

biotikum

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# Eggitorial

Hello dear readers of the Biotikum!

I hope you enjoyed your spring holidays and have started well into the new semester. This edition, we will focus fully on ... eggs. The idea arose when one of our authors (Andrin) was amazed by the development of eggs covered by Professor Wutz during fundamentals of biology III lecture (so if you haven't studied this lecture yet, you now have something to look forward to). And while discussing possible topics, we all realised: eggs are a truly amazing and often underrated aspect of biology! So whether you are an egg-skeptic and want to be convinced, or already fascinated by them, this edition is for you.



The topics include:

-  An Introduction to Eggs
-  Fun facts about Eggs
-  A Guide to Fish Eggs
-  An Article on Insect Eggs
-  Eggs
-  Eggs
-  Eggs
-  And of course: another chapter of Adrian Bärs science fiction novel "Eggvocation"

I hope you enjoy the read! On a more personal note, this will be my final edition as editor-in-chief. I have been selected for this year's ETH IGEM team, which is unfortunately a very time consuming extracurricular activity. But the Biotikum continues! The aforementioned Andrin will take over, and I am sure he will do an eggcellent job. So for a final time,

All the best and enjoy the semester!

Bennet Burmeister

*Bennet Burmeister*

Dear reader,

I'm very egg-cited to present to you the newest Biotikum that our team has written, which seems to be about... eggs? Clearly, whoever picked the topic for this edition must be a gym-bro who is going through a bulking phase, otherwise I really can't explain this.

For the past hour, I have been wracking my brain to find as many bad egg jokes as I can to put into this, so I apologize if everything is a bit scrambled.

At the end of last semester, we improved the website, hopefully you saw our new merch page! If you're interested in buying something, write to us at [merch@vebis.ch](mailto:merch@vebis.ch) and come pick up your item at our office. Regarding the coming semester, we're incubating some big ideas! At the start of march, we hit the slopes on the annual ski weekend and (hopefully) no one got injured. When you read this, you might already have gotten egg-static at our beloved Karaoke Night, where you could scream your lungs out, leaving you egg-hausted. We'll have lots of other cool events coming your way, maybe even something involving eggs? I'm very aware that all my puns were egg-stremely unfunny, so that's all, yolks.

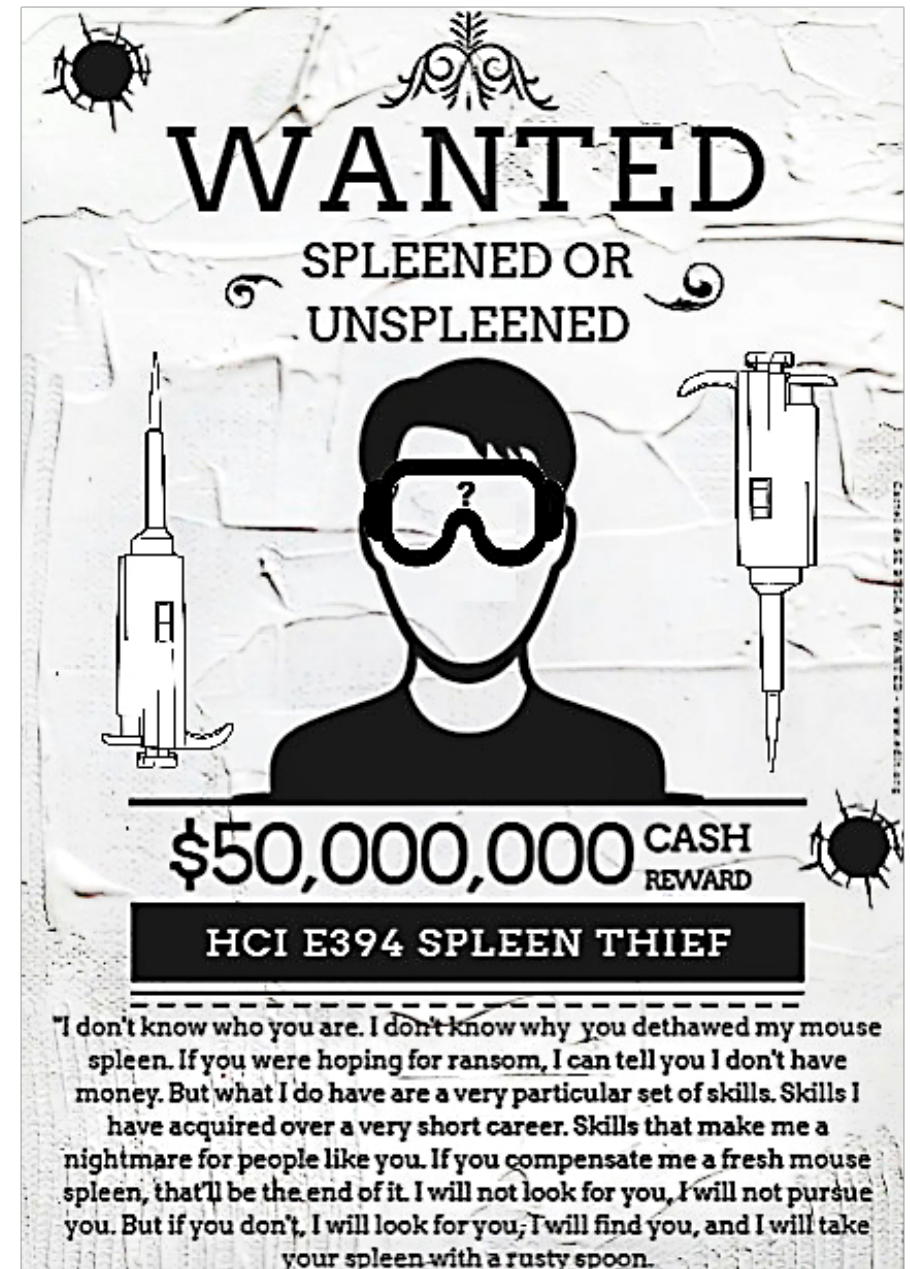
In other important news (egg-pun free), after the demonstration against the increase in tuition fees this autumn, which, encouragingly, many of you attended, the situation in federal parliament now looks rather discouraging. The savings package 27 still has to go through the National Council, but it is unlikely that it will take a particular stand in favour of education and research.

So what now? The VSETH has decided to support the VSS (the National Union of Students of Switzerland) if it decides to launch a referendum against this savings package. The VSS would of course not do this alone, but if it comes to that, the VSS – and thus the interests of students – would be right at the forefront.

We are curious to see how things develop and will keep you updated!

I hope you enjoyed this egg-straordinary article,

Jasmina



**WANTED**  
**SPLEENED OR UNSPLEENED**

**\$50,000,000 CASH REWARD**

**HCI E394 SPLEEN THIEF**

"I don't know who you are. I don't know why you dethawed my mouse spleen. If you were hoping for ransom, I can tell you I don't have money. But what I do have are a very particular set of skills. Skills I have acquired over a very short career. Skills that make me a nightmare for people like you. If you compensate me a fresh mouse spleen, that'll be the end of it. I will not look for you, I will not pursue you. But if you don't, I will look for you, I will find you, and I will take your spleen with a rusty spoon."

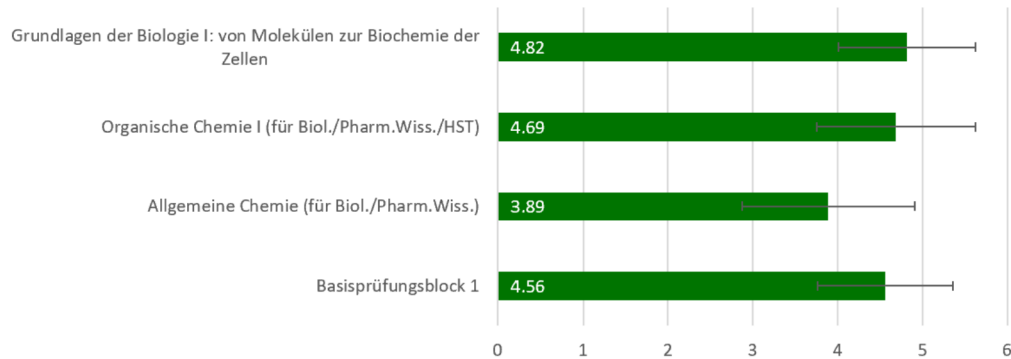
# Prüfungstatistiken

Hier findet ihr die Durchschnittsnoten der letzten Prüfungssession.

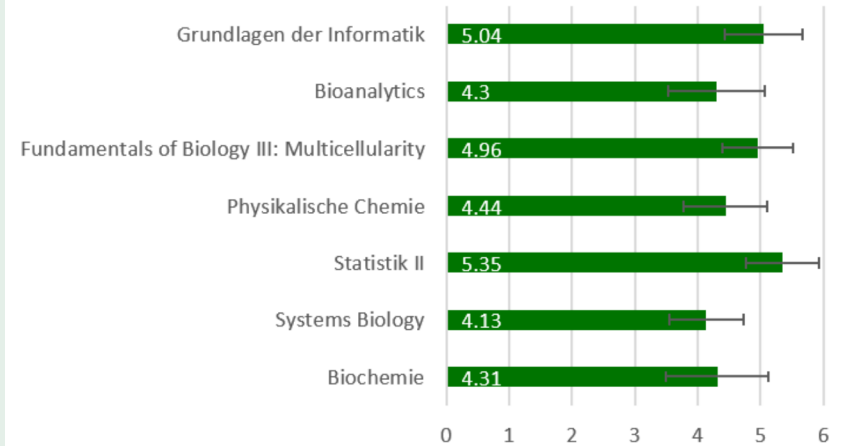
Der Basisprüfungsblock I in der Wintersession 2026 wurde von insgesamt 74 Studierenden geschrieben. Herzliche Gratulation an alle, die es geschafft haben, weiterhin viel Erfolg, Motivation und Durchhaltevermögen! Ihr könnt es gebrauchen. Innerhalb der Balken könnt ihr jeweils die Durchschnittsnoten finden.

Um den Datenschutz zu gewährleisten, sind für die Konzeptkurse des 3. Studienjahres nur diejenigen Prüfungen aufgeführt, die 10 oder mehr Studierende absolviert haben.

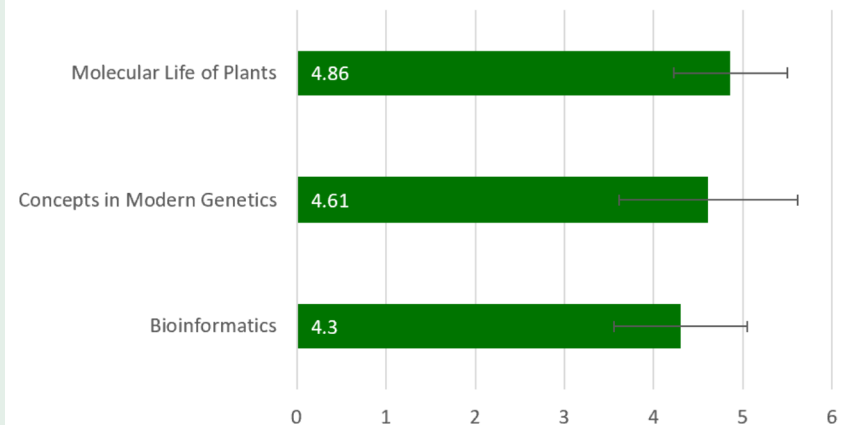
## Basisprüfungsblock 1



## 2. Studienjahr



## 3. Studienjahr



# INTRODUCTION TO EGG

Andrin Bär

Full disclosure: when I yolkingly suggested “Egg” to our dear editor-in-chief as the main topic for this Biotikum, I did not eggspsect to be called on my bluff. When questioned about my sugg-egg-stion (okay, that one might be a bit of a reach), I simply pulled a Marge Simpson –



“Well, I just think they’re neat” – and promptly forgot about it. That is, until I was told in no uncertain terms that the idea had, in fact, won the popular vote. Now I am supposed to write an article about Egg. So, like a wholly unprepared best man who has just realised he forgot both the rings and the speech, here goes nothing.

Egg, I have known you a long time. From your starring roles in The Omelette and Scrambled to your breakout performances in oh-so-many of my egg-drop experiments in primary school, we have certainly been through a lot together. Yet even with all these fond memories, I fear I have only known you for a fraction of your lifetime. So let this

article today be a celebration of you – a nod to your past and present, and a toast to your future.

Egg was not always so shelled off from the world. In their earliest days, long before the evolution of even the trees in which the birds that lay them today roost, the first evidence of egg-like reproductive structures dates back some 600 million years to simple, coral-like marine animals. You would be forgiven for not recognising Egg back then. Gelatinous, aquatic, microscopic, and without even the beginnings of a shell to crack. The Michelin Guide would not have been impressed. It is not hard to see why Egg could not possibly have foreseen the planet-wide omelette that would follow.

But when was it that Egg came to acquire that signature calcium carbonate shell for which we know them today? The earliest intact dinosaur egg fossils, found in the early 2000s in Argentina, belonged to the early sauropodomorph dinosaur *Mussaurus patagonicus* and date back approximately 193 million years. Their discovery provided valuable insight into the evolution of Egg as we know them today, revealing that early dinosaurs likely buried their eggs in sediment, similar to modern snakes and sea turtles.

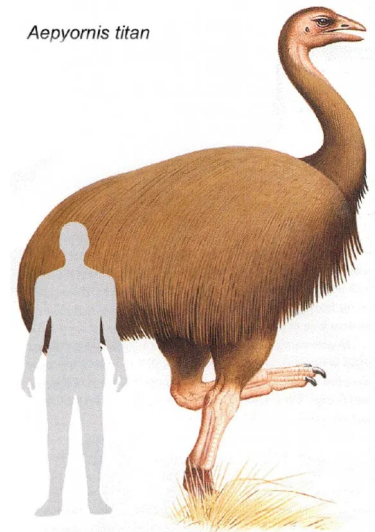
That is not to say Egg’s amniote form – complete with protective membranes and a mineralised shell

– was not already in existence. This evolutionary innovation most likely originated around 312 million years ago in early reptiles such as the roughly 20-centimetre-long, lizard-like *Hylonomus lyelli*. With this development, Egg became a self-contained life-support system, freeing vertebrates from the need to reproduce in water and paving the way for the rise of terrestrial vertebrates, who would go on to domesticate wild jungle fowl for their eggs before, at one such breakfast, someone with a tad too much time on their hands paused mid-bite and thought, “You know what? This deserves an article.”



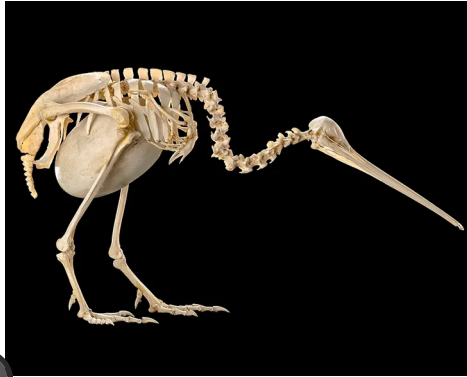
Yet with so much history and so many groundbreaking achievements, you may wonder how it is that Egg remains so humble today. The truth is that this is also a relatively recent development, at least in evolutionary terms. Had you met Egg 1,000 to 1,200 years ago, you would have caught them squarely in their “go big or go home” phase. Measuring up to 34 centimetres in length and holding at least 8–9 litres in volume, the largest Egg ever got was thanks to the elephant bird, *Aepyornis maximus*. Imagine

the Omelettes I could make with that! Truly, their weight-loss journey since then is a testament to Egg’s character.



Comparatively, the most Egg has ever let themselves get in modern recorded history was a meager 2.589 kilograms, laid by an ostrich (*Struthio camelus*) on May 17, 2008, at a farm in Borlänge, Sweden. What an evolutionary weight-loss journey that must have been. To be fair, they did have some help, as the arrival of humans on Madagascar helped to drive the elephant bird to extinction. Interestingly, the Kiwi bird family (genus *Apteryx*), are

the closest extant relative to the elephant birds of the past, and today are still known for their large eggs, boasting the largest egg to body ratio of any living bird, with eggs weighing 370–450 grams – up to 20% of the female's body weight.



While we are speaking of Egg's impressive weight-loss achievements, it would be remiss not to mention their feats of miniaturisation. At just 1.3 centimetres in length and weighing less than 0.5 grams, the bee hummingbird (*Mellisuga helenae*) holds the record for the smallest confirmed naturally laid avian egg in the world. There is, of course, some nuance here, as the closely related vervain hummingbird (*Mellisuga minima*) has supposedly been recorded laying an egg only 10 millimetres long and weighing a mere 0.365 grams, though sources here are mostly historical, and as such scarce.

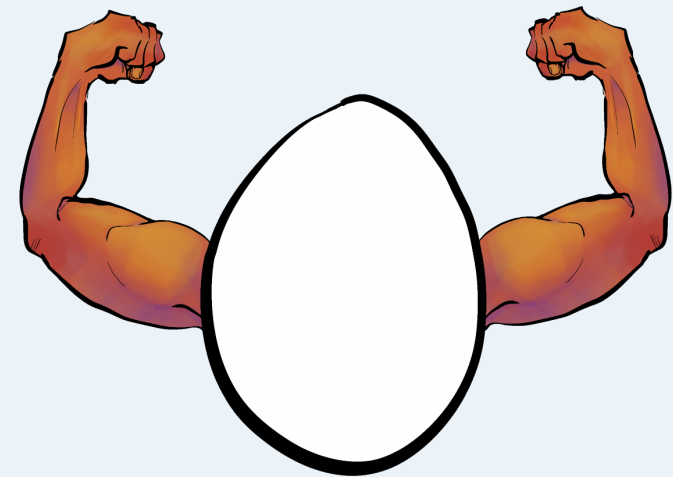
Well, Egg, needless to say, as I gaze upon you here on my plate today, you are absolutely glowing – and I mean that literally! The protopor-

phyrin in brown chicken eggs glows a pinkish-red under ultraviolet light, while other bird eggs also contain the pigment biliverdin, visible to us as a blue-green pigment. Both of these pigments can glow in a variety of colours depending on structure when exposed to UV light. It is not just Egg's eggcellent shell-care routine; this may actually serve an important purpose in allowing bird parents (who can see into the ultraviolet spectrum) to distinguish their eggs, though this theory is still widely debated among eggsperts. One thing is for sure, though: Egg has been glowing under blacklight long before it was cool!

Speaking of things Egg has been doing long before they were cool: expiration dates. Pretty neat bit of technology, right? Definitely one of those things you take for granted right up until you experience the consequences of not adhering to them. Well, Egg has no need for our pathetic, monkey-brain solutions to food safety. See, Egg has their own expiration-date technology built right into their shell. Along with Egg's mood, which can often get steadily fouler with age, moisture evaporates out of their shell, leaving behind an air pocket. A young, fresh, inexperienced egg will sink in water, much like other young, inexperienced organisms I have been told I am not permitted to name as this toast must be kept PG13. An egg that is still fresh, but slightly older, will sink in water, but stand upright, probably complaining about the water's temperature. Should you ever be unfortunate

enough to encounter an older Egg that is feeling particularly off, you will find that they do not sink but instead float on the surface of the water. It is not advisable to continue with the consumption of such an egg, as doing so may result in food poisoning.

Well, Egg, this toast has gone on longer than expected – as all great evolutionary sagas do. Three hundred million years of innovation, extinction, reinvention, and refrigeration. Older than dinosaurs, brighter than blacklights, tougher than calcium carbonate, and still somehow only 7 CHF for a pack of 10 at my local farm. You survived mass extinctions. You survived continental drift. You survived our attempts at microwave omelettes. Long may you boil. Long may you scramble. Long may you outlive us all.



# 3, 2, 1 Los - Suche Insekteneier!

Bennet Burmeister und Julia Huang



Stell dir vor, du müsstest von deinem aktuellen Standort - genau dort, wo du gerade das Biotikum liest - möglichst schnell irgendeine Form von Insekteneiern finden. Ein bisschen wie in einer der unzähligen Social Media Challenges. Wo würdest du suchen?

Nein, lies nicht einfach weiter, denk für einen Moment darüber nach!

Es gibt verschiedene Möglichkeiten. Eventuell würdest du einfach unter einen Stein schauen und hoffen, dort zufällig Insekteneier zu finden. Aber das ist mit viel Glücksspiel verbunden. Eine sichere Möglichkeit ist es wohl, zur ETH Gruppe für Sustainable Food Processing zu sprinten. Diese sitzt im Zentrum und betreibt unter anderem Forschung zu Insekten als Nahrungsquelle. Ausserdem wird hier am "Black Soldier Fly Larvae Treatment" geforscht. Du hättest also garantiert die Möglichkeit, Insekteneier zu finden.

Und wenn wir schon bei Insekteneiern sind, dann kannst du auch mal dein Handy zücken und nach den Insekteneiern im Pokemon suchen. Wusstest du, dass es 94 verschiedene Käfer-Typ Pokemon Spezies gibt? Diese durchgehen Entwicklungsreihen, die als Spiegelung des Wachstums oder gar der Metamorphose der Insekten in der Natur gelten können, sind allerdings nicht immer akkurat. Alle Käfer in der Natur evolvieren nämlich von Larven und durchgehen eine Metamorphose, um letztendlich in die Chitinpanzer-Form zu gelangen.



Überlegen wir weiter: wo findest du am schnellsten Dinosaurier Eier? Und... Go!

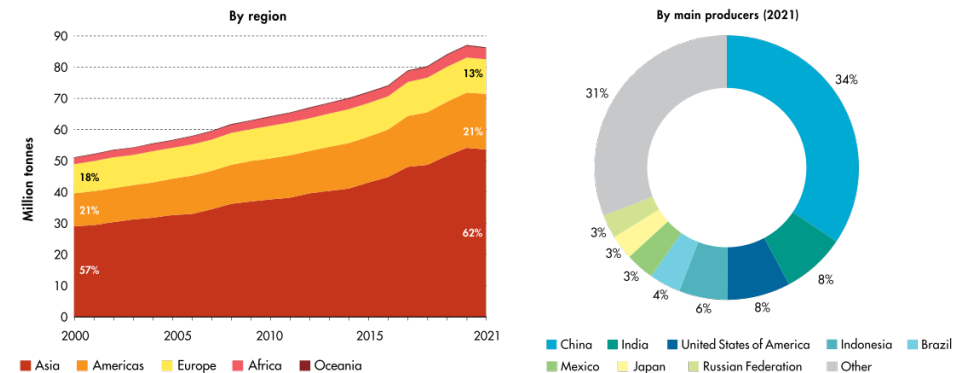
Meine Idee wäre die wissenschaftliche Sammlung des Paläontologischen Instituts der UZH. Allerdings ist die Online Abfrage der Sammlung mit einem so vagen Wort wie "Dinosaurier Eier" nicht möglich. Daher kann ich leider nicht garantieren, dass du dort fündig wirst.

Besser geht das schon bei der Frage: Wo findest du am schnellsten Hühnereier?

Hier würde dir wahrscheinlich direkt eine Route zum nächsten Supermarkt einfallen. Und dies ist auch in Zahlen belegbar: Folgende Abbildung (1) zur Produktion von Hühnereiern zeigt auf, dass immer mehr Eier produziert werden.

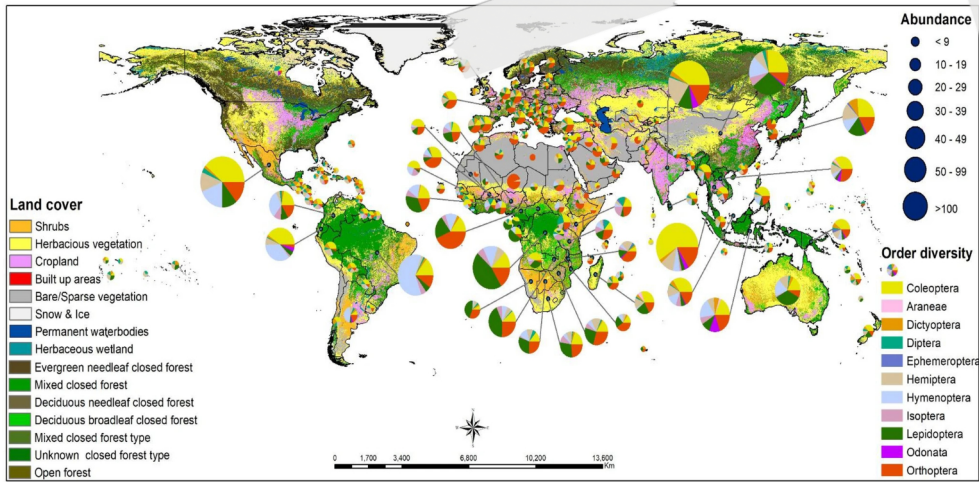
Ein globaler Trend zum Veganismus ist also nicht erkennbar. Und ausserdem ersichtlich: Das mit Abstand beste Land, um Hühnereier zu finden, ist China.

WORLD PRODUCTION OF HEN EGGS



Note: Percentages on the figure indicate the shares in the total; they may not tally due to rounding.  
Source: FAO, 2022. Production: Crops and livestock products. In: FAOSTAT, Rome. [Cited October 2023]. <https://www.fao.org/faostat/en/#data/QCL>  
Download: <https://doi.org/10.4060/cc8166en-fig29>

Bei Insekteneiern hingegen ist die Antwort bei weiten nicht so einfach<sup>1</sup>:



Eines aber zumindest ist klar: Europa ist hier nicht führend. Sollte es also um ein ganz bestimmtes Insektenei in der Social Media Challenge gehen, so könnte es eventuell die beste Antwort sein, sich schnell in einen Flieger zu einem anderen Teil der Welt zu setzen.

# Kino Program

2026  
by soseith



25 February  
**The Girl Who Leapt Through Time**



04 March  
**Kill Bill: Vol. 2**



11 March  
**Past Lives**



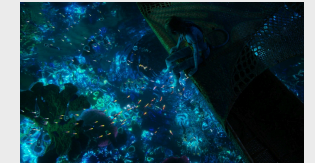
18 March  
**Tre uomini e una gamba** with: ASTAZ



25 March  
**Top Gun: Maverick** with: AAZ



01 April  
**Avatar: The Way of Water**



15 April  
**The Dictator**



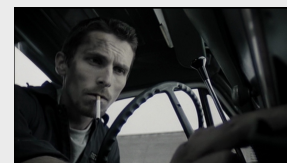
22 April  
**The Fall**



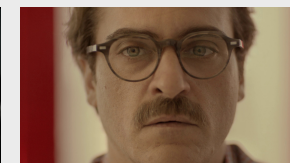
29 April  
**Steve Jobs**



06 May  
**The Machinist**



13 May  
**Her**



27 May  
**Zootopia 2**



free entry every wednesday in ETH HG F1 at 18:30

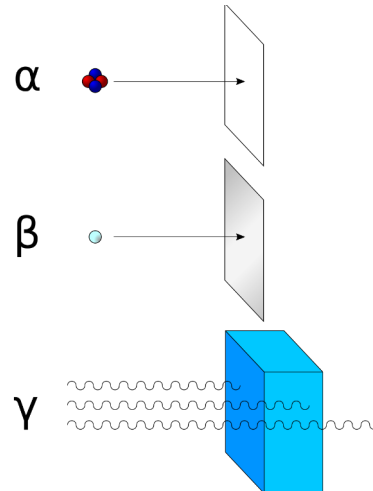
<sup>1</sup>Quelle: <https://doi.org/10.1038/s41598-024-55603-7>

# Fungi Are (Allegedly) Munching on Chernobyl

Noelia Rodríguez Carballo

After three years in the editorial as layout editor, it is time for me to say goodbye. And what a better way to do it than by making a part two of the only other text I have ever written for Biotikum: “Bacteria Are Munching on the Titanic.” This time I will tell you about radiotrophic fungi. And to whoever is curious about how I came up with this topic, I was pondering on how fungal spores also serve as a means of reproduction, just like eggs do.

I am sure that you’ve heard about all kinds of trophic levels during your relatively short time studying biology at ETH, such as heterotrophy, lithotrophy, autotrophy, etc. One type that is very rarely discussed is radiotrophism (maybe because it hasn’t been fully described yet, but let’s ignore that). Organisms of this type can perform radiosynthesis, a means of obtaining energy from ionizing radiation. As a short crash course into radiation, in case you didn’t recently fall into a rabbit hole as I did, this type of radiation includes alpha, beta and gamma radiation, amongst others. UV-light is also ionizing, by the way. One way these are produced is by the decay of unstable atoms, such as Uranium-235, commonly used as fuel for nuclear power plants. These unstable atoms release energy by emitting alpha particles ( $\text{He}^{2+}$  atoms), beta particles (electrons or positrons), and gamma rays (electromagnetic rays/photons).



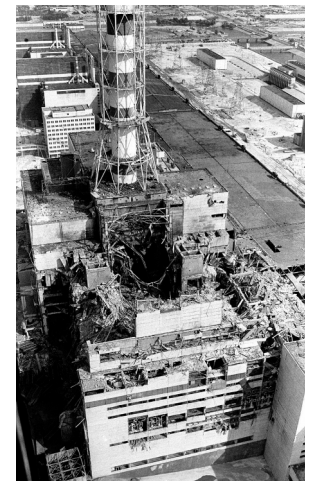
It is theorized that melanin (No, not melatonin, the other one) plays a crucial role in utilizing ionizing radiation for biomass production. This pigment, like others such as chlorophyll, changes its chemical properties upon exposure to energy sources. Plants utilize light emitted by the sun for photosynthesis, so fungi using radioactivity paired with melanin to grow are not that farfetched. Indeed, the first studies on this possibility have already been performed. Professor Ekaterina Dadachova of the University of Saskatchewan showed that irradiated melanin displayed a 4-fold increase in its capacity to reduce NADH compared to the non-irradiated structure. Additionally, the *Cryptococcus neoformans* fungus grew three times faster than normal under radioactive conditions. This species is not known to most for its ability to grow under these conditions, however, but for its pathogenicity.

Its basidiospores can enter the lungs via aerosols and disseminate into the central nervous system, causing meningoencephalitis mainly in immunocompromised patients. Whether the damage caused by radiation could limit the organism’s fitness and whether its growth under radioactive conditions is sustainable in the long run are questions to be answered another time. In one of her papers, Prof. Dadachova describes:

“The high-energy electrons generated by Compton scattering are ultimately responsible for the radiobiologic effects caused by gamma radiation by either direct interaction with DNA or through radiolysis of water in the cells, a process that results in the formation of reactive short-lived free radicals capable of damaging DNA. Stable free radicals in melanin may interact with these high-energy electrons and prevent them from entering a cell, thus enabling melanin to function as a radioprotector. The Compton electrons may then undergo secondary interactions with melanin molecules with their energy gradually lowered by melanin.”<sup>1</sup>

So, not only could melanin serve as a means of obtaining biochemical energy, it also might protect the organism from the very source of energy it feeds on, just like it does on our skin. These are optimal molecular qualities that organisms, such as fungi, can profit from to survive and even thrive in arguably one of the most inhospitable places on earth: the exclusion zone of Chernobyl.

In case you haven’t watched HBO’s miniseries, which I personally recommend you do, human error mixed with questionable reactor design resulted in the worst nuclear disaster in human history in 1986, with around 30 casualties directly caused by the disaster (up to 4000 from long term effects) and 2,600 km<sup>2</sup> of contaminated land. That is a bit less than the area of Ticino. A safety test that shouldn’t have been performed with the reactor running at low power or at 1 AM in the first place, involved turning off the emergency cooling system. I know, what could possibly go wrong? It must be mentioned that the reactor had first been scheduled to pass the test four years prior to the accident but the infrastructure kept failing the test. During the safety test, however, a sudden power surge incited the engineers to press the AZ-5 emergency button, lowering the



<sup>1</sup>By the way, Compton scattering, if you’re curious, is the theory of how a high-frequency photon scatters when it interacts with charged particles such as electrons, often pushing said electrons from atom’s valence shells.

control rods that were meant to curb down the reaction. As of itself, that was a good idea, but the conditions in the reactor were far from normal, as it had previously been powered down for maintenance and the inactive cooling system created an out-of-the-ordinary situation in the reactor for which the rods were not designed. To top it all off, the control rods' tips were lined with graphite, a material that stimulates atomic reactions. Therefore, the first thing to enter this already sizzling and fuming cauldron of instability and chaos awaiting to be set aflame were a few dozen lit matches. And evidently, this didn't end well.



Today, the reactor that was split open is covered in a sarcophagus of concrete and the area is closed off to everyone except scientists and workers ensuring the safe decommissioning of the area. These people do their jobs under very strict safety measures in order not to be unnecessarily exposed to the still deadly radiation doses in the area. When reactor 4 exploded in 1986, highly radioactive uranium from the core, among other substances, was blasted all over the region, making it unfit for safe human habitation. What said scientists have observed though, is that the highly irradiated reactor plant and surrounding area is not completely off-limits to 200 species of melanized fungi which seem to like living in the area quite a bit.

But the existence of radiotrophic organisms isn't just a fun fact. There are claims that radiosynthesis could make use of these fungi for radiation barriers to protect astronauts from ionizing rays in space. First results of an experiment in the International Space Station are promising for their implementation in aeronautics. A 1.7 mm thick layer of *Cladosporium sphaerospermum*, another radiotrophic fungal species, reduced radiation by 2.4%. To significantly deflect the annual dose of radiation received, a 21 cm layer could be enough. Of course, this would increase the mass of the spacecraft, making the decision of implementation a trade-off between safety and physical limitations. Additionally, these fungi could be used to manage nuclear

waste disposal or as a means of environmental remediation. They could reduce the radiation load in areas affected by radioactive catastrophes by absorbing the damaging particles. As a more sci-fi possibility, these organisms could even be used as a nutrition source in high altitudes, where the ground is exposed to high doses of ionizing rays from the sun and space.

The disaster in Chernobyl certainly made the general public aware of the dangers of not following protocols and lack of safety measures. However, this event also showed the best of humanity, as people sacrificed, and still do, their well-being to contain the invisible beast that is radiation. And, on the way, we discovered the great ability of these tiny organisms that might one day make a difference in our lives. I do want to stress that this is still an unexplored field, therefore what might be considered true today, might not be tomorrow, but that is part of the beauty of science.

With this, I want to bid my goodbye. It was a pleasure to edit the pages of 14 Biotikums while pretending to take notes in lectures. Amazing pastime, I swear. And having an excuse to scroll through science memes "for work", I won't complain about either. I wish Alice just as much fun in the editorial team as I had. Take care everyone :)



# Eggs: The Weird, Wonderful, and Surprisingly Funny Side of Biology

Clara Leo

When you hear the word egg, you probably think of breakfast, maybe Easter or that time you dropped one on the kitchen floor and watched it explode in slow motion. But in biology, eggs are far more than food. They are tiny biological marvels, evolutionary masterpieces and, believe it or not, sources of some genuinely funny and strange stories.

Let's crack into the science of eggs and see why they are one of nature's most fascinating inventions.

## 1. An Egg Is Not Just an Egg

Biologically speaking, an egg (or ovum) is a single cell. Yes, one cell. And yet, it's one of the largest cells produced by animals. A human egg is about the width of a human hair, while an ostrich egg is so big you could make an omelet for an entire class.

What makes eggs special is that they're packed with everything an embryo needs to get started: nutrients, protective layers, and instructions for development. In bird eggs, the yolk is essentially a biological lunchbox, full of fats and proteins. The egg white (albumen) is mostly water and proteins that protect the yolk and keep bacteria out.

**Fun fact:** the egg white isn't white at first. It's actually clear. It turns white when cooked because heat causes the proteins to unfold and stick together, a process called denaturation. So your scrambled eggs are basically protein chaos.

## 2. Why Are Eggs Egg-Shaped?

Eggs are not perfect spheres, and that's a good thing. Their oval shape helps prevent them from rolling away. If you've ever tried to balance an egg on a table and watched it wobble in a circle instead of rolling straight off, congratulations: You've witnessed physics helping biology.

Scientists also think the egg shape helps with gas exchange and structural strength. The curved shell distributes pressure evenly, which is why you can sometimes stand on eggs (carefully!) without breaking them. Try that with a sphere made of calcium carbonate and see how it goes.

## 3. The Shell Is Stronger Than It Looks

Eggshells seem fragile, but they're actually engineering masterpieces. Made mostly of calcium carbonate, shells have thousands of microscopic pores that let oxygen in and carbon dioxide out. That's how a chick breathes before it hatches. Here's the funny part: eggs are strongest at their ends. That's why it's hard to crush an egg by squeezing it from top to bottom but incredibly easy to smash it sideways. Nature clearly didn't design eggs for clumsy humans.

## 4. Not All Eggs Are Laid In Nests

Insects, fish, amphibians, reptiles, birds, and mammals all produce eggs—but they do it in wildly different ways. Frogs lay eggs in jelly-like masses that look suspiciously like floating blobs of bubble tea. Fish release thousands (sometimes millions!) of eggs into the water, hoping at least a few survive. Some sharks produce leathery egg cases nicknamed "mermaid's purses". These often wash up on beaches and confuse people who think they've discovered alien artifacts.

And mammals? Most of us still use eggs, we just keep them inside the body. Human eggs don't have shells because they're protected internally, which is far less dramatic but much safer.

## 5. Some Eggs Are Extremely... Creative (?)

Nature gets weird when it comes to eggs. The cuckoo bird lays its eggs in other birds' nests and lets them do all the parenting. Even worse, the cuckoo chick often pushes the host's eggs out of the nest. That's not laziness. That's biological sabotage. Octopuses guard their eggs obsessively, sometimes for months, refusing to eat until they hatch. Many octopus mothers die shortly afterward, making this one of the most dramatic examples of parental dedication in the animal kingdom. Parasitoid wasps lay their eggs inside other insects. When the larvae hatch, they eat their host from the inside. This is horrifying, fascinating, and the reason biologists both love and fear insects.

## 6. Eggs and Humans: A Long Relationship

Humans have relied on eggs for food for thousands of years, but eggs have also helped science. Chicken eggs were crucial in early embryonic research because you can literally watch development happen by opening the shell at different stages. Even vaccines have an egg connection: some flu vaccines are still produced using fertilized chicken eggs to grow weakened viruses. So yes, eggs may have helped save your life.

### Final Thought: Eggs Are Small, but They're a Big Deal

Eggs might seem ordinary, but they represent one of the most important strategies in evolution: protecting and nourishing life before it even begins. From wobbling across tables to carrying the future of entire species, eggs are funny, fragile, tough and endlessly interesting. So next time you crack an egg, remember you're holding one of biology's greatest inventions. Just try not to drop it.

## Zwischen Huhn und Ei

### Warum Entwicklung keinen Startpunkt hat

Keyi Fang

„Was war zuerst da - das Huhn oder das Ei?“ Kaum eine Frage ist so bekannt, so oft wiederholt und gleichzeitig so irreführend. Sie taucht in Filmen, Büchern und Diskussionen auf und wird häufig als Sinnbild für Probleme verwendet, auf die es angeblich keine Antwort gibt. Doch vielleicht liegt das eigentliche Problem nicht in der Antwort, sondern in der Art, wie wir fragen. Die Frage klingt tiefgründig, fast philosophisch, aber sie beruht auf einer Annahme, die in der Realität nur selten zutrifft: der Vorstellung eines klaren Anfangs.

In der Biologie, besonders in der Evolution, entstehen Dinge nicht plötzlich. Neue Arten tauchen nicht von einem Moment auf den anderen auf. Sie verändern sich langsam, über viele Generationen hinweg. Es gab kein eindeutig „erstes Huhn“, welches plötzlich existierte. Stattdessen gab es eine lange Reihe von Organismen, die sich Schritt für Schritt veränderten. Irgendwann legte eines dieser Tiere ein Ei, aus dem ein Tier schlüpfte, das wir heute ein Huhn nennen würden. Doch dieser Übergang war fließend. Es gab keinen klaren Punkt, an dem man hätte sagen können: Jetzt beginnt das Huhn. Die Grenzen ziehen wir erst im Nachhinein, um etwas zu sortieren, was ohne Ordnung und Planung geschah. Etwas, das eigentlich ein kontinuierlicher Prozess war.

Die Frage „Was war zuerst da?“ ver-

sucht, einen langen und komplexen Vorgang auf einen einzelnen Zeitpunkt zu verkürzen. Genau darin liegt der Denkfehler. Sie reduziert etwas Dynamisches in ein starres Entweder-oder. Entweder das Huhn oder das Ei, als gäbe es nur diese beiden Möglichkeiten und als müsste eine davon zwingend am Anfang stehen. Die Realität ist jedoch oft weniger eindeutig. Sie bewegt sich in Übergängen, nicht in klaren Schnitten.

Trotzdem halten wir an solchen Fragen fest. Vielleicht, weil klare Anfänge beruhigend sind. Ein Startpunkt gibt Orientierung. Er vermittelt das Gefühl, dass alles einem festen Ablauf und einer verständlichen Logik folgt und man nur wissen muss, wo etwas beginnt, um es zu verstehen. Wenn es einen Anfang gibt, hoffen wir oft auf ein klares Ende. Diese Vorstellung macht komplexe Dinge überschaubar und gibt uns das Gefühl von Kontrolle.

Dieses Bedürfnis nach Klarheit zeigt sich in vielen Bereichen des Lebens. Menschen suchen nach Momenten, an denen etwas „wirklich“ beginnt: ein neuer Abschnitt, eine Entscheidung, eine Veränderung. Ebenso suchen sie nach Punkten, an denen etwas abgeschlossen ist. Doch solche klaren Übergänge existieren selten. Meistens bewegen wir uns in langsamen, kaum wahrnehmbaren Entwicklungen. Veränderungen passieren schleichend. Während man mitten in ihnen steckt,

fühlen sie sich oft unübersichtlich an, manchmal sogar widersprüchlich.

Wachstum und Veränderung verlaufen nicht gleichmässig. Es gibt Phasen, in denen vieles Sinn ergibt, und andere, in denen alles wieder offen scheint. Fortschritte sind oft unsichtbar, solange man mitten in ihnen steckt. Erst im Rückblick wird deutlich, wie viel sich tatsächlich verändert hat. Das Gefühl, „noch nicht so weit zu sein“, ist daher weniger ein Zeichen von Stillstand als ein Hinweis darauf, dass man sich noch innerhalb des Prozesses befindet.

Hier wird das Ei zu einem hilfreichen Bild. Es gilt oft als Symbol für den Anfang des Lebens. Biologisch betrachtet ist es jedoch kein Anfang, sondern ein Zwischenzustand. Bevor ein Ei existiert, ist bereits viel geschehen: Entwicklung, Wachstum und Veränderung über lange Zeiträume hinweg. Und auch nach dem Ei folgt kein fertiges Ergebnis, sondern ein empfindlicher Prozess, der Zeit braucht. Das Entscheidende passiert nicht in einem Moment, sondern in vielen kleinen Schritten, die von aussen kaum sichtbar sind.

Ein Ei lässt sich nicht beschleunigen. Es braucht Schutz und Geduld. Zu viel Druck von aussen führt nicht zu schnellerem Wachstum, sondern zum Zerbrechen. Entwicklung folgt keinem festen Zeitplan und lässt sich nicht erzwingen. Dieses Bild lässt sich leicht auf andere Bereiche übertragen. Viele Dinge brauchen Zeit, auch wenn es von aussen so aussieht, als müsste längst mehr passiert sein. Nicht alles, was langsam ist, ist rückständig. Manches ist einfach noch unterwegs.

Auch im Alltag stellen wir uns oft Fragen, die mehr Druck erzeugen, als dass sie weiterhelfen. Wann ist man bereit? Wann ist man gut genug? Wann hat man etwas erreicht? Diese Fragen setzen voraus, dass es einen klaren Punkt gibt, an dem Unsicherheit verschwindet. Doch dieser Punkt existiert selten. Zweifel und Unklarheit begleiten viele Prozesse von Anfang bis Ende. Sie verschwinden nicht einfach, sondern verändern ihre Form.

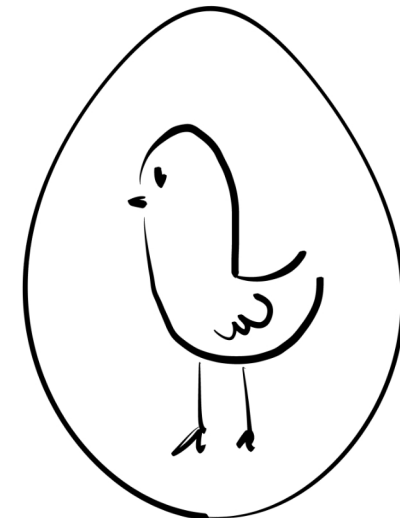
Dabei ist dieses Dazwischen kein Ausnahmezustand. Es ist der Normalfall. Die meiste Zeit befinden wir uns nicht am Anfang und nicht am Ziel, sondern irgendwo dazwischen. Man ist unterwegs, ohne genau zu wissen, wohin. Das fühlt sich oft unangenehm an, weil es keine klaren Antworten gibt. Doch genau in dieser Phase passiert eine Entwicklung, auch wenn sie sich nicht sofort bemerkbar macht.

Vielleicht wäre es hilfreicher, andere Fragen zu stellen. Nicht: Wo beginnt etwas? Sondern: Wie entwickelt es sich? Nicht: Bin ich schon angekommen? Sondern: Was verändert sich gerade? Solche Fragen lassen Raum für Zeit, für Umwege und für langsames Wachstum. Sie nehmen den Druck, sofort klare Antworten liefern zu müssen, und erlauben es, Prozesse als das zu sehen, was sie sind: offen und nicht vollständig planbar.

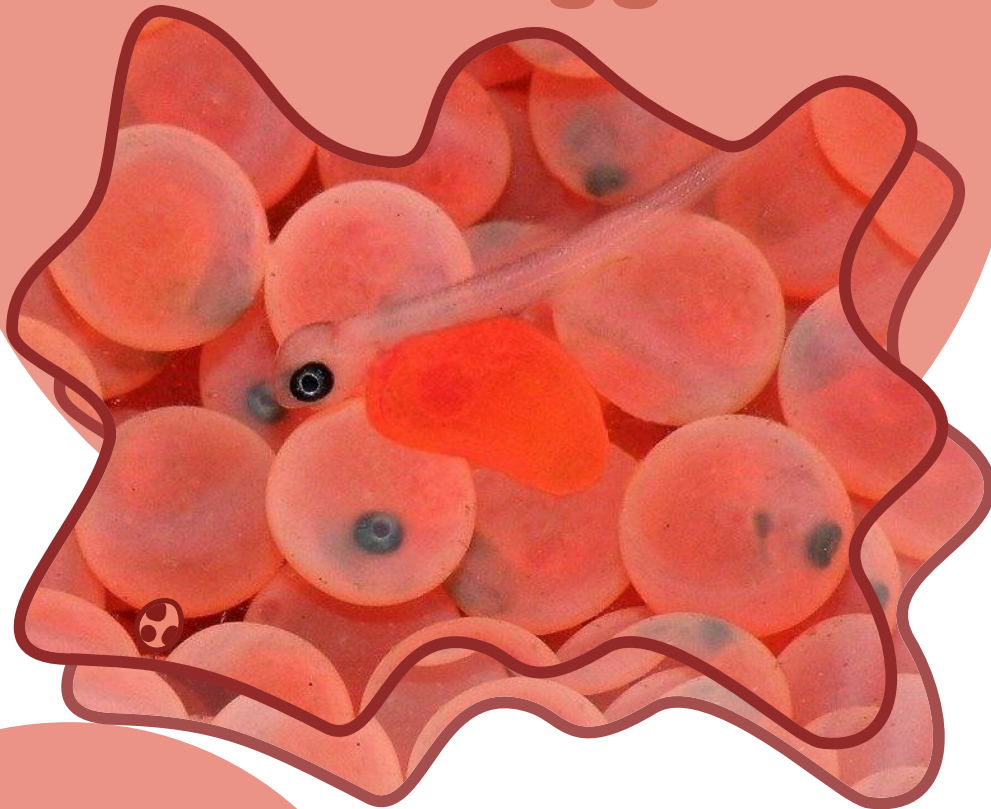
Das Huhn und das Ei-Problem zeigt, wie schnell wir versuchen, komplexe Vorgänge zu vereinfachen. Wir suchen nach klaren Linien, nach Anfang und Ende, nach eindeutigen Antworten. Doch die Realität ist oft weniger or-

dentlich. Vieles lässt sich nicht sauber in "vorher" und "nachher" trennen. Meist befindet man sich mitten in einem Prozess, ohne genau zu wissen, wann er begonnen hat oder wann er endet. Vielleicht ist das Ei deshalb ein so starkes Bild. Nicht als Symbol für einen klaren Anfang, sondern für das Unfertige. Für etwas, das sich entwickelt, ohne von aussen sofort sichtbar zu sein. Für das Potenzial, das Zeit braucht und geschützt werden muss.

Nicht alles muss sofort geklärt sein. Nicht jede Entwicklung braucht einen klaren Startpunkt. Manches darf einfach reifen.



# A Compact Guide to A COMPACT GUIDE TO FISH EGGS



Aiyi Lyu

For a long time, seafood-processing byproducts such as fish roe were largely treated as waste. In recent years, however, this view has shifted dramatically. A growing body of research shows that fish eggs are exceptionally rich in nutrients, including essential amino acids (most notably lysine<sup>1</sup>) and a wide range of fatty acids. These properties have renewed scientific and commercial interest in roe as both a biological material and a food resource.

From a biological perspective, fish eggs share key structural and functional features with avian eggs. Like chicken eggs, they contain all nutrients required for early embryonic development and are enclosed by a protective envelope. Fish roe consists predominantly of ovoglobulins (approximately 75%), alongside collagen (13%) and albumins (11%)<sup>2</sup>. Tuna roe, in particular, is notable for its high content of polyunsaturated fatty acids and functional proteins, many of which resemble those found in egg yolk. This composition makes fish roe a valuable nutritional source not only for developing embryos but also for human consumption and higher trophic-level predators.

Despite their nutritional richness, fish eggs are biologically fragile.

From a conservation standpoint, they are highly susceptible to disease, especially fungal infections. Fungal and fungal-like oomycete pathogens are a major cause of mass mortality events in aquatic ecosystems, contributing significantly to population declines in crayfish, fish, and amphibians. In aquaculture, strategies such as immunization and chemical treatments have been proposed to reduce infection pressure, though these approaches remain under active evaluation due to ecological and ethical concerns.<sup>3</sup>

Although fish eggs are less extensively studied than other developmental systems, they remain a focus of diverse laboratory investigations. Current research addresses changes in oocyte energy metabolism during maturation and after fertilization, protein and RNA metabolism before and following fertilization, as well as the transfer of genetic information and the hormonal regulation of early development.<sup>4</sup> Together, these studies showed that fish roe is a powerful model system at the intersection of developmental biology, ecology, and applied aquaculture research. As a matter of fact, researchers have found that trout from small eggs grow bigger than those from large eggs.

<sup>1</sup>S R, A.; Mudgal, M. B. Biochemical Composition of Fish Eggs from Local Water Reservoirs around Amravati City. *Biosci. Biotech. Res. Comm* 2017, 10 (2), 49–52. <https://doi.org/10.21786/bbrc/10.2/8>.

<sup>2</sup>Food Sci Nutr. 2018 May 21;6(5):1276–1286. doi: 10.1002/fsn3.676 (1)

<sup>3</sup>Liu, Y.; De Bruijn, I.; Jack, A. L. H.; Drynan, K.; Van Den Berg, A. H.; Thoen, E.; Sandoval-Sierra, V.; Skaar, I.; Van West, P.; Diéguez-Urbeondo, J.; Van Der Voort, M.; Mendes, R.; Mazzola, M.; Raaijmakers, J. M. Deciphering Microbial Landscapes of Fish Eggs to Mitigate Emerging Diseases. *The ISME Journal* 2014, 8 (10), 2002–2014. <https://doi.org/10.1038/ismej.2014.44>.

<sup>4</sup>Turner, Charles, *Fish Physiology*, 1979

# EasterEGGS

There are easter eggs hidden in this edition of the Biotikum. See if you can find them all. Spoiler: it's not easy. hehe (solution on the last page)



## sudoku time

	6							9
						5	8	2
4		3	2	9			6	
3		5	9			7	1	
8		6	1				9	3
	2	1	3					
2			8		1		7	4
7		4	5			8		6

			6	2	8	7		
							9	3
2		1						
7		8	4					9
			9	7	1	2		
								7
8		7	2	9				4
4	3		8	5				

### [URGENT!] Debrief: EVOCATION - Log 7 (Godseye)

To the offices of our Numen, Percival. Effective immediately, I request that EVOCATION's priority classification be elevated to Critical, and that additional resources be allocated to ensure that the mole remains uncompromised. Cicerone's previous report sufficiently outlines the basis for this request. The pace of Kindler advancement exceeded all prior projections. This was not accounted for in our original timelines. Responsibility for that failure rests with this office, and for this, I humbly plead for your forgiveness. The implications are decisive. The emergence of a viable, Shadowvein-immune, living-use Ginohne-Lhok lineage invalidates our previous strategic assumptions and compresses the remaining window in which Salvation military superiority can be assured. In light of this, and in alignment with the recommendations of your tacticians, it is also the assessment of this office that an immediate, full-scale assault on the AIS homepage of Galiberterras is required. While such an engagement will incur substantial cost—particularly given the absence of extended preparatory planning—delay carries a greater and irreversible risk. Our borders must be secured before this technology reaches galactic parity and renders our current doctrines obsolete. The impact of living Ginohne-Lhok on space warfare will be transformative. The closest historical analogue is the introduction of the dreadnought to ancient Earthen naval conflict. Those who acted first dictated the shape of the wars that followed. Those who hesitated were rendered irrelevant.

The Salvation cannot afford hesitation.

I await your command.

Godseye.



## > Log X: Aftershock - Operation Day: 334 (Cicerone)

Pass my congratulations on to Godseye, HAVEN. News of the successful raid against the AIS homeworld has spread rapidly. Preliminary reports indicate that negotiations for AIS surrender are progressing in our favour.

Developments within EVOCATION, however, are less reassuring.

The mole has now transitioned fully into his new position at the Oaurrou City Sail Club. The hospice staff provided a letter of recommendation, which appears to have smoothed the process considerably. His lodging has changed accordingly; he now resides in an on-site housing unit. Compensation has improved in tandem. The mole has used his increased earnings to acquire a new exosuit equipped with a Kindler media uplink, allowing continuous access to public broadcasts while on duty. [3.1][4.1]

As a result, the mole has been able to closely track developments surrounding Barterriion's research. According to his assessment, it is now difficult not to acquire information on the project. Since the announcement, Kindler media has been saturated with speculation. While this abundance of information is of potential value to us, verification remains inconsistent.

What we can confirm is as follows:

The reason the Ginohe-Lhok paper was able to undergo peer review, whilst also being sanctioned by mandated confidentiality is that one of the reviewers has been positively identified as the Kindler Authority for Research and Development (KARD). This confederation-controlled body was also one of the two recipients of the remaining GL-FE47 seedlings. By extension, it is reasonable to assume that the Kindler Armed Forces now have access to the strain.

Regarding the already implanted seedling: the predicted gemburst within the Ecvilteh Deep Crust Basin was successful. A video file was released shortly after basin sensors registered an exceptionally violent detonation. The footage—captured via a fixed security camera—shows an eruption comparable to a large-scale firework, scattering incandescent fragments across the surrounding rock. Within seconds, figures in silver-heat-resistant exosuits are seen collecting the shards. Seven discrete samples are visible being secured. Their subsequent destinations are unconfirmed.

Kindler media reports that multiple private-sector entities and individuals have attempted to open negotiations with the High

Council to obtain a GL-FE47 seedling. All requests have so far been denied. Official statements cite the need to further verify the strain's integrity and safety, requiring observation of additional gembursts. For similar reasons, no galaxy-wide announcement has yet been made. Nonetheless, rumours of a major Kindler scientific breakthrough are spreading by word of mouth through portions of the outer rim.

It is fortunate that EVOCATION was embedded when it was. Intelligence suggests the Confederation is preparing to tighten border controls in response to increased asylum traffic following our victory over the AIS.

On the subject of rumours: the mole has intercepted repeated reports originating from the outer rim concerning an unidentified spacecraft operating just beyond Kindler-controlled space. Descriptions are broadly consistent. The craft is said to be predominantly black, marked with red bands along its flanks, featuring anhedral wings, two forward-facing canopies with a metallic gold coating, and between two and four engines mounted either along the fuselage or beneath the wings. This configuration does not correspond to any known platform within the Salvation database, nor does it align with any known Kindler platforms.

Some commentators speculate that KARD may be trialling a new deep reconnaissance or strike craft, possibly incorporating early living Ginohe-Lhok components. This remains unsubstantiated. Nevertheless, we are proceeding under the assumption that Kindler surveillance capabilities are advancing rapidly. All EVOCATION communications are being further encrypted, and transmission intercept points are being relocated. We cannot afford complacency. The Confederation should not be underestimated.

Within Oaurrou itself, the mole has not encountered Barterriion or his research team at the sailing club in recent weeks. This absence is unsurprising, given their current rotation through interviews, conferences, and summits across Kindler space. Barterriion did, however, send a congratulatory message to the mole's new lodging, accompanied by a bottle of a traditional Kindler celebratory drink. In the message, Barterriion expressed hope to return to Oaurrou in time for the Festival of Ribbons, after which he intends to take paid leave to recover from exhaustion.

The mole has also conducted preliminary research into Barterriion's partner, Verie. She is a sitting member of the Kindler High Council. Her party, United Ecvilteh, secured the second-highest vote share in the previous election cycle. Should access to Verie become feasible—potentially through Barterriion—we

would gain a vector into the Confederation's governing body itself. This possibility warrants further consideration.

Publicly, Verie has maintained a position of neutrality regarding Salvation activity, as has much of the Council. This stance is increasingly unstable. Our decisive actions against the AIS have had an unintended secondary effect: a previously marginal segment of the Kindler population now views the Salvation as an existential threat to Confederation sovereignty. This sentiment is growing more vocal, driven in part by the return of Kindler citizens from former AIS territories and amplified by asylum seekers transiting through Ecvilteh to non-Salvation space.

As a registered asylum seeker himself, the mole has been questioned with increasing frequency regarding his views. He reports taking additional precautions to maintain operational secrecy, particularly as anti-Salvation sentiment intensifies.

For the time being, we will continue close observation.

Keep your sensors tuned to  
**B10-T1kum** for further updates!

*(To be continued...)*

- Adrian Bär

### Key Words (for those who are just jumping in)

Do be sure to head back to our earlier issues to catch up with the whole project ;)

**“Ginohne-Lhok”** An organism whose remains are used in various technologies on account of its “flexible crystalline structure.” Essentially the backbone of all modern technologies in the galaxy.

**“Shadowvein”**: A widespread parasitic organism that infects Ginohne-Lhok. Upon death, Ginohne-Lhok embrittles, becoming less useful as a result.

# MEMES

## Winter Survival

Human 	Absolutely pathetic. Freezes to death without clothes and heating technology.
Bear 	Gets fat Finds a cave Sleeps it off
Wood Frog 	Pisses into it's own blood and mixes it with glucose to make anti-freeze, then let's itself gets 2/3rds frozen for months until it thaws out



## Das Letzte

So schnell ist das Biotikum auch schon durchgelesen. Aber halt, der Spass muss kein Ende haben:

## Redakteur\*in gesucht!

Schreibst du gern? Hast du Interesse an Journalismus? Möchtest du andere an deinem Schreibtalent und deinem Wissen teilhaben lassen? Oder einfach mal deine Schreiblust stillen?

Wenn du alle oder auch nur eine dieser Fragen mit ja beantworten würdest, dann melde dich bei [redaktion@vebis.ch](mailto:redaktion@vebis.ch) und unterstütze unsere Kommission!

## Dankeschön

Ein grosses Dankeschön an Alice Andonovski fürs Layout sowie an die ganze Redaktion für die vielen Artikel!

## Bis zur nächsten Ausgabe!



## solutions time

5	6	2	7	1	8	4	3	9
1	9	7	6	4	3	5	8	2
4	8	3	2	9	5	1	6	7
3	4	5	9	2	6	7	1	8
8	7	6	1	5	4	2	9	3
9	2	1	3	8	7	6	4	5
6	3	8	4	7	2	9	5	1
2	5	9	8	6	1	3	7	4
7	1	4	5	3	9	8	2	6
1	8	5	7	3	9	6	4	2
9	4	3	6	2	8	7	1	5
6	7	2	5	1	4	8	9	3
2	9	1	3	8	5	4	7	6
7	5	8	4	6	2	1	3	9
3	6	4	9	7	1	2	5	8
5	2	9	1	4	6	3	8	7
8	1	7	2	9	3	5	6	4
4	3	6	8	5	7	9	2	1

there were 28 eggs!  
did you find them all?





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