

Studies on the Little Toothed Whales in the West Sea Area of Kyushu — XV

Underwater Sound of the Chinese Finless Porpoise caught in the Japanese coastal sea

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Abstract

In Japan, the chinese finless porpoises which had been caught in the Japanese coastal sea are bred in three aquariums, but the underwater sound of this species have not been recognized yet. The authors collected their signals and analyzed them by sound spectorograph in the same way as for the bottlenosed dolphin.¹⁾ Unlike the bottlenosed dolphin, however, this species did not make "Whistle", and "Clicks" of this species were lower than those of the bottlenosed dolphin.

Introduction

Studies on the underwater signals of sea animals have been progressed in recent years, but their underwater signals have hardly been recognized. The chinese finless porpoise (*Neomeris Phocaenoides*)²⁾ is one of the smallest species among whales and is located in the coastal sea.

In Japan, they are located in the Inland Sea, Ise Bay and the coastal sea of Nagasaki Prefecture. Especially in the coastal sea area of Nagasaki prefecture, a large number of them are seen from autumn to winter in Tachibana Bay, Omura Bay and Ariake Sea. During that season, they are sometimes caught by small fixed nets or by small round haul nets. Moreover, the chinese finless porpoise belongs to the group of phocaensidae and it is known that included in this group are common porpoise (*Phocaena phocaena*), chinese finless porpoise (*Neomeris phocaenoides*), TRUE's porpoise (*Phocaenoides truei*), DALL's porpoise (*Phocaenoides dalli*), and so on. It has been reported by WATKINS,³⁾ RIDGYAY⁴⁾ and BUSNEL & DZIEDZIC⁵⁾ that common porpoise and DALL's porpoise do not make the sound which is called "whistle".

The authors, therefore, presumed that the chinese finless porpoise will not make the sound of "Whistle" because this porpoise belongs to the same group as mentioned above. Investigative collection of the sounds of the chinese finless porpoise was carried out for this purpose.

Methods

As a matter of fact, it was eagerly desired to record the underwater sound of the chinese finless porpoise in natural environment, but it was found to be extremely difficult. The authors attempted such recording in Tachibana Bay and Tomioka Bay as shown in Fig. 1 from 18 to 26 October 1967, and from 10 to 20 December, but in vain because the vessel could not approach the porpoises in spite of efforts.

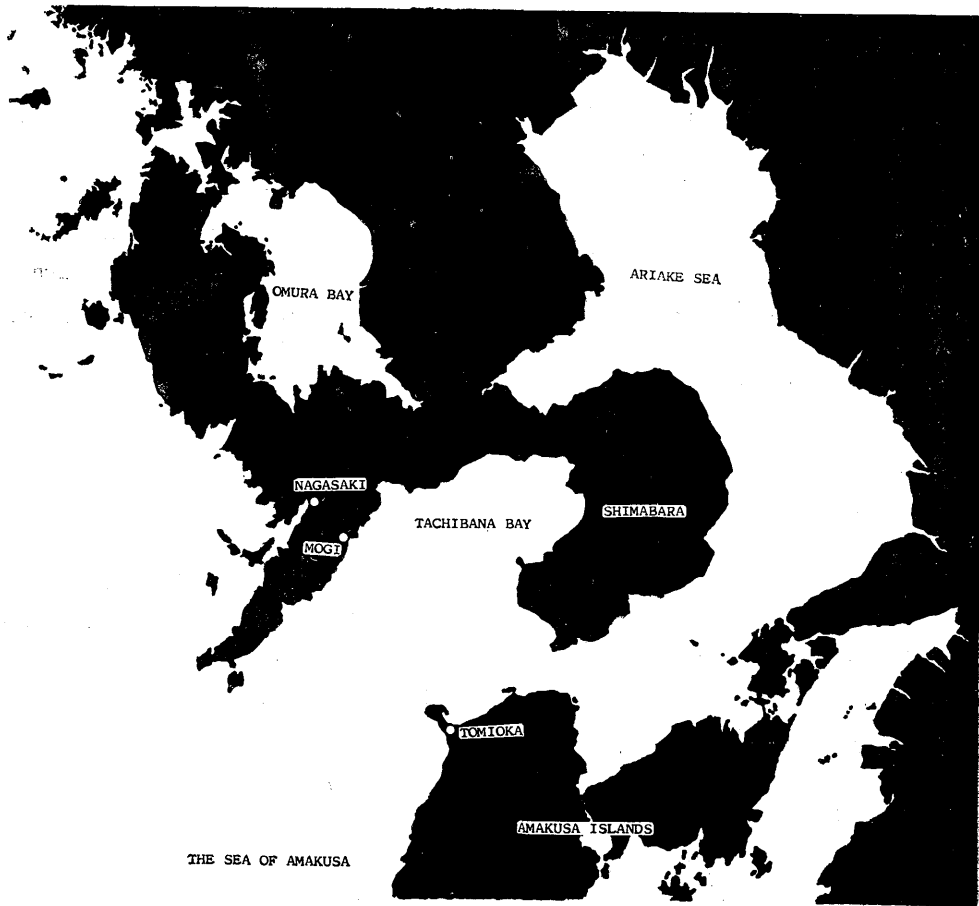


Fig. 1. Test recording area.

The experiments, therefore, were carried out in the aquariums where the chinese finless porpoises were bred. At present, there are three aquariums in Japan where the chinese finless porpoises are bred, namely, Toba Aquarium in Mie prefecture, Ujina Aquarium in Hiroshima prefecture and Nagasaki Aquarium in Nagasaki prefecture. The Toba Aquarium breeds three chinese finless porpoises (two males and one female) which were caught in Ise Bay. Ujina Aquarium breeds one (female) which was caught in

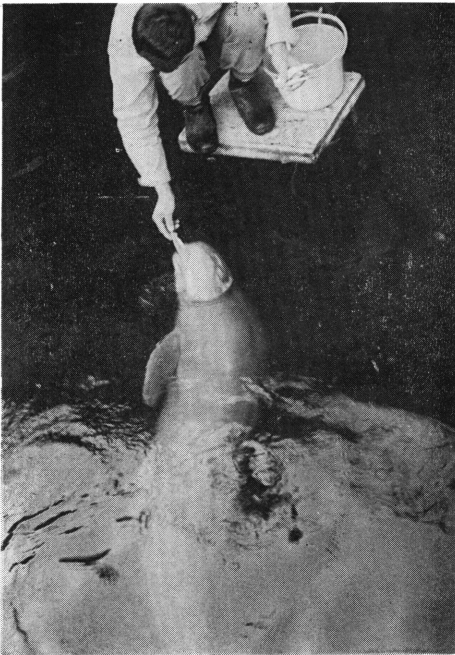


Fig. 2-a *Neomeris phocaenoides*
of the Toba Aquarium.

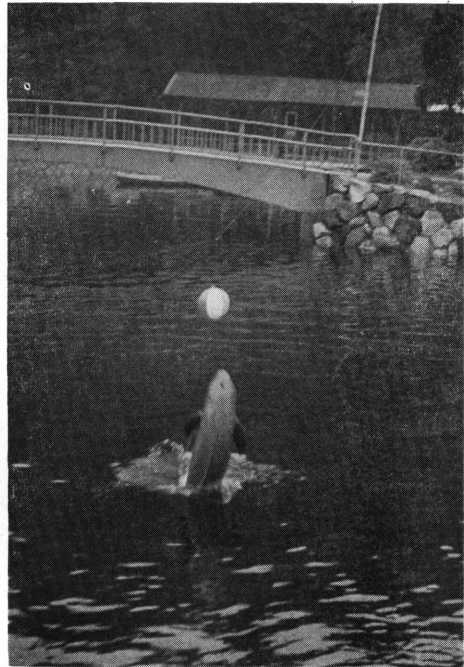


Fig. 2-b *Neomeris phocaenoides*
of the Ujina Aquarium,

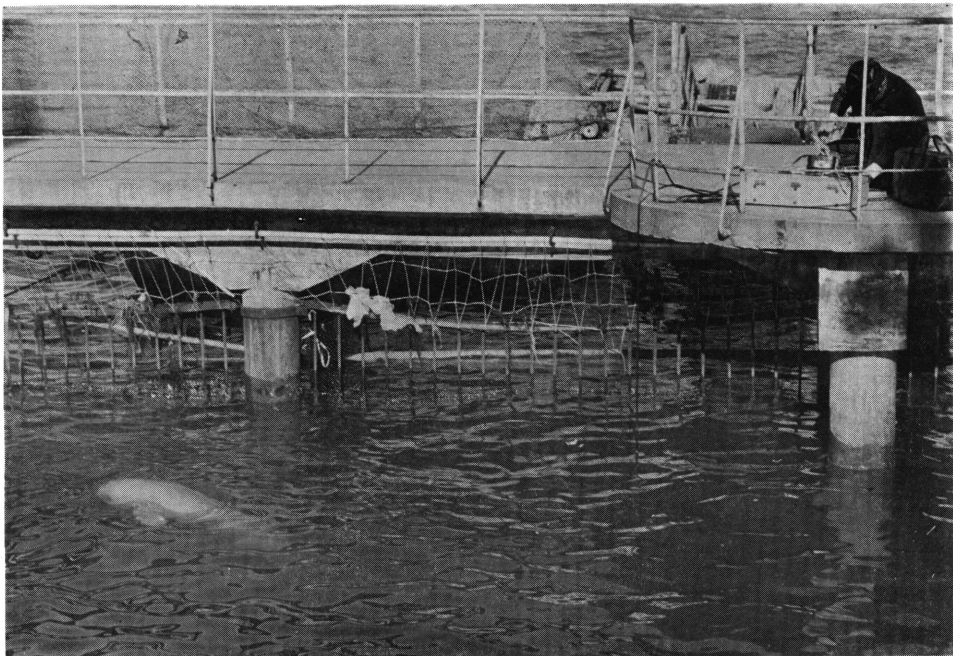


Fig. 3 *Neomeris phocaenosdes* of the Toba Aquarium.

the Inland Sea, and Nagasaki Aquarium breeds one (male) which was caught by a pound net with some cub-shaped bags in Omura Bay on 13 April 1968. They are shown in Fig. 2-a, 2-b and 3.

Experiments were carried out twice at Toba Aquarium on 28 October and 26 November 1967, once at Ujina Aquarium on 5 November 1967, and once at Nagasaki Aquarium on 16 April 1968. At Toba Aquarium, recording was carried out at night as it was very difficult in the daytime on account of the noise of many ships. In the other aquariums, recording was made in the daytime.

The instruments used in those experiments were a tape recorder, a hydrophone and a pre-amplifier as shown in Fig. 4. The tape recorder was SONY's model "EM-2" which is generally called "DENSUKE" in Japan, the hydrophone was OKI's model "57-TA-2", and the pre-amplifier was also OKI's "ST-65".

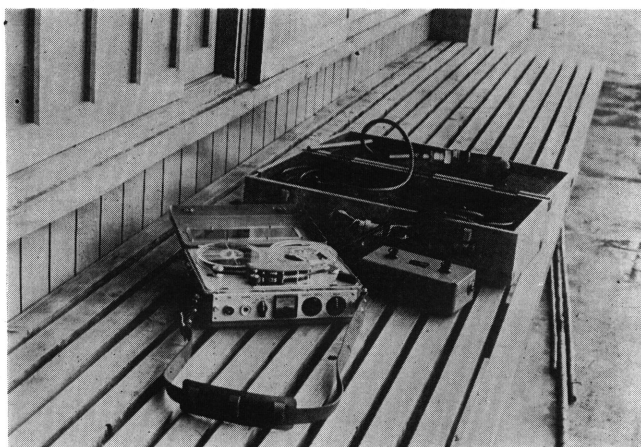


Fig. 4 Instruments

The hydrophone was submerged in the pond where the chinese finless porpoises were bred and their underwater sound was recorded for about a total of six hours. Sometimes food was thrown into the pond and the underwater sound at that time was also recorded. The recorded tapes were analysed by the sound spectorograph, RION model SG-40-A, and the following results were obtained.

Analysis and Discussion

Three types of signal (whistle, clicks and stratiform sound) are emitted by the bottlenosed dolphin. However, the chinese finless porpoise made only two. This porpoise did not use whistle which are often used by other species. And this porpoise used a signal of many layers very often like the bottlenosed dolphin makes whistles. It seems that this signal also serves as the whistle in other species. This signal is shown

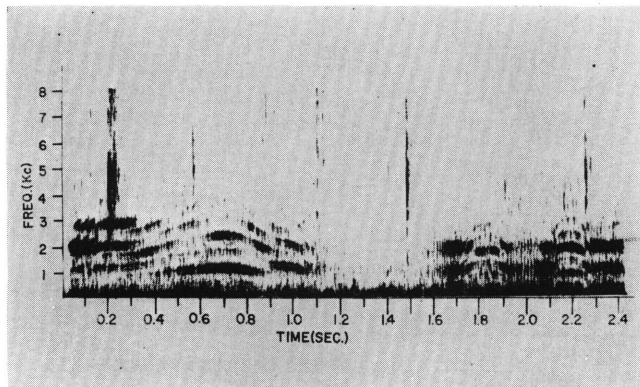


Fig. 5 Stratiform sound of *Neomeris phocaenoides*; the effective filter bandwidth of the analyzer is 300c/s.

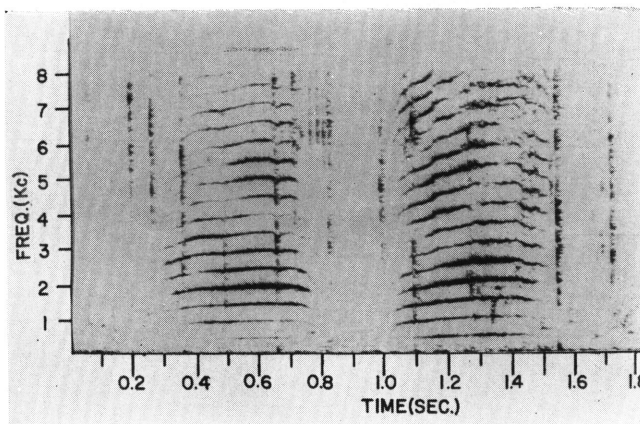


Fig. 6 Stratiform sound of the bottlenosed dolphin; the effective filter bandwidth of the analyzer is 45c/s.

in Fig. 5. This fact seems to be applicable to the group of phocaenidae such as the common porpoise and DALL's porpoise, but this type of signal was lower frequency than that of the bottlenosed dolphin. For comparison with Fig. 5, this type of the bottlenosed dolphin is shown in Fig. 6. Unlike the fact that the bottlenosed dolphin has a powerful energy at high frequency, the chinese finless porpoise only has very weak energy at the frequency of above 4 kc.

The signal of the chinese finless porpoise at the time of feeding was analyzed to be stratiform sound. Fig. 7 shows the stratiform sound of the common porpoise presented by BUSNEL & DZIEDZIC and Fig. 8 is the one obtained in the recent experiments. This

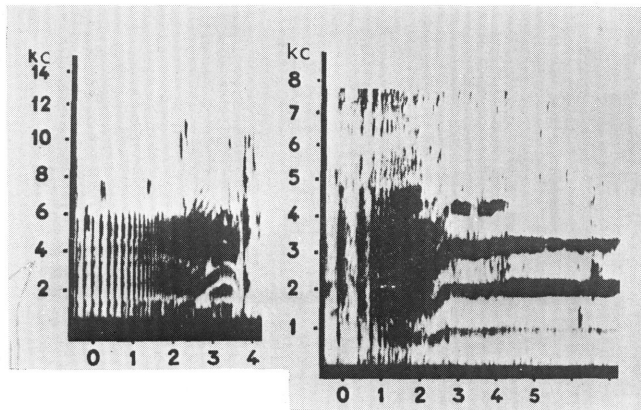


Fig. 7 Sonagram of signal emitted during food intake in *Phocoena phocoena*; presented by BUSNEL & DZIEDZIC.

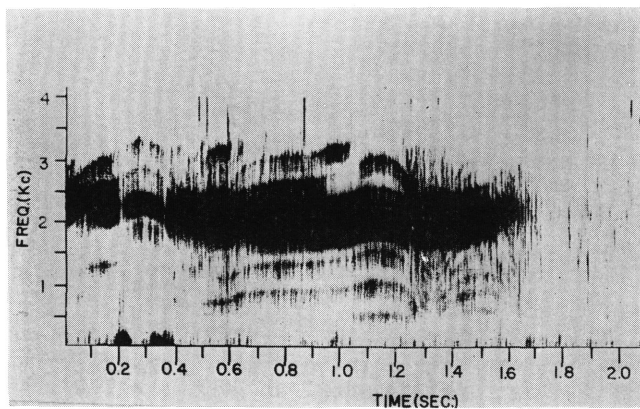


Fig. 8 Sonagram of signal emitted during food intake in *Neomeris phocaenoides*; the effective filter bandwidth of the analyzer is 300c/s.

signal was also lower than that of the bottlenosed dolphin. The repetition rate of the clicks of the chinese finless porpoise was 80 to 800 per second. It has been reported that the rate of the DALL' s porpoise was about 30 per second (by RIDGWAY) and of the common porpoise was 60 to 800 per second (by WATKINS) . Moreover, the frequency of clicks of this species is low in comparison with other group. The clicks of the bottlenosed dolphin (Fig. 9) ,the common porpoise (Fig. 10) , the DALL' s porpoise (Fig. 11) and this species (Fig. 12, 13) are shown in the following figures for comparison. As shown in these figures, the frequency of any signal of the group of phocaenidae is lower than that of the bottlenosed dolphin.

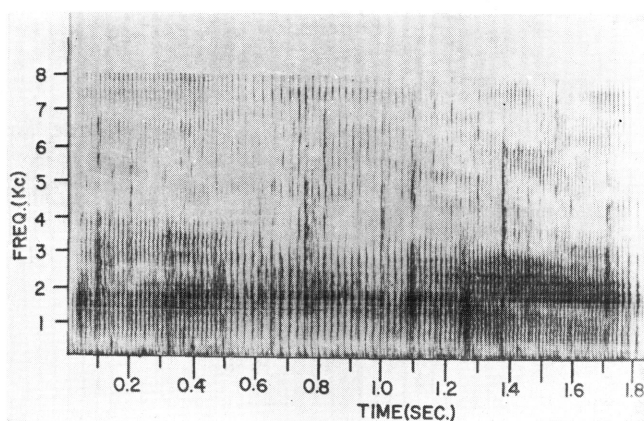


Fig. 9 Clicks of the effective filter bandwidth of the analyzer is 300c/s.

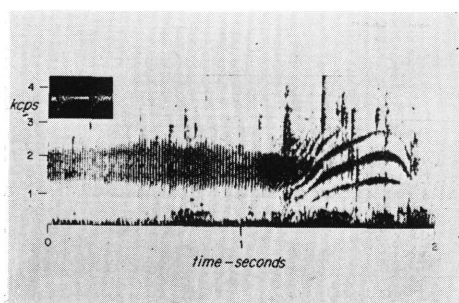


Fig. 10 Clicks of the common porpoise presented by WATKINS.

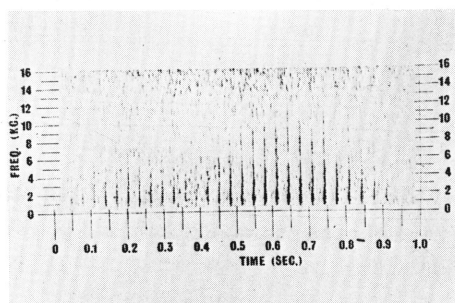


Fig. 11 Clicks of DALL's porpoise presented by RIDGWAY.

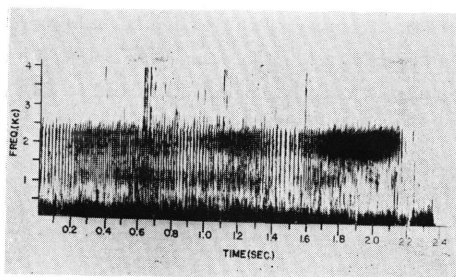


Fig. 12 Clicks less than 4 kc of *Neomeris phocaenoides*; the effective filter bandwidth of the analyzer is 300c/s.

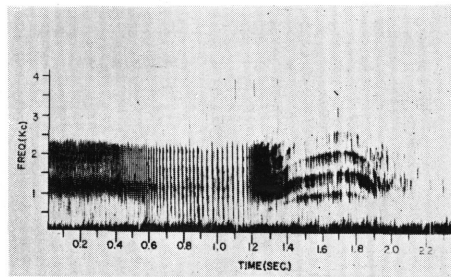


Fig. 13 Clicks less than 4 kc of *Neomeris phocaenoides*; the effective filter bandwidth of the analyzer is 300c/s.

Conclusion

1. Some chinese finless porpoises were bred in three aquariums in Japan and authors collected the underwater sound of this species by hydrophone and analyzed it by sound spectorograph.
2. This species did not emit whistles, but clicks and stratiform sound such as the signal of food intake.
3. The clicks of this species was generally repeated at the rate of 80 to 800 per second.
4. These sounds of this species were lower than those of the bottlenosed dolphin and the main energy was in the extent of 0 to 4 kc.

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Reference

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