



Belgium
partner in development

REPORT

Taxonomic training & access to collections in Belgium

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 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

Pierre Huybrechts & Anne-Julie Rochette
Belgian Focal Point to the Global Taxonomy Initiative,
Royal Belgian Institute of Natural Sciences
Vautierstraat 29,
B-1000 Brussels, Belgium
Tel.: +32 2 627 45 90
Fax: +32 2 627 41 41
Email: cbd-gti@naturalsciences.be

PART I – CANDIDATE INFORMATION

Family name:	ONDIBA
First name(s):	Melvin Kerubo
Nationality:	Kenyan
Date of arrival and departure in / from Belgium	10 th March 2024 to 30 th March 2024 5 th May 2024 to 18 th May 2024
Number of training days:	Thirty-five (35) days
Type of visit	☒ Mainly training in taxonomy and collection management ☐ Mainly access to collections ☐ Other, <i>specify</i>
Location of training:	☒ Royal Belgian Institute of Natural Sciences, Brussels ☐ Royal Museum for Central Africa, Tervuren ☐ Botanic Garden of Meise ☐ Other, <i>specify</i>

PART II - GENERAL INFORMATION

Describe concisely how you have learned about the Belgian GTI Project	I learned about the Belgian GTI Project through my supervisor, Dr. Maarten Van Steenberge. This project aimed to train young African researchers in taxonomy and collection management and connect them with ongoing research projects, most notably Belspo-funded research projects on the ichthyofauna of the Great East African Lakes.
Describe concisely how you have learned about this specific call for proposals	I learned about the specific call for proposals related to the Belgian GTI Project through my supervisor Dr. Maarten Van Steenberge.
Describe concisely why you needed capacity building in taxonomy and collection management	Capacity building in taxonomy and collection management is crucial for my doctoral studies in assessing aquatic species diversity using an environmental DNA (eDNA) approach. By correctly identifying and documenting the otter species in Morocco and the species found in the Mara River and Akagera Wetland, it aids in the preservation of biodiversity and supports conservation efforts. It helps to effectively curate collections, making them valuable resources for scientific research. In addition, it also helps mitigate the risks associated with inaccurate taxonomy, which can lead to mismanagement of resources and misunderstanding of ecological dynamics, which could lead to threats to biodiversity.

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 have received training in environmental DNA (eDNA) analysis, that is, environmental DNA (eDNA) extraction, amplification and purification of otter fecal samples from Morocco and water samples from the Mara River and Akagera Wetland, and data analysis using Geneious software. Seventeen (17) otter fecal samples were extracted using the QIAamp Fast DNA Stool Mini Kit and amplified using otter specific primers (Lutcyt-F and Lutcyt-R). PCR replicates were visualized on a 1% agarose gel. Thirteen (13) PCR replicates that amplified successfully were sent to Macrogen for sequencing. The sequences were then cleaned and edited using Geneious software. A total of twenty-nine (29) water samples from Akagera Wetland and the second campaign to the Mara River and six (6) internal negative controls (INC) were extracted using the Sylphium Environmental DNA Isolation Kit. Seven (7) Whatman filter samples collected during the 2021 campaign to the Mara River and one (1) negative control were extracted using the Macherey-Nagel environmental DNA (eDNA) isolation protocol. A metabarcoding library prep of samples from the Mara River and Akagera Wetland was performed using a protocol provided by Dr. Schenekar. Each sample was given a unique tagged primer for the 12SV5 and MiMammal primers. After PCR amplification, the PCR replicates were visualized on a 2% agarose gel. Samples amplified using the MiMammal primer amplified successfully as compared to samples amplified using the 12SV5 primer. Despite this, environmental DNA (eDNA) analysis is very relevant to taxonomy as it helps identify species through their genetic material in the environment. This data could provide reference samples for validating DNA identifications and enhancing taxonomic knowledge.
Describe concisely how your gained capacity will help you in your professional duties	The skills acquired will enhance my professional duties by enabling more accurate and efficient monitoring of otters in Morocco and biodiversity in the Mara River and Akagera Wetland. Environmental DNA (eDNA) techniques allow for the detection of species presence and abundance without the need for direct observation or capture, reducing disturbance to species and habitats. It will improve my ability to assess environmental impacts, inform conservation strategies, and contribute to environmental compliance with greater precision and reliability. Additionally, environmental DNA (eDNA) analysis facilitates the early detection of invasive species, aiding in rapid response and management efforts.

Describe concisely how your gained capacity will be implemented in your institution	My knowledge in environmental DNA (eDNA) analysis will be implemented at the National Museums of Kenya (NMK) and Mohammed V University in Rabat through several ways. Firstly, I will integrate environmental DNA (eDNA) analysis in both institutions into ongoing ecological research and biodiversity monitoring projects, allowing for more comprehensive and non-invasive species detection and ecosystem health assessments. Secondly, by collaborating with other academic and environmental organizations, I will utilize environmental DNA (eDNA) technology to enhance data collection and analysis, fostering interdisciplinary studies and broader environmental impact assessments. Thirdly, environmental DNA (eDNA) analysis will be incorporated into our curriculum at Mohammed V University, providing students and researchers with hands-on experience and expertise in cutting-edge environmental technologies. Lastly, I will ensure environmental DNA (eDNA) data at the National Museums of Kenya (NMK) will support local and regional conservation efforts, helping to inform management decisions, track invasive species, and monitor endangered species.
Describe concisely what other support you eventually would need	Access to specialized software tools, training on advanced analytical methods, and collaboration with experts in related fields would be beneficial and valuable for maximizing my knowledge on environmental DNA (eDNA) analysis.
Describe concisely what infrastructural and human resources you and your institution eventually still need to become fully functional	The National Museums of Kenya (NMK) and Mohammed V University in Rabat would require to establish collaborations with external experts and organizations that could provide valuable support and training services in environmental science, data analysis, and sustainability practices. Also, it would need infrastructural resources such as an environmental DNA (eDNA) laboratory and equipments, updated hardware, software licenses for specialized environmental DNA (eDNA) analysis, and data storage facilities capable of handling large datasets.

Describe concisely how you think the Belgian GTI National Focal Point could further construct capacity for you and your institution	The Belgian GTI National Focal Point could construct capacity for me and my institutions (National Museums of Kenya (NMK) and Mohammed V University in Rabat) by providing training programs focused on advanced environmental data analysis techniques, facilitating access to international networks and collaborations for knowledge sharing. Additionally, the focal point could assist in organizing workshops, seminars, and conferences to foster professional development and exchange best practices in environmental management and sustainability.
---	---

PART III – TAXON SPECIFIC INFORMATION

What is your taxon of interest	Vertebrates (mammals and fishes)
Describe concisely how you intend to make your taxonomic data available to other colleagues / people in your homeland	To make my taxonomic data available to colleagues and people in my country, I plan to create a centralized database accessible online. The sequences of otters found in Morocco will be published in GenBank and the taxonomic data found in the Mara River and Akagera Wetland will include detailed taxonomic information and ecological data for each species. Additionally, I will publish research articles summarizing my findings and share them through academic journals, conferences, and workshops. Collaborating with local universities, research institutions, and government agencies will also facilitate the dissemination of taxonomic data to a broader audience.

Describe how your taxonomic work helps improving the status of biodiversity in your country	My taxonomic work contributes to improving the status of biodiversity in several ways. Firstly, accurate identification of the otter species in Morocco using environmental DNA (eDNA) analysis is fundamental for biodiversity conservation efforts. The otter acts as a keystone species and plays a vital role in maintaining the health and balance of aquatic ecosystems. By cataloguing and classifying the otter, it provides the foundation for knowing its distribution in Morocco. Secondly, environmental DNA (eDNA) data help in identifying species that are threatened, endangered, or endemic to specific regions. In the Mara River and Akagera Wetland, there are species that are threatened or vulnerable. Having this information is crucial for prioritising conservation efforts and allocating resources effectively to protect vulnerable species. Thirdly, understanding the relationships between different species found in the Mara River and Akagera Wetland and their environments is essential for effective ecosystem management. This research provides insights into the ecological roles of species, their interactions, and dependencies, aiding in the development of sustainable management strategies. Lastly, sharing taxonomic knowledge of the Mara River and the Akagera Wetland with the public and policymakers raises awareness about the importance of biodiversity conservation. Through outreach activities, workshops, and educational materials, my work helps foster a deeper understanding of the value of biodiversity and the need for its protection.
Describe how your project could help reduce poverty in your country	Environmental DNA (eDNA) analysis has the potential to contribute to poverty reduction in my country in several ways. Firstly, environmental DNA (eDNA) analysis of the Mara River and Akagera Wetland can aid in identifying and monitoring biodiversity hotspots, allowing for targeted conservation efforts to protect ecologically important areas. Preserving biodiversity in the Mara River and Akagera Wetland not only maintains ecosystem services essential for human well-being but also creates opportunities for ecotourism, providing jobs and income for local communities. Secondly, environmental DNA (eDNA) analysis can be used in aquaculture and agriculture to monitor for pathogens and pests, helping to maintain the health and productivity of food systems critical for livelihoods and nutrition. Finally, environmental DNA (eDNA) analysis generates valuable data that can inform evidence-based policymaking and decision-making processes. By integrating environmental DNA (eDNA) findings into environmental policies and development plans, governments can prioritize actions that promote sustainable development and poverty reduction.

Annexe: Photo



Photo 1: Preparation of Qubit working solution in the Pre-PCR laboratory at the Royal Belgian Institute of Natural Sciences (RBINS)