Bradycardia of the Polar Bear

For several years two male polar bears have been studied by long-life implanted physiological radio capsules at the Naval Arctic Research Laboratory, at Point Barrow[1]. One of the siblings has consistently been larger than the other. A regular measurement has been the resting heart rate; for this we used the lowest heart rate obtained during night-time sleep. Night-time sleep is used because different heart rate levels are obtained during day-time sleep and night-time sleep. The two bears, during the continuous light of the summer, sleep regularly from about 11 PM until 9:00 AM; occasionally short bouts of sleep occur around early afternoon. Sleeping heart rates have been obtained throughout the lifetime of these two individuals. For example, during the summer of 1971, the larger polar bear, Irish (310 kg), had mean resting heart rates of 54 ± 2 SD b/m (N = 12); in 1972 at 332 kg his rate was 48 ± 5 SD b/m (N = 12); the smaller bear in 1971, at 286 kg, had a lower sleeping heart rate (50 ± 5 SD b/m). Heart rates are taken by stopwatch for several minutes each hour during the sleep period of the bears. The sleeping heart rate is defined as the mean of the lowest heart rate for 12 consecutive readable nights. A readable night is when there were at least 10 hourly readings. The change in heart rate with age and increased weight has been reported elsewhere[2].

A technique for demonstrating bradycardia (rapid slowing of heartbeat) in marine mammals was developed by Irving and Scholander[3], namely instrumenting the animal and training it to place its head under water. We decided to try this technique with the larger of the polar bears (Irish). The bear was separated from its companion, deprived of food and water overnight, and then recorded during three routine situations: 1) during high activity time; 2) during the filling of the water tub (approximately 300 litres) and 3) during feeding time. Heart rates were taken by the stopwatch every 15 seconds. Most behaviours lasted between 45 sec and 180 sec; therefore, for convenience, each description has been converted to terms of 1 minute (see Table 1). Head immersion and diving bradycardia were evident for periods lasting up to 2 minutes; during that time the animal appeared to be searching for food at the bottom of the tub. Although diving bradycardia was evident (rate reduced 10 per cent to 72 b/m), it is apparent that there was much more bradycardia during the period of eating (reduced 20 per cent to 60 b/m). This slow rate during eating was remarkably close to the sleeping heart rate. One might have expected the heart rate to go up during the excitement of feeding. Also, competition for the food was not entirely lacking; the companion polar bear in the adjoining cage was constantly reaching through the bars as it attempted to obtain some of the food. One might have expected this activity to increase the excitement. We have found no other reference to bradycardia during feeding.

TABLE 1

Expt. Time (mins)	Heart Rate (b/m)	Behaviour
1	70	Sitting } no investigator
2	74	Sitting } present
3	116	Playing and chasing
4	116	Playing and chasing
5	104	Playing and chasing
6	88	Standing, breathing heavily
7	92	Watching water pour into tub
8	93	Biting water hose
9	84	Drinking
10	80	Drinking and standing
11	80	Drinking and standing
12	76	Standing
13	72	Head immersed
14	84	Standing by tub
15	72	Head immersed
16	80	Standing by tub
17	76	Head immersed
18	72	Head immersed
19	80	Walking
20	80	Walking
21	76	Standing by tub
22	72	Head immersed
23	80	Slapping water with paws
24	76	Meat being presented
25	68	Taking meat
26	64	Eating meat
27	66	Additional food
28	64	Eating donut
29	60	Eating second donut
30	64	Eating meat
31	60	Paw holding bone, tearing meat
32	60	Tearing meat from bone
33	80	Charging investigator
34	64	Eating
35	60	Chewing bones
36	60	Chewing bones
37	60	Dunking bone in tub

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A Skeleton in Triassic Rocks in the Brooks Range Foothills

Fragments of vertebrate fossils are found in beds of the Shublik Formation, which blanketed most of northern Alaska during Triassic time. Although articulated remains are uncommon, one partial skeleton was discovered in 1950 during exploration of Naval Petroleum Reserve No. 4[1]. Tourtelot and Tailleur revisited the site in 1968 during study of oil shales in northern Alaska (supported by the U.S. Navy Office of Petroleum and Oil Shale Reserves and by the Naval Arctic Research Laboratory) and found the skeleton still well enough preserved to merit expert examination. In 1970, Mull placed a sign, prepared by W. C. Black of the U.S. Geological Survey, requesting preservation of the skeleton for future collection, now feasible because of easier access to the area. This note calls attention to the existence of the skeleton and reports on what has been observed of the vertebrate remains.

Figs. 1 and 2 locate the site (68°37′15″ N., 157°35′W.) on Cutaway Creek (Howard Pass 1:250,000-scale quadrangle) in the geologically disturbed zone of the Brooks Range foothills. It is about 200 miles south of Point Barrow and 35 miles northwest of Howard Pass.

Fig. 3 is a photograph of the actual bedding-plane exposure. Most of one side of the rib case is exposed, and some limb structures seem preserved. The exposed parts indicate a skeleton more than 5 feet long. Bone fragments are common in the fine talus weathering off the outcrop. Although no invertebrate fossils were seen on the surfaces of beds containing the skeleton, they are abundant in correlative beds; detailed examination of this or nearby exposures should yield pelecypods that will fix the biostratigraphic level of the vertebrate remains.

Some features of the Late Triassic environment can be assessed. A sea of remarkably persistent character extended beyond the length of the present Brooks Range and

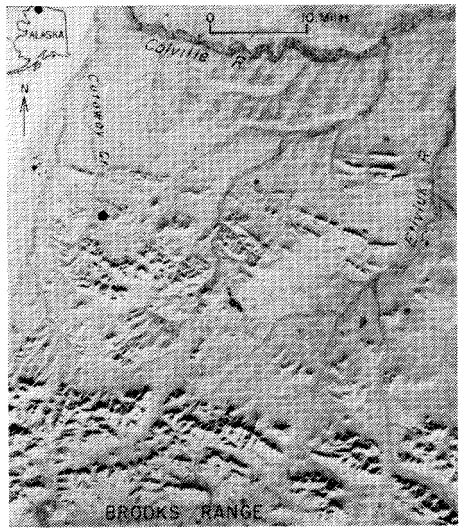

FIG. 1. Skeleton locality (dot on upper Cutaway Creek) plotted on part of ERTS-1 near-infrared image 1058-21403-7, 19 September 1972 (snow-covered).

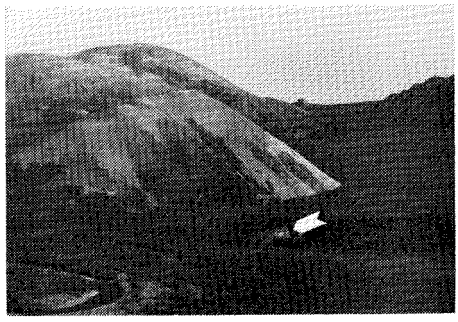

FIG. 2. View northwest across Cutaway Creek to skeleton exposure (arrow).