

An animal to feed your eco-car

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Tunicates are marine filter feeders that weigh between 50 and 70 grams and are found in all oceans. Credit: Inge Dorskeland

Researchers at the University of Bergen and Uni Research have found that a certain type of tunicate - ascidiacea - can be used as a renewable source of biofuel and fish food. This is particularly good news for the growing aquaculture industry, which for years has struggled to find enough quality feed for its fish. There also is the prospect of reducing emissions from traffic.

The [marine animal](#) tunicate can be used both as [biofuel](#) and fish food, according to prize-winning Norwegian research.

On the ocean floor, under the pier, and on ship ropes – that's where the tunicates live. Tunicates are marine filter feeders that serve as bacteria eaters and as a foodstuff in Korea and Japan. But in the future they may become more prevalent.

Five researchers at the University of Bergen (UiB) and Uni Research have found that a certain type of tunicate – ascidiacea – can be used as a [renewable source](#) of biofuel and fish food. This is particularly good news for the growing [aquaculture industry](#), which for years has struggled to find enough quality feed for its fish. There also is the prospect of reducing emissions from traffic.

Usable as fuel

It is the cellulose, the protein, and the [Omega-3 fatty acids](#) in the ascidiacea that is the cause for its many uses.

"Its mantle consists of cellulose, which is a collection of sugars. When cellulose is cleaved, one can obtain ethanol. And ethanol can be used for biofuel in cars. The animal's body consists of large amounts of protein and Omega-3. This can be used for [fish feed](#)," says Professor Eric Thompson at UiB's Department of Biology.

Thompson and his colleagues have spent years looking into the many possible uses of the ascidiacea.

Commercial potential

At the innovation conference GROW in March 2013, arranged by

Business Region Bergen, the researchers received a prize for [innovative research](#) and were awarded NOK 300,000 for their discoveries. Regional bank Sparebanken Vest and Bergen Teknologioverføring (BTO) sponsor the prize.

The researchers plan to use the prize money to create commercially viable products based on their research. They have already acquired a patent for biofuel and have a patent application pending for the cultivation of ascidiacea as fish feed.

Why are tunicates particularly suited for use as biofuel?

"The bioethanol used today is unsustainable as it comes from foods already used for human consumption. That is why there has been a move towards using cellulose from the timber industry to produce bioethanol," says Dr. Sc. Christofer Troedsson of Uni Research's Molecular Ecology Group and head of the research at UiB's Marine Development Biology and the tunicate research project.

"However, it is quite complicated to break down the cellulose in trees and convert it into ethanol. This is because the wood contains a substance called lignin, which is hard to separate from the cellulose. Tunicates contain no lignin. Their [cellulose](#) is also low in crystals and is more efficiently converted into ethanol."

More environmentally friendly

Troedsson also points out that using ascidiacea rather than trees is more environmentally friendly, because this does not occupy large tracts of land which could otherwise be used for other purposes, such as growing food.

Another important point is that the ascidiacea are not in the food chain, probably because of their protective mantle. So there are no creatures dependent on the ascidiacea to survive. They also grow very quickly. 4-6 months after "birth" they are ready for harvesting. Tunicates are also found in all oceans, with an enormous growth potential that exceeds most land-based feedstock.

"We have spent years to arrive at these findings, so the prize is a nice recognition. Now we look forward to working on commercialising the results," says Thompson.

Provided by University of Bergen

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