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## Comparative study of antimicrobial guided assay and bioactive component determination, *in vitro* antioxidant, minerals, anti-nutrient and proximate analysis of aqueous and ethanol extracts of *Alchornea laxifolia* and *Piliostigma reticulatum* leaf on clinical and environmental isolates

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*Piliostigma reticulatum* plant in West Africa is an evergreen shrub with a twisted bole to 9 m high, with a bushy spherical canopy, bark dark grey to brown, fibrous and corky, slash dark red, leaves large, thick, leathery, grey-green, 6-12 cm long, fruit large, long, straight, undulate or twisted and hard, either glabrous or sparsely pubescent, brown, indehiscent, up to 25 cm long, 5 cm wide. *Alchornea laxifolia* is a Deciduous, erect to straggling shrub 7 m tall. Two extracting solvents were used for extraction, (ethanol and aqueous). Six clinical and environmental organisms were used for this research work. The organisms are *Escherichia coli*, *Salmonella* Typhi, *Candida albicans*, *Klebsiella pneumonia*, *Aspergillus flavus* and *Staphylococcus aureus*. Agar well diffusion assay were used to determine the antimicrobial activities of the plants. Both plants exhibit different degree of antimicrobial zones inhibition. Quantitative and qualitative phytochemical screening was also determined. It was observed that both plants contain various bioactive components like alkaloids, cardiac glycoside, flavonoids, steroids, tannin, saponin and phenol. Quantitative analyses of minerals present were determined (ug/100 g), minerals like Na<sup>2+</sup>, K<sup>+</sup>, Ca<sup>2+</sup>, Mg<sup>2+</sup>, Zn<sup>2+</sup>, Pb and P<sup>+</sup> were present at various percentage composition by mass. Quantitative analyses of anti-nutrients present were elucidated. Anti-nutrients like tannin phenol, oxalate, saponin and flavonoids were present in various quantities. Proximate analyses of both plants were determined. *In vitro* antioxidant activities of ethyl acetate leaf extracts of the plants were also determined. The purpose of this research work is to determine the antimicrobial activities, minerals present, anti-nutrients, proximate contents and *in vitro* antioxidants activities of *Piliostigma reticulatum* and *Alchornea laxifolia*.

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## A contribution to the biological and phytochemical studies of the medicinal plant *Gunnera perpensa* L

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Ethnopharmacology is the study of medicinal plants used in traditional medicines. This includes the study of the chemical composition of crude extracts, compounds isolated and their biological activities. This scientific discipline has increased over the years because of the development of antibiotic resistant bacteria. Drug resistance is a global problem which needs to be resolved by the development of new anti-microbial agents which can be found in plants. *Gunnera perpensa* is a South African medicinal plant which is prescribed by traditional healers for treatment of a number of infectious diseases, to treat wounds, urinary tract infections as well as a number of pregnancy related medicines. *Gunnera perpensa* L. rhizomes were collected from the Faraday Muti Market in Johannesburg and sequentially extracted with solvents. Antibacterial testing was performed with the use of Minimal Inhibitory Concentration (MIC). Thin layer chromatography (TLC), Gravity Column Chromatography (GCC), 2D-Gas Chromatography (GCxGC) TOF MS were used to obtain a semi-quantitative chemical composition profile of the extracts. Phytochemical screening was carried out on the plant extracts using standard procedures. The following compound classes were found to be present: Alkaloids, tannins, reducing sugars, flavonoids, cardiac glycosides and steroids. Over 100 compounds were identified in the crude extract of *G. perpensa* using 2D-Gas chromatography mass spectrometry-TOF in which fatty acids were found to be in abundance. *G. perpensa* showed antibacterial activity against all of the Gram-positive bacteria and showed no activity against the Gram-negative bacteria. The different phytochemicals that have been isolated and identified were linked to the anti-bacterial effects as well as the different antimicrobial results show great potential in the medicinal properties of this plant.

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