

## AN INCIDENCE OF TWINNING IN THE SEA OTTER (*ENHYDRA LUTRIS*)

On 3 October 1984 at 0928 h (PST) near Pt. San Simeon, California (35°39'N, 121°11'W), we observed a female sea otter (*Enhydra lutris*) resting in a kelp bed (*Macrocystis pyrifera*) with a small pup on her chest; approximately 2 m away another small pup floated unattended in the kelp. The only other otters we saw in the area was a mated pair (adult male tending an adult female) resting about 20 m from the mother and pups. At 0929 h the mother swam to the unattended pup and placed it on her abdomen next to the other pup. We concluded that live birth of twin pups had occurred, an incident previously unrecorded for the species.

We observed the triad from a cliff approximately 10 m above sea level using 10 × 50 binoculars and 50-80× Questar telescope. We recorded only the mother's behavior since we could not recognize the pups individually (Table 1). We also noted each pup's position relative to the female (Table 1). Based on the pups' behavior (Payne and Jameson 1984), we estimated their age at a few hours to, at most, a few days. Our observations on 3 October continued until 1715 h when darkness precluded further observations. We resumed ob-

Table 1. Percent of time spent in various behavior categories by a mother sea otter observed with twin pups on 3 and 4 October 1984.

Date and time	Activity <sup>1</sup>					Pups' position			
	Rest	Groom	Groom pup	Nurse	Swim	Both on female	Both in water	One in One on	One part on One on
3 Oct 1984; 0929-1715	59.4	3.0	25.3	27.0	11.2	43.4	3.0	26.2	27.5
4 Oct 1984; 0940-1249	71.4	6.4	14.3	37.6	2.1	29.0	8.4	52.1	10.5
Total	62.9	4.0	22.1	30.1	8.6	39.2	4.4	33.7	22.6

<sup>1</sup> Values sum to more than 100 percent because some activities occur simultaneously.

servation on 4 October at 0940 h and continued until 1249 h. Total observation time was 10.6 h.

Only three percent of the female's time during the first day was spent grooming and she did not forage. When not at rest, she attended one or both pups (Table 1). Sandegren *et al.* (1973) reported that female sea otters with small pups spent approximately 11 percent of their time grooming themselves, and, although they fed less than females with larger pups, they did spend about two percent of their time foraging (Table 2). Both pups were simultaneously on the mother's chest about 43 percent of the time during the first day. Suckling bouts averaged about 5 min for both days of observation (day 1,  $\bar{x}$  = 5.3, SE = 0.90,  $N$  = 24; day 2,  $\bar{x}$  = 5.1, SE = 0.93,  $N$  = 14). Sandegren *et al.* (1973) stated that suckling bouts averaged six per day and normally lasted about nine min. The apparent difference in length of suckling bouts between our observation and those of Sandegren *et al.* (1973) was perhaps due to frequent switching of the pups from the water to the female's chest. There seemed to be insufficient room at the abdominal teats for both pups to nurse simultaneously.

The pups appeared to spend more time in the water than do single pups, which ordinarily spend most of their time on their mothers' chests (Fisher 1940, Kenyon 1969, Sandegren *et al.* 1973). One of us (RJJ) has noted that captive pups spent 73 percent of their time on their mother's chest, and a wild pup apparently born while its mother was hauled out spent 83 percent of its time on the mother's chest and abdomen (Jameson 1983). Both wild pups were seen on their mother only 43 percent of the observation period on day 1; that day the floating pup never drifted more than 5 m from its mother before it was retrieved, and the triad spent the entire period within less than 0.5 ha.

The mother responded to approaches by the mated pair by swimming away carrying one pup on her chest and holding the other in her mouth. She did the same when moving to a new location. If one pup drifted away while the mother

Table 2. Comparison of percent of time allocation of a mother sea otter with twin pups and mothers with small pups observed by Sandegren *et al.* (1973).

	Rest	Self groom	Groom pup	Nurse	Swim	Forage	N <sup>1</sup>
This study	63	4	22	30	9	0	1
Sandegren <i>et al.</i> 1973	48	11	25	10	14	2	7

<sup>1</sup> N = number of mothers with pups observed.

was attending the other or grooming herself, she would swim to the drifting pup and resume her activity.

We returned to the site on 4 October and found the triad in the same location. The mother's behavior differed significantly between days (Table 1) ( $\chi^2 = 13.2$ , d.f. = 4,  $P < .01$ ). In general, she was less active on the second day. By 1030 h the northwest wind had increased to about 40 km/h, and the natal triad was blown out of the kelp. By 1049 h the mother with pups in tow stopped drifting and swam back to her original location in the kelp bed. At 1117 h she began to vigorously groom herself. She remained close (<2 m) to one pup while the other drifted away. When the drifting pup was about 15 m away, the mother, carrying the nearest pup, swam to the drifting pup. At 1125 h she picked it up, put the other pup in the water and began to groom the pup she had just picked up. The pup in the water drifted south, and by 1133 h was 25 m from the mother. By 1150 h it was in open water and by 1206 h it was still adrift 200 m south of its mother. The mother, apparently unconcerned, had resumed resting with the remaining pup. The drifting pup washed ashore at 1249 h on a rocky headland near the mouth of Pico Creek (35°37'N, 121°09'W), about 500 m south of where it was abandoned.

We immediately retrieved the abandoned pup, a female, which showed no external signs of trauma. The umbilicus was still attached. This, plus the extremely small size (1.1 kg, P. Quinn, pers. comm.), about one-half the normal weight of a newborn pup (Kenyon 1969, Williams *et al.* 1980), provided more evidence that the pup was one of a set of twins. The orphaned pup was turned over to personnel from the Monterey Bay Aquarium at 1523 h on 4 October 1984 and, as of 2 July 1986 weighed 15 kg (P. Quinn, pers. comm.).

Twinning in sea otters occurs infrequently (Snow 1910, Barabash-Nikiforov 1962, Kenyon 1969, Schneider 1972). Williams *et al.* (1980) report on a sea otter that apparently died trying to give birth to twins. Kenyon (1969) speculated that, even if the live birth of twins occurred, the mother would be unable to raise both pups to weaning because of the harsh environment sea otters inhabit and the high energy requirements of both mother and pups. This has been demonstrated to be true for pinnipeds, which also have a very low incidence of twinning (Spotte 1981).

We suggest that survival of twin pups is unlikely for the following reasons: (1) the frequent switching of the pups from the water to the mother's chest

suggests that she was ill-equipped to cope with the presence of two pups; (2) it may be difficult for a foraging female to tend two pups, thus increasing the chance that one or both pups would be swept ashore; (3) there seemed to be room for only one pup to nurse at a time and, although the mother sea otter described here spent 30 percent of the time nursing her pups, which is equivalent to mothers with single pups (Vandevere 1972), twin pups might not receive an equivalent amount of milk; (4) twin pups are smaller than single pups; and (5) the twin pups were in the water for more time than single pups. This, combined with the smaller-than-normal size, may increase the likelihood of death due to hypothermia.

Natural selection in marine mammals has clearly favored small litters (Estes 1979). Even though twinning is known to occur in pinnipeds (Spotte 1981) and now in sea otters, and twin fetuses have been found in cetaceans (Harrison 1969) and manatees (*Trichechus* spp.) (G. Rathbun, pers. comm.), we are aware of no records of any wild twins surviving to the age of independence. Our observations, and those of Williams *et al.* (1980), illustrate at least two ways in which selection may favor single-pup pregnancies in sea otters. First, giving birth to twins may be difficult for sea otters and may cause the death of the adult female. Second, the abandoning of one pup suggests that there may be behavioral constraints on the female that preclude her from bonding to more than one pup. If the second pup did not survive, perhaps because mortality of smaller-than-normal neonates may be higher (Schneider [1972] found few living pups weighing <1.4 kg), or if both pups survived but longer-term survival of the pups or mother was reduced, then selection favoring single births would have occurred.

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#### LITERATURE CITED

- BARABASH-NIKIFOROV, I. I. 1962. The sea otter (Kalan) [translated from Russian]. Israel Program for Scientific Translations, Jerusalem. 227 pp.
- ESTES, J. A. 1979. Exploitation of marine mammals: R-selection of K-strategists? *Journal of the Fisheries Research Board of Canada* 36:1009-1017.
- FISHER, E. M. 1940. Early life of a sea otter pup. *Journal of Mammalogy* 21:132-137.
- HARRISON, R. J. 1969. Reproduction and reproductive organs: cetacea. Pages 253-348 in H. Andersen, ed. *The biology of marine mammals*. Academic Press, New York, N.Y.
- JAMESON, R. J. 1983. Evidence of birth of sea otter on land in central California. *California Fish and Game* 69:122-123.
- KENYON, K. W. 1969. The sea otter in the Eastern Pacific Ocean. U.S. Fish and Wildlife Service. *North American Fauna* 68:1-352.
- PAYNE, S. F., AND R. J. JAMESON. 1984. Early behavioral development of the sea otter, *Enhydra lutris*. *Journal of Mammalogy* 65:527-531.
- SANDEGREN, F. E., E. W. CHU AND J. E. VANDEVERE. 1973. Maternal behavior in the California sea otter. *Journal of Mammalogy* 54:668-679.

- SCHNEIDER, K. B. 1972. Sea otter report. Alaska Department of Fish and Game, Federal Aid in Restoration, Project W-17-4, 1:1-36. Alaska Dept. of Fish and Game, Anchorage.
- SNOW, H. J. 1910. In forbidden seas. Edward Arnold, London. 277 pp.
- SPOTTE, S. 1981. The incidence of twinning in pinnipeds. *Canadian Journal of Zoology* 60:2226-2233.
- VANDEVERE, J. E. 1972. Behavior of southern sea otter pups. Pages 21-35 in *Proceedings of the Ninth Annual Conference on Biological Sonar and Diving Mammals*, Stanford Research Institute, Menlo Park, California.
- WILLIAMS, T. D., J. A. MATTISON AND J. A. AMES. 1980. Twinning in a California sea otter. *Journal of Mammalogy* 61:575-576.

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