References

1. Churchill, E. P. *Appendix VIII, Rept. U. S. Com. Fish., 1919 (1920), Bur. Fish. Doc. No. 890,* 1920, 1.
2. Galtsoff, P. S. *Proc. 5th Pacific sci. Cong.,* 1934, **3**, 4119.
3. Loosanoff, V. L. *Biol. Bull.,* 1937, **72**, 406.
4. ———. *Science,* 1939, **89**, 177.
5. Nelson, T. C. *N. J. agric. exp. Sta. Bull. No. 351,* 1921, 1.
6. Thorson, Gunnar. *Meddel. Fra Kommissionen for Danmarks Fiskeri-Og Havundersgelser, Serie: Plankton,* 1946, **4**, 1.

On Interspecific Hybridization in *Ostrea*

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In view of numerous attempts to introduce the Japanese oyster, *Ostrea gigas,* to the Atlantic coast it is important to determine whether this species will cross with the native oyster, *Ostrea virginica,* which is found from Massachusetts to Florida.

Galtsoff and Smith (*2*) made some preliminary observations in determining whether these two species would cross. They reported that "Eggs of both species were easily fertilized by either sperm, the ensuing development resulted in apparently normal straight hinge larvae. Comparison with controls showed no increased mortality among the hybrids." Since their observations terminated at the very early straight-hinge stage, it remained undetermined whether the hybrid larvae would continue to develop normally and would finally metamorphose. The present study was undertaken to provide an answer to this question, using the methods now standard at Milford Laboratory for rearing larvae to metamorphosis.

Unfertilized eggs and active spermatozoa of *O. virginica* and *O. gigas* were obtained from mature individuals and allowed to stand suspended in aerated sea water for a short time. The egg suspensions were divided into six equal portions, after an examination had shown that they were free of casual spermatoza. To each of three portions of *O. virginica* eggs, a small volume of *O. virginica* spermatozoa was added, and the remaining three portions received the same quantity of spermatozoa from *O. gigas.* Thus, triplicate cultures of *O. virginica* ♀ × *O. virginica* ♂ and *O. virginica* ♀ × *O. gigas* ♂ were prepared. Eggs from *O. gigas* were handled in the same manner, giving triplicate cultures of *O. gigas* ♀ × *O. virginica* ♂, and *O. gigas* ♀ × *O. gigas* ♂. This assured that eggs and spermatozoa used in hybrid crosses were from the same source and therefore were equal in viability to those used in the control nonhybrid cultures. All 12 groups of fertilized eggs were then cultured under identical conditions. The experiment was repeated three times with consistent results.

In general, hybrid larvae develop quite normally to the straight-hinge veliger stage. However, contrary to the observations of Galtsoff and Smith (*2*), in most of the hybrid cultures of *O. virginica* ♀ × *O. gigas* ♂ the proportion of larvae developing to the straight-hinge stage was appreciably lower than for the corresponding control nonhybrid cultures. Furthermore, in all hybrid cultures a very high mortality became apparent about the sixth day, and almost all the larvae were dead by the tenth day. This heavy mortality in such a short period was especially striking because the hybrid larvae were entirely normal in appearance and vigorous in behavior until the onset of mortality.

The control nonhybrid cultures of *O. virginica* and *O. gigas,* on the other hand, grew quite normally, with no undue mortality, and all cultures were reared to the setting stage. The *O. virginica* cultures reached metamorphosis in 19–25 days, whereas most of the *O. gigas* cultures required 26 to 27 days to metamorphose.

As shown by these experiments, hybrid larvae died within 6–10 days after fertilization, although the nonhybrid cultures grown under the same conditions developed normally to metamorphosis. The mortality of hybrid larvae was apparently due to a lethal combination of inherited factors, that did not become active until a specific stage of development, which most larvae attained in 6–10 days, although the time may be dependent on temperature and thus may vary considerably. The possibility is not excluded, however, that in some rare cases a few of the hybrid larvae, characterized by a special genetic complex, might survive to metamorphosis or even to maturity.

Crosses of *O. virginica* with *O. lurida* were also tried, but the experiments were necessarily confined to attempts to fertilize *O. virginica* eggs with *O. lurida* spermatozoa, because many individuals of the latter species, in addition to being larviparous, are also hermaphroditic, and one cannot, therefore, be certain of exclusion of their spermatozoa. It was possible, however, to find many individuals that appeared to be true males at the time and these were stripped to obtain spermatozoa for the experiments in which active *O. lurida* spermatozoa were added to unfertilized eggs of *O. virginica.* Although the mixture of eggs and spermatozoa was held, in some cases, for as long as 8 hr, no fertilization occurred. Observations also showed that the spermatozoa of *O. lurida* did not interfere with later fertilization of these eggs by spermatozoa of their own species, even when this addition of *O. virginica* spermatozoa was as late as 8 hr after the unsuccessful attempt to fertilize the eggs with spermatozoa from *O. lurida.* Apparently the *O. lurida* sperm does not even enter the *O. virginica* egg, since it does not cause formation of a fertilization membrane or interfere in any way with the later fertilization of the egg by *O. virginica* spermatozoa. These results closely parallel those of Bouchon-Brandely (*1*), who also attempted to cross a larviparous species (*O. edulis*) with an oviparous species (*O. angulata*) and reported that there was no "evidence of successful fertilization or of development."

References

1. Bouchon-Brandely, G. *Bull. U. S. fish Comm.,* 1882, **2**, 319.
2. Galtsoff, P. S. and Smith, R. O. *Science,* 1932, **76**, 371.

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