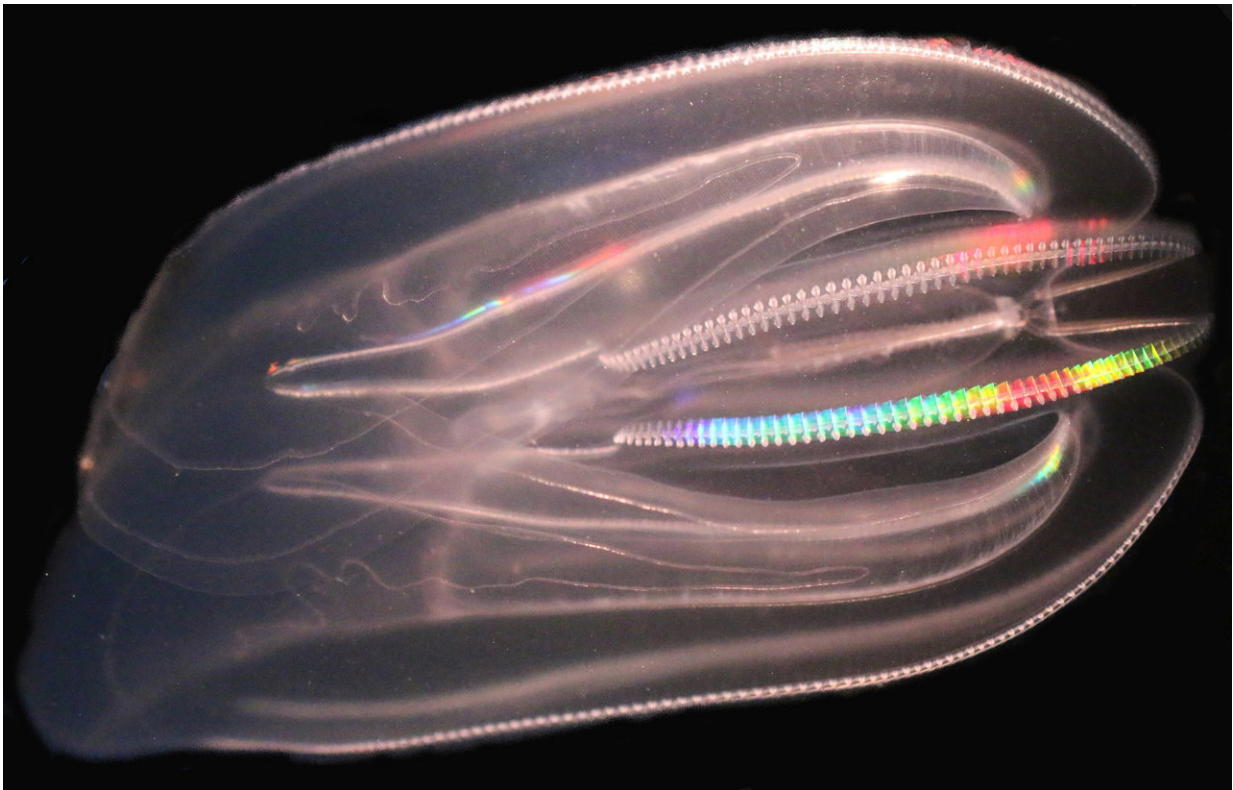


# Currents propel the spreading of invasive jellyfish

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The American comb jelly *Mnemiopsis leidyi*. Credit: Cornelia Jasper/GEOMAR, DTU Aqua

Twelve years ago, the comb jelly *Mnemiopsis leidyi*, originating from the North American East Coast, appeared in northern European waters. Based on the first comprehensive data collection on the occurrence of

this invasive jellyfish in Europe, scientists from 19 countries led by the GEOMAR Helmholtz Centre for Ocean Research Kiel and Technical University of Denmark have now shown that ocean currents play a key role for this successful invasion. The study has been published in the international journal *Global Ecology and Biogeography*.

When the American comb jelly *Mnemiopsis leidyi*, also known as sea walnut, conquered the Black Sea as a new habitat 35 years ago, the ecosystem there changed sustainably. The economically important anchovy stocks collapsed since the fish had to compete with the jellyfish for food. Against this background, scientists, fisheries associations and environmental authorities were alarmed when, in 2005, the sea walnut also appeared in northern European waters. Although effects similar to those in the Black Sea have not been observed in the Baltic and in the North Sea yet, scientists are still closely monitoring the development—particularly since many questions on invasion pathways are still largely unclear.

A total of 47 scientists from 19 countries have now published the first comprehensive inventory of *Mnemiopsis leidyi* in European waters in the international journal *Global Ecology and Biogeography*. With this data, the interdisciplinary team of authors shows that ocean currents as pathways of invasive jellyfish and other drifting organisms in the seas have been significantly underestimated so far. "To explain the invasion of alien species in marine ecosystems, everybody is focused on transport in or on ships. That is important, but does not explain the whole phenomenon", says lead author Dr. Cornelia Jaspers, Biological Oceanographer at the GEOMAR Helmholtz Centre for Ocean Research Kiel and at the Technical University of Denmark in Lyngby.

As basis for their study, the participants have collected all reliable data on the occurrence of the American comb jelly in European waters since 1990—a total of more than 12,000 geo-referenced data points. "Even

this inventory is new, because so far there were only regional studies on the distribution", explains Dr. Jaspers.

In cooperation with oceanographers and [ocean](#) modelers, the team linked data on the occurrence of *Mnemiopsis leidyi* to prevailing currents in European waters. The analysis included not only the flow directions and their strength, but also their stability. The models showed that the steady flow pattern of the southern North Sea closely links the region with much of northwestern Europe, including the Norwegian coast and even the Baltic Sea.

Due to this close connection, not only invasive jellyfish but generally non-native species floating in the sea can be spread over long distances within a very short time. "Using the imported sea walnut as example, we were able to show that these species can travel up to 2000 kilometers within three months," says Hans-Harald Hinrichsen, physical Oceanographer at GEOMAR. Species that arrive in ports in the southwestern North Sea, such as Antwerp or Rotterdam, reach Norway and the Baltic Sea very quickly.

To confirm this connection, the authors used a natural experiment. After a very cold winter season in early 2010, the jellyfish disappeared from the Baltic Sea and large parts of northwestern Europe in 2011 and stayed away until 2013. But after the warm winter of 2013/14, a new population of *Mnemiopsis* established itself in the Baltic very fast. "This new population was of another genotype than the first invaders. Thus, within a short time, a new immigration took place, driven by the prevailing [ocean currents](#)," says Dr. Jaspers. Perhaps the new arrivals from the second invasion wave are even better adapted to the local conditions.

Therefore, the authors plead not only to keep an eye on the transport routes across oceans, but also to better investigate the possibilities of spreading within a region. "The study shows that a single gateway, a

single port for example, in which ships with invasive species arrive, is enough, to redistribute non-native species across entire regions," she concludes.

**More information:** Cornelia Jaspers et al, Ocean current connectivity propelling the secondary spread of a marine invasive comb jelly across western Eurasia, *Global Ecology and Biogeography* (2018). [DOI: 10.1111/geb.12742](https://doi.org/10.1111/geb.12742)

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