

Wrap up of panel discussion of EPC8 – Friday 25.08.2023, 3-4 PM

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Moderators: Wiebe Kooistra, Inka Bartsch

Question 1: What novel, innovative technologies, currently on the horizon, will provide opportunities for addressing novel questions and hypotheses in phycological research?

- There has been an increase in technological developments over the past 20 years that already influenced and will influence phycology in future such as biosensors, molecular technologies and artificial intelligence. We need to better use AI, machine learning and neural networks but also better enabling the use of technologies by developing easy APPs for everybody. In future we need **cheap and free tools**. Genomics will be central for de novo re-engineering of valuable products. New technologies, such as 3D printers, should also be used to **decentralize processes** and make things cheaper. Microbiome research offers a huge potential to increase resilience by also considering the bacteria/microbiome of an organism and their performance.
- Despite all these technological advances, **we still do not know what is out there** with respect to species diversity and its associated genetic and functional diversity. Make use of biotechnology to disentangle the fantastic diversity and focus on desired properties which algae inherit and may deliver to develop a **bio-based economy** with cost-efficient, sustainable and bio-refined algal cultivation systems. Single cell amplified genomics may help to better elucidate populations dynamics and unravel the discrepancy between genetic diversity and phenotypic plasticity which is still mostly unknown and hinders biotechnological developments.
- We realise that with global change there is a big loss of (bio-)diversity and **biodiversity conservation is a central topic** for the future. Fundamental biology and ecology thereby have to cross to also better meet applied aspects.
- In order to achieve wider goals and answer global questions we need better and more efficient communication platforms and we can only solve big tasks if we **form bigger consortia and networks** encompassing a diversity of experts.
- Until there is no full advantages of new technologies, as **good open access protocols** are often missing.
- The masses of available data need a good and **efficient organization of datasets**. The data quality has to be improved through common protocols and thus rather put energy into the **curation of databases** than into the production of masses of data. The topic **BIG DATA** has reached phycology but is not always sufficiently addressed.
- In addition to technology we should also better use **citizen science** possibilities to generate global datasets and to connect science to the public which will increase their perception for the needs of change.
- However, what seems to be even more important than these technologies is the general approach. **‘Do we ask the right questions’** to address the Agenda 2030 and to develop a sustainable future? We all have to think over how to meet the challenges of tomorrow. In this respect we should stay honest in our research: we

should **not promise more than we can deliver**. Unfortunately, this has become quite common in grant applications and this attitude often also is transferred into politics. Especially stay honest in climate change research!

- Furthermore there is an increasing need to do **outreach** in order to multiply your knowledge and to transfer your own excitement as researcher to others!

Question 2: What societal challenges can we, as phycologists, address, do we need to address, and how?

- We need a **holistic view** of the challenges we are facing. For this, **inter- and transdisciplinary approaches** and a good awareness of complex solutions are needed.
- It is important to think over whether we are asking **good questions** and we should try to avoid too narrow questions. Always ask yourself in which way your science is contributing to wider goals and questions and in which way they can serve society. **Does your research has any impact and in which way?**
- Always **stick to reality and facts** and try to **avoid overstatements**. There have been a series of publications/films/journalist articles generating the impression that algae will save the world by generating the impression that algae do not need fertilizers, that their habitat is free to use and so forth – which is all not true. By transferring exploitation from terrestrial habitats to the sea, similar problems will develop unless we are thinking ‘sustainability’ from the very beginning.
- The communication of engineers to industry needs improvement.
- In order to be able to conserve our biodiversity, we need more **bio-banking approaches** on an **industrial scale**.
- We need more **policy briefs** and **partnerships with the general public** to in order to increase the social acceptance of technology and convince politicians and the general public that we need restoration, or CO₂ capture, or defend habitat loss via conservation measures. But this can only be achieved if we outline realistic pathways. **Get involved with society!**
- We have to build-up a **better education** and start to develop concepts **for children**.

But in the end, nobody, including researchers, is perfect and everybody has its own capacities with which we have to live and which we have to accept. Comparison with others is deadly. Some are fast, others slow, some are leaders, other followers. But we all contribute to the insights the phycological community as a whole is generating, we are all part of this network. And it is important to see and feel the vibrations that connect us a research community which is only possible during events such as the EPC8.

Inka and Wiebe – September 21^{rst}, 2023