Pharmacological and Biological Activities

The methanolic extract of *Anacardium humile* leaves significantly inhibited gastric lesions in rodents. There results support the traditional use of this species in treatment of gastric diseases (Luiz-Ferreira *et al*., 2008). The flavonol glycosides from *Schinus molle* possss antioxidant activity (Marzouk *et al.* (2006). The antioxidant and free radical scavenging activity of flavonoids and/or volatile oils from other species have been reported e.g. *Semecarpus anacardium* L. f. nuts (Pal *et al*, 2008), *Schinus areira* L., *Schinus longifolia* (Lindl.) Speg. (Murray *et al.*, 2009), *Schinus fasciculata* (Griseb.) I. M. Johnst, *Schinus spraecox* (Griseb.) Speg. (Murray *et al*., 2008) and *Spondias pinnata* (Hazra *et al.*, 2008).

The antibacterial and antifungal activities of the extracts and/or constituents of several species of the family Anacardiaceae have been reported. 5-(12-Heptadecenyl) resorcinol is the major component of the antifungal activity in peel of mango fruit (Cojocaru *et al.*, 1986). The aqueous extract of the leaves of *Pleiogynium solandri* showed antimicrobial activity against *Bacillus subtilis* and *Staphylococcus aureus* (El-Fiki and Ahmed, 1999). The essential oil of *Schinus molle* exhibited fungitoxic activity against some common storage and animal pathogenic fungi (Dikshit *et al*., 1986). The volatile oil of *Cotinus coggygria* exhibited antibacterial and antifungal activities. Also, the essential oil from aerial parts of *Schinus terebenthifolius* possessed fungicidal activity against *Trichophyton longifusus* and showed low antibacterial activity (Moustafa, 2007). The methanolic extract of *Anacardium occidentale* bark exhibited antimicrobial activity against 13 out of 15 bacterial isolates at concentrations of 20 mg/ml (Akinpelu, 2001). The methanolic extracts of the different parts of both *Dracotomelon dao* (Khan and Omoloso, 2002) and *Eroschinus papuanus* (Khan *et al*., 2004) showed antibacterial and antifungal activities. Islam *et al*. (2002) reported the zoosporicidal activity of polyflavonoid tannin identified in *Lannea coromandelica* stem bark against phytopathogenic oomycete *Aphanomyces cochlioides*. 2-*O*-Caffeoyl-(+)-allohydroxy citric acid and chlorogenic acid butyl ester, isolated from leaves and stems of *Spondias mombin* showed antiviral activities against *Coxsackie* and *Herpes simplex* viruses respectivey (Corthout *et al.*, 1992). The antibacterial and antiviral activities of *Lithraea molleoides* have been also reported (López *et al*., 2011).

The anti-protozoal and antibacterial activities of the four cyclic alkyl polyol derivatives, isolated from *Tapirira guianensis* were reported (Roumy *et al*, 2009). The alkylene resorcinols from *Lithraea molleoides* possess nematicidal activity (Valcic *et al*., 2002).

The acoholic extract of the leaves of *Lannea coromandelica* (Gandhidasan *et al*., 1991), and both 5-(11'Z-heptadecenyl)- and (8'Z,11'Z-heptadecadienyl)-resorcinols from mango peels (Knoedler *et al.*, 2008) showed anti-inflamatory activity. The aqueous as well as hydroalcohol extracts of *Myracrodruon urundeuva* Allemão exhibited significant anti-inflammatory, wound healing and antiulcer properties. Also, the aqueous extract of *Astronium urundeuva* (syn. *Myracrodrron urundeuva*), significantly inhibited aspirin-induced gastric lesions, as well as the restraint pulse histamine-induced ulceration, in rats. The ethanol extract was shown to inhibit physostignine-iunduced gastric intestinal propulsion that could partly account for the plant antidiarrheal activity (Rao *et al*., 1987). Souza *et al.* (2007) reported that the tannin-enriched fraction from the stem bark of *Myracrodruon urundeuva* presents anti-inflammatory and antiulcer effects, partly due to its antioxidant action, known to be present in polyphenols, including tannins.

The cytotoxicity of several plant extracts and/or their constituents have been reported.

The dichloromethane extract of *Lithraea molleoides* presented a significant antioxidant activity and a significant stimulatory action on normal lymphocytes (López *et al.*, 2011). The cytotoxicity of the same species have been reported by others (*e.g.* Fernandez *et al*., 2002; Ruffa *et al*., 2002). Anacardic acids and cardols, isolated from *Anacardium occidentale* exhibited moderate cytotoxicity (Kubo *et al*., 2011). Lanneanol (**19**), isolated from bark of *Lannea nigritana* (Kapche *et al*., 2007) and 1,3-dihydroxy-5-(tridec-4',7'-dienyl)-benzene from *Lithraea molleoids* (Lopez *et al*., 2005) showed cytotoxic activity. Lanneaquinol and 2'(*R*)-hydroxylanneaquinol from *Lannea welwitschii* exhibited modest cytotoxicity (Groweiss *et al.*, 1997). Essential oils of *Schinopsis balanse*, *Schinopsis lorentzi* (Azzam, 2004b), *Schinus molle* (Ibrahim *et al.*, 2004; Diaz *et al*., 2008) and *Schinus terebenthifolius* (Ibrahim *et al.*, 2004) were cytotoxic in several cell lines (brain, breast carcinoma and leukemia cells). Also, the alkaloidal extracts of stems and leaves of *Schinopsis lorentzi* (Azzam, 2004b) possessed cytotoxic activity. The two alkylphloroglucinols from *Protorhus thouvenotii* showed marginal *in vitro* cytotoxicity activity in A2780 ovarian cell lines (Cao *et al*., 2004). Anacardic acid (**13**) and ginkgoic acid (**14**) are responsible for the cytoxic activity of *Ozoroa insignis* bark extract (Rea *et al*., 2003). The nut milk extract of *Semecarpus anacardium* L.f. (marking nut) significantly reduced alpha-fetoprotein levels (increased in aflatoxin B_1 "AFB_1 "-induced hepatocellular carcinoma "HC" in rats) within the normal range, suggesting an antitumour activity against AFB_1 -induced HC (Premalatha and Sachdanandam, 1999).

Anacardic acid, 2-methylcadrols and cadrols, isolated from *Anacardium occidentale* exhibit tyrosinase inhibitory activity (Kubo *et al*., 1994). 2-Hydroxy-4-methoxybenzaldehyde, isolated from the bark of *Sclerocarya caffra*, is a potent tyrosinase inhibitor. It inhibited the oxidation of *i*-3,4-dihdroxyphenylalanine by mushroom tyrosinase (Kubo and Kinst-Hori, 1999). Also, a compound identified as (4,6-dihydroxy)-dihydrobenzofuran-3-yl-(3,4-dihdroxy)-phenyl ketone, isolated from wood of Assam (*Mangifera quadrifida* L.) is reported as a tyrosinase inhibitor. It inhibited the oxidation of L-tyrosine more than that of L-3,4-dihydrophenylalanine, and suppressed the melanin biosynthesis in the B 16 mouse melanoma cell lines (Takagi and Mitsunago, 2002). The cyclooxygenase inhibitory activity of butein (tetrahydrochalcone) and 7,3',4'-trihydroxyflavone, isolated from the stem bark of *Semecarpus anacardium* was reported (Selvam *et al.*, 2004).

Pharmacological studies by various groups of investigators have shown that *Sclerocarya birrea* possesses antidiarrheal, antidiabetic, anti-inflammatory, antimicrobial, antiplasmodial, antihypertensive, anticonvulsant, antinociceptive and antioxidant properties, thus lending pharmacological support to the plant's folkloric, ethnotherapeutic uses in South African traditional medicine. All these studies, together with its phytochemistry, pharmacology and toxicology and its ethnomedicinal uses have been rewiewed by Ojewole *et al*. (2010).

The dichloromethane extract of the dried *Ozoroa insignis* twigs was moderative active against *Artemia salina* larvae; 6-pentadecylsalicylic acid was found responsible for the antifouling activity (He *et al*., 2000).

Several other activities have been reported. Mangiferin, extracted from mango plant (*Mangifera indica*) has cardiotonic and diuretic properties (Mentzer and Ratsimamanga, 1968). Oral administration of the pectin isolated from *Spondias lutea* L. caused significant decrease in blood sugar levels in alloxan-induced diabetic rats (El-Fiki, 2000).

Cardanol, from *Schinus terebenthifolius* is a skin irritant (Stahl *et al*., 1983). 3-(Pentadec-10-enyl)-catechol, isolated from *Lithraea caustica* is the major allergenic principle of the plant (Gambaro *et al*., 1986). 1,2-Dihydroxy-3-heptadeca-8',11'-diphenylbenzene is a major vesicant (dermatite) from *Smodingium argutum* (Gorst-Allman *et al*., 1987).

The essential oils from leaves and fruits of *Schinus terenebenthifolius* possess allelopathic

activity on germination and radicle growth of *Lactuca sativa* and *Cucumis sativus* (Barbosa *et al*., 2007).

The family Anacardiaceae is represented in Egypt by 2 genera and 7 species (Boulos, 2000).