BlueBio COFUND – BlueMed CSA Integrated advanced training course on Blue Biotechnologies, Aquatic products and Blue Bio-economy – Activity Report

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Introduction

In March 2021 the Integrated advanced training course on Blue Biotechnologies, Aquatic products and Blue Bio-economy was jointly organized in the framework of the BlueBio COFUND and BlueMed CSA, hosted by the Institute of Marine Biological Resources and Biotechnology of the National Research Council of Italy (CNR-IRBIM; www.ricercamarina.cnr.it/en/irbim.php; www.irbim.cnr.it/it/index.php).

This report provides an analysis of the activities, including contents and process. It addresses methodology approaches as well as the online format used due to the pandemic situation and thus, its novelty. Lessons learned, concluding remarks and follow-up opportunities are also tackled in this Activity Report.

Timeline

- ➔ May 2020: following the official message by the BlueMed CSA Coordinator to the BlueBio COFUND Coordinator, the activity is approved;
- ➔ June 2020: Set-up of the Organizing and Technical Committee and decision on the format;
- ➔ September 2020: first draft of the application form; definition of the selection & evaluation committee and preliminary criteria for evaluation; indicative budget breakdown per cost item (30 pax); invitation of lecturers;
- ➔ October 2020: confirmation of lecturers; confirmation of the modality of the course (in presence) and decisions on possible back-up solutions, including the option to organise an online training course according to the evolution of the pandemic; preannouncement;
- ➔ November 2020: announcement and application form published;
- ➔ December 2020: applications closed;
- ➔ February 2021: announcement of selected participants and final decision on the format (entirely on-line); purchase of relevant support equipment;
- ➔ March 2021: going online with platform, course running;
- ➔ April 2021: reporting and follow-up.

The concept

Nowadays, Blue Bioeconomy offers largely underexploited potentials. It is part of the overall EU Bioeconomy Strategy and Circular Economy Package and it connects, directly or indirectly, with several other sectors of the Blue Economy (e.g. fisheries, aquaculture, energy, tourism, conservation, etc.).

The UN-Decade of Ocean Science for Sustainable Development recognises the link between ocean health, impacts on resources and Blue Economy sectors as one of the knowledge gaps to be overcome to reach “A sustainably Harvested & productive Ocean” goal.

The BlueBio project “Unlocking the Potential of Aquatic Bioresources” (www.bluebio.eu) is an ERA-NET COFUND action started in December 2018 and aimed at establishing a coordinated R&D funding scheme for strengthening Europe’s position in the Blue Bioeconomy, identifying new and improving existing ways of bringing bio-based products and services to the market. In December 2019, the evaluation and selection

process of proposals submitted to its first Joint Call[1] over four priority areas: Exploring new bio-resources/Exploring improvements in fisheries and aquaculture/Exploring synergies across sectors/Exploring Biotechnology and ICT, for a total budget of 29,25 M€, was completed. This paved the way to the recent launch of the 1st BlueBio Additional Call, which aims at integrating the topics covered by the first BlueBio co-funded Call, and to the identification of Additional Activities (under Work Package 7), whose main goal is to strengthen the societal impact of BlueBio project. Dedicated actions to be designed and implemented are meant also to foster the uptake of the outputs of the co-funded projects by knowledge users and improve stakeholder engagement.

The BLUEMED CSA R&I initiative for Blue jobs and growth in the Mediterranean area (www.bluemed-initiative.eu) has identified "Explore the potential of Blue Biotechnologies" as one of the priority goals of its Strategic Research and Innovation Agenda (SRIA)[2], tackling the Challenges "Innovative Blue Growth trajectories: biotechnologies, food and the deep sea resources" and "Innovative businesses based on marine bio-resources".

To fill knowledge gaps at the crossroads of biotechnology, food production, and sustainable use of bio-resources is recognized as crucial for pursuing a sustainable exploitation of marine bio-resources and/or biomasses, considering socioeconomic impacts in several fields.

Among the actions identified to reach this goal, foster collaborative research through transdisciplinary fields of expertise (e.g. genomics, databases, outreach) and interdisciplinary approaches (e.g. by scientists, private stakeholders, end-users etc.), and promote education through training the next generation of marine biotechnologists.

The recently published Euromarine Strategic Agenda on Enhancement of Human Resources to support Blue Growth sectors (EHUSEA)[3] highlights the importance of training marine biotechnologists. Besides the need of improvements along the BlueBio value chain, including fisheries and aquaculture, it also identifies BlueBio COFUND funders' network as a potential key player able to foster and develop tools for the implementation of actions targeting human resources.

Finally, training the new generation of marine biotechnologists is also among the recommended activities in support of the UN-Decade of Ocean Science for Sustainable Development outlined by the Mediterranean Workshop for preparing the Decade held in Venice on 21-23 January 2020.

In this context, the BlueMed Implementation Plan[4], endorsed at Mediterranean level, identified 'Exploring the potential of blue-biotech' as key priority for action and proposed to promote the development of a joint strategic action on Blue Biotech at first by organizing:

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[1] BlueBio Call Announcement, 11 February 2019, https://bluebioeconomy.eu/wp-content/uploads/2019/02/Call_AnnouncementandGuidelines_BlueBio_rev_11_02_2019.pdf

[2] BlueMed Strategic Research and Innovation Agenda, www.bluemed-initiative.eu/wp-content/uploads/2018/12/BLUEMED-SRIA_Update_2018.pdf

[3] EuroMarine Strategic Agenda on Enhancement of Human Resources to support Blue Growth sectors, euromarinenetwork.eu/EHUSEA_Strategic_Agenda; www.dta.cnr.it/publications/ISSN2239-5172/2019_28_EuroMarine_EHUSEA_Strategic_Agenda/EuroMarine_EHUSEA%20Strategic%20Agenda_v0.pdf

[4] BlueMed Preliminary Implementation Plan, March 2020, http://www.bluemed-initiative.eu/wp-content/uploads/2020/07/bluemed-preliminary-implementation-plan_version-complete.pdf

- What: a training course on Blue Biotechnologies and Blue Bioeconomy aiming at the creation of blue careers;
- Indicative timing: March 2021;
- Proposed instrument: Call for opportunities, e.g. BlueBio COFUND additional activities, BlueMed CSA, DG-MARE/EASME Blue skills call;
- Tentative budget: 25 k€ (for 15 participants physically present).

Acknowledging the above-mentioned trajectories and as proof of alignment, the following coordinated joint activity between BlueBio COFUND ERANET and the BlueMed Coordination and Support Action is proposed.

Rationale, objectives of the course and target

According to marine biotechnology purposes, which encompasses exploration and application of products or services, the present course intends to cover gaps in the education of young researchers working or willing to work in marine biotechnology fields, which can be identified in the lack of bridge professional figures who can facilitate the progress along the pipeline towards the market. With this aim, the programme will offer the opportunity to increase awareness about marine biotechnology purposes, offering tool boxes referring to cutting-edge methodologies, and also promoting the progress of the research results through the pipeline up to the market, identifying technological and legal bottlenecks step by step and prospecting solutions. This objective will be accomplished using a practical approach focusing on multiple case studies:

- Microbiome in the aquaculture setting;
- Bioproducts and biomaterial from marine resources;
- Services (bioremediation).

The course will also offer the opportunity to interact with stakeholders and end-users in order to create effective interaction in a bidirectional way by knowledge and technology transfer and pointing out gaps on the product or service, which is intended to be promoted.

The following table presents a synoptic overview of the course, including options both for the in person and remote format and can be considered as a useful handbook for organising training courses, including in a mixed modality in person or remote.

Specific objectives	- Be aware of the significance of marine biotechnology in a broad sense. - Know the application fields, tools and opportunities. - Know the limits and identify overcoming strategies (e.g. available infrastructures). - Identify intra/interdisciplinary interaction strategies. - Give examples of best practices related to real-life experiences. - Be aware of the global market on marine biotech and development trends. - Identify internship opportunities with industrial partners based on available products and services.
Aim	Contribute to the creation of 'blue skills' filling knowledge gaps while matching market opportunities via a joint effort among the scientific community, research infrastructures and business operators.

Target	PhD students and researchers/practitioners working/willing to work in the field of marine biotechnology
Period and time frame	5 days (Monday-Friday), March 2021
Location, including virtual option	Proposed venue/digital hub: CNR-IRBIM, Messina, Italy Desirable features: easy to reach; well connected; close to a relevant facility, including nodes of RIs; well equipped (desks, pc, monitors, microphones, etc…)
E-training back-up option	On-line seminar
Max no. of pax	30
Indicative contents	Based on: Blue Biotech actual trends & knowledge needs, including private sector/regulatory aspects; Aquatic food & ingredient; BlueMed CSA findings; Abstracts of BlueBio COFUND granted projects.
Format/Proposed activities	- Front lessons, - 1 field visit, - 3 entrepreneurs' speeches, - showcase of BlueBio granted projects, - wrap-up of previous day, - practical sessions, - hands-on exercises, - group discussions, - round tables, - pitch presentations, - survey for course evaluation. Proposed activities for the e-training back-up option: - On-line lessons + forum for discussion, - Virtual field visit, - Entrepreneurs' speeches, - Showcase of BlueBio granted projects.
Proposed collaborations	- COST Action Ocean4Biotech - European transdisciplinary networking platform for marine biotechnology (www.ocean4biotech.eu/) - CIRCLES (https://circlesproject.eu/), a H2020 project on marine biotech in aquaculture

	- EuroMarine 2020 Call for Fellowship Applications (e.g. www.euromarinenetwork.eu/calls/euromarine-2020-call-fellowship-applications) - iAtlantic, www.iatlantic.eu/
Preliminary selection criteria	age, background/experience, nationality, gender
Preliminary impact indicators	No. of applicants, participants, feedback of the evaluation survey
Tentative budget breakdown	- transfer (including for field visit), subsistence (catering + one/two social dinner and one networking event) for 30 students + up to 20 teachers; - travel expenses of students - venue & equipment free of charge - travel for up to 20 teachers (over projects' budget)

The Programme

In general, the course was conceived as a multi-module programme covering technology, management and policy issues.

Moreover, the programme was:

- **multidisciplinary**: the team of instructors was selected from a wide variety of expertise and several cases study and evidence on specific themes were also included;
- **multi-sectoral**: scientific, regulatory and industrial aspects have been addressed;
- **interactive**: each lesson was elaborated by trainees with both bidirectional communication between trainees and lecturers and trainee groups interaction.

In particular, the programme was split into 5 modules as follows:

Module 1: General introduction on Marine Biotechnology and future perspectives

The module provided an overview on Marine Biotechnologies. The module was based on a comprehensive understanding on the meaning of Marine Biotechnologies, their potential, direction and final goal. Students learnt about marine bioresources value, opportunities and perspectives. A focus on existing products and pipelines was underlined to gain insights on the value chain, including related new and emerging global market opportunities. An excursus on available infrastructures (technological platform, pilot systems, research vessels, databases for storage and data sharing etc.) was also added to the acquired knowledge. The bioprospecting together with the benefit sharing issues were explained in the context of national and international protocols on environmental protection and sustainable use of natural resources.

Module 2: Pipeline of Marine Biotechnologies and related tools.

Students were provided with knowledge on cutting-edge technologies and experimental approaches on-going in the marine biotechnology field. Practical training on step-by-step pipeline starting from products biodiscovery, screening, in silico analyses, application fields, up to the upscaling, allowed students to comprehend the advantages, the potential, gap and needs of the proposed technologies.

In particular, the recent advancements in metagenomics, biochemistry and bioinformatics applied to marine resources were described, with special attention to the structural and functional biodiversity from phylogenetic level deep to molecular level. As a practical approach, a virtual experience on upscaling pilot experiment in mesocosm facilities was shown, reporting bioremediation treatment for the recovery of oil-polluted marine areas.

Module 3: Practical approach, showcasing marine biotech inspiring experiences

Seminars provided researchers and industry experience aiming to encourage the entrepreneurial spirit and inspire future perspectives. Specifically, the coordinators of projects selected in the first joint call oF the Blue Bioeconomy COFUND ERANET were invited to the training course as lecturers. Four of them accepted to participate with presentations/lessons aimed at introducing their own “on-the-job” experiences concerning recycling activities in marine environment, including in particular the production of bioplastics from seaweed, the production of biogenic calcium carbonate from waste seashells and the development of bacteria-based technologies in recirculating aquaculture systems. In addition, other important contributions were given by the coordinators of two H2020 projects, the first one (RES URBIS) aiming at building an urban bio-refinery to convert urban organic waste into value-added bioplastics, the second one (SOPHIE) at developing a theoretical framework linking ocean and human health as well as a Strategic Research Agenda. The module was closed by a roundtable, entitled “Opportunities beyond research: the role of coordination actions”, which involved coordinators and project managers of relevant networking initiatives, offering an overview of different framework of implementation, including the Cost Action Ocean4Biotec (European transdisciplinary networking platform for marine biotechnology), the Interreg-MED B-Blue project (Building the Blue Biotechnologies Community in the Mediterranean), and as well the organizing initiatives (BlueMed Coordination and Support Action and BlueBio Cofund ERANET).

Module 4: Management in Marine Biotechnologies

The module focused on public-private partnerships taking into account the different interests of academia and industry. The management of interaction with the private sectors including communication strategies and IP issues put in evidence gaps and needs for the future. In particular, knowledge and technology transfers were highlighted as crucial activities for the success of the marine biotechnology pipeline. The afternoon was devoted to performing science communication activities as relevant expertise in such a context.

Module 5: Final day: brainstorming and reflections

The half-day and final module focused on showcase, in a roundtable open-question format, practical and inspiring experiences by clusters and start-ups of research-industry collaboration, as a key feature of the bluebiotech value chain, with particular reference to the final product. Such coexistence favors high scientific innovation since it provides researchers with technological platforms and competences to implement knowledge-based businesses. Finally, reflections on bioethics and international bio-law profiles

as well as on insights of Coronavirus and the food chain were addressed to complete the overview of all relevant frameworks and themes, including related to actual events. Before the virtual good-bye an evaluation survey has been disseminated.

Taking into account the outline presented above, the Programme was finally set-up as reported in Annex I. The abstracts of each lesson and the bio-pic of lecturers are reported in Annex II.

Management: organizing and evaluation committees and communication staff

Activities were co-organized by three focus groups joined by representatives of the BlueBio COFUND and BlueMed CSA projects composed as follows:

Technical and Organizing Committee:

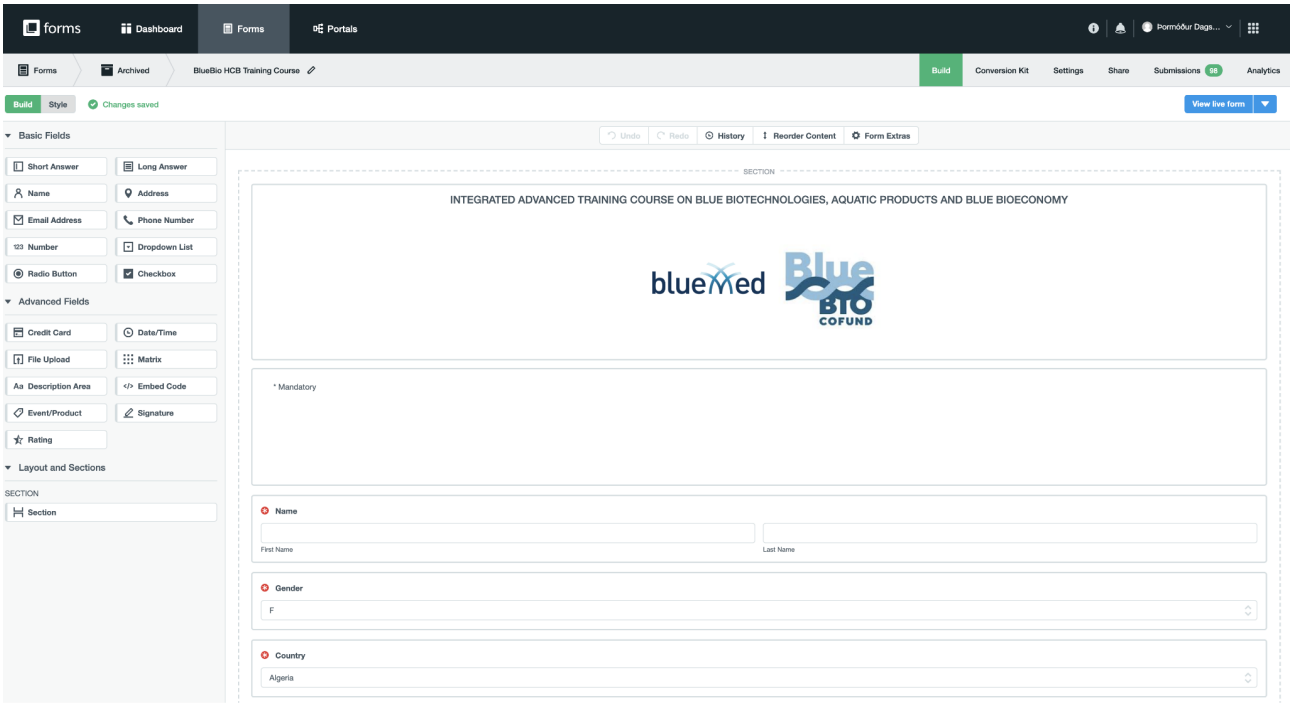
- BlueBio COFUND: Kristin Elisabeth Thorud, Renata Denaro, Dennis Lisbjerg, Jella Kandziora, Gianna Fabi, Bernardo Patti;
- BlueMed CSA: Margherita Cappelletto, Gian Marco Luna (Director of CNR-IRBIM), Salwa Sadok (BlueMed National Pivot);
- BlueBio COFUND & BlueMed CSA: Abraham Trujillo Quintela and Esther Chacón Campollo.

Evaluation Committee: Renata Denaro, Gian Marco Luna, Salwa Sadok, Margherita Cappelletto, Esther Chacón Campollo, Jella Kandziora

Communication Staff: Þormóður Dagsson (BlueBio COFUND) and Rita Giuffredi (BlueMed CSA).

The process: submission, evaluation and selection

Following the dissemination of the call for applications, left open for about two months until 21 December 2020, candidates were evaluated on the basis of the information submitted via the Formstack tool, available on-line for compilation. A screenshot of the dashboard is reported below.



The following inputs were required in the template:

Name (First)	Name (Last)	Gender	Country	Email	Organisation	Employer	Department	Degree

Current Position	English skills	Have you collaborated with partners of BlueBio or BlueMed	If yes, please describe the collaboration	Research area and interest	Motivation

The main criteria for evaluation were the following:

Academic record	Academic/ Professional experience	Languages	Level of engagement	Motivation/ Interest	CV

An overall evaluation of the applicant's profile was carried out taking into account several aspects such as background, age, nationality and gender, in order to get a wide representation of Blue Economy actors and to pave the way to the interaction among young and senior, European with non-European professionals, men and women. Not only scientific publications as a measure of academic excellence were taken into account but also other publications and dissemination activities working as indicators of the professional career: Reports, chapter in books, communication in (non-) scientific workshop/seminar/conferences, Participation to committee/association/evaluation committees, others.

Each criterion was assessed according to a maximum score and the total score was the sum of all. Candidates were ordered in a ranking list following the total score they got. Thus, a preliminary ranking list was obtained to do the selection of candidates.

Apart from the above-mentioned criteria, five criteria were reconsidered after some cancellations of selected candidates. As there was a tie among applicants, some fine-tuning of the selection regarding age, gender, previous experience with BLUEBIO-BLUEMED initiatives and nationality has been done by the evaluation panel.

Relevance to partnerships	Gender balance	Geographic balance	Background balance

After assessing relevance to partnerships, gender balance, geographic balance and background balance as criteria, a final list of candidates was selected.

Figure 1 - Overview of applicants

Three iterations were necessary to finalize the trainees' group due to no answers by candidates. In the end, 30 applicants were selected and confirmed their attendance to the course.

Figure 2 - Overview of selected participants

Invitation and rejection letters were sent to all applicants. The texts are reported in the following:

Dear Applicant,

On behalf of the BlueMed CSA and BlueBio COFUND projects, we would like to inform you that the selection process of the "Integrated advanced training course on Blue Biotechnologies, Aquatic products and Blue Bio-economy" has been concluded.

In total, 30 out of 101 submitted applications were successful in the selection process. Applications were selected by experts from BlueBio COFUND and BlueMed CSA projects following a pre-defined evaluation process. The final decision took also into consideration general requirements regarding gender, age, experience, and geographical balance.

We are pleased to inform you that your application has been selected, subject to support being available from BlueMed CSA and BlueBio COFUND projects.

Please be aware that due to the ongoing COVID-19 pandemic, the course will be entirely accomplished online. Further information on access data, programme and technical needs will be provided soon. Please be aware that you need to prepare your participation (personal computer, Wifi stable connection, ...).

We would like to remind you that the online training course is scheduled from 15-19 March 2021, starting at 9 AM CET. Moreover, an introductory remote meeting will be organized on 10 March 2021 at 10:00 AM CET.

Please acknowledge the reception of this message and confirm your full availability to attend the course before the 8th of February 2021 by replying to this message at the following email contacts: bluemed@cnr.it and bluebio@bluebio.eu.

Please do not hesitate to contact us should you need further information.

Best regards,

BlueMed-BlueBio training course managers

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Dear Applicant,

On behalf of the BlueMed CSA and BlueBio COFUND projects, we would like to inform you that the selection process of the "Integrated advanced training course on Blue Biotechnologies, Aquatic products and Blue Bioeconomy" has been concluded.

In total, 30 out of 101 submitted applications were successful in the selection process. Applications were selected by experts from BlueBio COFUND and BlueMed CSA projects following a pre-defined evaluation process. The final decision took also into consideration general requirements regarding gender, age, experience and geographical balance.

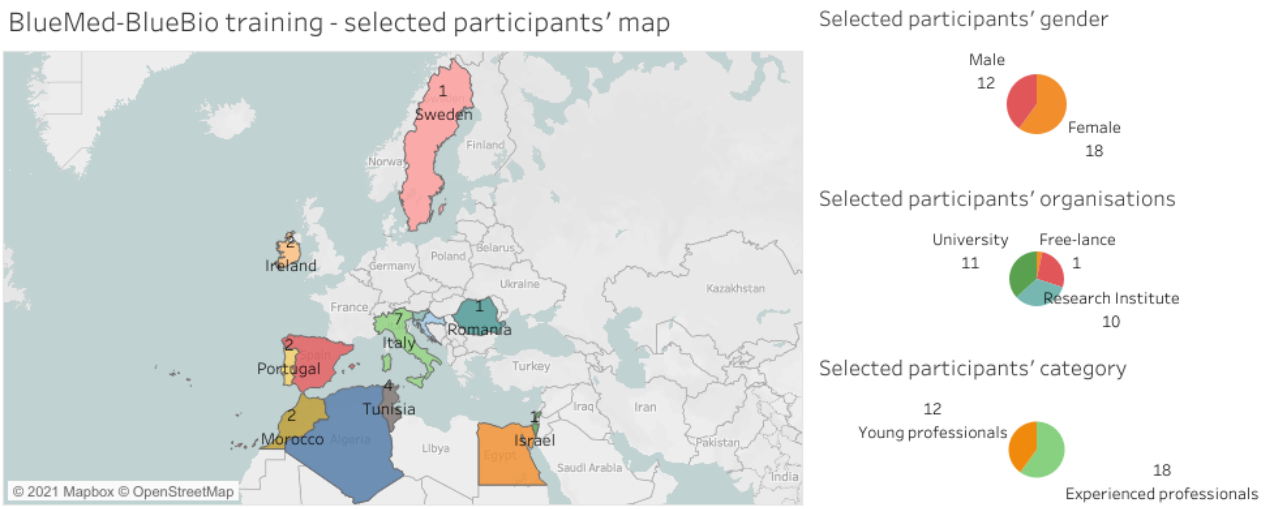
We regret to inform you that your application has not been selected for your participation to the training course.

We would like to thank you for your interest in the course and encourage you to check the course material that will be available for all applicants at the BlueMed and BlueBio webpages. We will keep you informed of the publication of the course material.

Please do not hesitate to contact us should you need further information.

BlueMed-BlueBio training course manager

Distributions of the 30 selected trainees by gender, participant's organization and work experience are given in the following info panel.



Digital hub

The digital hub was hosted by the Institute of Marine Biological Resources and Biotechnology of the National Research Council of Italy in Messina (Italy) and supported by the Institute's staff for administrative and logistics aspects. Technically, it was managed by the PI4 company providing a common platform for organizing the course, including the virtual conference tool, and storing the material as well as supporting the digital activities from a technical point of view: access, moderation, chat messages, break-out groups, screenshots.

Moderation and facilitation

One moderator per day and a facilitator for the whole duration of the course supported the modules and constant interaction among participants. A detailed script was drafted to support actions and speeches of the moderators and facilitator as well as to respect timing.

Communication and dissemination

Communication and dissemination were carried out in parallel on BlueBio COFUND and BlueMed CSA websites and social media channels, from the announcement to the live reporting of the activities, i.e. via Twitter @BlueBioCOFUND and @BlueMedEU.

The launching news were made available at:

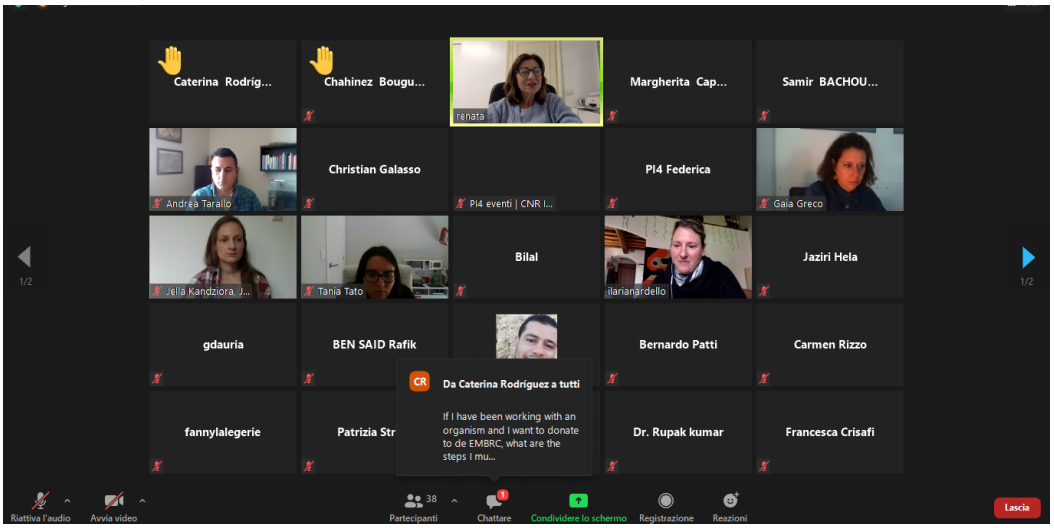
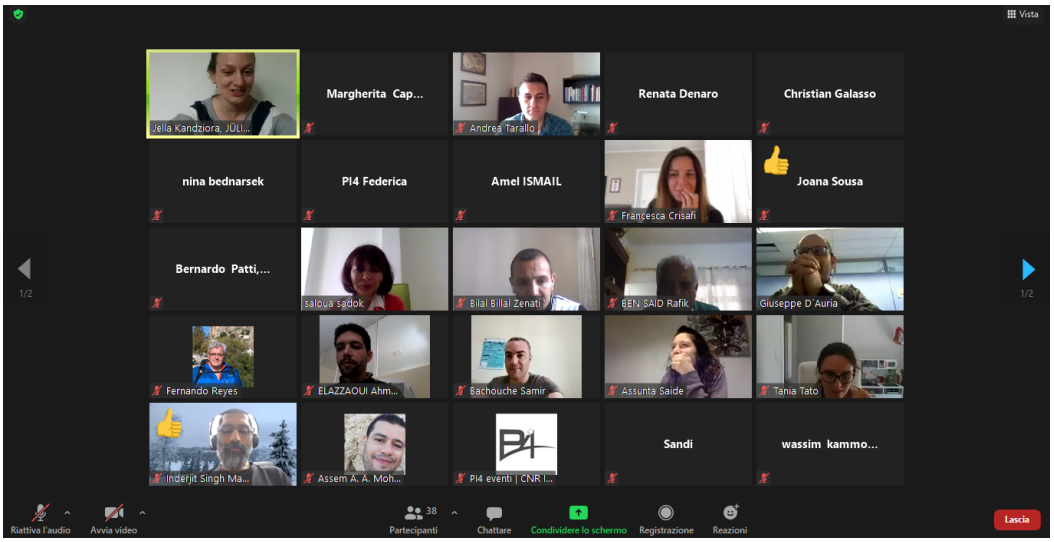
- https://bluebioeconomy.eu/the-bluebio-eranet-cofund-and-the-bluemed-coordination-and-support-action-on-blue-biotechnologies/

and at:

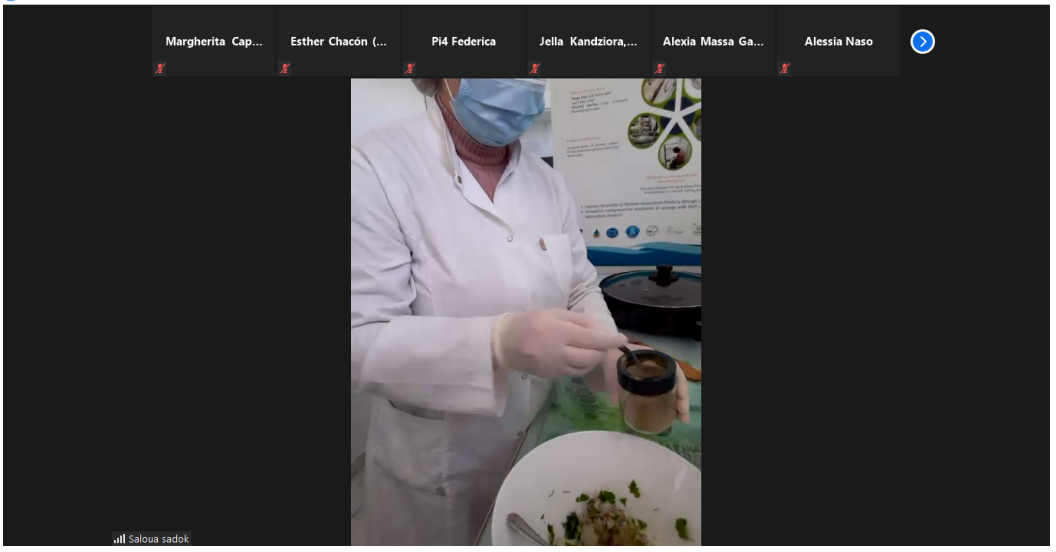
- www.bluemed-initiative.eu/training-course-on-blue-biotechnologies-jointly-organised-by-bluemed-csa-and-the-bluebio-eranet-cofund-open-for-applications/.

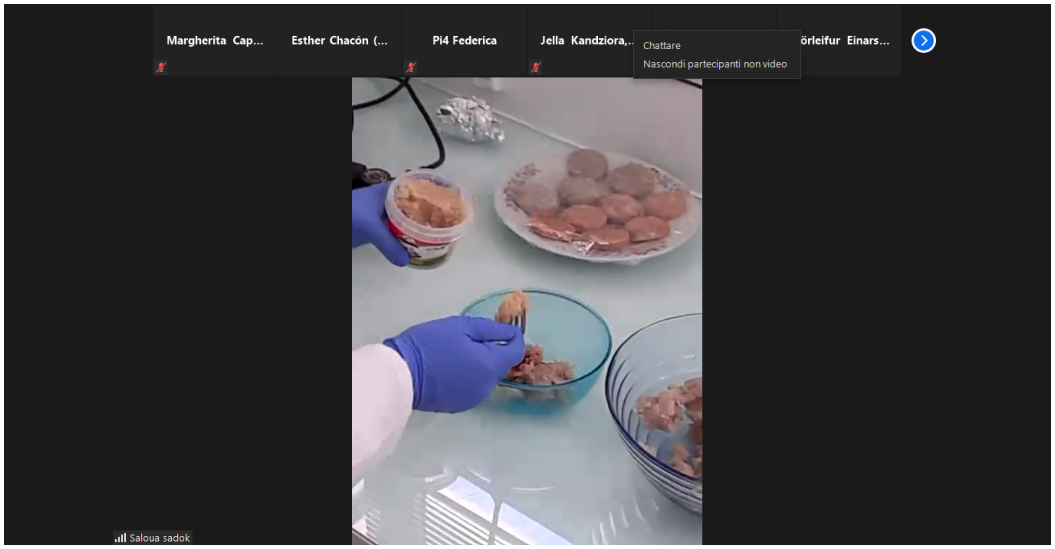
Supporting tools and dedicated activities for connection and engagement

As far as regards tailored engagement activities, they were at the core of the course format and encompassed 1 tasting webinar for icebreaking and introduction to the course, 4 wrap-up discussion groups, 2 moderated round tables, 1 informal brokerage event, 1 hands-on exercise, 1 live-cooking session, 1 virtual tour of Messina city. The following tools were used to enable them.

Tool	**Scope**
Indico	Platform enabling unique access point with relevant links, information and material, to store the material up to 6 months past the course
Zoom	Video conference system was used to run the course enabling live chat, participation and interaction, e.g. raise hand functionality to pose questions and thumbs-up as from the screenshots below.  

	The breakout rooms' function of zoom was used to run the *Classrooms*. Designed as discussion wrap-up groups to capture main outputs of the lessons, one classroom per day was organized. In order to ensure rotation and composition balance, the groups for the breakout rooms were formed by randomly distributing the participants within them. After the random distribution we verified the composition of the groups according to four parameters: - gender - public or private affiliation - age (young/professional) - EU or non-EU origin. Each of the four parameters was then compared to its value calculated for the totality of course participants. Adjustments to the composition of the groups were finally to ensure for each day not only rotation but also that the heterogeneity in each group was the same or almost the same as in the group as a whole. Outputs of the classroom were collected via Sli.do (see above and in Annex III). It has to be remarked that while Zoom enables the recording of the sessions, this has not been performed following a specific request by lecturers sharing sensible data and information.
Sli.do	Tool to run live online polls, survey and classrooms 
wonder.me	Tool enabling the organization of a brokerage event for tailored networking characterized by an informal layout of the virtual environment.

	 Source: wonder.me This virtual space was launched at Wednesday evening on March 17th, 2021 to enable participants spontaneous chats, random encounters or unexpected conversations with involved partners in BlueMed CSA and BlueBio Cofund as well as lecturers of the training course. After participants could get to know each other during the Tasting Webinar a week before the training course and during the first two days co-organizers have created a communication-friendly space where remaining questions could have been asked. In addition, participants could share insights, discuss and create new partnerships in future.
Videos	- Tour of Messina - Live cooking event transmitted from the INSTM - B3Aqua Laboratory 

	
Google drive	Hands-on lesson on communication to enable exercises in parallel groups

Follow-up and impacts

Activities included:

- acknowledgment and distribution of learning material towards lecturers and participants,
- one wrap-up meeting among co-organizers,
- declaration of attendance sent to trainees,
- communication of unlocked material for all applicants available password protected on the platform for a duration of 6 months,
- dissemination actions, e.g. co-organizers interviewed for a local TV network www.justtivu.tv/le-biotecnologie-del-mare-a-portata-di-tutti-grazie-al-cnr/ (in Italian).

Among the results of the interaction and networking, including vertical (lecturers-trainees) and horizontal (among trainees and among lecturers), the following typologies can be accounted for:

- informal requests of mentoring,
- networking's impact, participants cross-engaged in future collaboration,
- co-organizers were invited to present the outcomes of the course in the framework of the session on "Italian Recovery Plan and blue circular economy" at ECOMONDO exhibition (Rimini, Italy) on 27 October 2021.

Feedback and lessons learned

An overall overview of the outputs of the (e)ValueBack survey proposed at the end of the course and answered by 19 participants is presented in this section and can be explored in detail in Annex III. It is also complemented with additional qualitative inputs gathered from discussions, including informal, among organizers and with participants. This information is relevant to adjust and enhance the organization of future courses.

As detailed from page 39 of Annex III, 100% of respondents were able to easily login in and access the event. Positive feedback was gathered on organizational aspects, the interesting topics tackled, the stimulating and inspiring atmosphere created, the improved knowledge and skills. All deployed engagement tools were appreciated, from the accessibility, e.g. with the possibility to connect to zoom even via phone, to the daily discussion in small teams (breakout rooms) aiming at wrapping-up, to different engaging tools, including the opportunity to raise questions and also typing them via chat. Video material has also been appreciated.

While overall the programme and lecturers were rated high 4-5, being 5 the maximum score on a range from 1 to 5 (pp. 43-44 of Annex II), the following topics were proposed for improving the programme:

- entrepreneurship,
- seaweeds biotechnologies,
- new molecules, molecular tools and upscaling process,
- biosurfactant and bioemulsifiers, bioplastics and exopolysaccharides from marine bacteria, microalgae and recirculating aquaculture systems (RAS), monitoring and characterization of bioplastics in seas,
- start-up and spin-off,
- China/Asian blue biotech,
- EU policy,
- drug discovery from the bioassay point of view,
- economic viability of proposals background,
- exploitation's opportunities from other marine microorganisms like yeast,
- sample collection techniques.

The list of additional topics to be tackled or tackle more in-depth suggests that a training course on blue-biotechnologies should be either longer, e.g. a summer school, or proposed more than once. Indeed, the organization of a next edition was encouraged by 74% of respondents to the survey (page 53, Annex III) with 100% interested in joining another training course on the topic. The ideal frequency would be every two years. Furthermore, it was proposed to link this course with others on more specific topics, e.g. science communication or coding.

While recognizing that the virtual modalities can be a means to overcome travelling barriers, comparison of virtual vs in-person modality was evaluated 'not as good as' by 32% of survey's respondents and 'the same as' by 37%.

Additional general suggestions for improvement include:

- the possibility to shorten the lunch break;
- to double check that time zone is clear in every communications;
- to record session (on this, organizers decided not to upon request of lecturers due to sensible data shared);
- to prepare presentations and useful documentation of each lesson 1 to 2 days before the lesson.

In the following, inputs from co-organizers, and in particular moderators and facilitators are presented. Discussion topics are reported together with comments.

Attendance

- Data treatment and protection to be improved, including consent to take pictures, recordings, etc…
- People jump in and out more randomly but in general very high attendance rate.
- Three selected people while confirming their attendance finally have not registered at the platform and haven't joined → this hampered the participation of other interested applicants.
- Some selected applicants forwarded the link to colleagues → this can be avoided by adding a note to the invitation letter, including a validation system when entering the platform so access to join the meeting is limited and only available after validated registration.
- Only a few trainees have not interacted at all.

Selection/evaluation

- Some of the fields in the submission template should be more specific to allow an easier assessment to the evaluators. In the same way, a couple of criteria should be revised and explained better to evaluators.
- Communication/Dissemination of the course should be improved as most of the applicants were informed by one of the lecturers about this opportunity.
- Three iterations were needed with selected applicants to confirm their attendance, some of the selected ones were finally not available or just did not answer the invitation letter.

Interactive formats

- Classrooms were very relevant although sometime not participated, in some cases only one attendee → this should have been immediately noted and the group reshaped.
- Very good interaction rate during Q&A sessions.

- Three selected interactive formats (zoom chat, breakout rooms), sli.do (in a couple of circumstances difficult to enter) and wonder.me → technical support constantly needed.

- Open questions taken up later by lecturers, no Q&A document needs to be uploaded at the platform.

- Positive feedback regarding the brokerage event with wonder.me and about the breakout group sessions (wrap-up) → discussing the milestones of the day enabled exchanging views considering the background variety of the group composition. Another exercise could be for the wrap-up sessions to ask 4-5 questions about the lessons the same day so they can discuss what they learnt/understood.

- Tasting webinar was a good icebreaking start where a short get to know each other was included in breakout rooms → For the sake of interacting: during the tasting webinar or icebreaker event, they could be divided into groups and asked some questions. After the course, maybe the 3rd day, they could be asked the same questions and compare the results: how much did they learn? In addition, after agreement of applicants, ask for a short CV/profile like we had for lecturers and if they confirm to share it with other applicants including contact details.

- Attendance of lecturers and partners of BlueBio and BlueMed to the wonder.me brokerage event could have been higher → better to shift this event to a timeslot in the morning or afternoon as well as better communication and dedicated organizations within the consortia of the sponsoring initiatives to gather more participants.

- Live cooking event proved to be very entertaining → proposal: a contest of recipes based on food from the sea could be organized during the first 2 days. After compiling the recipes, a vote would take place on the 3rd day and a video with the winner one would be shown on the 4th day.

- Important to analyse reasons why only half of the trainees underlined that the virtual event was as good as an in-person event and one third thinks it would have been more fruitful in person → while the virtual modality favour accessibility, moments of informal interaction such us coffee and lunch breaks as well as social dinners are more powerful in person and give the opportunity to meet and get to know each other easily. Although the icebreaker and brokerage events were very good ideas they are not the same.

<u>Timing</u>

- No issues, only 15 minutes delay on one day.

- During the first day the procedure for trainees on how to do the wrap-up could be explained more in detail. Also, it was too much rapid the split in the virtual rooms.

- The last day, the closure of the course together with the final survey perhaps was a bit rushed.

Feedback

- Trainees used reaction emojis of zoom to give direct feedback to lecturers and moderators.

- The chat enables private comments with organizers.

- One trainee wrote in a chat to all: “For the first time, I seriously may be looking for my career, and study the possibilities to switch from research to create my own strat-up! thanks to this training course!” Answer of another trainee: “Completely agree with […], very complete and inspiring course, fruitful experience”.

- Mentoring.

Communication and dissemination

- It is recommended to have one coordinating communication body instead of five (BlueMed mailing list, BlueBio mailing list, Pi4 notification mails, two organizers’ personal emails) → a single account managed by more than one person should be used as well as a communication responsible appointed.

- several reminders were sent to trainees but not coordinated from one platform. Lecturers received one reminder each day before their lesson and three days before the training course started. In addition, there was a reminder for the brokerage event → to be reduced.

- Recommend having the platform ready when the invitation is sent out to selected trainees.

- Make zoom links to join meetings more visible and easier to find at the platform → This link should be accessible only for registered people and not to everyone who has clicked on the platform link (see the encountered issue explained above).

- In order to cover a broad range of participants from different countries zoom was the best choice in terms of connectivity.

- Recommend communicating in advance that there is no recording or that recording is only foreseen for internal use.

- Trainees support the idea to have learning material, presentations and videos online available before the course starts.

Programme

- Well structured.
- Many topics in this field have been covered.
- Bioinformatics session showed that it was hard to follow for beginners. In particular is probably not for most of biologists, but one hour lesson cannot turn you into a bioinformatician, it can just introduce you to the topic, and I found that the lecturer did a very good job in that, also adopting a very practical and useful approach → The selection of the trainees was not easy, also to receive feedback in some case. Could be useful for the future taking into account the research field there were many algologists. Also, Bioinformatic is one of the key disciplines to strengthen the future education plans.

To conclude, the **course** has been a **positive experience and feedback encourages the implementation of next editions**. Despite the remote modality, the Programme was conceived to enable networking in addition to knowledge transfer and circulation and proved successful.

As far as concern the possibility to propose again a training course on the same topic, considering that in the Mediterranean region the knowledge gap is still evident as demonstrated by the high number of applicants from Mediterranean EU and non-EU countries, reflections are ongoing to organize such a course, in collaboration with maritime clusters active in the area.

Annexes

Annex I – The Programme

Annex II – Biopics of lecturers and abstracts of the lessons

Annex III – Sli.do polls results

Integrated advanced training course on Blue Biotechnologies, Aquatic products and Blue Bio-economy

On-line, digital hub @ CNR-IRBIM, Messina, Italy

15-19 March 2021

Credit: Lucas Benjamin on Unsplash

Integrated advanced training course on Blue Biotechnologies, Aquatic products and Blue Bio-economy

On-line, digital hub at CNR-IRBIM, Messina (Italy), 15-19 March 2021

Tasting webinar (10th March 2021, from 10:00 to 12:00)

- Welcome by *Gian Marco Luna, Director of CNR-IRBIM*, *Kristin Thorud* (BlueBio COFUND) and *Margherita Cappelletto* (BlueMed CSA)
- Ice breaking presentations in break-out rooms: people and marine biotech project/experience, *facilitated by Jella Kandziora*
- Programme presentation and introductory lesson on Marine bioresources (biodiversity, bioproducts, biomaterials, services), *by Renata Denaro, CNR*
- Engagement solutions, *by Jella Kandziora*

Monday	Tuesday	Wednesday	Thursday	Friday
Moderator: Renata Denaro	**Moderator: Salowa Sadok**	**Moderator: Bernardo Patti**	**Moderator: Esther Cachón Campollo**	**Moderator: Margherita Cappelletto**
Facilitator: Jella Kandziora	**Facilitator: Jella Kandziora**	**Facilitator: Jella Kandziora**	**Facilitator: Jella Kandziora**	**Facilitator: Jella Kandziora**
9.00 Welcome to trainees	**9.00** Wrap-up with trainees	**9.00** Wrap-up with trainees	**9.00** Wrap-up with trainees	**9.00** Wrap-up with trainees
Module 1 **General introduction on Marine Biotechnology and future perspectives**	**Module 2** **Pipeline of Marine Biotechnologies and related tools**	**Module 3** **Practical approach, showcasing marine biotech inspiring experiences**	**Module 4** **Management in Marine Biotechnologies**	**Final Day**

Monday	Tuesday	Wednesday	Thursday	Friday
Moderator: Renata Denaro	**Moderator: Salowa Sadok**	**Moderator: Bernardo Patti**	**Moderator: Esther Cachón Campollo**	**Moderator: Margherita Cappelletto**
Facilitator: Jella Kandziora	**Facilitator: Jella Kandziora**	**Facilitator: Jella Kandziora**	**Facilitator: Jella Kandziora**	**Facilitator: Jella Kandziora**
9.15 Bioprospecting of marine resources and international protocols for protection, *by Susana Gaudencio, UCIBIO FCT- NOVA & Fernando Reyes, Fundación MEDINA*	**9.15** Isolation and structure characterization of novel marine compounds chemical and biochemical tools, including High-throughoutput technology platforms, *by Angelo Fontana, CNR*	**9.15** Bioprospecting biomass valorization, company experience/1, *by Giuseppe Falini (CASEAWA) and Øystein Arlov (PlastiSea & SNAP)*	**9.15** Knowledge and Technology transfer, research results values, *by Roberto Cimino, Italian Cluster BIG*	**9.15** Brainstorming case study: researcher, company, stakeholders, endusers, *by Technology Cluster BIG (Roberto Cimino), Pole Mer Mediterranée (Colin Ruel), Hweta-oil Start-up (Sonia Ben Rejeb)*
10.15 Global market, potential of marine biotechnology, *by Gaia Raffaella Greco, CNR*	**10.00** Omics approach (metagenomics, metaproteomic, metabolomics), *by Peter Golyshin, Bangor University*	**10.15** Bioprospecting biomass valorization, company experience/2, *by Ingrid Bakke (RASbiome) and Arne Malzahn (SIDESTREAM)*	**10.00** Marine bioeconomy and biotechnologies, *by Hjörleifur Einarsson, University of Akureyri*	
11.15 Coffee break and snack	**11.00** Coffee break and snack	**11.15** Coffee break and snack	**11.00** Coffee break and snack	**11.00** Coffee break and snack

Monday	Tuesday	Wednesday	Thursday	Friday
Moderator: Renata Denaro	**Moderator: Salowa Sadok**	**Moderator: Bernardo Patti**	**Moderator: Esther Cachón Campollo**	**Moderator: Margherita Cappelletto**
Facilitator: Jella Kandziora	**Facilitator: Jella Kandziora**	**Facilitator: Jella Kandziora**	**Facilitator: Jella Kandziora**	**Facilitator: Jella Kandziora**
11.45 Research Infrastructures and blue-biobanks, *by Ilaria Nardello, Eramaris*	**11.30** Bioinformatics tools, gene mining, *by Giuseppe D'Auria, FISABIO*	**11.45** Exploring, development, exploiting natural products, a model approach: Resources from Urban Bio-waSte (ResUrbis), *by Francesco Valentino, Ca' Foscari University of Venice*	**11.30** Challenges for researchers, IP and legal aspects, *by Alessia Naso, CNR*	**11.30** Reflections/1 Blue biotechnologies: bioethics and international biolaw profiles, *Ilja Richard Pavone, CNR- Interdepartmental Center for Research Ethics and Integrity*
		12:15 And the winner is…	**12.00** Developing business: interaction between research and private companies, *by Alexia Massa-Gallucci, AquaBioTech Group*	**12.00** Reflections/2 Coronavirus and the food chain: the contribution of innovative aquatic food products, *by Saloua Sadok, INSTM*
12.30 Lunch break	**13.00** Lunch break	**12.30** Lunch break with a virtual tour in Messina	**12.30** Lunch break …and Live cooking with algae, by Saloua Sadok	**12:30** (E)valueBack, Conclusions, follow-up, and greetings

Monday	Tuesday	Wednesday	Thursday	Friday
Moderator: Renata Denaro	**Moderator: Salowa Sadok**	**Moderator: Bernardo Patti**	**Moderator: Esther Cachón Campollo**	**Moderator: Margherita Cappelletto**
Facilitator: Jella Kandziora	**Facilitator: Jella Kandziora**	**Facilitator: Jella Kandziora**	**Facilitator: Jella Kandziora**	**Facilitator: Jella Kandziora**
15.00 Q&As to the Pipelines (recordings of the lessons shared in advance): 1. Microbiome in the aquaculture setting, *by Gianmarco Luna, CNR* 2. Bioproducts and biomaterial: Algae biorefinery, *by Matteo Francavilla, UNIFG* 3. Services; bioremediation, *by Michail Yakimov, CNR*	**15.00** Virtual hands-on time**:** demonstration on upscaling practical approach (micro-mesoscale systems facilities), *by Simone Cappello, CNR*	**15.00** Targeting actions: the SOPHIE Strategic Research Agenda for Oceans and Human Health, *by Sam Dupont,* University *of Gothenburg*, *SOPHIE Expert Group and Scientific Advising Committee* **15.30** Roundtable "Opportunities beyond research: the role of coordination actions", *Ocean4biotec (by Ana Rotter), BlueBio (by Kristin Thorud), BlueMed (by Margherita Cappelletto), B-Blue (by Cristian Chiavetta)* interviewed by trainees	**15.00** LivingLab Game on BlueBiotech COMM strategies, *by Ana Rotter, Ocean4Biotech*	**13:00** End of the course
16.00 End of Day 1	**16:00** End of Day 2	**16:00** End of Day 3	**16:00** End of Day 4	

Monday	Tuesday	Wednesday	Thursday	Friday
Moderator: Renata Denaro	**Moderator: Salowa Sadok**	**Moderator: Bernardo Patti**	**Moderator: Esther Cachón Campollo**	**Moderator: Margherita Cappelletto**
Facilitator: Jella Kandziora	**Facilitator: Jella Kandziora**	**Facilitator: Jella Kandz-iora**	**Facilitator: Jella Kandziora**	**Facilitator: Jella Kandziora**
17.00 Participatory class-room deadline	**17.00** Participatory class-room deadline	**17.00** Participatory class-room deadline	**17.00** Participatory class-room deadline	
		19.00 Aperitif time! Wonder.me informal brokerage event		

BlueBio-BlueMed integrated advanced training course on Blue Biotechnologies, Aquatic products and Blue Bio-economy

On-line, digital hub @CNR-IRBIM, Messina, Italy, 15-19 March 2021

INFORMATION ON INSTRUCTORS & LESSONS

Øystein Arlov

Affiliation: SINTEF Industry

Contact: oystein.arlov@sintef.no

Biography: Øystein Arlov is a researcher working at SINTEF Industry, Dept. of Biotechnology and Nanomedicine in Trondheim, Norway. He holds a Ph.D. in Biotechnology from the Norwegian University of Science and Technology (NTNU), where the work focused on chemical functionalization of algal polysaccharides for new biomedical materials. At SINTEF, Øystein's research focus is on the characterization, processing and utilization of marine biomasses, and in particular biopolymers from cultivated and wild harvested brown algae (Phaeophycae). He is presently coordinating two ERA-net projects (ERA BlueBio 'PlastiSea' and ERA SUSFOOD2 'ProSeaFood), and is additionally involved in projects utilizing marine biopolymers for biomedical applications such as tissue engineering and pharmaceuticals.

Title of the lesson: *The potential of algal biopolymers for new products and applications (The SNAP and PlastiSea projects)*

Date of the lesson:

Presentation/Focus of the lesson: The presentation will provide an overview of the ERA BlueBio projects PlastiSea, which are focused on developing new innovations based on European macroalgal biomass.

The **PlastiSea** project's main objective is to develop novel bioplastic materials based on cultivated and wild species of brown algae, as well as sustainable and cost-effective methods for processing the biomass into suitable bioplastic substrates.

The main objective of the **SNAP** project is to develop novel products and applications in high-value markets by upgrading and modifying biopolymers from cultivated brown algae and wild harvested brown and red algae.

Link to the website of the initiative/project/organization represented for the lesson:

www.sintef.no/plastisea/

www.sintef.no/en/projects/2020/snap-seaweeds-for-novel-applications-and-products/

Ingrid Bakke

Affiliation: NTNU, Norway

Contact: ingrid.bakke@ntnu.no

Biography: Professor in the research group Analysis and Control of Microbial Systems (ACMS) at Department of Biotechnology and Food Science, NTNU, Trondheim, Norway. Major research interests are within the field of microbiological water treatment, microbial management in recirculating aquaculture systems (RAS), and host-microbe interactions, particularly in fish rearing systems. Bakke is coordinating the BlueBio project "RASbiome: Microbial management in RAS for sustainable aquaculture production". In this project, we examine alternative microbiological processes to nitrification to improve nitrogen management and water treatment in RAS, and focus on promotion of high microbial and chemical water quality.

Title of the lesson: Management of microbiomes in RAS for sustainable fish production

Date of the lesson: 17.03 at 10:15

Presentation/Focus of the lesson: Microbiomes are fundamental for successful fish production in RAS. First and foremost, the water treatment in RAS depends on microbial conversion of toxic ammonia taking place in biofilms in biofilters. In addition, microbes exist in biofilms on tank and tube walls, suspended in the water, and in association with the fish. The microbial activities affect the chemical water quality, and the chemical water quality influences on the composition of the microbiomes. Moreover, the microbes suspended in the water will interfere with the fish and the fish-associated microbiomes. Thus, RAS represents complex microbial ecosystems. For optimized fish production in RAS, we need to manage the microbial ecosystem to maintain a high chemical water quality and to promote positive fish – microbe interactions. This lecture focuses on microbial management in RAS, and on the potential for implementation of new microbial processes for water treatment in RAS, as suggested in the BlueBio project RASbiome.

Suggested background material:

Blancheton et al (2013) *Insight into bacterial population in aquaculture systems and its implication*: *A* nice summary of issues related to the microbiology in RAS

Strous and Sharp (2018) *Designer microbiomes for environmental, energy and health biotechnology*: an introduction to how microbiomes can be managed in to perform specific functions in open processes.

Sonia Ben Rejeb

Affiliation: INSTM - Startup Hwita

Contact: soniabenrejeb1998@gmail.com

Biography: Sonia Ben Rejeb, currently studying in IHEC Carthage for a master's degree in Marketing Intelligence and Strategic Watch (competitive intelligence) and co-founder and CEO of the startup Hwita, will be assisted by Mouna Bouras, a bio-engineering student in the National Institute of Applied Science and Technology (INSAT) and also Research and Development Manager in Hwita startup.

Title of the lesson: Hwita Startup, presentation and concept (Brainstorming case study: researcher, company, stakeholders, end-users)

Date of the lesson: 19 March at 9 A.M.

Presentation/Focus of the lesson: We are a startup that recycles fish waste (that we preferentially call coproduct) generated from the seafood industry into fish oil destined to be used as a raw material in the para-pharmaceutical, cosmetic and food industries. It can be used as a raw material in various products such as food supplements, creams and milk derivatives. Rich in polyunsaturated fatty acids (PUFA) particularly the omega 3 series, this oil has numerous benefits on the body and is increasingly used in many industries as a raw material. We are also the only local production (in Tunisia) of purified fish oil destined for that matter. Furthermore, we're trying to be as eco-friendly as possible: first recycling the coproducts using green methods for the extraction (*e.i.* making it as mechanical as possible). Second, by recycling our own waste into fish meal used in aquacultures

Link to the website of the initiative/project/organization represented for the lesson:

Suggested background material: We will use our pitch template that has all the information about the startup as well extra slides for additional questions and information.

Margherita Cappelletto

Affiliation: CNR - National Research Council of Italy
Contact: margherita.cappelletto@cnr.it

Biography: Technologist at the Department of Earth System Science and Environmental Technologies of the National Research Council of Italy with a background in Astronomy and Astrophysics and a Master in Science Communication, Margherita Cappelletto works at the interface of science and policy, including cooperation/networking programmes and projects development targeting marine and maritime science (SEAS-ERA, COFASP, CSA-Oceans) in collaboration with national, European, and international organizations. Since 2016, she is the project manager of the BlueMed Coordination and Support Action, a project funded by the European Commission to support BlueMed, the intergovernmental research and innovation initiative for blue jobs and growth in the Mediterranean area, joined by 16 countries of the area. Recently, she has been supporting the Italian Oceanographic Commission in running the regional consultations and developing the proposal of the Mediterranean Programme for the Decade of Ocean Science for Sustainable Development (2021-2030).

Title of the roundtable: *"Opportunities beyond research: the role of coordination actions"*,

Date of the roundtable: March 17th 2021

Presentation/Focus of the lesson: The intervention will focus on the coordination action that via building dialogue and cooperation mechanisms supported the development of the BlueMed Research and Innovation Initiative for blue jobs and growth in the Mediterranean area.

Link to the website of the initiative/project/organization represented for the lesson: http://www.bluemed-initiative.eu/

Suggested background material: http://www.bluemed-initiative.eu/wp-content/uploads/2020/07/bluemed-preliminary-implementation-plan.pdf

Simone Cappello

Affiliation: National Research Council of Italy (CNR), Institute for Marine Biological Resources and Biotechnologies (IRBIM)

Contact: simone.cappello@cnr.it

Biography: Dr. Simone Cappello is a Full Researcher Scientist, Consiglio Nazionale delle Ricerche (CNR) - Istituto per le Risorse Biologiche e le Biotechnologie Marine (IRBIM) of Messina (Messina, Italy). Awarded Ph.D. in "Science and Engineering of Sea" (XVII cycle) of University "Federico II" of Naples (Naples, Italy) whit Thesis entitled: "*Analysis on medium scale of the evolution of hydrocarbons in marine environment: role and optimization of biodegradative potentiality of natural bacterial population*", the principal research topics of Dr. Cappello include: i) Development and optimization of bioremediation treatments for the recovery of terrestrial and marine sites contaminated by organic pollutants / hydrocarbons and heavy metals; ii) Development of scale systems (microcosms and mesocosms) to simulate the oil spill on marine environment; iii) Development of integrated physical-biological technologies for treatment of polluted matrix. The scientific activity of Dr. Simone Cappello is witnessed by more than 60 publications as first author (26 between papers and chapter's book) and co-author, 14 chapters in different books and/or volumes, more than 100 poster and/or oral communications in National and International conferences. As indicated (Google Scholar index) the scientific activity of Dr. Simone Cappello presents 2900 citations and a total H index equal to 31. However, Dr. Cappello is also author of 4 Italian Patent and 3 International Patent and is a Technical Director of Biotechonological spin-off ATHENA Green Solutions S.r.L.

Title of the lesson: Virtual hands-on time: demonstration on upscaling practical approach (micro-mesoscale systems facilities)

Date of the lesson: 16 March 2021 15:00

Cristian Chiavetta

Affiliation: ENEA - Italian National Agency for New Technologies Energy and Sustainable Economic Development

Contact: cristian.chiavetta@enea.it

Biography: Cristian Chiavetta is an Environmental Engineer graduated at the University of Bologna with a PhD on Life Cycle Assessment of renewable energy and secondary materials production. He is now working as researcher at the Italian National Agency for New Technologies, Energy and Sustainable Economic Development (ENEA) in the Valorization of Resources Laboratory (RISE). For the last ten years he has been working in the field of Circular Economy implementation at both company/organization and territorial level. He carries out research activities in Italian and International projects concerning the assessment of environmental, economic and social impacts of products, processes and systems and supports companies of the Blue Economy in eco-innovation paths through the implementation of industrial symbiosis instruments and circular economy principles. He is expert on Life Cycle Assessment Methodology (LCA), Efficient Management of Resources and Green Public Procurement (GPP) and he is one of the 10 Italian experts on Circular Economy selected by the Italian Ministry for the Foreign Affairs and International Cooperation (MAECI) to represent Italy in the the Summit of Two Shores initiative. Among others, he is coordinating the B-Blue project (Building the Blue Biotechnologies Community in the Mediterranean), financed by the Interreg-Med Programme and involving 10 organizations from 8 Med countries and several Associated Partners from the Southern Shore of the Mediterranean.

Title of the roundtable: *"Opportunities beyond research: the role of coordination actions"*,

Date of the roundtable: March 17th 2021

Presentation/Focus of the lesson: The intervention will focus on the coordination mechanism the B-Blue project aims to develop in order to unlock the innovation potential of the Blue Biotechnologies sector in the Mediterranean area.

Link to the website of the initiative/project/organization represented for the lesson:

- ENEA Department for Sustainability >> https://sostenibilita.enea.it/en/node
- Blue Biotechnology community_Marina platform >> https://www.marina-platform.eu/registeredarea/users/showMembersByCommunity/10

Suggested background material:

- https://interreg-med.eu/fileadmin/user_upload/Sites/Governance/horizontal_project/Library/Deliverables/GGOR_Innovation.pdf
- https://interreg-med.eu/fileadmin/user_upload/Sites/Governance/horizontal_project/Innovation-key-policy-paper_PANORAMED-def.pdf

Roberto Cimino

Affiliation: Technology Cluster Blue Italian Growth
Contact: clusterbig@gmail.com

Biography: Roberto Cimino is the Chairman of the National Technology Cluster Blue Italian Growth (BIG) since July 2018. In this position he has been instrumental in ramping up the Cluster BIG in his start up phase concluded on February 28th 2021 . The Cluster has now 86 members, including all major academia, research organizations, enterprises, SMEs and associations interested in the R&I in the Blue Economy and has established a number of partnerships with Mediterranean Blue Clusters with the aim of accelerating Technology Transfer and international cooperation. In addition, Roberto has 35 year experience on R&I and Technology Transfer in a major international energy company where he served in various positions in the R&D division, leading several pilot and demonstration projects from lab to testing to transfer to the customer.
He is a Chemical Engineer by education.

Title of the lesson: *Knowledge and Tech Transfer*

Date of the lesson: March 18

Presentation/Focus of the lesson: The lesson will present how the Technology Cluster BIG has organized its process of acceleration of Technology Transfer by discussing how the various actors involved- research organizations, enterprises and stakeholders- can be successfully integrated and by providing take-aways and lessons learnt to the participants.

Link to the website of the initiative/project/organization represented for the lesson: www.clusterbig.it

Suggested background material: EC Paper on industrial cluster policy
https://ec.europa.eu/growth/industry/policy/cluster_en

European Cluster Observatory Report on Cluster Collaboration and Business Support Tools to Facilitate Entrepreneurship, Crosssectoral Collaboration and Growth: https://ec.europa.eu/docsroom/documents/9972/

ECCP - Cluster Policy Smart Guide
https://clustercollaboration.eu/news/smart-guide-cluster-policy-published

Giuseppe D'Auria
Affiliation: FISABIO Sequencing and Bioinformatics Service, Valencia, Spain
Contact: dauria_giu@gva.es

Biography: I obtained my degree in biology at Messina University, Italy. In 2004 I obtained my PhD studying the microbial diversity of deep anoxic hypersaline basins of the Mediterranean Sea at the National Research Council (CNR-IAMC Messina, Italy). Then, I moved at Miguel Hernández University (Alicante, Spain) working in bioinformatics and microbial ecology. In 2007 I moved to Cavanilles Institute for Biodiversity and Evolutionary Biology of Valencia University working on the genome sequencing of *Legionella pneumophila* and studying the microbial diversity of Tablas the Daimiel National Park. Then, I moved to the Foundation for the Promotion of Health and Biomedical Research of Valencia Region (FISABIO) focusing my studies on the human gut microbiota. In 2016 I promoted the development of FISABIO Sequencing and Bioinformatics service and leading it for three years. I spent one year at the institutional Chair FISABIO - University of Valencia organizing events and courses in bioinformatics and microbial genomics. Since 2020, I am leading the Bioinformatics Service within at FISABIO fundation. During the SARS-CoV2 pandemic, I promoted the activities for the sequencing of the firsts Spanish genomes of the virus.

Title of the lesson: *Bioinformatics approaches to Metataxonomy and Metagenomics analysis*

Date of the lesson: Tuesday 16/03/2020: 12:30-13:30

Presentation/Focus of the lesson: This lesson will provide an overview on the types of data obtained from next generation sequencing experiments in Metataxonomy and Metagenomics. The sequencing approaches will be shown; the early sequence quality controls, upstream and downstream analytical steps will be also presented. The students will have an overview on the data preparation, common programs and approaches, types of results and representations.

Moreover, an introduction to the Linux environment will be provided in order to know its importance in bioinformatics, where to find main learning resources and applications.

Link to the website of the initiative/project/organization represented for the lesson: www.fisabio-ngs.com

Suggested background material:

- QIIME2: Quantitative Insights Into Microbial Ecology https://qiime2.org/;
- SqueezeMeta: a fully automated metagenomics pipeline, from reads to bins https://github.com/jtamames/SqueezeMeta

Renata Denaro

- Affiliation: CNR - National Research Council of Italy
- Contact: renata.denaro@cnr.it

Biography: Renata Denaro gained her PhD in Biochemical and Biomolecular Sciences at University of Catania. She is a researcher at Water Research Institute at the National Research Council, Rome. Professor of Environmental Microbiology at University of Tor Vergata, Rome. She is author of several articles and book chapters with a special focus on bioremediation in marine environment. Member of European Society for Marine Biotechnology (ESMB), and International Marine Biotechnology Association (IMBA).
The research area is related to: 1. Marine biotechnologies (member of working group at ERANET BlueBio) 2. Structure and function of marine microbial communities in contaminated environments (scientific activity within European projects COMMODE, MAGIC-PAH 3. Ecology, genetics and physiology of bacteria specialized and generalists in the degradation of contaminants in the marine environment, including adaptive mechanisms (enzymes, siderophores, biosurfactants) and biotic and abiotic factors that govern the self-cleaning processes in the marine environment (scientific activity within European project KillSpill). 4. Bioremediation and environmental monitoring at sea (focus on technologies and biotechnologies in situ and ex situ, biosensors built with marine bacteria, responsible of task European project BRAAVOO) At the same time, knowledge and technology transfer activities were carried out to stakeholders, also analyzing ways of interaction in international contexts (responsible for European networks CSA Marine Biotech and ERANET Marine Biotech).

Title of the lesson: Marine Biotechology, marine bioresourses and pipelines.

Date of lesson: 10 March 2021

Focus of the lesson: the lesson will introduce the course giving basic information on marine biotechnology. A set of marine products will be described, together with related pipeline. It will be also outlined the program of the course.

Link to the website of the initiative/project/organization represented for the lesson:

- http://www.bluemed-initiative.eu/
- https://bluebioeconomy.eu/

Suggested background material:
http://www.marinebiotech.eu/launch-marine-biotechnology-research-and-innovation-roadmap
Marine Biotechnology in Europe. Advancing Innovation in Europe's Bioeconomy
https://www.oecd.org/health/biotech/marine-biotechnology-ocean-productivity-sustainability.htm

Sam Dupont
Affiliation: University of Gothenburg
Contact: sam.dupont@bioenv.gu.se

Biography: Sam Dupont is an associate professor and senior lecturer in Marine Eco-Physiology at the University of Gothenburg. His main research topic is on the effect of global changes (e.g. ocean acidification, warming) on marine ecosystems. He was published in more than 180 publications in journals including Nature, PNAS and TREE. He is also working on the development of innovative science communication and education strategies to tackle global challenges through his role as Steering Committee member of the Centre for Collective Action Research (CeCAR) and communication coordinator of the Nordic Centre of Excellence on Sustainable and Resilient Aquatic Production (SUREAQUA). Over the last 5 years, he has explored the relationship between the ocean and human health and was a member of the expert group and the Scientific Advising Committee of the EU SOPHIE project. The last aspect of his work aims at evaluating and building capacities for marine science in developing countries.

Title of the speech: *Targeting actions: the SOPHIE Strategic Research Agenda for Oceans and Human Health*
Date of the speech: Wednesday, 17 March 2021
Presentation/Focus of the lesson: There is an intimate link between the health and well-being of humans and the marine environment. Oceans provide nutrition, medications, mental and physical health benefits, climate control, mitigation of both CO_2 and global warming, and coastal protection. The interactions between humans, our health, and our oceans are likely to be increasingly modified as human-driven changes to the environment intensify. As negative changes in global oceans manifest at costs to human well-being, the health problems and environmental solutions are becoming increasingly recognized across national and international scales (e.g. Sustainable Development Goals, UN Paris Climate Agreement, and United Nations Decade of Ocean Science for Sustainable Development). Understanding the relationship between the ocean and human health is key to define priorities in research and policy to ensure a sustainable use of the ocean. This strategy has been developed by the SOPHIE project to develop a theoretical framework linking ocean and human health as well as a Strategic Research Agenda (SRA). This SRA is a comprehensive overview of the required research and capacity to develop Oceans and Human Health in Europe and focused on 3 key three target actions: (i) Sustainable seafood and healthy people; (ii) Blue spaces, tourism and, well-being; and, (iii) Marine biodiversity, biotechnology and medicine. These will be discussed in the context of Blue Biotechnologies, Aquatic products and Blue Bio-economy.
Link to the website of the initiative/project/organization represented for the lesson/Suggested background material: https://sophie2020.eu/about/.

Hjörleifur Einarsson

Affiliation: University of Akureyri, Akureyri, Iceland

Contact: hei@unak.is

Biography: Hjörleifur Einarsson has a background in biology and food science with food quality and safety as main priorities He is a professor in Food Science and gives lectures in Food Science, Biotechnology and Food Innovation. His latest research projects focus on novel ingredients for food, feed (incl. plant stimulants), nutraceuticals and cosmetics. The sources of these ingredients are from marine micro-organisms living on or close to hydrothermal vents, algae and other underutilized marine species and resources. I am now involved in two Nordic projects on this topic. One is "SAFE- Sustainable aquaculture feed based on novel biomass from wood by-products" (Nordforsk) and the other one is "Biorefine - Blue bioeconomy network" (NMR). Hjörleifur has been involved in a few start-up companies as a result of his research.

Title of the lesson: Marine bioeconomy and biotechnologies

Date of the lesson: Thursday, Mars 18th 2021

Presentation/Focus of the lesson: The lesson will give a short introduction to Bioeconomy concept: Then it will give several examples of how the biorefinery approach can be used to increase value from current resources and where biotechnology is a key player for better results. The examples given will also demonstrate the importance of technical transfer from university to industry and how industry can provide test platform for further development.

Link to the website of the initiative/project/organization represented for the lesson: https://biopol.is/efni/english

Suggested background material:

Magnús Örn Stefánsson, Sigurður Baldursson, Kristinn P. Magnússon, Arnheiður Eyþórsdóttir and Hjörleifur Einarsson (2019). *Isolation, Characterization and Biotechnological Potentials of Thraustochytrids from Icelandic Waters*. Mar. Drugs, 17(8), 449.

Arnheidur Eythorsdottir, Sesselja Omarsdottir and Hjorleifur Einarsson (2016). *Antimicrobial Activity of Marine Bacterial Symbionts Retrieved from Shallow Water Hydrothermal Vents*. Mar Biotechnol 18:293–300.

Giuseppe Falini

Affiliation: Alma Mater Studiorum – Università di Bologna

Contact: giuseppe.falini@unibo.it

Biography: Prof. Giuseppe Falini (GF), PhD in Chemistry, is full professor in chemistry at the University of Bologna. GF teaches general and inorganic chemistry and solid state chemistry at the University of Bologna. He has been advisor of Master and PhD theses of several students and currently is advisor of five master students and two PhD students. Currently, the research activity of GF is mainly addressed in the fields of biomineralization and macromolecular crystallography. It can be summarized in the following subjects: the study of the crystalline structure using X-ray crystallography of biological macromolecules and minerals involved in the biomineralization processes of calcium carbonate; the design and preparation of innovative materials from waste marine biominerals and biopolymers. GF guides the biomineralization and biocrystallization laboratory. GF is co-author of about 230 scientific publications (H-index = 43) in international journals (two in Science) with impact factor. GF also wrote 5 book chapters and is inventor of 3 patents. GF has been invited to present his research activities in more than fifty international and national conferences and schools. GF has been awarded from national institutions, companies and European Community (ERC Adv).

Title of the lesson: *Waste shells from aquaculture: valuable biomaterials.*

Date of the lesson: Wednesday 17/03/2021: 09:00-10:00

Presentation/Focus of the lesson: Shellfish aquaculture is seen as a highly sustainable food source and will play an important role in the future global food balance. The increase in aquaculture production around the world requires the evaluation of all aspects related to it. In this context, a little considered problem of shellfish aquaculture is the production of waste, i.e. the production of calcium carbonate shells. The shells of the aquaculture industry are thought to be an unwanted waste product, but at the same time calcium carbonate is extracted in the form of limestone from quarries and viewed as a valuable commodity. In an era environmental wise of high awareness of the need for a circular economy, aquaculture and the fishing industry should consider shells as a valuable biomaterial that can be reused with both environmental and economic benefits. This lesson discusses the current waste shell problem and identifies current large-scale shell applications. Of the plethora of techniques and methodologies proposed for shell valorization reported in the scientific literature, this lesson will focus only on those that consider a large-scale use of shells, that are simple and potentially economically viable. Furthermore, this lesson will illustrate how shell value can be enhanced when considering their peculiarities as biomaterials, which are the result of millions of years of evolution and this represents their intrinsic richness.

Link to the website of the initiative/project/organization represented for the lesson:
http://www.fao.org/resources/infographics/infographics-details/en/c/231544/

Angelo Fontana

Affiliation: Consiglio Nazionale delle Ricerche -Institute of Biomolecular Chemistry and University of Naples "Federico II"- Department of Biology

Contact: afontana@icb.cnr.it

Biography: Angelo Fontana is Full Professor of Organic Chemistry at the Department of Biology of the University of Naples "Federico II". From August 2020 he is the Director of the Institute of Biomolecular Chemistry of the National Research Council (CNR) of Italy where he has worked for more than 25 years first as a Researcher and then as a Research Director. Post-doctoral Fellow of the Japan Society for Promotion of Science in the Department of Pharmaceutical Chemistry of Hokkaido University (Japan), in 2000 he was a visiting scientist at the Department of Chemistry of the University of British Columbia (UBC) (Canada) where he returned as a faculty member in 2009. More recently, he was appointed Enseignant Invite a Plein Temps for the Department of Chemistry at the Université de Nice-Sophia Antipolis (France) and honored to be a Guest Professor of the Second Military Medical University of Shanghai (China). Currently, he is coordinating the group of Bio-Organic Chemistry and Chemical Biology whose research is aimed at the development of new therapeutic principles from natural small molecules and implementation of biotechnological processes based on marine microorganisms. These studies have received numerous national and international funding grants, and in 2016 he co-founded Bio*SEA*rch SRL, a start-up company for the development of marine natural products in medicine and cosmetics. As a permanent member, he collaborates with the international scientific committees for the organization of "Marine Natural Products Symposium" and "European Conference on Marine Natural Products". He received the 2009 Apivita Award from the Phytochemistry Society of Europe for his contribution in the field of natural products.

Title of the lesson: Marine Natural Products

Presentation/Focus of the lesson: On the basis of my personal experiences, this presentation provides a general overview of how studies on the small molecules from marine sources referred to as "marine natural products" was transformed by insights from molecular and cellular approaches, and highlights the current research in the identification of bioactive molecules and the future directions with a focus on chemical immunology.

Link to the website of the initiative/project/organization represented for the lesson:
https://www.icb.cnr.it/

Suggested background material: https://www.biosearchsrl.com/

Matteo Francavilla

Affiliation: STAR*Facility Centre, Department of Agriculture, Foods, Natural Resources and Engineering, University of Foggia, Italy.

Contact: matteo.francavilla@unifg.it

Biography: Researcher in Organic Chemistry at UNIFG, Department of Agriculture Science, Foods, Natural Resources and Engineering (DAFNE); Responsible of STAR*Facility Centre, a technological hub of University of Foggia for biomass valorization; Lecturer in "Organic Chemistry", "General Chemistry" and "Biomass and Biorefinery". Laurea cum laude in Organic Chemistry at University of Rome "La Sapienza", PhD in Sustainable Agro-Ecosystems at University of Foggia, Master in "Natural Organic Compounds" at University of Rome "La Sapienza". His research activity's main topics include the valorization of biomass (including algae) through extraction, purification and characterisation of fine chemicals, bioactive compounds and biomaterials; Biorefinery processes; Green Chemistry applied to biomass valorization. His research interests are currently addressed towards nanoplarticles production using biopolymers as template, platform compounds, and biofuels production from aquatic and terrestrial biomass.

Title of the lesson: *"Bioproducts and biomaterial: Algae biorefinery".*

Date of the lesson: March 15th 2021

Presentation/Focus of the lesson: The STAR*Facility Centre is a technologically advanced laboratory of University of Foggia, funded by a FP7 Research Project (STAR*AgroEnergy). It is focused on biomass valorization trough a combination of chemical, thermochemical and biochemical processes with a biorefinery approach. Algae, among other biomass, represent an intriguing and challenging substrate that is studied and tested for biorefinery processes in our lab. An overview of main research results referred to cascade process for algae conversion into high value products (algae biorefinery), will be provided and discussed.

Link to the website of the initiative/project/organization represented for the lesson:

STAR*Facility Centre

https://www.agraria.unifg.it/i

Susana P. Gaudêncio

Affiliation: UCIBIO, Chemistry Department, Blue Biotechnology and Biomedicine Lab, Faculty for Sciences and Technology, NOVA University of Lisbon
Contact: s.gaudencio@fct.unl.pt

Biography: Susana P. Gaudêncio is the Head of the Blue Biotechnology and Biomedicine Lab at UCIBIO, FCT-NOVA (*). Her research interests focus on the investigation of marine-derived actinobacteria from Portugal and the Macaronesia Archipelagos for the discovery of bioactive natural products as lead-like agents for drug discovery and biotechnological applications. She owns a collection of over 1,000 actinobacteria, numerous of these with proven biotechnological potential. She uses a multidisciplinary bioprospecting approach to Blue Biotechnology research combining Marine Natural Products Chemistry, Biochemistry, Molecular Biology, Microbiology, Metabolomics, Genomics, Chemo and Bioinformatics, Chemical Ecology, Pharmaceutical Sciences and Material Sciences. Her publication record includes over 30 peer-reviewed papers with about 950 citations, 3 book chapters, over 60 conference proceedings and she has participated in 22 national and international research projects.

(*) https://www.requimte.pt/ucibio/research-groups/lab/blue-biotechnology-biomedicine, https://orcid.org/0000-0002-5510-1170.

She was organizer and chair of two of the three most prestigious congresses in Marine Natural Products, the joint XVI MANAPRO & XI ECMNP 2019 http://wmnp2019.ipleiria.pt/ .

She is Working Group Leader, Management Committee Member, and STSM Committee Member of the Cost Action CA18238 - European transdisciplinary networking platform for marine biotechnology (https://www.ocean4biotech.eu/).

Title of the lesson: *Bioprospecting of Marine Resources and International Protocols for Protection*

Date of the lesson: Monday 15 March 2021

Presentation/Focus of the lesson: Bioprospecting is the exploration of natural resources from the chemistry, biochemistry and genetic point of view for the development of commercially valuable products with medical or any other biotechnological application. To avoid biopiracy, which is the unethical appropriation and exploitation of genetic/biological resources and native knowledge without fair compensation to a given region or country, the UN Convention on Biological Diversity (CBD) and the Nagoya Protocol treaties have been created. The Nagoya is an international legally binding agreement that implements the access and benefit-sharing obligations of the CBD. It entered into force on 12 October 2014 and to date has been ratified by 87 Countries.

Link to the website of the initiative/project/organization represented for the lesson: https://www.cbd.int/abs/

Peter Golyshin

Affiliation: Bangor University

Contact: p.golyshin@bangor.ac.uk

Biography: Peter Golyshin is a Professor and Chair in Environmental Genomics at Bangor University, UK. He graduated from the MV Lomonosov Moscow State University in 1987 and received his PhD degree in microbiology in 1991. He worked in the 'Bioengineering Centre' of the Russian Academy of Sciences (1990-94), GBF – National Research Centre for Biotechnology mbH in Brunswick, Germany (1995-2000), Carolo-Wilhelmina Technische Universität zu Braunschweig (2001-2005) and Helmholtz Centre for Infection Research, Brunswick (2005-2007) before accepting professorship at Bangor University in 2007. His current research investigates mechanisms of functioning of microbial communities and microbial processes using OMICS approaches; he has a particular interest in extremophilic Archaea and application of functional (meta)genomics for mining novel enzymatic diversity and in microbial degradation of petroleum in marine systems and functional genomics of marine oil-degrading bacteria. Over the past 5 years, he co-ordinated the EU Horizon 2020 Innovation Action 'INMARE' (Industrial Applications of Marine Enzymes), received Natural Environment Research Council UK (NERC) grant for 'Plastic Vectors' Project, Horizon 2020 'FuturEnzyme' Project, Era-Net grant 'MetaCat' and the ERDF-Welsh Govt funding for the Centre for Environmental Biotechnology (£7.8M) where he is acting as a Director. He has published >220 papers, inter alia, in Nature, Nature Biotechnology, Nature Catalysis, Nature Microbiology, Nature Communications, PNAS and JBC. ORCID: https://orcid.org/0000-0002-5433-0350

Title of the lesson: Omics approaches for mining uncultured microbial diversity for new biotech applications

Date of the lesson: March 16, 2020

Presentation/Focus of the lesson: The revolution in the high throughput DNA sequencing technologies has resulted in a significant reduction of the sequencing costs and thus led to an explosion of in silico data production and dramatic expansion of the databases. In contrast to that, the pipelines for functional protein analysis operate at much lower rates and throughputs, opening the gap between the numbers of proteins predicted in silico and those experimentally characterized in the lab: the proportion of the latter asymptotically approaches zero per cent. There is an urgent demand in fostering functional analysis of proteins and a growing appreciation that this emerging gap between the high throughput metagenomic sequencing data and experimentally characterized proteins has to be dealt with. The presentation will give some examples on applications of functional OMICS approaches for streamlining the process of discovery of new enzymes for industrial applications, with the main focus on marine microorganisms as a source.

Link to the website of the initiative/project/organization represented for the lesson: H2020 Project 'INMARE', http://inmare.bangor.ac.uk/

Centre for Environmental Biotechnology, http://environmental-biotechnology.bangor.ac.uk/

Gaia Raffaella Greco

Affiliation: CNR - National Research Council of Italy

Contact: gaia.greco@icar.cnr.it

Biography: Researcher at the *National Research Council* of Italy, Gaia Raffaella Greco works in Naples for *ICAR*, the *Institute for high performance computing and networking*. Graduated in Management, she received her PhD in Business Strategy from *Università degli Studi di Napoli, Federico II*. After several years spent in consulting (both in public and private organizations), she returned to academia thanks to a fellowship in the Italian flagship project *Ritmare*. She carries out research activities concerning mainly science-based industries, technology transfer, knowledge networks, academic spin-offs.

Title of the roundtable: *"Global Market, Potential of Marine Biotechnology".*

Date of the roundtable: March 15th 2021 (Module 1)

Presentation/Focus of the lesson: Despite the increasing attention that the political and the institutional spheres voice towards marine biotechnology at the regional, national and international level, the knowledge about the private organizations that live the sector remains moderate. The intervention will focus on the companies that develop products and services of marine and fresh water origin, presenting an up-to-date analysis of the scientific and institutional literature on the issue. In particular, it will be presented the cosmetic sector, analyzing different business case studies.

Link to the website of the initiative/project/organization represented for the lesson: http://www.ritmare.it/en/index.php?option=com_content&view=featured&Itemid=101

Suggested background material:

> *The Marine Pharmacology Pipeline of Midwestern University:*
> https://www.midwestern.edu/departments/marinepharmacology/clinical-pipeline.xml
>
> *A business case study: Mussel Polymers Inc. (MPI) – video TEDx:*
> https://www.musselpolymers.com/knowledgehub

Gian Marco Luna

Affiliation: National Research Council of Italy (CNR), Institute for Marine Biological Resources and Biotechnologies (IRBIM)

Contact: gianmarco.luna@cnr.it, home: +39 071 2078860, mobile: +39 347 6381022

Biography: Director (since 2018) of IRBIM CNR. Hired at the CNR in 2011, he obtained his PhD in Marine Biology and Ecology at the Polytechnic University of Marche (2005). He has carried out scientific research at UnivPM (2006-2011), then at the ISMAR CNR Headquarter in Venice (2011-2016) and later at his location in Ancona (2016-2018). He has participated to a number of national and international research projects and scientific expeditions around the globe, and has been visiting scientist in foreign Research Centers. He is the author of more than 100 publications including articles in peer-reviewed scientific journals, popular articles on marine sciences and book chapters. His research investigates the marine ecosystem and how marine microorganisms influence its functioning, from the coastal area to the abyssal depths, with emphasis on the mechanisms that regulate the biodiversity, the response of the marine (micro)biota to human impact and global change, and the significance of microbe-host association in the marine environment. He is currently WP Leader in the H2020 project "Circles - Controlling mIcRobiomes CircuLations for bEtter food Systems" that is focused on finding solutions for future food challenges by investigating the potential of microbes in the food systems, including aquaculture fish species.

Title of the lesson: *Microbiome in the aquaculture setting*

Date of the lesson: 15 March 2021 15:00

Presentation/Focus of the lesson: Aquaculture has increased significantly in last years, and will continue to grow, as it is predicted that more than half of fish consumed on a global scale will be produced by aquaculture by 2030. In the Mediterranean Sea, fish farming production, and particularly that regarding sea bream (Sparus aurata) and sea bass (Dicentrarchus labrax), has increased by 77% over the last decade, an expansion that is also drawing increasing concerns on the environmental impact of these activities. Microbiota of fishes play a key role in the host physiology, growth and immunity, yet it is only in recent years that the successful application of -omics techniques have opened the way to decipher better which microbes are associated to aquaculture species, and what role they played within the aquaculture setting. During this lesson, some outcomes from the H2020-funded project Circles will be presented, and promising examples of applications of gut microbiome manipulation to aquaculture will be discussed (such as insect-based feeds, vaccination, pro- and prebiotics, artificial selection on the hologenome).

Link to the website of the initiative/project/organization represented for the lesson: http://www.ricercamarina.cnr.it/en/index.php

Suggested background material: https://circlesproject.eu/

https://royalsocietypublishing.org/doi/full/10.1098/rspb.2020.0184

Mauro Majone (replaced by Francesco Valentino)

Affiliation: University of Rome “La Sapienza”

Contact: mauro.majone@uniroma1.it

Biography: Professor of Chemical Engineering at the Department of Chemistry of the University of Rome “La Sapienza”. Head of the multidisciplinary Research Center for Protection of Environment and Cultural Heritage (CIABC).
Research areas: Environmental and Industrial biotechnologies for treatment and valorisation of waste and wastewater. Biopolymer (PHA) production. Remediation of polluted soils and groundwater.
Author of more than 200 papers on international scientific journals with peer review, which received more than 6800 citations (HI=47). Scientific coordinator of several research projects under public or private commitment, and participant into several FP7 and H2020 European Projects. Among them, Coordinator of the H2020 Project RES URBIS (GA 730349) “Resources from Urban BioWaste”. Member of the PhD Programme in Chemical Processes for Industria and Environment.

Title of the lesson: *Exploring, developping, exploiting natural products, a model approach: Resources from Urban Bio-waSte (ResUrbis)*

Date of the lesson: March 17th, 2021, 11.45 CET

Presentation/Focus of the lesson: The RES URBIS (RESources from URban BIo-waSte) project was funded by the European Commission under Horizon 2020 (GA 730349) and involved 20 partners from 8 European countries, including universities, research institutes, SMEs, NGOs and public administration. The main objective of RES URBIS was the development of an urban bio-refinery to convert urban organic waste into value-added bioplastics, based on polyhydroxyalkanoates (PHA). PHA are particularly interesting polyesters because of biological origin and completely biodegradable in the environment. Two pilot plants have been developed to continuously produce PHA from liquid waste resulting from fruit processing or a mixture consisting of the organic fraction of municipal solid waste and excess sludge from municipal wastewater treatment. Over 30 kg of PHA were produced and extracted from microbial cells using pollutant-free methods as well as characterized and tested for various market applications (films, interlayers, biocomposites and durable goods, environmental remediation). Then, the waste/sludge management systems of 5 territorial clusters (Barcelona, Lisbon, Copenaghen, Trento, South Wales) was analysed and for each one, integration with existing AD plants to fit needs for biowaste treatment by 2024 was considered. An overall potential for PHA production of around 7 kton/year was estimated, along with additional bio-waste treatment of 270 kton and over 6 million m3 additional biogas generated. Moreover, a complete LCA that compared 6 potential scenarios for the management of urban organic waste, showed that the RES URBIS biorefinery has potential environmental benefits. Finally, social perception was investigated through questionnaires that explored drivers and barriers to consumers’ awareness and acceptance of waste-based bioproducts and what would drive the decision to switch from traditional to these new products. A general consumer acceptance of these products was verified.

Link to the website of the initiative/project/organization represented for the lesson: www.resurbis.eu

Suggested background material:

- https://www.resurbis.eu/sites/default/files/newsletters/ResUrbis_2nd_Newsletter.pdf
- https://www.resurbis.eu/sites/default/files/newsletters/ResUrbis_3rd_Newsletter.pdf

Arne Malzahn

Affiliation: SINTEF Ocean, Trondheim Norway

Contact: arne.malzahn@sintef.no

Biography: Arne Malzahn graduated as a fisheries biologist in 2001 at the University of Kiel. He proceeded to the Biological Station on Helgoland, an outpost of the ALfred Wegener Institute for Polar and Marine Research in German. Here he finished his doctoral thesis in 2005 and continued to work there for another 7 years on various topics covering plankton and fish ecology. In 2012 he was appointed as an assistant professor for fish biology at the Sultan Qaboos University in Muscat, Oman. In 2015 he moved to Trondheim in Norway to start his current position at SINTEF Ocean. At SINTEF he continues to work on larval fish, copepods and phytoplankton, but also developed a project portfolio revolving around secondary bioproduction of low trophic marine species on industrial waste streams.

Title of the lesson: Production of lower-trophic marine organisms on Industrial sidestreams

Date of the lesson: 17.03.2021 10:00-11:00

Presentation/Focus of the lesson: I will summarize current efforts taken to utilize industrial side streams for secondary bioproduction of low trophic marine species. Biomass produced on the side streams shall in turn be used as (amongst others) feed ingredients for aquafeeds to supply the aquaculture industry with high quality marine compounds which are short in supply. Such efforts rely on interdisciplinary efforts between biologists, engineers and economists.

Alexia Massa-Gallucci

Affiliation: AquaBioTech Group

Contact: amg@aquabt.com

Biography: Dr. Alexia Massa Gallucci is a fisheries biologist with extensive experience in applied research, fieldwork, data analysis and writing in both marine biology and fisheries science. She obtained a PhD in Fisheries Biology in Ireland at University College Dublin for research on the management and conservation of wild fish populations. She pursued post-doc research projects in a variety of subjects from conservation biology through environmental sustainability to impact of climate change and ocean acidification on marine habitats using both ecological and molecular methods to address conservation issues. She I currently working as Senior Scientific Consultant at AquaBioTech Group in Malta where she leads the Fisheries Research and Development department. She carries out R&I&D activities in commercial and research projects with national, European and international organisations.

Among others, she is coordinating the BYTHOS (Biotechnologies for Human Health and Blue Growth) project financed by the Interreg Italia-Malta program involving 6 organizations from Malta and Italy.

Title of the lesson: Developing business: interaction between research and private companies

Date of the lesson: Thursday, 18 March at 12:00

Presentation/Focus of the lesson [Max 250 words]: The lesson will present a several examples of interactions between research and private company that can lead to the development of business within the field of marine biotechnologies. It will also showcase as case study the project BYTHOS - Biotechnologies for Human Health and Blue Growth, aiming at valorising fish by-products and zero waste.

Link to the website of the initiative/project/organization represented for the lesson:

https://www.aquabt.com/

Suggested background material:

http://www.bythos.eu/

https://issuu.com/thinkuni/docs/think32_issuu

Ilaria Nardello
Affiliation: Eramaris/SZN
Contact: ilaria.nardello@gmail.com

Biography: Dr. Ilaria Nardello is an international manager and a researcher, who has dedicated various years to the investigation of models of sustainability for Research Infrastructures. She led the establishment of the European Marine Biological Resource centre (EMBRC-ERIC), in Paris, between 2015 and 2019. She previously worked towards the establishment of the Biomarine International Cluster Association, under the auspices of Prince Albert the II Foundation, in Monaco, in 2014. Between 2009 and 20015, she was the National Coordinator of Ireland's Marine Biotechnology Programme and moved on to be the Industry Research Specialist for the College of Science at NUIGalway, in Ireland. A bio-optical oceanographer by training, she is currently occupied with the establishment of her own enterprise 'Eramaris - from Research to Business', supporting the development of public and private initiatives, in the blue and circular economy, and related research disciplines. She is an Expert Advisor to the European Commission and a visiting professor at University of Milano Bicocca, in the context of the Executive Masters in Management of Research Infrastructures (EMMRI).

Title of the lesson: *Research Infrastructures and blue-biobanks*

Date of the lesson: 15 March 2021, h12:30-13:30

Presentation/Focus of the lesson: This lecture will present the role of Research Infrastructures for the investigation of marine life. Focusing on the recently established European Marine Biological Resource Centre (EMBRC-ERIC), we shall explore their organisation and the availability of and access to technological tools for research on marine biological resources, including ecosystem access, laboratories, collections and biobanks.

Link to the website of the initiative/project/organization represented for the lesson:

- www.embrc.eu
- www.assembleplus.eu
- www.bluebiobank.eu

Suggested background material:

- https://www.embrc.eu/sites/default/files/publications/EMBRC_Business_Plan_web.pdf
- https://www.bluebiobank.eu/2020/05/08/challenges-face-by-developing-countries-for-access-to-marine-genetic-resources-benefit-sharing/

Alessia Naso
Affiliation: National Research Council (Italy)
Contact: alessia.naso@cnr.it

Biography: Alessia Naso has a Degree in Biological Science and a PhD Degree in Material Science and Technology. She had several years of research activities in Biophysics then, since 2008, she is in charge at the Technology Transfer Office of CNR for the management and exploitation of Intellectual Property in the field of life sciences, medicine, biotechnologies, pharmaceutical and agro-food technologies, as well as for the protection of New Varieties of Plants and the registration of Trademarks. She is the person responsible in the above-mentioned fields for the prior art searches and patentability analysis and for supporting inventors in patenting procedures, examination, granting of rights. She manages more than 80 Intellectual Properties Rights. She is member of the CNR IPR Committee, and of the Committee for the Expression of Interest for the exploitation of the CNR IPR portfolio. She supports inventors in drafting and negotiation of confidentiality agreements (NDA), materials and data transfer agreements (MDTA), co-ownership agreements, as well as in negotiating for patent option, license and assignment agreements. Moreover she performs tutoring activities and training courses on IP protection and IP agreements.

Title of the lesson: Challenges for researchers, IP and legal aspects

Date of the lesson: Thursday, 18 of March 2020

Presentation/Focus of the lesson: Intellectual Property (IP) Rights are specific legal rights given to inventors, creators and other right holders over the creations of their minds. They usually give the creator an exclusive right over the use of his/her creation for a certain period of time and comprises (i) Copyright and rights related to copyright, created to encourage and reward creative work and (ii) Industrial property rights, created to stimulate innovation and creation of technology and services, to stimulate and ensure fair competition, to protect consumers.

The lesson will give a first glance on such Intellectual Property Rights, with an overview of the different forms of Intellectual Property for protecting research results, in order to understand how to give value to own ideas. The legal rights conferred by patents, trademarks, registered designs, copyright and trade secrets will briefly introduce, as well as what they protect and how to obtain them. Then the lesson will highlight the protection of inventions, and will give the basic principles of the patent system and related main aspects: inventorship and co-ownership, priority date and publication, duration and country validation. Moreover, the lesson will present the procedures to apply for a European patent application according to the European Patent Convention (EPC) or to apply for an international patent application through the PCT (Patent Co-operation Treaty) way: filing, Search Report and examination, granting and validation.

Link to the website of the initiative/project/organization represented for the lesson/Suggested background material: https://www.epo.org/, https://www.wipo.int/portal/en/index.html

Ilja Richard Pavone

Affiliation: National Research Council of Italy (CNR), Interdepartmental Center for Research Ethics and Integrity

Contact: ilja.pavone@cnr.it, home: 0039 0695227618, mobile: 0039 3402620812

Biography: Ilja Richard Pavone gained his PhD in International Law and Human Rights at Sapienza University, Rome. He is a Researcher of International Law at the National Research Council of Italy, Rome, where he coordinates the research unit in International, European and National Biolaw. He is member of the Scientific Secretariat of the CNR Research Ethics and Bioethics Committee. He is also Professor of European Law and Biotechnologies at the Catholic University of the Sacred Hearth (Rome). In the past, he has taught at the universities of Rome (Sapienza), Macerata, Siena, Venice (VIU), Viterbo (La Tuscia). He has been Visiting Professor at Queensland University, New York University, Bochum University and Max Planck Institute for Comparative Public Law and International Law (Heidelberg). He is author of over fifty publications, essays and articles in International Law and European Union Law, with a particular focus on Bioethics, Human Rights, Animal Law, International Health Law and Environmental Protection. He is also a member of the Scientific Boards of the journals "Biolaw: Rivista di biodiritto" and "The Future of Science and Ethics"

Title of the lesson: *Blue Biotechnologies: Bioethics and International Biolaw Profiles*

Date of the lesson: 18 March 2021

Presentation/Focus of the lesson: The sustainable use of marine resources related to the development of modern biotechnologies is a key element of the 2030 Agenda for Sustainable Development. Goal 14 clearly affirms that the United Nations pledge to "Conserve and sustainably use the oceans, seas and marine resources for sustainable development". Target 14.a focuses on increasing scientific knowledge, developing research capacity and transfer marine technology, in order to improve ocean health and to enhance the contribution of marine biodiversity to the development of developing countries, in particular small-island developing States and least developed countries". This intervention – starting from the 2030 Agenda –will provide an overview of global efforts to ensure a sustainable use of marine resources focusing on the interrelation between law of the sea, international biolaw and environmental law.

Link to the website of the initiative/project/organization represented for the lesson: --

Suggested background material: https://unctad.org/news/conservation-and-sustainable-use-marine-biodiversity-areas-beyond-national-jurisdiction-recent

Fernando Reyes

Affiliation: Fundación MEDINA, Granada, Spain

Contact: fernando.reyes@medinaandalucia.es

Biography: Fernando Reyes is Area Head of the Chemistry Department at Fundación MEDINA, where he leads a group of scientists working on isolation and structural characterization of bioactive metabolites from microbial sources, including actinomycetes and fungi. He received a Ph. D. in Organic Chemistry from the University of Granada (Spain) in 1995. In 1997-98, he carried out an 18-month post-doctoral stage with the late Prof. Chris Abell at the University of Cambridge (UK), focused on the synthesis of potential inhibitors of enzymes of the shikimate and pantothenate pathways. Over the last 25 years, he has worked on the isolation and structural elucidation of bioactive natural products from several sources and for different companies and institutions, including Smithkline Beecham, PharmaMar and Fundación MEDINA. His work at PharmaMar during the period 2000-2010 was mainly focused on the isolation of anticancer metabolites from marine organisms, and one of the compounds isolated by his team (PM-184) is currently undergoing clinical trials in cancer therapy. He has co-authored 131 scientific publications in the field of natural products chemistry and is co-inventor of 15 international and 5 national patents, all of them on bioactive natural products. He is member of the editorial board of Marine Drugs, Review Editor of Frontiers in Marine Biotechnology, and serves regularly as reviewer of several journals in the field of natural products.

(*)https://scholar.google.es/citations?user=hGKbUhIAAAAJ&hl=en, https://orcid.org/0000-0003-1607-5106

He has participated as WP Leader in several FP7 and H2020 projects focused on Marine Biotechnology (PharmaSea, Ocean Medicines, MarPipe) and is Management Committee Member representing Spain of the Cost Action CA18238 - European transdisciplinary networking platform for marine biotechnology (https://www.ocean4biotech.eu/).

Title of the lesson: *Bioprospecting of Microbial Resources at Fundación MEDINA*

Date of the lesson: Monday 15 March 2021

Presentation/Focus of the lesson: Bioprospecting is the exploration of natural resources from the chemistry, biochemistry, and genetic point of view for the development of commercially valuable products with medical or any other biotechnological application. Good practices for the creation of the MEDINA´s microbial strains collection and particularities on the application of the Nagoya Protocol when collecting environmental samples for research in Spain will be commented.

Link to the website of the initiative/project/organization represented for the lesson: https://www.medinadiscovery.com/

Ana Rotter

Affiliation: Marine Biology Station Piran, National Institute of Biology, Slovenia

Contact: ana.rotter@nib.si

Biography: Shortly before obtaining her PhD in 2011, she was awarded the L'Oreal for women in science scholarship as recognition for her scientific work on statistical design and analysis of biological data. She collaborated in many research, innovation, networking and coordination and support actions, of which 10 national, 1 FP7, 3 H2020, 2 Adriatic IPA projects, 1 Interreg Med, 5 COST networks and authored/co-authored 41 peer reviewed scientific papers, 3 book chapters, >80 scientific conference contributions and media appearances. She was the management committee member of the COST action TA1201 genderSTE (network of policy makers and experts committed to promoting a fairer representation of women and better integration of gender analysis in research and innovation) and is in the management committee of COST Actions CA15219 (Developing new genetic tools for bioassessment of aquatic ecosystems in Europe) and CA18240 (ADHEsion GPCR Network: Research and Implementation Set the path for future Exploration). She has acted as the dissemination and communication representative in Adriatic IPA project in COST CA15219 and B-Blue Interreg Med project (https://b-blue.interreg-med.eu/) and is the leader of dissemination and communication WP and a technical WP in H2020 GoJelly project (https://gojelly.eu/), as well as the WP leader in H2020 CHANGE project. She is the chair of COST Action CA18238 (Ocean4Biotech, European transdisciplinary networking platform for marine biotechnology, https://www.ocean4biotech.eu/), which started in November 2019.

https://orcid.org/0000-0002-6879-0980

https://twitter.com/rotterana?lang=en

Her four current most important career pillars are: equal opportunities in science & science policy, development of marine biotechnology, science communication and data analysis. She is keen on mentoring the younger generations and will search opportunities to do so in the future, jointly with new collaboration opportunities for the development of marine biotechnology and circular economy pipelines.

Title of the lesson: *LivingLab Game on BlueBiotech COMM strategies / Roundtable "Oppor-tunities beyond research: the role of coordination actions"*

Date of the lesson: Thursday, 18 March 2021 at 15h / Wednesday, 17 March 2021 at 15:30h

Presentation/Focus of the lesson on Thursday: Appropriate science communication is becoming one of the most important skills for the modern scientist. However, science communication is often not taught as part of standard academic curricula. I will provide the basic knowledge from my experience and the trainees will be given a short exercise with the aim of improving their communication skills. A general discussion will follow.

Colin RUEL

Affiliation: Pôle Mer Méditerranée

Contact: ruel@polemermediterranee.com

Biography: Colin has worked on several French, European and international projects as content provider, data manager and administrative and financial coordinator. Since 2014, he manages the European projects in which Pôle Mer Méditerranée is involved and accompanies cluster's members, especially SMEs, toward European support mechanisms.

Title of the lesson: "Pôle Mer Méditerranée maritime cluster: Support for science and industry collaboration"

Date of the lesson: March 29, 2021

Presentation/Focus of the lesson: The presentation will focus on the concrete experiences of Pôle Mer Méditerranée, an innovation cluster located in the South of France, notably its actions supporting the emergence of collaborative projects (science/ industry) in the field of Blue Biotechnologies.

Link to the website of the initiative/project/organization represented for the lesson: https://www.polemermediterranee.com/

Saloua Sadok

Affiliation: Institut National des Sciences et Technologies de la Mer (INSTM), Tunis Tunisia

Contact: salwa.sadok@instm.rnrt.tn

Biography: Saloua Sadok, received a Master's Degree in Life Sciences from the Faculty of Sciences of Tunis –Tunisia and a PhD in Marine Biology from the University of Hull-United Kingdom (1993-1996). Back to Tunisia, Dr Sadok worked as Associate Professor in the INSTM, where she created a new laboratory for Seafood Quality and Valorisation in INSTM–La Goulette center. She was awarded the Ensign of the Tunisian National Order of Merit in Education and Science in 2007. In 2011, she became Professor and created in 2016 the fifth National Laboratory in INSTM called Blue Biotechnology & Aquatic Bio-products (B3Aqua) and was responsible for its accreditation (ISO-17025-2017) in 2019. She has over than 18 years of experience in research areas related to aquatic organism eco-physiology, pre/post mortem quality, analytical procedure, extraction of bioactives from marine sources and developing new Agro-food products. She is member of 6 national related Committees and is the national pivot for the economy pillar in the BlueMed Initiative. She coordinated more than nine national projects, 6 international projects as partners and two as leader (BIOVecQ and SecurAqua- IEVP Italy-Tunisia program). She supervised more than 20 Masters and 10 PhD students, she is the author of more than 100 publications with 63 in Scopus impacted journals; and has a Scopus h-index: 16.

Title of the lesson: Coronavirus and the food chain: The contribution of innovative aquatic food products.

Date of the lesson: 16/03/2021

Presentation/Focus of the lesson: It is well established that COVID-19 pandemic has globally impacted the whole food supply chain particularly from an economic side, but it has equally shaped consumer perception and expectation. We must therefore be aware that there is currently a serious concern about food production, processing, distribution and consumption.
The aquatic food products are of high importance, contributing to global nutritional security and socio-economic development. For instance billion rely on fish as primary source of protein and nearly 60 million people work on the primary fisheries and aquaculture sector, the development of such sector for the next decade was predicted to be among key enabler for a sustainable and green food production system. However fisheries and aquaculture are among the most pandemic-affected sectors.

This course will highlight not only disruption occurring in the aquatic food sector, but will also focus on arising opportunities to size for the creation of innovative products and new start-up in the present/post pandemic era.

Suggested background material:

https://www.foodqualityandsafety.com/tag/covid-19/
http://www.fao.org/3/ca9229en/ca9229en.pdf

http://www.biovecqpt.eu/Biovecq/Pr%C3%A9sentation-du-Projet

Kristin Elisabeth Thorud

Affiliation: The Research Council of Norway (RCN)

Contact: ket@rcn.no

Biography: Kristin E. Thorud is Special Advisor in The Research Council of Norway (RCN). She acts as coordinator of the ERA-NET Cofund on Blue Bioeconomy – unlocking the potential of aquatic bioresources (BlueBio), and she also represent Norway in the Management Board of JPI Oceans. She is a trained veterinarian (1984) and holds a PhD in fish diseases from the Norwegian School of Veterinary Science (1991). She started working as a fish health veterinarian on the west coast of Norway, a work that encouraged her to go into research in fish diseases at the Norwegian Veterinary Institute (1985). In 1997 she left for the Norwegian Animal Health Authority to act as manager of the Norwegian animal surveillance and control programmes and later as head of the Fish Health Section. From 2004-2008 she worked in the Norwegian Ministry of Fisheries and Coastal Affairs with fish health and aquaculture management, and with European (FP7) and international research collaboration. From 2008 until 2012 she held a position as Head of Department of Companion Animal Clinical Sciences at the Norwegian School of Veterinary Science.

Title of the lesson: Welcome & Roundtable

Date of the lesson: 15.03.2021

Presentation/Focus of the lesson: BlueBio welcomes the invitation by BlueMed to cooperate on this training course. The ERA-NET Cofund BlueBio is established to unlock the potential of aquatic bioresources to create job, economic growth and provide food, valuable nutrients and bio-based products and services. The core objective is to establish a coordinated R&D funding scheme and engaging funding agencies to implement joint call focusing on Blue knowledge and technological developments to respond to needs and gaps for research and innovation along the blue bioeconomy value chains. The goal it to identify new and improve existing ways of bringing bio-based products and services to the market and find new ways of creating value in the Blue Bioeconomy. BlueBio will implement a range of related activities to add value to the funded projects and better address the impact of the projects. Human capacity building including training and mobility exchange is one of our key activities to add value to projects and support the development of a thriving blue bioeconomy.

Link to the website of the initiative/project/organization represented for the lesson: https://bluebioeconomy.eu/

Francesco Valentino

Affiliation: University of Venice “Ca Foscari”

Contact: francesco.valentino@unive.it

Biography:
- Assistant Professor (tenure track) of Industrial Chemical Plants and Biochemical Processes at the
Department of Environmental Sciences, Informatics and Statistics of “Cà Foscari” University of Venice.
- Research areas: Environmental and Industrial biotechnologies for treatment and valorization of waste
and wastewater. Biopolymer (PHA) production. Dark fermentation. Anaerobic Digestion.
- Author of more than 35 papers on international scientific journals with peer review, which received
more than 700 citations (HI=16).
- Scientific collaborator of several research projects under public or private commitment, and participant
into several FP7 (Routes; Ecobiocap; Water4Crops), H2020 (ResUrbis, NoAW, SmartPlant) and BBI (Usable Packaging) European Projects.
- Member of editorial board of MDPI Sustainability journal and head of different special issues as guest editor; advisory/expert evaluator in European project proposals at European Commission - Research Executive Agency (REA)" H2020-BBI-JU (Bio-based Industries Joint Undertaking).

Title of the lesson: Exploring, developing, exploiting natural products, a model approach: Resources from Urban Bio-waSte (ResUr-bis),

Date of the lesson: March 17th, 2021, 11.45 CET

Presentation/Focus of the lesson: The RES URBIS (RESources from URban BIo-waSte)
project was funded by the European Commission under Horizon 2020 (GA 730349) and involved 20 partners from 8 European countries, including universities, research institutes, SMEs, NGOs and public administration. The main objective of RES URBIS was the development of an urban bio-refinery to convert urban organic waste into value-added bioplastics, based on polyhydroxyalkanoates (PHA). PHA are particularly interesting polyesters because of biological origin and completely biodegradable in the environment. Two pilot plants have been developed to continuously produce PHA from liquid waste resulting from fruit processing or a mixture consisting of the organic fraction of municipal solid waste and excess sludge from municipal wastewater treatment. Over 30 kg of PHA were produced and extracted from microbial cells using pollutant-free methods as well as characterized and tested for various market applications (films, interlayers, biocomposites and durable goods, environmental remediation). Then, the waste/sludge management systems of 5 territorial clusters (Barcelona, Lisbon, Copenaghen, Trento, South Wales) was analysed and for each one, integration with existing AD plants to fit needs for biowaste treatment by 2024 was considered. An overall potential for PHA production of around 7 kton/year was estimated, along with additional bio-waste treatment of 270 kton and over 6 million m3 additional biogas generated. Moreover, a complete LCA that compared 6 potential scenarios for the management of urban organic waste, showed that the RES URBIS biorefinery has potential

environmental benefits. Finally, social perception was investigated through questionnaires that explored drivers and barriers to consumers' awareness and acceptance of waste-based bioproducts and what would drive the decision to switch from traditional to these new products. A general consumer acceptance of these products was verified.

Link to the website of the initiative/project/organization represented for the lesson: www.resurbis.eu

Suggested background material:
- https://www.resurbis.eu/sites/default/files/newsletters/ResUrbis_3rd_Newsletter.pdf
- https://www.resurbis.eu/sites/default/files/newsletters/ResUrbis_2nd_Newsletter.pdf

Michail M. Yakimov

Affiliation: Institute for Marine Biological Resources and Biotechnologies, IRBIM-CNR, I-98122, Messina, Italy
Contact: mikhail.iakimov@cnr.it

Biography: I achieved my PhD in 1990 at the Institute of Biochemistry, Russian Academy of Science, where I was working till March 1992. Than I accepted the invitation to work as a PostDoc at the National Centre for Biotechnology (GBF, Braunschweig, Germany). Since 2001 I am working at the National Council of Research (CNR, Italy) as a permanent employee, and since 2018 as the Scientific Director of the Institute of Biological Resources and Marine Biotechnology (IRBIM-CNR) in Messina, Italy. My research interests are dedicated to marine petroleum microbiology and microbiology of extremophilic bacteria and archaea (halophiles and psychrophiles). During my career I got a broad experience in marine molecular microbiology studying the microbial communities thriving in oil-polluted and extreme marine environments, such as deep-sea hypersaline anoxic lakes, deep-sea petroleum- seepage sites, deep-sea corals, mud volcanoes and Antarctic subglacial lakes. I am also experienced in isolation and cultivation of taxonomically and physiologically novel obligate marine microorganisms, highly specialized in degradation of petroleum hydrocarbons (both aliphatic and [poly]aromatic). I am the author of more than 200 articles, reviews and book chapters, including articles in Nature, PNAS, ISME J, Nature Biotechnology and Nature Communications. I have co-ordinated and participated in a number of projects funded by the EU and other international and national structures. Regarding the topic of my lesson, I should addressed the following European Projects: MAGIC-PAH (*Molecular Approaches and MetaGenomic Investigations for optimizing Clean-up of PAH contaminated sites*); ULIXES (*Unravelling and exploiting Mediterranean Sea microbial diversity and ecology for Xenobiotics' and pollutants' clean up*) and Horizon2020 Project INMARE (*Innovative screening and expression platforms to discover and use the functional protein diversity from the sea*). Currently my group is involved in Horizon2020 Project FUTURENZYMES (*Technologies of the future for low-cost enzymes for environment-friendly products*).

Title of the lesson: Services: Bioremediation
Date of the lesson: 15 of March 2021

Presentation/Focus of the lesson:
Oil pollution, which represents one of the major threats to ocean life, is mainly caused by man's activities at sea, including tanker and pipeline leaks, accidental ocean discharges, and numerous spills of different scales. *Oil spills* are environmental disasters, which have been one of the major concerns of the marine world for a long time now. In addition to killing fish, marine mammals and birds, when an oil slick reaches the shore, it damages wildlife littoral habitats and the beaches, thus affecting terrestrial biota and human settlement. The last accidental *BP/Deepwater Horizon* ocean discharge in April 2010 is considered to be the largest oil spill in the petroleum industry's history and also provoked extensive damages to the marine environment. The oil well blowout discharged approximately 500,000 metric tonnes of oil to the deep water
of the Gulf of Mexico.

Clean-up and recovery from an oil spill is a very complex and difficult operation and depends upon many factors, including the type of oil spilled, the water temperature, place where the accident has occurred and types of shorelines and beaches (if any) involved. It is exactly this process that is named bioremediation and primarily refers to the capabilities of marine hydrocarbon-degrading bacteria to clean up and recover polluted habitats. Functioning as a part of a biological network composed of additional microbial community members, they are responsible for initial transformation of toxic LPHs into harmless intermediates, which finally end up with production of microbial biomass, $CO_2$and water.

Link to the website of the initiative/project/organization represented for the lesson:
https://cordis.europa.eu/project/id/245226/it
https://cordis.europa.eu/project/id/266473/it
https://cordis.europa.eu/project/id/634486

Suggested background material [two items max]:

Marine microorganisms make a meal of oil
IM Head, DM Jones, WFM Röling
Nature Reviews Microbiology 4 (3), 173-182

Obligate oil-degrading marine bacteria
MM Yakimov, KN Timmis, PN Golyshin
Current opinion in biotechnology 18 (3), 257-266

BlueBio-BlueMed training course

05 - 08 Mar 2021

Poll results

slido

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Share your expectations

0 1 6

Open text poll

Please write a milestone you have identified for each lesson. One sentence which in your opinion defines one of the most important messages of the lesson (feel free to add the number of your Group)

0 0 6

(1/5)

- Presentation 6: Bioremediation: a promising green technology to clean up marine sites Presentation 5: Macroalgae source of many bioproducts Presentation 1: prospecting marine environment for socio-economic purposes must be running under international marine policies and protocoles Presentation3: Blue-biobanks are critical infrastructures and should be easily accessible by researchers. Presentation 2 Blue biotechnology : a pontial growing market which ensure add values with sustainable resources
- sustainable blue resources with no impact on wildlife in

Open text poll

Please write a milestone you have identified for each lesson. One sentence which in your opinion defines one of the most important messages of the lesson (feel free to add the number of your Group)

0 0 6

(2/5)

marine environment Blue-biobanks are excellent opportunity for researches to explore, and investigate more deeply the economic potential of marine biotechnology as a sustainable blue resource

- Room 4: Lesson 1 – Susana Gaudêncio-Nagoya Protocol, pharmacological applications, bioprospecting and biotechnology

Fernando Reyes-Sustainability, biodiversity conservation, networking Lesson 2 –Gaia Greco-Blue biotechnology Lesson 3 – Ilaria Nardello-Marine Biological resources; infrastructures, Projects, Interaction Lesson 4 - Gianmarco Luna- Microorganims

Open text poll

Please write a milestone you have identified for each lesson. One sentence which in your opinion defines one of the most important messages of the lesson (feel free to add the number of your Group)

0 0 6

(3/5)

as a tool for sustainable aquaculture Lesson 5- Matteo Francavilla- Marine algae and biorefinery Lesson 6- Michail Yakimov-Marine bacteria as a tool for petrolleum pollution combat

- Breakout Group 1 1 Lesson Scientists are the sole responsible for the sustainable use of the biological resources they used for their research 2 Lesson The importance of coordination (from the Institute to the Policy Makers) 3 Lesson Potential of European seaweed industry to grow (0.57 % from the global seaweed production is very low!) 4 Lesson The research infrastructure has to invest more into the linkage between Industry and

Open text poll

Please write a milestone you have identified for each lesson. One sentence which in your opinion defines one of the most important messages of the lesson (feel free to add the number of your Group)

0 0 6

(4/5)

Science (Research) Gian Marco Luna The sustainability of aquaculture should be advertised and financed by the government first. Matteo Francavilla Great solutions for the small-scale projects are to be still developed for industrial-scale use. Michael M. Yakimov The idea of the use of bioremediation should be advertised and financed by the government first.

- We have selected the following milestones: safeguard for the first session, sustainability for the second, sharing for third, one-health for the microbiome talk, circular bioeconomy for the biorefinery talk and finallly bioremediation of sediments for the bioremediation talk. We are group number 5 ?
- Room (3) Francesca, Bernardo, Assem Lecture

Open text poll

Please write a milestone you have identified for each lesson. One sentence which in your opinion defines one of the most important messages of the lesson (feel free to add the number of your Group)

0 0 6

(5/5)

1 recap 1- Equitable and uniform sharing of genetic resources. 2- Rational use of the international convention for marine resources. Lecture 2 recap 1. The important role of Global industry of marine biotechnology Lecture3 recap 1. The crucial role of a blue Biobank in biological marine. 2. The opportunity
to set research infrastructure for specific need. Luna’s Lecture Role of micro biome for a most sustainable aquaculture technique (system) Matteo Francavilla Video presentation Booming of Algae production industry in European Union. Yakimov video presentation Self-cleaning potential of marine environment and biotechnological application of Hydrocarbonoclastic bacteria

Open text poll

Please write a milestone you have identified for each lesson. One sentence which in your opinion defines one of the most important messages of the lesson (feel free to add the number of your Group)

0 0 5

(1/5)

- Presentation 1: Marine environment as a sink of undiscovered new biomolecules with broad diversity and applications Presentation 2: Omics approach is the key to improvement new culturing approaches and for the discovery of new enzyme
- from marine habitats. Presentation 3: Bioinformatics is useful tool and approach to put in order data science Presentation 4: Research facilities support are needed to find innovative bioremediation technologies to facing oil pollution problems
- GROUP 5 Lesson 1: - Marine biodiversity as a source of novel bioactive

Please write a milestone you have identified for each lesson. One sentence which in your opinion defines one of the most important messages of the lesson (feel free to add the number of your Group)

0 0 5

(2/5)

products. A field to explore and a source of research opportunities. Lesson 2: - Omics technologies are growing in parallel with bioinformatics, the development and evolution of this new tools are helping to discover new microbiome and enzymes of high interest. Lesson 3: - Bioinformatics is a powerful tool for data analysis and interpretation, that researchers should learn to use in scientific domain. Lesson 4: - The use of bacteria for the environmental recovery after oil pollution.

- Group 4 milestones are; For the first session: “Marine Natural Products are still far from being fully explored, but they have a great potential, specially in the

Open text poll

Please write a milestone you have identified for each lesson. One sentence which in your opinion defines one of the most important messages of the lesson (feel free to add the number of your Group)

0 0 5

(3/5)

pharmaceutical and biomedical research field” For the second: “Metagenomics (and all the -omics) supposed a great challenge, even more for those researchers who are not familiar with those techniques”. For the third session: “It is a neccesity that we implement the use of bioinformatic tools from the very early stages of our carreer pathway” And for the last session: “Great progress are made in bioremediation but it still requiera to be adaptes from the mesoscale to bigger scenarios”

- Group 3 1. Marine organisms are potentially endless source of new products that can address emerging human problems. 2. Omics is

Open text poll

Please write a milestone you have identified for each lesson. One sentence which in your opinion defines one of the most important messages of the lesson (feel free to add the number of your Group)

0 0 5

(4/5)

a relatively easy and cheap way to obtain data about putative activity of compounds in non-culturable microorganisms, but the protein activity needs to be proved. 3. Bioinformatic is a tool for everyone, it’s hard, but just try! (but not using windows please) 4. Mesocosm experiments are fundamental to apply lab proof of concepts to quasi-real conditions.

- Breakout room 2 Amel, Assunta, Nathalia, George, Saloua and Assem Morning Lectures Lecture One by (Angelo) • The ocean is a big source of marine natural product unexplored. • Marine natural products as promising sources

Open text poll

Please write a milestone you have identified for each lesson. One sentence which in your opinion defines one of the most important messages of the lesson (feel free to add the number of your Group)

0 0 5

(5/5)

of bioactive compounds. Lecture two by (Peter) • Recent advances in the field of genomics, transcriptomics, proteomics, and metabolomics have led to an overall increase in the industrial output and, hence, an improvement in the biomedical outcomes. Lecture three by (Giuseppe) • The evolution of DNA extraction & storage methods • Mapping VS Assembly

Afternoon Lectures Lecture four by (Simone) • How to avoid the spread of oil in the water surface. • Research activity with high transfer potential, aimed at developing advanced technological products that impact the market and possible commercial exploitation in priority sectors for the economy. • Marine bacteria are interesting candidates for bioremediation.

Ranking poll

Which two projects inspired you most?

0 1 5

1. PlastiSea — 1.13
2. ResUrbis — 0.73
3. SNAP — 0.60
4. RASbiome — 0.33
5. CASEAWA — 0.20
6. SIDESTREAM — 0.00

Please write a milestone you have identified for each lesson. One sentence which in your opinion defines one of the most important messages of the lesson (feel free to add the number of your Group)

0 0 4

(1/7)

- Group 3: Assunta Saide, Bernardno Patti Giuseppe Falini: “The multiple function of CaCO3” “The great resource from waste material” Arlov: “The emerging functions of polychetides” Malzahn; “Energy efficient biogas production by recirculation” “Polychaete as raw material for feed and law trophic marine species” Ingrid bakke: “Microbial management in RAS for sustainable aquaculture” Francesco Valentino: “The urban waste is the big opportunity for the circular economy” Sam Dupont: “The Ocean health has a big impact on human health”
- Breakout room 2 - Exploitation of CaCO3, from

Open text poll

Please write a milestone you have identified for each lesson. One sentence which in your opinion defines one of the most important messages of the lesson (feel free to add the number of your Group)

0 0 4

(2/7)

waste product of aquaculture to a biomaterial and energy materials, the interest of shell calcium carbonate compared to geogenic calcium carbonate - The algal polysaccharides : a source of various applications,
more than 80% for food less of 20% for biotechnologies, multiple applications targeting multiple industry sectors - The importance of law trophic organisms

to produce novel feed ingrédients especially for Europeen aquaculture - Microbes are fundamental for successful fish production and the sustainability of aquaculture because Microbioms are correlated to water quality - Application of circular economy

Open text poll

Please write a milestone you have identified for each lesson. One sentence which in your opinion defines one of the most important messages of the lesson (feel free to add the number of your Group)

0 0 4

(3/7)

- approach conversing urban wastes into bioplastic from pure microbial culture - Research activities for sustainable development: improve our knowledge to focalize the action and protected health oceans which is linked to human health
- Breakout room 5 Caterina Rodriguez, Joana Sousa, and Assem Mohamed
- Lecture 1 by (Giuseppe Falini & Øystein Arlov) Although shell waste remains a huge barrier to sustainable development, it is a good example about how apply a circular economy approach. Due to the crucial role of seaweeds industry, it is necessary get a better technology to

Open text poll

Please write a milestone you have identified for each lesson. One sentence which in your opinion defines one of the most important messages of the lesson (feel free to add the number of your Group)

0 0 4

(4/7)

obtain high value and bio-sustainable materials Lecture 2 by (Arne Malzahn & Ingrid Bakke) Microbiomes and lower trophic levels have key roles for environmental, energy and health biotechnology, so we need to do more
effort to overcome the challenges Lecture 3 by (Francesco Valentino) It’s time to

replace linear economy with circular economy for turning waste into resource. Benefits from the waste as an additional source of income. Lecture 4 by (Sam Dupon) It is important to preserve the oceans and a life in them, through multidisciplinary approaches. Impact of the

Please write a milestone you have identified for each lesson. One sentence which in your opinion defines one of the most important messages of the lesson (feel free to add the number of your Group)

0 0 4

(5/7)

- global changes on marine species and ecosystem. Ocean health= human health Lecture 5 by (Round table) Co-operation with the different researchers, networking to change your way of thinking. Sustainable blue growth accelerating the blue bioeconmoy knowledge, new product and services, by improving existing way.
- Leason 1 Extract
- calcuim carbonate from sea shell wastes for eg oyster,mussels this mineral used in paper plastic pints and coating industries. Algal extracted polysaccharides, cellulose from algal other project the title is novel ehanced bioplastics from sustainable processing of seaweed used chemical

Open text poll

Please write a milestone you have identified for each lesson. One sentence which in your opinion defines one of the most important messages of the lesson (feel free to add the number of your Group)

0 0 4

(6/7)

and enzymatic hydrolysis that make alginate and cellulose

Leason 2 Bioprospecting bio-mass valorization, com-pany experience/2, by In-grid Bakke (RASbiome) and Arne Malzahn (SIDE-STREAM) production of lower trophic Marine organisms on industrial sides stream produced fatty acids rich in omega 3 from

salmon fish established new production candidates cultived polychaeta as raw material from feed product biogas digested as substrated from single cell protein production Ras biome for sustainable aquaclture production the method that improved water quality

Open text poll

Please write a milestone you have identified for each lesson. One sentence which in your opinion defines one of the most important messages of the lesson (feel free to add the number of your Group)

0 0 4

(7/7)

for fish with microbiol fish Leason

3 Used urabanic wast to product PHA polyhyroxyalkanoate biodegradale polymer as procution of bioplasic In afternoon * sophie project to have a good life *the perpose of blue med project Groupe 5

Multiple-choice poll

What would be your favourite seafood dish?

0 0 9

Algae salad

11 %

Fish burger

33 %

Marine candy

56 %

Open text poll

Please write a milestone you have identified for each lesson. One sentence which in your opinion defines one of the most important messages of the lesson (feel free to add the number of your Group)

0 0 5

(1/8)

- Groupe 3: Billal Zenati, Nezha Mejjad and Amel Ismail Presentation1: Technology transfer starts from idea then laboratory scale to reach industrial scale which accelerated by connect all stakeholders and decision makers and build a communication bridge for each phase. Presentation 2: Biotechnology is among the blue economy sectors that could keep the three components balanced social-economic and environment sectors as it contributes to reduce both resource loss and waste. Presentation 3: Patent is a crucial process to protect innovative ideas that may reach the market. Presentation 4: The

Open text poll

Please write a milestone you have identified for each lesson. One sentence which in your opinion defines one of the most important messages of the lesson (feel free to add the number of your Group)

0 0 5

(2/8)

Cooperation between government, academic researcher and private companies, could deliver tangible results, ensure business development, and attract more attention and benefits.
Presentation 5: Developing communication skills and using social media as channel is the best way expand and bay knowledge.

- 1. The importance of targeting an economical purpose for each and every research project with the aim to transfer the knowledge and technologies results. 2. The importance of coupling marine biotechnology with marine bioeconomy for a sustantiable growth and a healthy blue word 3. The importance

Please write a milestone you have identified for each lesson. One sentence which in your opinion defines one of the most important messages of the lesson (feel free to add the number of your Group)

0 0 5

(3/8)

- of caution when disseminating unpublished results, ideas or unprotected products and innovations 4. The role of academics in economical firms, and how to break barriers to successfully build a bridge between the two entities 5. Science communication: how can it make or break your career?
- Group 4 1 - Technology transfer is pivotal to transfer research results from academic environment to industry and society. 2- Marine resources are still poorly explored but highly potential for bioeconomy and biotechnology. 3 – IP rights is the first step for research results that go to the market because

Please write a milestone you have identified for each lesson. One sentence which in your opinion defines one of the most important messages of the lesson (feel free to add the number of your Group)

0 0 5

(4/8)

they assure exclusivity. 4- Research alone is no longer sufficient and efficient without the support of the private sector. EU funding for company/researcher bring to the development of marketable products. 5 – Success is based on efficient communication.

- Group 5: Lecture 1: The key to accelerate the technology transfer is the synergy between research compartment and industry compartment; Cluster BIG offers the opportunity to create this synergy, Collaboration and cooperation. That is why we need to get trained on tech. transfer. Lecture 2:

Open text poll

Please write a milestone you have identified for each lesson. One sentence which in your opinion defines one of the most important messages of the lesson (feel free to add the number of your Group)

0 0 5

(5/8)

We have learnt examples about obtaining good and services from marine species with zero waste. Lecture 3: IPR is important to push the technology transfer. Benefits are for the “inventor” but also for the others that can improve your technology. Lecture 4: As the marine biotechnology pipeline is very wide and about the
interaction between a SME and research, SME favors the connection between Marine biotech industry, academic sector and (very important) governance. Lecture 5: It is interesting and surprising to know that there exists some rules that we must follow to be a good communicator. If there exists course for that, we want to assist!

- Knowledge and Technology transfer, research

Open text poll

Please write a milestone you have identified for each lesson. One sentence which in your opinion defines one of the most important messages of the lesson (feel free to add the number of your Group)

0 0 5

(6/8)

results values, Lecture1 by Roberto Cimino, Italian Cluster BIG Explaine the technologie transfer and the interaction en relation with society,custmer ,institution, research organisation entrepreneur the purpose to develop technologie Show the national system
of innovation and speaks about biobiothenology to have

sustainable marine Exploitation Talk about the collaboration between Italy and Tunisia Transfer of biotechnology to create the community of mediterranean blue biotechnologie Marine bioeconomy and biotechnologies, Lecture2

Open text poll

Please write a milestone you have identified for each lesson. One sentence which in your opinion defines one of the most important messages of the lesson (feel free to add the number of your Group)

0 0 5

(7/8)

byHjörleifur Einarsson, Univer-sity of Akureyri The blue bioeconomy concept used to tranfer technologie from university to industries. From fish algae can have a new product in cosmetic, medical, feed ingredient,extacted oil and have quality sea food. Can elaborat collagen , gelatin and glycosaminoglycan Can have active ingredients from fish. Challenges for re-searchers,

IP and legal as-pects, Lecture3 by Alessia Naso, CNR She Speaks to legal right, patent and copyright. The role of patent provides the inventor with legal right for the invention. Developing

Open text poll

Please write a milestone you have identified for each lesson. One sentence which in your opinion defines one of the most important messages of the lesson (feel free to add the number of your Group)

0 0 5

(8/8)

business: interaction between re-search and private companies, Lecture4 byAlexia Massa-Gal-lucci, AquaBioTech Group Speaks about Marine biotechnology pipeline and the role Aqua biotech group that he work to extract from fish waste to extract oil, valorization fatty acid, marine collagen and fish meals. Live cooking with algae, by Saloua Sadok
He show laboratory, the students prepars a new product from sardinella aurita and hamburger frorm sparus aurata and algae meal. In afternoon LivingLab Game on BlueBiotech COMM strategies, Lecture 5 by Ana Rotter, Ocean4Biotech She Speaks about the communication between reacher an public used oral, written, and social media. Group 5

Multiple-choice poll

Has your country ratified the Nagoya Protocol?

0 1 3

Yes

69 %

No

31 %

Which solutions the B-Blue project has proposed in order to mainstream its results and to be more effective in reaching its goals?

0 1 2

- Circular Economy
- Enhancing the biotech transfer
- bluebiotechnologies
- Is by extend its cluster actors
- To increase the communication between several actors involved in blue biotech community
- I think that we must first have an adequate research program.
- research of funding , project management, dissemination, valorisation
- Adopting suistanable development
- Bioenergy
- Blue-biotech innovation
- Bioeconomy
- bioenergy

Multiple-choice poll

Survey (1/5)

0 0 2

Which of these databases is used for 16S rDNA taxonomic annotation?

SILVA ✓

50 %

KEGG

0 %

RESFINDER

50 %

InerPRO

0 %

Multiple-choice poll

Survey (2/5)

0 1 1

Which of these programs is used for metagenomic assembly?

QIIME2

45 %

FASTP

27 %

SPADES

9 %

FASTQC

18 %

Multiple-choice poll

Survey (3/5)

0 1 4

How many pharmaceutical product currently on the market are of marine origin?

None

7 %

10

50 %

100

21 %

1000

21 %

Multiple-choice poll

Survey (4/5)

0 1 2

The anammox process can be used to treat wastewater because it

converts nitrate and ammonia to nitrogen gas

8 %

removes nitrogen by ammonia oxidation under anaerobic conditions

75 %

removes nitrogen through sludge production

8 %

removes nitrogen by ammonia oxidation under aerobic conditions

8 %

Multiple-choice poll

Survey (5/5)

0 1 3

What is (order of magnitude) the worldwide production of waste seashell from aquaculture per year?

tens of tons

0 %

hundreds of tons

23 %

thousands of tons

23 %

millions of tons

54 %

Multiple-choice poll

(e)ValueBack Survey. Your feedback is important to help us develop future training courses that exceed your expectations. Thank you. (1/15)

0 1 9

Were you able to login in easily and access the event?

(e)ValueBack Survey. Your feedback is important to help us develop future training courses that exceed your expectations. Thank you. (2/15)

0 1 8

How would you summarise the training course? Share your highlights of the week in 100 maximum words!

(e)ValueBack Survey. Your feedback is important to help us develop future training courses that exceed your expectations. Thank you. (3/15)

0 1 4

What were your favourite features and tools during the virtual training course?

(1/2)

- zoom, slido and wonder
- This course was usefull for me because I have learned many things during this period.
- Lecutres
- The milestone wrap-up and discussion between trainees there, the chat to annonce questions (when we don't like to appear), the online presentations zoom-in (effective tool to better understand the lessons), the videos provided before the lessons
- Android phone-based ZOOM application
- Breakout rooms associated to sli.do and wander.me
- Breakout rooms
- exaustive mail communication of the organisers

Open text poll

(e)ValueBack Survey. Your feedback is important to help us develop future training courses that exceed your expectations. Thank you. (3/15)

0 1 4

What were your favourite features and tools during the virtual training course?

(2/2)

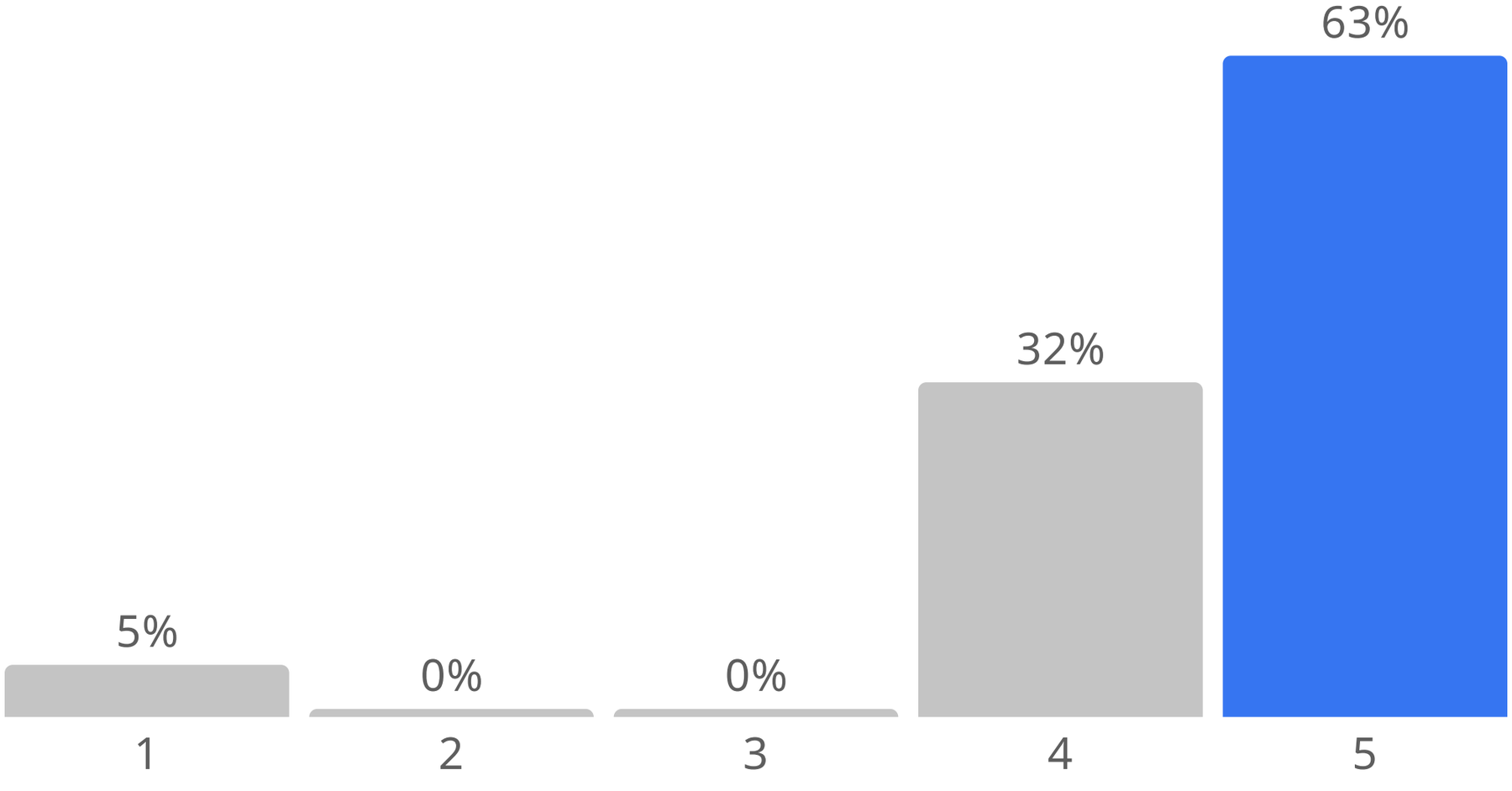
- The small teams after each day
- Wrap-up sessions
- The course platform
- very good
- The great potential of biotechnology from marine species and the different applications
- The main tool for following the course and the brokerage event were perfect and the features presented were also very relevant.

(e)ValueBack Survey. Your feedback is important to help us develop future training courses that exceed your expectations. Thank you. (4/15)

0 1 9

Rate the content of the programme (5 = highest rating, 1 = lowest rating)

Score: 4.5

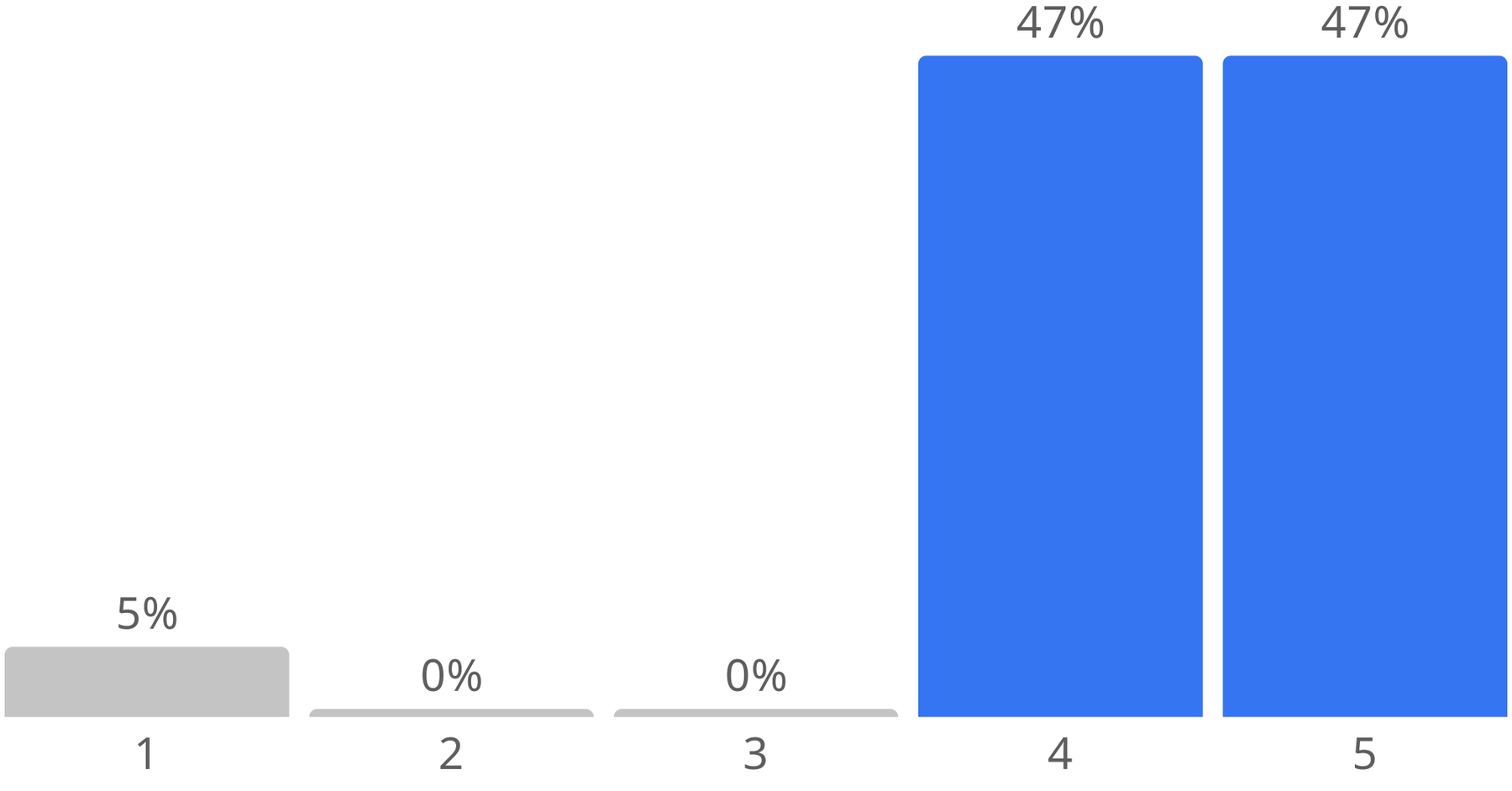


(e)ValueBack Survey. Your feedback is important to help us develop future training courses that exceed your expectations. Thank you. (5/15)

0 1 9

Rate the lecturers and speakers (5 = highest rating, 1 = lowest rating)

Score: 4.3

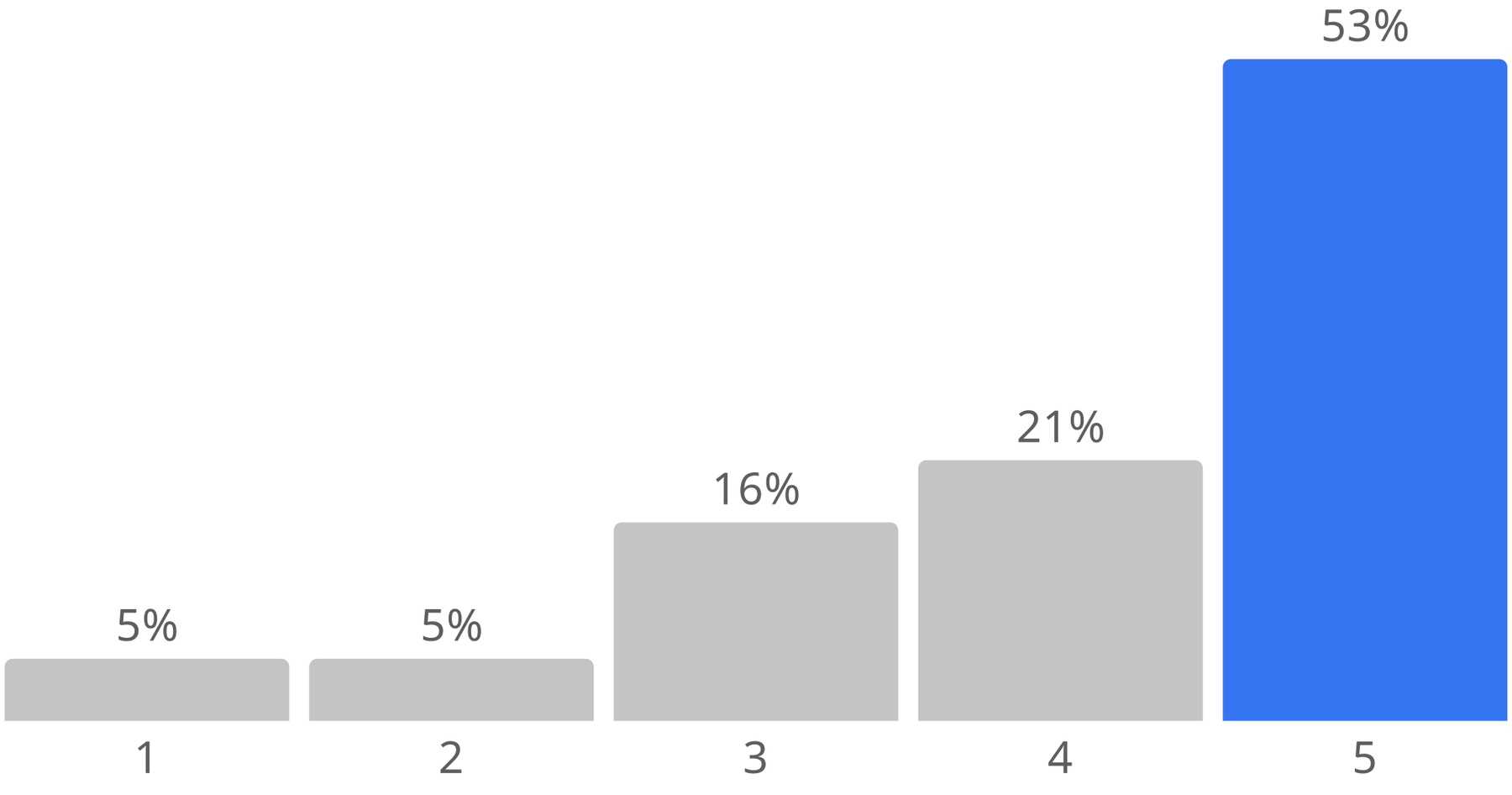


(e)ValueBack Survey. Your feedback is important to help us develop future training courses that exceed your expectations. Thank you. (6/15)

0 1 9

Rate the communication prior to the training course (5 = highest rating, 1 = lowest rating)

Score: 4.1

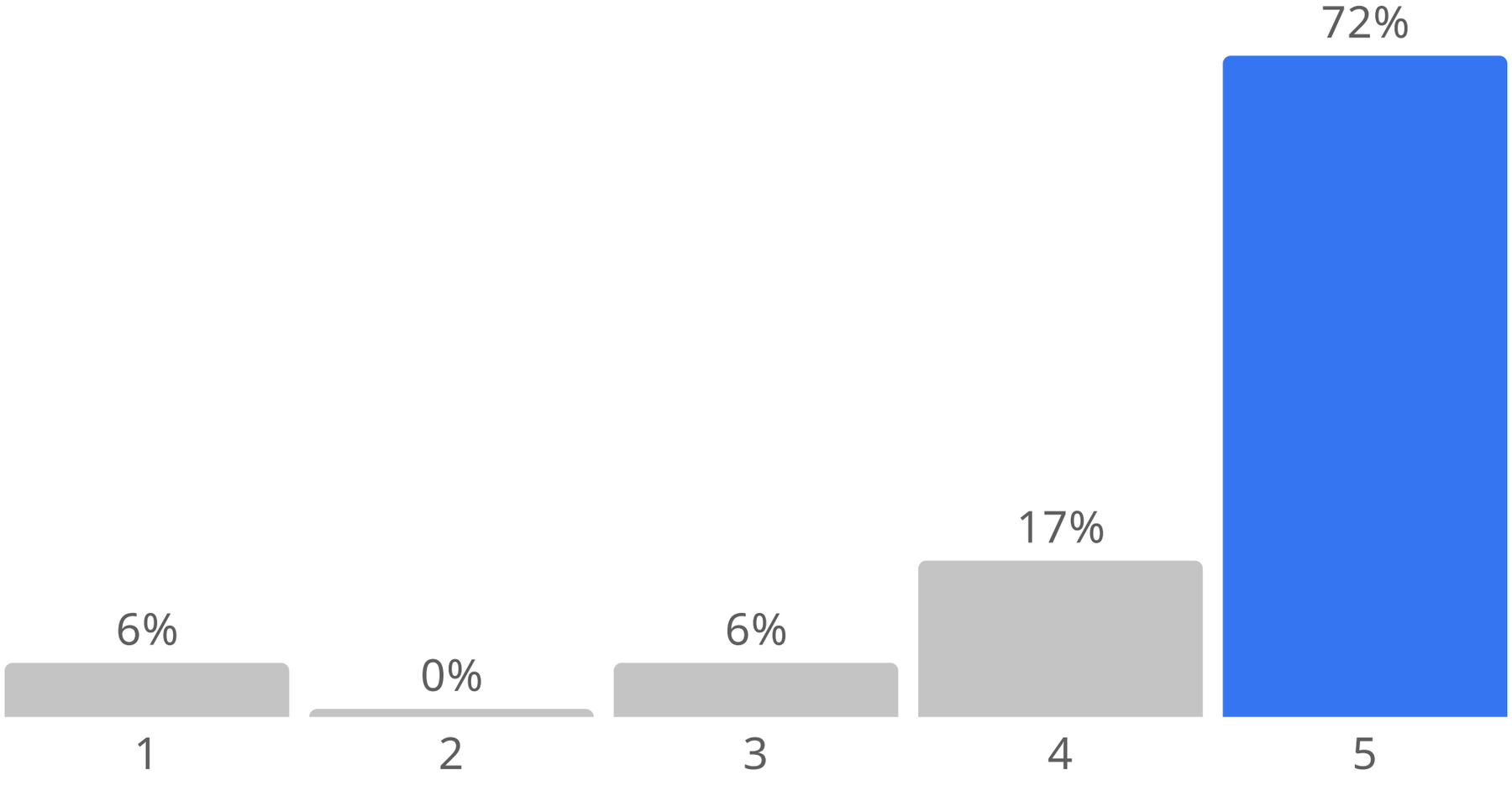


(e)ValueBack Survey. Your feedback is important to help us develop future training courses that exceed your expectations. Thank you. (7/15)

0 1 8

Rate the opportunity for questions (5 = highest rating, 1 = lowest rating)

Score: 4.5

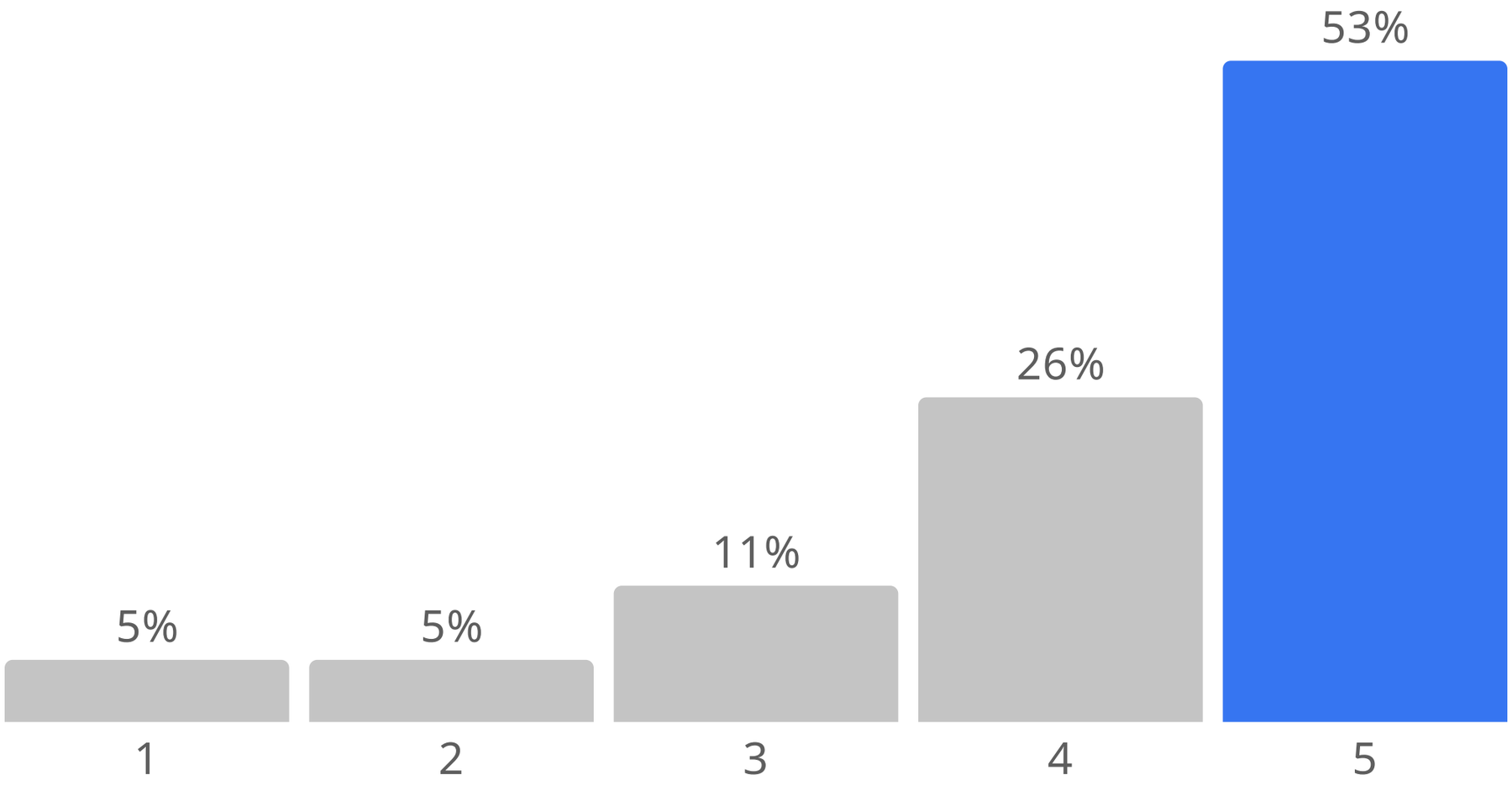


(e)ValueBack Survey. Your feedback is important to help us develop future training courses that exceed your expectations. Thank you. (8/15)

0 1 9

Rate the virtual networking opportunities (5 = highest rating, 1 = lowest rating)

Score: 4.2



(e)ValueBack Survey. Your feedback is important to help us develop future training courses that exceed your expectations. Thank you. (9/15)

0 1 4

Please specify which relevant speakers or topics not featured here today you would like to see at a future training course

(1/2)

- entrepreunership
- To have deeper knowledge on Seaweeds Biotechnologies in the future
- more molecular tools and upscaling process
- Andrea Franzetti to speak more about biosurfactant and bioemulsifiers, bioplastics and exopolysaccharides from marine bacteria in
- more details, microalgae and Recirculating aquaculture systems (RAS), monitoring and characterization of bioplastics in seas
- I would like to see more speakers from start-up and spin-off.
- China/Asian blue biotech is a topic that should be addressed. Among speakers, maybe someone from policy and EU
- Drug Discovery from the

Open text poll

(e)ValueBack Survey. Your feedback is important to help us develop future training courses that exceed your expectations. Thank you. (9/15)

0 1 4

Please specify which relevant speakers or topics not featured here today you would like to see at a future training course

(2/2)

bioassay point of view

- I am very satisfied
- Market, economic viability of proposals background
- product new molecul
- The contribution of biotechnology on blue economy
- Maybe a talk or very short session about opportunities of other marine microorganisms (like yeast)
- Circular Economy -

Blue economy -

- Nagoya protocol

Open text poll

(e)ValueBack Survey. Your feedback is important to help us develop future training courses that exceed your expectations. Thank you. (10/15)

0 1 2

Feel free to further comment/suggest us improvements

(1/2)

- Virtual courses is excellent idea especially for those how travelling is difficult for them like me. I just propose that lunch beak is 1h not 2 and course end at 4pm not 5 pm and wonder session also be at 3 pm for exemple not 7 pm.
- Some lecturers spoke quickly. So sometimes I couldn't follow them easily. Thereafter,in the future please avice them to speak slowly because our Englis is not very good. Thank you.
- If I well understand the question "Rate the communication prior to the training course": meaning for me my level of communication before joining this training course, I answered "not very well", but after, I feel more comfortable when addressing to other peoples.
- Please mention different time zone for the international participants

Open text poll

(e)ValueBack Survey. Your feedback is important to help us develop future training courses that exceed your expectations. Thank you. (10/15)

0 1 2

Feel free to further comment/suggest us improvements

(2/2)

- Possibility to access to the recordings of session would be a big plus
- I really enjoyed the programme
- It was perfect
- Congratulations to the organization, great job, very interactive and nice disussing environment
- communication
- You did it great, guys, perfect! I would loved to be there, but with the covid issue, this has been the better way.
- As a virtual programme it is good
- I don't have suggestion

Multiple-choice poll

(e)ValueBack Survey. Your feedback is important to help us develop future training courses that exceed your expectations. Thank you. (11/15)

0 1 9

How would you consider this on-line training course compared to an in-person training course?

Better than

16 %

The same as

37 %

Not as good as

32 %

This is my first training course

5 %

I don't have a clear opinion

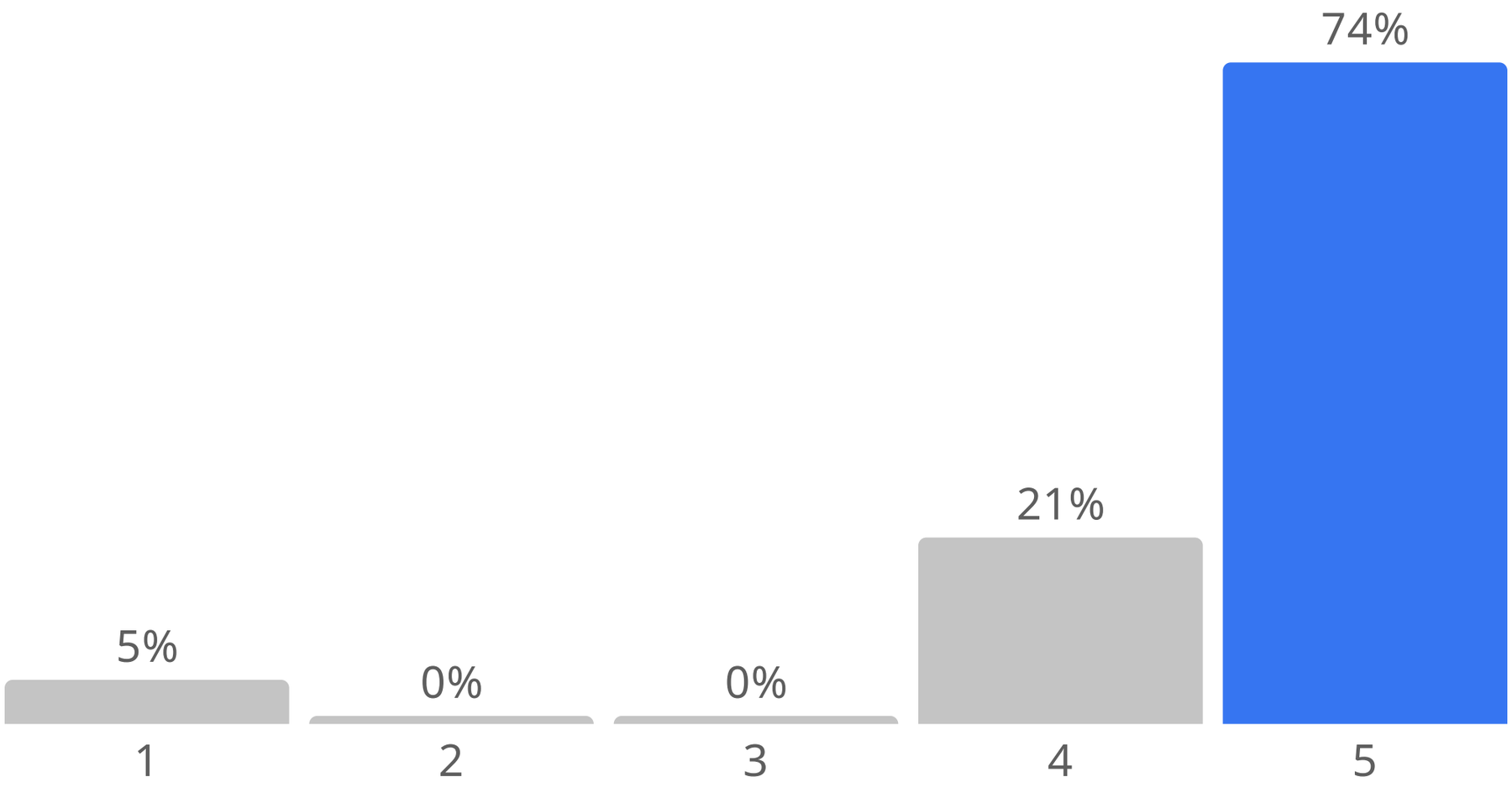
11 %

(e)ValueBack Survey. Your feedback is important to help us develop future training courses that exceed your expectations. Thank you. (12/15)

0 1 9

How are you likely to see a next edition of this course? (1 = not likely at all; 5 = totally in favour)

Score: 4.6



Open text poll

(e)ValueBack Survey. Your feedback is important to help us develop future training courses that exceed your expectations. Thank you. (13/15)

0 1 2

What aspects of the training course we can improve upon for a possible next edition? How far should it take place from now on and with whic frequency?

(1/2)

- juste the time, course end at 4pm not 5 pm and wonder be at 3 pm not 7 pm. frequency of other training 8 months or 1 year.
- I think that aquaculture biotechnology training course would be useful for many people. Such a course could be held every two years
- Preparing presentations (if it is possible) and
- useful documentation of each lesson 1 to 2 days before for better understanding and interest in the lessons
- There is some issue related to specific pronunciation aspect for the speaker. In this regard, the subtitle should be flashed during the talk for a better understanding of the matter.
- I think that there aren't

(e)ValueBack Survey. Your feedback is important to help us develop future training courses that exceed your expectations. Thank you. (13/15)

0 1 2

What aspects of the training course we can improve upon for a possible next edition? How far should it take place from now on and with whic frequency?

(2/2)

- more aspects to improve.
- I would take out the hard bioinformatic lession. Every year or every two years.
- I think the next course could takes place in 2 yeras; it can cansider also sampling collection techniques as new topics to improve the course
- Since it is necesaary to much time to
- organize it, it could be once a year.
- Maybe annualy call of the course, and if possible not online
- Other biotechnology
- Maybe link this course with others more specific and in which we have shown interest (e.g. science communication)
- -

Multiple-choice poll

(e)ValueBack Survey. Your feedback is important to help us develop future training courses that exceed your expectations. Thank you. (14/15)

0 1 9

Would you be interested in joining another training course related to blue biotechnologies, aquatic products and blue bioeconomy?

Yes

100 %

No

0 %

Multiple-choice poll

(e)ValueBack Survey. Your feedback is important to help us develop future training courses that exceed your expectations. Thank you. (15/15)

0 1 9

Would you be interested in joining another brokerage event related to blue biotechnologies, aquatic products and blue bioeconomy?

Yes

95 %

No

5 %