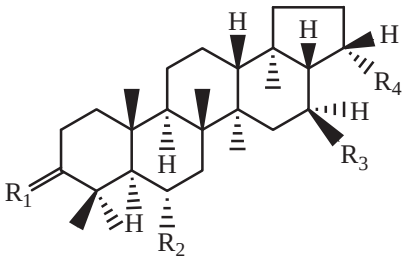
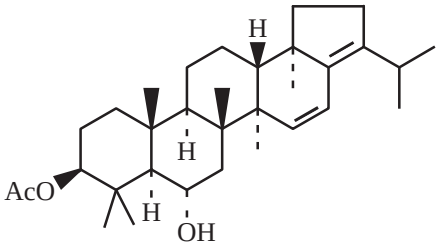
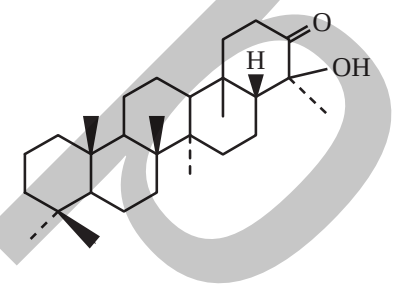


21 6α-Acetoxy-16β,22-dihydroxy-3-ketoisohopane
R_1=O; R_2=OAc; R_3=OH; R_4=CMe_2OH

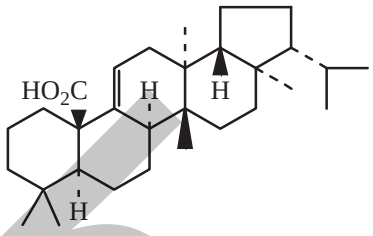
22 Mollugogenol A
R_1=H, β–OH; R_2=R_3=OH; R_4=CMe_2OH



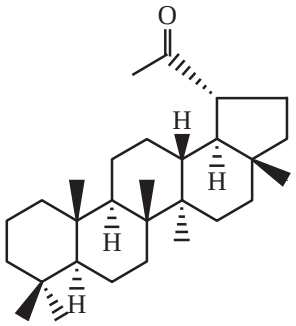
23 3β-Acetoxy-6α-hydroxy-hop-15,17(21)-diene



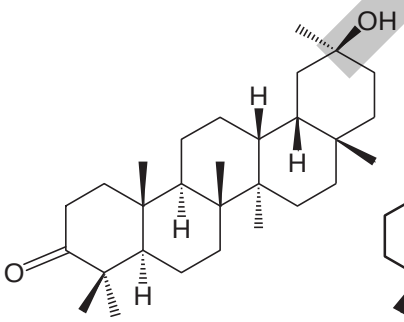
24 Oxohakonanol



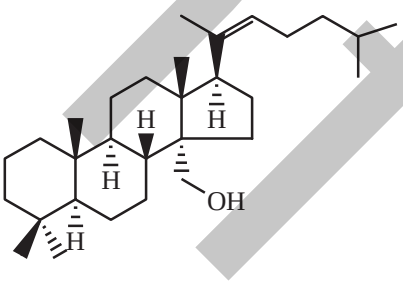
25 Fern-9(11)-en-25-oic acid



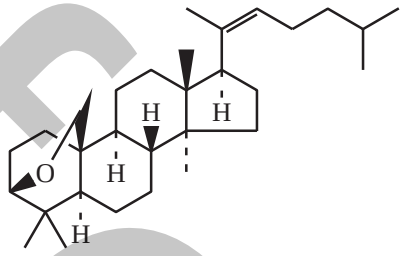
26 Adiantulupanone



27 Adiantuoleanone



28 Adiantuolanosterol



29 Adiantulanostene ether

Cooper-Driver and Swain (1975) reported the isolation of sulphate esters of caffeylglucose and *p*-coumaroylglucose from 10 *Adiantum* species. Methyl-*p*-coumarate and psoralen (a furocoumarin) were isolated from *Adiantum thalictroides* Willd. ex Schlecht var. *hirsutum* (Erazo *et al*., 1991).

A lectin was extracted from the leaves of *Adiantum flabellulatum* and was shown to be a glycoprotein with molecular weight of 22,000-22,500 containing 4% neutral saccharides (Yu *et al*., 2004).

Folk Medicine, Pharmacological and Biological Activities

The genus *Adiantum* is used in Ayurvedic medicine and is well known for its antibacterial, antiviral and other biological activities (Hayat *et al*., 2002; Brahmachari, 2003). A lot of *Adiantum* species have been used in traditional Chinese medicine to cure human and animal diseases including relief of fever, enhancement of urination, removal of urinary calculus and sundry and other curative claims (Pan *et al*., 2001) An infusion of *Adiantum aethiopicum* Linn., is used as an emollient in coughs and diseases of the chest. In Basutoland,

Table 2 - Flavonoids of some *Adiantum* species

Species	Plant part	Flavonoids	References
1. *Adiantum aethiopicum*	Fronds	Astragalin, prunin and isoquercitin	Hasegawa and Akabori (1968)
2. *Adiantum caudatum*		Quercetin-3-*O*-glucoside	Gupta *et al.* (1990)
3. *Adiantum malesianum*	Fronds	Kaempferol 3-*O*-α-D-galactoside, kaempferol 3-*O*-β-D-galactoside, vitexin, isovitexin and hyperin	Murakami *et al.* (1986)
4. *Adiantum monochlamys*	Fronds	Trifolin, hyperin, prunin, isoquercitin and astragali	Hasegawa and Akabori (1968); Akabori (1978)
5. *Adiantum sulphureum*	Farina	Galangin and isalpinin	Wollenweber (1976b)
6. *Adiantum tetraphyllum*	Fronds	Quercetin and quercetin 3-*O*-β-D-glucoside	Melos *et al.* (2007)
7. *Adiantum venustum*		Kaempferol glucoside and a quercetin glucoside	Rangaswami and Iyer (1967)

a decoction of the caudex is used to promote parturition. *Adiantum flabellulatum* Linn., is used in China as a cough medicine. *Adiantum pedulatum* Linn., is employed in North America as a pectoral in chronic catarrhs (Kirtikar and Basu, 1984). Ethnomedicinally *Adiantum* species have been used as tonic and diuretic, in the treatment of cold, fever, cough and bronchial disorders, as stimulant, emollient, purgative, demulcent, general tonic and hair tonic, in addition to skin diseases, tumours of spleen and other viscera (Singh *et al.*, 2008) and in treatment of jaundice and hepatitis (Abbasi *et al*., 2009, 2010). The leaves of *Adiantum caudatum* are used as a cure for cough and fever. They are also employed externally as a remedy for skin diseases (Kirtikar and Basu, 1984). The antimicrobial activity of several species *viz. Adiantum trapiziforme* (Kshirsagar and Mehta, 1972), *Adiantum caudatum*, *Adiantum peruvianum* and *Adiantum venustum* has been reported (Singh *et al*., 2008). *Adiantum cuneatum* Langsd. and Fisch., is employed in Brazilian folk medicine as diuretic, expectorant, emollient, for coughs, urinary disorders, alopecia and menstrual difficulties (Bresciani *et al*., 2003). *Adiantum incisum* Forssk. is used in Pakistan for skin diseases, fever, cough and diabetes, and also has expectorant, emetic and diuretic activities (Hamayum *et al*., 2006). *Adiantum lunulatum* Burm. (syn. *Adiantum philippense* Linn.) commonly known as walikun maiden hair fern is traditionally used in the treatment of various diseases among the local and tribal people in India. The plant is mainly used in blood diseases, epileptic fits, erysipelas, fever, dysentery, ulcers, febrile affections, atrophy, emaciation or cachexy, muscular pain, rabies and elephantiasis (Chopra and Chopra, 1956; Brahmachari and Chatterjee, 2002). *Adiantum lunulatum* L., is also used as a medicine for bronchitis and cough (Reddy *et* al, 2001). *Adiantum thalictroides* var. *hirsutum* is used in folk medicine in Chile, as an emmenagogue and expectorant (Erazo *et al*., 1991). *Adiantum venustum* G. Don is used in the treatment of biliousness, inflammatory diseases of chest, tumours, ophthalmia, cold, headache, as antibacterial and aniviral drug (Alam *et al*., 2000). It has been also reported to possess analgesic and anti-inflammatory activities (Hussain *et al*., 2008c).

The ethanolic extract of *Adiantum venustum* Don possesses significant anticancer activity and also reduces elevated level of lipid peroxidation (Pandy and Devmrari, 2011).

The genus *Adiantum* is represented in Egypt by one species.

3.1.1. ***Adiantum capillus-veneris*** L., Sp. Pl., ed. 1, 1096 (1753); Boulos, Fl. Egypt 1: 3 (1999).

Fern, Kuzbarat El-Bir, Sha’ar El-Banat (Ar) كزبرة البير، شعر البنات

Carbohydrates

The amount of insoluble carbohydrates in the shoot apical meristem of *Adiantum capillus-veneris* showed an annual periodic change. The accumulation of the insoluble carbohydrates began in the early spring (February to March), reached its maximum in April, then decreased gradually, reaching its lowest content in winter (January) (Chiang and Lin, 1979). The mucilage content of the fronds extracted with cold and hot water amounts to 2.7 and 1.5 % respectively. The chemical composition of the mucilage is galacturonic acid, galactose, glucose, xylose and rhamnose (El-Tantawy *et al*., 1994).

Adiantum capillus-veneris can be catagorised as arsenic accumulator. The experimental study showed that it has a potential to tolerate arsenic up to 500 mg kg^{-1}. It was able to detoxify arsenic stress through induction of antioxidant defence system (Singh *et al*., 2010).

A microscopic description of *Adiantum capillus-veneris* (maidenhair fern) has been reported (Tunmann, 1911).