

Report First ISME-Africa Symposium 20-26 May 2023

Venue : Institut National Polytechnique Félix Houphouët Boigny, Yamoussoukro, Côte d'Ivoire

Date : 22-26 mai 2023

I-Context of the event

The first African regional event was held in South Africa (Johannesburg) on the sidelines of the South African Microbiology Congress in 2018. This meeting was attended by all African ISME Ambassadors. Since then, due to the pandemic, there has not been any opportunity for in person regional events although the group has met several times online. The regional network has grown substantially since the first symposium ISME-Africa symposium aimed to strengthen this collaborative network. Indeed, at our previous meetings, we identified the lack of bioinformatics training as one of the major impediments for African microbiome research. Given the use of high throughput sequencing, this was a good opportunity to strengthen regional research collaboration. We have identified the lack of training in bioinformatics as one of the main obstacles to microbiome research in Africa, given the use of high-throughput sequencing. This is why it was agreed to organize a face-to-face meeting in the form of an ISME-Africa symposium and training workshop in bioinformatics which aims to bring together regional and international experts in addition to instructing students, researchers and anyone interested in this field. INPHB was chosen to organize this first ISME-Africa symposium and training workshop in bioinformatics. This choice is not accidental. On the one hand because the senior ambassador ISME Côte d'Ivoire Prof Adolphe Zézé and the junior ISME ambassador Dr Fossou Romain are from the INPHB. On the other hand, more importantly, the INPHB has the infrastructure (Laboratory) and a team of microbiologists and bioinformaticians capable of implementing a symposium/workshop at this high level.

This first Symposium-Workshop in Microbial Ecology and Bioinformatics in Africa of the International Society for Microbial Ecology (ISME) was a hybrid scientific event (face-to-face and online) which was successfully held from May 22 to 26, 2023 at the Félix HOUPHOUËT-BOIGNY National Polytechnic Institute (INP-HB) in Yamoussoukro. The theme chosen for this double event was "**Microbial ecology, an asset for sustainable ecosystem services**". Through this theme, it was a question of taking stock of research in microbial ecology, an essential discipline for sustainable development in the agricultural field, agro-industries, extractive industries and health, etc., while giving a practical training in bioinformatics analyzes for the young generation of researchers.

This first ISME-Africa event was a good opportunity to hold a hybrid event as a Symposium and Bioinformatics Training workshop. The Symposium aimed to bring together regional and international experts.

Organizing committee

President: Professor Adolphe ZEZE, ISME Country Ambassador (adolphe.zeze@inphb.ci)

Vice-president: Dr Romain FOSSOU, ISME Country Young Ambassador(romain.fossou@inphb.ci)

Protocol and Welcome: Ms YEBOUET Inès; Dr. TIENEBO Eric

Restauration: Ms AMON E. épouse BEHOU

Secretary: Mr. EBOU Anicet - Dr. FOSSOU Kouakou Romain - Dr Kouadjo-Zézé Claude Ghislaine

Transport and logistics: Dr. NANDJUI Jacob; Mr. ADOU Paul-Marie; Dr Kouadjo-Zézé Claude Ghislaine

Communication and media: Mr. GNAHOUA Arafat

Finance: Mr. EBOU Anicet (bis) - Ms YEBOUET Inès

Maintenance and hygiene: Ms AKAFFOU Marie-Ange

Members as ISME ambassadors from Africa:

Prof Thulani Makalanyane, University of Pretoria, SA

Prof Fanus Venter, University of Pretoria, SA

Prof Nourou Soulemane Yorou, University of Parakou, Benin

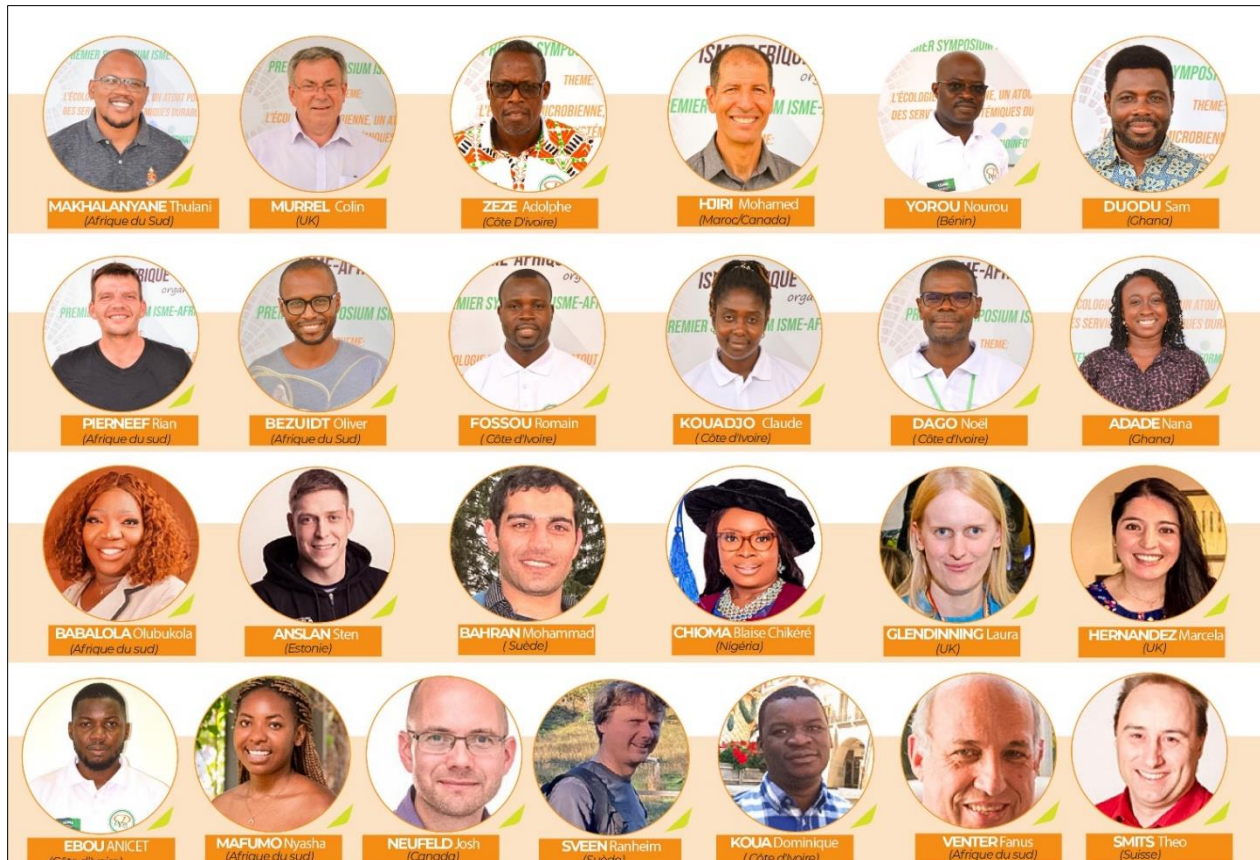
Dr Sam Duodu, University of Ghana, Ghana

Prof Chioma Blaise Chikéré, University of Port Hacourt, Nigeria

II-Scientific reports

This event saw the in presence attendance of 16 experts of which ten foreign experts: Five Professors came from South Africa, including four from the University of Pretoria and one from Northwest University, a Professor from the University of Parakou in Benin, a Professor from the University of Montreal and the Mohamed VI Polytechnic University, a Professor from England (East Anglia University) and two experts from the University of Ghana. There were 9 online conferences worldwide (Photo 1)

Photo 1: invited experts during the first ISME-AFRICA symposium/Workshop



This symposium/workshop in bioinformatics saw in presence attendance of 37 students including 25 scholarship holders, of which 15 from Côte d'Ivoire and 10 non-nationals from Morocco, Benin, Senegal, Burkina Faso, Mali, France and Nigeria (Photo 2)





1- Opening ceremony

The opening ceremony of this Symposium-Workshop was launched in the honor hall of the INPHB in Yamoussoukro in the presence of the general manager of the INP-HB represented by Professor YOUROUGOU Pierre, Deputy Director General in charge of International Cooperation and the Technopole (DGA-CIT), and Prof Wandan Narcisse DRH INPHB, the Ministry of Higher Education and Scientific Research of Côte d'Ivoire (MESRS-CI), represented by the Deputy Director of Cabinet Prof Ouattara Djakaridja, the Director of Research Prof Bamba and the Director of Innovation Prof Soro Scheherazade.

After the speech of the Senior Ambassador Côte d'Ivoire, Prof Adolphe Zézé who explained the context and the challenge of this first Symposium-Workshop, the DGA Prof Yourouguo on behalf of the DG said the honor of the INPHB to host this event and extended the traditional welcome to the participants. ISME President Prof Phil Hugenholtz intervened from Brisbane, Australia to express his joy at the holding of this first ISME-Africa symposium in Côte d'Ivoire.

The DirCab Prof Ouattara Djakaridja representing Prof Diawara, Minister of Higher Education and Scientific Research of Côte d'Ivoire (MESRS-CI) said the importance of this event which is close to the heart of the Minister. He thus opened this event by wishing a good symposium/workshop.

After the opening ceremony, which was strongly attended by participants connected online, the following stages of the event were devoted to the symposium, the highlights of which are presented below.

2- Scientific activities

2.1 Plenary conference

Professor Mohamed HIJRI of the Mohammed VI Polytechnic University (UM6P / Morocco) and the University of Montreal (Canada) opened the scientific exchanges with a plenary conference on the theme "Microbial ecology, an asset for ecosystem services sustainable". Prof Mohamed Hijri highlighted the importance of microbial OMICS in the development of agriculture in Canada and in understanding ecosystem services in sustainable agriculture. Several questions were asked by the audience, including interventions by Prof Bamba, Director of Research and Prof Djakaridja, Deputy Dir cab of MERS. This conference was greatly appreciated by the various participants who were also able to measure the scope of this unprecedented event in Africa.

After this conference, online and face-to-face oral presentation sessions were organized. There are a total of six seminars covering various axes of microbial ecology:

2.2 Seminars

Seminar 1: The microbial ecology of soil, plants and food in the era of "omics" technologies. This seminar included four conferences, three of which were face-to-face and one online. The first lecture was presented online by Prof. Theo SMITS (Zurich University of Applied Sciences (ZHAW), Switzerland). It focused on the application of -omics technologies in the plant-microbe interaction: the example of *Xanthomonas fragariae*. Then followed the respective presentations of Ms. Emma AMON-BEHOU (INP-HB, Côte d'Ivoire) on the metagenomic analysis of the soil bacteriobiome in Côte d'Ivoire, by Dr. Romain FOSSOU (INP-HB, Côte d'Ivoire) on the ecology of Rhizobia in the soils of Côte d'Ivoire and Prof. Olubukola O. BABALOLA (North-West University, South Africa) on the role of rhizobacteria in the adaptation of plants to drought and environmental changes.

Seminar 2: The microbial ecology of humans and animals.

This seminar was opened by the online presentation of Dr Laura GLENDINNING (The Roslin Institute and R(D)SVS, University of Edinburgh, UK) on the subject of the microbiota of commercial and village chickens. After this presentation, it was the turn of Dr. Sam DUODU and Mrs. Nana ADADE (University of Ghana, Ghana) to communicate respectively on the topics "Genomic overview of *Klebsiella pneumoniae* ST101 clones from humans and poultry" and "Comparative analysis of *Vibrio cholerae* isolates from Ghana".

Seminar 3: The microbial ecology of extreme environments.

The keynote of this seminar was given by Prof. Thulani MAKHALANYANE (University of Pretoria, South Africa) on the topic of microbial ecology of extreme environments. It was followed by the online presentation by Dr. Marcela HERNANDEZ (University of East Anglia, UK) on CO oxidants and soil formation in volcanic rocks and face-to-face presentations by Dr. Rian PIERNEEF (University of Pretoria, South Africa) on evolutionary adaptive strategies revealed by dryland microbiology and

Dr. Oliver Bezuidt (University of Pretoria, South Africa) on viral contribution to biogeochemical recycling in remote and pristine marine environments.

Seminar 4: Marine and surface water ecology and environmental restoration.

This seminar included two online presentations including the opening conference presented by Prof. Josh NEUFELD (University of Waterloo, Canada) with the theme “Microbes in water: new light on anoxygenic photosynthesis” and the presentation of Prof. Blaise Chikéré CHIOMA (University of Port Harcourt, Nigeria) on Nature-Based Strategies for the Eco-Remediation of Oil-contaminated Lands in line with the UN SDGs. The last presentation of this seminar was made face-to-face by Mrs. Nyasha MAFUMO (University of Pretoria, South Africa) on the distribution, metabolic potential and functions of viral communities in the Agulhas Current and the Southern Ocean.

Seminar 5: Survey of microbial communities.

Opened by one of the former presidents of ISME, Prof. Colin MURRELL (University of East Anglia, UK), on the theme “Microbial ecology of bacteria degrading isoprene”, this seminar included online presentations by Prof. Mohammad BAHRAM (Swedish University of Agricultural Sciences, Sweden) on the analysis of ecological communities using metabarcoding data and Dr. Tord Ranheim Sveen (Swedish University of Agricultural Sciences, Sweden) on basic data management and analysis of OTUs and taxonomic diversity.

Seminar 6: The SeqCode.

This last seminar, which marked the end of the symposium, was led by Prof. Fanus VENTER (University of Pretoria, South Africa) with a talk on The SeqCode: bringing stability to microbiome research, and by the bioinformatics team ahead of the workshop.

In sum, the speakers addressed a variety of topics, ranging from the contribution of -omics technologies in environmental microbiology studies to current challenges in the analysis of genomic data of viruses & bacteria and the innovative approaches used to overcome them. The exchanges were very lively and helped to generate new ideas for collaboration and student exchanges.

3. Bioinformatics training workshop

For three days, participants had the opportunity to attend hands-on training workshops led by experts in the field. The workshops covered a wide range of topics, such as:

- Introduction to the IT environment and the Linux command line led by Dr. Dominique KOUA & Mr. Anicet EBOU (INP-HB, Ivory Coast)

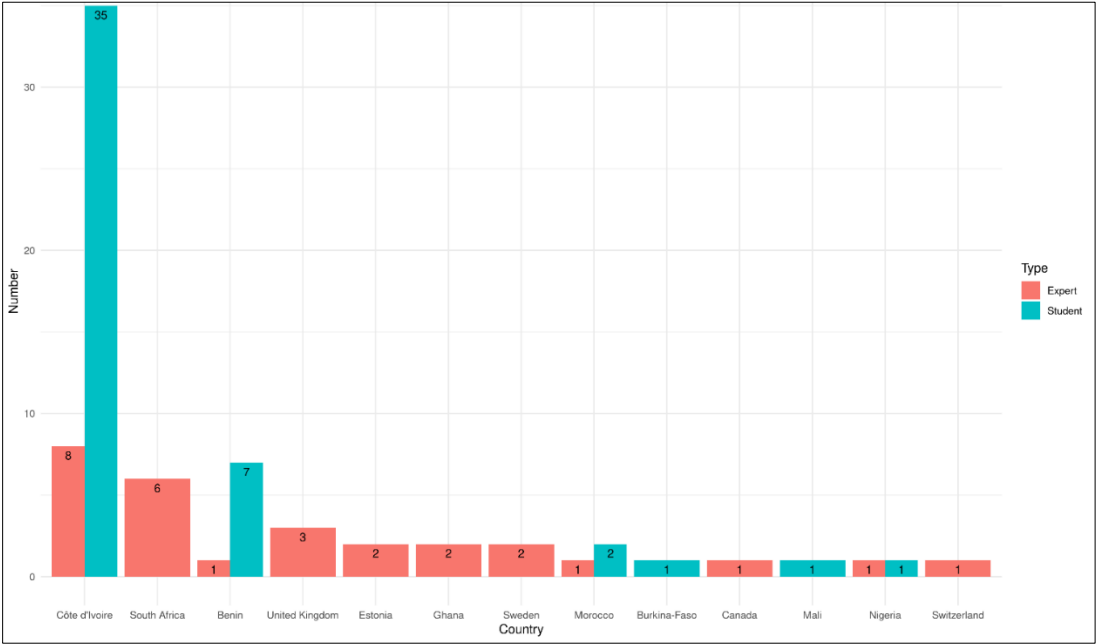
- Introduction to bioinformatics tools and databases on online servers led by Mr. Anicet EBOU (INP-HB, Ivory Coast) and Dr. Noel DAGO (University GBON COULIBALY, Ivory Coast)
- Practical workshop on processing metagenomic data (Part 1: PCR data, Part 2: Metagenomic data and Part 3: Phylogenomic analysis and genome-based tree reconstruction) led by Dr. Rian PIERNEEF and Dr. Oliver BEZUIDT (University of Pretoria, South Africa)
- Multilocus sequence analysis (MLSA) and phylogeny led by Dr. Romain FOSSOU (INP-HB, Ivory Coast)
- Ecological statistical analysis of microbial data with R led by Mr. Anicet EBOU and Mrs. Emma AMON-BEHOU (INP-HB, Ivory Coast)

Participants were able to practice the concepts and techniques learned and pose specific questions to each trainer. These sessions encouraged fruitful exchanges and discussions between participants and trainers.

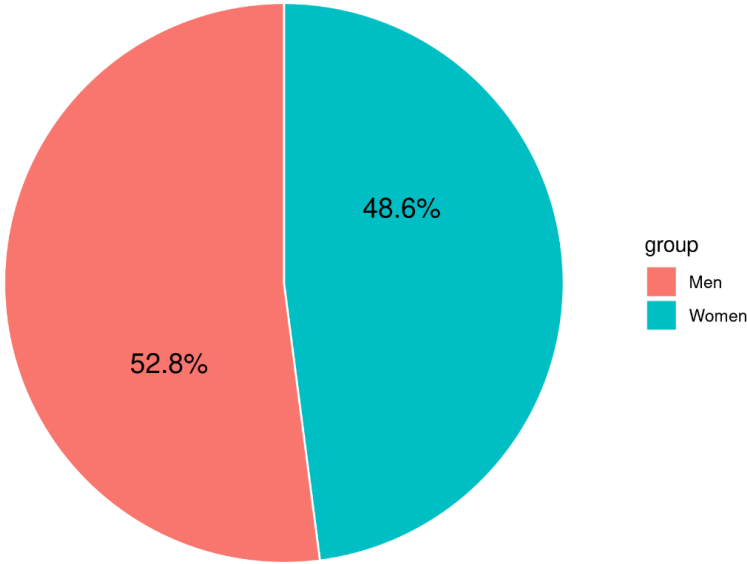
4. Some statistics

More than 100 people attended the opening ceremony of ISME-AFRICA 2023. Among them, 75 people then participated in the symposium and practical training in Bioinformatics. These participants come from 13 countries including 8 African countries (Annex 1). Women made up 49% of all participants. As for the participants from Côte d'Ivoire, they come from 8 Ivorian higher education institutions, including INP-HB, Félix HOUPHOUËT-BOIGNY University (UFHB), ALASSANE OUATTARA University (UAO) of Bouaké, the University Peleforo GON COULIBALY (UPGC) of Korhogo, University Jean LOROUGNON GUEDE (UJLoG) of Daloa, the Pasteur Institute of Côte d'Ivoire (IPCI), the National Center for Agronomic Research (CNRA), the Swiss Center for Scientific Research in Côte d'Ivoire (CSRS-CI).

Annex 1 : Statistics of ISME-AFRICA 2023 per country



Annex 2 : Gender statistics



Conclusion

At the end of five days of intense scientific activities, it is clear that the 1st ISME-AFRICA 2023 Symposium-Workshop was a great success in terms of the relevance of the scientific exchanges and the quality of the participants. It is with joy that all the participants said they were looking forward to the next edition of the ISME-AFRICA Symposium-Workshop. But long before that, they all made an appointment in July 2024 in Cape Town, South Africa, for the next congress of their learned society, a first in Africa in 45 years.

It should be noted that the organization of this major scientific event has been entrusted to Côte d'Ivoire thanks to the action of the ISME Ambassador in Côte d'Ivoire, Professor ZEZE Adolphe, and his Deputy, Doctor FOSSOU Romain, all the two microbiologists and teacher-researchers at the INP-HB. The latter were also able to show our political capital to their illustrious guests, in particular the Basilica of Our Lady of Peace in Yamoussoukro.

Annex 3: Family photo with officials at the ISME-AFRICA 2023 opening ceremony



Annex 4: A few photos of the first ISME-AFRICA Symposium/Workshop in bioinformatics



Yamoussoukro le 17 Juin 2023

The ISME-AFRICA 2023 organizing committee
Prof Adolphe ZEZE, President

