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the case of the mare, the left maxillar P3 is lacking, but may have been lost post mortem. Weavemouth is a common condition in older domestic animals (Jubb and Kennedy, 1970, op. cit.) in which successive teeth in the molar arcade wear at different rates. In the antagonistic arcade the weave is reversed so that opposite occlusive surfaces remain appositive and occlusion can still be complete. The effect on mastication is therefore probably minimal and weavemouth may be considered of minor importance. The skull of an old mare (Fig. 9) also showed hook formation of the left mandibular P2. This condition results from incomplete longitudinal coincidence of the molar arcades which allows irregular wear.

In the skull of an adult mare which had lost two of her maxillar cheek teeth (left P4 and right M1), P4 and M1 of the left mandibular molar arcade project beyond the level of the other teeth, while both mandibular P2's show hook formation (Figs. 10 and 11).

In most of these skulls the dental abnormalities were probably merely incidental post mortem findings. Even in the cases showing lesions consistent with periodontitis the inflammation was chronic rather than acute. The influence which the dental abnormalities described here may have had on the mortality of Cape mountain zebras in the MZNP remains speculative, but would seem to be unimportant.

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Opportunities are rare for determining the degree to which an animal can starve and still survive. Therefore we describe here an incident in which a wild wolf (*Canis lupus*) starved almost to death and was then restored to her former free-ranging state. The incident took place in northern Lake County, Minnesota.

Female wolf 6301 was captured, radio-collared, and blood sampled as a pup on 3 September 1981; she weighted 13.5 kg. Between 28 and 30 December 1982, this wolf got caught in a steel foot trap set by fur trappers who failed to check their traps every 36 hr as required. We found her in the trap on 4 January, after a minimum of 5 days there. The wolf was lying on her side, with her head up. She then dropped her head, offered no resistance, and failed to respond while the trap was removed. She was emaciated and weighed 18.6 kg which is the lightest of 77 wild yearling or adult females from Minnesota for which we have records. The lightest of 22 well-fed, captive yearling and adult female

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TABLE 1. Pertinent blood values of wolf 6301.

Blood values	3 Sep 1981[a,b]	4 Jan 1983	10 Jan 1983[b]	13 Jan 1983[b]
Hemoglobin (g/dl)	10.7	11.0	11.2	10.2
Red blood cells ($10^6/\mu l$)	4.34	4.84	5.04	4.56
Hematocrit (vol. %)	37	37	37	34
Mean corpuscular volume (fl)	85	76	73	75
Mean corpuscular hemoglobin concentration (g/dl)	29	30	30	30
White blood cells ($10^3/\mu l$)	10.3	26.0	24.2	23.3
Glucose (mg/dl)	146	194	113	109
Urea nitrogen (mg/dl)	28	32	31	34
Triglycerides (mg/dl)	37	29	38	46
Cortisol (μg/dl)	8	0	3	2
Triiodothyronine (ng/dl)	65	<25	<25	<25
Thyroxine (μg/dl)	3.4	1.4	1.3	1.3
Total protein (g/dl)	5.3	5.9	6.6	6.0
Creatinine phosphokinase (mIU/ml)	—[c]	30	23	51
Serum glutamic oxalacetic transaminase (mIU/ml)	—[c]	23	23	22

[a] 4–5 mo old.
[b] Anesthetized with ketamine hydrochloride (Bristol-Myers Co., Syracuse, New York 13201, USA).
[c] Analyses not made.

wolves for which we have data was 25.5 kg (Seal and Mech, 1983, J. Wildl. Manage. 47: 704, 715).

A blood sample taken about 2 hr after the wolf was found (Table 1) showed that she had significantly ($P < 0.01$) reduced hematology values indicative of anemia compared with well-fed, captive female wolves in January (Seal and Mech, 1983, op. cit.) and with wild wolves (unpubl. data). Her red cells were mildly hypochromic, suggestive of a nutritional deficit—probably protein; an elevated white blood cell count suggested the possibility of an infection. Elevated blood urea nitrogen and triglycerides suggested that she was metabolizing body protein, and the very low cortisol level was suggestive of adrenal failure.

Approximately 2.5 hr after the wolf was removed from the trap, veterinarian D. B. Brewer described her as follows: "Temperature 101.3, respiration 15 per min, pulse 70–80 per min. Depressed, withdrawn, mild clinical dehydration, moist gums and mucous membranes, normal capillary refill, thin with minimal muscle mass. Stable with respect to shock." He then administered an I.V. infusion of 1 liter of 2.5% dextrose in ½-strength lactated Ringer's solution (Abbott Laboratories, North Chicago, Illinois 60064, USA) with 1×10^6 units Kepen G and 0.75 ml vitamin B complex (Professional Veterinary Laboratories, Minneapolis, Minnesota 55437, USA). Her injured paw was scrubbed and a dressing applied. She received 450,000 units Benzathine Penicillin G (Benzapen—Beecham Laboratories, Bristol, Tennessee 35620, USA) and 450,000 units Procaine Pen G (Vetycil-AS—Veticare Products, Baltimore, Maryland 21225, USA) by injection and was dewormed with an oral dose of 4 cc pyrantel pamoate (Strongid-T, Pfizer, Inc., New York, New York 10017, USA).

The wolf was then put into a cage with water, 0.5 kg beef liver, 0.3 kg ground

TABLE 2. History of food consumption and weight change in wolf 6301 after prolonged inanition.

Day	Food eaten (kg)	Weight of wolf (kg)	Change (kg)
0	—	18.6	—
1	1.9	—	—
2	1.9	20.0	+1.3
3	2.3	20.0	0.0
4	2.5	20.4	+0.5
5	0.6	20.9	+0.5
6	1.7	22.2	+1.4
7	2.7	22.7	+0.5
8	1.7	22.2	−0.5
Release	—	23.1	+0.9

beef, and 0.5 kg commercial dog food. By morning the wolf had eaten all of the beef and liver, but none of the commercial dog food. She had moved slightly, into a sleeping position, and she lifted her head in response to movements near her face. For the next 8 days the wolf was fed liver, ground beef, venison (*Odocoileus virginianus*), moose (*Alces alces*), and water, ad lib. From the second day forward, she refused to eat ground beef, and moved about normally within her small cage.

Over the 8-day period the wolf ate between 0.6 and 2.7 kg ($\bar{x}$ = 1.9) of meat per day (Table 2) and drank approximately 47 ml of water per day. She gained weight slowly until the 6th day, when she gained 1.4 kg; her weight then stabilized at 22.2 kg, 3.6 kg more than her weight when found. For the next 2 days the wolf continued to consume approximately 2.0 kg of meat per day, but gained little weight.

We released the wolf on 13 January 1983 with a radio-collar. By 20 January she had moved a straight-line distance of 9.1 km, by 27 January 6.4 km more, and by 23 February 32 more km. She continued to move normally at least through 3 May. Thus her treatment in captivity evidently restored her to close to her normal condition. (The animal succumbed about 14 May after having broken a wire snare which had caught her around a hind leg and cut her to the bone.)

The full period of wolf 6301's inanition is unknown. Wolves in her area have been experiencing a food shortage, and several have starved to death (Mech, 1977, J. Mammal. 58: 559–574). Thus 6301 may already have starved for several days before being trapped. Even her mean corpuscular volume and mean corpuscular hemoglobin concentration when she was caught as a pup (Table 1) indicated a mild protein deficit compared with captive pups (unpubl. data) and wild pups (Seal et al., 1975, J. Mammal. 56: 64–75). We do not believe that the inanition during the 5 to 7 days this wolf spent in the trap was enough in itself to cause the wolf's weight to drop to 18.6 kg. Wolves have gone as long as 17 days without eating, yet still survived (Makridin, 1962, Zool. Zhur. 41: 1413–1417). Certainly the period of inanition that a wolf can survive is very much a function of the animal's weight and condition at the beginning of the period. No doubt trauma, exposure, and struggling also contributed to the wolf's poor condition. The present observation demonstrates the degree to which a wolf's physical condition can deteriorate and the recuperative potential that individual wolves may have.

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