Japanese Journal of Ichthyology
Vol, 31, No. 4 1985

魚類学雑誌
31巻4号 1985年

The Japanese Sea Bass, *Lateolabrax japonicus* (Pisces, Percichthyidae), an Apparent Marine Introduction into Eastern Australia

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(Received May 1, 1984)

Abstract The Japanese sea bass, *Lateolabrax japonicus*, is newly recorded from Australia, based on two specimens recently collected near Sydney. This large, commercially important species was presumably introduced into Australia through the ballast water of ships from the northwest Pacific Ocean. The gobiid fish *Tridentiger trigonocephalus* was first recorded from Australia in 1973 as a presumed ballast water introduction into Sydney Harbour. This species has subsequently been collected from Melbourne and Perth, and found alive in the ballast water of an Australian ship.

The Japanese sea bass, *Lateolabrax japonicus* (Cuvier in Cuvier and Valenciennes, 1828), is recorded only from the coastal waters of Japan, Korea, Taiwan and China as far south as Hong Kong (Katayama, 1960: 27; Chan, 1968: 52). Katayama (1960) placed the genus in the subfamily Macculochellinae of the Serranidae, which Gosline (1966) removed to the family Percichthyidae. *Lateolabrax japonicus* is an important food fish in both Japan and China, exceeding one metre in total length. The species is catadromous, spawning in the sea and spending part of the life cycle in rivers (Chan, 1968). *L. japonicus* is distinguished from *L. latus*, a Japanese endemic and the only other species in the genus, by the presence of 12–14 dorsal rays (vs 15–16), transverse scales from the lateral line to the anal fin origin 18–21 (vs 14–16), lower side of the mandible scaleless (vs with a row of scales), a shallower body and caudal peduncle and paler ventral and caudal fins.

Two specimens of *Lateolabrax japonicus* were collected in shallow waters around Sydney as follows: AMS I. 22855-001, 1 (370 mm standard length (SL)), Pittwater, N.S.W. (just north of Sydney in Broken Bay) from Sydney wholesale fish markets, April 1982; AMS I. 24177-001, 1 (397 mm SL) gillnetted, Botany Bay, N.S.W. from Sydney wholesale fish markets, 27 October 1983 (Fig. 1). D XII, I, 13–14; A III, 8–9; P 16–17; V I, 5; lateral line 78–81+5–6; transverse scales 16–18+1+17–20; gill rakers (with rudiments in brackets) (2–4) 4+1+12–14 (2–4); vertebrae 16+19–20; head length (HL) 30.5–30.7% SL; snout length 23.8–26.4% HL; eye diameter 14.9–17.6% HL; body depth 78.4–80.2% HL (4.1–4.2 in SL); caudal peduncle depth 31.4–31.7% HL (3.2 in HL); caudal peduncle length 69.6–69.8% HL. Bands of villiform teeth on jaws, vomer and palatines. Preopercle with three large, antrorse spines below, one large spine at angle and serrations above; opercle with two spines, with bony outline between spines weakly concave; supracleithrum exposed above upper edge of gill slit with posterior edge serrated; scales small and ctenoid; underside of lower jaw with patches of small scales one to three rows wide beginning at level of anterior nostril. Fresh colour silvery, in preservative yellowish; ventral fins light, caudal fin dusky. The specimens are preserved in the collections of The Australian Museum, Sydney (AMS).

Two features of the Sydney specimens disagree with the diagnostic features of *L. japonicus* as described by Katayama (1960). Katayama described the undersurface of the lower jaw of *L. japonicus* as scaleless, and of *L. latus* as having a single row of scales to the tip. Our specimens have patches of scales beginning at the level of the anterior nostril. A 171 mm specimen of *L. japonicus* from Chusan, China (AMS I. 1984) has one short row of small scales under the middle of the eye. Also the ventral and caudal fins of *L. japonicus* are described as generally pale, while those of *L. latus* are generally dusky;

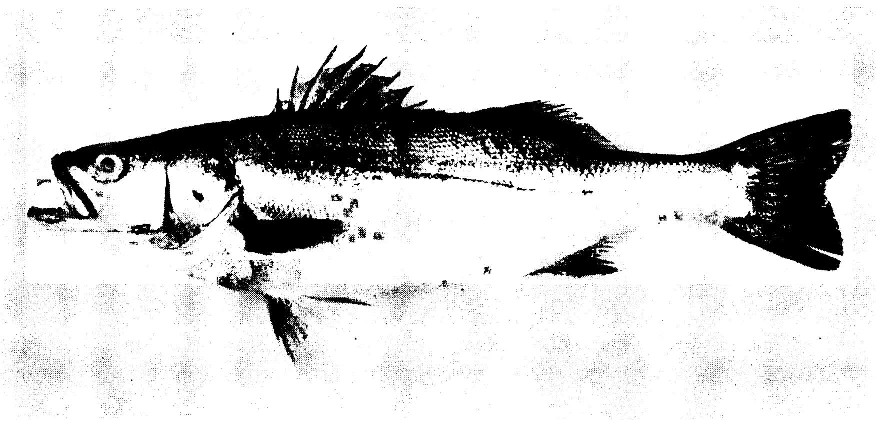

Fig. 1. *Lateolabrax japonicus*, 397 mm SL, AMS I. 24177-001.

our specimens have light ventral fins but dusky caudals. The sum of characters indicate the Sydney specimens are *L. japonicus*.

Lateolabrax japonicus has not been reported from the Indo-Australian Archipelago or the Philippines, and is here recorded from Australia for the first time. The shallow waters around Syndey have been fished commercially for more than 150 years, so heavily fished that the waters of Sydney Harbour were considered depleted due to overfishing by a Royal Commission on fisheries in New South Wales in 1880 (Macleay et al., 1880). A seven year survey (1972–1979) of Sydney Harbour fishes resulted in the documentation of more than 550 species of fishes, from both new collections and old museum specimens (Paxton, 1984). If such a large catadromous fish as *L. japonicus* were naturally present around Sydney, it should have come to notice before this time.

We think the Japanese sea bass is a recent introduction into Australia from the northwest Pacific. Hoese (1973) documented the presumed introduction of the Japanese gobiid fishes *Acanthogobius flavimanus* and *Tridentiger trigonocephalus* into Sydney Harbour and considered ballast water from ships was the most likely method of transport. Middleton (1982) has discussed the ecology and increase in numbers of the former species around Sydney. *Tridentiger trigonocephalus* has subsequently been collected from Melbourne and Perth (AMS I. 24008-002, Rickett's Point, Port Phillip Bay, Vic.; NMV A. 1396, Hobsons Bay Vic.; WAM P. 25945-001, Cockburn Sound, W. A.; WAM P. 26037-001, Swan River, W. A.). Medcof (1975) and Williams et al. (1982) have shown that marine animals, including polychaetes, copepods and fishes (*Terapon jarbua*, *Ptereleotris* sp.), arrive live in eastern Australia in the ballast water of recently berthed ships from Japan.

Although it has generally been assumed that the gobiids traveled to Australia in ballast water tanks, neither of the introduced species had actually been taken from ballast tanks until March, 1976. K. Graham of New South Wales State Fisheries collected a 35 mm SL specimen of *T. trigonocephalus* from the Fisheries Research Vessel 'Kapala' in a refrigerated sea water tank which had been filled for ballast. The vessel had been docked for several weeks and the 20 tonne capacity tank was filled halfway after leaving the dock. Since *T. trigonocephalus* is primarily benthic as both juvenile and adult, the specimen presumably had been living in the intake pipe. The goby was alive when captured and showed no sign of damage.

The size of the specimens of *Lateolabrax japonicus* from Sydney indicate they arrived some years ago. The data on age and growth appear conflicting, with Chan (1968) indicating two year old fish are about 200 mm long and Hayashi (1972) suggesting 350 mm females are either two or three years old. Based on scale readings, our 370 mm specimen is 2+ years old and the 397 mm specimen 3+ years old; however all scales showed growth checks and the ages can only be considered approximate. Nevertheless the specimens must have arrived in Sydney as larvae at least as early as 1980 and perhaps at the same time. Watanabe (1965) has shown that the pelagic eggs of *L. japonicus* are found mostly around the entrance to Tokyo Bay. However after hatching, the larvae move into Tokyo Bay; their entrapment in the ballast water of ships is certainly possible.

With only two specimens found, it is not possible to say whether the Japanese sea bass will form a reproducing population off eastern Australia or whether the species will sporadically appear as chance introductions. The gonads of both specimens were so undeveloped that sex determination was not possible. If the Japanese sea bass establishes a reproducing population around Sydney, it will probably spread further north and south, as the species has a broad latitudinal distribution in the northern hemisphere (23–43°N) and presumably a broad temperature tolerance.

The other potential methods of introduction would be as escaped aquarium specimens (none of the three introduced species is sold in the aquarium trade) or as a purposeful introduction by some individual (permits for the import of these species have never been issued). It seems clear that ship ballast water is currently the means of introducing exotic species into the marine environment of Australia, with three fish species implicated to date. Williams et al. (1982) found 16 non-indigenous species of invertebrates alive in the ballast tanks of Japanese ships in Australian ports (many other taxa are probably implicated, but could not be identified to species). The introduction of two relatively small species of gobies probably does not have a major impact on the environment. However the establishment of such a large carnivore as the Japanese sea bass could have a major influence on a large number of native species, perhaps even some economically important species. Stomach contents were examined from both specimens. Each had partially digested remains of a single, unidentifiable fish in the stomach; the larger specimen also had two types of fish scales and three isopods of the family Aegidae. While some may applaud the introduction of a potentially important commercial fish, such introductions should only be considered after exhaustive experiments to test the ecological results. We think that some control of the ballast water of all foreign ships, either by treating the water with chemicals or temperature, should be implemented as soon as possible.

Acknowledgments

We thank John Baldwin and David Pollard of New South Wales State Fisheries for bringing the specimens to our attention, R. Talbot of State Fisheries for age determination of the scales, Ken Graham of State Fisheries for the information and specimen of *Tridentiger* from the Kapala, and Roger Springthorpe of The Australian Museum for the identification of the isopods. We thank Martin Gomon of the National Museum of Victoria (NMV) and Jerry Allen of the Western Australian Museum (WAM) for making specimens available to us. Pollard and Rob Williams of State Fisheries reviewed the manuscript.

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スズキの東オーストラリア水域への移入

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スズキ，*Lateolabrax japonicus* がシドニー近くから最近2個体採集された．これは本種のオーストラリアからの初記録である．この大型の水産重要種は船のバラスト水によって，北太平洋からオーストラリアに搬入されたものと思われる．

シマハゼ，*Tridentiger trigonocephalus* が1973年にバラスト水によってシドニー港へ搬入され，初めてオーストラリアから記録された．これにつづいて，メルボルンとパースでもシマハゼが採集され，オーストラリア船のバラスト水中にも生きて発見されたことがある．