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 (Rasoamiaranjanahary *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). Hypoestatins 1 and 2 (phenanthroinolizidine alkaloids) isolated from *Hypoestes verticillaris*, were found to markedly inhibit growth of the murine P-388 cell line ($ED_{50} = 10^{-5}$µg/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 µg/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 *Strobilanthopsis 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(3*H*)-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 glaberrrima* 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:

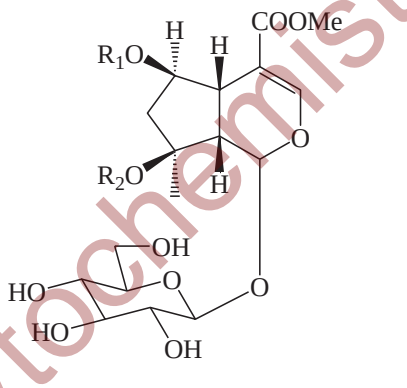
1- *Barleria cristata* L.: Acetylbarlerin and (**80**) shanzhiside methyl ester (**81**) (El-Emary *et al*. 1990).

2- *Barleria luplina* (leaves and aerial parts): Schanzhiside methyl ester, 8-*O*-acetyl schanzhiside methyl ester (barlerin) (**82**), 6,8-*O*,*O*-diacetylschanzhiside (acetylbarlerin), 6-*O*-acetylschanzhiside methyl ester , ipolamiidoside (**83**), 6-*O*-*p*-methoxy-*cis*-cinnamoyl-8-*O*-acetylschanzhiside methyl ester, 6-*O*-*p*-methoxy-*trans*-cinnamoyl-8-*O*-acetyl-schanzhiside methyl ester, 6-*O*-*p*-*cis*-coumaroyl-8-*O*-acetylschanzhiside methyl ester and 6-*O*-*p*-*trans*-coumaroyl-8-*O*-acetylschanzhiside methyl ester (Suksamrarn, 1986; Byrne *et al*., 1987; Tuntiwachwuttikul *et al*., 1998; Kanchanapoom *et al*., 2001b). The flowers contain barlerin, acetylbarlerin, ipolamiidoside, 6-*O*-acetylschanzhiside methyl ester, schanzhiside methyl ester, mussaenosidic acid, schanzhiside and 8-*O*-acetylschanzhiside (Suksamrarn *et al*., 2003).

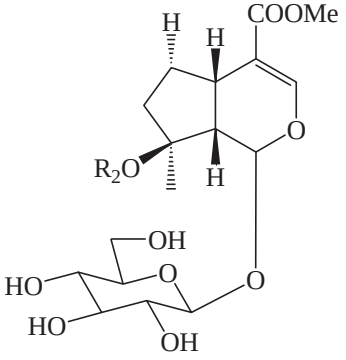
3- *Barleria prionitis* L. (whole plant): Barlerin, acetylbarlerin, gentioside, 5,6-β-epoxy-7β-hydroxy-8β-methyl-1-β-D-rhamnosidyl iridoide, 4-carbomethoxy-7β,8α-dihydroxy-8β-methyl-1β-D-glucopyranosidyl iridoide, 6-*O*-*trans*-*p*-coumaroyl-8-*O*-acetylshanzhiside methyl ester and its *cis*-isomer, shanzhiside, shanzhiside methyl ester (Taneja and Tiwari, 1975; Purushothaman *et al*., 1988; El-Emary *et al*., 1990; Chen *et al*., 1998b; Kanchanapoom *et al*., 2001b), 7-methoxydiderroside and luplinoside (**84**) (Ata *et al*., 2009). Damtoft *et al*. (1982) corrected the structures of barlerin and acetylbarlerin to 8-*O*-acetyl- and 6,8-di-*O*-acetylschanzhiside methyl ester respectively.

4- *Barleria strigosa* (whole plant): 7-*O*-Acetyl-8-epiloganic acid and 10-*O*-*trans*-coumaroyleranthemoside (Kanchanapoom *et al*., 2004b).

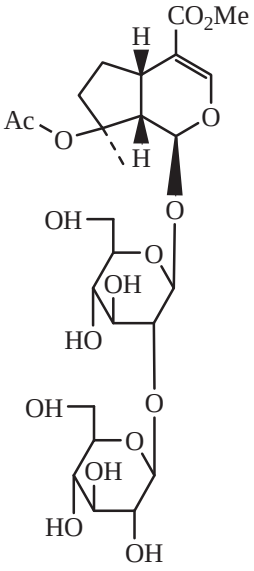
5- *Barleria trispinosa*: The following four iridoid glycosides were isolated from the aerial parts: barlerin, acetylbarlerin, schanzhiside methyl ester and 6-α-L-rhamonopyranosyl-8-*O*-acetylshanzhiside (Harraz *et al*., 2009).



80 Acetylbarlerin R_1=H,R_2=Ac
81 Shanzhiside methyl ester R_1=R_2=Ac
82 Barlerin R_1=R_2=H



83 Ipolamiidoside



84 Luplinoside

Anthraquinones, Flavonoids and Other Phenolics

Anthraquinones were isolated from few *Barleria* species. Barleriaquinone, (**85**) 1-hydroxy-7-carbomethoxyanthraquinone, 1-hydroxy-2-carbomethoxy-7-methylanthraquinone and 1-hydroxy-5-carbomethoxy-7-methylanthraquinone were isolated from the roots of *Barleria buxifolia* (Gopalakrishnan *et al*., 1984; Ramaiah *et al*., 1997). Four anthraquinones were identified from the stems and roots of *Barleria longiflora* Linn. *viz.* tectoquinone, 1,3,5-trihydroxy-4-methoxy-2-methylanthraquine, 3,8-dihydroxy-4-methoxy-2-methylanthraquinone and 1,3,4-trihdroxy-5 (or 8)-methoxy-2-methylanthraquinone (Rao *et al*., 1999). 1,8-

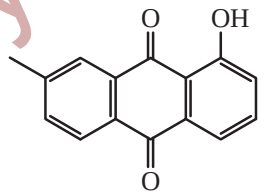
Dihydroxy-2,7-dimethyl-3,6-di-methoxyanthraquinone and 1,3,6,8-tetramethoxy-2,7-dimethyl anthraquinone were identified from *Barleria prionitis* (Ganga *et al*., 2002).

Examples of the flavonoids isolated from some *Barleria* species are:

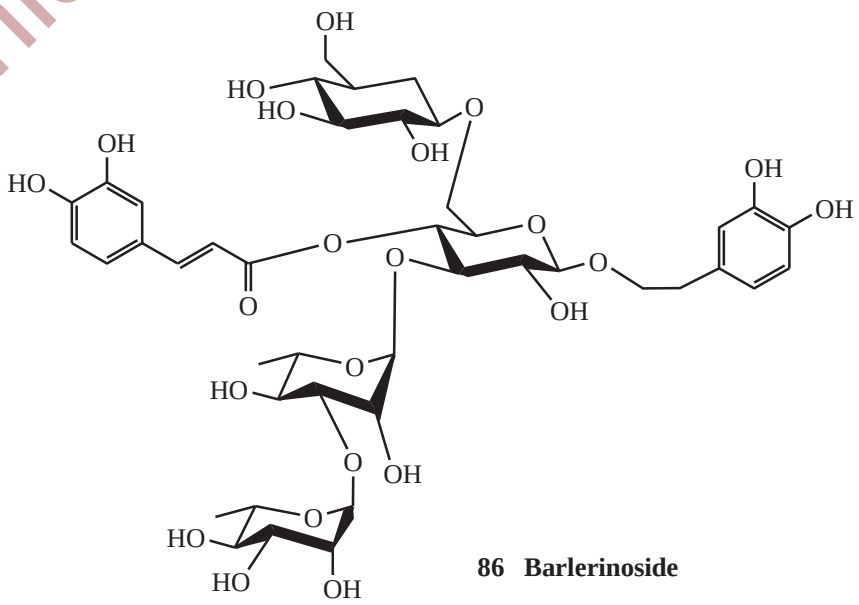
1- *Barleria cristata* Linn.: Apigenin, apigenin 7-*O*-glucoside, luteolin and luteolin 7-methyl ether (Daniel and Sabnis, 1987; El-Emary *et al*., 1990). The flavonoids of *Barleria cristata* (violet flowers) were identified as apigenin, naringenin and apigenin glucuronide. An anthocyanin was identified as malvidin 3,5-diglucoside. *Barleria cristata* with white flowers yielded apigenin 7-glucuronide (Subramanian and Nair, 1972).
2- *Barleria grandiflora* Dalz.: Scutellarein and scutellarein 7-methyl ether (Daniel and Sabnis, 1987).
3- *Barleria prattensis* Sant.: Luteolin 7-methyl ether (Daniel and Sabnis, 1987).
4- *Barleria prionitis* Linn.: Scutellarein and scutellarein 7-rhamnosylglucoside, scutellarein 7-neohesperidoside (Harborne *et al*., 1971; Nair and Gunasegaran, 1982; Daniel and Sabnis, 1987). The roots contain an acylated flavonoid glucoside identified as luteolin 7-*O*-(2''-*O*-*p*-coumaroyl(-β-D-glucopyranoside) (Gupta and Saxena, 1984).
5- *Barleria strigosa* Willd.: Apigenin and apigenin 7-*O*-α-L-rhamnosyl-(1→6)-*O*-β-D glucoside (Daniel and Sabnis, 1987; Kanchanapoom *et al*, 2004b).

Three phenylethanoid glycosides *viz*. aceteoside, desrhamnosylaceteoside and poliumoside were isolated from the callus cultures of *Barleria cristata* (Abd El-Mawla *et al*., 2005). Strigoside, verbascoside, isoverbascoside, decaffeoylverbascoside, (+)-lyoniresinol 3α-*O*-β-D-xylosyl-(1→6)-β-D-glucoside and (3*R*)-1-octen-3-ol-3-*O*-β-D-xylosyl-(1→6)-β-D-glucoside, were identified in *Barleria strigosa* (Kanchanapoom *et al*., 2004b). Barlerinoside (**86**) was isolated from the aerial parts of *Barleria prionitis* Linn. (Ata *et al*., 2009).

Daniel and Sabnis (1987) identified vanillic acid in five *Barleria* species: *Barleria cristata* Linn., *Barleria grandiflora* Dalz., *Barleria prattensis* Sant., *Barleria prionitis* Linn. and *Barleria strigosa* Willd.). Other phenolic acids detected in some of these species are: salicylic, *p*-hydroxybenzoic, genistic, protocatechuic, α-resorcylic, 2-hydroxy-4-methoxy benzoic, 2-hydroxy-5-methoxybenzoic, syringic, melilotic, *p*-coumaric and *o*-coumaric acids (Daniel and Sabnis, 1987).



85 Barleriaquinone



86 Barlerinoside

Triterpenes and Other Constituents

Arnidiol, a pentacyclic triterpene, and its isomer faradiol were isolated from the stems and roots of *Barleria longiflora* Linn. f. (Rao *et al*., 1999). *Barleria cristata* L. and *Barleria*

prionitis L. contain α-amyrin, β-sitosterol and stigmasterol-3-*O*-D-glucoside (El-Emary *et al*., 1990). *Barleria prionitis* contains balarenone, piptaline, lupeol and 13,14-secostigmasta-5,14-diene-3α-ol (Kosmulalage *et al*., 2007). Lehra *et al*. (2010) isolated *n*-octacosanol, taraxasterol, oleanolic acid acetate, β-sitosterol and stigmasterol from the whole plant of *Barleria prionitis*. γ-Sitosterol was identified from *Barleria strigosa* (Ganguly *et al*., 1969). Saponins, tannins, flavonoids, phyosterols and carotenoids were extracted from *Barleria luplina* Lindl. (Nguyen and Nguyen, 1998).

Folk Medicine, Pharmacological and Biological Activities

Barleria cristata Linn. is useful in inflammations, fevers, bronchitis, blood diseases, biliousness, tympanitis, pains, and asthma. The roots and leaves are used to reduce swelling, and an infusion is given in cough. *Barleria cristata* var. *dichotoma* is used as a stimulant and demulcent. The methanol extract of *Barleria cristata* leaves exhibits significant anti-inflammatory activity (Manoj *et al.*, 2009). A decoction of the root of *Barleria courtallica* Nees is given in rheumatism and pneumonia. A decoction of the root of *Barleria longiflora* L. is given in stricture, dropsy and gravel. A decoction of *Barleria noctiflora* is used as an adjunct to, and substitute for human milk. *Barleria prionitis* L. (whole plant and especially the root) is used as a diuretic and tonic medicine in Ceylon, and is also credited with diuretic, febrifugal and anticatarrhal properties. *Barleria strigosa* Willd. is useful in ulcers, skin diseases, leucoderma, pains, itching, inflammations, bronchitis and diseases of the teeth. It is also used by the Santals as a remedy of cough (Kirtikar and Basu, 1984).

In Thai traditional medicine, *Barleria luplina* is externally used as an anti-inflammatory for insect bites, herpes simplex and herpes zoster (Kanchanapoom *et al*., 2001b). It is one of the plants used by hunters for themselves and their hunting dogs in Trinidad for snake bites, scorpion stings, for injuries and damage of dogs and to facilitate hunting (Lans *et al*., 2001). The antiulcer activity of the methanol extract of *Barleria luplina* has been reported. It afforded significant protection against alcohol and indomethacin induced ulcer as well as stress induced ulceration (Suba *et al*., 2004c). The anti-inflammatory, analgesic, antiperoxidative efficacy (Suba *et al*., 2005) and anti-amoebic activity (Sawangjaroen *et al*., 2006) of *Barleria luplina* has been also reported. The plant afforded significant hepatoprotection against carbon tetrachloride, galactosamine and paracetamol induced hepatoxicity (Singh *et al*., 2005). The methanol extract of the aerial parts of *Barleria luplina*, orally tested, exerted significant anti-hyperglycemic effect in streptozotocin hyperglycemic rats (Suba *et al*., 2004a,b). *Barleria luplina* exhibited virucidal activity against herpes simplex virus. The results obtained by Yoosook *et al*. (1999) suggest a therapeutic potential of *Barleria luplina* against HSV-2. It also showed strong antibacterial activity against acne-inducing bacteria (Chomnawang *et al*., 2005). Ipolamiidoside, isolated from *Barleria luplina* exhibited antiviral properties (Suksamrarn *et al.*, 2003). The methanolic extract of the plant showed significant motor incoordination and muscle relaxant activity. It also potentiated phenobarbitone sodium induced sleeping time and has significant psychopharmacological activity (Suba *et al*., 2002). The cytotoxicity of two anthraquinones (barleriaquinone I and barleriaquinone II) isolated from *Barleria buxifolia* was reported (Imbaraj *et al*., 1999). A decoction of the stem and root of *Barleria mucronata* is emetic. The Zulu administer a root decoction of *Barleria ovata* E. Mey. ex Nees by the mouth or as an enema for the relief of a condition characterized by painful nodules under the skin (Watt and Breyer-Brandwijk, 1962).

Barleria prionitis L. exhibits several medicinal properties. In India, the leaves are chewed to relieve toothache (Chopra *et al*., 1956). In the Netherlands Indies, the plant is used as a febrifuge and as a diuretic (Watt and Breyer-Brandwijk, 1962). Juice of the leaves is used in