

The time is right for cod research

March 4 2013, by Torkil Marsdal Hanssen



The CODE (Cod Development) knowledge platform promotes greater understanding of the fundamental biological processes behind the development of robust and high-quality fish larvae. The insights gained may be transferred to other cold-water marine species. Credit: Julie Skadal, Institutt for biologi, UiB

Despite the ongoing crisis in cod farming, the Research Council of Norway is investing NOK 21 million into research on cod larvae. "Right move at the right time," believes Professor Ivar Rønnestad.

Nine [research institutions](#) and several international research groups are collaborating on the CODE (Cod Development) knowledge platform. They are seeking to learn more about the fundamental biological processes behind the development of robust, high-quality fish larvae.

Broad-based research

"We know, for example, that larvae reared on natural [zooplankton](#) demonstrate better growth and development and are of higher quality

than larvae fed rotifers and Artemia. We would like to understand why. This is a complex question, where both nutritional and [environmental factors](#) have an impact on the biology and development of fish larvae. The CODE project enables us to carry out broad-based analyses, from the very basic molecular level up to major, complex [physiological processes](#)," states Ivar Rønnestad at the University of Bergen, who is coordinating the comprehensive [research collaboration](#).

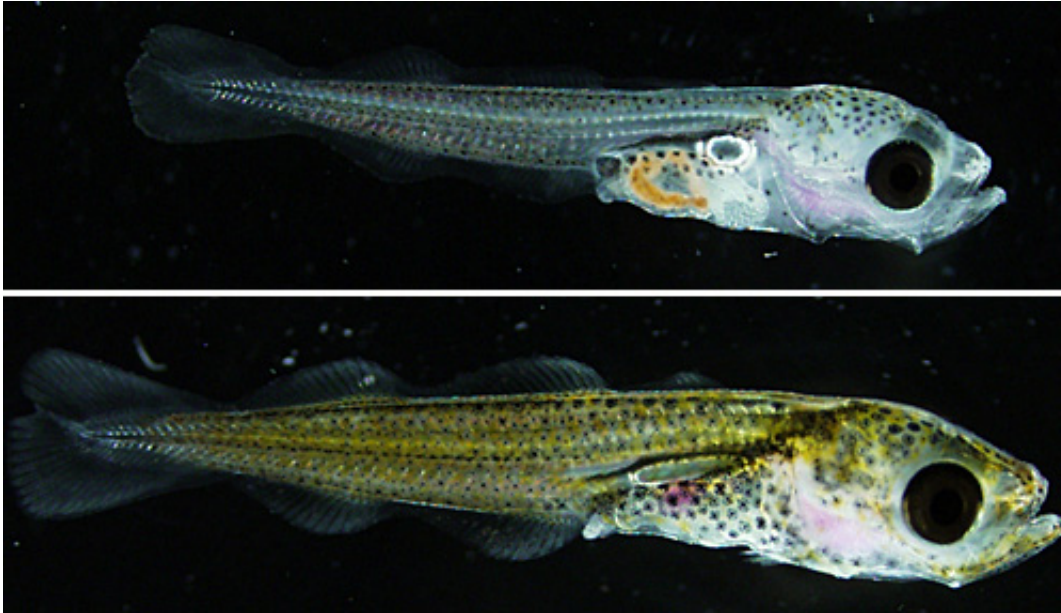
One of the CODE project's objectives is to discover which factors are most significant in the development of high-quality cod fry. It is equally important to identify factors that are not essential to [larval development](#). This knowledge can subsequently be applied by producers of fry to optimise feed and [environmental conditions](#).

Beyond a single species

"But what is the point of investing millions in this type of research given the current financial crisis affecting Norwegian cod farming?"

"Norway has acquired a high level of expertise in marine fish larvae over many years. This know-how could quickly disappear during times of decline. The CODE platform will help to maintain and further develop knowledge that extends far beyond cod farming," believes Dr Rønnestad.

He points to the example of the growth in Ballan wrasse production. This production benefits directly from the marine fish expertise which has primarily been generated from research on the Atlantic cod along with some important input relating to both halibut and turbot. The same will apply to other new species for marine production.



Developmental differences in cod larvae 45 days after hatching. Larvae reared on rotifers at top and copepods (natural zooplankton) at bottom. Credit: Ørjan Karlsen, Havforskningsinstituttet

Cod: a model fish

"The problems and challenges associated with cod production have many parallels among other marine species. Since cod is such an important species in the North Atlantic in terms of its economic value, it has long been the object of study. We know a lot about it. In addition, we have sequenced the entire cod genome. This is a knowledge base that we are obligated to use in the best possible way. Together with new analytical methods and experimental trials, the newly gained genome information gives us a tremendous opportunity for in-depth studies to understand the developmental processes in the cod species," says the professor of marine developmental biology. He adds that all this makes cod a model fish for researchers.

"There are a number of fish currently acting as models, both freshwater

and marine fish. The marine fish used as models, however, are mostly warm-water species. The comprehensive knowledge base that we are in the process of establishing in relation to cod through the CODE project can be transferred to other cold-water species," Dr Rønnestad says.

Examining long-term effects

The CODE project includes a thorough analysis of environmental effects on cod larvae. It is already well known that temperature has a major impact on the development of the cod larva. The CODE platform has recorded data on growth and development in high and low temperatures as well as on the biological processes that temperature changes trigger in cod larvae.

"The results of this research are providing a better, basic understanding of the environments that are best suited to promote growth among wild cod. This is valuable information for marine resource management," Ivar Rønnestad asserts.

The CODE project is also focusing on how climate change may affect the Atlantic cod. In the last phase of the project the researchers will be starting epigenetic studies to analyse the long-term effects of changes in temperature and various nutritional regimes.

"As part of the CODE platform, we are rearing groups of [cod](#) under very different feeding programmes. We are currently observing the fish up to sexual maturation and through their spawning period in the hope that this will provide information on the long-term effects of temperature conditions and feed," Dr Rønnestad says.

Unique collaboration

It is rare in aquaculture research for so many research groups to collaborate on a project. The nine Norwegian institutions, along with the international partners, have come up with successful ways for working together in practice.

"The physical distance between us is one of the obstacles we face, but we have found ways around it. The extent to which the CODE collaboration will be continued is likely to depend on the results from the individual work packages. We want to encourage further cooperation where we see it is possible. We already see that there is some exciting data in what we have compiled so far. Some of these findings will be presented at national and international scientific meetings as well as published in scientific journals in the spring of 2013. Our own expectations for these findings are high," says Ivar Rønnestad, who emphasises that priority will also be given to disseminating findings to [marine fish](#) producers.

Provided by The Research Council of Norway

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