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Reproductive Biology and Early Life History of the Chilean Oyster, with Special Reference to Populations in Northern New Zealand.

Andrew Greig Jeffs

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this passage, and was under some apprehensions of not being able to
fetch the Streights, which would have obliged us to steer away for
George's Island; so I would advise any that comes to this part to
keep to the Southward, particularly in the fall of the year, When
the S.o and SW winds prevails. The Land when we first made
it appeared high and formed a confused jumble of Hills and
Mountains – We steered alongshore to the Northward, but was much
retarded in our Course by reason of the swell from the NE. At
noon on the 3.d of April, Cape Farewell, which is the South point
of the Enterance of the Westside of the Streights, EbN ½ N.o
by the Compass 3 or 4 Leagues, ~~It lays in the Latitude of 40°.38' S.o~~
~~and by the Lunar Observations 172°.30' East Longitude from~~
~~Greenwich, Having made 24°.51' from Adventure bay, The~~
~~Variation is 13 degrees East.~~ About 8 O'Clock we entered the
Streights and steered NE till midnight, then brought to till
day light and had soundings from 45 to 58 fathoms sand
and broken shells. At day light made sail and steered SEbE
had light airs – Mount Egmont NNE 11 or 12 Leagues, and Point
Stephens SE½E 7 leagues. At Noon Mount Egmont NbE
12 Leagues. Stephen's Island SE 5 leagues. In the Afternoon
on the 5.th We put the drudge overboard in 65 fathoms, but
caught nothing except a few small scollops, two or three
Oysters and broken shells – Standing to the Eastward for Charlotte
Sound with a light breeze at NW. In the Morning on the 5.th
of April, Stephen's Island bearing SWbW 4 Leagues, was taken
aback with a strong Easterly wind, which obliged us to haul
our wind to the SE and work to Windward up under Point
Jackson. The course from Stephen's Island to Point Jackson
is nearly SE by the Compass 11 leagues distant; had from 40
to 32 fathoms sandy ground. As we stood off and on fired
several Guns but saw no signs of any inhabitants. In the
afternoon

Frontispiece:-

The first record of the Chilean oyster, *Tiostrea chilensis*, from New Zealand waters in 65 fathoms in central New Zealand in an entry from 5 April 1773 from Captain Tobias Furneaux's Log of the Voyage of HMS Adventure.

Abstract

The Chilean oyster, *Tiostrea chilensis*, is a commercially important species that is native to New Zealand and the Pacific Coast of South America. The description of the variability in life history characteristics among populations of the Chilean oyster is fundamental to understanding its biology and may help in solving some of the problems encountered in culturing this species. Research presented in this thesis describes some aspects of the reproductive biology of the Chilean oyster from four populations, mainly in northern New Zealand, and compares the results with previous studies from elsewhere.

Similar patterns of gametogenesis were found among three study populations at Manukau Harbour, Hauraki Gulf and Foveaux Strait. Oysters were protandrous, maturing firstly as males and later also producing ova. In all three populations the majority of the contents of all the gonads were male reproductive products. There was no evidence that the sexuality of oysters alternated rhythmically as has been reported in other species of larviparous oysters. For spawning females, the often concurrent release of ripe sperm indicated the possible presence of self fertilisation. In samples of oysters examined from Foveaux Strait the sexuality of oysters was found to change markedly with size. This suggested that the infection of oysters by the parasite *Bonamia* may not be related to their sexuality as was previously thought.

At two northern populations (Hauraki Gulf and Manukau Harbour) larvae were produced from young, small oysters, and a much larger proportion of the population was brooding larvae each year than has been reported elsewhere. In both populations, larvae were being brooded, released and were settling at all times of the year, unlike other populations. The mean fertility of the Manukau Harbour oysters was the highest so far reported for any population of this species.

The size of larvae in all three northern populations were smaller than has been reported for all other locations in New Zealand and Chile and is thought to be related to differences in water temperatures.

Overall, the results highlight the importance of investigations into populations of molluscs across their geographical range for revealing variation in life history characteristics which may be of benefit for aquaculture.

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Researching and compiling a doctoral thesis is like building a house, thousands of parts and people contribute in some way to the finished product. Consequently, it is hard to formally give praise and thanks to all of those who contributed even though the thought is there. Some contributions to the completion of this thesis, however, merit particular mention as they were fundamental to holding the research and the researcher together.

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