



Biodiversity-to-Biomedicine (Bio2bio) Sustainable Biotech Course





About the Course:

A significant proportion of the world's estimated ten million species of fungi, plants, and animals are at risk of extinction. To help address this problem, a group of young scientists has formed the working group [Biodiversity for Survival via Biomedicine](#) (Bio2Bio), which is a global, cross-disciplinary initiative to support scientists working to prevent the loss of biodiversity.

As part of these efforts, the [Bio2Bio](#) group has recently published a Position Statement titled '[Global Young Academy Position Statement on Conservation of Biodiversity: Protecting Molecular Diversity and Biomedical Discoveries](#)', which outlines key challenges and possible avenues for solving them.

The preservation of biodiversity highlighted by this Statement is perhaps the single most important building block for achieving the 17 Sustainable Development Goals set by the United Nations, for example, Zero Hunger, (SDG-2), Climate Action (SDG-13), Life below Water, (SDG-14), and Life on Land (SDG-15).

According to [Bio2Bio](#) Group Leader [Milica Pešić](#) (Serbia), 'This Statement calls upon action from the perspective of the biomedical value of Earth's species, and biodiversity for the survival of humankind.'

Mirroring this sentiment, a portion of the statement reads as follows: 'The GYA believes that collecting, curating, and disseminating knowledge on biodiversity as it relates to the treatment of human diseases will promote the conservation of bio- and molecular diversity while creating the international cooperation needed to safeguard well-being for all communities.'

The [Bio2Bio](#) working group is an good example of such cooperation, as it focuses on protecting the molecular diversity needed for novel biomedical discoveries and development through the following activities: creating open interdisciplinary international dialogue; establishing best practices and codes of conduct; promoting the fair and equitable sharing of benefits obtained from drug discoveries among stakeholders; and standardizing high-capacity biological assays to test natural products against cell-based disease models.

Therefore the proposed course 'Sustainable entrepreneurship in biotech', that we have successfully tested last year with great help from some of you. This year we would like to make an improved iteration, and therefore I am wondering if you would like to devote any time (from 1hr on Skype up to participating face-to-face at any points during the whole semester) towards advice to the teams of PhD students trying to model a start-up idea. These ideas could also be shaped up by your ideas. These start-up ideas could be anything within bio2bio remit - ranging from the app, helping you to monitor biodiversity or diet, database of natural products and high-value chemicals



from nature, to some superfood ingredients helping build healthy diets for the particular conditions and anything students and you could try for.

The course starts in early February and runs up to end of May/ early July, when student teams present their cases. We plan to try and publish the report, and actually hoping that some of these cases will turn into businesses. In any case the point of this project is to help students touch upon the business side of biology, and try to test their ideas for health and nature on the international market, ideally helping generating increasing revenues, while proving improving/supporting people's health and keeping sustainable for the planet.

Despite a lot of us may not spend much of this time face-to-face in Gdansk, we aim to make this course online/offline, as the business is becoming so more and more. So for those of you who can't come even for a couple of days to Poland, Skype with teams could be a great option.

The course base in Gdansk, but local students will be joined by postdocs, and more students from Edinburgh, Paris, and this year we plan to have a team from Vladivostok...

Hopefully some of your precious time will be rewarded by interesting student-driven projects and possibly taking part in the future start-ups that come as a result.



AGENDA

TUESDAY, 5th FEBRUARY, 2019

Venue:

University of Gdańsk, Faculty of Chemistry, Wita Stwosza 63, room D3

09:00-09:30 Greetings & Networking over Coffee

09.30-10:30 Introduction to Bio2bio course, overview (Sasha/Ted)

10.30-11:30 Lecture by the Head of the International Engagement, SBS, University of Edinburgh, prof. Peter Doerner „Exploiting plant natural diversity for novel resources, production approaches and technologies”

12:00-13:00 Lunch break

13:00-14:00 Reflections from the pilot course in 2017 (Sasha and 2nd year ICCVS PhD students)

14:00-15:00 Prof. Robin Fahraeus „Using yeast for neoantigen drug discovery”

15:00-15:30 Coffee break

15:30-16:30 Sara Mikac „Biosynthesis of anticancer lignans in wild flax *Linum flavum*”

16:30-17:30 Dr Javier Alfaro „Cancer systems biology and personalized cancer medicine”

17:30-18:30 Start of the Bio2Bio Hackathon: Sasha, presenting variety of experiences from Bio2bio network, diverging ideas, blue-sky ‘best ever scenarios’ etc.

WEDNESDAY, 6th FEBRUARY, 2019

**Only for PhD students who did not attend the OPTIMA
Grand Challenge in 2017**

Venue:

University of Gdańsk, Faculty of Chemistry, Wita Stwosza 63, room F16

9:00-9:30 Coffee



„Innovation and Business Skills” by Kevin Parker

- Biotechnology Stock Market
- What is innovation?
- There is no such thing as a problem: only opportunities
- How to communicate to a non-technical problem

12:00-13:00 Lunch break

- The “route to market” and the Business Model
- Managing Projects and People
- An Introduction to Finance

15:00-15:30 Coffee break

- Intellectual Property Basics
- Reflections: Career Skills for the future

THURSDAY, 7th FEBRUARY, 2019

Venue:

University of Gdańsk, Faculty of Chemistry, Wita Stwosza 63, room F8

9:00-9:30 Coffee

‘Biodiversity for Biomedicine: historical, ethical, and legal contexts’ - A day with Ross Piper (zoologist, entomologist, author, presenter)

Biodiversity for Biomedicine

Medicines from Nature – historical overview

- Lessons from non-human primates
- Traditional medicine
- The modern pharmaceutical age

Where have we looked?

- Fungi and bacteria
- Vascular plants
- Marine organisms
- Terrestrial animals



What constraints have limited our search?

- The enormous diversity of living organisms – where do we start?
- The rarity of many organisms
- The small size of many organisms

Where should we be looking?

- The hyper-diverse animal groups: insects, mites, nematodes
- The neglected marine organisms

12:00-13:00 Lunch break

13:00-14:00 Dr Sachin Kote „Screening, isolation, and analysis of natural molecules”

14:00-15:00 Dr Ross Piper (cont-d):

Using ecology to guide our search

- Ecology-led drug discovery: How and Where species live are signposts to interesting and potentially useful chemistry
- Forging links between ecologists and chemists is crucial

15:00-15:30 Coffee break

15:30-18:30 Dr Ross Piper (cont-d, helped by Sasha):

Ethical and Legal Aspects around Natural Products

Historical perspectives

- The age of empire and the easy export of material from around the world

Ownership

- The rights of nations, the rights of humanity, the rights of species

Bioprospecting – negative associations

- The ‘mining’ of traditional knowledge
- Theft of material
- The poorest countries have the most to lose
- Zero returns for species or habitats
- Attaching monetary value to species



Bioprospecting backlash

- Indigenous groups and governments now very suspicious
- The pitfalls of collecting in and exporting countries
 - Bureaucracy, fines, prison sentences
 - Some countries completely off limits
- The Nagoya protocol

The need for a new framework

- Accelerating environmental destruction
- Loss of indigenous cultures and their knowledge
- Limitations of Nagoya
- Greater awareness of corporate greed
- Synergy between biomedicine and conservation

20:00 An Official Dinner for invited participants and guests

FRIDAY, 8th FEBRUARY

Venue:

University of Gdańsk, Faculty of Chemistry, Wita Stwosza 63, room D3

Choice of the projects by the teams, and open discussion around the table.

09:00-09:30 Greetings & Networking over Coffee

09.30-12:00 Forming the teams, discussing the cases, and pitching ideas for the course.

12:00-13:00 Lunch

13:00-17:00 Team building exercises

17:00 Pitches by the teams

Wrap-up

19:00 An Informal Meeting in Gdańsk



Sample areas/topics for the teams

1. Natural products as future drugs (e.g. ant-cancer, antimicrobial, etc).
2. Synthetic biology, cultivation, and novel technologies for bio2bio
3. In silico solutions, apps, etc
4. Novel blue and green natural products – novel products from the marine and terrestrial species.
5. Personalized nutrition (e.g. as support for chemotherapy patients, sports nutrition, age groups, particular medical conditions).
6. Food ingredients and bioactive food additives, eg alternative sources of protein, lipids, vitamins, etc