Morning

	Name	Title		Abstract
V1	Ulla Plappert, Paula Fischer, Christiane Talke-Messerer	**A Vitamin C killer hidden in the garden**	E	Vitamin C (ascorbic acid) is important for the human body due to its antioxidant effect and must be supplied regularly through the diet. Pumpkin plants contain a lot of ascorbate oxidase, this oxidizes ascorbate to dehydroascorbate. Since cucumber, zucchini, or melons are often included in smoothies, the question arises whether they might degrade the vitamin C present in smoothies and whether this can be prevented? This question was investigated in two student research papers at phaenovum using different methods. In the workshop we will present these works and show that this topic is suitable to demonstrate enzyme reactions very impressively to students using the simplest methods - both in the context of nutrition (composition of smoothies) and as an exciting example for demonstrating enzyme reactions. We conduct these experiments using only fruits and vegetables and vitamin C test strips. The experiments provide quick (2 school hours) and clear results, so they can be easily integrated into lessons as a student practical without much effort.
V2	Claire Bonifay	**Dissection of a rabbit**	E	We all know the anatomy of several animals and have certainly dissected insects or fish, but would you dare to dissect a warm-blooded mammal with your students? Rabbits are a perfect choice because you can eat them afterwards. Enjoy a practical lesson with little theory. We can dissect in several language groups and learn how to handle dead rabbits without scaring the students too much. Be amazed by the perfect arrangement of the organs inside the animal. Very interested candidates can even take a look at the brain while others plunge into articulated joints to prepare the rabbit for cooking. Workshop leader speaks German, French and English
V3	Bruno Schull	**PACE in life science education**	E	You have probably heard of STEM (Science, Technology, Engineering, and Mathematics). This is the direction that life science education has been moving for the last decades. But have you heard of PACE? PACE stands for Play, Arts, Creativity, and Exploration. PACE is a new movement directed at incorporating these important activities and cognitive processes into life science education at all levels, especially secondary school, where they are often ignored. We will discuss the importance of PACE, study practical examples, brainstorm about new teaching materials, and learn how to incorporate PACE into testing and grading, which is often a challenge. Come prepared for a fun and through-provoking workshop!
V4	Fabian Bieri	**Diffusion and osmosis - challenge and opportunity for living organisms**	D	The stability of plant cells, the necessity of cardiovascular systems, but also the use of glycogen and fats as energy storage substances, as well as the principle of surface enlargement are direct consequences of diffusion and osmosis. In this workshop, various student and teacher experiments will be presented, which illuminate these phenomena from different angles. Experimental difficulties as well as technical errors that can occur during the execution of these experiments will be discussed. In addition, many cross-references to everyday phenomena are shown.
V5	Saskia, Demir	**Digestive enzymes small but mighty**	D	In this workshop short experiments with different digestive enzymes will be performed. Based on these experiments, the substrate specificity, the conversion of zymogens into the active enzyme and other typical properties of enzymes can be discussed and the digestion process can be explained clearly.
V6	Michèle Wegmann & Kerstin Beyer-Hans	**DNA - much more than just our blueprint**	D	The atomic force microscope (AFM) was developed a little more than 30 years ago by Gerd Binnig, Calvin Quate and Christoph Gerber (the latter is from the University of Basel) and has since revolutionized the world in the revolutionized the world in the nanometer range. Today, AFM can be used to film biological nanomachines at work, to image chemical bonds or to diagnose malignant tumors. In the workshop, we will show how the AFM is used in different ways and offer teachers the opportunity to try it out. To better understand the principle of this particular microscope, we show how to make a simple model out of wood that they can implement with the students.

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V7	Mualem Mrgalit and Bergman Hagit	**Method for testing the intracellular environment**	E	In this workshop we will demonstrate how to distinguish between internal environment and external environment in yeast suspension by measuring acidity level with two measurement methods. We will use it to check the effect of detergent on the yeast's ability to maintain a stable internal environment. In other words, on damaging the permeability of the cell membranes.
V8	Abu Gneem Mariam and Damouni Nadera	**Why is it not recommended to decorate a cheesecake with pineapple**	E	We will test the effect of different factors on the activity of pineapple proteases, at two levels of exploratory activity - structured and guided
V9	Benoit Kunz	**The Wolbachia Project**	D	The Wolbachia Project is an integrative, 5-part laboratory series at Vanderbilt University in Nashville, Tennessee, USA. The goal of the project is to bring real-world scientific research into high school biology classes through field research and exposure to biotechnology laboratory methods. Students generate scientific data on the bacterial endosymbiont Wolbachia pipientis and can enter their results into the international Wolbachia database. Course participants analyze their self-caught insects using DNA extraction, polymerase chain reaction (PCR), and gel electrophoresis. The practical applications experienced in the course and the materials handed out can be used directly in the classroom. The Wolbachia Project has received the Elizabeth W. Jones Award for Excellence in Education from the Genetics Society of America.
V10	Dario Cerletti	**Bacteriophages in wastewater**	D	Bacteriophages, by their sheer number and diversity, carry a large proportion of the genomic diversity of the biosphere. They influence bacteria (and thus indirectly also humans) in many ways. They can transform harmless bacteria into pathogens or be used as an alternative to antibiotics. Phages are usually hardly noticed, but can be clearly detected in water samples by simple student experiments. The workshop presents a simple method for phage detection and discusses the thematic embedding of the topic as well as possible further experiments.
V11	Christine Baader	**"So how does the specific immune response really work?" Introduction to working with the Compad learning material**	D	Compad® means communication pad and refers to a proven, multifunctional and flexible collection of learning materials and methods. 3 to 5 learners in a learning group analyze complex issues with a set of materials and present them clearly in the form of "material notes". The Compad® learning material... - encourages the learners to grasp the complex contents in an active way and thus enables "internal" learning instead of just learning by heart; - enables the implementation of self-directed and cooperative forms of learning; - is an effective tool for internal differentiation of heterogeneous classes; - supports the active learning behavior of students; - also promotes communication and group processes; - addresses students cognitively, voluntarily, aesthetically, emotionally, socially and sensory-psychomotorically. Background The Compad® method was developed at the University of Bern and has been successfully tested in practice over the past years. Schulverlag plus AG has included the Compad® learning material in its range of products - in the meantime it is successfully used at many elementary, secondary, vocational and technical schools as well as in counseling settings. Objective: Introduction to the practical application of the Compad® learning material using concrete examples from biology lessons.

Afternoon

	Name	Title		Abstract
N1	Dr. Omer Choresh and Efrat Link	**Demonstration of ELISA kit to detect SARS-CoV-2 suitable for high school students.**	E	In this workshop we'll introduce immunological technique- a demo-ELISA kit (Enzyme-Linked Immunosorbent Assay) to detect concentration of antibodies against virus, in several patients. The procedure is suitable for teaching the immune system or the biology of viruses, while exposing the sutdents to real everyday assayes used in medicine. Of course this is relevant to the students' lives in the shade of Covid19 epidemic. In the workshop we will introduc the procedure adapted to a 90-minute class activity, and also propose ideas for further research activities thaccan be performed by high school students.
N2	Herve FURSTOSS	**The sounds of nature, tools for scientific investigation**	E	The recording of the sounds produced by living beings allows their studies. During the workshop different situations will be studied (bird songs, frog crunches, bat echolocation, etc.) by the mean of sonograms and spectrograms.
N3	Stephan Girod	**Little chicken - quite big!**	D	In the context of human anatomy and histology, chick organs can be used to produce histological preparations with relatively simple means. This subject matter is ideally suited for practical use as part of the biology emphasis and supplementary subject. The course will demonstrate how to prepare organs from dissected animals so that they can be sectioned with a microtome, mounted on slides, and then stained.
N4	Thomi Scheuber und Sacha Glardon	**To Bee or not to Bee**	D	The project "To Bee or not to Bee" examines various aspects of the bee and its honey with a collection of experiments. The students learn methods to distinguish real honey from artificial honey, they investigate the enzymatic and antibacterial effects of honey and establish evidence for differentiation of sugars present in nectar and honey. The experiments cover a wide methodological range. Some of the experiments use very little and inexpensive materials, others are more sophisticated and need a bit more infrastructure.
N5	Manon, Haag & Claudia, Ginsburg	**Enzymology and pharmacology**	D	After a short theoretical introduction, experiments are performed in pairs or small groups. The experiments focus on the enzymes chymotrypsin and trypsin (substrate specificity), lipase (competitive inhibition) and carbonic anhydrase (effect, side effects and suppression of side effects of drugs). Wet chemistry coupled with absorbance measurement is used to determine the mass concentrations of unknown protein solutions. The possibility of protein or amino acid analysis by electrophoresis will be demonstrated in the workshop.
N6	Sylvia Zehnder	**Gout - model experiment on the mechanism of action of a drug**	D	Why are only humans and apes threatened by gout? What is gout anyway and how does the gout drug (allopurinol) work against the painful joint inflammations caused by gout? We will investigate the mechanism of action of allopurinol using a model experiment that can be used very easily in the classroom and discuss questions about enzymology based on the experiment.

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N7	Thomas, Werner	**Who likes to eat wood?** **- Cellobiase activity in fungi**	D	The cleavage of cellobiose into glucose represents the final step of the enzymatic degradation of cellulose. In the workshop we will demonstrate the activity of cellobiase in crude extracts of different fungi using a synthetic substrate. We would then like to relate the results to different nutritional modes of fungi (saprophytes, mycorrhizal fungi). A comparison of different processes for bioethanol production also suggests itself in this context. The measurement principle is suitable as a practical application to the topics of enzymatics and photometry. In follow-up experiments, a class could also be used to investigate the activity of the extracted cellobiase as a function of temperature, pH, substrate concentration, etc., in order to illustrate properties of enzymes.
N8	Joshua Drewlow	**BioApp - The Biology Quiz for Smartphones**	E	The BioApp is a smartphone application that playfully promotes awareness of biology and expands existing knowledge about biology. In teaching, the BioApp is intended to support teachers in biology lessons and make it easier for students to prepare for exams. It is also a training tool for the participants of the Biology Olympiad. The questions of the BioApp are entered and validated by volunteer teachers (authors) in an editing tool. In this workshop, we will present the BioApp as well as ways to integrate it into the classroom. In addition, you will learn how you can help as an author to support the further development of the BioApp questionnaire. Preparation: Please bring a laptop and download the BioApp on your smartphone (https://bioapp.ch).
N9	Benoit Kunz	**CRISPR-Cas9** **The gene scissors**	D	This project gives participants a tool to perform real gene editing in the classroom. The experiment is the first learning activity of its kind and will have your students exclaiming, "Wow! I did CRISPR!" Using familiar - and safe - reagents, techniques and organisms, students use "CRISPR-Cas9 Gene Editing" to modify the lacZ gene in E. coli. The resulting phenotype is easily visualized by blue-white screening, and students can confirm the DNA interface by PCR using the optional "Genotyping" extension. As your students gain a deeper understanding of the unique opportunities and limitations of CRISPR-Cas9 technology, they will be able to engage in more meaningful conversations about the opportunities, risks, and ethical aspects of gene technology.
N10	Declan Cathcart	**Food Biotech through Inquiry**	E	An inquiry-based approach to Biotechnology in Schools has been gradually developed by Dr Declan Cathcart (SonS-IRL). A series of related laboratory activities ranging from basic practical food microbiology using the beneficial lactic acid bacteria, to DNA fingerprinting and advanced molecular PCR-based diagnostics for the detection of food pathogens. Students learn both the fundamental biology of microorganisms and DNA, while also developing their practical laboratory and problem-solving skills. These activities have been piloted in secondary schools in Ireland and the Netherlands over the last three years. Complete teaching and learning modules will be presented, and workshop attendees will have the opportunity to get hands-on experience of laboratory activities.
N11	Daniel Margadant	**Artificial intelligence in science education**	E	Answering an exam question on zoology, writing a lecture text about a hominid or writing a science report - these are challenging tasks even for good students. But they can be done quite well by AI today, without requiring much prior knowledge. How do we deal with this? In the workshop we will learn and discuss possible ways, focusing on opportunities rather than prohibitions. We will discover various possible applications (for students as well as for teachers) and learn how to implement them concretely. Prior knowledge or even programming skills are not necessary (but don't hurt either); at the beginning of the workshop, a short input informs about current AI tools and the technology behind them.