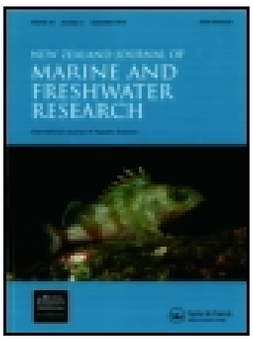

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OCCURRENCE OF THE JAPANESE OYSTER, *CRASSOSTREA GIGAS* (THUNBERG), IN NORTHLAND, NEW ZEALAND

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ABSTRACT

Crassostrea gigas (Thunberg), the Japanese oyster, is recorded for the first time in New Zealand. This exotic species may have been introduced accidentally.

INTRODUCTION

The only species of *Crassostrea* known to New Zealand until now is the northern rock oyster, *C. glomerata* (Gould), which occurs in the intertidal areas of Northland, attached to rock and other hard surfaces. However, in January 1971, a few oysters (which not only looked different but also were clearly larger than the other oysters growing alongside them) were noticed growing on asbestos battens in a rock oyster farm at Mahurangi (Fig. 1). Because the battens were sections of spat collectors put out by the Marine Department in the lower Mahurangi Harbour and supplied to oyster farmers after the summer of 1970, most of the oysters were approximately of the same age, about 1 year old. The larger oysters had several features of shell and soft anatomy characteristic of the Pacific or Japanese oyster, *C. gigas* (Thunberg).

RESULTS

Six specimens, ranging in size from 40 mm long × 56 mm high to 65 mm × 78 mm, were collected by Mr G. Duncan Waugh, Director of Fisheries Research, from Mr J. Meldrum's oyster farm, Mahurangi, on 26 January 1971. All show the following features:

SHELL: The most conspicuous characteristic of the shell is the absence of denticles around the edges of the valves. The right valve is very slightly domed and, externally, shows a series of concentric lamellae (Fig. 2A); the left valve is broadly adherent to the asbestos surface and shows only a slight recess under the hinge; both the valves have wide and uneven crenulations along the lip (Fig. 2C). The muscle scars (Fig. 2B) are usually purple, though in two specimens they were whitish. Externally the right valve is white or creamy, with three radial bands of purple or red, which are very conspicuous in the smallest specimen; internally, the nacre is an enamel white with a dull lustre.

GILLS: There are 12–14 filaments per plica, and the gill margins have a blackish edge in most of the specimens. The pallio-branchial fusion occurs postero-dorsally (Fig. 3).

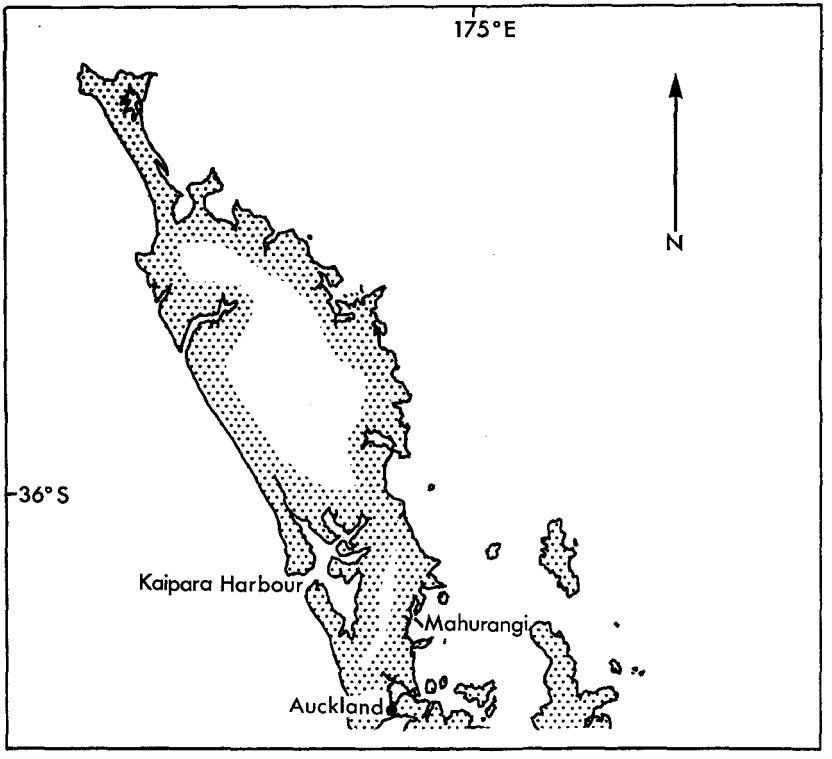

FIG. 1—Northland, North Island, New Zealand, showing locations referred to in text.

MANTLE: The edges of the mantle and the papillae are suffused with brownish yellow, and the surfaces of the inner and outer folds are darker; the papillae of the middle fold are arranged mainly in two rows, with an inner row of long papillae alternating with six or seven shorter papillae of the outer row; the inner papillae are particularly long near the pallial fusion.

RECTUM: The rectum ends as a short tube on the dorsal aspect of the adductor muscle and well short of the pallio-branchial fusion (Fig. 3). A thin collar extends around the anal opening, though an anal fold, as such, is absent.

PROMYAL CHAMBER: This is very conspicuous; the exhalant passage of the chamber is black or light brown (Fig. 3).

AURICLES: The auricles are slightly brownish, and the inter-auricular connection is extremely tenuous.

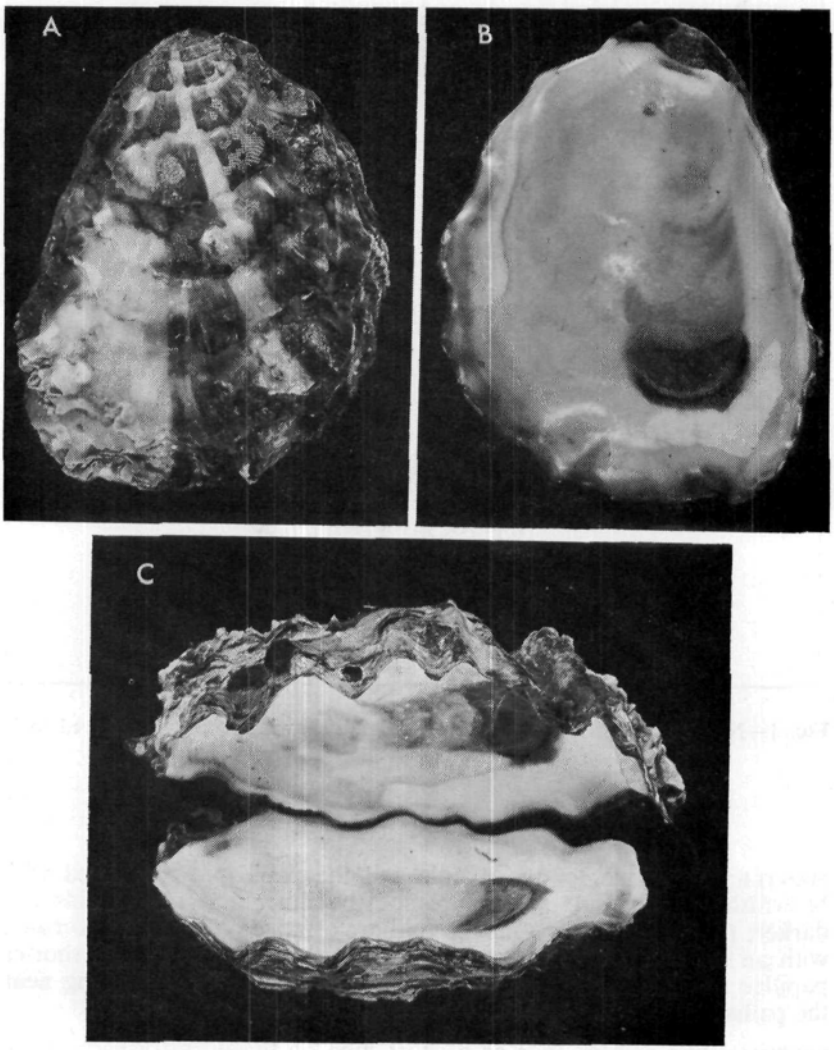

FIG. 2—*Crassostrea gigas* (Thunberg), measuring 52 mm long and 65 mm high, from Mahurangi.
A. Right valve, outer view; B. Right valve, inner view;
C. Apertural view, showing crenulations of the margin.

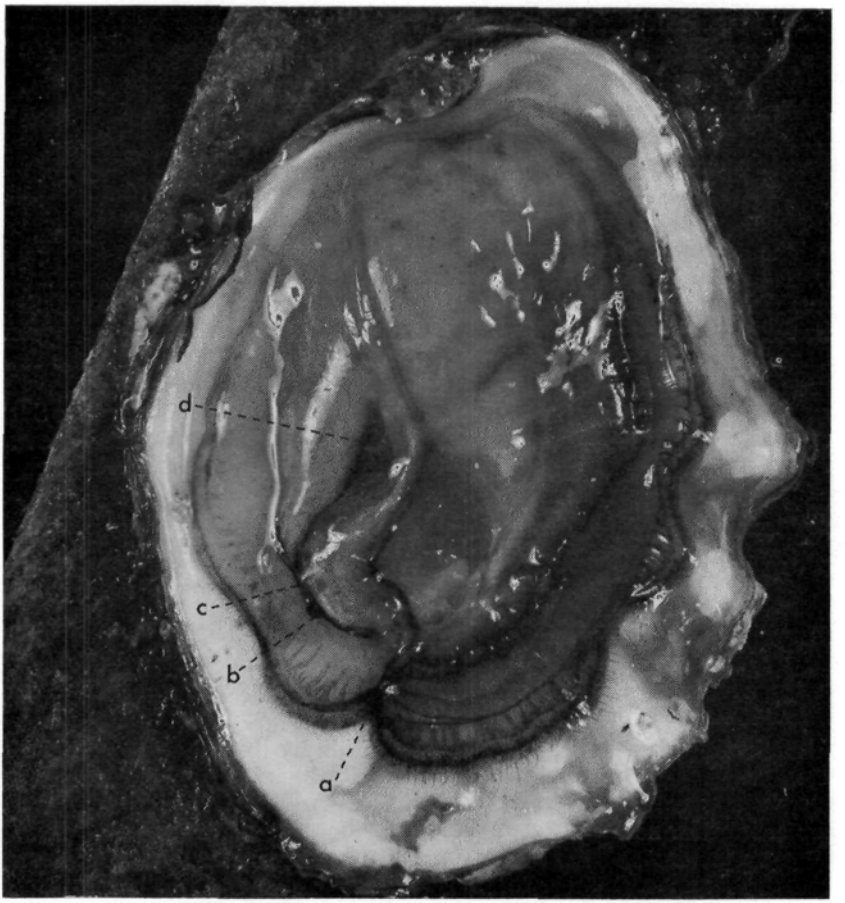

FIG. 3—*Crassostrea gigas* (Thunberg) with the right valve removed to show (a) postero-dorsal pallial fusion, (b) anus, (c) rectum, and (d) promyal chamber.

DISCUSSION

Thomson (1954) describes characters for distinguishing *Crassostrea gigas*: the absence of denticles in the shell, characteristic shell features and coloration, the pigmentation and arrangement of the mantle folds, the dorsal position of the pallio-branchial fusion, the narrow union of the auricles of the heart, the short rectum, and the number of gill bars per plica. The Mahurangi specimens agree very closely with Thomson's description in all characters. Hirase (1930) describes for the "*laperousi*" form of *C. gigas*, the presence of a "sessile" rectum, which he points out as a specific difference from *C. rivularis* (Gould), and also the three

purple bands in the shell; both these features are shown by the Mahurangi specimens, which have other *"laperousi"* features: a rounded and ridged shell.

The Pacific or Japanese oyster is widely distributed throughout Japan and Korea and has been introduced to many parts of the world: the Pacific coast of North America (Cahn 1950, Quayle 1969), Massachusetts and Alabama (Galtsoff 1964), Australia (Thomson 1952), and China, Manchukuo, Hawaii, and Okinawa (Cahn 1950).

The surprise appearance of Japanese oysters in New Zealand waters raises the important question of their origin. The nearest well-established population of *Crassostrea gigas* is across the Tasman Sea in Australia; successful breeding and dispersal of the Japanese oyster have been reported from Tasmania (Willson 1970). However, the few specimens found on the east coast of Northland are unlikely to be the result of larval migration and settlement from across the Tasman Sea, considering the 2–3 week normal larval life, and the distance of over 1,200 miles (1,900 km). It is much more likely that the Mahurangi specimens have originated by accidental, passive dispersal.

Possibly, (1) Japanese oysters on ships' bottoms may have spawned in Northland waters at the higher temperatures obtaining during summer; (2) larvae in ballast water from where *Crassostrea gigas* is found may have been discharged by ships off Northland; (3) adult oysters, perhaps discarded from visiting ships, may have survived and spawned. Dispersal may thus have been solely synanthropic; larvae are tolerant of a wide range of salinity and temperature, and settle on surfaces submerged below low water.

Of further interest is possible reproduction by the existing small stock at Mahurangi and other oyster farms in Northland, to which *Crassostrea gigas* seems to have been distributed along with rock oyster seed from the same Marine Department batch. A recent examination showed six large specimens on similar asbestos battens at an oyster farm in Kaipara Harbour, and a few scattered specimens are present in other farms throughout Northland; single specimens have been seen on two oyster farms in the Bay of Islands, and on one in Ohiwa Harbour, Bay of Plenty; all were on spat collectors supplied by the Marine Department farm, Mahurangi, in 1970. In the course of studies on the larvae and spat of northern oysters, including *Crassostrea glomerata,* a watch will be kept for the occurrence of *C. gigas,* particularly for naturally occurring specimens in the Auckland area.

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