



Foliolum

Alternatives for animal testing

*Stem cell-derived
human 3D models
of organs*

G.F.S.V. "Pharmaciae Sacrum"- Study Pharmacy
Volume 34 - Issue 1 - October 2020



“Transform
passion and
innovation into
life-changing
solutions.”

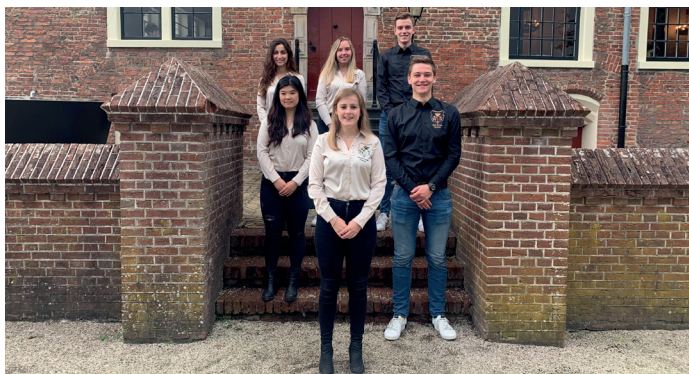
Fagron is de wereldmarktleider in bereidingen. Als onderneming bieden wij artsen, apothekers en ziekenhuizen het breedst mogelijke spectrum aan geïndividualiseerde bereidingsmogelijkheden. Onze missie is het verbeteren van de kwaliteit van leven van miljoenen mensen wereldwijd. Dit doen wij door het ontwikkelen van unieke concepten en innovatieve oplossingen voor de groeiende behoefte aan medicijnen op maat.

A collage of 15 diamond-shaped photographs arranged in a grid-like fashion. The photos depict various scenes of student life: students in formal black suits and ties, students in casual wear posing on a grassy field with a large rock, students on a bridge, students on a boat, students in a bar, and students in various outdoor settings. The collage is set against a white background with a large, stylized 'TS' in the top left corner.

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PREFACES

Editorial



Dear reader,

The summer vacation is already over and the new academic year has started. Corona still has a lot of influence on daily life. There are still no physical lectures, still fewer physical activities and we didn't have much physical meetings with our Editorial Committee. That also results in a different content of the Foliolum.

Our first issue unfortunately does not contain the usual column 'Having dinner with' and less physical activities automatically means fewer photos. This does give more room for new ideas. For example, Joeri tells about his life in quarantine and we created a wall of fame with old 'Gems of the week'.

For our first issue we chose the theme "Alternatives for animal testing". Katja Wolthers, clinical virologist, tells something about her research on stem cell-derived human 3D models of organs.

Furthermore, this number contains a story about the life of a PhD student, studying abroad, the activities of a production pharmacist and more.

We hope life returns to "normal" soon and until then we make the most of it! I hope you enjoy reading.

Love,
on behalf of the Editorial
Committee 2020-2021 "Scribo".

Thirsa Lohuis
h.t. praeses



Board



Dear reader, dear P.S.-member,

Since a couple of weeks the academic year has started. Due to coronavirus, everything is different from what we are used to. Corona also affected our association; it is not possible to receive you at our boardroom and the activities are either online or adjusted to the Government measures. This year, the Faculty Introduction Day and the First-year Introduction Camp were different compared to previous years. Despite that, we gave a warm welcome to many freshmen and we hope to see them at many of our activities in the coming period.

The first edition of the Foliolum is "Alternatives for animal testing". Although the wellbeing of the animals is warranted by law, alternative techniques for animal testing prevent unnecessary suffering. There already are a lot of alternative methods. For instance, tests with cell- and tissue cultures from the human body and the well-known 'lab on a chip'. Altogether, alternatives for animal testing are growing and will play an important part in the future of pharmacy.

I would like to congratulate the Editorial Committee 2020-2021 "Foliolum" on its first Foliolum and I'm looking forward to read it.

Kind regards,
on behalf of the 139th board of
G.F.S.V. "Pharmaciae Sacrum",

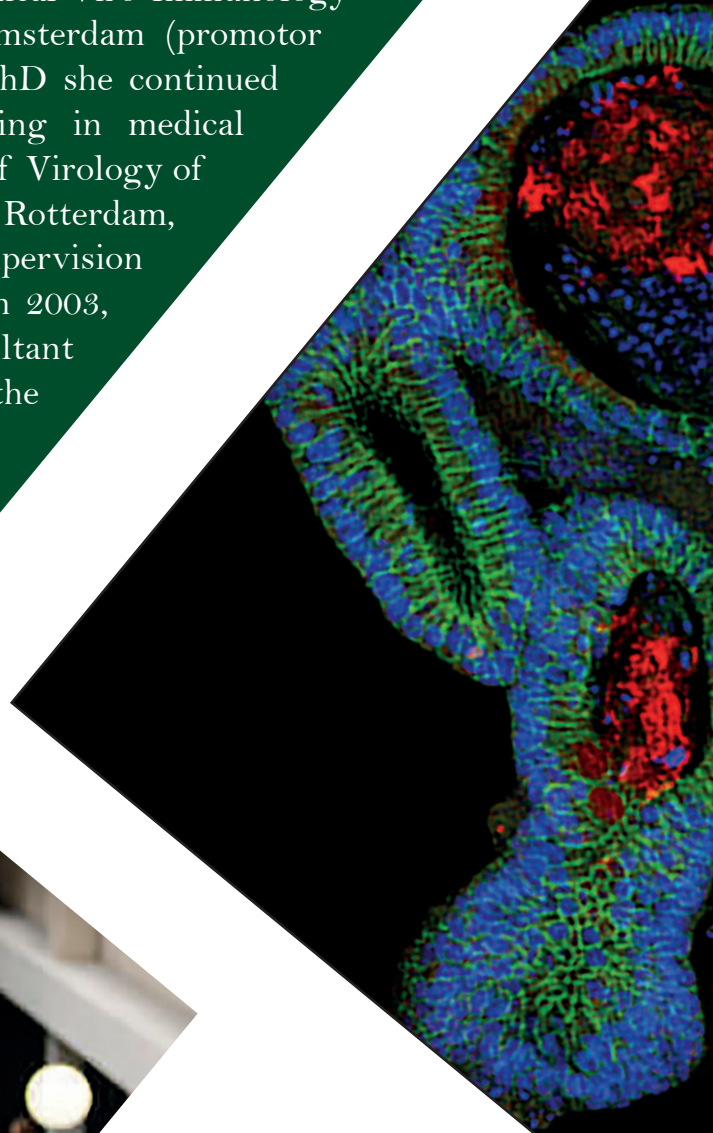
Lotte Hulskotte
h.t. praeses



Virus research with organoids

Katja Wolthers is a clinical virologist at the Department of Medical Microbiology at the Amsterdam University Medical Centers (AMC).

After she finished her medical study, she spent a year in Boston, USA, doing research on lactase gene regulation. She did her PhD in HIV research at the Dept of Clinical Viro-Immunology of the Sanquin Blood Bank in Amsterdam (promotor Prof. Frank Miedema). After her PhD she continued her medical training by specializing in medical microbiology-virology at the Dept of Virology of the Erasmus Medical Center in Rotterdam, the Netherlands, under supervision of Prof. Ab Osterhaus. In 2003, she started as a consultant clinical virology at the AMC.



Amsterdam UMC

Universitair Medische Centra

Stem cell-derived human 3D models of organs, i.e. organoids, have quickly become an essential tool for basic and translational biology. These organ models have immense potential to empower virology and innovate the way host-pathogen interactions are studied. Understanding these interactions is critical for prevention and treatment against virus infections. For decades, virology research has been limited to immortalized cancerous cell lines or animal models, but data from these models can only partially be translated to the human situation. In our EU training consortium OrganoVIR (Organoids for Virology, www.organovir.eu) we aim to transform the virology landscape and establish organoids as human models to study viral disease and develop antiviral therapy, thus replacing animal models and reducing animal use.

Emerging infectious diseases pose a global health concern with significant human and economic losses, as shown by the recent severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) pandemic that has brought the world to a standstill. However, infectious diseases outbreaks are a constant in the evolutionary race against disease-causing pathogens. In addition to the current pandemic, the recent 2009 swine flu pandemic, Ebola virus epidemic, and Zika virus epidemic serve as reminders of this burden. A lesson learned from these recent outbreaks is that there is an urgent need for standardized models that can accurately predict disease outcome and immune response, and are suitable for immediate antiviral testing.

Although animal models have historically contributed immensely, the limitations of these models are also clear. Animal models do not adequately reproduce human disease pathophysiology and in some instances, pathogens have a unique human host range that cannot be replicated in an animal model. This calls for novel validated models that recapitulate human physiology and are predictive of human disease.

An organoid is a miniature and simplified version of an organ, made out of human tissue cells and stem cells. Stem cells are pluripotent, which means that it can form into any type of adult cell. Organoids have the ability to organize as well as renew themselves. Due to its combination of human tissue and stem cells, an organoid actually contains the DNA of its donor, which means it carries the characteristics of that donor (e.g. genetic make-up, age, gender, etc).

In our international network OrganoVIR, several

research groups within the EU have teamed up, to accelerate establishment of organoids as models for virus research. Viruses are inert particles capable of exploiting and utilizing host cell processes to replicate itself. Viruses enter and hijack host cells to direct the production of new viral molecules from host cellular components, ultimately leading to the assembly and production of new virus particles. Specific viruses cause diverse diseases in different models, and infection follows distinct routes within the host. For this reason, it is important to employ the most natural system to study the effects of virus infections on a specific host such as humans. Viral and host factors associated with viral infection and disease have been extensively studied in immortalized cancerous cell lines or animal models. With the development of human organoids, a new and innovative tool became available to better study virus infections in the human host, and this is the one of the aims within the OrganoVIR network. Human organoids are infected with different viruses to provide a more accurate image of what host factors are essential for a virus infection in humans and to study the effects of differences between donors, such as age, sex, or genetic make-up. Identification of such factors is essential to understand why some individuals only experience mild disease after viral infections while others fall severely ill. If the response to a virus infection can be predicted for individuals or groups, this will help in making better decisions such as on who to hospitalize or treat.

Also important for prevention and treatment of virus infections is to understand how a virus spreads through the human body and causes disease ('virus

pathogenesis'). Many viruses enter the human body via the airways or via the gut. Infection may be limited to these entry sites, causing respiratory disease such as the common cold, or gastrointestinal disease such as diarrhea or vomiting. Some viruses are able to infect deeper via local spread or travel via the blood to further infect organs such as lung, skin or brain. At the Amsterdam UMC/AMC, my research group as part of OrganoVIR, has established organoids from human airways, gut, and brain. These organoids provide excellent models to visualize how viruses infect and spread in human tissues (Depla et al., 2020; Karelehto et al., 2018; Van der Sanden et al., 2018). However, organoids as they were originally established are closed round structures (Figure 1). These round structures are difficult to infect with viruses: the cells needed for infection are mostly inside the organoid. Therefore we adapted the original gut organoid to an 'open' organoid model where cells grow on a transwell, so that they can be reached from the upper and lower side to establish infections (Roodsant et al., 2020) (Figure 2). This model system is ideal for infectious diseases studies and to test antimicrobial drugs.

As viruses use receptors (molecules present at the cell surface) as 'keys' to enter cells, identification of these receptors is important as they are the key in understanding how viruses cause disease in the human body. As many of these receptors have been identified in cell lines that do not recapitulate characteristics of cells in the human body, we are studying whether these known receptors actually do play a role in infection of the human organoids. The data from studies with the organoids translate well to the situation in real life, as the organoids do recapitulate the characteristics of the cells in the human body. Identification of the right receptors is important as blocking of these receptors leads to blocking the virus its key to enter, and this is one of the ways to develop antiviral treatment for stopping virus infections.

There are several limitations in applying organoids for virus research. The models are quite new and validation or standardization of these infection models is still needed. Moreover, organoids are not complete organs as they lack connective tissue, blood vessels, immune cells and innervation, and they are not connected as organs are in the human body. Organoids can also play a role in reduction of animal testing for antiviral research. Currently, 500-1000 animals are needed for optimizing a new antiviral compound for clinical trials.

Gut organoids



Brain organoids



Figure 1. Gut organoids generated from human intestinal tissue (above; photographer A. Sridhar), and brain organoids generated from human pluripotent stem cells (under; photographer Ivan Pel for ZonMw).

However, 95% of drugs that get to the clinical trial stage do not make it to the market despite promising results in animal models. Based on the resemblance to the in vivo situation, organoid models show potential in being superior to animal models in prediction of efficacy and toxicity of an antiviral compound and therefore saving costs in the development of antivirals.

While organoids have found their way into virology research, new developments in this field look promising to build more complete infectious diseases models in the future. Immune cells have successfully been added to several organoid models, endothelial cells are being included, and the fast growing field of Organ-on-chip is developing several different disease models with multiple organs on a chip and mimicking a blood flow. Building a 'human-in-a-dish' seems more possible than before, and with that, building the ultimate model to fully replace animals in infectious diseases research should no longer be considered science fiction.

Acknowledgements

Dr Dasja Pakjrt, MD PhD, pediatric infectious diseases specialist and (co-)director of OrganoVIR; Adithya Sridhar, PhD, senior scientist; Angelica Reitsma, project manager OrganoVIR.

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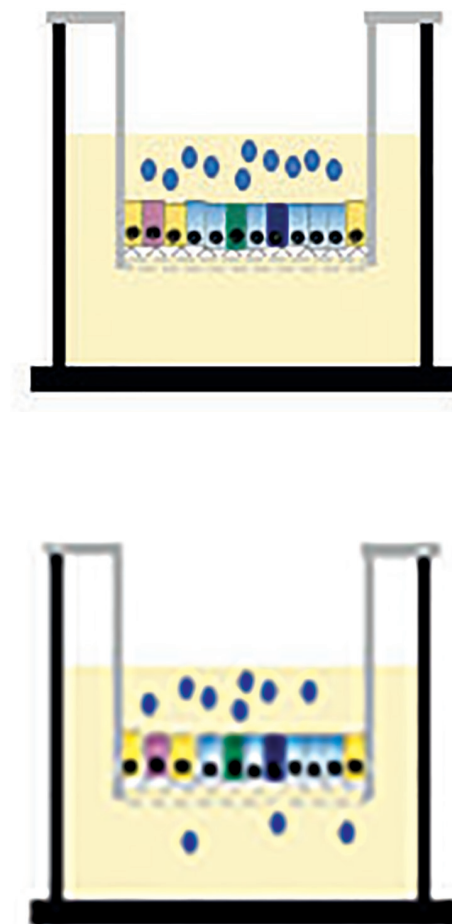
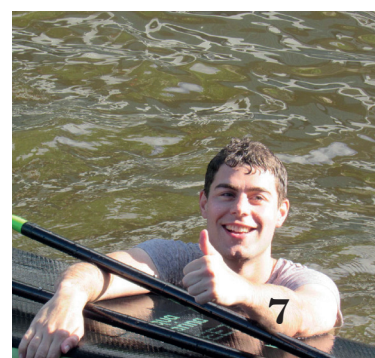
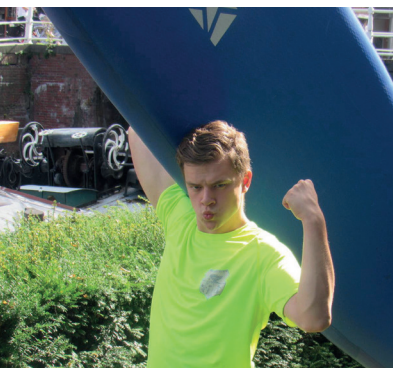


Figure 2. Open gut organoid model: differentiated gut epithelial cells (colors represent different specialized gut epithelial cells) grow in mono-layer on a transwell membrane in specialized medium (yellow). Blue dots represent pathogens that enter the tight monolayer by infecting the cells (picture under) (picture by I. Aknouch).



PhD

Annemarie Broesder

After studying Pharmacy at the University of Groningen for 6 years, I started my PhD research at the department of Pharmaceutical Technology and Biopharmacy. Now, almost 4 years later, I still enjoy research.

I started my Bachelor of Pharmacy due to my interest for the human body and the effects of medicines, and I did not know what I wanted to do afterwards. I enjoyed the practical courses, but I was still never fully certain that research would suit me. My bachelor project focused on a specific pathway that was investigated in a cell line. One of the things I learned was that I did not like the uncertainty of research: did something just not work or was it a mistake on my end?



Annemarie Broesder studied Pharmacy in Groningen from 2010 to 2016. After graduation she started as a PhD-student at the department of Pharmaceutical Technology and Biopharmacy.

I decided that research was not for me, and decided to do a short master project (30 EC instead of 45 EC) in my fifth year. The focus of this project was on the development of microspheres for the sustained release of an active protein. The idea was that with this sustained release formulation, patients would no longer need frequent injections. This would not only increase the patient compliance, but would also be more patient-friendly. After my master project had finished, I realized I had been very lucky with it. The larger research line had just started when I started mine, which in my opinion is the ideal situation to see what doing research is all about. I could not only help with the development of the formulation, but also with the analytical methods, since they were not available yet. Especially the analytical method development was challenging,

and at the end of my project we were still not able to measure the protein content of the microspheres. I was disappointed that my project was finished, and I wanted to continue. This was the time that I realized research is something I enjoy. I discovered it was energizing to try new ideas, from literature or thought up by myself, and to see whether it would lead to the result we wanted. Still, I doubted that doing a PhD was something for me, since writing was (and still is) not something I truly enjoy doing.

After my master project I started with my internships at the hospital and public pharmacy. I enjoyed working in the public pharmacy and the interactions with patients. However, at the end of my internships I had the idea that I would be happy working in a public pharmacy for only a couple of years, but I was afraid that eventually this would become routine and that it would not be challenging enough. Therefore, I decided to talk to people about doing a PhD project. I got offered a position to research ileo-colonic drug

delivery with the ColoPulse coating. The ColoPulse is a pH-dependent coating which quickly ruptures in the terminal ileum where the pH reaches a peak value. My project focusses on combining this coating with different types of formulations. So far, the ColoPulse coating has only been used on single unit dosage forms such as tablets and capsules. Now I investigate its applicability on multi-particulates such as pellets. Another subject I focus on is poorly soluble drugs. With the use of high throughput screening by the pharmaceutical industry, a lot of new drug candidates have been discovered that are unfortunately poorly soluble. This results in a poor bioavailability. Formulation scientists have come up with solutions for this problem, such as the development of solid dispersions or self-emulsifying drug delivery systems. However, these formulations are usually not tested in their final dosage form. One of my research lines focuses on this issue and I look at the influence of the ColoPulse coating on these enabling formulations. Research questions are whether these formulations still perform as well, and which formulation works best if a coating is necessary. What I like about this research is that it is very visual: you can see by eye if the formulation improves the solubility or not (i.e. does the drug quickly precipitate in water or not).

At the beginning of my PhD it was a bit overwhelming to be responsible for my own project. Luckily, even though you are actually responsible for your own project, you are not doing the lab work and research on your own. First you learn a lot from technicians and more experienced PhD students. Then, in the later stages of your project, you pass down the knowledge you have obtained about the equipment or analytical techniques to other (new) PhD students. As most of you will know, PhD students also supervise capita selecta's, colloquia, bachelor projects, and master projects, of which the topics are usually linked to our own research. Thus, a part of the time I have for my PhD is devoted to teaching students and hopefully making them enthusiastic about doing research themselves. I enjoy teaching since it challenges you to explain methods in different ways and the questions students ask force you to reflect on your own research. Ultimately, this can only improve your own work. Next to teaching you also spend time going to conferences, where you meet researchers from other institutes and can discuss your research. An added bonus of attending conferences is sightseeing in your free time.

I am currently in the last phase of my PhD research and have to start writing my thesis. I still do not enjoy writing like some of my fellow PhD students do. However, you become more proficient at it over time. Luckily, you do not write papers all by yourself, because there are supervisors to help with this. So, for everyone who doubts doing a PhD only because of the writing, I would say do not worry about this, you will learn. It might never be your favorite thing, but the thrill of research will surely make up for this.



ALUMNUS

Tristan Snoei

My name is Tristan and I was asked by the Foliolum committee to write something about my career in the pharmaceutical industry. Having been an alumnus of the study association for more than two years so far, I obviously could not say no to this question.

I am currently working as a production pharmacist at an Astellas Pharma manufacturing plant located in Meppel. Before having recently switched to this new job I was working in the Quality Assurance department which really provided me with a solid base for my future career.

In the plant in Meppel both large-scale packaging and formulation of a variety of pharmaceutical products take place and the plant only stops production during the weekends.

These products are shipped to a large number of countries and improve the health of people around the world. In the formulation department several different production steps take place (weighing, granulation, capsulation, mixing, tableting, coating) and in the packaging department both primary and secondary packaging are performed on a variety of packaging lines. As each of these steps have a lot of their own criticalities, there is always something going on to investigate, contribute to, improve or even simplify within the production department.

As a production pharmacist I am involved in a lot of different projects. The scope of these projects range from, for example, the introduction and production of new products in the plant to investigating the root

Tristan Snoei studied Pharmacy in Groningen from 2010 to 2017. At the moment he is working as production pharmacist at an Astellas Pharma manufacturing plant.



cause of a certain trend found in tablet test results. Beside these projects my daily tasks consist of batch review and order flow, assessing and investigating process deviations, continuous improvement of different processes and a lot more. This large

variety of activities ensures you will never have a dull moment working in the industry!

So why the interest?

To start with, yes, Pharmacy was my first choice of study. As I always had a wide interest in all sorts of subjects, this indeed was a very great choice for me.

During both my bachelor and masters, I was very involved with the study association P.S. As a member of the 130th board and member to a lot of committees, I really broadened my horizon and became interested in the pharmaceutical industry. At first, this was mostly due to the visits to pharmaceutical companies during both foreign and domestic study trips. After these visits I wanted to know more of this industry.

During internships at the local pharmacist I became aware that my challenges were not to be found there. Therefore, I began looking at how I could differentiate my curriculum more to my liking in my masters.

I really liked that high-level overview of how one can look at vaccines and the potential to further prevent and control such diseases on countrywide scale.”

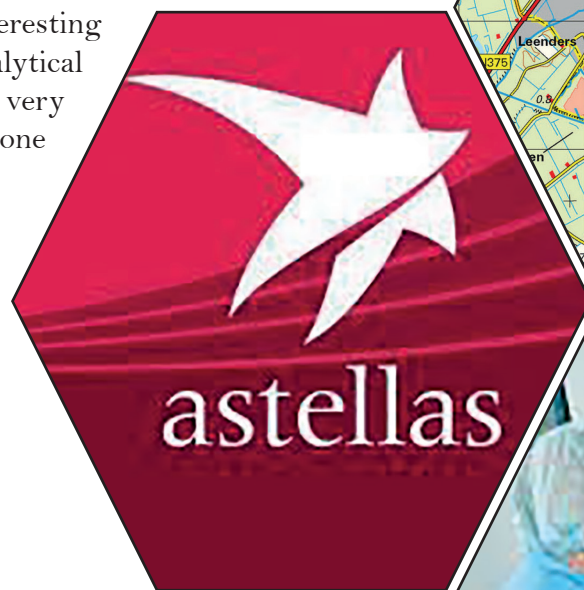
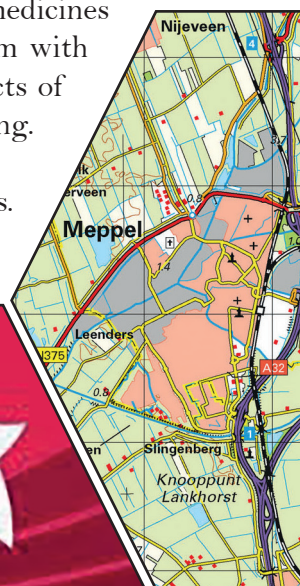
As a part of my master project I had an internship at GSK to research the further optimization of the Dutch National Immunization Program. I really liked that high-level overview of how one can look at vaccines and the potential to further prevent and control such diseases on a countrywide scale. I must say that the internship in a hospital pharmacy was also very much to my liking, but the following internship at Sanofi gave the final push for starting a career in the industry.

At Sanofi I was involved in further enhancing an existing product in the general medicines department. This internship showed me a lot more of the industry by working in a team with different backgrounds. I got aware of quality, marketing, regulatory and much more aspects of a pharmaceutical company and I really liked to contribute to the team in which I was working.

It can be very difficult when having to decide what you would like to do after your masters. Local or hospital pharmacist, PhD, clinical research, market access, R&D, pharmacovigilance, quality assurance, health insurances, etc. etc. Each of these occupations grants you access to very different but all interesting perspectives in the world of pharmaceuticals. The analytical and critical views you master during your studies are a very sought-after skill in each of these different perspectives one can end up in.

Therefore, I cannot imagine making a wrong career decision after finishing your studies!

Tristan Snoei



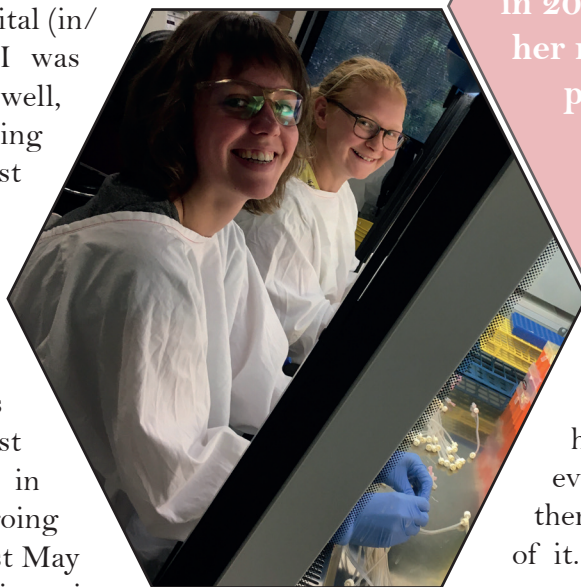
STUDENT ABROAD

Nicole Westendorp

Before I even started my Pharmacy studies in September 2014, I already knew I wanted to go abroad for a certain period of time during my studies. Unfortunately, we don't have a minor in our third year, so I had to wait a bit. When the time came to decide upon a Masters research project, I did doubt for a second if it wouldn't be smarter to choose a project in a hospital (in/ around Groningen) since I was very interested in that as well, but I can assure you, going abroad was by far the best decision I could have made!!

About six months before I wanted to go abroad I had a chat with Reinoud Gosens. The opportunities that interested me the most were either in Canada or in Australia and since I was going from September until at least May that meant either having winter in Canada (freezing cold) or summer in Australia (extremely hot). Australia it was and quickly after, I received a warm welcome from my professor in Newcastle, Australia. Lisa-Marie had been to the same research institute the year before and was super enthusiastic about her experience, which made me even more eager to go. After taking care of the long process with all formalities including applying for a temporary research visa and scholarships, I received my visa on June 27th which finally made it official.

In September last year it was time to go on my adventure. After saying goodbye to everyone in the Netherlands, I took off on my 25-hour flight and an even longer journey before I arrived in Newcastle. My professor there insisted on picking me up from the train station, I'm sure I made a very good first



Nicole Westendorp started studying Pharmacy in 2014 and is currently doing her master's. For her research project she travelled to Australia.

impression after an almost 30-hour journey, but ey, in Australia everyone takes care of each other so there was no way I was gonna get out of it. I had a couple of days to explore my new hometown before I started my project at the Hunter Medical Research

Institute (HMRI) and it just happened to be that Newcastle has beautiful beaches and it was about 25 degrees and sunny, so of course I immediately loved the place. Before I started I could also move into my room, which I sublet from Annelies, a former MPS student at the RUG who is doing her PhD at HMRI. I was living there with three other girls, one Australian, one American and another Dutch one. As a real Dutchie, of course I had to get myself a bike, but I must confess that I didn't ride it a lot, Australia appears to be quite hilly compared to the Netherlands.

The Australian girl I was living with was doing her PhD at HMRI, so most of the time I could get a ride with her. Public transportation in Australia is cheap compared to the Netherlands, but although everyone

always complains about the NS, public transportation is pretty decent here compared to Newcastle. On my first day at HMRI I met the rest of my research team, lovely people from all over the world. My day-to-day supervisor was this Australian guy who was absolutely completely crazy and someone you could have a good laugh with, but he was also a very good teacher in the lab. Every weekday from 9 am till 5 pm I was at HMRI, like a regular workday. In my project I investigated the role of shear stress on the innate anti-viral immune response in airway epithelial cells from asthmatic patients after infection with rhinovirus. This meant I was in the lab most of the time, culturing cells, infecting cells, harvesting cells and performing analyses such as qPCR, ELISA and histological staining. Cells for my project were obtained during bronchoscopies of asthmatics at the John Hunter Hospital, which is located next to HMRI. I even got to watch one of the bronchoscopies.

HMRI is not located on the university campus so I didn't have the typical student life over there. The study year starts in February and ends in November, so unfortunately I could only play tennis at the student tennis club and attend their events a few times. We did hang out with the PhD students from HMRI a lot though, partying downtown, going to a festival, or just having pizza and a drink at the beach, but also going to a horse race, a super cars race or on a wine tour, all kinds of fun stuff! I also spend a lot of my weekends travelling. Sydney is only a three-hour train ride away, where I also met up with Annemiek and Xantia. The Blue Mountains is just a bit further and Port Stephens, the holiday location for lots of people from the city, is even closer and both are absolutely stunning. Marieke came over to travel the Great Ocean Road and Melbourne with me for a week and during the Christmas holidays I did a road trip through the beautiful island Tasmania. Christmas itself was about 28 degrees and I was eating turkey sandwiches in my bikini at the beach at surf camp, what a way to celebrate Christmas the real Aussie way!

After all the bushfires in Australia during summer, who would have thought we would also get COVID-19 not long after? Unfortunately, my time abroad got cut short because of it and at the end of March I had to leave Australia from one day to another. Devastated to end an absolutely amazing experience this way, without the chance to have said goodbye to everyone and with my travel plans gone to waste. I was supposed to finish my project at the end of April and travel around the country for about 2,5 months afterwards. Luckily I was able to write my report back home and finish my project properly and when COVID-19 is all over I will come back to Australia and travel some more for sure!

If you have any questions whatsoever, please ask. I can only highly recommend doing your research project abroad.

Cheers!
Nicole



COMMITTEES

Career Day Committee



Dear readers,

We are the new Career Day Committee, which means we will have the pleasure to organize the Career Day in February 2021.

Let's start with a quick introduction: Martijn is our ambitious praeses, who will make sure the other committee members will do their tasks in time and he is responsible for making the Career Day of 2021 a big success. Our ab-actis, Annabel, will be the contact of our committee regarding other committees, and several different companies, which we have to cooperate with in order to organize the Career Day. As an ab-actis she will also have to take minutes during our meetings. Lotte and Daan, our quaestors, will have to team up for the entire committee year to make sure we will lay contacts with a lot of diverse companies, to make the next Career Day both useful and unforgettable. Last but not least, our assessor I Melanie. Well, to be honest, she is just here to drink a lot of wine. Also, she will help out the other committee members wherever she can of course.

Despite these insecure and crazy times we, as a committee, are looking forward to organizing and taking part in the Career Day of 2021.

Lots of love,
The Career Day Committee 2020-2021

Master Committee



My dearest reader,

We are the most senior committee of the study association. Although most of you will not visit our activities, those who do will always remember us. This year we will organise four activities for the master students.

It is our honor to introduce you to our committee. Firstly, there is our frontman, president and guiding light Frank. Then there is Danique, who loves football and is able to make sure our agenda is up to date. Of course, we cannot forget our money man, Akkad. He is not the brightest person, but he will suffice. The committee is also supported by the assessor. The assessor consist of two prominent members, our appie I Mirte and our appie II Eric. Mirte is not able to drink beer but wine will do, while Eric our appie II has to drink beer. Doing so, he made a new personal record of 12 beer 'adtjes' in one evening. It was a memorable evening and many more memorable evenings will come in the future.

As for now, we hope you have a rough idea of who we are and what we do. We will see you soon!

Love,
The Master Committee 2020-2021

COMMITTEES

Student Council Pharmacy



We are the Student Council Pharmacy "SpringSTOF" (ENG: explosive), and we will help the students of Pharmacy with study related problems. Do you have any remarks, questions, or suggestions? Send an email to stof@psgroningen.nl or come to us for advice or help.

Every two months, we organize a meeting where the committee discusses the reported problems with the Year Representatives, heads of Pharmacy, and other interested parties. If you want to help us improve Pharmacy and be a Year Representative, let us know.

Lastly, some quick information about ourselves. First, Evelien is the praeses and a first-year master student. Then we have Bram, our ab-actis, he is a second-year master student. Thirdly, we have Giovanni, he will finish his bachelor's this year. Lastly, we have Julie, who has begun her master this year. We are always in for a party and are there for your help!

With love,
Student Council Pharmacy (STOF) 2020-2021
"SpringSTOF"

Technical Supporting Committee



Now it's time for the most epic committee of P.S.: the (3rd) T.O.C. (Technical Supporting Committee). We are the digital warriors of the association and help the board and all P.S.-committees with their technical questions/problems.

These are the T.O.C. heroes: Remco is our praeses and leader of the wolf pack. As 2nd year T.O.C.-member he has all the experience he needs to lead us to victory. Cees is our ab-actis. He has been a member of every T.O.C. in history, so you could say he is kind of legen - wait for it - dairy. Adnan is our Assessor I and is the most experienced computer expert of our committee. It's true. It's amazing. *TRUMP VOICE*. Sina is our newest member and our Assessor II. With his catchy laugh he is the ultimate distraction when the T.O.C. warriors need to come to the rescue. But don't underestimate his knowledge about computers, because otherwise we wouldn't have allowed him to join our elite squad. Our Assessor III is Daan. He is our Arnold Schwarzenegger, because he is the tallest warrior of us all. After a brief year he has returned to the T.O.C.! #I'LLBE BACK. Last but not least: Rob the Dawg. He is our Assessor IV and also board member. After extensive training for a year in the T.O.C. he has become the chosen one to be the Appie II for P.S., but we couldn't let him go and kept him as our Appie IV!

If you have a problem and if no one else can help...
Maybe you can hire the T.O.C.!

COMMITTEES

First-years Committee



Praeses - Kai

Kai will be our praeses in this years EJC. Nieuw-Amsterdam is the town where he and his family live. He is looking forward to organize parties and meet new people in the fabulous city of Groningen. He plays table tennis and likes to hang out with his friends.

Ab-actis - Noa

The role of ab-actis will be filled by Noa this year. She was born in Groningen, but has lived in Brabant for over 15 years; meaning she will take all her carnival knowledge that she has gathered the past decade and bring it back home to her birthplace to throw some amazing parties together with the rest of our committee.

Quaestor - Erik

Our new quaestor is going to be Erik, he is 18 years old and lives in a small village in Friesland. It's about a 2 hours trip to Groningen. He is very excited to have joined this years EJC and will make sure that we organize some unforgettable parties according to budget.

Assessor I - Eline

Eline will be our assessor I, she is 18 years old and she lives in Smilde, a small village in the middle of nowhere. She just started ice skating at the sportassociation TJAS, and she likes to have lots of drinks at parties with her friends. That's why she thinks EJC is the perfect committee for her.

Assessor II - Cas

Cas is going to be our assessor II this year. He is 18 years old and he is born in Utrecht. Fortunately he has found a room in Groningen,. He played soccer for about 16 years in Utrecht, but now he is going to row at Aegir. In Utrecht he practised his drinking skills, so he will fulfill his role as assesor II just fine.

Assessor III - Nina

Nina will be assessor III this year. She is 19 years and is from Overijssel. Groningen is where she lives now and she already knows the city very well. She can be easily recognized because of her "Twentse" accent from miles apart. She's looking forward to be a member of the EJC and to organize parties.

Assessor IV - Eva Marjolein

Eva Marjolein will be our assessor IV, but you can call her Eva. Even though Eva has hockey training on Monday evening, she will come running back to meet us for dinner, drinks and some partying.

Assessor V - Ali

Last but not least, Ali is our assessor V. 18 years old and currently living in Emmen. Being bilingual and having a double nationality, he is also called Mr. Worldwide. Unfortunately he still hasn't found shelter yet in Groningen. During these exceptional times due to corona, he will try his best to make the best out of it with the EJC and our all-beloved first-years!

In 2018,
approximately
200 pharmacists
graduated.

Fact

Isolation and
quarantine are
the same thing.

Fable

Patients that are infected
with the coronavirus can
infect other people up
to 14 days after the last
symptoms.

Fable

Most pathogens are
spread through the
hands.

Fact

FACTS & FABLES

The coronavirus is
spread through direct
contact with droplets
containing the virus in the
air and surfaces followed by
touching the nose, mouth
or eyes.

Fact

At the end of
2018, the number of (Bio-)
Pharmaceutical Sciences
students in Groningen,
Utrecht and Leiden was 658
students.

Fact

In 2019, the
biggest insurance
company in
Groningen was the
“Zilveren Kruis”.

Fable

People
can get infected
by the coronavirus
through their pets.

Fable

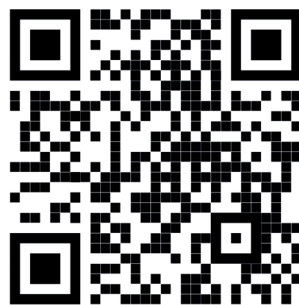
Sanitizers and disinfectants
should contain at least 60%
alcohol to effectively kill
the coronavirus.

Fact



Check the
QR-code
for the
answers

RIDDLES



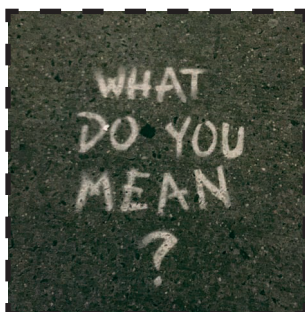
People can participate in the game “guess the fruit” at the fair. There are 4 closed boxes on the table, each of them containing a different type of fruit. The 4 types of fruit are apple, pear, melon, and mango. The purpose of the game is to guess which box has which fruit in it. 100 participants all try their best at this game. In the end, 23 people had no right answers, 58 had 1 right answer and 14 had 2 right answers. How many people had 3 right answers? And how many had 4 right answers?



When I am young, I am tall. But the older I get, the shorter I am. What am I?



What comes once in a minute, twice in a moment, but never in a thousand years?



What do you break before using it?



You are stuck in a house with 2 rooms, 1 upstairs and 1 downstairs. Downstairs you have 3 numbered switches and upstairs 1 lamp. One of the switches turns the lamp on, but you are only allowed to check the lamp once. After this check, you have to tell the answer. You need to find out which switch controls the lamp. How do you know for sure which switch turns on the lamp?

P.S.-ACTIVITIES

Murder Mystery

By Lilly van Rooi & Melanie Hesse



Dear P.S.-(murder)ers,

The 11th of June, the moment we had all been waiting for, was finally there: the P.S. Murder Mystery night. Several teams tried to solve different crimes, in which different P.S. members were involved.

We learned a lot about the new board in this activity. We don't know about you guys, but we don't trust this board anymore! They love killing and stealing, and don't treat their members and each other very nicely. Their favourite colours should be blue and yellow, but we figured out they prefer the colour red, the colour of BLOOD! Besides finding out that the board members are psychopaths, we also put our minds to work trying to solve different riddles. One riddle was about an apple which was sliced in half with a knife. One half was eaten by one person and the other half by another. Only one person died, how was this possible? After thinking long and hard, you had to give your answer as soon as possible, because the fastest teams got the most points.

Unfortunately, our team did not win. Only one team could be the winner, and they won a gift certificate for Cappuvino. We very much enjoyed thinking and participating in this online activity!

Love,
Melanie & Lilly

JAK Beer Games

By Wietske van der Bijl



On Saturday the 11th of July, the JAK Beer Games took place. This was a day full of physical exercise combined with beer and laughter.

The day started around 1 pm. Every group of around 5 people got a map and a nice Corona beer, to start with. We all had to follow the route of 5 km and came across multiple fun locations. There was a beer tasting, a fun ball game and some more games for example. At these locations we also got a beer for the next part of the route. The fastest group to finish all games won.

After finishing the route, everyone gathered at cafe "De Toeter", where we also had a small drink. This also was the starting point for the main activity of the day; stand up paddling! There were only some students with enough talent to stay on the board, but most fell off into the dirty water of the canals. Some of the participants stayed at 'De Toeter' until late and also had dinner there, but others went home to take a shower after falling in the canal.

At the end of the day, with all things combined, it was a nice activity with a lot of laughter and wildplassen!

Love,
Wietske

P.S.-ACTIVITIES

Pharmalead Pubquiz

By Xantia Heeres



On Monday the 6th of July the online Pharmalead Pubquiz took place. We first had a lovely dinner with our enthusiastic team so we would be fully focused during the quiz. We ate sweet potatoes with a cheese schnitzel and broccoli, a really nice recipe from Pieter. With, of course, a glass of wine on the side.

Our team consisted of Tine, Pieter, I, and Dennis who joined later on. It's always nice to see that so many students also take part in online events like this one.

The first round of the quiz started off with a difficult one. We had to guess what kind of substance each structural formula was. We somehow ended up doing pretty well in that round and almost got all the points.

The next rounds consisted of common knowledge, pharmaceutical questions and several other categories. I thought the questions were very difficult and it would have been nice to get some more thinking time. However, time flew by, the quizmasters did a nice job and we had fun with our team. We did better than expected because we ended up in second place! All in all we had a nice evening with each other and also learned a lot.

Xantia

First-year Introduction Weekend

By Noa Eleveld



It's 10.35 a.m. and I'm frantically running around in my room. After three failed attempts, I finally find the right key for my bicycle and I'm on my way. When arriving at café "De Toeter", gasping for air, I strangely enough only see a group of three people standing outside the building. I then start to understand I'm actually on time and eventually had to wait another 20 minutes for our group leader to arrive.

After a short introduction, we were good to go and headed towards one of the committees looking for new students to complete their team. After a lot of us showing interest in several commissions, we all got our own goodiebag filled with, among other things, a generous lunch. When we finished drinking our many 0.0% beers, some of us already started to feel light-headed and almost forgot to keep their 1.5 meters distance, luckily enough they were all reminded on time. Continuing our journey we crossed several stops; different committees, McDonald's, the 138th board, K.N.P.S.V. etc. All being very excited to meet us.

Around 5 o'clock the official program was over and even though there were some pretty tired faces among us, we decided we didn't want the day to be over yet. So we then walked to our starting point, sat down and discussed the day while enjoying a nice, cold glass of... water.

Noa

THE CORONA LIFE OF...

Joeri Teisman

About Joeri

Joeri started studying Pharmacy in 2018 and after one year of studying he became Assessor II of the 138th board of “Pharmaciae Sacrum” in academic year 2019-2020.

Corona made his board year end differently than expected; activities were canceled or took place online.

He will talk about the last months of his board year and his life in quarantine.



The life in quarantine

On March 23rd this year our year as the board of “Pharmaciae Sacrum” was suddenly interrupted by the “intelligent lockdown”. In the previous weeks at the boardroom, we heard a lot about the coronavirus and feared the worst. We now had to cancel most of our upcoming activities and had to work separately at our homes. After a lot of Zoom sessions and Skype meetings, an online activity schedule was made. After a lot of fun online activities during the quarantine period, the date 2 June was getting close. This date didn't only mean freedom from quarantine but also the end of our board year.

With all the negativity in this very brief autobiography, you must think that there were only sad sides in my quarantine life, but on the contrary, I enjoyed some things in lockdown too. For the first time in the whole year I could hang out with my roommates, which made our friendship much stronger! I also achieved my intended ECTS during the quarantine via the online examinations. And I also lost a lot of weight, because of my weekly scheduled workout sessions and significant reduction of alcohol consumption.

After the retirement as a board member, there was even more free time to spend and we now could gather with friends because of the end of the lockdown period. Because of the nice weather June gave us, my roommates and I often put the sofa outside the door and enjoyed the free life with an ice cold Heineken. The first real life fraternity evening of G.F.H.D. “Snoeihard” was organized after a period of online drinks, which was just as convivial as the ones before quarantine.

When the new board was installed they had already thought about some extra online and the first real life (with 1.5m distance of course) activities. For example in July we had the first P.S.-Social Drink since March, where, as always, the free keg of beer was served in no time. The conviviality was present as it was never before and the one and only meal of “De Toeter”, the “Toeter burger”, was flying by every 10 minutes.

But before the first Social Drink was organized the first Monday evenings in cafe “t Vaatje” took place. The first Monday evening the committees were rounded up by the new board and were heading to cafe “De Negende Cirkel”. The evenings after that “t Vaatje” was opened again (for only 30 people unfortunately). “t Vaatje” had listened to our desires and put a wheel of fortune on the wall. For just 10 euros, you could spin it with a decent chance of winning buckets with Red Bull vodka in it. Enough reason to contact “Ome DUO” for some extra money that month.

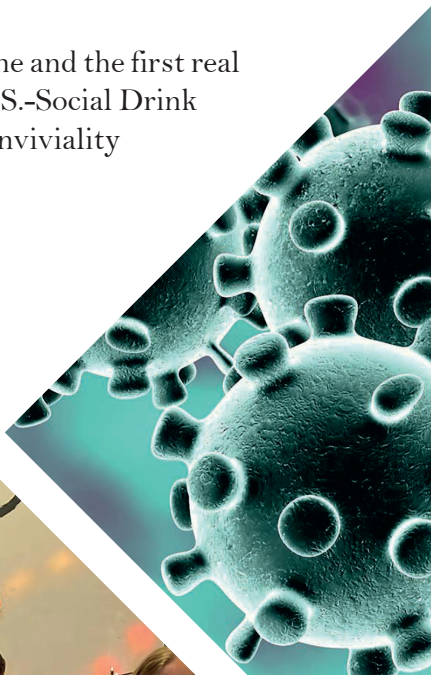
Apart from my many lost hours behind the television, watching Netflix, Videoland, Disney+ and playing games on the PS4, these were my highlights in the past months.

Hopefully I will see you all next year at online or real life activities!

And don't forget,
P.S. is moo!

Joeri Teisman

“For the first time in the whole year I could hang out with my roommates, which made our friendship much stronger!”



Getting to know...

Assessoraat



Lemke Slijkhuis

My hobbies are:

Cooking, shopping, partying, going to the spa, chilling and having fun with friends.

My first job was:

Working at the Albert Heijn.

This is me in three words:

Crazy, caring and spontaneous.

If I could combine two animals, I would combine:

A bird with a fish, because sometimes I'm flying high in the sky and sometimes I'm swimming in deep waters.

Why I chose Groningen and Pharmacy:

Nothing beats Groningen of course. I chose Pharmacy since I loved the subject chemistry.

My academic year is:

2016

I think the best subject is:

Patënt, Therapie en Veiligheid (PTV), because you really learn what you will do as a pharmacist after your studies.

Why I chose to be part of the board and hold this position:

Participating in the board seems to be an enrichment for myself in the field of new skills. I also hope to get to know lots of different directions in the field of pharmacy, in order to find out which direction suits me. I really enjoy being in contact with all committees that P.S. has, and to see what beautiful and fun activities they organize.

About me

My name is:

Lemke Slijkhuis

My birthday is on:

June 18 (born in
1998)

My hometown is:

Deventer (Overijssel)

My function:

Assessor I

Things I want to keep from my predecessor:

My friendship with Anniek.
Assessoraat Boerinnen <3

I think the best P.S. activity is:

The Reception of the Dies. I look forward to it the whole year.

This is the best moment I remember from my student days:

There have been countless moments in my student days that have taught me many new things in my life, and those moments have been the best.

My nicest/funniest statement is:

Without the valleys you don't learn to appreciate the peaks.

If I have to choose, then I choose the following:

Videoland - **Netflix**

Fries - **Pizza**

Theory - Practical

Faberzaal - Keuningzaal

Hometown - **Groningen**

Beer - Wine (*special beer)

't Vaatje - de Negende Cirkel

Kingsland - **Nazomeren**

This will be my advice for the freshmen:

The student life (at P.S.) is the best thing that will ever happen to you, so enjoy it to the fullest.

Later I want to become:

A healthy and happy mother with a healthy and happy family.

This is still on my bucketlist:

Travel around the world and see the northern lights.



Getting to know...

Assessoraat



Rob de Hond

My hobbies are:

Football, gaming, bingeing shows, I like going to festivals and the regular hanging out with friends.

My first job was:

Stocking shelves in a supermarket.

This is me in three words:

Low alcohol tolerance.

If I could combine two animals, I would combine:

A dog with a Blue Florida lobster, because these two are the most amazing animals you can think of and combining them cannot give you anything other than total awesomeness.

Why I chose Groningen and Pharmacy:

My favourite subjects in middle school were biology and chemistry. So, I wanted to combine these two subjects. I wanted to go to Utrecht at first, but the selection procedure took place in the time I wanted to travel. That's why I chose, rather impulsively, for Groningen (a succesful choice I might add!).

My academic year is:

2019

I think the best subject is:

Pharmacology & Physiology from the few subjects I have had yet.

Why I chose to be part of the board and hold this position:

It was a surprise when I was asked for this board year. Meeting new people and learning more about the field of Pharmacy during my board year's really appealed to me. And of course, Assessor II is the best position.

About me

My name is:

Rob de Hond

My birthday is on:

April 6 (born in 1999)

My hometown is:

Waspik
(North-Brabant)

My function:

Assessor II

Things I want to keep from my predecessor:

It would be nice to gain the same amount of weight that Joeri did.

I think the best P.S. activity is:

The First-year Introduction Camp. This is my favourite activity from the ones which I was able to attend.

This is the best moment I remember from my student days:

In the last year, the moment I first thought "so this is a student's life" was when I had a practical day after a night of drinking.

My nicest/funniest statement is:

People say nothing is impossible, but I do nothing everyday.

If I have to choose, then I choose the following:

Videoland - Netflix

Fries - Pizza

Theory - Practical

Faberzaal - Keuningzaal

Hometown - Groningen

Beer - Wine

't Vaatje - de Negende Cirkel

Kingsland - Nazomeren

This will be my advice for the freshmen:

Try to join as many activities as possible and meet lots of new people in your first weeks as a student.

Later I want to become:

Cheesy answer: Happy, Realistic answer: I don't know yet, Final answer: A peanut butter sandwich.

This is still on my bucketlist:

Traveling to different parts of the world.



PUZZLE PAGE

- 3D models
- Bacteria
- De Toeter
- Ethics
- Mice
- Pfizer
- Refine
- Testing
- Alternative
- Bayer
- Drugs
- Reduce
- Folium
- Novartis
- Pharmaciae Sacrum
- Replace
- Vaccines
- Virus
- Animals
- Chimpanzees
- Editorial
- Laboratory rat
- Organoids
- Stem cells

Find the 24
hidden
words!

P	T	B	J	N	E	A	L	T	E	R	N	A	T	I	V	E	A
M	U	R	C	A	S	E	A	I	C	A	M	R	A	H	P	X	P
F	V	A	Q	E	D	N	Q	Q	Z	M	U	L	O	I	L	O	F
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Z	T	I	D	T	B	U	R	Q	P	G	Y	K	S	N	A	I	I
R	M	M	M	E	E	G	D	K	H	U	P	E	I	T	R	R	T
X	S	A	O	S	B	C	L	E	W	R	N	C	T	B	Y	E	R
M	E	L	D	T	N	V	A	S	R	I	O	S	X	S	R	T	A
M	E	S	E	I	U	E	K	L	C	M	S	T	G	Q	O	C	V
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S	P	I	B	I	U	G	N	W	Y	B	E	C	S	T	O	R	S
C	M	N	O	R	U	A	X	P	X	A	C	E	U	E	B	E	J
I	I	E	T	R	G	D	M	D	N	Y	I	L	R	O	A	Z	N
H	H	L	D	R	J	K	F	N	B	E	M	L	I	T	L	I	K
T	C	I	O	F	F	Q	P	Y	W	R	L	S	V	E	I	F	E
E	U	K	W	X	E	D	I	T	O	R	I	A	L	D	N	P	N

LIST OF ACTIVITIES

October 15th	Hooghoudt Jenever Masterclass
October 19th	Research Market
October 20th	General Members' Meeting
October 22th	EJC activity
October 30th	Master activity
November 3rd	P.S. Social Drink
November 11th	Board Information Evening
December 1st	STOF Meeting
	P.S. Social Drink (Sinterklaas)
December 8th	ALDi Party
December 10th	Hospital Pharmacy Evening

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Bioanalytical services

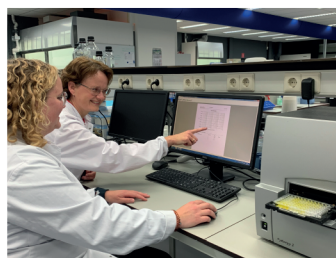
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