BREEDING OF THE CHILEAN OYSTER (*OSTREA CHILENSIS* PHILIPPI) IN THE LABORATORY

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THE 1948 Lund University Expedition to Chile[1] collected samples of *Ostrea chilensis* from the northern part of the Golfo de Ancud and in the neighbouring Bahia de Ancud, where they were found on stony beaches and on sand and mud down to depths of 11 m. In one of the samples collected in November 1948, several specimens brooding eggs and larvæ were found which were stated to measure 0·5–0·75 mm and 0·7–1·2 mm respectively. This is abnormally large for *Ostrea* eggs and larvæ and suggested that all the larval development would occur while being brooded in the mantle cavity and that the duration of the planktonic stage would be very short. A similarly reduced planktonic stage has been recently reported for the New Zealand oyster, *O. lutaria*[2].

A consignment of *O. chilensis* was received in good condition in this laboratory on September 17, 1962, and placed in glass tanks with running sea-water. Within a few hours a number of early embryos were aborted, indicating that some of the oysters were brooding when they arrived. Four liberations of larvæ were obtained in October during which period the temperature of the water gradually decreased from 15° to 11° C. This range is approximately that found in the late spring and early summer on their natural grounds[3]. Thirteen liberations occurred in November when the temperature was being maintained at 11°–14° C.

The larvæ at liberation had a well-developed foot and eyespot, and mostly metamorphosed within a few hours on the glass and slate sides of the tank and on mussel shells suspended for spat collection in the tank. The shell shape agreed with that figured by Ranson[4] although the size was less than that estimated by Soot-Ryen[1]. The mean and range of shell-length of six liberations are given in Table 1.

Table 1

	Mean	Range
1	435μ	390–510μ
2	477μ	430–500μ
3	475μ	450–490μ
4	490μ	460–510μ
5	492μ	450–520μ
6	491μ	460–510μ

The larvæ were sufficiently active to swim up to the surface film, although the velum is small compared with that of *O. edulis*. The gill rudiment, consisting of 6–8 projections on the left side, is more pronounced than in the mature larvæ of *O. edulis*. Some larvæ isolated in a glass beaker had not become attached 24 h later, suggesting that clean glass was not a favourable surface, although two specimens had metamorphosed without attaching—a phenomenon which has also been seen in *O. edulis*. Some of the larvæ which had not metamorphosed were placed on mussel shell and two became attached in the next 5 h, indicating that metamorphosis can be delayed for at least 24 h.

Two brooding adults have been opened and the number of eggs or embryos estimated (broods of *O. edulis* of this size would contain about 500,000 embryos) (Table 2). Early embryos are white in colour, but at the later stages the brood is light brown in colour instead of the grey or black of *O. edulis*.

Table 2

	Mean diam.	Internal vol.	Dry meat wt.	No. of embryos
1	60 mm	15·0 ml.	1·18 g	66,600
2	51 mm	11·5 ml.	0·94 g	62,800

One adult was observed to be spilling a few eggs in the exhalent current. When opened few were in the inhalent chamber but there were many in the exhalent chamber and filling the water tubes of each demibranch, and more were seen issuing from the genital pore. The eggs, which measured 323 × 264μ, were exceptionally large for a lamellibranch with pelagic larvæ. Thorson[5] noted that the largest lamellibranch egg to develop into a pelagic stage (*Yoldia limatula*) has a diameter of 150μ; those species with larger eggs have a direct non-pelagic development. In *O. edulis* the egg is 150μ in diameter and in *O. lurida* 100μ. A number of individuals of *O. chilensis* have been observed to spill either eggs or early embryos in the exhalent current, and it is suggested that this is caused by the difficulty of forcing these very large eggs through the gills into the inhalent chamber.

Some of the adults which had spilled eggs or early embryos over a period of 3 days were separated from non-breeding individuals. When one was opened 11–13 days later the larvæ had grown to a mean shell length of 331μ at a temperature of 13°–15° C. When another was opened after 27–29 days the larvæ had a mean shell length of 390μ; the temperature in the second part of the period had been 9°–14° C. A sample of this brood was cultured and at 13°–14° C the shell length of the larvæ grew at about 10μ per day. A rudimentary foot was seen on the third day and on the seventh day the foot was well developed, a row of rudimentary gill filaments was visible and the eye spot was clearly developing. On the eleventh day one spat was found attached to the wall of the vessel and many on the fourteenth day. It is probable then that the incubation period at temperatures of 13°–15° C is about 5–6 weeks.

The spat have grown well after settlement and some exceeded 1 mm in length within 12 days at 13°–15° C. The very short free-swimming larval life suggests that *O. chilensis* might be a valuable species to introduce into British waters, since the loss of larvæ by tidal currents and predators would be substantially reduced and most of the settlement would take place near to the parent stock. The temperature at which breeding occurs is lower than the 17°–20° C required by *O. edulis*, and this could result in an earlier production of spat and, since the larvæ at release are more mature than those of *O. edulis*, spatfall would presumably be more reliable. There is the possibility, however, that production of larvæ would continue for a large part of the year, resulting in thin oysters with a proportion 'white sick' during the normal marketing season. In this case *O. chilensis* might be suitable only for the cooler waters of the British Isles. In external appearance it closely resembles *O. edulis* and in the imported sample the oysters were in excellent condition.

[1] Soot-Ryen, T., *Acta Univ. Lund Avd.* (2) **55**, No. 6 (1959).
[2] Hollis, P. and Millar, R. H., *Nature*, **197**, 512 (1963).
[3] Brattström, H. and Dahl, E., *Acta Univ. Lund Avd.* (2) **46**, No. 8 (1951).
[4] Ranson, G., *Bull. Inst., océanogr. Monaco*, No. 1183 (1960).
[5] Thorson, G., *Medd. Grønland*, **100**, No. 6 (1936).