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USA-Kenya Collaboration in Guided-inquiry Green nanoscience Drug Discovery research

Joseph Kipronoh Rugutt[1] and Joyce Jepkorir Kiplimo[2]
[1]Missouri State University, USA
[2]University of Kabianga, Kenya

The Department of Chemistry at Missouri State University-West Plains (MSU-WP) is internationalizing the existing research activities by initiating a collaborative USA-Kenya drug discovery project. Professors Rugutt (MSU-WP) and Kiplimo (University of Kabianga (UoK), Kenya) are indebted to the Carnegie African Diaspora Fellowship (CADF) program for a three-month awardthat supported the project. Undergraduate, graduate and high school students played an integral part in implementation of all research and educational activities. Th e overarching goal of the project is to establish synergistic relationships between diff erent research groups and academic institutions in Kenya and MSU-WP. We chose natural products as the centerpiece of our collaboration because many medicinal Kenyan plants represent an important and underexploited reservoir of potentially new pharmaceutical drugs. Our preliminary results on bioassay-directed fractionation and screening of representative plants aff orded several compounds that exhibited various bioactivities including anticancer, antimalarial, anti-HIV, antimicrobial, antimycobacterial andantifungal. Aft er identifying the most active natural products (Sesquiterpene lactones, Fl avonoids, Binaphthyls, Steroids, etc.), we conducted a hypothesis-driven green nano-synthetic modifi cations in order to pinpoint the essential structural features necessary for bioactivity. Novel compounds were prepared based on the world's best named reactions such as those developed by Nobel Laureates (Diels-Alder, Grubbs, etc.) Our integration of research and education was anchored on the fact that natural productsresearch cuts across many STEM (Science, Technology, Engineering and Mathematics) disciplines such as Medicinal, Organic, Analytical and Inorganic Chemistry. To strengthen preparation of students for STEM careers, chemistry faculty at MSU-WP andUoK are revamping their research and laboratory courses by incorporating current hot and inspirational topics in guided-inquirygreen Chemistry, nanoscience and natural products. Th e new courses will provide students with opportunities to learn innovative experimental techniques (Chromatography, Spectroscopy, Bioassays, etc.). Bioassay data from structure-bioactivity relationshipstudies will be discussed. Also, reports summarizing professional development activities will be disseminated.

Jrugutt@MissouriState.edu, Jkiplimo@kabianga.ac.ke

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