

CV

Personal details

Surname: Buxton (Dr.)

Firstname: Mmabaledi

Gender: Male

Marital Status: Married

Date & Place of Birth: 11 June 1980, Ghanzi: Botswana

Nationality: Citizen of Botswana (Motswana) **National ID:** 799 310 205

Permanent Home Address: P.O Box 300073, Thito ward, Maun, Botswana.

Physical Address: Plot 5650, Selokwana Ward, Tlokweng, Botswana.

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Mobile: (+267) 75468974

Qualifications:

- Doctor of Philosophy in Biological Sciences: Botswana International University of Science and Technology (BIUST), Botswana

Title: *The Bio-Ecology of key mosquito vector species in Botswana: Implications for shifting environments.*

October 2018 – March 2021

Graduation: 24th September 2021

PhD Defense Examination Panelists

- Distinguished Prof. Steven Juliano (sajulian@ilstu.edu) *Mosquito Biologist*

Illinois State University, USA

- Prof. Donald Yee (donald.yee@usm.edu) *Mosquito Biologist/Ecologist*

The University of Southern Mississippi, USA

- Prof. Maxwell Barson (Barsonm@ub.ac.bw) *Aquatic Scientist/ Parasitologist*

University of Botswana, Botswana

- Prof. Jeremy Perkins (perkinsjs@mopipi.ub.bw) *Ecologist*

University of Botswana, Botswana

- Master of Sciences in Biological Sciences: Botswana International University of Science and Technology (BIUST), Botswana.

Title: *Dynamics of mosquito species (Diptera: Culicidae): implications on vector management and malaria prevalence under global climate change*

January 2015 to March 2018: Coursework: **CGPA: 4.43 in a 5.0 scale.** Thesis: Pass (**85%**).

Graduation: February 2019

- Bachelor of Education (Special Education)- Majors: **Biology** and **Hearing Impairment.**

Aug 2001 to May 2005: **2(i): CGPA: 4.3 in a 5.0 scale.** University of Botswana (UB), Botswana.

Graduation: October 2005

- Diploma in Forensic Science (*Crime Scene Investigations*) – (Distance): **Distinction.** Darnley Career Academy, Alva, United Kingdom: 2008- 2009.
- O'level (GCSE) 1998- **Second Division.** Gantsi Senior Secondary School, Ghanzi, Botswana.

Master of Sciences Modules

(i) Year 1: Modules studied

Applied Entomology **84%**, Applied Plant Biotechnology **90%**, Biochemistry **86%**, Microbial and Fermentation Technology **76%**, Molecular Biology & Bioinformatics **72%**, Microbiology **66%**.

(ii) Year 1 & 2: Thesis title- Dynamics of the Mosquito species (Diptera: Culicidae): implications on vector management and malaria prevalence under global climate change (Pass: **85%**).

Bachelor of Education (Biology/ Science Modules)

General Entomology (**75%**), Applied Entomology (**82%**), Diversity of Life (**67%**), Invertebrate Zoology (**65%**), Vertebrate structure (**55%**), Chordates (**80%**), Conservation Biology (**70%**), Dynamics of Savannah Ecosystems (**70%**), Genetics (**58%**), Plant Structure and Function (**85%**), Plant Response to Environmental Stress (**76%**), Introduction to Mammalian Physiology (**60%**), Introduction to Computing for Scientists (**52%**). HIV Prevention and Control in Botswana **76%**, ICT and E-learning **81%**, Introduction to web design, development and publishing **78%**.

Research publications

Published

- **Buxton, M.**, Lebani, K., Nyamukondiwa, C. and Wasserman, R. J. (2019). First record of *Aedes (Stegomyia) aegypti* (Linnaeus, 1762) (Diptera: Culicidae) in Botswana. *BioInvasions Records*, 8: 551-557.
- **Buxton, M.**, Cuthbert, R. N., Dalu, T., Nyamukondiwa, C. and Wasserman, R. J. (2020). Cattle-induced eutrophication favours disease-vector mosquitoes. *Science of the Total Environment*, 715: 136952.
- **Buxton, M.**, Cuthbert, R. N., Dalu, T., Nyamukondiwa, C. and Wasserman, R. J. (2020). Predator density modifies mosquito regulation in increasingly complex environments. *Pest Management Science*, 76: 2079-2086.

- **Buxton, M.**, Machezano, H., Gotcha, N., Nyamukondiwa, C. and Wasserman, R. J. (2020). Are Vulnerable Communities Thoroughly Informed on Mosquito Bio-Ecology and Burden? *International Journal of Environmental Research and Public Health*, 17: 8196.
- **Buxton, M.**, Nyamukondiwa, C., Dalu, T., Cuthbert, R. N. and Wasserman, R. J. (2020). Implications of increasing temperature stress for predatory biocontrol of vector mosquitoes. *Parasites and Vectors*, 13: 604.
- **Buxton, M.**, Cuthbert, R. N., Dalu, T., Nyamukondiwa, C. and Wasserman, R. J. (2020). Complementary impacts of heterospecific predators facilitate improved biological control of mosquito larvae. *Biological Control*, 144: 104216.
- **Buxton, M.**, Wasserman, R. J. and Nyamukondiwa, C. (2020). Spatial *Anopheles arabiensis* (Diptera: Culicidae) insecticide resistance patterns across malaria-endemic regions of Botswana. *Malaria Journal*, 19: 1-9.
- **Buxton, M.**, Wasserman, R. J. and Nyamukondiwa, C. (2021). Disease Vector Relative Spatio-Temporal Abundances to Water Bodies and Thermal Fitness Across Malaria Endemic Semi-Arid Areas. *Journal of Medical Entomology*, 58: 682-691.
- Wasserman, R. J., Sanga, S., **Buxton, M.**, Dalu, T. and Cuthbert, R. N. (2021). Does invasive river red gum (*Eucalyptus camaldulensis*) alter leaf litter decomposition dynamics in arid zone temporary rivers? *Inland Waters*, 11: 104-113.
- **Buxton, M.**, Nyamukondiwa, C., Wasserman, R. J., Glaizot, O., Pigeault, R. and Christe, P. (2021). Surveillance studies reveal diverse and potentially pathogenic-incriminated vector mosquito species across major Botswana touristic hotspots. *Insects*, 12: 913.
- **Buxton, M.**, Buxton, M. P., Machezano, H., Nyamukondiwa, C. and Wasserman, R. J. (2021). A survey of potentially pathogenic-incriminated arthropod vectors of health concern in Botswana. *International Journal of Environmental Research and Public Health*, 18: 10556.
- Eduard Mas-Carrió, E., Schneider, J., Nasanbat B., Samiya, R., **Buxton, M.**, Nyamukondiwa, C., Stoffel, C., Augugliaro, C., Ceacero, F., Taberlet, P., Glaizot, O., Christe, P. and Fumagalli, L. (2021). Assessing environmental DNA metabarcoding and camera trap surveys as complementary tools for biomonitoring of remote desert water bodies. *Environmental DNA* 4:580-595. <https://doi.org/10.1002/edn3.274>.
- **Buxton, M.**, Cuthbert, R. N., Basinyi, P. L., Dalu, T., Wasserman, R. J., and Nyamukondiwa, C. (2022). Cattle dung in aquatic habitats alters mosquito predatory biocontrol dynamics. *Food Webs*, 32: e00241.

In press

- **Buxton, M.**, Nyamukondiwa, C., Kesamang, M. and Wasserman, R. J. (*In Press*). Mosquito community composition in Central District, Botswana: Insights from a malaria endemic to non-endemic gradient. *African Entomology*, 30: e13584. <https://doi.org/10.17159/2254-8854/2022/a13584>

Accepted with minor revisions

- Birkhofer, K., **Buxton, M.**, Feng L., Simba, L., Diekötter T. (Accepted). Conserving insects for the provision of ecosystem services (Book Chapter).

Late preparation stages

- **Buxton, M.**, Setlalekgomo, M., Machekano, H., Nyamukondiwa, C., Cuthbert, R. N., Dalu, T., Wasserman, R. J. (Under preparation). Anthropogenic activities around ephemeral water systems- knowledge, perceptions and practices.
- Christe, P., Glaizot, O., Pigeault, R. **Buxton, M.**, Nyamukondiwa, C. (Under preparation). Avian malaria parasites and mosquito host interactions in the northern part of Botswana.

Early preparation stage

Buxton, M., Nyamukondiwa, C., Wasserman, R. J. (early preparation stage). *Culex pipiens* complex, an important yet neglected mosquito taxa in Southern Africa, a review.

Service

Programme development task team (BSc Biological Systematics and Taxonomy: January 2022 to date)- BUAN

Restructuring of Biochemistry module (Level 200: June 2022)- BUAN

Developing module content (Global Change Biology: August 2019)- BIUST

Sponsoring best student: form 4 and 5 in Biology: April 2022- Maun Senior Secondary School

Supervisory Role

BSc Student Projects (BIUST)

2019- 2020: Lefang Leo Chobolo

(Main supervisor: Prof Ryan Wasserman, Co-supervisor: **Dr Mmabaledi Buxton**)

Title: *Effects of Cattle Nutrifcation and Temperature on Culex pipiens Larval Mosquito Growth Rate, Survival and Thermal Tolerance.*

2020- 2021: Phatsimo Leungo Basinyi

(Main supervisor: Prof Casper Nyamukndiwa, Co-supervisor: **Dr Mmabaledi Buxton**)

Title: *Effects of Cattle Dung Degraded Aquatic Habitats on Mosquito-Predator Trophic Interactions.*

2020- 2021: Onalethata Baopedi

(Main supervisor: Dr Ricard Mazebedi, Co-supervisor: **Dr Mmabaledi Buxton**)

Title: *Emergent effects of temperature and salinity on the hatching success of macroinvertebrates of temporary wetlands of the Central District, Botswana.*

Key Quality Skills:

- Good interpersonal Skills -Meet deadlines and targets well -Smart & organised
- Team spirit -Hardworking and mature -Good presentation skills

Research Interest:

- Biodiversity monitoring

- Species diversity/ taxonomy
- Ecology and Conservation
- Aquatic ecology
- Medical and Veterinary Entomology
- Host-parasite, vector, and environmental interactions
- Parasitology
- Disease ecology: animal & public health
- Vector borne infections
- Organismal physiology under global climate change scenarios
- Insecticide resistance: molecular evolutionary biology
- Novel and sustainable approaches in insect control.

Key Biological Science Competency Skills:

- DNA/ Protein extraction, purification & quantification
- Gel electrophoresis
- Polymerase chain reaction (PCR)
- BLAST
- Phylogenetic analysis
- Microscopy

Specific Ecological/ Entomological Competency Skills:

Species Identification/ Taxonomy

- Molecular (PCR)
- Gross Morphology (Identification Keys and Microscopy)

Sampling techniques

- Scooping (Aquatic invertebrates)
- CDC light trapping (CO₂ Baited: Indoor & Outdoor)
- Passive trapping (BG-GAT: *Aedes*, *Culex*, *Mansonia*, *Anopheles*, *Mimomyia*, *Coquillettidia* and *Uranotaenia* mosquito species)
- Aspiration (Vegetation sweeping & Indoor)
- Sweep netting (terrestrial arthropods)
- Pit trapping (terrestrial arthropods)
- Sticky pads & pheromone lures (Diamondback moth: *Plutella xylostella*)
- Insecticidal & pheromones lures (Fruit fly: *Bactrocera dorsalis*)

Data recordings

- Data loggers (i- buttons: Temperature & Humidity)
- GPS (Geographical Coordinates/ information)

Rearing

- Larval and pupal stages (Aquatic species)

- Terrestrial Adults (cage rearing)
- Feeding (Larvae: fish food, Adults: 10% sugar solution)
- Life stage transfers (pipettes and mouth/ electric aspirators)

Preservation methods used

- Silica gel (desiccation)
- Freezing
- Liquid nitrogen
- Alcohol

Laboratory Experiments

- Susceptibility testing (Bioassays)
- Critical thermal limits (CTmax & CTmin)
- Desiccation tolerance
- Body lipids assessment
- Functional Responses
- Growth rates

Data Analysis

- STATISTICA
- MEGA software
- SPSS
- R

Work Experience:

(i) Lecturing (Temporary full time: Botswana University of Agriculture and Natural Sciences): November 2021 to date.

Modules:

(a) BSB 123 (Biodiversity):

Component taught [*Evolution, Taxonomy, Biodiversity, Animal diversity & Ecology*]

(b) BSB 113 (Biology of Cells):

Component taught [*Cell Structure, Biochemistry, Mendelian Genetics*]

(c) BSB 214 (Biological Systematics):

Component taught [*Molecular identification of species*]

Developing Lecture material and student notes

Designing practical session [The use of BLAST (Basic Local Alignment Search Tool)]

Marking and grading both the test (component taught) and Laboratory practical (Molecular sequence BLAST).

(ii) Biodiversity monitoring and ecosystem services and disservices in Botswana (Bobirwa) and Namibia (Caprivi strip) (June- August 2021)

[*German funded project under Prof. Casper Nyamukondiwa (see referees), BIUST*]

-Sampling of Arthropod (Beetles, Arachnids, Mosquitoes) in the maize crops and the wild (natural) environment.

-Reporting on the biodiversity, ecosystem services and disservices.

(iii) **Teaching Assistant (lab demonstrator) - BIUST: 2014 October to July 2021**

- Summary of Teaching Assistant duties

Plan for labs, pre-lab (running trial experiments), set up equipment in the lab, demonstrates, monitor & evaluate lab progress, assign lab tasks/ activities, give feedback, remedial work, field trips with students, administer & mark quizzes, exam invigilation and marks consolidation.

(iv) **Tutoring (BIUST)- October 2014 – July 2021**

Modules tutored for:

BSc level

- Communication in Biology
- Comparative Animal Physiology
- General Biology (First year)
- General Biochemistry
- Ecology and Biodiversity (Depart. of Earth & Environmental Sciences)
- Zoology

MSc level

- Applied Entomology
- Biochemistry

(v) **Lecturing (BIUST) Zoology: Level 200; 25% of content**
Component taught [*Organismal Systems*]. August 2019-January 2020.

(vi) **Part Time Research Assistant (BIUST):** Project title: Investigation of the diversity and impact of flaviviruses carried by species of *Aedes* in North- West district of Botswana. January to March 2019.

- **Duties:** Mosquito trapping, Geo- Mapping & Data Analysis.

(vii) **Senior Secondary School Teaching- (Biology):** Maun Secondary School- Botswana; 2010 to 2014.

(viii) **Junior Secondary School Teaching- (Integrated Science):** Taung Junior Secondary School- Botswana; 2006 to 2009.

-Summary of teaching duties (Secondary)

Lesson Planning, Subject content delivery, Test preparation & administration, giving assignments, Analyzing tests & assignments, Monitoring student progress, Classroom Control and behavioral management.

Awards/ Achievements/ Workshops/ Seminars/ Presentations:

Prestigious Awards

- Bronze Medal for student award (“*awarded irregularly in recognition of the exceptionally high standard of a specific piece of work by a junior scientist or manager, normally in the form of a dissertation*” as extracted from the SASAQs Constitution) awarded by the Southern African Society of Aquatic Scientist. 3rd November 2021.
<https://www.youtube.com/watch?v=xxqpqTHg8Mk>
- PhD awarded with Distinction: BIUST- 31st March 2021.

Conferences

- Southern African Society of Aquatic Scientist (SASAQs) 2nd – 4th Nov 2021 ‘*Are Vulnerable Communities Thoroughly Informed on Mosquito Bio-Ecology and Burden?*’
- Malaria annual conference presentation on “*Mosquito vector control and climate change*”- September 2019: Maun, Botswana.
- Malaria annual conference presentation on ‘*The dynamics of the Anopheline species in insecticide sprayed and none sprayed structures in three malaria endemic Districts of Botswana*’ - September 2016: Francistown, Botswana.

Trainings

- Training in mosquito species identification and surveillance: 8- 12 May 2017, University of Botswana, Gaborone, Botswana.
- Polymerase chain reaction (real time PCR) training- 28-29th April 2015, BIUST, Palapye, Botswana.
- Training in advanced microscopy (Electron microscopy): 2015 Majestic 5, Palapye, Botswana.
- First aid certificate (Red Cross): pre- requisite for lab and field work safety- 12- 18th June, 2015, BIUST, Palapye, Botswana.
- Level 1- 3 in Botswana Sign language/ American: 2005, Kasane and Gaborone.

Seminars

- Biological Sciences & Biotechnology department seminar presentations: MSc and PhD research progress-2014- 2021, BIUST, Palapye, Botswana.

Workshops

- Performance Management System (PMS) workshops 2006 to 2014: Taung secondary School (Ramotswa) & Maun Senior Secondary School (Maun), Botswana.
- Work Improvement Teams (WITs) workshops- 2006: Taung Secondary School, Ramotswa, Botswana.

Other achievements

- Collaboration with Ministry of Health and Wellness, Botswana (***Malaria Vector Control Programme***): 2015 to date.
- Corresponding author in five (5) peer review articles.
- First author in twelve (12) peer review articles.
- Hobby; Table Tennis player & Instructor.
- Clean Driving License (Botswana & UK): Class A and B.

Motivation:

My interest is in teaching and/or research within my strong hold subject area, of Ecology/ Zoology/ Entomology. Teaching and research experience I gathered to date, provides me with concrete and necessary knowledge and skill of what it entails to be a good researcher and /or an instructor. The PhD in Biological sciences has been an opportunity of development in acquiring an in-depth knowledge and skill to further benefit the local and international communities through research and innovation.

Referees:

1. Prof. Ryan John Wasserman (Associate Professor): **Ecology/ Zoology and Aquatic Science.**

Department of Zoology and Entomology, Rhodes University, Makhanda 6140, South Africa.

Email: r.wasserman@ru.ac.za.

Mobile: (+27) 727385552

2. Prof. Casper Nyamukondiwa (Associate Professor): **Applied Entomology/ Ecology.**

Department of Biological Sciences and Biotechnology, Botswana International University of Science & Technology, P/Bag 16, Palapye, Botswana.

Email: nyamukondiwa@biust.ac.bw

Mobile: (+267) 75360701

3. Dr. Tatenda Dalu (Lecturer): **Aquatic Sciences/ water pollution/Ecology/ Zoology**

School of Biology and Environmental Sciences, University of Mpumalanga, Nelspruit 1200, South Africa.

Email: dalutatenda@yahoo.co.uk

Mobile: (+27) 83 308 7633

4. Dr. Richard Mazebedi (Lecturer): **Ecology/ Aquatic Sciences**

Department of Biological Sciences and Biotechnology, Botswana International University of Science & Technology, P/Bag 16, Palapye, Botswana.

Email: mazebedir@biust.ac.bw

Mobile: (+267) 72596188

5. Dr. Ross N. Cuthbert (Early Career Fellow): **Invasion Ecology.** Queens University Belfast, UK.

Email: rossnoelcuthbert@gmail.com

Mobile: (+44) 7742810689

6. Prof. Shimane Makhabu (Associate Professor): **Ecology.** Botswana University of Agriculture and Natural Sciences, Private Bag 0027, Gaborone, Botswana.

Email: smakhabu@buan.ac.bw

Mobile: (+267) 71804261