

A Record of the Japanese Anchovy *Engraulis japonicus* from the Stomachs of Salmonids in Offshore Waters of the North Pacific Ocean

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Abstract. Sixteen specimens of the Japanese anchovy, *Engraulis japonicus* Temminck et Schlegel, 83.0–98.9 mm in standard length, were found and briefly described from the stomachs of chum salmon (*Oncorhynchus keta*) and sockeye salmon (*O. nerka*) captured at 49°30'N and 166°30'E in the North Pacific Ocean on July 10, 1990. This finding remarkably extends the known geographical range of *E. japonicus* to the northeast and constitutes the northeasternmost record of this species. The offshore occurrence of *E. japonicus* is caused by enlarged range due to increased population size in Pacific waters of Japan after the late 1980s.

The Japanese anchovy, *Engraulis japonicus* Temminck et Schlegel, ranges from southern Sakhalin to Taiwan, but is distributed mainly in coastal waters of Japan and Korea (Hayashi, 1961). While its occurrence in offshore waters of the North Pacific Ocean is poorly studied, Hattori (1964) collected juvenile *E. japonicus* at 43°–45°N and 158°–160°E, and Novikov *et al.* (1991) took its eggs and larvae in the area of 35°–45°N and 141°–160°E.

In the course of a study of the feeding habits of Pacific salmon (*Oncorhynchus* spp.) from the North Pacific Ocean, 16 specimens of *E. japonicus* were found in the stomachs of chum salmon

(*O. keta*) and sockeye salmon (*O. nerka*) taken in offshore waters as far as 49°30'N and 166°30'E (Fig. 1). The present record remarkably extends the known distributional range of *E. japonicus* and constitutes the northeasternmost record of this species (Fig. 2).

Materials and Methods

The salmonids examined were captured with surface gillnets by the R/V *Hokko maru* at 49°30'N and 166°30'E on July 10, 1990. Ten chum salmon, 6 sockeye salmon, and 2 pink salmon (*O. gorbuscha*) were collected, and their stomachs were removed and fixed in 10% formalin in sea water. The sea temperatures at the collection site were 8.5°C, 8.6°C, and 4.4°C at 0, 10, and 50 m.

In the laboratory, the stomachs were examined for contents, and 11 and 5 specimens of *E. japonicus* were found in 1 chum salmon (564 mm in fork length) and 1 sockeye salmon (546 mm), respectively. Methods of measurements and counts follow those of Matsubara (1955). Measurements are in millimeters with an average in parentheses.

Description

Dorsal fin rays 14–16; anal fin rays 16–18. Standard length 83.0–98.9 (90.5); total length

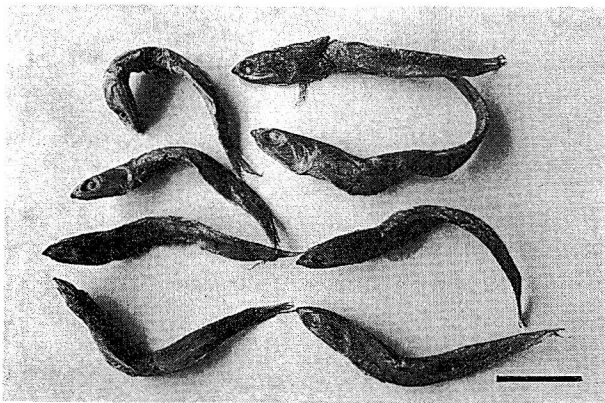


Fig. 1. *Engraulis japonicus* Temminck et Schlegel found in the stomachs of chum and sockeye salmon from offshore waters of the North Pacific Ocean. Scale=3 cm.

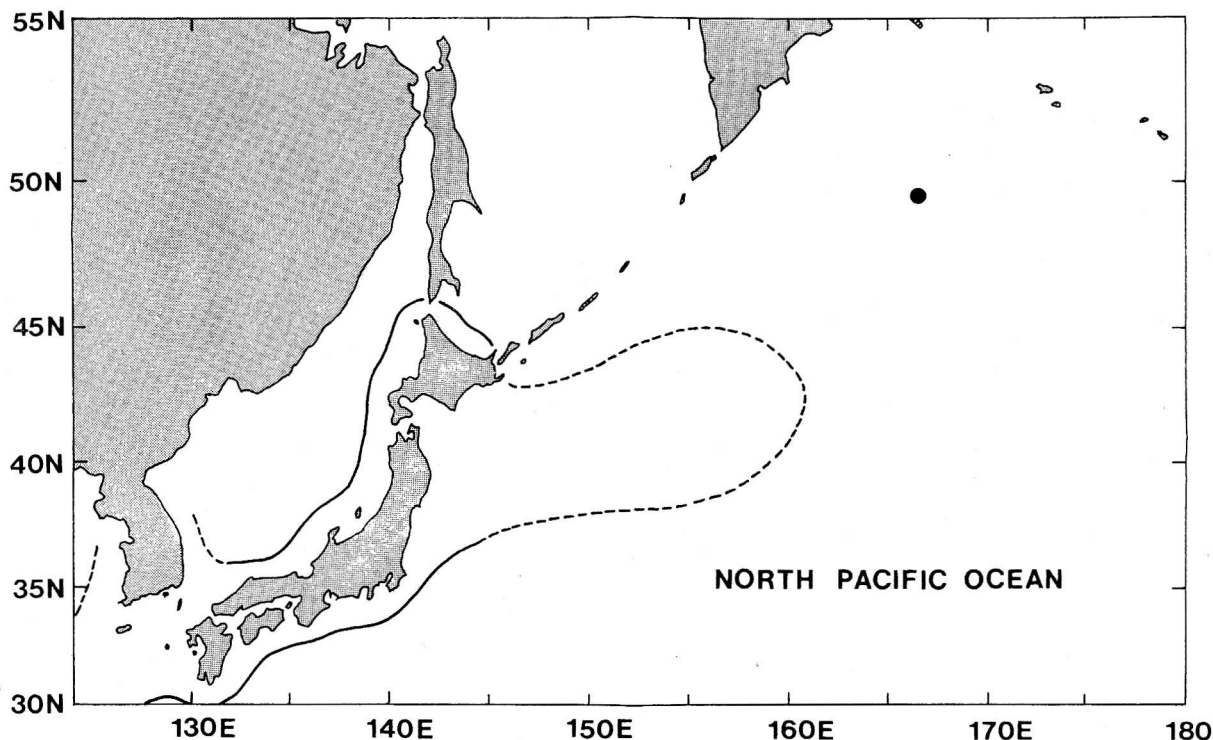


Fig. 2. Map of the western North Pacific Ocean, showing the distributional range of *Engraulis japonicus* (modified from Anonymous, 1973) and the collection site (filled circle) of salmonids which ingested *E. japonicus*. Solid and broken lines show confirmed and obscured distributional range of *E. japonicus*, respectively.

98.9–118.6 (107.2); fork length 94.0–110.5 (101.6); body depth 12.1–14.7 (13.0); body width 6.6–9.0 (7.3); head length 23.6–28.1 (25.3); snout length 4.1–4.6 (4.4); upper jaw length 18.4–21.0 (19.6); eye diameter 5.3–6.9 (6.0); interorbital width 4.2–5.2 (4.6). Body weight 3.3–6.2 (4.1) grams.

Body elongate; slightly compressed. Snout protruding; mouth inferior; upper jaw longer than lower jaw. Jaws with a row of minute teeth. Dorsal fin at mid-body. Anal fin origin posterior to dorsal fin base. Adipose eyelid present. Scales cycloid.

Comments

The distributional range of *Engraulis japonicus* changes with its population size (Nakahara and Ogawa, 1979; Funakoshi, 1988). The catch of *E. japonicus* off the Pacific coast of Japan remained low in the late 1970s and early 1980s but increased thereafter (Kitachi, 1991). Nearly consistent with this trend, there have increased records of *E. japonicus* since 1990 from Pacific

and Okhotsk waters off east Hokkaido and the southern Kurile Islands, which are near the coastal northern limit of its distribution (Kondo, 1990; Yamaguchi and Yamagishi, 1990; Ueno *et al.*, 1990, 1991). Novikov *et al.* (1991) also reported that the percentages of *E. japonicus* eggs and larvae have increased since the late 1980s in the western North Pacific Ocean (35–45°N, 141°–160°E). These suggest that, with increased population size since the late 1980s, *E. japonicus* has acquired a wider range than before and that our sample is part of those widely migrating individuals of *E. japonicus*. Similar offshore occurrence has been reported for the Japanese sardine (*Sardinops melanostictus*) at its high population level (Wada and Ogishima, 1988; Kuroda, 1991) and it is probable that *E. japonicus* is often recorded from offshore waters in the 1990s.

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北太平洋沖合域のサケ科魚類の胃内から得られたカタクチイワシ

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1990年7月10日、北太平洋沖合の北緯49度30分、東経169度30分で流し網によって漁獲されたサケとベニザケの胃内から16尾のカタクチイワシ(標準体長83.0-98.9mm)が見出された。これは、カタクチイワシの新北限記録と同時に新東限記録である。このカタクチイワシの沖合域での出現は、日本太平洋沿岸におけるカタクチイワシの1980年代後半からの資源量増大に伴う分布域の拡大に原因すると考えられる。

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