

## MAN, MICROBES AND MEDICINAL PLANTS

604TH INAUGURAL LECTURE  
2025/2026

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### ABSTRACT

Humans and microbes coexist in nature, thus making infectious diseases inevitable. Many of these diseases since ancient times have been treated using medicinal plants, the science of most of which remained yet uninvestigated and undocumented. Studies in medicinal plants were undertaken to investigate the local uses of these plants in order to validate and justify their use in the treatment of infections and diseases. Plants used in the treatment of wound infection, mycobacteria infection, peptic ulcer disease and cancer, were selected by ethnobotanical surveys and plant database search. The samples of such selected plants were collected, authenticated at the herbarium of the Forest Research Institute of Nigeria (FRIN), air-dried under shade and extracted with different solvents. The extracts were tested against pathogens implicated in the study diseases using appropriate assay methods. Of such were *Eucalyptus camaldulensis* Dehnh. and *E. torelliana* F. Muell., which afforded 89% and 92% gastro-protection at 1000mg/kgbw, and 46.67±3.33% and 58.33±3.07% decrease in ulcer size at 500mg/kgbw, respectively, in Wistar rats. When tested in *Mycobacterium tuberculosis* H37Rv ATCC27294 (*Mtb*), a 100% growth inhibition at a concentration of 32 µg/mL, with minimum inhibitory concentration (MIC) values of 4 and 8 µg/mL, for *n*-Hexane extracts of *E. camaldulensis* stem bark and *E. torelliana*

leaf, respectively were seen. Bioassay-guided fractionation of *n*-hexane extract of *E. torelliana* leaf yielded two (2) compounds- hydroxymyristic acid methyl ester (1) and a substituted pyrenylester, asterol (2), with MIC values of 49.45 and 46.99  $\mu\text{g}/\text{mL}$  and  $\text{IC}_{50}$  of  $>100$  and 38.32  $\mu\text{g}/\text{mL}$ , respectively, and minimum bactericidal concentration of 62.50  $\mu\text{g}/\text{mL}$  for both compounds against *Mtb*. Compound 2 above enhanced the activity of clarithromycin ( $\Sigma\text{FIC} = 0.75$ ) against *Helicobacter pylori* (*H. pylori*) in a combination study by reducing the MIC value of clarithromycin twofold, from 0.125 to 0.0625  $\mu\text{g}/\text{mL}$ . *Anogeissus leiocarpus* (DC.) Guill. & Perr. and *Terminalia glaucescens* Planch ex Benth. with inhibitory activity in *H. pylori* (MIC = 0.08 - 1.25  $\text{mg}/\text{mL}$ ) were tested for cytotoxicity activity in gastrointestinal tract cancer in which *H. pylori* is implicated using colon cancer cells- SW480, SW620, HCT116, Caco2, and gastric cancer cells- AGS and NCI-N87. The aqueous partition of *A. leiocarpus* root (ALR-Aq) was the most active against the cancer cell lines ( $\text{IC}_{50}$  of 14.6 and 15.0  $\mu\text{g}/\text{mL}$  in HCT 116 and SW480, respectively). Bioassay-guided fractionation of ALR-Aq led to the isolation and identification of methyl gallate (MIC = 15 - 17  $\mu\text{g}/\text{mL}$ ). Cytotoxicity activities of *Dillenia indica* and *A. leiocarpus* were studied in breast cancer using MCF-7 cancer cell. The aqueous partitions of root and stem bark of *A. leiocarpus* (ALR-Aq and ALS-Aq) had  $\text{IC}_{50}$  of 15.23 and 15.53  $\mu\text{g}/\text{mL}$ , respectively, while the aqueous partition of *Dillenia indica* stem bark (DIS-Aq) had an  $\text{IC}_{50}$  of 65.28  $\mu\text{g}/\text{mL}$ . Ellagic acid ( $\text{IC}_{50}$  of 8.6  $\mu\text{g}/\text{mL}$ ) isolated from ALR-Aq, induced significant alterations in gene expression patterns in MCF-7 cells. These findings suggest that medicinal plants hold enormous numbers of medically important phytoconstituents that if properly harnessed and developed, can serve as alternative therapeutic agents which can tremendously improve healthcare.

