated, several dens were dug by the bears themselves. The larger enclosure has two, while the smaller has one stand from which spectators can look down on the bears and freely throw them food. The large enclosure has two dead trees in the center, whereas the small one has several living trees which certain bears would climb to heights of 6-8 m.

Group S was first reared in the smaller enclosure, and transferred to the larger one in

July, 1963. Group J was transferred to the small enclosure from the fenced area in March, 1963.

The survey was carried out intermittently from February, 1963 to the following January, mainly upon the two groups mentioned above, with occasional observations of newly arrived cubs. Antagonistic and other social behaviours of the bears were recorded during the daytime when they were in the open areas. The competitive food-getting test, that of throwing pieces of biscuit or apple down between two individuals, was sometimes applied to determine the dominance-subordination relationships between them.

### Observations

#### General daytime activities.

*Group S:* As soon as the shutter of the gate of the larger enclosure was opened, the bears were driven through it out of the sleeping cage. This was about 9:00 in the morning in winter and about 7:00 in summer. They usually dispersed over the field, walking slowly, sniffing the air, searching for food, shaking themselves, etc. Then some of them would begin pseudo- or play-fighting such as punching, pushing, biting, chasing and wrestling one another. One round of wrestling might sometimes continue for about half an hour, and was usually between two males. Some of the others loitered about the field, devoting themselves to digging small holes with the fore legs and claws, playing with a piece of wood, or soliciting visitors for food by showing various attractive begging actions near the stands. The rest would try to climb up and down the trees, or would like down to rest or sleep. At mid-day on hot summer days most of them would rest for a long time in the shadow of the walls and again become active only in the afternoon although not so active as in the forenoon. On the contrary, in winter especially on light snowy days or on the days after snowy nights, nearly all individuals tended to become active in playing throughout the daytime except for some who shut themselves into the dens. They liked to bathe in water in summer and to slide on the snow in winter.

Each bear usually spent the day independently of other members, except when feeding, when frightened and when rushing to the cage in the evening in a group. Some bears were rather active, while others were relatively inactive. All bears usually calmed down for one or two hours before the door of the cage was opened in the evening, about 16:30 in winter and 18:00 in summer.

*Group J:* The activities of the younger bears did not differ fundamentally from those of the older ones. The younger ones, however, more actively ran about in the field or chased each other — allelomimetic behaviour — and conversely tended to lie down or sleep for longer periods in daytime than the older ones did.

Among various behaviour patterns, the following kinds of behaviour are mentioned here to understand their social relations: I) Antagonistic behaviour, II) Play-fighting, and III) Contact behaviour in relation to the dominance relationship.

#### I) Antagonistic behaviour.

Antagonistic behaviour may conveniently be classified into two categories; antagonistic contacts such as slapping, biting, pushing and struggling, and non-contact, approach-avoidance and threatening with or without growling. The former rarely happened in the opening, except under certain testing conditions described

later, and in general ceased immediately. Therefore, the bears kept in the Garden never gave any serious harm to the individuals of their own group. Non-contact behaviour, on the other hand, occurred more frequently especially under the following situations: A) food getting, and B) ambiguous situations under which the dominance relationships could be recognized from their activities.

A) *Food getting situation.* a. Cases dealing with the food box: When a fragile food box filled with rice or pieces of vegetables was occasionally thrown in the opening, all the bears would rush to get it with one or two bears seizing it first. But as the box was usually broken and the contents scattered around, the other bears could secure the food without any apparent aggression by the strong individuals. Some individuals crowding around the food would growl weakly while chewing the food (weak threat), but as long as there was sufficient food, these bears generally did not attempt to attack the others during the competition for food.

When the box was not easily broken or the amount of food was insufficient, attack and defence sometimes broke out between the holder of the food and the others. If all others hesitated to approach the former, this could be regarded as the  $\alpha$  individual of the group. Of course, many feeble bears would be driven away by the threats or attacks of the superior ones, even if the former had obtained the food box first. But it was impossible to identify all definite dominance relationships among all members of the groups this way, though one or several dominant individuals could be determined (Fig. 2a).

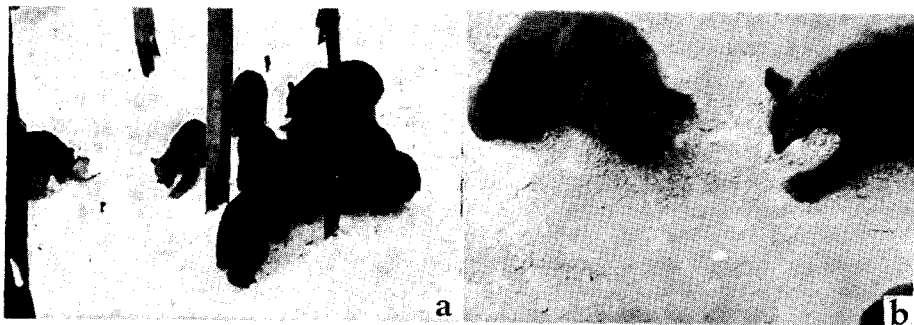


Fig. 2. a. Bears taking food in a herd, without any apparent hostility. Left bear is  $\alpha$  individual, holding a broken food box. b. Two bears are competing for a bit of food thrown between them, growling at each other for a long time in this instance.

b. *Competitive feeding situation:* As is commonly done in testing the dominance order, a bit of food—a piece of biscuit, cracker, cake or apple—was thrown to the bears, intending that it be exactly between two individuals. However, it was so difficult to throw the food correctly that various competitive situations between two individuals were produced. These are roughly arranged in the following five cases. 1) Food was approximately in the middle and one got it; 2) Food was slightly far from the individual which got it; 3) Food was very close to the one which lost it; 4) Food was slightly nearer to the one which got it, and 5) Food was very close to the one which got it. These cases either hand no threatening gestures, or were accompanied by unilateral or reciprocal threats.

These categories might have some connection with the degree of dominance. For instance, the bear which without being threatened lost the food placed just in front of him appeared quite weak in relation to the other. Another seemed to be a little stronger or almost equal to a competitor in dominance, when it could get the food from the middle point between them after vigorous mutual threatening accompanied by prolonged growling.

Based upon these cases and other attitudes demonstrated at their encounters, the degrees of dominance are summarized in the following six classes: *A*. Absolutely strong, primarily including case 3. The subordinate often sneaked away from the dominant when he approached the former to get food which had even been dropped just under the former's nose. *B*. Case 2, but without the threaten-growl by the assailant. The defender sometimes growled or at other times would only cast a glance at the food and then immediately look away from it. *C*. Case 2 with mutual threatening acts. The subordinate also tried to get the food with threatening acts, often without, though usually accompanied by growling. This growling match would last about 0.5 min., although longer on some occasions. *D*. Case 1 without growl of holder. Either the loser would occasionally resist the superior by











		MD	MY	MG	MC	MV	MS	FO	FP	MB	FH
	FH	A	A $\frac{\square}{1.8}$	A	B $\square$	C $\square$	C $\square$	C $\square$	B $\square$	E $\square$	
	MB	B $\square$	A $\frac{\square}{2.7}$	A $\frac{\square}{1.2}$	B $\frac{\square}{1.7}$	C $\frac{\square}{3.1}$	C $\frac{\square}{2.4}$	B $\square$	C $\square$		
	FP	B	A $\square$	A	C $\square$	B $\square$		D $\square$			
	FO	B $\square$	C $\square$	C $\square$	D	C $\square$	E $\square$				
	MS	C $\frac{\square}{2.4}$	C $\frac{\square}{1.6}$	C $\frac{\square}{2.9}$	B $\frac{\square}{2.0}$	E $\square$			C $\square$		
	MV	A $\square$	A $\frac{\square}{1.4}$	B $\square$	C $\square$						
	MC	E $\frac{\square}{2.5}$	C $\frac{\square}{2.7}$	B $\frac{\square}{2.9}$							
	MG	C $\frac{\square}{3.9}$	D $\square$								
	MY	F $\frac{\square}{1.5}$									
	MD										

Fig. 3. The dominance relationship and frequency of wrestling in group J. F and M of individual marks mean female and male. Left marginal figures indicate relative size of bears. A,B,C,... in the column are degree of dominance, and square shows the frequency of wrestling in each combination. Number under each square is mean (in minute) duration per one wrestling and nothing is given in cases under one minute.

growling or other threatening expressions, though usually ignored by the latter, or the former would only glance at the food. *E*. Case 1 with mutual threatening acts. The power difference between them seemed to be slight, so that they often glared at each other while holding a small piece of food between them for a relatively long period—maximum duration measured here was 62 sec. Pointing their noses at the food, both bears would very slowly push themselves forward toward it in a growling match, until finally one would pick it up by sticking out its tongue (Fig. 2b). In some cases there was no remarkable antagonistic behaviour between the two bears concerned. Dominance would be estimated only by frequency of feeding and other attitudes in all cases. *F*. It seemed that there was no apparent difference in dominance among some individuals. They alternately got or lost a snack case by case, whether or not they exhibited an aggressive attitude toward each other. Dominance relationships which were mainly based upon degree A or B and had no

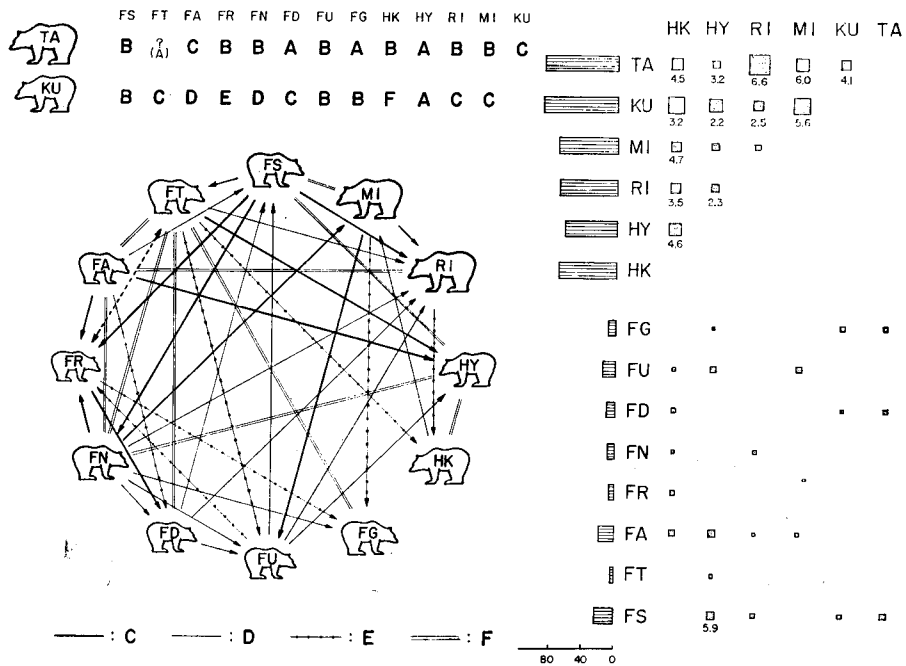


Fig. 4. The dominance relationship and frequency of wrestling in group S. Figures of bear turning to the left are male and right female. Arrows and A,B,C,... indicate dominance relationship and its degree. (Dotted line means the change of dominance in degree C.) Histogram shows the total frequency of wrestling in each individual and square shows the frequency of male-male and male-female combination. Number under each square is mean (in minute) duration per one wrestling.

counter-attack might be called "snatch right" and the rest "snatch dominance" with degree C, D, E, F, and counter-actions. The dominance relations of the members in the two groups are shown in Figures 3 and 4.

Group J had a simple linear order including only one deviation or triangle which was dissolved at the end of the year. In group S, however, it would be very complicated and the relations between some members could not be clarified by the tests mentioned, because it was hardly possible to bring them readily under testing conditions. Group S differed from group J in that it had several pairs in which the members appeared to be equal in status. Two males who ranked outside the circle (Fig. 4) were dominant over all the rest. A few changes of dominance-subordination relations and degree of dominance occurred during the course of the observation. The relationship of TK (previous dominant)-RU (subordinate) and FH (d.)-MS (sub.) completely reversed at the end of the year, with the change of degree in the former C to D and latter C to E respectively. The rank of MS was clearly shifted above FP to the third position by the end of the year.

c. Begging-place: Growling matches were easily caused by food thrown by visitors besides that thrown by the author in testing situations. However, they usually threw pieces of food one after another which caused the growling to cease immediately. When the visitors rustled the pouches of biscuit or threw some of them into the arena, the bears hitherto dispersed in the arena gradually came together near the spectators' stands (Fig. 5a). Then, the relative begging-positions of each bear were recorded at every feeding. Some examples of the records are

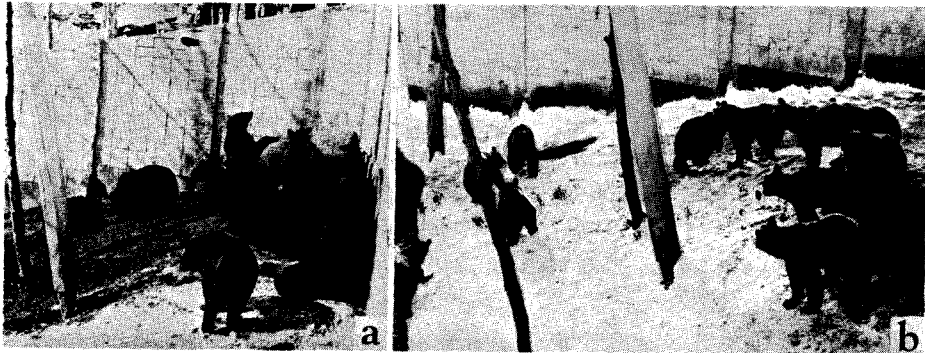


Fig. 5. a. Bears begging in assembly to receive food from visitors. Two bears on the left side are competing for a bit of food. b. Panic in group S. Arrow indicates a individual TA.

shown in Figs. 6 and 7. Several individuals in the senior group seemed to have more or less definite places where they used to beg, while others and nearly all of the group J had no such fixed topographical location.

There were likely many external and internal factors affecting the selection of definite begging places : a) Place and number as well as throwing manner of

feeder. Naturally, the bears tended to come up close to the feeder. b) Amount of food. The amount of food would cause the bears to move out of their usual begging places toward the food given. c) Appetite of each individual. A bear which had a stronger drive might come up sooner and nearer to feeder than the others. d) Preceding residence. If a bear chose a location which was generally occupied by another individual, it sometimes occupied that position during several successive

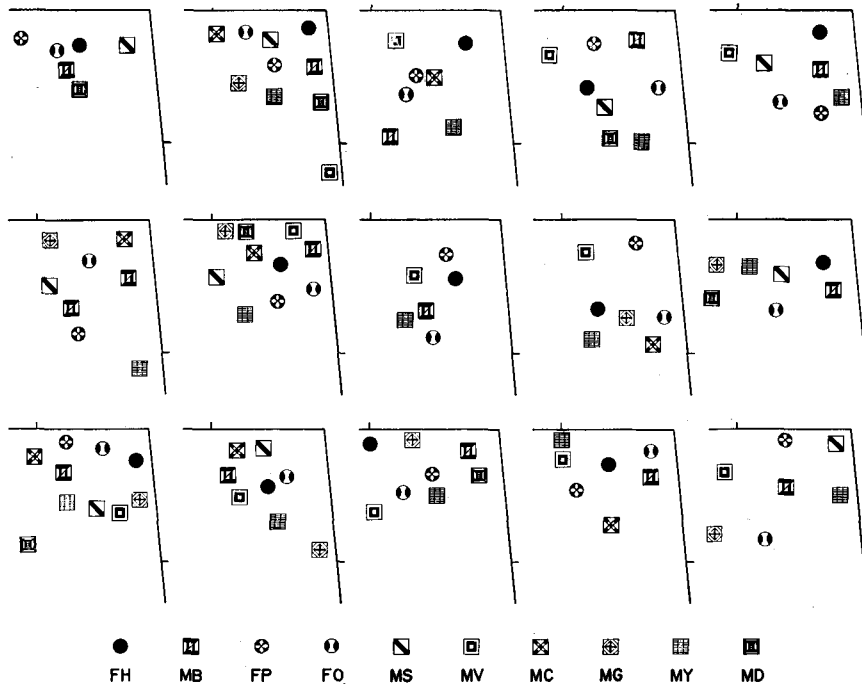


Fig. 6. Some examples of begging position of each individual in group J.

feedings by different parties of spectators, and as a result the one formerly occupying that position would need to use an unfamiliar place. Some bears tended to avoid certain members at times of feeding, having places either too distant from the feeders or too close to the wall. At such places generally less food was given than at intermediate locations. Moreover, even if subordinates first occupied advantageous positions, they often abdicated them as their dominants approached. Such behaviour in regard to the begging places often served to certify the dominance relationships among the members.

In a situation where two bears were challenging each other for food, one of them would finally pounce upon the opponent biting its body. During or soon after this short struggle, another bear with no immediate involvement in the quarrel and without regard to its status in the dominance order, would dare to boldly

attack either of the contestants. The causes of such an attack by a "third bear" were not clarified, but can probably be attributed to frustration at that time.

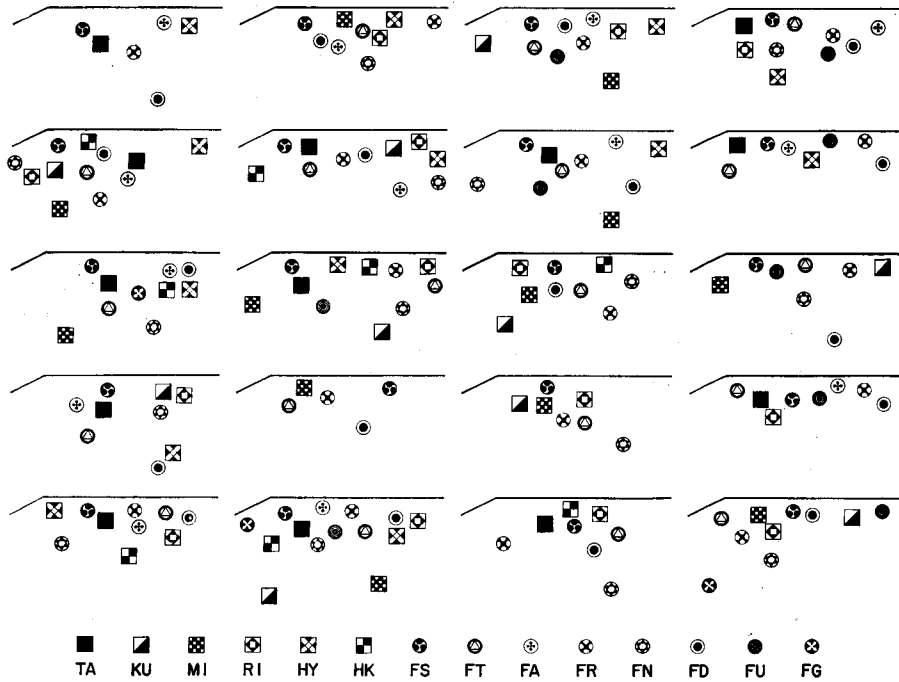


Fig. 7. Some examples of begging position of each individual in group S.

B) *Ambiguous situation.* Actual attacks or aggressive situations rarely occurred in the groups observed, except for those at competitive food-getting situations. Even then if an actual fight did break out, it usually lasted but a very short time. Antagonism between TA (male dominant) and FG (female), however, was very peculiar. Once or twice a day TA would suddenly begin to come close to FG in a threatening manner, without any observable reason for attacking her. Even though he chased her silently, making no sounds, she would run in fright, snorting harshly and making a noise with her mouth like a click-pac-pac - - -. The female, which was sometimes driven into a corner, would then express a counter-threat against the male. In this encounter they would only stand and glare at each other, though the inferior would manifest a very frightened attitude, withdrawing its rump, rounding its back slightly, snorting loudly, purring or making the pac-pac-pac-sound.

After continuing for a few minutes this situation would come to a close as the assailant would give up the chase. There was seldom any serious damage done to the bodies of the bears during such attacks. Although it was not

exactly clear why this relation was established between them, it might have some connection with their sexual activities.

When trouble between the  $\alpha$  and certain other individuals would occur there would at times be a remarkable reaction by the rest of the group, i.e. *panic*. For instance, when TA of group S would assume a hostile attitude in approaching FG as the latter was walking or foraging about in the arena, one or more of the remainder of the group, usually lower ranking males, would quickly detect the hostile situation and snorting would prepare to run from TA. This behaviour would call the attention of the rest of the herd to the trouble, and they would then assemble in a group apart from the two bears in conflict. The assembled group became slightly excited; some snorted, others would prowl about in the group, others climbed trees in confusion, with the rest standing motionless and watching the aggressor. It was noticeable that this outstanding reaction was always caused only by the  $\alpha$  individuals in both groups (Fig. 5b).

## II) Play-fighting.

Most of the bears would like to wrestle each other for long periods in the arena. A bear which was in the mood to play with others would show various pre-wrestling actions before the actual grapple. For example, it would first approach another, usually walking with its head down, poking or pushing with its fore legs at the head or other parts of the play mate, subsequently baring their teeth at each other and so on.

After this they would start to wrestle topsy-turvy or grapple with each other with their fore legs as they reared (Fig. 8a). Duration and degree of wrestling

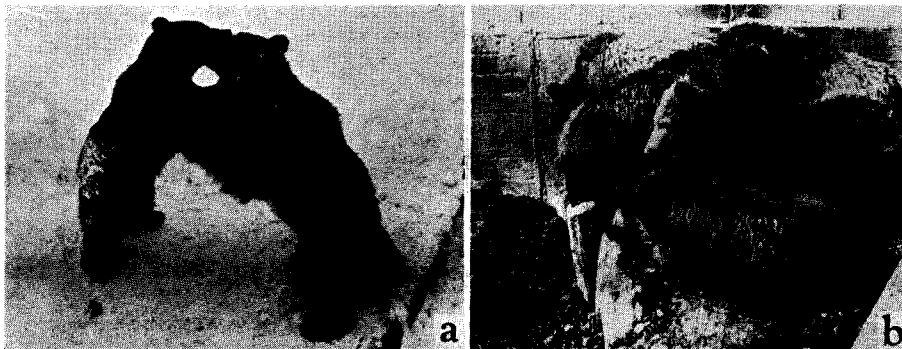


Fig. 8. a. Play-fighting. Two males are wrestling in rearing. b. Sucking behaviour. The bear sitting down in the center of the resting herd is sucking the right ear of another lying on all fours.

depended on each case: it continued about 15 minutes at the maximum and longer when it was interspersed with several short rests by the wrestlers in the course of this play fighting. Frequency and duration of wrestling were accumulated in

every match (Figs. 3 and 4).

Generally speaking, the wrestling was performed among younger individuals without definite combination. They tended to match at random with all group mates. On the other hand, more or less definite combinations occurred among the older ones. The matches between males were more frequently seen than those between females or male versus female. The percentages of mean frequency for the play fighting, for instance, are 52.3 (male), 31.2 (female) and 16.5 (male vs. female) in group J. This might be due to the fact that there were large difference of physical strength depending on the variation in body size between sexes and also among individuals; adult males were generally bigger than females and females characteristically seemed to be less playful than males.

The larger individual was usually, but not always, more powerful in wrestling matches where there was a more or less marked difference in body size. In such cases the inferior was easily made to back down. But the decision of matches between those of more nearly the same size could not be defined in many cases. Even lower ranked individual would like to wrestle for long time with the superior as far as the former was similar to the latter in size, for examples, RI (sub.) vs. TA (dom.), MY (sub.) vs. MB (dom.), etc. (Figs. 3 and 4). The play-fighting was never followed by actual fighting no matter how it became very vigorous and made the wrestlers exciting.

### III) Contact behaviour.

The bears would often lie down to rest and sleep in the daytime throughout the year. They would keep themselves in the shadows on hot summer days, gather to bask in the sun in sunlit places in spring or fall, and retire together into the large dens made artificially or dug by themselves on the very cold winter days. Under such conditions, in spite of the fact that the bears mostly rested alone they would come in close contact with one another. Contact-mates were not regular: high ranked individuals would indiscriminately sleep together with lower ranked ones without regard to sex. There were also some individuals which did not show such contact anywhere with one another, probably caused by psychological reasons than social ones. The dominants of cattles (Shiratsuki and Itow 1958) had a tendency to lie in the center of the herd in resting, but it was not observed in the present cases and no bear had its own particular resting places.

Sucking behaviour was observed only in the following individuals — FT and HY of group S, and FH, MS, MG and MD of group J. When they were sucking something, they simultaneously moaned in a whisper as wru-wru-wru-. They would suck the ears and sometimes other protruding parts of another who was resting (Fig. 8b), except for FT and FA. Female FT always sucked the 1st claw of her right fore leg while lying on her belly, and FH sucked only the fingers of the keepers. The sucking and sucked individuals were almost always the same, but it was not clear whether the dominance played any role in the appearance of such behaviour and the particular sucking-sucked combinations (Table 1).

Table 1. Sucking-sucked relationship in two groups. Numbers show total frequency of sucking activity for 26 days. Frequency of FH entirely depended on the number of the keeper's acts of availability.

Sucking Indiv. Mark Group J	Sucked Indiv. Mark				Total
	MB	FP	MG	MY	
MS	—	1	2	—	3
MG	—	—	—	1	1
MD	5	—	9	4	18
FH	(self 8)				8
Group S.	FD	FA	HK		
HY	2	1	2		5
FR	(self 6)				6

Table 2. Total frequency of mounting for 11 days in group S and 8 days in group J.

Passive Indiv.		FR	FA	FS	FD	FT	FG	FN	MI	RI	HY
Group S	TA	7	2	1							
	KU	1	4		7	8				2	1
	HK			1			1				
	MI	2		1			1				
	RI								1		3
	HY										
	FS				1						
Passive Indiv.		FH	FP	FO	MS	MV	MC	MG			
Group J	MB	2	2	3	4	1	1	1			
	MS							1			
	MC	1									
	MY		1								

The bears could not conceive under two years of age in such confined circumstance, but sexual activities were imperfectly carried out even amongst those aged about one year. In winter, February in the present observations, the males of group S began to try to mount from the back either males or females who were standing or walking. But intercourse was not performed due to insufficient erection in the mounted males and refusal by their mates. It was observed that the high ranked males had many occurrences of mounting other individuals (Table 2). Whether the mounting behaviour, however, had a direct meaning on the dominance subordination relationship, specially between the males in homosexual

mounting, was yet uncertain due to lack of adequate data. A male, KU, changed his mate during the season from female FA in spring to FT in autumn. Males in group S might have two or three regular mates, but MB in group J was inclined to mount indiscriminately on all members.

### Discussion

Except for the breeding season and brooding period during which females rear their cubs for about one or rarely two years, it is thought at present that under natural conditions the Yezo brown bear lives solitarily roaming over a large territory. When a bear happened upon another in the wild state, it would sometimes fight furiously to the extent of killing and eating its opponent, or even cubs (Inukai 1955). In spite of the solitary life and ferocious character of animals in the wild state, the bears kept in the Garden have spent their time together without serious harm to any in the group, although maintaining the dominance-subordination relationship among the members.

The types of dominance relationships relevant to food-getting in competitive situations are either the "snatch dominance" or "snatch right" in each combination of the members of both groups. Group J has a linear dominance order, but group S showed more deviations, or triangles and rectangles, than the former had. The  $\alpha$  individual in each group had a special character by which *panic* was caused among the other members; it seemed to behave like a despot and to be temporarily isolated at that time. In various animal societies which are organized despotically, the despot has a tendency to be isolated within the group (e.g. Urich 1938, James 1939). Thus, the organization of the present groups may consist of not only a linear dominance order but also a kind of despotism although this is not pronounced; group S had a little more recognizable tendency toward despotism than group J.

The superiority of individual in dominance relationships or in ranking within the groups seemed to have few connections with sex, though generalization is still premature because the bears observed were not yet mature enough. Two males were dominant over all the rest in group S, but the  $\alpha$  individual was female and two other females were also ranked high in group J. Winslow (1938) and Baron *et al.* (1955) reported that both sexes could be dominant in cats and Kawai (1953) found a similar fact in his young rabbits. Male bears may not always be superior in the wild state throughout four seasons; even females seem to become dominant in some cases, particularly during the mating season (Meyer-Holzapfel 1956).

The top ranked individual was the largest in each group and males generally became bigger than females after about two years. But body size was not necessarily the direct factor which determined the dominance-subordination relationship between members. James (1939) has already pointed out that there was a large but submissive dog even in a group which consisted of individuals from the same litter, suggesting the importance of psychological factors on the dominance

relationship.

Nor should the inherited character differences of individuals be ignored in the determination of the social order in the present study. Imaizumi (1949) has suggested, following the oral tradition of the Ainu, that with regard to ferocity the golden haired brown bear is more violent than the black one. Such a fact was not proved in the present observation, since there was no obvious correlation between the social rank and the hair colour. The keeper observed large differences in aggressiveness among the cubs in response to his treatment when they were first brought in and were reared in a small cabin. Unfortunately, there are no reliable data about the inherited characteristics, nor about the intervention and treatment by the keeper of the bears observed, nor the many possible mutual interactions since they were grouped together, nevertheless these facts are important in considering the formation of the dominance order. But there is no doubt that both *a* individuals were especially well reared and tamed by the keepers.

Because the social order described above is originally based on the competition for food, it may function over other behaviour of the bears particularly in situations related to their feeding. Often when they gathered to beg bits of food from visitors in daytime, the dominant would have a tendency to occupy an advantageous position for getting food, while the subordinate would locate at a disadvantageous place far from or too close to the visitors' stand. However, neither individual received very different amounts of food since the visitors tried to feed them equally. Nor did they take exactly the same place each time, the actual position of each individual at one assembly generally being decided by social and psychological interaction among the members as they gathered.

It is noticeable that dominant males tended to mount on some females, whereas subordinate ones frequently tried homosexually on other males, though without insertion. The dominant in mice (Crowcroft 1955), lions (Allee 1952) and many animals (cf. Ito 1959) generally was able to have many females and could copulate frequently, the subordinate could not do so. The active partner in homosexual mounting is usually considered to be dominant over the passive one or pseudofemale in some mammals (e.g. Winslow 1938, Itani 1954, Kawai 1955). Although this fact might be possible in the present groups, it can not be definitely asserted due to too few records on their sexual activities in puberty.

Some of the bears observed spent a fairly long time in play-fighting. This seemed to have no direct correlation with the social order nor with the determination of mastery between the two individuals concerned.

It is pointed out that the cubs had a tendency to enter indiscriminately into relations with all members of their group; they would make an attack on any other individual at feedings, change their partners one by one in play-fighting, rest in a crowd and so on. Although the groups were initially disorganized and unstable, as ability for individual discrimination developed pairs began to establish regular relationships with the result that the groups were stabilized. One of the principles

that operates in the social life in this case is superiority in competitive food-getting situations, but it does not always rule the whole social life of each bear. As in play-fighting or sucking, certain relationships which might depend on some psychological cause came to be formed between the constant members, independently of their status in dominance-subordination relationships and social order in their groups. Therefore, not only social dominance, but also the individuality of each bear is seen to be determinative in the social life of these small groups S and J.

The life of bears kept under such circumstance is so different from that in the natural state, that their social behaviour and organization can be described only in terms of the adaptation which has been made to conditions of confinement. It is plain enough, as e.g. Schneirla (1946) and Krott (1962) have pointed out, that it is precipitate to apply general principles of social organization developed under restrictive conditions to those of the natural state. The wild life of the Yezo brown bear is commonly thought to depend on territoriality and its resultant activities. But Krott (1962, 1962a) has recently asserted from observations of the natural life of the Alpine bear (*Ursus arctos*) that it was never "Reviertier". He also quotes the same fact reported by other authors in studies of somewhat similar bears, such as the grizzly (Storer and Tevis 1955) and the Kodiak bear. Thus, the occurrence of definite territoriality in the natural life of the Yezo brown bear is still open to question, necessitating further critical studies. The defense of particular places or things, the occupation or selection of dens, defecation at a restricted place, and other acts relating to the maintenance of territory were not observed at all in the course of this study.

Some relationships observed in the present work are those which could hardly be expected under natural conditions, with particular reference to the size of the group and the length of time an individual would normally spend with it. Usually two and occasionally as many as four cubs would spend up to a year and a half with the mother and with each other, after which they would be alone. Nevertheless, some social tendencies such as resting and sleeping in contact with group members, feeding in a herd, and playing together, usually seen in more gregarious animals, were detected in this essentially solitary creature when living in forced confinement. This suggests that irrespective of the occurrence of definite or supposed territoriality in the Yezo brown bear, they can more or less easily adapt themselves to a forced living situation, indicating their basic capacity for accommodation to aggregate living, whether natural or forced.

In this connection, it is noteworthy that the stereotyped movement familiar in bears kept in zoos and circus (e.g. Hediger 1950) had not developed in the individuals observed, except for infrequent to and fro movement on the part of two individuals. This may be partly explained not only by the adequate size of the enclosures but also by the diversity of available social relations which might be responsible for inhibiting the appearance of such a neurotic stereotype. But concurrently, social dominance also may be one of the factors causing stereotyped movements in an inferior individual (Schloeth 1954 cited in Meyer-Holzapfel 1957). It might be similar in the case of abnormal sucking which seemed to be a kind of regression, fundamentally relating to ingestive behaviour. Since in the present

case it was not possible to analyze the origin or development of these abnormal activities, the relation between the social status of an individual and its negative results is left to further studies.

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### Summary

Social dominance among Yezo brown bears in captivity was observed in two groups at the Noboribetsu Bear Garden in 1963. One of the group consisted of 7 males and 3 females, all one year old, and another of 6 males and 8 females, two years old.

From the social behaviour observed during the competitive feeding tests, it was found that there were dominance subordination relations involving both "snatch dominance" and "snatch right" types in the two groups. The junior group had a rather linear dominance order and the senior had many deviations in order. In both, the  $\alpha$  individuals showed a kind of despotic character in relation to the rest. Sexuality and body size seemed to have no immediate connection with the preservation of dominance relations in the present cases.

The dominance relation seemed to function not only in the food taking situation, but also in mating activities. The social interaction of the members, however, did not always result from their status in the dominance order. Some combinations of individuals in play-fighting matches and other activities would seem to have had psychological causes, as well as causes resulting from differences of character or strength related to sexuality.

The young cubs tended to associate freely with each other, although all individuals came to regularly relate to special mates with whom they repeatedly interacted.

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