Drug Immobilization of Walrus (*Odobenus rosmarus*)

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Five out of nine walrus (*Odobenus rosmarus*) were successfully immobilized at Round Island, Alaska, in May of 1978 by combinations of phencyclidine hydrochloride and acepromazine hydrochloride. A crossbow was an effective delivery technique. Walruses that had recently hauled out were more suitable for immobilization than well-rested animals. Care was taken to prevent walruses from overheating or suffocating.

Key words: walrus, *Odobenus rosmarus;* immobilization, marine mammal

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Grâce à des combinaisons d'hydrochlorure de phencyclidine et d'hydrochlorure d'acépromazine, on a pu immobiliser avec succès cinq sur neuf morses (*Odobenus rosmarus*) à l'île Round en Alaska en mai 1978. L'arbalète a été un instrument efficace de lancement. Il était préférable d'immobiliser des morses qui avaient atterri récemment plutôt que des animaux bien reposés. On s'est efforcé de prévenir l'échauffement ou la suffocation des animaux.

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IN this note the results of drug immobilization experiments on free-living walruses are reported. Immobilization may be necessary in future studies as walruses are too large and powerful to be restrained physically under field conditions.

From May 13 to May 21, 1978, we attempted to immobilize nine Pacific walruses (*Odobenus rosmarus divergens*) hauled out at Round Island, Alaska (58°36'N, 159°58'W, see Miller 1976 for description of island habitat). We used combinations of phencyclidine hydrochloride (Sernylan) and acepromazine hydrochloride (Lentfer 1969; Seal et al. 1970; Hofman 1975) in eight attempts, and one attempt was made with ketamine hydrochloride (Williams and Kocher 1978; Hunter et al. 1977). Our target dose range of 0.2–0.3 mg/kg of Sernylan was based on previous immobilization experiences with Weddell seals (Hofman 1975) and walruses (F. H. Fay, University of Alaska, Fairbanks, Alaska, personal communication). Initially we used a capture rifle (Lentfer 1969); however, the report of the rifle disturbed the walruses. In the last six immobilization attempts we used a crossbow to deliver the drugging darts. (Darts were attached to the arrow with Palmer Chemical Company arrow adapters.) Animals were approached within 25 m. Care was taken to be quiet and to remain out of sight during the approach. The occurrence of large boulders on the beach made the approach considerably easier. Only animals that were considered to be sleeping were used as subjects. Animals were darted either in the rear flank or in the front shoulder with a 3.5 in-barbed needle. There were no indications that the capture dart ever failed to fire or that the needles were too short to inject the drugs directly into muscle tissue.

Typically, the animal's reaction to the dart involved rearing the head back and looking around. As long as the rest of the herd was calm, the darted animal would not move into the water. In the three cases where the capture rifle was used, instead of the crossbow, the animal's reaction was to move

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TABLE 1. Summary of data related to immobilization of walrus on Round Island, Alaska.

Animal no.	Drug	Dose (mg)	Estimated weight (kg)	Estimated dose/weight (mg/kg)	Latent period (min)	Effect
1	Ketamine	900	1100	0.8	—	After 47 min animal went in water. Ineffective dose.
2	Sernalyn	250	1100	0.2	22	Animal lightly sedated. After 56 min animal mobile (went in water).
3	Sernalyn Acepromazine	375 10	1700	0.2	—	Animal immediately went in water.
4	Sernalyn Acepromazine	350 15	1600	0.2	35	Animal moderately sedated. After 1 h 59 min animal awkwardly mobile.
5	Sernalyn Acepromazine	325 15	1600	0.2	40	Animal lightly sedated, able to move head while being worked. After 1 h 45 min animal mobile.
6	Sernalyn Acepromazine	340 15	1600	0.2	33	Animal moved down beach, before becoming immobile. After 50 min one convulsion occurred and the animal died.
7	Sernalyn Acepromazine	450 5	1350	0.3	20	Animal heavily sedated. After 4 h 7 min animal mobile.
8	Sernalyn Acepromazine	360 15	1100	0.3	38	Animal moderately sedated. After 4 h 23 min animal mobile.
9	Sernalyn Acepromazine	360 10	1100	0.3	26	At 33, 39, and 41 min after injection convulsions occurred. After 3rd convulsion animal died.

towards the water's edge, and often animals near the darted individual were disturbed. We noticed that animals that were at the landward edge of the herd did not move as close to the water when they were disturbed as did animals that were at the center of the herd. We also noticed, after many unsuccessful stalks, that individuals that had been hauled out for several days were very difficult to approach without disturbing them. On the other hand, animals that had recently returned to the island to haul out were quite easy to approach. This may also be confounded by the cyclic nature of hauling patterns. In general, the number of hauled out animals would cycle from thousands of animals to a few animals in roughly a 10-d period. During the buildup, the herds were large and animals were easy to approach. During the decline phase, herds were generally smaller, and animals were much more difficult to approach.

Four different combinations of drugs and dosage were tried (Table 1): ketamine (0.8 mg/kg); Sernylan (0.2 mg/kg); Sernylan (0.2 mg/kg) and acepromazine (0–15 mg); and Sernylan (0.3 mg/kg) and acepromazine (5–15 mg). The ineffective dose of ketamine was the maximum that could be delivered by a single dose, and therefore, further experiments with ketamine were discontinued.

The symptoms associated with Sernylan and Sernylan/acepromazine injections were similar to those described by Hofman (1975) for Antarctic seals. We observed an increase in nasal secretions and tear formation (first effect), resting of the head on the tusks (second effect), and the lack of response to mechanical stimulation (third effect). An animal was considered lightly sedated if it could still move its head slightly while being handled. With light sedation, eye reflexes were good and breathing was regular (8–15 breaths per minute). A moderately sedated animal had no head control, good eye reflex, and a breathing rate between five and seven breaths per minute. A heavily sedated animal had no head control, a very weak eye reflex, and a breathing rate of two to four breaths per minute. Lightly sedated animals were mobile within 2 h after immobilization; moderately sedated animals were mobile between 2 and 4 h after immobilization; and heavily sedated animals were only awkwardly mobile between 4 and 7 h after immobilization.

Thermoregulation is disrupted by Sernylan (Seal et al. 1970), and heat stress may have occurred in animals immobilized for more than several hours on warm, sunny days (daytime temperatures reached 15°C during the study period). We attempted to minimize this problem by pouring cold water over heavily sedated animals. Heavily sedated animals with weak eye reflex were also exposed to possible eye damage from flies that occur on the hauling grounds. Another potential problem is the position of the immobilized animal relative to the slope of the beach. The two fatalities that occurred involved animals that moved toward the water's edge prior to complete immobilization. This positions the head and chest lower than the abdomen. The resulting pressure of the abdominal viscera on the diaphragm may have inhibited the respiration of the drugged walruses. We feel this was not simply an overdose of the drug because both animals were mobile just prior to when their breathing stopped. Most hauled out

walruses lay facing up the incline of the beach, which may facilitate breathing.

We believe that additional immobilization experiments should be conducted. Our results indicate that a dose of 0.2–0.3 mg/kg of Sernylan is a reasonable dosage, but because of respiratory depression, alternatives to phenothiazine compounds should be considered (e.g. valium). Sernylan is not currently available and other immobilizing agents presumably must be used in the future. Based on our observations, future researchers, in developing adequate immobilization techniques for walrus, should consider the importance of delivery techniques, the sensitivity of walruses to Sernylan, and the potential problem of overheating. We recommend the crossbow as a reliable means of projecting the drugging darts, and caution against attempting immobilization research where the slope of the terrain is not level. In addition, we recommend that researchers, when choosing individuals to immobilize, select individuals that have recently hauled out and are part of a large herd.

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