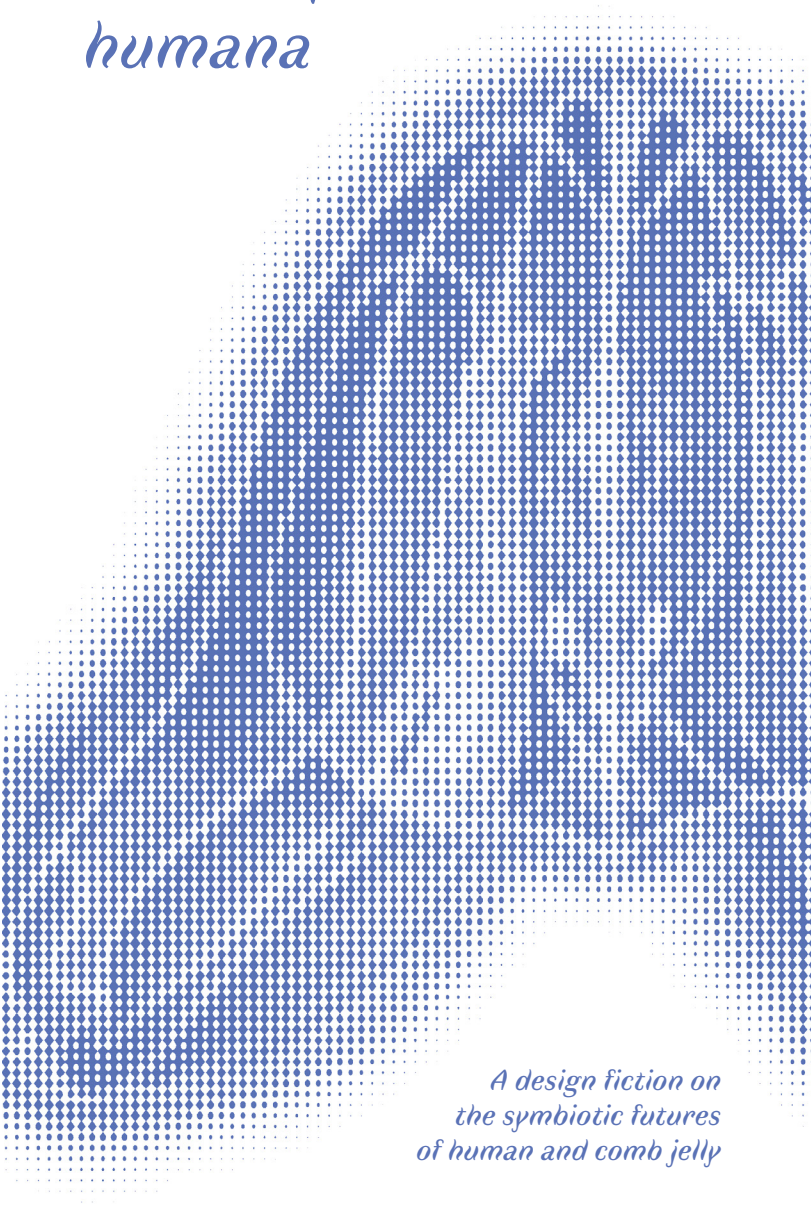
Mnemiopsis humana



A design fiction on the symbiotic futures of human and comb jelly

by Lotta Bauer

Content

In a future where non-native species of all kinds have become a part of everyday life, where the air is so polluted that large parts of the world are uninhabitable, where cities once known as tourist hotspots are no longer worth visiting, and speculative bio art has become reality — the shipping agency ***Invagency Cruises*** *has made a name for itself as a pioneer of a new kind of cruise.*

Due to continuous maritime traffic over the past 1000 years, species like the comb jelly ***Mnemiopsis leidyi*** *have become permanently established — a species that can survive in oxygen-poor waters, feeds on all kinds of microorganisms, and is thus incredibly adaptable but at the same time has contributed to the current situation of the marine ecosystem through its feeding behaviour.*

For the first time on the market, ***Invagency*** *offers a journey during which this extraordinary species and humans merge and form a symbiosis. A major step in biotechnology — and especially one for the tourism industry, which had long seemed doomed.*

01

Introduction

The project *Mnemiopsis humana* explores the parallels and possible symbiotic relationships in the "invasion" — or rather, the continuous movement to unfamiliar places — of two species that could hardly be more different. It critically examines the term "invasion," which implies an ideal or original state of ecosystems and communities, and which inherently classifies and therefore carries the risk of a one-sided assignment of blame.

The goal of this project is not to assign blame, but to foster a responsible approach to our environment. To that end, a narrative is created. The ability of comb jellyfish to merge with each other — as a survival strategy in the case of injuries — was picked up to create a story in which a human perspective merges with the fictional viewpoint of a comb jelly (*Mnemiopsis leidyi*). This encourages us to adopt unfamiliar perspectives and approach other species with empathy.

The fictional narrative — whether read as utopia or dystopia — of *Mnemiopsis humana* (a hybrid being formed from human and comb jelly) explores the legacy our present-day civilisation leaves behind on this planet, and the often unconscious ways in which we are entangled with our environment and other species.

At the same time, it opens a dialogue on a range of deeply interwoven sub-topics, such as questioning the term 'invasive' in relation to non-native species, as well as tourism. A critical look is taken at cruise tourism in particular, which not only has an impact on the oceans and the creatures that live in them, but also on our own species and the communities that live in our holiday destinations. Ultimately, it also addresses the question of how we can appreciate the lives and realities of other species without projecting our own perspective onto them and what we can possibly learn from other living beings.

This project is not seeking to answer all these questions, but to ask them. There may not be a clear answer to many. But just by raising them, by encouraging us to think and by stirring up our thoughts and perspectives, we may get a little closer to the answers.

02

Realisation

By creating an immersive experience, the aim is to enable us to leave our entirely human and anthropocentric perspective and instead engage with a new, unknown one. Even if this perspective is fictional and corresponds to that of a hybrid species of human and sea walnut, it can open up reflection on different perceptions of other living beings.

The main element of the experience is a mask, created from the biomaterial *agar plastic*, which resembles a comb jelly. The bioplastic used is translucent, which means that the mask can be experienced not only from the outside but also from the inside, changing perception considerably as only shadows and silhouettes are visible, similar to underwater. Especially in combination with daylight, the fine structures of embedded algae and shells from Venice become visible. The biomaterial itself is also made from agar — a plant-based thickening agent made from algae — and therefore has its natural origins in the sea, just like the comb jellyfish.

The mask includes headphones, which are used to tell a fictional story about the future of humans and sea walnuts.

03

'Invagency Cruises'
Fictional background of the storytelling

The agency *Invagency Cruises* is a cruise company that was on the verge of bankruptcy due to the poor state of the environment and the cities that have evolved from former tourist strongholds to run-down places that we have all seen before.

Architectural landmarks and magnificent palazzos in Venice have been transformed into derelict buildings that are more tide-scarred than ever. Instead of investing in preservation and restoration measures, for centuries the city has focussed exclusively on the tourist industry, attracting ever greater numbers of people with ever new attractions.

As a result, the actual number of inhabitants - not only in Venice, but in all large tourist cities - steadily declined until there were hardly any left and thus fewer and fewer citizens' petitions were raised. Flooded daily by new masses of people, but abandoned by permanent residents, the cities became empty/dead places, because there was actually no more life there, only consumption.

Our society is constantly striving for growth and change through new developments. Most people now realise that our future on this planet is finite. By constantly cutting down forests and destroying the ecosystems of the oceans, we have damaged the lungs of this world to such an extent that they no longer produce enough oxygen. Scientists have been working for decades to escape this impending disaster and find a solution to ensure our survival.

Recently, researchers in the field of biotechnology have finally succeeded in developing an initial possibility. This came about through more detailed research into the species Mnemiopsis Leidyi — a species of comb jellyfish that has been spreading on a large scale in the waters of the North Sea, Baltic Sea and Mediterranean Sea since the end of the 20th century. The species is able to merge with another animal of its species in order to survive. At the same time, it is extremely adaptable and can also survive in water with a very low oxygen content. These are characteristics that put them well ahead of us humans and will ensure their survival in the future.

The result of the research is now the development of a process in which it is possible to merge humans with said comb jellyfish. Test subjects are now needed to carry out tests on this process.

This is when *Invagency Cruises* saw its oppor-

tunity: by marketing this experiment on humans as a new, exciting form of cruise tourism, it hoped not only to double its profits but also to secure its industry. So the idea for a two-week cruise across the Atlantic to Venice was born. It was in their favour that — as the researchers promised them — a large part of the human senses would be adapted to those of the jellyfish for the duration of the merging. Mental capacity is retained, but senses such as hearing and sight are greatly reduced.

This also solves the problem of the visibly poor state of the oceans and cities, while at the same time providing a unique experience of travelling underwater.

04

About Mnemiopsis leidyi

In October 2024, right after starting our Master's degree programme in Space & Design Strategies, we went on our first excursion to Venice.

On boat trips through the lagoon and by exploring the small islands ("Barena" in Italian), I noticed mysterious slime lumps on land that covered the entire beach and didn't look like ordinary jellyfish. Shortly afterwards, I observed these slightly purple shimmering animals in the water and learnt their name: Mnemiopsis leidyi or sea walnut. They are a species of comb jellyfish, which is a separate phylum of marine life that is distinct from jellyfish, despite their similar appearance. The broader classification for these organisms is gelatinous plankton.

I was instantly fascinated by these creatures, which drifted through the lagoon in huge numbers, and began to research them:

Sea walnuts grow to about ten centimeters in length and have an average lifespan of approximately one year. They perceive their environment through a variety of sensory mechanisms that differ significantly from those of humans. For instance, they do not possess senses of hearing or smell. Their vision is limited mainly to detecting light stimuli. With the help of statocysts, they can sense gravity, and ciliated sensory cells allow them to detect water currents. Comb jellies also possess chemical receptors, particularly on their tentacles.

One of the most remarkable features of the sea walnut is its ability to fuse with another individual of its kind. This doesn't just happen, but is a survival strategy used when two animals are injured. In order to survive, they permanently bond with each other, which means that their nervous systems fuse together within about two hours. However, body parts such as the mouth continue to exist in duplicate.

The sea walnut is also characterised by its bioluminescence property. Unlike many other deep-sea organisms, it can synthesize the required chemical compounds on its own. This bioluminescent response is triggered by stimuli such as touch and serves as a defense mechanism.

Originally native to the East Coast of the United States, Mnemiopsis leidyi has, in recent years, been found in the North Sea, the Baltic Sea, and the Mediterranean. It reaches these regions — along with other species — via the ballast water of ships. Ballast water is taken on board to stabilize ships for ocean crossings and then released

at the destination port. This daily practice transports marine species from one body of water to another. While not all survive the journey, and not all that do necessarily pose problems, the introduction of Mnemiopsis leidyi into new ecosystems is often unwelcome.

Mnemiopsis leidyi is extremely adaptable, allowing it to thrive in a variety of environments — from the cold waters of the North Sea to the warm Mediterranean, in the low-salinity Baltic Sea, and even in the highly saline Black Sea. Warm waters are particularly favorable, which is why these creatures tend to reproduce and spread rapidly during the summer months.

Sea walnuts are not picky eaters. They feed on all sorts of microscopic organisms, including plankton, eggs, larvae, and especially Artemia (a genus of brine shrimp). They consume these almost constantly, essentially filtering the ocean as they move through it. A single adult comb jelly can filter up to 250 liters of seawater per day, capturing as much as 90% of the microorganisms in that volume. In their new habitats, this behavior can lead to serious ecological issues, as they often have no natural predators outside their native Atlantic environment.

This intensive filtering can disrupt ecosystems in several ways: eating fish larvae can reduce fish populations; competition for food can arise with other species; and by consuming organisms that would normally feed on algae, Mnemiopsis leidyi can indirectly cause algal blooms. When these blooms die off, they may lead to oxygen depletion, which can threaten large numbers of marine organisms. For the comb jellyfish, low oxygen concentrations are not a problem.

To date, it remains unclear whether Mnemiopsis leidyi poses a significant threat — and if so, which specific factors are responsible for that impact.

05

About cruise tourism

On our first excursion to Venice, not only the comb jellies caught my attention, but also the tourists. How could it be otherwise? After all, Venice receives as many visitors within two days as the entire population of the city, including the lagoon islands (14 million visitors per year compared to roughly 83,000 residents).

Many of these are day-trippers who, among other means, invade the historic city aboard cruise ships. Until recently, these ships were still allowed to dock right in the middle of the city. The enormous vessels would pass directly by the Giardini of the Biennale, the Doge's Palace, and Piazza San Marco.

The images of this approach through the heart of the city are overwhelming, eerie, and alarming. The historic buildings disappear entirely behind the massive cruise ships, some of which reach lengths of up to 300 meters. If just seeing these pictures causes unease, one can hardly imagine what it must feel like to pass these ships in a small boat — as most Venetians do — when the ships can carry up to 8,000 people (passengers plus crew).

Fortunately, the port has now been moved to the mainland, the "terra ferma."

What shocked me even more — far more than the impact of the comb jellies' migration — was everything I learned in further research about cruise tourism.

In the book *About Tourism*, cruise tourism is described as the pinnacle of overtourism. In 2022, 20.1 million people vacationed on cruise ships, and the number continues to rise steadily, as it is a convenient way to travel.

Over time, it became clear to me that many of the cruises offered represent a form of multidimensional exploitation.

One issue is the working conditions on the ships: there are often no unions or employee representatives, so the cruise companies themselves decide how to distribute tips. Crew members sometimes work up to 72 hours per week for very low pay.

Although cruise ships account for only about 1% of international shipping traffic, their greenhouse gas emissions are enormous and particularly burden the populations of port cities where the ships dock. This is mainly due to the frequent use of heavy fuel oil, which is very cheap but highly toxic. The allowed sulfur content in such fuels is roughly 500 times higher than that

permitted in (European) road traffic.

The food consumption of several thousand passengers naturally generates large amounts of waste and wastewater. Approximately 30 tons of food are discarded each week. A large share of the organic waste ends up in the sea, as does all untreated wastewater discharged directly into the ocean.

Another harmful effect of cruise ships is fouling, where the ship's bow below the waterline becomes covered with mussels, barnacles, and other organisms. These hitchhikers, along with organisms transported in ballast water, are carried to non-native locations.

Through these various factors, cruise ships contribute to climate change and the formation of so-called "dead zones" in the sea. These are areas completely devoid of oxygen, where higher organic life cannot survive.

The local populations of major tourist hotspots also suffer from the constant influx of visitors. Platforms like Airbnb and rising property prices are pushing residents out of their own cities. Small, independent businesses struggle to survive and are increasingly replaced by souvenir shops, fast-food chains, and international fashion retailers. The psychological strain caused by the relentless crowds pushing through the streets should probably not be underestimated.

The local population often gains little from cruise tourism; the average spending per person per port is only about €50. What remains behind, instead, is waste.

Of course, there are also aspects such as cultural exchange from which cities can benefit through tourism. However, this is only the case as long as the number and concentration of tourists do not exceed a certain threshold.

06

About the term 'invasive'

In scientific terminology, species that have "established themselves in an area where they were previously not native"[1] are referred to as *neobiota* (introduced after 1492 — the colonization of the Americas) and *archaeobiota* (introduced before 1492, dating back to the last Ice Age). In conservation contexts, the term „invasive species" is used to describe neobiota that compete with native plants for habitat and displace them. In science "invasion" refers to the entire process of introducing non-native species, regardless of whether their impact is harmful or not. The term „invasive" is highly debated and increasingly viewed as problematic. Instead, terms like „non-indigenous" and „introduced species" are preferred.

The label „Invasive" — or „alien" — creates a narrative suggesting that certain species belong somewhere, while others do not. This perception is misleading, as it contradicts the nature of ecosystems, which are constantly changing. It implies the existence of an original, untouched state of nature — a notion that is scientifically untenable. There are countless species that were once non-native to a region but are now considered native, often because they have proven useful to humans. In such cases, their origin quickly fades into the background. By contrast, non-native species that are demonstrably harmful to their new environments are more often emphasized as „foreign" and portrayed as spreading uncontrollably.

This distinction highlights how quickly we draw lines between welcome and unwelcome so-called invasive species.

This definition is particularly problematic because it bears parallels to xenophobia. The classification of species into native and non-native, and the judgment that follows, was already echoed in National Socialist ideology under the banner of „Blut und Boden" (blood and soil).

This shows that the debate around neobiota is also about „developing a vocabulary that avoids terms rooted in migration politics and steers clear of ethnonationalist or racist connotations" [2].

This project aims to contribute to a more reflective perspective on non-native species. It is, of course, beyond question that some of these species can have devastating effects on local populations and, in the worst case, may even contribute to extinctions. What matters to me, however, is not to stigmatize the species themselves as

„foreign“, „invasive“, or „dangerous“, but rather to see them in context and, above all, to question the mechanisms and systems that facilitate their spread to new areas. These include human-induced climate change, the globalization of trade and transport — and in the case of Mnemiopsis leidyi international shipping.

It is important to point out that the debate on ‘invasive species’ is highly summarised and simplified here. Due to its complexity, a detailed scientific analysis is beyond the scope of this brochure.

[1] Reinhard Piechocki, in Nicolaisen, L., Passeick, Y., 2018. Das Fremde und das Eigene, original language: „in einem Gebiet etabliert haben, in dem sie zuvor nicht heimisch waren“

[2] Nicolaisen, L., Passeick, Y., 2018. Das Fremde und das Eigene, original language: „sich einer Sprache zu bedienen, die frei von Begrifflichkeiten aus der Migrationspolitik ist und die zudem keine völkischen und rassistischen Kontinuitäten aufweist“

Sources

04

Karlowski, U., 2016. Meerwalnuss: Eine ökologische Herausforderung in der Ostsee. Deutsche Stiftung Meeresschutz. URL https://www.stiftung-meeresschutz.org/themen/klimawandel/meerwalnuss-erobert-die-ostsee/ (accessed 6.11.25).

Khoshnood, Z., Khoshnood, R., Ghobeitihasab, M., 2013. Effects of the Invasive Ctenophore Species, Mnemiopsis Leidyi, on the Caspian Sea. Transylvanian Review of Systematical and Ecological Research 15, 117–126. https://doi.org/10.2478/trser-2013-0010

Jokura, K., Anttonen, T., Rodriguez-Santiago, M., Arenas, O.M., 2024. Rapid physiological integration of fused ctenophores. Current Biology 34, R889–R890. https://doi.org/10.1016/j.cub.2024.07.084

Bessho-Uehara, M., Huang, W., Patry, W.L., Browne, W.E., Weng, J.-K., Haddock, S.H.D., 2020. Evidence for de novo Biosynthesis of the Luminous Substrate Coelenterazine in Ctenophores. iScience 23, 101859. https://doi.org/10.1016/j.isci.2020.101859

Aquarium of the Pacific, Comb Jelly (Sea Walnut) [WWW Document]. URL https://www.aquariumofpacific.org/onlinelearningcenter/species/comb_jelly (accessed 6.11.25).

Bessho-Uehara, M., Huang, W., Patry, W.L., Browne, W.E., Weng, J.-K., Haddock, S.H.D., 2020. Evidence for de novo Biosynthesis of the Luminous Substrate Coelenterazine in Ctenophores. iScience 23, 101859. https://doi.org/10.1016/j.isci.2020.101859

05

Fitz, A., Mayer, K., Ritter, K., Architekturzentrum Wien (Eds.), 2024. Über Tourismus. Park Books, Zürich.

De Giorgi, I., 2024. Big Cruise Ships Going Feral: An Ecocritical Reading of Overtourism in Venice. LGSP JournalArticle_18162. https://doi.org/10.30687/LGSP/2785-2709/2024/01/007

Meyer-Hentrich, W., 2019. Wahnsinn Kreuzfahrt: Gefahr für Natur und Mensch, Politik. Ch. Links Verlag, Berlin.

Würfel, C., 2019. Kreuzfahrten: "Ich bezeichne sie als Monster." Die Zeit.

Meyer-Hentrich, W., n.d. Kreuzfahrt in die Klimakatastrophe | Blätter für deutsche und internationale Politik [WWW Document]. URL https://www.blaetter.de/ausgabe/2019/august/kreuzfahrt-in-die-klimakatastrophe (accessed 6.16.25).

Böhme-Kuby, S., n.d. Knochenjobs an Bord: Die Kehrseite des Kreuzfahrt-Booms – DW – 25.01.2023 [WWW Document]. dw.com. URL https://www.dw.com/de/knochenjobs-an-bord-die-kehrseite-des-kreuzfahrt-booms/a-64449893 (accessed 6.16.25).

06

Reichholf, J., n.d. Invasive Arten: Was heißt hier "fremd"? - [GEO] [WWW Document]. URL https://www.geo.de/natur/oekologie/invasive-arten-was-heisst-hier-fremd-30186828.html (accessed 6.17.25).

Nicolaisen, L., Passeick, Y., 2018. Das Fremde und das Eigene [WWW Document]. FARN – Fachstelle Radikalisierungsprävention und Engagement im Naturschutz. URL https://www.nf-farn.de/fremde-eigene (accessed 6.17.25).

Fachstelle Radikalisierungsprävention und Engagement im Naturschutz (FARN), 2018. Rechtsextreme Ideologien im Natur- und Umweltschutz - Eine Handreichung.

Font: Faune by Alice Savoie

Mnemiopsis humana, 2025
by Lotta Bauer
@lottabauer_
Space & Design Stragies | Kunstuni Linz