

YaBiNaPA

Actu

Mensuel d'informations du Yaoundé Bielefeld Bilateral Graduate School of natural Products with anti microbial and antiparasitic activities

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YaBiNaPA and PHARMBIOTRAC for the valorization of phyrodugs



A delegation of PHARMBIOTRAC from Uganda visited the Yaoundé Bielefeld Bilateral Graduate School of natural Products from July 16th-19th, 2019.

P8

■ Pr. Jean-Emmanuel Pondi



YaBiNaPA, un modèle de coopération entre deux universités: Yaoundé I et Bielefeld

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■ YaBiNaPA hand in hand with traditional Healers



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YaBiNaPA is financially supported by





Prof. Norbert Sewald
Project Coordinator at
Bielefeld (Germany)

What is YaBiNaPa?

YaBiNaPa is the Yaoundé-Bielefeld Bilateral Graduate School for antiparasitic and antimicrobial Natural Products Discovery funded by DAAD to strengthen the capacity of Lecturers, Researchers (Master and PhD students) in the domain of infectious diseases for sustainable development in developing countries.

Our Mission

- A) **Improvement of Graduate Education:** The network of scientists involved, improved technical resources, timely disciplinary and interdisciplinary skills.
- B) **Sustainability and translational research:** The combination of the disciplines in relationship to potential application of natural products. The necessity of sustainable supply of plant derived natural products or extracts
- C) **Improvement of quality of life:** The joint research effort of the scientists from different disciplines is expected to lead to a progress in the therapy of parasitic or microbial diseases.

Which IMPACT?

- > Train specialized experts,
- > Validate the use of certain species used in the treatment of parasitic and microbial diseases
- > Discovery of new bioactive compounds to be further developed as drugs
- > Formulate phytodrugs
- > Establish sub-regional centers for phytochemical analysis and bio-screening



Prof. Bruno Lenta NDJAKOU
Project Coordinator at
Yaoundé (Cameroon)

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COLLABORATIONS:

- ◆ Institute of Public Health and Traditional Medicine,
- ◆ University of Malawi, Malawi;
- ◆ University of Antananarivo, Madagascar;
- ◆ University of Addis Ababa, Ethiopia;
- ◆ University of Kumasi, Ghana;
- ◆ University of Abomey-calavi, Benin;
- ◆ University of Douala, Cameroon;
- ◆ University of Dschang, Cameroon;
- ◆ University of Buea, Cameroon;
- ◆ University of Bamenda, Cameroon;
- ◆ University of Maroua, Cameroon;
- ◆ Institut de Recherche Médicales et d'Etude des Plantes Médicinales du Cameroun (IMED), Centre Pailleur, Cameroon;
- ◆ Alango Foundation, Dschang, Cameroon;
- ◆ Laboratoire Roger Ducos, Cameroon;
- ◆ Traditional Healers Association, Cameroon.



IMPLEMENTATION AND FACILITIES

RECRUITMENT OF STUDENTS

Students are selected after an international call on the basis of their academic performance (CV, transcript of records, publications, recommendation letters etc...) for registration at the graduate school. They are from Cameroon and other african countries (Chemistry, Biology, Biochemistry, pharmacology, Microbiology, Medicinal chemistry...). The selection process consider particularly the issue of gender balance

20 students from the University of Yaoundé I, were selected for 4 years full PhD programme (2017-2020)

EACH YEAR:

- Six months research stay in Yaoundé : 03 PhD students from other Cameroonian Universities, 03 PhD students from other African Universities
- Twelve months research stay in Yaoundé: one postdoc
- Six months research stay in Bielefeld : 02 PhD students
- Twelve months research stay in Bielefeld : one PhD students and one Postdoc
- Possibility of short research stay for lecturers from in Bielefeld

SOME FORMULATIONS FROM YABINAPA

Developing Phytomedicines



STEPS OF FORMULATION

<p>Annona senegalensis (Annonaceae)</p> <ul style="list-style-type: none"> □ Use for malaria, diarrhea and stomach ache □ Toxic part: stem bark □ Physical signs of toxicity: Degeneration and necrosis of the hepatocytes 	<p>Jatropha curcas (Euphorbiaceae)</p> <ul style="list-style-type: none"> □ Use for cancer □ Toxic part: leaves □ Physical signs of toxicity: loss of appetite, asthenia, depression and death. 	<p>Syzygium aromaticum (Myrtaceae)</p> <ul style="list-style-type: none"> □ Use for gastrointestinal tract diseases □ Toxic part: buds □ Physical signs of toxicity: abdominal writhing and death
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FACILITIES

TRAINING
32 Associated Partners from Universities, Research centers and private groups (Africa, Europe, Asia and USA) and traditional healers in Cameroon.



LC-MS

LYOPHILIZER

CLEAN BENCH FACILITIES

REFRIGERATOR

MPLC

YaBiNaPa is financially supported by



Federal Ministry for Economic Cooperation and Development



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Former des experts pour la valorisation des plantes médicinales



Les maladies bactériennes et parasitaires restent un problème de santé publique dans la plupart des pays africains. La situation est aggravée par la résistance des microorganismes aux médicaments existants. Les plantes sont largement utilisées dans la médecine traditionnelle et peuvent jouer un rôle dans la recherche de nouveaux agents thérapeutiques. Plusieurs produits formulés à base de plantes médicinales sont utilisés dans les centres de phytothérapie et commercialisés dans différentes villes du Cameroun. Certaines de ces plantes ou formulations n'ont jamais fait l'objet d'investigations scientifiques. Il est donc important de vérifier l'efficacité, la toxicité, la stabilité, le dosage des extraits de plantes ainsi que de ces formulations.

Depuis plus d'un demi-siècle, plusieurs équipes de recherche se sont lancées dans l'étude des plantes. Mais leurs travaux se sont limités au screening biologique ou à la détermination de la composition chimique. Ceci n'a pas permis d'améliorer la qualité des populations.

Ces échecs peuvent être justifiés par: le manque de coordination entre les chercheurs, l'absence d'équipements appropriés, la rareté des ressources financières et humaines, le manque de collaboration entre chercheurs, l'absence de plateformes d'échange.

En plus, la plupart des pays africains projettent leur émergence vers 2035 et doivent compter sur leurs propres ressources. La formation des experts dans la valorisation de ces ressources est donc une nécessité.

Il faut donc changer de paradigme. « Faire la recherche pas seulement pour les publications mais pour améliorer la qualité de vie de la population ». YaBiNaPA offre un cadre approprié pour cette formation. Ses missions sont :

- Renforcer les capacités des étudiants et chercheurs dans la formulation des phytomédicaments et le contrôle de leurs qualités grâce au network d'experts de différents pays;
- Favoriser la recherche transversale et multidisciplinaire sur les plantes médicinales;
- Améliorer de la qualité de vie des populations par la valorisation des produits des plantes médicinales (efficacité, toxicité, formulation, contrôle de qualité, texture, bon design, conservation, notice avec date de péremption, goût, etc.)

Depuis 2017, le projet YaBiNaPA a installé des plates formes modernes pour les analyses chimiques et les tests biologiques dans 8 laboratoires de l'Université de Yaoundé I. Aujourd'hui, plusieurs équipes de recherche collaborent et travaillent en

synergie. Ceci facilite le transfert des connaissances autour des projets ayant des approches transversales et multidisciplinaires.

L'équipement des laboratoires, le financement des activités de recherche, et surtout l'amélioration des conditions de vie des chercheurs par l'octroi des bourses a conduit à un maximum de concentration nécessaire pour la créativité et l'innovation.

Entre 2017 et 2019, 60 étudiants, 8 enseignants et 06 jeunes docteurs des universités du Cameroun et d'Afrique ont été sélectionnés pour bénéficier des programmes de formation ou de mobilité de YaBiNaPA.

En plus de leurs travaux dans les laboratoires, les chercheurs ont assisté aux cours, séminaires, workshops, webinars, enquêtes, organisés par des experts dans la valorisation des plantes médicinales. Leurs compétences ont été renforcées sur les aspects tels que le montage et la gestion des projets de recherche, la présentation scientifique, la rédaction des articles et rapports, la formulation de phytomédicaments, entrepreneuriat, valorisation des résultats de recherche, propriétés intellectuelles, etc. Ils ont participé aux conférences nationales et internationales (Afrique, Asie, Europe etc.)

Nous avons aussi rencontré des traditpracticiens pour leur présenter le projet et expliquer la nécessité de la validation scientifique de leurs formulations. Ainsi les séminaires organisés ont permis dans le cadre des projets conjoints de renforcer leurs capacités dans différents domaines pour une meilleure visibilité de leurs produits (rédaction des monographies, amélioration de la formulation, texture, contrôle de qualité, conservation, design, la notice et aussi la vulgarisation des préparations validées scientifiquement et aussi de la protection de espèces. Plusieurs médicaments disponibles en pharmacie trouvent leurs sources dans les plantes médicinales.

Ces plantes constituent une importante source de revenus sur lesquelles les pays tropicaux peuvent compter pour booster leurs économies. D'où la nécessité de la formation d'experts dans le domaine de la formulation et du contrôle de qualité des phytomédicaments grâce à la mutualisation des compétences nationales et internationales.

Pr. Bruno Lenta, Coordonnateur du projet YaBiNaPA

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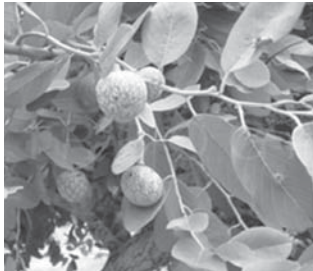
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YaBiNaPA to strengthen the capacity of lecturers, researchers and traditional Healers on the valorization of medicinal plants for sustainable development.



Cameroon has a rich biodiversity with around 8,620 plant species. Some of these species are used by traditional healers in the treatment of microbial infections and various other diseases (malaria, trypanosomiasis, leishmaniasis, diabetes and tuberculosis, etc.). Since more than half of a century, several research teams from universities and research centers have been studying some of these species. Till 2013, not less than 10,000 secondary metabolites have been isolated from 312 plant species belonging to 67 families. Unfortunately, the majority of these studies documented by not less than 3,500 publications have been limited to preliminary screening or to the determination of the chemical composition. These works did not improve the quality of life of the population in terms of health. Several reasons can justify the low impact of the work carried out in the access of populations to healthcare. We can

note on the one hand the poor structuring of research projects, the lack of funding, scientific communication between the different research teams, database, platforms for biological tests and chemical analyzes and especially a network of researcher working on medicinal plants in universities and research centers. Indeed, several skills are necessary for the formulation of a phytomedicine. A multidisciplinary and transversal structuring of projects involving ethnobotanists, chemotaxonomists, phytochemists, biochemists and pharmacologists etc... is imperative. The objectives should not be limited to chemotaxonomy or preliminary screening. On the other hand, the content of the training received in universities is not sufficient to allow the formulation of phytomedicines in the case of extracts or active and non-toxic fractions and also the quality control thereof. In addition, the disregard of traditional methods in some cases has not

made it possible to validate the biological potential of certain species. In most phytotherapy centers, plants are used in combina-

tion, while studies in laboratories are carried out on each species alone. The role of other additives is not taken into account. At the time when most countries project their emergences towards the 2035s, they must be able to count on the development of their bioresources. Expert training in these areas is imperative. The paradigm shift is therefore a necessity.

YaBiNaPA (Yaoundé-Bielefeld Bilateral Graduate School of Natural Products with Antimicrobial and Antiparasitic) is a project that aims to build the capacity of researchers (students and teachers) and traditional therapists in the field of phytomedicine for sustainable development in developing countries, as foreseen by the UN 2030 program on the theme "Transforming our world". There are plans to offer southern stu-

YaBiNaPA Missions

- A) Improvement of Graduate Education: The network of scientists involved, improved technical resources, timely disciplinary and interdisciplinary skills.
- B) Sustainability and translational research: The combination of the disciplines in relationship to potential application of natural products. The necessity of sustainable supply of plant derived natural products.
- C) Improvement of quality of life: The joint research effort of the scientists from different disciplines is expected to lead to a progress in the therapy of parasitic or microbial diseases.

The improvement of the training of PhD candidates, specialized experts and academic lecturers with broad knowledge of ethnobotany, phytochemistry, analysis, as well as the development of drugs for therapy of parasitic and bacterial diseases based on ethno-pharmaceutical principles. Development of interdisciplinary and translational research and also the creation of a research exchange platform between biologists, chemists, and pharmacologists, the public and traditional healers. This has mainly influenced the training of PhD students, and young scientists. The number of young female scientists participating in research has increased.

The focus of the project is the search for potent antimicrobial and antiparasite compounds or fraction that can be used for the formulation of new therapeutic agents.

THE FACILITIES AND ADVANTAGES OF YABINAPA ARE MULTIPLE

1-INSTALLATION OF A PLATFORM FOR BIOLOGICAL TESTS EQUIPPED WITH ADVANCED EQUIPMENT

A laboratory of biology has been equipped with sophisticated equipment at the annex of the Faculty of Science of the



University of Yaoundé I. Since 2017, students and researchers of the project have carried out biological tests there which were not possible a few years ago. Over 500 plants used in the treatment of bacterial infections (skin diseases, dysentery, typhoid and parasitic (Lishmaniasis, malaria, trypanosomiasis, amoebiasis, schistosomiasis)

2-A DIGITAL ROOM WELL

EQUIPMENT AT ENS YAOUNDE

A digital room was created at the Chemistry Department of the Higher Teacher Training College of the University of Yaoundé I. There, computers are installed and connected to the databases such as scifinder, antibase. These databases, which contain updated data on published work in the fields of chemistry, biology, biochemistry, microbiology, medicine, pharmacology, etc., allow for cutting-edge research and up-to-date scientific work. This has considerably facilitated access to published data and better structuration of thesis topics. Everyday, this room receives no less than 50 students from the different institutions of the University of Yaoundé I. In addition, video conferences, virtual meetings and capacity-building courses are organized regularly between researchers in Germany and those in Cameroon.

IN THE CHEMISTRY DEPARTMENT OF THE ENS OF YAOUNDE I FOR CHEMICAL

ANALYSIS



The analytical service is equipped with the Liquid Chromatography coupled with a Mass Spectrometer (LC-MS) instruments.

The LC-MS equipment were acquired in the frame work of YaBiNaPA project, aiming at the rapid dereplication of extracts and fractions from plants, the checking of the purity of compounds, the determination of the molecular mass of pure samples and the LC-MS guided fractionation and purification of secondary metabolites.

Since the installation of the LC-MS, we have been receiving samples from other Universities and collaborators in Cameroon dealing with organic samples in joint

research projects, amongst which we can cite: The University of Dschang, University of Douala, University of Maroua, University of Bamenda, University of Ngaoundéré, University of Buea and the University of the Mountains, Bangangté.

YaBiNaPA SDG graduate School, via the LC-MS is always in the permanent quest of sophisticated equipment for the analysis of organic molecules of various origins, but the task is not easy considering the rarity of equipped laboratories in Cameroon. However, we work in partnership with the Medical Institute of Medicinal Plants of Cameroon, the highest institution that evaluates and validates the phytomedicines produced in Cameroon, and the National Drugs Quality Control and Valuation Laboratory.

The LC-MS instruments have become a key tool for research in bioactive molecules from natural sources, the quality control of common drugs such as paracetamol, and is also very useful for researchers working on pesticides degradation in the nature. Thus,

biologists and chemists are now combining the LC-MS analysis profile with SciFinder database, for the dereplication of secondary metabolites or identification of active coum-



pound for the standardization of phytodrugs. All students in the Department of Organic Chemistry at the University of Yaoundé I has been instructed to follow the LC-MS screening of their crude extracts in order to make a good choice of the plant material for their study. Nowadays, it is very current for Master students to diversify their research topics, using the LC-MS as a key instrument.

This device that is very sophisticated can be used to make analyzes in many disciplines for example in chemis-

Great opportunity for students to perform their thesis in good conditions



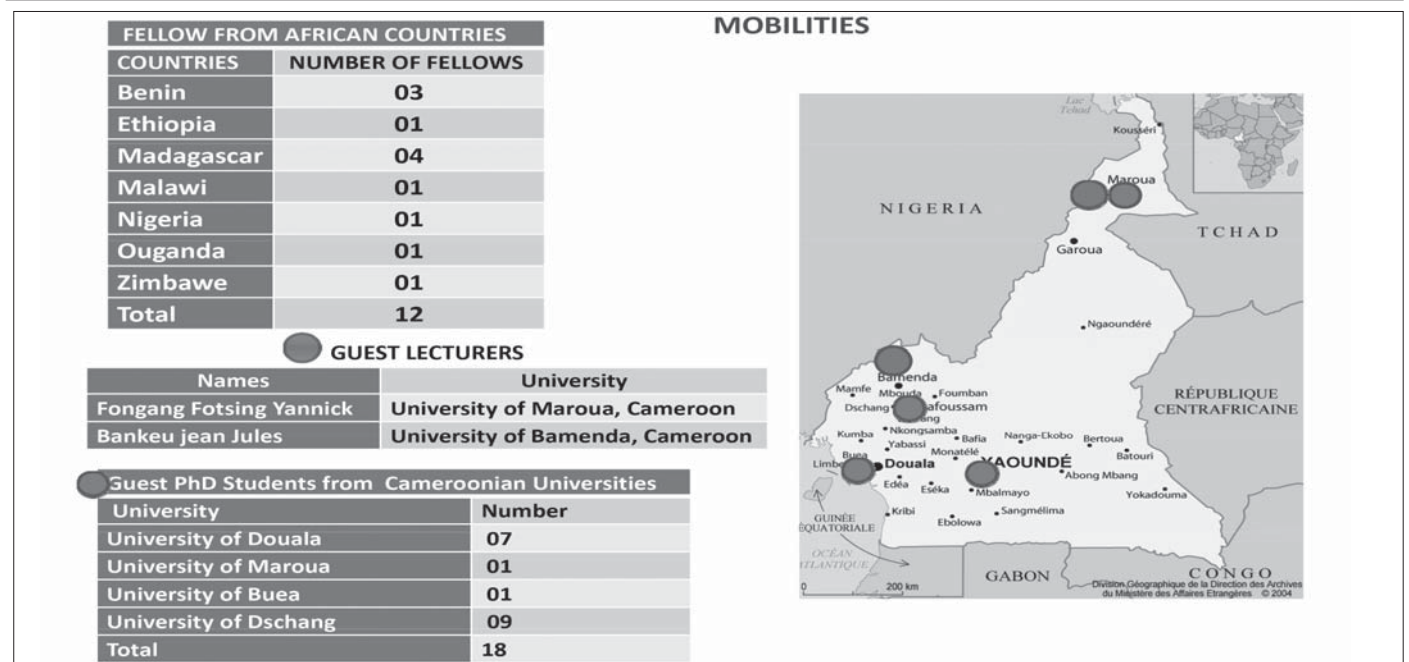
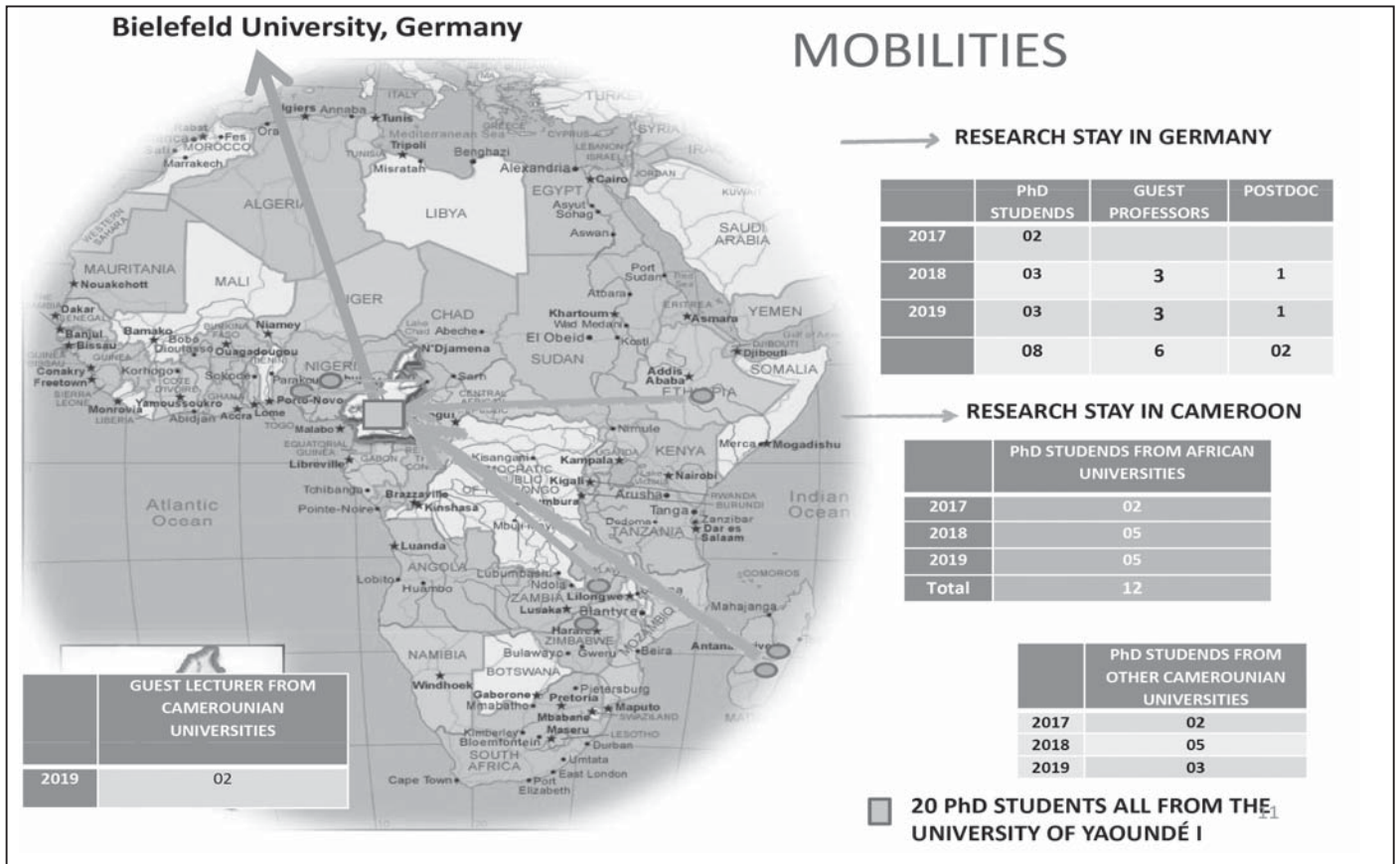
20 PhD students were selected for 4 years full PhD programme and are receiving monthly living allowance from DAAD. In order to facilitate interdisciplinary and knowledge transfer, they were grouped into working teams according to the transversality of their projects and their skills to work on plants with the following potentials:

- Antiplasmodial and antileishmania

MOBILITY PROGRAMME For Cameroonian and African PhD students



In addition to the 20 full PhD students and thanks to the mobility programme of YaBiNaPA, students from other Cameroonian universities and also from African universities have made research stays at the University of Yaoundé I and also at the Bielefeld University in Germany. Since 2017, 18 students from other Cameroonian universities and 12 from other African universities have carried out research stay at the Yaoundé I University as part of the YaBiNaPA project.





Participation of YABINAPA to National and international Conference

4TH EDITION OF SCIENTIFIC CONFERENCE OF PHD STUDENTS AND YOUNG RESEARCHERS OF STATE UNIVERSITIES/PRIVATE INSTITUTES OF HIGHER EDUCATION 2019 AT THE UNIVERSITY OF DOUALA FROM 11th - 13th JUNE 2019.

The objective of the seminar was to look into current issues of students' participation in Higher Education Governance, from institutional to national and international levels, outlining the adaptation of their training with needs of enterprises' in order to overcome the current problems and obstacles faced by students after graduation. The conference thus aimed at looking for examples of good practical solutions and proposing a way forward as well as to foster discussion and strengthen connections between experts and young scientists from national and private universi-

ties.

The three-day scientific conference comprises plenary and posters sessions and YaBiNaPA delegation was constituted by 20 students. Stands were provided different participants particularly research groups or Graduates Schools for exposition of their products and research outcomes. This was an opportunity to meet people from private sectors and companies for further collaboration on the valorization and conservation of our bio-resources.

For the participation of YaBiNaPA to this event, plants used in Cameroonian traditional medicine against skin diseases (from fungal or bacterial origin) were selected and tested in vitro. From active fractions and extracts, students formulated antibacterial liquid soap, antifungal soap, antifungal cream and anti-inflammatory balm for exhibition in their stand which was visited by nearly all the participants and the products from their creativity very appreciated.

The conference was structured to foster discussion between participants around the core themes of the small state pro-



jects. This was achieved by hosting small group debates, minute papers, and full group discussions on pre-prepared questions following each session. In the part on the development of student participation, we have gathered the overviews of the current context of stu-

dent participation, given at the seminar, from various perspectives and as a resume of what has been much more elaborated in the Background document. The students and the coordinator did oral presentations on some aspects of projects developed at YaBiNaPA and their talks were highly appreciated. Posters summarizing the progress of research work were also presented during poster session and thanks to their structuration and quality of the results, the organizing committee awarded the prize of the best poster to the Yaoundé-Bielefeld Bilateral Graduate School of Natural Products with Antiparasite and Antimicrobial activity.

YaBiNaPA received the prize for the best poster presentation at the conference, and has also awarded a price entitled "LC-MS analysis of 50 samples" in recognition of the best project on the valorization of Cameroonian medicinal plants.

18th Symposium of NAPRECA in Egypt



The theme of the conference was "Natural Products for the Health and Welfare of Africans" which is consistent with the objectives of YaBiNaPA SDG graduate School which was represented by a delegation of four researchers, Prof Lenta and three PhD students (M Keumoe, M Feudjou and Mme Dongmo). It was a good opportunity to present YaBiNaPA SDG Graduate School to other participants from several African countries (Uganda, Kenya, Nigeria, Madagascar, Zimbabwe, Romania, Sudan) and to create new research collaborations. Most of the presentations focused on the isolation of constituents of medicinal plants and the evaluation of their biological potential. The interest of the research results to valorization in the sustainable way was at the center of discussions and the SEKEM model was presented as an example to be followed in most African countries.

In fact, SEKEM was founded with the idea of sustainable development and giving back to the community. Sustainable development towards a future where every human being can unfold his or her individual potential; where mankind is living together in social forms reflecting human dignity; and where all economic activity is conducted in accordance with ecological and ethical principles.

It was also noted that very few Africans apply to funding program for research projects. Advice was given so that researchers draft several projects with their partners and this long before the opening of tenders. In addition, the scholarship programs of African Academy of Sciences (AAS) and African Academies Diaspora Fellows Program - IAP were presented in detail because they remained unknown by most African researchers.

Visit of YABINAPA by a delegation from PHARMBIOTRAC and training of the students on the formulation of phyrodugs



Formulation of syrup from hyroalcoholic extract from Cameroonian medicinal plants against salmonella.

Joint grant proposal writing to secure funding for joint activities (YaBiNaPA-PHARMBIOTRAC)

PHARMBIOTRAC is specialized in phytodrug design, formulation and manufacturing, clinical trials.

YaBiNaPA is specialized in structure determination, elucidation and quality control. Purification of compound as standard for PHARMBIOTRAC manufaturations

It has been unanimously agree that policies makers must encourage the promotion of traditional medicine

Academic mobilities (students and lecturer). Lecturer from YaBiNaPA can give training to PHARMBIOTRAC and vice-versa. Students from each institute can aspire for a research stay in other institutes. Both institutes must respect the rules and regulations of the other institute

- Joins seminars
- Experience sharing
- Plans for sustainability

A draft of memorandum of understanding has been initiated and sent to the the University of Mbarara authorities for amendment, approval and signa-ture.



Artavol, a tee from Artemisia species proposed by colleagues from Uganda

A delegation made up of one Lecturer and three PhD students from PHARMBIOTRAC, Mbarara University of Science and Technology in Uganda visited Yaoundé-Bielefeld Bilateral Graduate School of Natural Products with Antiparasite and Antimicrobial activity from July 16th-19th, 2019.

During their stay, a meeting was organized with the different heads of laboratory involved in the YaBiNaPA project at the University of Yaoundé I as well as a workshop on the formulation of phytomedicine and their quality control. Among the points of discussion during the meeting the genesis, structuration, management, activities, and facilities and the research network of the two institutes were presented by the two coordinators.

The genesis of the meeting between PHARMBIOTRAC and YaBiNaPA was narrated putting Prof Sewald, the coordinator of the project in Germany as the start point of the collaboration. Activities of the YaBiNaPA were presented with emphasis on the material and expertise we have in the project. Collaborations established in the fra-

mework of the project were also presented.

Dr Ogwang Patrick Engeu took the floor and presented the PHARMBIOTRAC as independent entity of the Mbarara University of Sciences and Technology of Uganda. He presented the project in his organization and management, equipment, activities and facilities.

The following thematic areas of Research and Development at PHARMBIOTRAC are:

- Understanding Traditional Medicine Philosophy of Health and Disease
- Prevention and Control
- Traditional/Herbal Medicine Quality and Safety Standards Herbal Medicine Production/Manufacturing and Quality Control Standards
- Traditional/Herbal Medicine Knowledge and Material Conservation and Propagation - in-situ, ex situ
- Traditional/Herbal Medicine/Clinical Validation Protocols and Standards
- Pharmaco-Biotechnology - Application of Biotechnology to Drug

- Discovery, and Drug Production
- Pharmaceutical
- Business Management/Regulation

Student recruitment is done in the way that only the best students are selected by the mean of recommendation by a supervisor, online interview in both institute. For PHARMBIOTRAC, at least 20% of the selected students must be outside Uganda. During their internship all the conditions are put together to allow selected student to concentrate on their research work for good outcome.

After discussion, it is obvious that the two structures have several points of convergence and, the most remarkable fact is the coincidence of their goal: "To build a critical mass of specialized and killed human resource that can advance traditional medicine and pharm-biotechnology for socio-economic development of Africa" Thus the following areas of collaboration were denoted between both institutes:



Meeting with traditional healers

For millennia, man has relied on nature for his multiple basic needs, health occupying a prominent place. The culture of health care based on the use of medicinal plants is an important element of the public health system in many African countries and this for cultural, economic and social cultural reasons. In Cameroon, several plants are used by traditional healers to treat diseases. However, many questions are asked about the efficacy, toxicity, dosage, protection of useful rare species, the conservation and stability of the various preparations. Thus, for a better valorization of medicinal plants and safety, it is necessary to create platforms of exchanges or organize meetings between scientists and traditional healers to discuss and strengthen their skills on certain aspects of the formulation of phytomedicines such as:

- scientific validation (efficacy, non-toxicity, percentage of the active ingredient) and control of the role of each constituent and its percentage.
- Formulation and design for a better presentation
- control of the harvest period or season, conservation of preparations,
- Improved taste and texture of certain preparations
- collaboration between laboratories and traditional healers
- quality control of existing phytomedicines
- creation of communication forum for better visibility

Thus, a meeting was organized on August 20, 2019 at the DAW Center in Yaoundé between the members of the Scientific Committee of YaBiNaPA and certain traditional healers in the Center Region in the presence of the Center regional delegate of the Ministry of Scientific Research and innovation. During this meeting, the YaBiNaPA



coordinator in Cameroon presented the project and its facilities and showed the need to collaborate with traditional healers to improve their skills in formulating phytomedicines according to international standards. For example, in the course of a field



survey in Yaoundé, it was noticed that some of the herbal drugs encountered were not really effective due to poor conservation or formulation. This might be due to the fact that either the active principle is not present in the plant material used for formulation or its concentration in the sample is very low. It is well known that the concentration of bioactive compounds depends on several factors including environmental factors. LC-MS could then be a suitable tool for the quality control of plant materials which will be further used for formulation. It is useful not only in terms of detecting the presence of the bioactive compound(s) but can provide information on its concentration as well. More than fifty traditional healers

took part in the work. Most of them have plants or mixtures of plants which they say to be effective in the treatment of certain diseases and, some of their discoveries are already protected by patents. The participants in majority did not master all the steps of the formulation of phytomedicines, and welcomed the approach of YaBiNaPA and hoped that training seminars would be organized very regularly. The Graduate School proposed to start by testing the samples used by each of the traditional healers against diseases before signing the MoUs with the University of Yaoundé I for the promotion of highly active species in the framework of joint projects. The next training seminar will take place at the end of the first semester 2020.



Ethnopharmacological Survey In Soumalomo-Lomie



Population in developing countries faces a number of public health problems, most of which are caused by parasitic and microbial diseases. They mainly use medicinal plants for their primary health care. In Cameroon, many people rely on plants for their health care. Nearly all the Baka pygmies' community in the eastern Cameroon has only traditional medicine as the unique way to access health care. This population has great knowledge in traditional pharmacopoeia. These plants are potential sources of

new drugs. For better valorization, knowledge on the composition and scientific validation of their potential is necessary and this on the basis of information obtained during different ethnopharmacology surveys. The mastery of the stages of this survey as well as the processing of the data obtained is very important for any expert in the valorization of medicinal plants. This is how, within the framework of the capacity building courses for students carrying out their work in the framework of the YaBiNaPA project, an ethno-

pharmacology course was organized with theoretical and practical phases at Lomié. This mission was led by Prof Lenta Bruno (project manager) University of Yaoundé I accompanied by Prof Ngadjui Bonaventure (University of Yaoundé I), Dr. Chouna Rodolphe (University of Dschang), Dr. Bankeu Jean Jules (University of Bamenda), Dr. Kitio Etienne and doctoral students from the University of Yaoundé I and Dschang. One of the aims of this mission was to train students on how to prepare and conduct an ethnopharmacological survey. The main objective of the survey was to identify the different plants used by the populations of this locality against parasitic and microbial diseases and the information on the collection, formulation, conservation of preparations and posology.

This mission took place on two sites: Karagoua and Bosquet.

After the meeting with the head of the Karagoua Canton, His Majesty Mame leKé Cedar, who is also a traditional healer and the brief presentation of the YaBiNaPA project and its objective by the coordinator, the work began with Lecture by Doctor Dr. Kitio on botany, the types of information to be collected during surveys, preparation fact sheets,



the approach to convince traditional healers in order to obtain information and especially the difficulties in the field. After this course, the delegation went to the forest where more than 75 medicinal plant species were identified and some samples collected.

The second phase of the training took place at bosquet, a small pygmies camp situated at 6 Km from the center of Lomié. Here, the students put into practice the lessons learned and successfully carried out surveys with several households. Several plants parts (leaves, barks, woods) to be investigated at the YaBiNaPA Graduate School were collected.

Monographs for better valorization of medicinal plants



Whenever the same plant is used in several regions, the doses and forms of administration vary from one traditional healer to another, which could amplify the harmful side effects. Thus the need for standard monographs for each plant is urgent.

The widespread use of medicinal plants has drawn the attention of the scientific community. This led to the identification of many secondary metabolites responsible of the pharmacological activities of some plants used in folk medicine. It has been shown that several environmental factors affect the nature and concentration of secondary metabolites in plants. The content of these metabolites varies from one plant to another or even from one period of the day to the next,

which might considerably change the activity from one locality to another. Thus an active plant in the South could be inactive in the north; likewise, a plant collected in the morning might have an activity which differs from that of the same plant collected in the evening.

An efficient and optimal use of medicinal plants will be possible only through open collaboration between traditional therapists (holder of empirical knowledge), pharmacologists and chemists. The YaBiNaPA project is a platform for such collaborations.

Indeed, YaBiNaPA project aims to identifying active metabolites in medicinal plants used against bacterial and parasitic diseases, the leading cause of death in sub-Saharan Africa. With multiple advanced equipment ac-



quired by research laboratories under this project, it is possible now to quantify active ingredients in traditional phytodrugs, to evaluate their activities experimentally and monitor their transformation in different environmental conditions.



As a consequence, it will be possible to develop cost effective improved traditional medicines (ITM) accessible to all. In addition, the series of biological assays available in the project is enabling us to differentiate "true" from "false" phytomedicines which are rampant in the local markets. It is noteworthy that several of these locally avail-

able herbal based concoctions act through a placebo effect. This will therefore enable us to sensitize the local communities on the best plants they could use and for how long their concoctions could be stored.

With the multiple seminars, conferences and partnerships developed, the YaBiNaPA project ensures the sensitization of traditional healers on the need for frank collaboration with researchers and academics. Thanks to these activities, Cameroon already has a large network in the phytomedicine chain, bringing together researchers, academics and traditional healers. This network contributes in making phytotherapy blossom. There are better days to come to the Cameroonian herbal medicines.

14.4- YaBiNaPA: A Model Project for Sustainable



Development through Bio-resources Exploitation including Medicinal Plants

Pr. Jean-Emmanuel PONDI

YaBiNaPA, un modèle de coopération entre deux universités: Yaoundé I et Bielefeld

Vice-Recteur Chargé de la Recherche, de la Coopération et des Relations avec le Monde des Entreprises s'exprime sur l'importance et la pertinence du projet pour l'Institution.

Monsieur le Vice-Recteur, quelles sont vos impressions par rapport au Graduate School YaBiNaPA ?

Ce projet YaBiNaPA est un modèle de coopération réussie entre deux universités : l'université de Yaoundé I au Cameroun et celle de Bielefeld en Allemagne. L'approche interdisciplinaire et transversale du projet permet la mutualisation de compétences existantes à l'université de Yaoundé I pour la valorisation des bio-ressources. Grâce aux équipements et autres facilités mis à disposition des étudiants, la recherche dans le domaine des substances naturelles se fait dans de très bonnes conditions.

Pensez-vous que le projet a eu un impact sur la qualité de l'enseignement et de la recherche à l'Université de Yaoundé I ?

YaBiNaPA a forcément eu un impact sur la qualité de l'enseignement et de la recherche à l'Université de Yaoundé I. En effet, les cours de renforcement de capacités organisés grâce au plateau numérique installé à l'École Normale Supérieure-ENS, permettent aux experts de renforcer les capacités des étudiants dans les aspects professionnels et plus précisément l'entreprenariat et la productivité. Les compétences acquises permettent aux étudiants de s'insérer plus facilement dans la vie active.

De même, les mobilités des enseignants et étudiants vers l'Allemagne permettent d'acquérir de nouvelles compétences ou approches pédagogiques et didactiques nécessaires à l'amélioration des leurs enseignements et présentations.

Sur le plan de la recherche, la dotation des laboratoires de l'Université de Yaoundé I d'équipements de pointe dans le domaine des substances naturelles a été saluée pour de nombreux étudiants et autres chercheurs, car les temps d'analyses sont réduits et certains de ces équipements sont utilisés pour les enseignements pratiques.

La création d'une salle numérique à l'ENS et la connexion de l'Université de Yaoundé I aux bases de données ont facilité l'accès à la documentation scientifique nécessaire pour toute recherche de pointe.

Sur le plan social, l'octroi des bourses aux étudiants a amélioré leurs conditions de vie et ceci a conduit à un maximum de concentration nécessaire pour la créativité et l'innovation.

Selon vous, est-ce une expérience à renouveler ?

L'Université de Yaoundé I s'est officiellement engagée à soutenir le projet YaBiNaPA. Il fait la fierté de notre institution. Il contribue au rayonnement de l'Université et surtout à la formation des experts capables d'améliorer la qualité de vie des populations. Nous souhaitons vivement qu'à la fin de cette année que ce projet soit renouvelé. Je pense que les porteurs ont des compétences nécessaires pour former plusieurs générations d'étudiants dans le domaine de la valorisation des bio-ressources pour un développement durable.

Je ne saurais finir mon propos sans adresser mes sincères remerciements au gouvernement allemand au travers de la DAAD pour les programmes de finance-



ments

en direction des universités de notre pays ainsi que les programmes de mobilité vers l'Allemagne.

Mes remerciements vont également à son excellence Monsieur l'ambassadeur de la République Fédérale d'Allemagne au Cameroun pour toutes les dispositions qu'il a toujours su prendre pour faciliter l'obtention des visas d'entrée en Allemagne pour les étudiants et enseignants. De manière générale, au nom de M.le Recteur, le Pr. Maurice Aurélien Sosso, je dis merci et félicitations à tous les intervenants nationaux et Allemands du programme Yabinapa.



Le Directeur de l'École Normale Supérieure de Yaoundé félicite le YaBiNaPA



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Yaoundé, le 07 FEV

LE DIRECTEUR

À MONSIEUR LE
PROFESSEUR BRUNO LENTA
CHEF DU PROJET YABINAPA
S/C DU CHEF DU DEPARTEMENT DE CHIMIE

Objet : lettre de félicitations

Monsieur le Professeur et cher collègue,

J'ai l'honneur de vous adresser mes sincères et vives félicitations à la faveur des Journées portes ouvertes du projet YABINAPA que vous pilotez avec entregent, méthode, rigueur et honorabilité. Le mois dernier, nous avons pu apprécier la richesse de vos recherches ainsi que leur exploitabilité immédiate.

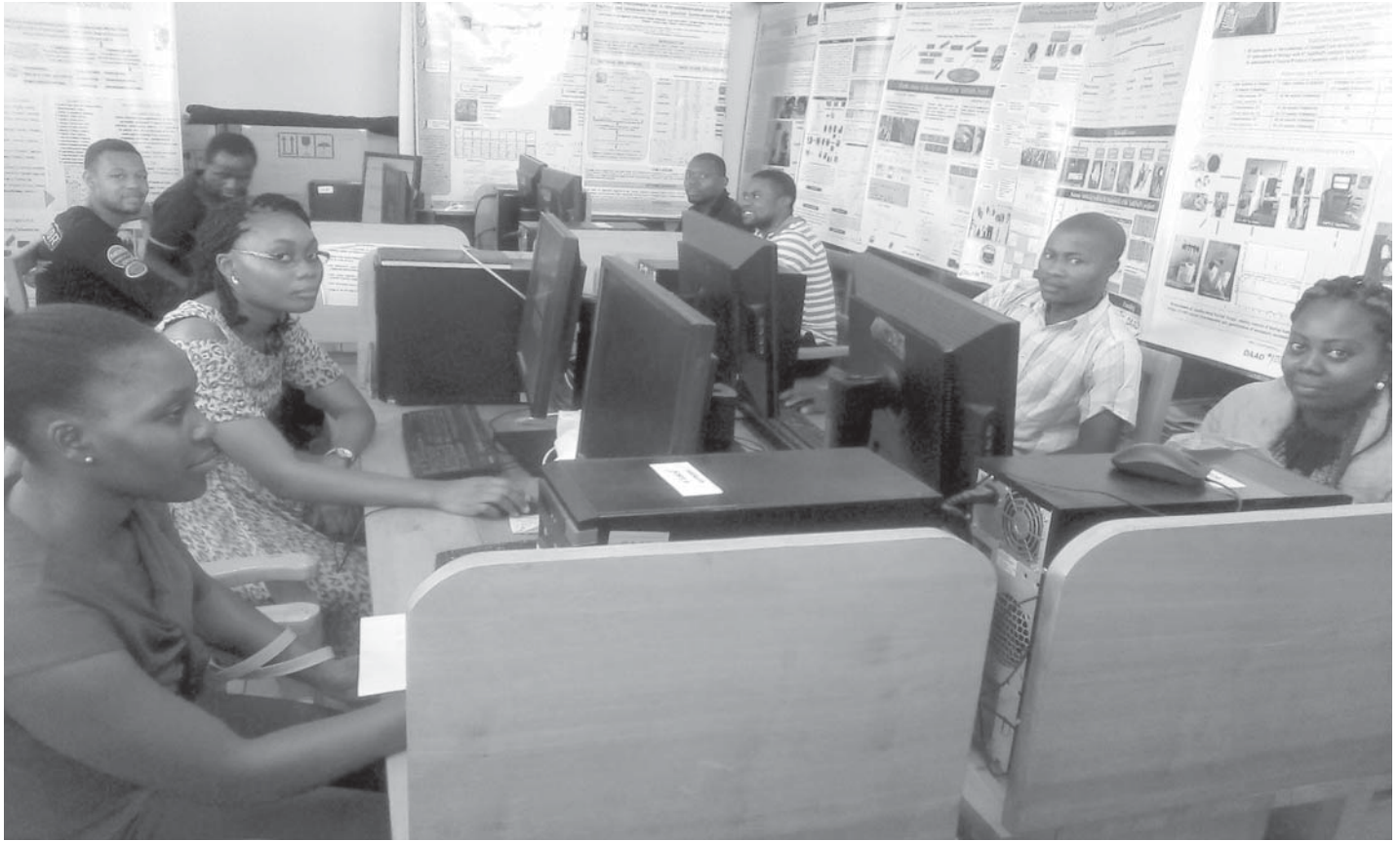
Vous avez su démontrer, par de faits concrets, l'efficacité et l'effcience du projet YABINAPA mis en place grâce à la précieuse contribution de la DAAD. Nous apprécions au plus haut degré tout ce que l'Allemagne fait pour l'ENS et notamment tous les projets maturés au département de chimie.

Je vous exhorte à aller de l'avant et à vous maintenir dans cette position de leadership à laquelle vous vous êtes hissé par la force du travail, le goût de l'innovation et l'amour de votre institution universitaire d'attache. Je vous prie d'agréer, monsieur le Professeur et cher collègue, les assurances sans cesse renouvelées de ma parfaite considération.

Barnabé MBALA ZE
Professeur

Natural Products with Antiparasite and Antibacterial Activity (YaBiNaPA)
Yaoundé-Bielefeld Graduate School
YaBiNaPA

Numerical platform connected to database at ENS for Literature research



Developed projects within Yabinapa and their impacts



Interdisciplinary research is one of the principles on which the Bilateral Graduate School, YaBiNaPA, builds to achieve its goal which is, to strengthen the capacity of researchers (including students and lecturers) in the domain of phytomedicine for the sustainable development in developing countries. This research approach allows students to learn by making connections between ideas and concepts across different disciplines. Students learning in this way are able to apply the knowledge gained in one discipline to another different discipline as a way to deepen the learning experience. Interdisciplinary teaching and learning is maximized when professionals from different disciplines work together to serve a com-

mon purpose and to help students make the connections between different disciplines or subject areas. Such interaction is in support of the constructivist paradigm which allows new knowledge construction and a deeper understanding of ideas. One of the biggest barriers to achieving true interdisciplinary research is the necessity for collaboration. This can be difficult to achieve, but not impossible. In order to facilitate interdisciplinary research and knowledge transfer within the graduate school, PhD students from different research areas (chemists, biochemists and microbiologists) have been grouped into various research themes. The direct impact of this close collaboration has been the possibility for students enrolled in a research field (e.g. chemistry, biochemistry or microbiology) to gain hands-on training on other research fields. Thus, PhD students in Natural

Products Chemistry could acquire skills on the assessment of the biological properties of plants derived products and get more insights on chemical processes within and relating to living organisms, while PhD students in biochemistry and microbiology could in turn acquire adeptness in the isolation and characterization of lead bioactive compounds from medicinal plants.

The various constituted research teams within the YaBiNaPA graduate school are working on:

- 1- The investigation of plants with antiparasitic properties (antiplasmodial, antileishmanial and toxoplasmosis);
- 2- The investigation of plants with antibacterial and antifungal activities;
- 3- The investigation of plants with antischistosomiasis activity
- 4- The study of the effects of some selected plants against malarial and diabetes co-infection.

For sure the above-men-

tioned approach has brought more insights into natural products research as promising results have been evolving from the aforementioned research teams.

YABINAPA is thus a unique nation-wide platform for phytochemical analysis and bio-screening established for research activities at the University of Yaoundé I. Besides investigating basic principles, standardized, highly effective and non-toxic accessible plant medicine to improve the health and socio-economic situation for the people living in Cameroon and other developing countries as a replacement of current non-standardized medicinal preparations are expected to be developed. In addition, contacts are continuously established with collaborators from public and private and organizations regarding the clinical application of phytomedicine.



Prof. Dr. Ngadjui Tchaleu Bonaventure
Professor Faculty of Science – University of Yaoundé I

I think that YaBiNaPA project is an unprecedented opportunity given to students and colleagues to carry out applied research in the natural product field

Pr Ngouela Silvère

Head of the Department of Chemistry, University of Dschang/ Director of the Center of valorization of medicinal plants

It is my pleasure to write these few words about the YaBiNaPA graduate program.

It is a wonderful opportunity for me and my team to be involved in this program. During its first four years, YaBiNaPA helped us to build an ideal environment to enhance our research through a multidisciplinary project focused on the valorization of our biodiversity in the fight against antimicrobial diseases.

In fact, as part of this program:

- Our Laboratory has received the appropriate material (equipment and consumables) to facilitate research work;
- Students received financial support to help them focus on their projects.

The mobility program helped us to receive foreign students in our laboratory, I also benefited for a 3-month research stay in Germany.

- Internal and external collaborations have been established
- Support for specific courses, workshops, seminars, national and international conferences were granted to team members (lecturer and students).

We must congratulate and encourage the spirit of this program which brings around the project, skills from various scientific fields, both national and international. There is no doubt that the students who are the main beneficiaries of this program will be better equipped at the end of their training to integrate projects for the promotion of local medicinal plants, one of the aspects of which is the production and control of phytomedicines. One of the challenges of this project, which is being taken up in view of the current results, is to see the students enrolled in PhDs as part of the program, defend their PhD within a reasonable time.



Dr Bankeu Kezetas Jean Jules
Department of Chemistry, Faculty of Science, The University of Bamenda

I am Bankeu Kezetas Jean Jules, a PhD holder from the University of Yaoundé I and a researcher in Natural Products Chemistry from The University of Bamenda, Cameroon. I spent three months (March-June) as guest researcher at the YaBiNaPA graduate school in 2019. Since then, I have been assisting students involved in the YaBiNaPA project and the coordinator. I really learnt a lot during my three months stay at the YaBiNaPA graduate school. YaBiNaPA is a project that is aimed at promoting the valorization of medicinal plants from Africa with antiparasitic and antibacterial properties for sustainable development, which falls within the goals of the United Nation. This project is just at the right place in a region

of the globe where more than 80% of the populations still rely on natural products for their primary healthcare due to extreme poverty and limited modern health facilities. Analysis of compounds isolated from plants, determination of chemical composition, verification of pharmacological properties as well as the toxicity have been key steps in phytodrug production and drug discovery processes. The graduate school has made the above preoccupation their main goal through the multidisciplinary training of students and researchers from Sub-Saharan Africa. The graduate school through the interdisciplinary collaboration created between natural products chemists, biologists, ethnobotanists and traditional healers represents an amazing platform for the discovery of cheap and improved phytodrugs. I have therefore seen the YaBiNaPA

project as one of the biggest opportunity given to African researchers to make their research more helpful and more accessible to their population through the production of phytodrugs. In fact, the project has enabled many laboratories at the University of Yaoundé I to be equipped with modern tools used in the field of natural products chemistry and biology. In addition, the project has provided the above laboratories with all the necessary consumables, something that is lacking in many Sub-Saharan African research institutions.

Since the project results from the collaboration between the University of Yaoundé I and the University of Bielefeld, the time for analysis of samples has considerably dropped as LC-MS analyses and biological tests are performed in Cameroon and NMR analysis in Germany. This situation has created more moti-

vation to students, which are determine to come out with achievement of producing a few phytodrugs. I am convinced that, this project will definitely boost the research in natural products chemistry in Africa and will contribute to roll back malaria, leishmaniasis and bacterial diseases in the world. In fact, these diseases represent a big burden in many countries around the world and have been given sleepless nights to researchers.

I will end by saying that the YaBiNaPA project is a platform that if it were not existing, would have been created. It is a unique opportunity that each young African researcher in the fields of natural products chemistry, biology and biochemistry should seize to effectively contribute to roll back some infectious diseases and poverty in the world in general and particularly in Africa.



Dr Jean-Bosco Jouda
LC-MS Technician at YaBiNaPA, ENS Yaoundé

I am in my fourth year at YaBiNaPA SDG Graduate School working as a technician on the high pressure liquid chromatography coupled with mass spectrometer (HPLC-MS). I have been very flattered during all these years working in a very dynamic graduate school, which knows how to

seize the opportunity offered by the German-Cameroonian collaboration. Indeed, YaBiNaPA thanks to its latest generation equipment made part of the analyzes of natural substances in Cameroon easy. Thanks to my various internships abroad in this field, I was able to specialize and make myself more use-

ful to the Cameroonian university scientific community. For me, this is already a very good basis for setting up a sophisticated laboratory for the analysis of natural substances and it would be of great benefit to improving the use and standardization of medicinal plants in Cameroon.

Prof Chouna Rodolphe

Department of Chemistry, Faculty of Science, University of Dschang

Research in the field of Natural Substances in Cameroon has flourished over the decades; but the volume of results obtained has not always brought us to a comparable level of development in this field. The lacks of funding and a multidisciplinary approach are certainly obstacles. The YaBiNaPaProject (antiparasitic and antimicrobial Natural Products Discovery) is an opportunity to sanctify the aspect of development, because

it allows to put together in a common spirit and objectives Cameroonian and foreign researchers. On observation, I would say that the implementation of this program was a bit difficult because it was necessary to make the various stakeholders understand the innovative aspect of the project (applied research). I have the firm conviction that the stakeholders and the PhD candidate at the end, will be in addition to build

the research capacity, train specialized experts in phytomedicine. Ultimately, we would definitely bring added value in this field.

For the YaBiNaPa project to succeed, we must first believe in it; but also work for its success. I hereby also acknowledge the efforts of coordinators and the DAAD financial support. Personally I have adapted my research accordingly.

**Prof. Dr. Fabrice Fekam Boyom**

Faculty of Science – University of Yaoundé I

"YaBiNaPA is an ideal forum for training the future generation of African researchers in drug discovery research against tropical infectious diseases starting from local biodiversities and traditional knowledge".

**Dr Tchamgoue Joseph**

As a PhD holder we are generally supposed to have the five transferable skills that employers care about the most that is, information processing, information and data analysis, drawing actionable conclusions and work ethic. My research stay at the Yaoundé-Bielefeld bilateral graduate school of natural products with antiparasitic and antimicrobial activity (YaBiNaPA) have enabled me to strengthen the aforementioned points and to update my current knowledge on various scientific domains. Assisting in

the supervision of thirty one PhD students working each on a different plant species have indeed equipped me with the skills I need to succeed in my individual research endeavours.

Most importantly, I could acquire hands-on skills on the formulation on herbal-based drugs and on entrepreneurship through various workshops and seminars organised within the graduate school. These trainings gave me the impetus to set-up a start-up named Africa Chemistry Development (ACD)

dealing with the production of mosquito repellent candles from the essential oils of a well-known Cameroonian medicinal plant.

I express my deepest gratitude to the YaBiNaPA governing board and to DAAD for this worthwhile experience. I wholeheartedly believe such programs will certainly have a positive impact on research in our continent through which we could assure the sustainable development of Africa.

**Prof Kapche Wabo Deccaux**

Department of Chemistry, Higher Teacher Training College UYI

My impression concerning the "Yaoundé - Bielefeld Bilateral Graduate School Natural Products with Antiparasite and Antibacterial Activity (YaBiNaPA)"

The objectives of this bilateral graduate school were the training of PhD students and other researchers on the search, formulation and quality control of antimicrobial and antiparasitic drugs from plants. In this graduate School, students are working on complementary topic on plants used in Cameroon in the treatment of parasitic and microbial diseases under supervision of reputed University Professors. Young scientists have an inspiring atmosphere; they received extra training modules on the preparation of extracts, biological (bioactivity-

guided) screening, isolation and analysis of natural products using spectroscopic methods, structure elucidation of natural products, bioscreening of natural products and derivatives, formulation of phytomedicine. They are also trained on transferable skills (teamwork, management, entrepreneurship, languages, communication, and presentation) and have access to online scientific data databases like SciFinder and to scientific journals or books.

This unique initiative have intensified scientific cooperation between the University of Yaoundé I and Bielefeld University and will surely led to the training of experts in antiparasitic and antifungal natural products. I am sure that the strengthening of the scientific knowledge of researchers on

antiparasitic and antimicrobial natural products will improve the Cameroonian /African health sustainable development and life quality by the production of phytodrugs and formulation of herbal medicines. The implementation of this project has considerably and significantly improves the working conditions in the laboratories involved (with the acquisition of up-to-date scientific equipment, solvents, chemicals...) and also the living conditions of the students involved.

We expect that the project will be renewed and will lead to the establishment of subregional centers for phytochemical analysis equipped with HPLC, NMR, LC-MS apparatus and screening platforms for preclinical and clinical testing of phytochemicals and extracts.





Prof WANSI Jean Duplex
Department of Chemistry, Faculty of Science, University of Douala

The YaBiNaPA project is an excellent platform for scientific exchange and promotion of research. Within the last three

years, six PhD students from the chemistry laboratory at the University of Douala, namely Willifred Dongmo Tékapi Tsopgni, Ariane Dolly KenmogneKouam, Yves Salomon Makong, Tabekoueng Georges Bellier, Emmanuel Akosung and Djuidje Kamkumo Francesca were awarded. During their research six months stay in the YaBiNaPA Graduate School internship at the Universities of Yaoundé and Bielefeld, they accessed modern research tech-

nologies and well-equipped laboratories, supervised by Prof. N. Sewald in Germany and by my colleagues in Yaounde I. Their work revolved around being trained on very advanced chromatographic equipment like LC-MS, as well as on other modern spectroscopic, semisynthetic and biological techniques needed to deliver plant fractions and identify novel secondary metabolites for pharmaceutical formulation to enhance bioactivity, stability and efficacy. The results obtai-

ned during their internship led to seven publications in peer-reviewed scientific journals. Furthermore, the quality of their results enabled five students - due to excellent equipment and work condition - to complete their PhD theses in less than three years. For the time to come, these new post-doctoral researchers shall multiply for knowledge transfer of new approaches and methods learned and will help to develop and spread new scientific know-how between Douala



Prof. Dr. Simeon F. Kouam
Department of Chemistry, Higher Teacher Training College UYI

"The YaBiNaPA project is one in which the training of researchers is an example of good action which will in the near future accelerate the development of research and then increase the number of well-trained researchers to be involved in the development of the country"



Prof NKENGFAK AugustinEphrem
Head of Organic Chemistry Department, Faculty of Science, UYI

on the YaBiNaPa project which was launched three years ago. As indicated, by its name YaBiNaPa, is a project financially supported by DAAD between The University of Yaounde I and the University of Bielefeld. One of its main objectives is to enable students enrolled into PhD programs to work in favorable research environment and defend their PhD degrees in a reasonable time frame. My opinions about this project are very good. In fact: -it is an international academic multidisciplinary project which

is opened not only to students from Cameroon and Africa working in the field of Natural Products Chemistry but also to professionals who are interested in the development of phytodrugs. -Students who are part of this project work in better conditions compared to their mates who are not part of the project. They are entitled to a monthly stipend which enables them to fully focus in their research. In addition, they have facilities for Chemical analysis and literature search e.gScFinder, access

to consumables, participation in scientific seminars and conferences. Moreover, the YaBiNapa project has permitted the acquisition of some basic equipment which contributes to the smooth running of research in our appreciation to the management body of this project particularly to Professors Bruno Lenta, Norbert Sewald, DAAD, the staff members of the University of Yaounde I and Bielefeld, for their daily efforts employed for the smooth running of this project.

First of all, I am grateful for the opportunity given to me to express through "Actu" my opinion



Professor Charles Fon Abi
Head of the Chemistry Department, ENS Yaounde

KOU who is the coordinator of this project, in my department, has worked hard through cooperation with Bielefeld University in Germany with the support of DAAD Scholarship to bring it to this level that we are all seeing the fruits. This project, together with other projects managed by young and dynamic lecturers, has projected the Department of Chemistry, in particular and the Higher Teacher Training College of the University of

Yaounde 1 at large, into the limelight. Because of the cooperation that these Lecturers have succeeded to create between University of Yaounde 1 and foreign universities especially those in Germany, our Department is gradually being equipped with sophisticated and expensive laboratory equipment. For example, through the YABINAPA project, a High-performance Liquid Chromatography coupled with Mass spectrometry equipment

has been put in place for the analysis of plant and other organic extracts. I strongly believe that the only way forward to carry out meaningful research in chemistry for the development of Cameroon is to encourage our young lecturers to continue along this line of creating research cooperation with universities abroad that can support us to develop our own laboratories.

The YaBINAPA Project is a clear and palpable illustration of how Research and Development in Chemistry could be used to impact directly on the living conditions of mankind. Professor Bruno LENTA NDJA-

Annual events

Network meetings to evaluate the work done, exchange ideas adopt strategies and give new orientations to researchers



Traditional medicine may attract everyone because we are all interested in our health

GOUNI DONFACK Clémence, PhD student in Natural Products Chemistry at the YaBiNaPA graduate school.

Modern medicine in African societies has, in many cases, met with popular support because of its relative effectiveness. However, it has not resulted in the abandonment of traditional therapeutic practices despite the breakthrough of traditional medicine. Today, African people still rely on medicinal plants for their health care and its use is growing even in industrial countries.

In Cameroon in particular, it is estimated that 80% of the population relies on traditional medicine. The use of traditional medicine has become a common practice in the past year and the Mfoundi market in Yaoundé, known as the "Station Bridge", is reputed to be the largest supply market for natural pharmacopoeia in the city of Yaoundé.

However, the methodology of this

traditional medicine is based on personal experience or knowledge transmitted from one generation to other. Although scientific studies have confirmed the effectiveness of some traditional remedies, people mostly use them because of their observations or personal experiences. In addition, traditional medicine is a topic that may attract everyone because we are all interested in our health,

encouraging its use is far from simple because we must be reassured that the beneficial aspects are used safely. Indeed, very little research has been done to establish the security of their use. Their composition nor the proportion of active ingredients is known to traditional healers, much less is known on the level of toxicity of these medicinal plants.

Health research is crucial for progress towards universal health coverage

TSAMO FEUGAP Leonel Donald, PhD student in Natural Product from the University of Dschang, six months' fellow at the YaBiNaPA graduate School

The first Poverty Reduction Strategy Paper (PRSP) was developed by Cameroonian authorities in April 2003. This document was subsequently revised and led to the strategy Document for Growth Development and Employment (DSCE) in which the authorities formulated a vision of

development of Cameroon by 2035.

However, to achieve Cameroon's development, a healthy population is required in addition to different activities generating incomes in order to boost the country's economy. Indeed, nowadays, microbial and parasitic diseases

remain a major health problem because of their resistance to all antibiotics. Hence the importance to search for new antibacterial agents is necessary.

It is in this context that the University of Yaoundé I and the Bielefeld University have set up a program called, YaBiNaPA

(Yaounde-Bielefeld Bilateral Graduate School of Natural Products with Antiparasite and Antibacterial Activity), to produce phytomedicines that could be used for the treatment of these diseases.

YaBiNaPA for a good visibility of medicinal plants from northern Cameroon

TEGASNE Catherine, PhD Student in Natural Products Chemistry at the YaBiNaPA Graduate School, University of Yaoundé I.

I'm originated from the Northern part of Cameroon, a region where the education level among female is extremely low. The use of traditional medicines for healthcare by the population (including children and pregnant women) in this part of Cameroon is above 90%. For many centuries, this population has been relying almost exclusively on medicinal plants for their primary healthcare due to extreme poverty and limited modern health facilities. Another factor that favors this situation is the cultural acceptability since the knowledge is transferred orally from one generation to the other. Unfortunately, many users here don't really master the knowledge of dose and toxicity of plants that they are using, a situation that could lead in some cases to more

complicated health conditions with some patients. Despite the high use of medicinal plants in this part of the country where the climate is characterized by eight months of very harsh dry season, the main burden are parasitic (malaria and leishmaniasis) and waterborne diseases (including typhoid and cholera).

When I enrolled in the YaBiNaPA project, and considering its goal, I felt as if part of my problems were having a solution already. Since YaBiNaPA is aimed at investigating Sub Saharan Africa medicinal plants with antibacterial and anti-parasitic properties in order to produce Improved Herbal-Based Drugs, I have the hope that through this project we will produce a phytodrug that could help my fellow citizens. Indeed,

YaBiNaPA is working towards that direction through seminars, training courses on phytodrugs formulation and meeting with traditional healers. In addition, YaBiNaPA has equipped our laboratories with facilities (LC-MS) that enable us to control the quality of our samples and to verify the efficacy of locally produced phytodrugs by traditional healers. In addition, the project has created an interdisciplinary network that aid students and traditional healers to quickly have information about the toxicity of their samples.

It is important to note that climate has a great influence on vegetation, because this part of the country has only two seasons: four months of rain and eight months of very harsh dry season. In order



to fight against harsh climatic conditions, plants in this region develop resistance to adapt to climatic conditions by producing various secondary metabolites. This is the reason why a plant harvested in the dry season does not have the same secondary metabolites as that harvested during the rainy season.

Yaoundé-Bielefeld, a model of collaboration for swift analysis of secondary metabolites and amelioration of research conditions of PhD students



Argan Kelly Nkwenti Wonkam, PhD student in Natural Products Chemistry at the YaBiNaPA graduate school.

My research work focuses on the chemical and antiparasitic study of two Cameroonian plants from the Fabaceae and

Rubiaceae families. Analysis of compounds isolated from plants is a key step in the drug discovery process. YaBiNaPA is a project that is aimed at promoting the valorization of medicinal plants from Africa with antiparasitic and antibacterial properties for sustainable development, which falls within the goals of the United Nation. The graduate school represents an amazing platform for prompt analysis of compounds we isolate from medi-

nal plants, since analysis of compounds we isolate from chemical investigation of plants is a lengthy process. Students were obliged most of the time to send their samples in Europe or USA for analysis and the results were returned after a minimum of six months. Thanks to YaBiNaPA, the time frame for analysis has considerably been reduced. At this state of my work, I have already sent twenty nine (29) compounds for analysis at Bielefeld and have received

twenty six (26) of them. This is easily made possible since part of the analysis is now performing in Cameroon through our LC-MS facilities. Therefore, we are now able to verify the purity of our samples locally and also obtain their masses within the same day. Once these steps are followed, only our pure samples are sent for analysis in Bielefeld. Also, the LC-MS facilities enable us to have the profile of both extracts and fractions.

YaBiNaPA as a big opportunity for Sub Saharan African PhD students



Rodrigue Keumoe, PhD student in Biochemistry at the YaBiNaPA Graduate School, University of Yaoundé I.

I'm currently carrying out my research work on antiparasitic activities of plant extracts and isolated compounds at Centre Pasteur of Cameroon, which is one of the centers of

excellence for bioassays in Cameroon. I am in charge of antiparasitic evaluation of samples from the YaBiNaPA project at Centre Pasteur. This has been made possible through the network created by YaBiNaPA with private and public institutions as well as local companies. The YaBiNaPA program has made research in Sub Saharan Africa easier for PhD students working on the investigation of antibacterial and antiparasitic plants with the aim of producing Improved Herbal-Based Drugs. Indeed,

the main difficulties encountered by researchers working in Sub Saharan African countries have been the limited or lack of facilities, consumables, and financial support. This situation tends to hinder young researchers in the progression of their research work and even the development of African countries as a whole. To overcome this problem, some students apply for international scholarship programs and very few succeed. These fellowships enable the beneficiaries to considerably advance in their research works

through the facilities which are made available in their host laboratories and also with some monthly stipends which aid them in their basic needs. On the other hand, students who could not have access to these highly selective fellowships have to financially sponsor their research work. Thus, they seek for jobs in other to earn some money and this has a direct impact on the progress of their research work.

YaBiNaPA: A tool for modernization, collaboration and standardization in the field of phytomedicine

Michel POUOFO NGUIAM, a PhD student in Animal physiology at the YaBiNaPA Graduate School, University of Yaoundé I.

My research work is focused on diarrhoeal diseases involving Shigella and Entamoeba genera. I perform my assays both in vitro and in vivo on mouse models seeking for plants which can be used to control diarrhoea, a real burden to many Sub Saharan African countries. YaBiNaPA with its facilities has enabled us to perform our experiments in very short time. Above all, the YaBiNaPA Graduate School has created a large platform of collaboration between traditional healers, researchers and academics. Also, collaboration between researchers of different

fields and from different Sub Saharan African countries is now possible and has gone a long way for the past few years leading to promising and amazing results. Furthermore, YaBiNaPA has been encouraging students and traditional healers to work towards the formulation of improved phytodrugs from bioactive and nontoxic plants. With the LC-MS facilities, the composition of crude extracts can now be determined at a very short time.

YaBiNaPA has come as a stepping stone for the valorisation of medicinal plants in Sub Saharan

Africa, since the use of plants as medicine by the population in this part of the world is as old as the history of mankind. Indeed, through observation of its environment and multiple groping, human societies have gradually developed empirical knowledge of medicinal plants. This knowledge is the base of herbal medicine that is transmitted from generation to generation. Thus, every community has developed its own phytomedicine which generally differs from that of neighboring communities.

In the field of phytotherapy,

many misconceptions still circulate, including the idea that only those who have received ancestral gift must treat people with medicinal plants. For this reason, many herbal preparations are hidden, which does not facilitate the vulgarization of traditional medicine. The absence of monographs hinders the development of standardized phytomedicines. In addition, the use of many plants is still based on empirical considerations without scientific basis.

Universität Bielefeld

Natural Products with Antiparasite and Antibacterial Activity (YaBiNaPA)
Yaoundé-Bielefeld Graduate School
YaBiNaPA



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Some formulations of YaBiNaPA



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