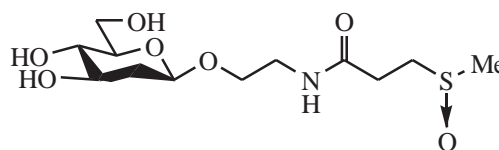


78 Cycloclinacoside A2



79 Cycloclinacoside C

Folk Medicine, Pharmacological and Biological Activities

Many species of the family Acanthaceae possess several medicinal properties and are used in treatment of various diseases. The leaves of *Acanthus ilicifolius* L. are used in ethnomedical practices in India to treat rheumatism, snake bite, paralysis and asthma. Analgesic, anti-inflammatory, antioxidant and hepatoprotective effects of this species has been also reported (Babu *et al.*, 2001b; Peng and Long, 2006). The plant is also used as a purgative, and anti-inflammatory, and the leaves dispersed with pepper (*Piper nigrum* L.) as tonic pills for longevity (Kanchanapoom *et al.*, 2001a). *Acanthus montanus* (Nees) T. Anderson is used in African traditional medicine for the treatment of urogenital infections, urethral pain, endometritis, urinary diseases, cystitis, leucorrhoea, aches, and pains (Okoli *et al.*, 2008). The experimental evaluation of the effectiveness of the root in the treatment of furuncles showed that it may largely derive from mobilization of leukocytes to the site of infection and activation of phagocytic activity as well as suppression of exacerbated immune responses by its constituents (Okoli *et al.*, 2008).

Adhatoda engleriana C. B. Cl. is used as a purgative in Tanganyika and Kenya. The Chagga use the plant to counter the bewitching of food and chew the fresh leaves as a purgative. A decoction of the leaf is given by the Bondi in childbirth to relieve pain. The root is a Shambala tuberculosis remedy (Watt and Breyer-Brandwijk, 1962). *Adhatoda vasica* Nees is an old remedy and is used in Indian traditional medicine for thousands of years. Its leaves are used in cough and asthma, bronchitis, tuberculosis, inflammation, allergy and as a uterotonic (Chopra *et al.*, 1982; Bhattacharyya *et al.*, 2005). It is also recommended in leprosy and phthisis (Aramberwela *et al.*, 1988). The leaves showed significant hepatoprotective effect at doses of 50-100 mg/kg, p.o., on liver damage induced by D-galactosamine in rats (Bhattacharyya *et al.*, 2005). Vasicine (an alkaloid isolated from the plant) is reported to possess slight hypotensive, appreciable bronchodilator and marked stimulant activities (Aramberwela *et al.*, 1988). Peganine, isolated from the plant had a cholegogic action (Rabinovich *et al.*, 1966). Gao *et al.* (2008) studied the inhibitory effect of the methanolic extract from the leaves of *Adhatoda vasica*. The obtained results suggest a use of the extract as an antidiabetic and showed a possibility that vasicine and vasicinol could be a useful treatment for metabolic disorders. The alkaloids of *Adhatoda vasica* possess anti-inflammatory activity (Chakraborty and Brantner, 2001). The insecticidal activity of the plant was also reported (Srivastava and Awasthi, 1958; Srivastava *et al.*, 1965). The results of the study of Shrivastava *et al.* (2006) suggest that the plant has an immense potential as an anti-ulcer agent of great therapeutic relevance.

The investigation of Sangameswaran *et al.* (2008) established pharmacological evidence to support the folklore claim that *Andrographis lineata* is used traditionally as a hepatoprotective agent. *Andrographis paniculata* has been widely used as a traditional medicine in China and Southeast Asia (Kuroyangi *et al.*, 1987). The plant is a popular medicinal herb for treating infection, inflammation, cold, fever and diarrhea in China and Taiwan. It has been also used in traditional medicine of India for the treatment of hepatitis. The diterpenoid andrographolide was found to be slightly more active than silymarin, a

known hepatoprotective drug (Saraswat *et al.*, 1995). The plant has different interesting biological properties (Geethangili *et al.*, 2008) such as antihepatic (Choudhury *et al.*, 1987), antifertility (Akbarsha *et al.*, 1990), hepatoprotective (Handa and Sharma, 1990), antithrombic (Zhao and Fang, 1991), immunostimulant (Puri *et al.*, 1993), antihepatotoxic (Kapil *et al.*, 1993), antiplatelet aggregation (Zhang *et al.*, 1994; Burgos *et al.*, 2005), cardiovascular (Zhang and Tan, 1997), antihyperglycemic, antioxidant (Zhang and Tan, 2000; Husen *et al.*, 2004), anti-inflammatory (Madav *et al.*, 1996; Shen *et al.*, 2002; Ji *et al.*, 2005), antimalarial (Dua *et al.*, 2004), anti edema and analgesic activities (Lin *et al.*, 2009). The aerial parts of the plant have been used traditionally as medicine to treat cancer (Kirtikar and Basu, 1975). Furthermore, the anticancer and cytotoxic activities of *Andrographis paniculata* diterpenoid constituents were also reported (Kumar *et al.*, 2004, Tan *et al.*, 2005; Li *et al.*, 2007a; Sheeja and Kuttan, 2007; Geethangili *et al.*, 2008). According to Geethangili *et al.* (2008), the flavonoids and some diterpenoids isolated from the plant may play a role in the prevention and/or management of cancer. Xanthones, from the roots of *Andrographis paniculata* exhibited promising anti-protozoal activity (Dua *et al.*, 2009). The antimalarial activity of these xanthones has been also reported (Dua *et al.*, 2004). The plant also possesses choleric (Shukla *et al.*, 1992), antibacterial (Singha *et al.*, 2003) and antileishmaniasis (Sinha *et al.*, 2003) activities. The ameliorating effects of *Andrographis paniculata* extract against cyclophosphamide-induced toxicity in mice (Sheeja and Kuttan, 2006), as well as the antiangiogenic activity of the plant extract (Sheeja *et al.*, 2007) have been also reported.

Asteracantha longifolia Nees is used as a food stuff by the Pedi. In Hindu medicine it is considered cooling, diuretic, stimulating and especially efficacious in dropsy and in cases of stone or gravel in the kidney. The plant is thought to have antidysentric properties and has been used as a remedy for hepatic derangement. In India, the seeds has been used as aphrodisiac and the root and the leaf against dropsy (Watt and Breyer-Brandwijk, 1962). The essential oils of the aerial parts and roots of *Asteracantha longifolia* exhibited antibacterial activity. The alkaloid-HCl solution of the plant is bronchodilator, diuretic and lowers the blood pressure after vagotomy or atropinization in dog and rabbit (Parashar and Singh, 1965). *Asteracantha longifolia* Nees is used as a diuretic and for the treatment of jaundice, dropsy, rheumatism, anascara and diseases of the urogenital tract (Misra *et al.*, 2001). *Asystasia gangetica* T. Anderson is a galactagogue. The leaf is Swahili antidote for snake-bite. In Central Africa, the plant is applied as an antipruritic. In Philippines the leaf and flower are eaten as pot-herbs and may also be used as an intestinal astringent. In West Africa the plant is used to lighten the pains of childbirth. In India, the juice of the plant is administered for swellings and rheumatism and as a vermifuge (Watt and Breyer-Brandwijk, 1962).

Brillantaisia nitens Lindau is widely used in African traditional medicine to treat skin infections and pain like toothache. The decoction of the plant has been administered orally to treat arterial hypertension in Cameroon. The vasorelaxant effects of *Brillantaisia nutans*, on isolated rat vascular smooth muscle was reported by Dimo *et al.* (2007). *Clinacanthus nutans* is an important herbal medicine in Thailand and China, being used as an anti-hepatitis and anti-herpes agent (Teshima *et al.*, 1998). The burnt and powdered root of *Crabbea hirsuta* Harv. is rubbed by the Pedi over the body of a hydrocephalic child. An infusion of the plant is said to be emetic. *Crabbea nana* Nees. is used by Xhosa as an anthrax remedy, and the leaf as a toothache remedy (Watt and Breyer-Brandwijk, 1962).

Dicliptera laxata C.B.Cl. is a remedy for general debility. The extract of *Dicliptera roxburghiana* Nees showed central nervous system depressant and skeletal muscle relaxant activities (Thapliyal *et al.*, 1990). The Chagga use the leaf and the root of *Disperma kilmandscharicum* C.B.Cl. together with goat blood and an extract of goat meat, as an aphrodisiac (Watt and Breyer-Brandwijk, 1962).

The diuretic activity of *Hygrophila auriculata* has been also reported (Swamy *et al.*, 2007). *Hygrophila stricta* is known as a malaria plant and is used for malaria, fever, rheumatic pains, wounds and headache (Khan and Omoloso, 2002). According to ethnobotanical investigations, a decoction of *Hypoestes serpens* (Vahl) R. Br. leaves is used in traditional Malagasy medicine for the treatment of high blood pressure (Rasoamiaranahary *et al.*, 2003a). The diterpene fusicoccane, isolated from the plant had a relaxant activity on isolated rat aorta (Andriamihaja *et al.*, 2001). A decoction of *Hypoestes verticillaris* R. Br. is used by the Swahili as a remedy for chest diseases (Watt and Breyer-Brandwijk, 1962). Hypoestatsins 1 and 2 (phenanthroinolizidine alkaloids) isolated from *Hypoestes verticillaris*, were found to markedly inhibit growth of the murine P-388 cell line ($ED_{50} = 10^{-5} \mu\text{g/mL}$) (Pettit *et al.*, 1984). The triterpenoid saponin, isolated from *Lepidagathis hyalina* Nees showed antimicrobial activity against various plant pathogenic bacteria and fungi (Yadava, 2001). The leaves of *Monechma ciliatum* have potent oxytocic effect (Uguru and Evans, 2000). The experimental findings by Kini *et al.* (2008) supported the use of *Odontonema striatum* by traditional physicians, in Burkino Faso, for the treatment of arterial hypertension in human disease. Rhinacanthins C and D (naphthoquinones), isolated from *Rhinacanthus nasutus*, exhibit inhibitory activity against cytomegalovirus (CMV), with EC_{50} values of 0.22 and 0.02 $\mu\text{g/mL}$, respectively against human CMV (Sendl *et al.*, 1996). In Tanganyika the crushed root of *Streptosiphon hirsutus* Mildbr. is used as an application to wounds. A decoction of the root of *Strobilanthes linifolia* Milne-Redhead is used for gonorrhoea (Watt and Breyer-Brandwijk, 1962). Singh *et al.* (2002b) reported that the triterpenoids from *Strobilanthes callosus* Nees possess anti-inflammatory and antimicrobial activities, which confirm the use of this plant in folk medicine (Watt and Breyer-Brandwijk, 1962). The roots of *Strobilanthes cusia* Bremek has been commonly used in traditional Chinese medicine to treat influenza, epidemic cerebrospinal meningitis, encephalitis B, viral pneumonia, numps and severe acute respiratory syndrome (Tanaka *et al.*, 2004). Indirubin, isolated from *Strobilanthes cusia* inhibited the growth of leukemia cells, and 4(3H)-quinazolinone had hypotensive activity (Li *et al.*, 1993). The essential oil from *Strobilanthes crispus* had higher antioxidant activity compared to α -tocopherol (Rahmat *et al.*, 2006).

The leaf of *Thunbergia atriplicifolia* E. Mey. ex Nees is much used by the Zulu and the Natal Indian in making a hair-wash. The leaf of *Thunbergia capensis* Retz. is one of the Xhosa applications to scrofulous swellings. *Thunbergia glaberrima* Lindau is an African remedy for scrofula (Watt and Breyer-Brandwijk, 1962). The extracts of the different parts of *Thunbergia laurifolia* Lindl. are reported to have detoxification, anti-inflammatory and antipyretic properties (Oonsivilai *et al.*, 2007). The experimental results obtained by the latter authors support the traditional medicinal use of the plant for detoxification.

The family is represented in Egypt by 6 genera and 6 species (Boulos, 2002).

1.1. BARLERIA L.

Iridoids, anthraquinones, phenylethanoid glycosides and flavonoids were identified from few *Barleria* species.

Iridoids

Several iridoids have been isolated from *Barleria* species. The following are examples of these iridoids:

1- *Barleria cristata* L.: Acetylbarlerin and (80) shanzhiside methyl ester (81) (El-Emary *et al.* 1990).