

FACULTY OF NATURAL SCIENCES

Department of Biotechnology

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Research visit to the University of Missouri, Columbia, USA, August 6th – October 17th 2019 hosted by Prof Abraham J Koo

Background

This report entails the aim of the visit to the University of Missouri (MU), Columbia, Biochemistry Department and the work done in collaboration with Prof Abraham J Koo. In 2019, I was awarded the grant of ± \$9000 by the University of Missouri South Africa Educational Program (UMSAEP) and the centre for Food Excellence (UWC) for the project proposal entitled “Elucidating the role of AtNOGC1 “a guanylate cyclase with an HNOX motif that binds nitric oxide with high affinity than oxygen” in conferring stress tolerance to plants. The purpose of this grant was to assist with travel and lodging arrangements at MU.

Objectives of the proposed project: 1. To purchase, germinate and confirm T-DNA insertion lines. 2: To clone the AtNOGC1 into plant expression vector for the generation of Arabidopsis transgenic plants. 3: To assay the effect of stress on transgenic and wild type plants.

The following experiments were achieved at MU (Fig 1.),

1. T3 generations seeds were germinated and further confirmed by genotyping at MU, followed by selecting homozygous and heterozygous lines, seeds collected and posted to UWC, SA. 2. Stress assays conducted include, 1. Insect assays (22 and 30°C), 2. Wounding (30 & 37°C), temperature (22, 30 & 37°C), NaCl & mannitol stress assays, followed by hormone analysis.

Outstanding work to be conducted between November, 2019 and June 2020 (UWC & MU):

Due to the fact that from the two lines (SAIL & SALK lines) one (SAIL) was not homozygous, further work is required. This include generation of AtNOGC1 overexpressing lines, further genotyping T3 generation seedlings and the transgenes and conducting stress assays.

Funds acquired through the UMSAEP opportunity:

College of Agriculture, Food and Natural Resources (CAFNR) International Collaborations Grant \$3000, support from Interdisciplinary Plant Group (IPG) (\$500) and UMSAEP (\$1000), and \$2400 to be supplemented by Mulaudzi-Masuku’s and Koo’s research funds to obtain an estimated budget of \$ 6900. This is for the purpose to complete outstanding experimental work at MU in 2020.

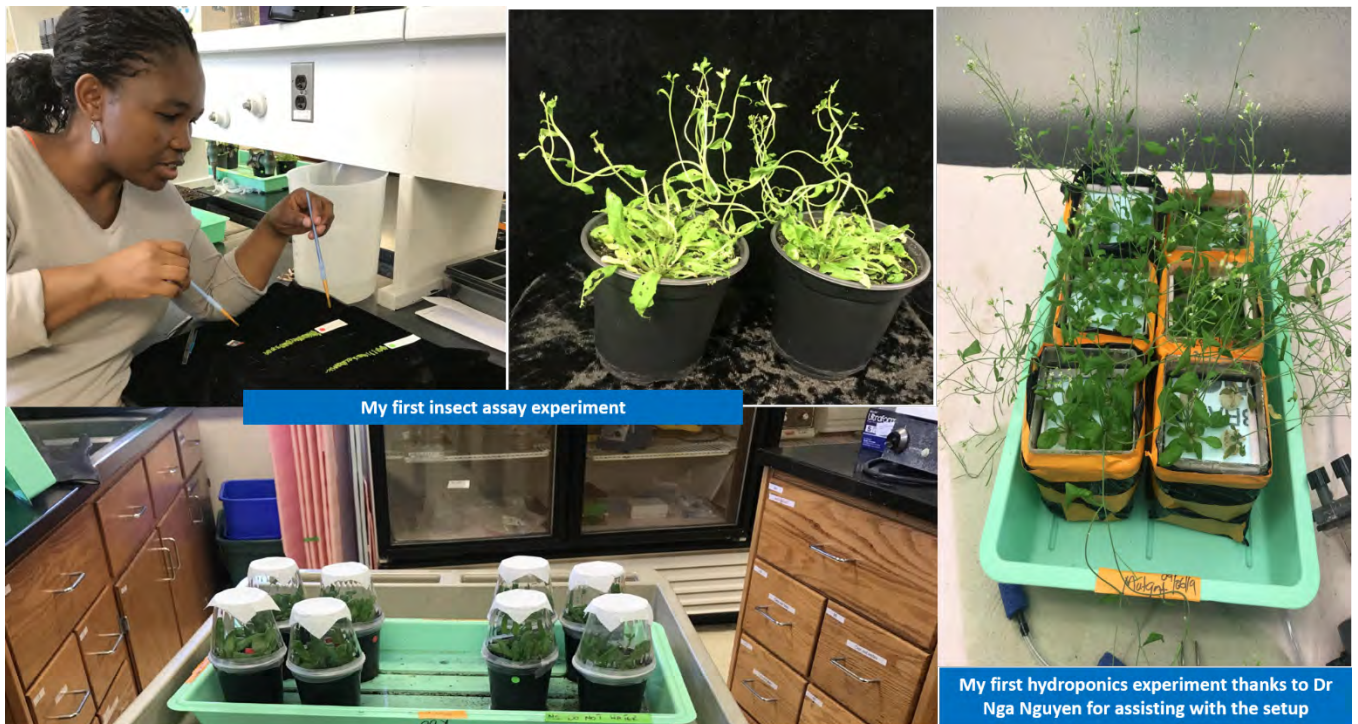
Seminars presented (Fig 2a. Talk at USGS and 2b. Talk at MU):

September 4th 2019, United State Geological survey (USGS) invited by Dr Thea Edwards, Supervisory Research Biologist.

September 20th 2019, MU, Biochemistry series, invited and organized by Prof Abe Koo.

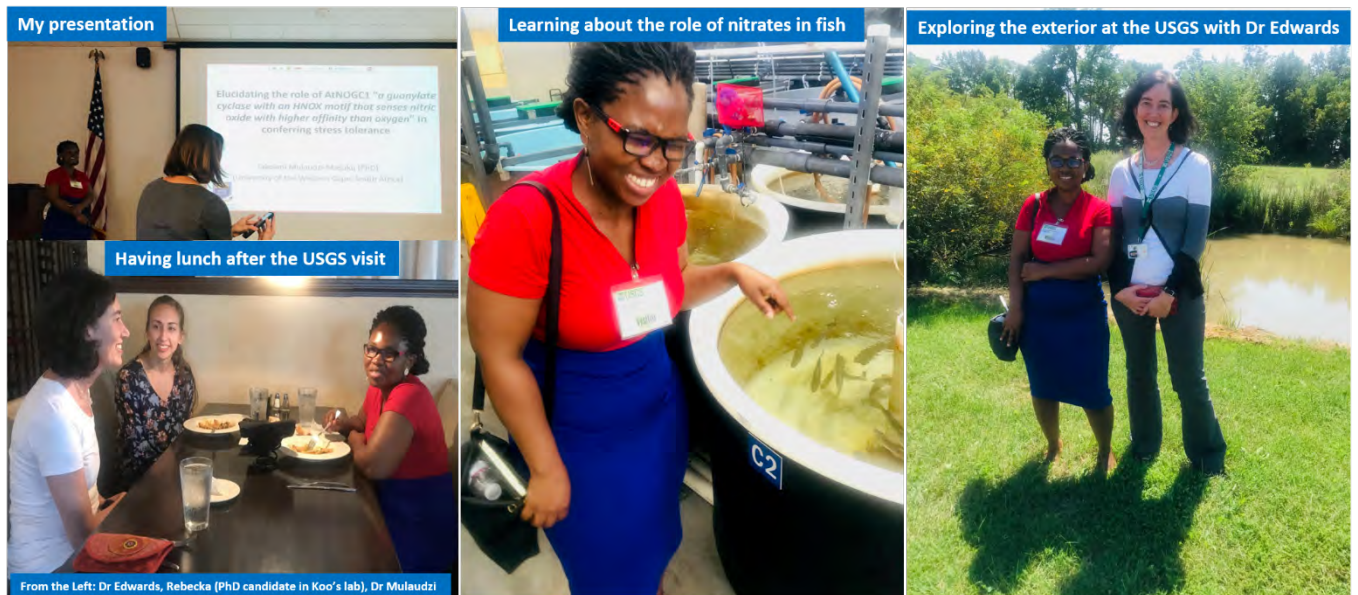
Extra activities (Fig 3a. football and 3b. soccer match):

Attended the football match and had the privilege and honour to meet with President Mun Y. Choi on September 15th 2019. On October 5th, attended a soccer match with Prof Uphoff and UWC visiting scholars.



Conducting experiments in the Biochemistry department in Koo's lab

Fig 1. Experiments conducted at MU

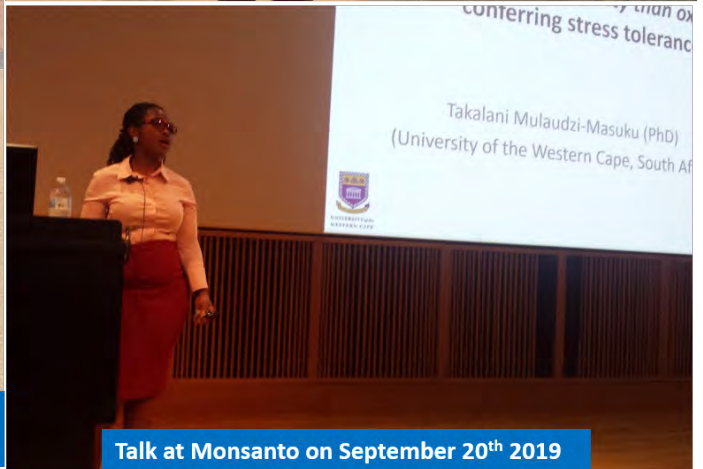


Invitation to talk at the US Geological Survey (USGS) by Dr Thea Edwards on September 4th 2019

Fig 2a. Invitation to talk at the USGS

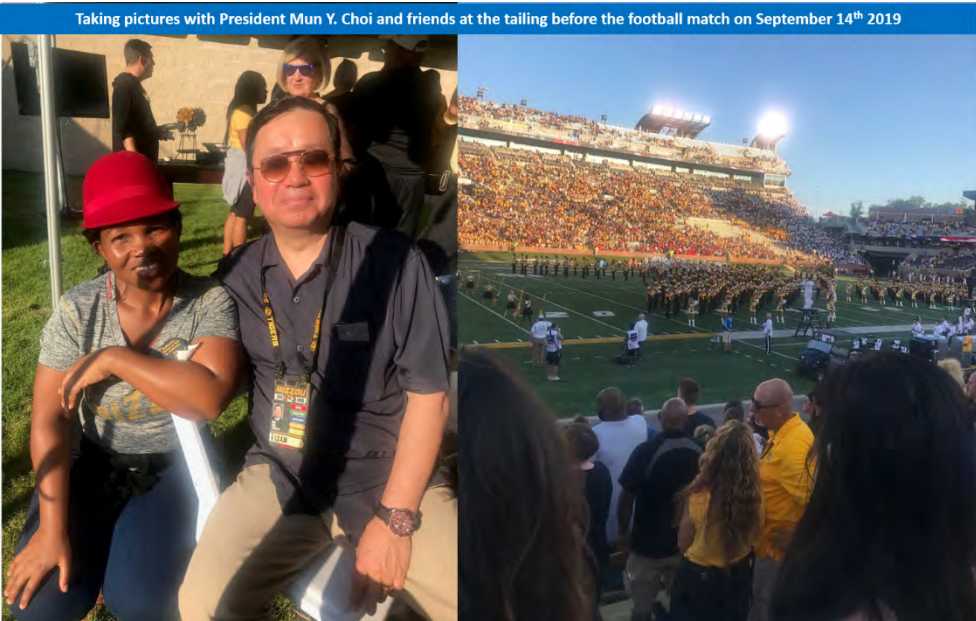


A treat for lunch by the Biochemistry graduate students before the talk



Talk at Monsanto on September 20th 2019

Fig 2b. Invitation to talk at MU



Taking pictures with President Mun Y. Choi and friends at the tailing before the football match on September 14th 2019



Takalani, Courtney (faculty from UWC), President Choi, Eraste & Aline (MU scholars), Megan (UM System, Events planner)



Fig 3a. Extra activities: Football match



Attending the soccer match with Prof Uphoff, wife and UWC visiting scholars on October 5th 2019

Fig 3b. Extra activities: Soccer match



Having lots of fun with Rebecka and MU students over the weekends



Fig 4. Learning about US cultures by attending Rebecka's wedding



Fig 5. The last dinner.

Conclusion, I learnt a lot about the cultures in the US (Fig 4.) and advanced on my research skills learning from the experts in plant genetics. I am confident to say that the research visit was a great success by learning new research skills and achieved most of the objectives proposed in the UMSAEP grant. I would like to thank the UWC/Missouri international office, UM system and the office of the President (Prof Choi), for awarding the funds, planning the visit and additional extra mural activities. Special thanks goes to Ms Megan Cahil, Ms Hilda Wilson, Ms Debra Lamson, and Prof Rodney Uphoff for their sacrificial work even out of their working hours. To Prof Koo and members of the Koo lab (Dr Athen Kimberlin, Mrs Rebecka Holtsclaw-Prater, and undergraduate students (Fig 5.), the Biochemistry Department, IPG members thank you for hosting me and giving me access to lab research consumables and instruments. Finally it was through the UMSAEP award and by God's grace that we obtained the opportunity to apply for the CAFNR international collaboration grant.

Yours faithfully,

Dr Takalani Mulaudzi-Masuku

Date: 13/12/2019