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REPORT

Taxonomic training & access to collections in Belgium

(projects executed between 1 April 2009 and 31 March 2010)

NOTICE

The present questionnaire must arrive with the Belgian National Focal Point to the Global Taxonomy Initiative within one month of the official closure of the capacity building visits. Electronic submission on the general e-mail address of the Belgian GTI NFP (cbd-gti@naturalsciences.be) is strongly encouraged. If electronic submission should however be impossible, paper copies may be sent by fax or ordinary mail. The Belgian GTI NFP will acknowledge receipt of all project reports.

If grantees have relevant pictures to illustrate their capacity building visit, these may be annexed to the report. The Belgian National Focal Point might use some of these pictures in one of its reporting activities, but only after the copyright holder has given his permission.

Contact and further information

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PART I – CANDIDATE INFORMATION	
Family name:	TAEDOUMG
First name(s):	Evariste Hermann
Nationality:	Cameroonian
Date of arrival and departure in / from Belgium	29-06-2009/29-07-2009
Number of training days:	24 days
Type of visit	☒ Mainly training in taxonomy and collection management ☒ Mainly access to collections ☐ Other, *specify*
Location of training:	☐ Royal Belgian Institute of Natural Sciences, Brussels ☐ Royal Museum for Central Africa, Tervuren ☒ National Botanic Garden of Belgium, Meise ☐ Other, *specify*
PART II - GENERAL INFORMATION	
Describe concisely how you have learned about the Belgian GTI Project	My Ph.D. supervisors, Pr. Bonaventure Sonké and Dr. Petra De Block, introduced me to the Belgian GTI project.
Describe concisely how you have learned about this specific call for proposals	I checked the GTI website regularly which is how I knew that this specific call was open for application.
If this was your first study visit financed via the Belgian GTI National Focal Point, describe concisely why you needed capacity building in taxonomy and collection management	This was my second study visit.

If this was not your first study visit financed via the Belgian GTI National Focal Point, describe concisely why you needed further support	I have just started my Ph.D., the topic of which is the study of the genus *Craterispermum* (taxonomy, phylogeny, population genetics, aluminium accumulation, etc.). The first object of the study is the taxonomic revision of the genus. Doing a taxonomic revision of *Craterispermum (*Rubiaceae) is impossible at my home institute, the herbarium of which houses less than sixty herbarium specimens of the genus. None of the western herbaria, which hold the types and the bulk of the herbarium specimens, will consider sending this material to Africa. Also the other parts of the Ph.D.-study, such as phylogenetic research, cannot be performed in Cameroon, because we lack the necessary equipment and expertise. Therefore, the National Botanic Garden of Belgium (BR) was chosen as the host institute for the taxonomic and phylogenetic work. This institute houses several Rubiaceae experts, a great collection of African plant material and a library containing all reference works needed for the study. During my first study visit (2008) I was introduced to all techniques needed to perform a taxonomic revision. While I have taken a course on taxonomy in Cameroon, I have realized that botany there focuses mainly on fieldwork. This is because of the lack of teaching materials, plant material (most Cameroonian plant material is held by Western herbaria) and the lack of relevant and recent literature. During my second study visit I have implemented the techniques I learned during the first visit. I delimited and described three new species of Craterispermum. Furthermore, I learned how to execute a phenetic analysis (choice of characters, scoring of characters, statistical analysis, etc.) while studying the species complex *Craterispermum schweinfurthii* Hiern, *C. cerinanthum* Hiern and *C. laurinum* Benth. This second visit to the National Botanic Garden of Belgium was the real start of my Ph.D and of my career as botanist. Before, I had only done some literature study and fieldwork.

Describe concisely what support (e.g. training, access to collections,…) you have received and how this training can be related to taxonomy and /or collection management	I brought about 300 dried specimens of Rubiaceae from Cameroun. I have seen how there are curated in the herbarium of the National Botanic Garden of Belgium. I was introduced to the different steps of the specimen processing: specimen sorting and decontamination, producing labels, databasing, identification, etc. I have also visited the Rubiaceae greenhouses and have seen how the plants are grown. More specifically, I have learned how to make cuttings and how to germinate Rubiaceae. Indeed, we are planning to build a greenhouse at the University of Yaoundé. All this will allow me to better curate the herbarium collection and to start a living Rubiaceae collection in Yaoundé. As regards the taxonomic revision of *Craterispermum*, I have now actually started my revision work. I have practised many taxonomic methods, notably: - describing a new species (which morphological and anatomical characters to stress) - working with a botanical artist georeferencing specimens and making distribution maps - writing articles and learning how to publish them - using a stereoscope and drawing tube; - flowers and fruits dissection - preparing material for SEM observation - learning how to collect material in the field (many special collections are necessary for the later stages of my study such as alcohol- or silica gel material, etc. I had access to ca. 90% of the existing herbarium material of *Craterispermum* (ca. 2000 specimens from different herbaria) and was able to place most of these into groups and identify 8 new species (3 already described). I had access to most of the type material of the genus. Only the Kew material was not available during this visit (Kew does not send large amounts of material on loan).
Describe concisely how your gained capacity will help you in your professional duties	Collection management training was very instructive and should allow me to better manage our Cameroonian Rubiaceae collection (dried and spirit) in the herbarium of Yaoundé and to start a living plant collection at Yaoundé University. I do fieldwork regularly to collect plant material. I have now learned how to make the special collections needed for specialized modern studies such as population genetics, anatomy, etc. Learning how to make and to use identification keys will allow me to aid in the identification of Rubiaceae material present in our herbarium. Also the literature I brought back with me will help in this regard. Solving the most complicated complex of genus *Craterispermum* is a great step in the revision of this genus. Now that I have delimited the species of Craterispermum using the massive amount of material available in Belgium, I will be able to identify the material held in the Yaoundé herbarium.

Describe concisely how your gained capacity will be implemented in your institution	Since a few years the Laboratory of Systematic Botany and Ecology at the University of Yaoundé has the plan to produce a Flora of Cameroon for the Rubiaceae family. Producing a revision for the genus *Craterispermum* is a very good preparation for participation in this project. The capacity gained from my research visits to Belgium will help since it has given me knowledge about the curation of Rubiaceae material and its identification (use of flora's and identification keys). Documentation (Rubiaceae literature) obtained during my stay is deposited in our library and will be used by other botany students. In the future, I hope to share knowledge acquired during my stay in Belgium by supervising other Cameroonian students in botany.
Describe concisely what other support you eventually would need	While these visits introduced me to the practise of a taxonomic revision, I need much more time to study herbarium material of *Craterispermum*. During this visit I have identified 8 new species of Craterispermum, but could only describe three. I have also delimited three closely related species (over half of all the material ever collected) *C. schweinfurthii , C. cerinanthum* and *C. laurinum* . There are still fifteen species to be studied (detailed descriptions and distribution maps are needed). In order to finish my revision, I will need a minimum period of six months in BR. As regards to training, I still have to learn all techniques involved in a phylogenetic study, notably DNA isolation, PCR and sequencing, sequence alignment and the analysis of DNA sequences using PAUP, McClade, MrBayes and other phylogenetic programs. Learning these phylogenetic techniques and using them on the genus *Craterispermum* would take a minimum of three months.

Describe concisely what infrastructural and human resources you and your institution eventually still need to become fully functional	- My institution needs access to recently published studies on African plants and taxonomy. With this documentation we will be able to progress from simply collecting plant material and storing it to studying it and publishing about it. We need both hard copies of existing literature and Internet access to consult taxonomic sources such as IPNI, ALUKA, etc. - We need computers in order to database our Rubiaceae collection and perform research on it. We also need technical materials such as microscopes, stereoscopes, dissecting kits, etc. - Material like pots, alcohol and silica gel are also needed to build up a Rubiaceae reference collection for morphological, anatomical and DNA studies. We already have an Orchid shadehouse (about 100 m^2). We need to extent this to include the Rubiaceae that we collect during our field trips. - We participate in many field trips with foreign researchers. In our team, many postgraduate students do not have financial support. They also lack technical material and would need tents, sleeping bags, torches and other field equipment. - We need people trained in taxonomy, morphology/anatomy and molecular phylogeny. Despite an obvious need and demand in these scientific fields, they are currently not taught in Cameroon, because of lack of trained staff.
Describe concisely how you think the Belgian GTI National Focal Point could further construct capacity for you and your institution	The bulk of the African plant collections and the literature published on them are held in European and American institutes. Furthermore, most of the specialists on African plants are working outside Africa. The Belgian GTI National Focal Point can help us to further build capacity in Cameroon by funding other students. We need to have specialists in Africa and not only in Europe. Training in taxonomy at Belgian institutes is necessary to give us the opportunity to examine collections of African material and to exchange knowledge with European specialists. However, GTI should also support training at a regional scale and promote the creation of 'centres of excellence' in the field of taxonomy based in Africa (for example, GTI could facilitate networking between African herbaria and universities).

PART III – TAXON SPECIFIC INFORMATION	
What is your taxon of interest	Plants/Dicotyledons-Euasteridae/Gentianales/Rubiaceae/ *Craterispermum*
Describe concisely the different methodologies for collecting your taxon.	We dry fertile branches (with flowers or fruits) in a plant press (several duplicates to send out to different institutes). When collecting a plant, we take copious notes on the habitat, the ecology and the altitude. We take GPS coordinates and make photographs. Whenever possible, local communities will be questioned concerning the vernacular names and local uses of the collections made. We also collect appropriate material for several studies: - leaves in silica gel for DNA-sequencing - flowers and fruits in different development stages in alcohol 70% for morphological-anatomical studies - entire leaves with nodes and stipules in alcohol 70% for morphological-anatomical studies (during my study visit to BR it became clear that leaf nervature and stipule morphology will produce species delimiting characters) - seeds and plant cuttings to grow plants for chromosome aluminium accumulation studies - wood for wood anatomical and aluminium accumulation studies - soil samples to calculate aluminium concentration. Furthermore, in order to study comparative genomics we need to work at population level and as such special fieldwork needs to be undertaken, collecting more samples within a single population.
Describe concisely how to best preserve collected specimens of your taxon for taxonomic purposes	Like all Rubiaceae specimens, *Craterispermum* specimens are preserved as herbarium sheaths (dried in a plant press). Several duplicates are distributed to different herbaria. A collector's label with abundant information on location, habitat, ecology, colour of flowers of fruits is very important. Pressed specimens are dried in a gas oven, and decontaminated (frozen or microwaved) to avoid insect damage before they are introduced in the herbarium. They are conserved in special cupboards, arranged by taxon. Flowers, fruits and leaves can also be preserved in 70% alcohol (for morphological and anatomical studies). Alcohol pots are labelled inside and outside and kept separate from the herbarium collection (fire risk). Leaves are rapidly dried in silica gel for DNA studies.

Describe concisely the best practice in the management of a collection of your taxon	Specimens are encoded in a database, containing information on collector, collecting number, additional collectors, collecting date, identification, locality, ecology, local name, uses and herbaria were specimens are deposited. Several specialized databases exist, such as BGBase or Brahms, but Access can also serve. The database can be used to generate labels for the specimens, checklists, distribution maps, etc. It also keeps track of the movements of each specimen, e.g. in case of a loan. Specimens are best provided with barcodes. Herbarium specimens are best kept in metal cupboards and should be checked regularly for insect damage. In case of insect problems, specimens can be frozen for ca. a week or microwaved to kill the pest species
Describe concisely how you intend to make your taxonomic data available to other colleagues	Publication of results is very important. At the end of my second visit, I have 2 papers to publish. They will be published as soon as possible in different taxonomic journals (Blumea, Nordic Journal of Botany). A third paper will require some further work but will be sent in as soon as possible (Taxon). PDF's of these papers can easily be sent to African collegues. At the end of my revision, a general publication on *Craterispermum* will be as widely disseminated as possible, e.g. by publishing in AbcTaxa, the volumes of which can be downloaded for free from the website. A good system to disseminate information would be to create an e-mail network of Cameroonian and foreign botanists in collaboration with the herbarium of Yaoundé. In fact, we already have something like that: Promo 2000 is a network grouping botany researchers and students from two different Cameroonian Universities. Another possibility is to make the *Craterispermum* database available online after the revision is finished.

Have you been briefed on the aims, scope and contents of the journal *AbcTaxa*?	Yes, It is a series of manuals dedicated to help capacity building in taxonomy and collection management. Several volumes have already been published. They are available in book form but can also be freely downloaded from the AbcTaxa website.
Do you think you have enough capacity to make a contribution to *Abc Taxa*?	☐ No, I still lack capacity ☒ Yes, if I get adequate guidance and support from my tutors ☐ Yes, I feel able to do this autonomously ☒ Other, *specify* after finishing my revision of the genus *Craterispermum*
If you feel capable to contribute meaningfully to *Abc Taxa*, are you willing to do so	☐ No ☐ No, I have no time to develop such a capacity building manual ☒ Yes, I will send a proposal along the lines stipulated on the website

Yaoundé, 13 October 2009

Belgian National Focal Point to the Global Taxonomy Initiative