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The Novozymes Prize 2024

Professor ***Jack Pronk***

Jack Pronk

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Nomination of **Jack Pronk**

Professor Jack Pronk is being awarded the 2024 Novozymes Prize in recognition of his significant contributions to our fundamental understanding of yeast physiology and its translation into industrial production of fuels and chemicals.

Jack Pronk is one of Europe's foremost leaders in innovative and sustainable biotechnology using microbes for the environmentally friendly conversion of waste streams into biofuels and fine chemicals. The advances Jack Pronk has made, especially by using yeast, are based on exceptionally deep knowledge of physiology and metabolism, rooted in rigorous fundamental research. His superb understanding of how a yeast cell operates has directly translated into his ability to exploit yeast cells as industrial-level factories for producing fuels and chemicals. The fundamental research and the knowledge generated about the functioning of yeast and fungi from Jack Pronk's laboratory has been the basis for numerous commercial applications with clear societal impact, as demonstrated by their full-scale industrial implementation.

A graduate of Leiden University in the Netherlands, Jack Pronk received his PhD in microbiology in 1991 from the Delft University of Technology (TU Delft), where he very quickly rose through the ranks, being appointed Antoni van Leeuwenhoek Professor of Industrial Microbiology already in 1999. Since 2019, he has been able to shape biotechnology research at TU Delft even more significantly as head of its Department of Biotechnology. Taking on leading roles in academia is part of Jack Pronk's DNA; another example is the Kluyver Centre for Genomics of Industrial Fermentation, a national centre for research in industrial biotechnology that included seven universities in the Netherlands, which Jack Pronk led as Scientific Director from 2002–2014. As an aside, although Jack Prink is best known today for improving the performance of yeast, he initially studied *Thiobacillus* bacteria, which he has described as "bizarre" because of their ability to grow in extremely acidic environments.

The impact of Jack Pronk's research is remarkably wide ranging: from conversion of lignocellulosic substrates into bioethanol and cell factories for producing lactate, pyruvate and vitamins to applications in brewing. Jack Pronk has been able to do this by bridging in an exemplary manner the gap between studies of fundamental cellular physiology and applying this knowledge to enable innovative bioprocesses at the industrial scale.

Jack Pronk has shown a unique talent for implementing groundbreaking metabolic engineering approaches, continually pushing the boundaries of what is possible in terms of the complexity of metabolic rerouting, enabled by an impressive combination of traditional molecular genetic methods with synthetic biology and evolutionary engineering. The latter method involves prolonged cultivation of microorganisms under conditions that are specifically designed to favour the growth of spontaneous mutants with an industrially relevant characteristic. After the responsible mutations are identified, they can be included in programmes for increasing the performance of strains in real-world applications.

A notable example of Jack Pronk's contributions to fundamental physiology has been the implementation of a set-up, the retentostat, that enables long-term monitoring of physiology and gene expression in living but non-growing yeast cells. This has been important for two reasons. First, it likely represents what happens in many natural environments, and understanding the specific adaptations for this state is required to make sense of the wiring of metabolic and regulatory circuits of yeast. Second, growth per se is generally not the goal of industrial applications but rather the efficient conversion of some substrate into compounds of interest.

Representative of all the above is Jack Pronk's pioneering work on engineering the ability of *Saccharomyces cerevisiae* yeast to

ferment pentose sugars, particularly xylose, into ethanol. *Saccharomyces* yeasts are widely used in brewing beer and wine and in producing fuel ethanol from sugar cane or corn because they very efficiently convert glucose to ethanol. Using sugar cane and corn for producing fuel can be controversial since expansion may lead to competition with food production. Substantial research efforts have gone into how lignocellulose biomass, such as forest or agricultural residues, could become an economically viable source of sugar for ethanol production. However, *Saccharomyces cerevisiae* cannot utilise xylose, a major sugar component in lignocellulose. This was a major hurdle for the process, and many scientists around the world had been trying very hard to engineer yeast to overcome this problem. In 2003, Jack Pronk and his laboratory were the first to introduce and efficiently express a xylose isomerase in yeast. Along with introducing the xylose isomerase from the anaerobic fungus *Piromyces* (isolated from elephant dung), extensive engineering of the native metabolism enabled yeast to grow on xylose without the drawbacks of previously implemented routes for xylose fermentation. An industrial partner acquired patents on these breakthrough inventions and applied them at the industrial scale. This work serves as a key example of how molecular biotechnology can help to establish sustainable bioprocesses for producing transport fuels and help to replace fossil fuels. It also provides an impressive example of modern biotechnology based on targeted and evolutionary engineering of metabolic pathways. Not surprisingly, it has become textbook knowledge for industrial microbiology and metabolic engineering.

Another spectacular success has been the expression and metabolic integration in yeast of the key enzymes of the Calvin cycle, the metabolic pathway responsible for fixing CO_2 in plants. This modification enabled the engineered cells to fix CO_2, which increased the production of the desired end-product, ethanol, by greatly reducing the production of unwanted by-products. Functional expression and metabolic integration of this pathway was a technical tour de force, requiring co-expression of bacterial helper proteins and extensive tuning of the recipient cells' endogenous metabolism. This breakthrough technology is already being applied at full scale in the bioethanol industry and can be integrated with other modifications towards a sustainable, circular carbon economy that will gradually replace the current unsustainable dependence on fossil fuels and materials.

What sets Jack Pronk apart from many others in this field is his uncanny talent for combining basic and translational research. In addition to an impressive series of academic publications, Jack Pronk has also (co-)authored 17 patents, and as already mentioned, some of these have been licensed to large companies that are exploiting these inventions to set up greener and more efficient biofuel production processes. This aspect, in which research is efficiently and successfully translated into full-scale industrial processes, goes beyond what is typical for academic biotechnology research.

In addition to his many outstanding contributions to basic and translational research, Jack Pronk has also shaped this field by training several generations of scientists. Jack Pronk is a truly exceptional mentor and educator of hundreds of students, junior scientists and biotechnology experts. He teaches classes in industrial and molecular biotechnology at TU Delft and was strongly involved in shaping the Life Science & Technology programme shared between Leiden University and TU Delft. His key teaching skills rely on an unmatched combination of humour, anecdotes, patience and innovation. Among the numerous awards he has received are several from both TU Delft and the Dutch Society for Biotechnology for his dedication to teaching and his outstanding teaching skills.

Jack Pronk is a world leader in industrial biotechnology and fermentation science, with a specific focus on developing sustainable bioprocesses that help to reduce waste streams and the carbon footprint. The Novo Nordisk Foundation is proud to recognise Jack Pronk's excellence in research by awarding him the 2024 Novozymes Prize.

About Professor Jack Pronk

1986
MSc in biology (cum laude), Leiden University

1991
PhD in microbial physiology, TU Delft

1991–1999
Assistant Professor, TU Delft

1999–
Professor of Industrial Microbiology, TU Delft

2002–2013
Co-founder and Scientific Director, Kluyver Centre for Genomics of Industrial Fermentation

2015
Fellow of the American Society of Microbiology

2015
Professor of Excellence Award, TU Delft

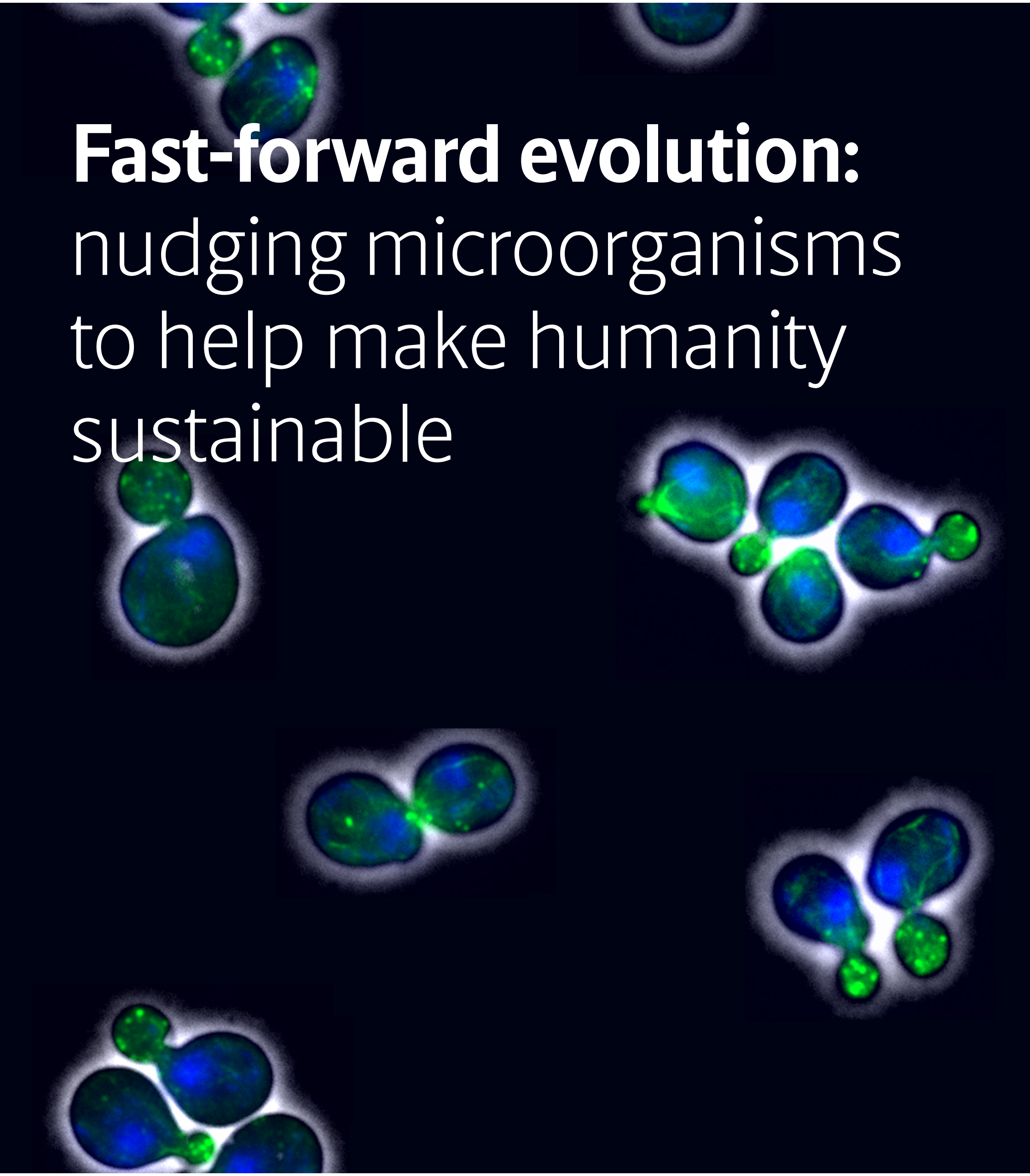
2018
International Metabolic Engineering Award

2019–
Head of the Department of Biotechnology, TU Delft

2020
Member of the Royal Netherlands Academy of Sciences

2021
Knight in the Order of the Netherlands Lion

Fast-forward evolution: nudging microorganisms to help make humanity sustainable



Much like humans, microorganisms are not inherently sustainable. However, like humans, they have the capability to become sustainable. When pressed, they can acquire this capability, thus proving to be an invaluable resource in humanity's effort to create a balanced world. Professor Jack Pronk has dedicated his entire career to studying microorganisms with this precise goal in mind: to enlist their help in achieving greater sustainability. He is receiving the 2024 Novozymes Prize for his efforts in developing sustainable bioprocesses that help to reduce waste streams and the carbon footprint.

Creating balance is the key. In recent years, humanity has strived to restore the delicate equilibrium between its eternal pursuit of greater prosperity and well-being and a planet and climate struggling to keep pace. Surprisingly, the planet's microorganisms emerge as allies in this battle for balance. Jack Pronk has dedicated his career to seeking assistance from yeasts, best known for their roles in bread rising and beer brewing. Nevertheless, with some careful nudging and balancing, these microorganisms can contribute far more significantly.

"Our dream is to establish a biobased economy using bacteria, yeasts and fungi. An example is producing fuel ethanol from sugar cane or corn using yeast, which efficiently converts glucose into ethanol. However, this approach is controversial because it could compete with food production. To address this, we are exploring, and have already identified, methods to modify these organisms. This enables them to transform agricultural and forestry waste into biofuels and fine chemicals," explains Jack Pronk, Professor and Head of the Department of Biotechnology at Delft University of Technology (TU Delft) in the Netherlands.

Survival under ice

Jack Pronk has always been captivated by nature, exploring it both at the macro level, such as being a dedicated fisherman, and seeking to understand the science behind it. Thus, studying biology at Leiden University was a natural choice for him. However, after just one year of BSc studies, he grew disillusioned with the textbooks filled with information on anatomy and the systematics of plants and animals.

"I was ready to quit. And even if I would continue, I saw myself probably becoming a full-time teacher. Fortunately, my parents persuaded me to give it another year. Then, in the second year, we had extended practicals in laboratory groups. Mine was in an animal physiology group conducting research on carp – and especially their muscle tissue. That was the first time I really thought, 'Wow, research is cool!' So, in a way, fish got me hooked on research."

The ability of carp to survive under ice for extended periods is attributed to alcoholic fermentation. The research practical investigated this phenomenon by isolating mitochondria and conducting enzyme assays. During his MSc studies in biology, his major research project focused on plant molecular biology, investigating the mechanism by which *Agrobacterium* can transfer DNA to plants.

"A second research project, on inducing bacteria to produce organic acids, got me even more excited. Unlike the waiting periods of months in other research areas, here I felt I obtained new results every day. This really sparked my interest in research as a potential career path."

Extremely acidic environments
Jack Pronk completed his MSc in biology in 1986 before earning his PhD in microbiology from TU Delft in 1991.

"As a PhD student, I studied *Thiobacillus* bacteria, and especially peculiar acid-loving species thriving at pH values as low as 1.6 – truly extreme conditions. So extreme that stainless steel parts of the expensive cultivation set-ups sometimes started to dissolve."

Acidithiobacillus ferrooxidans, an acidophilic bacterium, is crucial in bioleaching metal ores by oxidising ferrous iron and sulfur compounds found in the ores. This process solubilises metals such as copper, gold and uranium, facilitating their extraction.

"These acid-loving bacteria can be used for recovering metal from ores, but they also play a role in natural environments where sulfur-containing minerals and/or iron are present. My PhD project sought to understand their physiology better."

One surprise emerging from the PhD project was that *Acidithiobacillus ferrooxidans* can not only grow on sulfur compounds and iron but also on formic acid – a compound that is very toxic under acidic conditions. By using a controlled feeding strategy, much higher culture densities could be obtained with formic acid than with sulfur compounds or iron.

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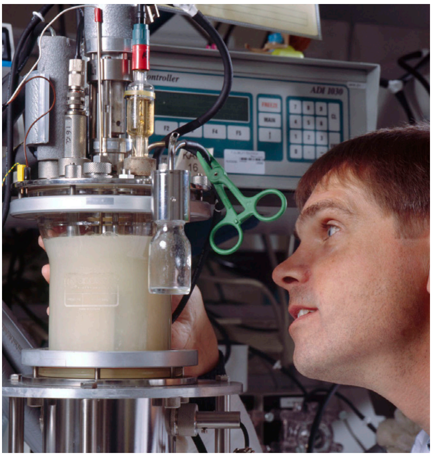
"The most intriguing outcome of my PhD research was the revelation that *Acidithiobacillus ferrooxidans*, traditionally known for oxidising ferrous iron, also possesses the capability to reduce ferric iron, enabling respiration and growth in anaerobic conditions. This unexpected flexibility in microbial behaviour, discovered during exploration, deeply resonated with me and has since become a driving force in my career."

Couldn't have been at a better time
Jack Pronk transitioned into yeast research through a stroke of luck and strategic planning. He was due to go into military service and had already been called up, but his services were needed elsewhere.

"During my PhD studies, I acquired the licence to be a radiological safety officer. At the time, our department had a large isotope laboratory, and at the end of my PhD, I was the only person with that qualification. This gave my PhD supervisor and then head of the department, Gijs Kuenen, the ammunition for a letter to the Ministry of Defence."



He got out, and just at that moment, there was a vacancy for an assistant professor in the TU Delft yeast group, led by Hans van Dijken. This marked the beginning of his journey into the world of yeast physiology and molecular biology.

"Reflecting on this turn of events," Jack Pronk remarked, "I fell headlong into yeast research. And it couldn't have been at a better time, really."

A stroke of luck

In the mid-1990s, two pivotal advancements occurred in yeast research. First, the complete genome sequence of the yeast and model eukaryote *Saccharomyces cerevisiae* was published in 1996, thus facilitating its precise genetic modification. Second, the field of yeast metabolic engineering started to take off.

"At the time, our lab specialised in growing microorganisms under tightly controlled conditions in chemostats. These bioreactors were invaluable for both fundamental research and quantitatively studying industrial process conditions. Combining this with yeast genetic engineering, uncommon then, likely caught the attention of Stanford University colleagues, pioneers in Affymetrix (now Applied Biosystems) microarray usage."

Affymetrix microarray technology revolutionised genetic research in the late 1990s by enabling the simultaneous analysis of the expression of thousands of genes. By embedding DNA probes on chips, it simplified the previously slow process of gene-by-gene analysis.

"The colleagues at Stanford had devised a very elegant experiment combining chemostats and microarrays and asked, 'Can we send someone over to run the cultures?' This stroke of luck enabled us to use and subsequently acquire a microarray set-up early on, marking a pivotal moment in our research capabilities."

Keep their machinery running

The new set-up enabled Jack Pronk and colleagues to significantly advance their understanding of yeast physiology and metabolism. The studies revealed how these tiny organisms manage their energy and grow under various conditions, especially focusing on their interactions with oxygen and utilisation of various nutrients.

Understanding these processes in yeast is not just about academic curiosity. Large-scale industrial processes for making bread, beer and wine – but also biofuels and chemicals – depend on optimally adapting the yeast cells' metabolic machinery to the relevant process conditions.

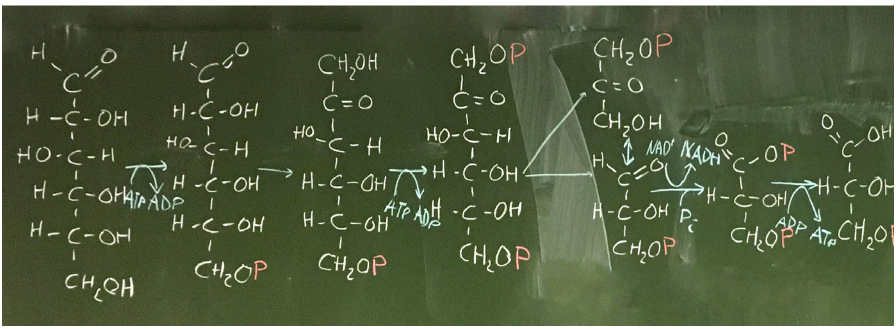
"Beer brewing and industrial production of ethanol rely on the ability of some yeast cells to grow in the complete absence of oxygen. Throughout my career, I have been fascinated by the question of why only very few of the thousands of known yeast species master this trick."

The potential of genomics for science and innovation had not gone unnoticed in politics. "At the turn of the century, we had a forward-thinking government that recognised the potential of genomics for addressing major societal challenges. They established the Netherlands Genomics Initiative."

Burnout and comeback
By setting up multiple virtual research centres, in which researchers from different research institutes, universities and industry partners collaborated, the Government of the Netherlands aimed to advance genomics research and its application. One such initiative was the Kluyver Centre for Genomics of Industrial Fermentation, tasked with revolutionising fermentation processes for producing food, pharmaceuticals, biofuels and biochemicals.

"I had just been appointed Antoni van Leeuwenhoek Professor of Industrial Microbiology at TU Delft. Colleagues insisted that I would be a good leader for this initiative. Encouraged by 'You can do it,' I took on the task. I remain grateful for their trust and glad I did not dodge the responsibility. It did, however, help to precipitate a rather traumatic learning experience."

Like many in academia, Jack Pronk had unconsciously been struggling with imposter syndrome for a long time. A burnout turned out to be the most valuable learning experience of his career.



"Reflecting on past experiences, I often dismissed compliments on my conference presentations, believing they were merely polite gestures. Despite achieving full professorship at 35, I harboured doubts about my abilities, fearing that luck had played a significant role and that my shortcomings would eventually be exposed. Now, I realise how this insecurity can drive individuals to exceed expectations, yet it can also lead to unhealthy perfectionism, in which a person feels that they must constantly give more than 100% to avoid being uncovered."

A lot of Bach, fishing, support from colleagues who had gone through the same experience and professional help enabled Jack Pronk to come back stronger.

"I learned not to continually measure myself against unrealistic targets or others but to also appreciate what goes well. It taught me the importance of getting to know my 'user manual', which I think is a lifelong learning challenge for us all."

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Critical hurdle in scaling up

His comeback proved to be an extraordinary success. Jack Pronk led the Kluyver Centre for Genomics of Industrial Fermentation for 12 years as Scientific Director, and his research at TU Delft moved into new directions. At the turn of the century, the increasing focus on the fossil fuel–sparked climate crisis led to a surge in interest in bioethanol as an alternative to conventional transport fuels. Addressing the challenges related to bioethanol production became one of his objectives.

One significant challenge in producing bioethanol was to use crude plant-based materials as feedstock. While traditional yeast strains, such as *Saccharomyces cerevisiae*, could efficiently ferment 6-carbon (hexose) sugars from fruits, vegetables and grains, they struggled with the 5-carbon (pentose) sugars commonly present in lignocellulosic biomass from agricultural residues, wood and grasses.

This type of biomass contains substantial amounts of the two pentose sugars xylose and arabinose, but yeast do not harbour the metabolic pathways needed to convert these sugars into ethanol.

"This limitation impeded the efficient conversion of agricultural residues, such as straw and leftover corn stalks, into ethanol, presenting a critical hurdle in scaling up bioethanol production from non-food sources."

Indian elephant dung

Earlier attempts to solve the pentose challenge largely relied on introducing two new enzymes in the yeast metabolism: xylose reductase and xylitol dehydrogenase. Despite many elegant studies, this two-enzyme solution was challenging to regulate and control. Jack Pronk and colleagues were convinced that the answer might comprise a completely different kind of enzyme when he met fellow microbiologist Huub Op den Camp from Radboud University Nijmegen.

“At the time, Huub was working with a fungus he had isolated from elephant dung. He was not involved in research on pentoses, but when Huub described a specific piece of DNA from the fungus, I realised it might hold the key to our problem. Together, we demonstrated that introducing the fungal gene into *Saccharomyces cerevisiae* solved this missing link.”

In the anaerobic fungus *Piromyces* sp. strain E2, isolated from the faeces of an Indian elephant, Jack Pronk and his collaborators found what many had been seeking – a xylose isomerase gene that would work well in yeast. “This result initiated years of research, which increasingly also involved collaboration with the Dutch company DSM. Through this process, *Saccharomyces cerevisiae* was adapted for processing the pentose sugars from agricultural waste streams.”

Still great potential

By around 2010, the modified yeast could quickly convert all relevant sugars from plant residues into ethanol, paving the way for more sustainable biofuel production technologies and minimising reliance on food crops as feedstock.

“Only four years later, DSM and the United States ethanol-producing company POET together opened a dedicated, full-scale plant for producing fuel ethanol from corn residues. The plant ran for a number of years until declining oil prices and a changing political context forced production to be interrupted.”

Despite this setback, Jack Pronk believes that the production of ethanol from agricultural residues will make a comeback. Ethanol is not only useful as a transport fuel but also as a precursor for compounds ranging from ethylene to aviation fuel.

“I see great potential for ethanol, produced by low-emission technologies, as a generic feedstock for producing food protein, pharmaceuticals and fine chemicals. There remains huge potential for its production from agricultural residues. I am convinced that genetically modified microorganisms, be they yeasts, bacteria or fungi, will enable cost-effective and sustainable ethanol production from these feedstocks.”

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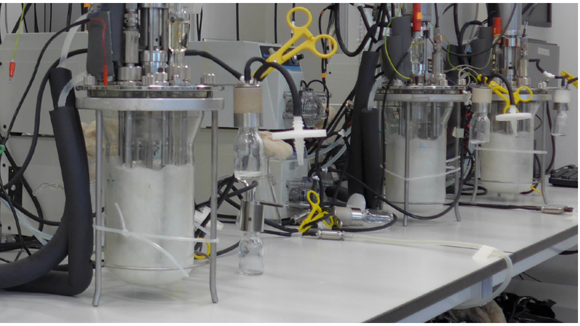

Weird and wonderful fungi

Equally important, the xylose isomerase example has proven that these kinds of productions are scalable. With the ability to engineer yeast, it is now straightforward to develop strains for the production of other valuable products from lignocellulosic biomass. However, a basic understanding of yeast physiology and growth remains equally important. In 2016, Jack Pronk received a European Research Council (ERC) Advanced Grant to investigate and eliminate the oxygen requirements in yeasts.

"We sought inspiration in the genomes of an evolutionarily ancient group of fungi, the *Neocallimastigomycetes*, or neos. These weird and wonderful fungi live in the oxygen-free guts of large herbivores. During evolution, their massive genomes have acquired a host of bacterial genes, as well as modifications in their own genes, that have helped them adapt to life in the absence of oxygen."

Growth of *Saccharomyces yeasts* without oxygen requires special anaerobic growth factors: molecules such as sterols, unsaturated fatty acids and vitamins. Investigating *Neocallimastigomycetes'* methods helped Jack Pronk's team to reduce these needs, enhancing the robustness of *Saccharomyces* yeasts in anaerobic processes and expanding their suitability across yeast species.

"Neos serve as a striking example of nature's ability to carry out genetic modification through the transfer of DNA across species. This process, a testament to natural evolution, happens on a scale that's almost hard to believe. Without playing down the amazing possibilities of synthetic biology, we have only just begun to explore the options offered by microbial biodiversity."

Brewing and antibiotics

Over the past decade, Jack Pronk and his team took another significant step towards creating a more efficient and sustainable method for producing ethanol that is now applied at full scale in the ethanol industry in the United States. For this invention, they called on help from his old acquaintances, the *Thiobacillus* bacteria. However, it was not the metal-eating variety but a relative, *Thiobacillus denitrificans*, from which the researchers borrowed a gene to fine-tune ethanol production using yeast.

"Integrating plant-like CO_2-fixation enzymes – active in the Calvin cycle – into a yeast enabled more efficient conversion of CO_2 to ethanol by minimising the unwanted by-product glycerol created during yeast growth. This way, we can create an even more economical production process and reduce environmental impact by co-utilising some CO_2."

Over the years, Jack Pronk's research and knowledge about yeast have benefitted far more industries than just bioethanol production. His collaboration with DSM and other partners has resulted in 17 patents and spans various sectors, including the production of important chemicals such as lactate and pyruvate, brewing and antibiotics. In 2018, his career took another new turn.

“The Dean stepped into my office and said, ‘Your head of department is leaving. We need an interim; would you be okay to do this?’ And my answer was, ‘Yes, of course.’ He then asked if I wanted to be head of department for a longer period. My less helpful answer was, ‘No way.’”

Six years later, Jack Pronk is still Head of the Department of Biotechnology at TU Delft. Asked to explain how his career took the twists and turns it did, he replies:

“Humans think they are rational. We are anything but rational, but we excel at rationalising after the fact. This holds especially in describing career paths, in which choices seem logical in hindsight but are often driven by deeper motivations. At crossroads, advice from family, friends and mentors, both in and outside science, has been invaluable, inspiring me and shaping decisions already taking shape subconsciously.”

We should stick this in yeast

Jack Pronk’s career exemplifies this notion through his pioneering research in industrial microbiology, particularly his work with *Saccharomyces* yeast in producing biobased fuels and chemicals.

“Our dream is to use microbial processes to replace existing chemical, fossil-based processes, thereby creating sustainable alternatives to traditional ones. Especially in academic research, it is important to acknowledge the unpredictability of which research line will ultimately make it to full-scale application. Our role is to continually explore and generate new options and, in the process, train new generations of scientists.”

To pass on knowledge, Jack Pronk has always been passionate about teaching and mentoring the researchers of tomorrow – and even as time has become more scarce because of his role as head of the department, he still gives priority to teaching the first-year students.

“I really enjoy interacting with the students – not just to teach them but also to form and be with them in the process.”

A remarkable example of Jack Pronk’s teaching philosophy in action occurred during a lecture when a spontaneous new insight emerged while teaching.

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“I love teaching as a duo, either with an experienced fellow staff member or with a talented PhD candidate. One day, listening to my co-teacher and looking at a slide he showed, I thought, ‘We should try to stick this enzyme in yeast,’ but I did not tell anyone right away because the idea felt a bit too good to be true. In the break, I went to my co-teacher and asked, ‘Should we try this?’ Together, we co-supervised a PhD project that turned a rough idea into an industry-applied technology.”

The 2024 Novozymes Prize is being awarded at a prize ceremony in Bagsværd, Denmark on 19 April to Professor Jack Pronk, Head of the Department of Biotechnology at Delft University of Technology.

Committee on the Novozymes Prize

The Novozymes Prize aims to raise awareness of basic and applied biotechnology research. The Prize is awarded to recognise outstanding research or technology contributions that benefit the development of biotechnological science for innovative solutions. It is awarded for a predominantly European contribution. Prize recipients must have a current position at a public or non-profit research institution in a European country. They may have any nationality.

The Committee on the Novozymes Prize awards the prize based on the nominations received. Anyone can nominate a candidate for the Prize, which is awarded annually and is accompanied by DKK 5 million. DKK 4.5 million is a funding amount for the Prize recipient's research, while DKK 0.5 million is a personal award.

The Novozymes Prize is awarded by a prize committee that selects the successful candidate based on scientific achievements after a confidential nomination and review process.

The members of the Committee are appointed by the Novo Nordisk Foundation's Board of Directors. The 2024 Committee comprised the following eight members:

Professor Detlef Weigel, Committee Chair
Professor Bernard Henrissat
Professor Jens Nielsen
Professor Maija Tenkanen
Professor Johanna Buchert
Professor Dame Carol Robinson
Professor Peer Bork
Senior Vice President of Biotech Claus Felby, representing the CEO

The award event usually takes place in the spring at the Novo Nordisk Foundation Prize Celebration, at which the Novo Nordisk Prize is also awarded.

In addition, in celebration of the award, the recipient gives a lecture lasting about 1 hour at his or her workplace. Before the end of the year, the recipient and the Foundation arrange an international symposium within the scientific field of the Prize recipient.

Candidates for the Novozymes Prize can be nominated by the Committee and former Prize recipients. In addition, a call for nominations is published in the spring, and candidates can be nominated based on this call.
The Committee meetings thoroughly discuss the nominated candidates with regard to their research contribution and impact, and a comprehensive bibliometric report is produced. A shortlist of candidates is then selected for thorough international peer review. Based on the international peer reviews, the Committee reaches a decision about the year's Prize recipient.

Previous recipients of
The Novozymes Prize
2015–2023

2015	Professor, Director Bernard Henrissat
2016	Professor Jens Nielsen
2017	Professor Emmanuelle Charpentier
	Professor Virginijus Siksnys
2018	Professor Gunnar von Heijne
2019	Professor Dame Carol Robinson
2020	Professor Detlef Weigel
2021	Professor Peer Bork
2022	Professor Mark van Loosdrecht
2023	Professor Anne E. Osbourn

Novo Nordisk Fonden
Tuborg Havnevej 19
2900 Hellerup
Denmark

Phone: +45 3527 6600

nnfond@novo.dk
www.novonordiskfonden.dk/en/

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