

[SHORT NOTE]

First record of a minke whale (*Balaenoptera acutorostrata*) in association with a school of Dall's porpoises (*Phocoenoides dalli*) off Muroran, Hokkaido, Japan

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This is the first record of a minke whale (about 6 m in body length) in association with a school of about 10 Dall's porpoises sighted off Muroran, Hokkaido, Japan on 24 June, 1999. Any aggressive behavior between two species was not observed, and judging from the shape of dorsal fin, there were some adult male Dall's porpoises in the mixed school. This minke whale had its own characteristic white spots in the lateral sides. Similar association was sighted on other five days in 1999, and from photo-identification, the same minke whale was recognized in four cases of them. Based on the 1992–1999 sighting records, two species were annually sighted in the area in spring and summer seasons, and the sighting rates of them were higher in May–June than July–August.

Key words: association, minke whale, *Balaenoptera acutorostrata*, Dall's porpoise, *Phocoenoides dalli*, off Muroran

Baleen whales were sometimes found in association with toothed whales (Fraser 1961, Miyazaki and Kato 1988). Miyazaki and Kato (1988) reported the association of minke whales (*Balaenoptera acutorostrata*) with other cetacean species, such as killer whales (*Orcinus orca*), long-finned pilot whales (*Globicephala melas*), and beaked whales, in the Southern Hemisphere. However, no association of minke whales with toothed whales has been recorded in the western North Pacific Ocean. Present observation is the first record of a minke whale in association with a school of Dall's porpoise (*Phocoenoides dalli*) off Muroran, Hokkaido, Japan.

Minke whales are widely distributed from the tropic to the ice edges in both hemispheres (Jefferson et al. 1993). In the North Pacific Ocean, the summer distribution of minke whales encompasses all waters from the southern Chukchi Sea south to the East China Sea, 30°N in the central Pacific, and coast of central Baja California, and their range during the winter extends at least from the East China Sea and central California, south to within two degrees of the equator (Rice 1998). By morphological and ecological study (Ohsumi 1983) and genetic study (Wada 1984, Goto and Pastene 1997), two stocks of minke whales are recognized in coastal waters off Japan; one is in the Sea of Japan (J-stock) and the other is in the eastern coast of Japan and Okhotsk Sea (O-stock). Based on catch data, Omura and Sakiura (1956) suggested that the species in both two stocks migrates north along the coasts of Japan in spring and summer, and migration in the reverse direction occurred in autumn. On the other hand, Dall's porpoises widely inhabit cold waters of the North Pacific Ocean (Nishiwaki 1972). In Japanese waters, the following two stocks of the species were recognized; (1) *dalli*-type stock in the Sea of Japan and Okhotsk Sea, (2) *truei*-type stock along the Pacific coast of Japan and in the central Okhotsk

Sea (Kasuya 1978, Miyashita and Kasuya 1988, Amano and Kuramochi 1992, Amano and Miyazaki 1996). The *dalli*-type Dall's porpoise in the Sea of Japan is known to migrate to the Pacific coast of Japan through the Tsugaru Strait and to the Sea of Okhotsk through Soya Strait in summer (Miyashita and Kasuya 1988). It was reported that Dall's porpoises associated with large cetaceans such as gray whales (*Eschrichtius robustus*), fin whales (*Balaenoptera physalus*), and blue whales (*Balaenoptera musculus*) (Morejohn 1979, Jefferson 1991), but their associations with other smaller cetaceans are relatively uncommon (Houck and Jefferson 1999). Adult male Dall's porpoise can be recognized by the several sexually dimorphic features; shape of dorsal fin, caudal peduncle shape, postnatal hump, and fluke shape (Miyazaki 1990, Jefferson 1990, Amano and Miyazaki 1993).

Since 1992, we have observed cetaceans in the research area off Muroran, Hokkaido, Japan (Fig. 1) for four months from May to August under cooperation of Dolphin Watching Company, ELM Co., Ltd. We surveyed twice a day (morning 10:00–13:00 and afternoon 14:00–17:00) using three boats (4.9–17 in tonnage, 14–15 m in length), as far as weather conditions were permitted. Both minke whales and Dall's porpoises were sighted off Muroran in every season for the eight years, 1992–1999. During the four months, the sighting rates of each eight year (no. of sighting days/no. of research days×100) ranged from 11.9% to 65.1% for minke whales and from 25.6% to 55.8% for Dall's porpoises, respectively (Table 1). The rates of both species tended to be higher in May and June compared with the other two months.

On 24 June, 1999, a medium size minke whale of about 6 m in length (M-1) was sighted in association with a school of about 10 *dalli*-type Dall's porpoises from the dolphin watching boat *Orca* (total length: 7m) operated by ELM

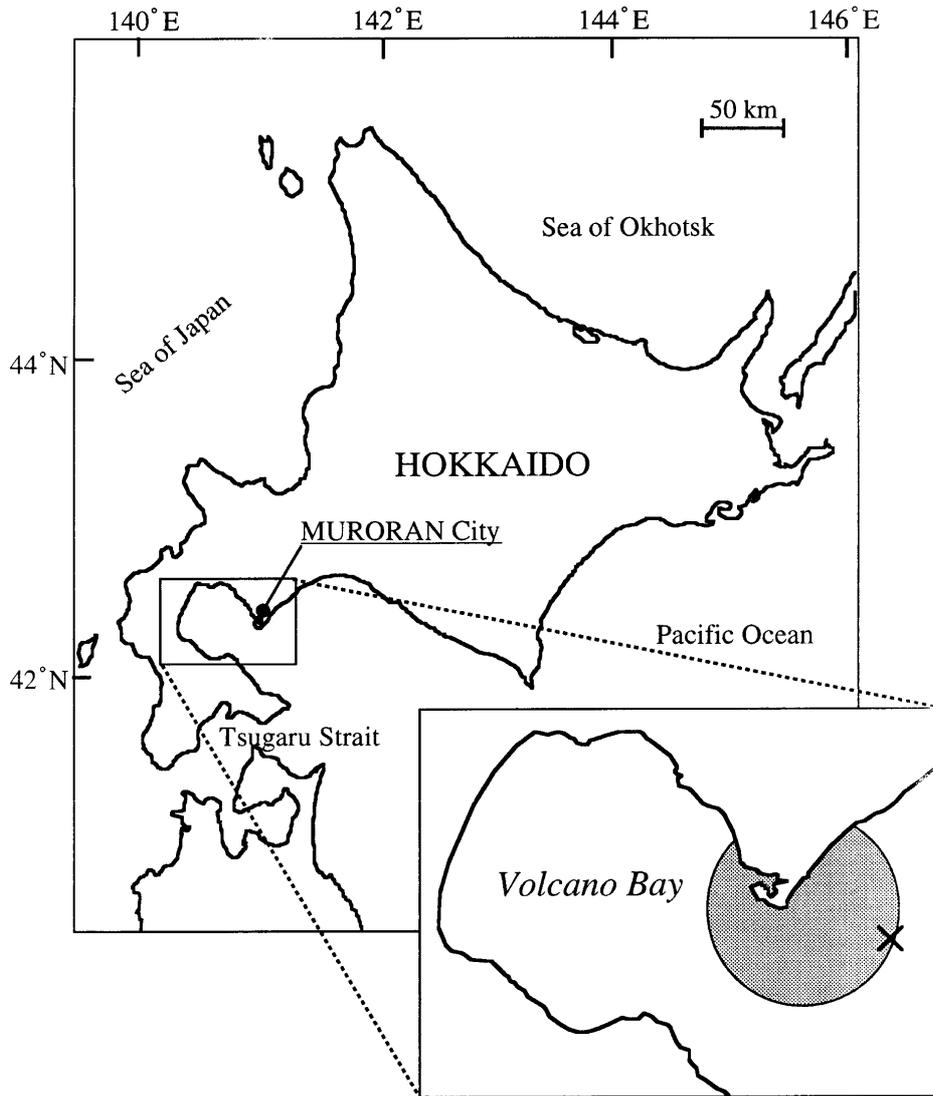


Fig. 1. Map of Hokkaido, Japan. Gray area shows research area of about 10 nautical miles in radius. × shows sighting location of the association of a minke whale with a school of Dall's porpoises on 24 June, 1999.

Co., Ltd. (Fig. 2). The sighting position was $42^{\circ}16'N$, $141^{\circ}13'E$ and its surface water temperature was $16.1^{\circ}C$. We had never sighted such association until 1998. Interestingly, the minke whale had many characteristic white spots on the lateral surface, which were useful for individual identification (Fig. 3). Judging from the dorsal fin shape, we confirmed that some adult male Dall's porpoises were included in the mixed school. During the observation by one of the authors (S. T.) on 24 June, most of Dall's porpoises moved at the front of the association and some moved by the side of the minke whale. Any aggressive behavior between Dall's porpoises and the minke whale was not observed in the mixed school. There were many shearwaters, *Puffinus* sp., which were frequently plunging into the sea above the two species and aggregation of fish were detected by echo sounder system on the research boat.

Moreover, on 30 May, 4 June, 15 June, 18 June and 21 June, 1999, a minke whale in association with about 10 dalli-type Dall's porpoises was also observed in the research area off Muroran and the photographs were taken by the staff of ELM Co. Ltd. Although Dall's porpoises and minke whales were also sighted in some days except for above-mentioned six days, no association of the two species

was observed. Figure 3 shows characteristic white spots of the minke whale sighted on 24 June (M-1) on both left and right lateral sides. Comparison of photographs of previously observed minke whales with those of the minke whale (M-1) indicated that all right side white spots (nos. 1–7) of M-1 were confirmed for the minke whales sighted on 4 June and 21 June, and nos. 2, 3, 5, 6 and 7 were found on the whale sighted on 18 June. This information indicates that these animals sighted on 4, 18 and 21 June was the same animal with the minke whale sighted on 24 June (M-1). For two minke whales sighted on 30 May and 15 June, no accurate comparison of white spots could be done by photographs because of long distant observation. These observations suggest that the animal stayed off Muroran for at least 20 days. We did not know whether the school of Dall's porpoises sighted on 24 June was the same with the school sighted on 30 May, 4 June, 15 June, 18 June, and 21 June.

Morejohn (1979) reported "play" behaviors of Dall's porpoises with baleen whales. He observed sub-adult Dall's porpoises splashing with a migrating gray whale and juveniles playing about a feeding fin whale. Jefferson (1991) also observed that Dall's porpoises rode breaking swells or

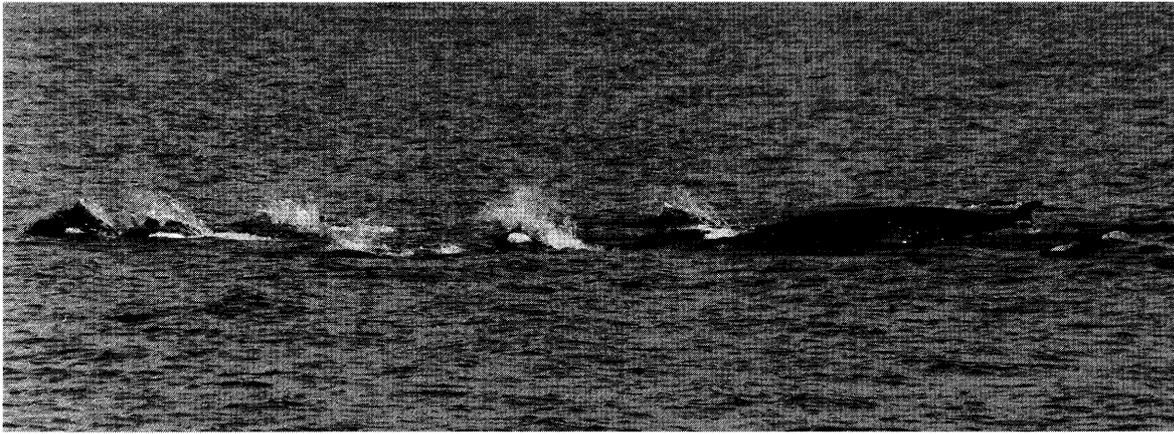


Fig. 2. A mixed school of a minke whale and about 10 Dall's porpoises off Murooran, Hokkaido, Japan, on 24 June, 1999 (Photo by courtesy of Ms. Kotoe Sasamori).

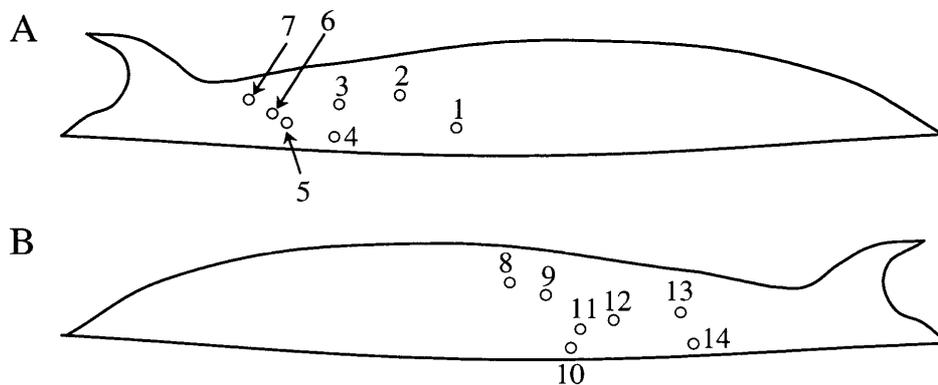


Fig. 3. Characteristic white spots on the right (A) and left (B) lateral sides of the minke whale (M-1).

the pressure waves caused by the blunt heads of blue whales and the latter appeared to be disturbed. However, minke whales did not appear to be disturbed in the present observation off Murooran. Moreover, the fact that the M-1 was sighted in four cases (4, 18, 21 and 24 June) out of above-mentioned six cases suggested that the whale positively associated with Dall's porpoises.

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Table 1. Sighting records of minke whales and Dall's porpoises off Muroan, Hokkaido, Japan for 8 years from 1992 to 1999.

Month	1992			1993			1994			1995			1996			1997			1998			1999			Total		
	MW	DP	R																								
May	6	5	8	4	3	5	2	5	7	6	9	9	3	12	15	6	7	11	10	7	18	6	7	16	43	55	89
	(75.0)	(62.5)		(80.0)	(60.0)		(28.6)	(71.4)		(66.7)	(100)		(20.0)	(80.0)		(54.5)	(63.6)		(55.6)	(38.9)		(37.5)	(43.8)		(48.3)	(61.8)	
June	5	4	8	4	8	12	1	10	16	1	16	18	3	9	11	7	12	19	2	10	17	19	25	25	42	94	126
	(62.5)	(50.0)		(33.3)	(66.7)		(6.3)	(62.5)		(5.6)	(88.9)		(27.3)	(81.8)		(36.8)	(63.2)		(11.8)	(58.8)		(76.0)	(100)		(33.3)	(74.6)	
July	3	2	10	1	3	10	4	1	8	0	4	14	0	10	19	6	7	22	4	7	22	14	15	24	32	49	129
	(30.0)	(20.0)		(10.0)	(30.0)		(50.0)	(12.5)		(0.0)	(28.6)		(0.0)	(52.6)		(27.3)	(31.8)		(18.2)	(31.8)		(58.3)	(62.5)		(24.8)	(38.0)	
August	2	0	17	2	1	15	0	0	17	2	1	19	2	4	22	6	0	14	13	1	23	17	1	21	44	8	148
	(11.8)	(0.0)		(13.3)	(6.7)		(0.0)	(0.0)		(10.5)	(5.3)		(9.1)	(18.2)		(42.9)	(0.0)		(56.5)	(4.3)		(81.0)	(4.8)		(29.3)	(5.4)	
Total	16	11	43	11	15	42	7	16	48	9	30	60	8	35	67	25	26	66	29	25	80	56	48	86	161	206	492
	(37.2)	(25.6)		(26.2)	(35.7)		(14.6)	(33.3)		(15.0)	(50.0)		(11.9)	(52.2)		(37.9)	(39.4)		(36.3)	(31.3)		(65.1)	(55.8)		(32.7)	(41.9)	

MW and DP indicate no. of days in which minke whales and Dall's porpoises were sighted, respectively.

R indicates number of research days.

Figures in parentheses are sighting rate (no. of sighting days/no. of research days \times 100).

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室蘭沖で観察されたミンククジラとイシイルカの混成群

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