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To cite this article: Namik F. Mir-Babayev & Peter J. Houghton (2002) Plants of the Republic of Azerbaijan with Potential Medicinal Applications. Part III, *Pharmaceutical Biology*, 40:1, 16-22, DOI: [10.1076/phbi.40.1.16.5863](https://doi.org/10.1076/phbi.40.1.16.5863)

To link to this article: <https://doi.org/10.1076/phbi.40.1.16.5863>



Published online: 29 Sep 2008.



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Plants of the Republic of Azerbaijan with Potential Medicinal Applications. Part III

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Abstract

This report, which is based on field studies and literature references, documents some traditional knowledge of the medicinal use of plants by local Azeri people and important medicinal plants typical for Azerbaijan. This report deals with 29 plant species belonging to 18 families which are used by local Azeri people as folk drugs for the treatment of various human and cattle diseases.

Keywords: Azerbaijan, phytochemistry, medicinal plants, sesquiterpene lactones, coumarins, flavanoids, alkaloids.

Introduction

The Republic of Azerbaijan occupies the southeast part of the Caucasus isthmus. It covers the southeast of the Greater Caucasus, a part of the Lesser Caucasus, the Talysh Mountains and the vast Kura-Araks depression. Geographically, the republic is located within the limits of the Eurasia bend closely connected with the Aral-Caspian depression and located near the conventional border between Europe and Asia. In addition to the continental part, the Republic's territory also includes several islands located along the Caspian coastline. These islands include: Nargin, Pyrallahy, Bulla, Svinoy and Glinyany. The Lesser Caucasus consist mostly of mountainous folds in the south-east, the Shakhdag, Karabakh, Congur-Alanges, Murovdag and Daralagez ranges. As well as ridges, the system of the Lesser Caucasus includes plateaus, mostly of volcanic origin (such as Karabakh plateau), and lowlands, which extend along the Middle Araks area (Fig. 1). The first Western European investigator who visited Transcaucasia in 1700–1702 was the famous botanist Tournefort. Following him, Bucksbaum, the first Russian botanist and a member of the Academy of

Sciences of Russian Empire, had travelled to the Caucasian region in 1724–1725.

A tremendous amount of floristic material on the Caucasus was collected at the end of 18th century by Guldenstedt and Palas (1796–1800). They investigated many regions in Caucasus, particularly, Azerbaijan. Prof. Carl Coch, the famous dendrologist, also visited the area and gathered a vast collection of the plants of the Eastern Caucasus in 1880. This resulted in his describing the characteristics of Caucasian flora and in an attempt to divide this territory into floristic provinces (Prilipko, 1954).

Methodology

Information about traditional medicine recorded here was collected by direct contact and interviews with farmers, peasants and herbal practitioners (halg hakim, tabib). Interviews were also held with semi-religious people and with teachers of botany and nature in secondary schools, at the tea houses where people spend their leisure, then compared with answers obtained from attar (herbalist's shop) in these regions. Some informants accompanied the authors in the field and mountains to identify the plants they used. The information recorded was checked and confirmed in different areas and villages. It was conducted by local scientific researchers who were working at the Nakhichevan Scientific Research Centre (Academy of Sciences) and at the Forest Nature Reserves, such as Gysyl-Agach, Pirkuli, Karabakh, Garagel and Zakatala, which belong to the Committee of State Ecology of Azerbaijan Republic. Information was also collected from historical documents. Samples of plants were collected, botanically identified and voucher specimens deposited in the Department Herbarium of the Institute of

Accepted: June 14, 2001

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Figure 1. Sketch map of the territory of the Azerbaijan Republic and its surrounds.

Botany Academy of Sciences of Azerbaijan Republic. As in previous articles (Mir-Babayev et al., 1993b; Mir-Babayev & Waigh, 1997; Mir-Babayev, 2000), plants are listed in alphabetical order botanical name, local name, the family and place of collection. The compounds isolated from plants are indicated.

The plant and their uses

Amaryllidaceae

Narcissus lactiflor (Haworth.) Baker., *N. poeticus* L., *N. pseudonarcissus* L.

(*Naruzgulu* – from village Aghsu of Kurdamir district, village Agshaglar, Talysh)

The juice of *N. pseudonarcissus* L. is recommended for rhinitis, bronchitis and whooping (Zalesova & Petrovskaya, 1898–1901). *N. pseudonarcissus* contain alkaloids: norpluvine, 10-norpluvine and oxy-acetylalanthamine (Kreh et al., 1995).

Apiaceae

Bupleurum nordmannianum Ledeb., *B. polyphyllum* Ledeb., *B. Gerardi* All., *B. Boissieri* Buasse, *B. falcatum* L., *B. longicaula* var. *himalayense*.

(*Okjuzboghan* – from Absheron, Nakhichevan and Diabar)

The decoction of *B. Longicaula* L. dry seeds is used against piles and also given for renal colic and hepatitis. *B. falcatum* L. contains coumarin alcohol glucosides and isopentenol glycoside (Ono et al., 1999).

Daucus carota L., *D. sativus* Roehl.

(*Kjock* – from Lesser Caucasus)

An infusion from the seeds *D. sativus* L. is diuretic and carminative. *D. carota* L. contains the vitamins C, B₁, and B₂, and 6-methoxymellein (Kurosaki & Nishi, 1983).

Ferula rigidula Regel. et Scmalh.

(*Yilankolkjasea* – from Nakhichevan)

The roots of *F. rigidula* are used for the treatment of tonsillitis and possess antibacterial activity.

The roots of *F. rigidula* contain complex esters (Mir-Babayev et al., 1993a).

Laserpitium hispidum M.B., *L. latifolium* L.

(*Syarttuk kyafryamotu* – from Guba')

L. latifolium L. is used in traditional medicine to treat headache and as a diuretic. The genus *Laserpitium* is rich in sesquiterpene lactones, such as laserin and isosileroide (Appendino et al., 1986).

Smyrniun perfoliatum L., *S. creticum* L.

(*Ohliva* – from Nakhichevan)

The seeds of *S. perfoliatum* L. are used to treat asthma. *S. olusatrum* L. contains sesquiterpene lactones such as istanbulin A and B. *S. creticum* L. also contains sesquiterpene lactones: istanbulin D and E (Ulubelen & Abdelmaleky, 1982).

Asteraceae

Aster alpinus L., *A. ibericus* Stev., *A. roseus* Stev., *A. tataricus* L., *A. tripolium* L.

(*Aster* – from Gusar, Shahdag)

The roots of *A. tataricus* L. are useful as an expectorant. *A. tataricus* contains two penta-peptides: asterinin D and E (Cheng et al., 1996). *A. alpinus* L. contain two clerodane derivatives related to salviarin and bacchotricuneatin A (Bohlmann et al., 1985).

Bidens tripartita L., *B. pilosa* L.

(*Jatyggangal* – from whole Azerbaijan)

A decoction of *B. tripartita* L. is used to treat chronic dysentery and ear ailments.

B. pilosa contains flavone glycosides (Brandao et al., 1998).

Centaurea transcaucasica D. Sosn., *C. cyanus* L., *C. jacea* L., *C. behen* L., *C. scabiosa* L., *C. rozdorskyi* Karjag., *C. hyrcanica* J. Borum., *C. Fischeri* Willd., *C. cobustanica* L., *C. caspia* L., *C. sosnowskyi* A. Grossh., *C. diffusa* Lam., *C. squarrosa* Willd., *C. apiculata* L., *C. Alexandrii* Bordz., *C. auxillaris* W.

(*Gulavar* – from Cobystan, Araks, Astara, Gusar and Nakhichevan)

C. cyanus L. is a bitter diuretic. It's used for dyspepsia and also in soothing compresses for eye infections. *C. auxillaris* W. also used in compresses for the eyes. *C. behen* L. is used for nervous disorders neurasthenia and digestive troubles (Rollov, 1908).

C. cyanus contains quercitrin, isoramnetin, luteolin and apigenin (Litvinenko & Bubenchikova, 1980).

Onopordon heteracanthum C.A.M., *O. acanthum* L., *O. tauricum* Willd.

(*Chakgal gangaly* – from Mugan, Lenkoran & Talysh)

O. acanthum L. is an excellent stimulant and nectariferous. The fresh juice of leaves *O. acanthum* is used for scabies and for malignancies. *O. tauricum* Willd. contains sesquiterpene lactones: arctiopicrin, carmenin, andalucin and onopordopicrin. Onopordopicrin is an antitumor lactone (Miski et al., 1988).

Tanacetum canescens D.C., *T. tabrisianum* (Boiss.) A. Grossh., *T. tenuissimum* (Trautv.) A. Grossh., *T. vulgare* L., *T. sibiricum* L., *T. parthenium* (L.) Schulz-Bip.

(*Dahtarkhunu* – from Nakhichevan)

T. parthenium (L.) Schultz-Bip. has been used in folk medicine as an antipyretic, for arthritis and migraine. *T. vulgare* L. is expectorant, antiseptic and spasmolytic. *T. vulgare* contains three sesquiterpene lactones: tatridin A, B and tamarin (Sanz & Marco, 1991). *T. sibiricum* L. contains flavones: isosacuranetin, naringen and homoeriodictiol (Stepanova et al., 1981).

Balsaminaceae

Impatiens balsamina L., *I. noli-tangere* L., *I. grandulifera* Royle

(*Balzamin* – from mountains Shirshir, Aghdaban, Pirsultan and Khachbulag)

In folk medicine, *I. balsamina* L. is used as a decoction to treat haemorrhoids, as diuretic and a laxative.

It also possess antianaphylactic effect (Fukumoto et al., 1996). *I. balsamina* contains coumarins, naphthoquinones and baccharane glucosides (Pharkphoom et al., 1995).

Caryophyllaceae

Stellaria media (L.) Vill., *S. pallida* (Dum.) Pire, *S. persica* Boiss., *S. holostea* L., *S. graminea* L.

(*Dzindzilim* – from Greater and Lesser Caucasus)

The juice of *S. holostea* L. is used to treat eye diseases and pains in the stomach. An essence of fresh *S. media* L is taken to relieve rheumatic pains and psoriasis, and also pains in the stomach.

Aerial parts of *S. media* contain coumarins, glucosides, steroids, flavanoids and carboxylic acid (Rizk, 1986).

Chenopodiaceae

Suaeda mycrophylla Pall., *S. altissima* Pall., *S. dendroides* (C.A.M.) Moq., *S. vermiculata* L.

(*Charan* – from Nakhichevan)

Aqueous crude extracts of aerial parts of *S. vermiculata* L exhibited antimicrobial activity against bacterial and fungal species. *S. altissima* Pall. and *S. vermiculata* contains coumarins: scoparone and scopoletin (Murray et al., 1982).

Convolvulaceae

Convolvulus eremophyllus Boiss. et Bse., *C. persicus* L., *C. hirsutus* Stev., *C. pilosellifollins* Desr., *C. arvensis* L.

(*Sarmashyg, touthantopal* – from place between Baku and Salyany, Lenkoran)

The roots of *C. arvensis* L. possess laxative properties. The leaves and stems are infused with lamp-oil, and a small amount of yellow wax is added. This ointment is successfully used for healing wounds. Local people mix the leaves and stems of this plant with oil and apply this ointment to tumors of the scrotum. A decoction of dried leaves of *C. arvensis* is used in folk medicine for leucorrhoea and also for bathing cutaneous eruptions. The dried-up latex of *C. hirsutus* Stev. is used in traditional folk medicine as a laxative and also for dropsy (Rollov, 1908).

Cupressaceae

Juniperus oblonga M.B., *J. pighmaea* C. Koch., *J. foetidissima* Willd., *J. sabina* L.

J. communis L., *J. nana* Willd., *J. oxycedrus* L., *J. polycarpus* C. Koch.

(*Ardidz* – from Greater and Lesser Caucasus)

The extract of the dried fruits of *J. communis* L. are effective against asthma (Zalesova & Petrovskaya, 1898–1901). The berries of *J. communis* are used for the treatment of urological and dyseptic diseases. An infusion of berries is used as a diuretic and as a disinfectant of the urinary tracts. The berries contains an essential oil, diterpene acids and umbel-

liferone (Feliciano et al., 1991). The essential oil of *J. communis* contain enantiomers of monoterpenic hydrocarbons such as α -pinene, camphene, sabinene and α -terpinene (Renata et al., 1997). *J. sabina* L. contains flavanoids: iso-quercitrin, rutinoside and apigenine (Abilkaeva & Pashinina, 1981).

Euphorbiaceae

Euphorbia squamosa Willd., *E. turcomanica* Boiss., *E. Szowitsii* Fish et Mey., *E. azerbaijanica* Bordz., *E. lathyris* L., *E. peplus* L. *E. hyrcana* A. Grossh., *E. Grosshemii* Prokh., *E. iberica* Boiss., *E. boissieriana* Prokh., *E. tuckeana* L.

(*Syuddyuian* – from Kelbadgar, Istisu, mountains: Pyrsultan, Shirshir, Gejurt, Khachbulag)

The seeds of *E. lathyris* L. are both emetic and laxative. *E. lathyris* contains cycloartenol and lanosterol (Giner & Djerassi, 1995). *E. azerbaijanica* Bordz. and *E. peplus* L. are used as diuretics and depuratives to treat asthma and liver disorders. *E. peplus* L. contain diterpenes (Jakupovic et al., 1998). Aerial parts of *E. tuckeana* L. contains β -sitosterol and simiarenone 24- α -methylene-cycloartanol. Extracts of this plant exhibited activity against *Candida albicans* (Ferreira et al., 1996).

Fagaceae

Quercus ilex L., *Q. occidentalis* J. Gay, *Q. macranthera* F. & Mey., *Q. castancifolia* C.A.M., *Q. araxina* (Trutv.) A. Grosh., *Q. anatolica* (Schwarz) D. Sosn., *Q. crispata* Stev., *Q. crecifolia* Stev., *Q. longipes* Stev., *Q. iberica* Stev.

(*Palyd* – from Masally, Cubatly, Nagorny Karabakh, Zange-lan, Gandza)

The acorns of *Q. macranthera* F. & Mey. are used as a remedy for diarrhoea and menorrhagia.

Q. iberica Stev. contain flavanoids: quercitrin and iso-quercitrin (Enukidze et al., 1972).

The cork of *Q. suber* L. contains polysaccharides (Assencio, 1993).

Gentianaceae

Gentiana gelida M.B., *G. semtenfida* Pall., *G. caucasica* M.B., *G. pontica* Soltok., *G. cruciata* L.

G. djumilensis C. Koch., *G. blepharophora* E. Bordz., *G. kochiana* L., *G. karelinii* Griseb.

(*Ajichichiak* – from mountains Aterk, Kyapaz, Gyzylymeidan, Gyzylgaja)

The decoction of these plants is used in fever and headache and as a blood purifier. *G. kochiana* L. contains heterosides, gentiopicroside and gentiogenine. *G. karelinii* Griseb. contains xanthoness and flavonoids: svercyaperenin, gentiakaulein, gentiakohianin, isobellidifolin and mangiferin (Butayarov et al., 1993).

Swertia iberica Fish & Mey., *S. connata* L., *S. mileensis* L. (*Gurju svertija* – from mountains Koshkar, Kyapaz, near lake Gjöl-gjöl)

S. mileensis L. is used in traditional medicine to treat hepatitis (Kikuzaki et al., 1996).

S. connata L. contains xanthone compounds (Solovyeva et al., 1980).

Hypericaceae

Hypericum perforatum L., *H. asperuloides* ex Turcz., *H. atropatanum*, *H. Theodori* Woron., *H. acutum* Moench., *H. Karjagini* Rzazade, *H. scabrum* L., *H. androsaemum* L., *H. polygonifolium* Rupr., *H. aucheri* L.

(*Duzy* – from villages Mjudgi and Astrakhanovka of district Shemakha, Shakhbuz)

The oil of *H. perforatum* L. is used to treat wounds, burns and ulcers; an infusion of *H. perforatum* can be used to treat disorders of the lungs and urinary tract. *H. perforatum* contains hypericin, pseudohypericin and hyperforin. Hyperforin is used as an inhibitor for (Gram-positive) organisms (Farnsworth & Cordell, 1976).

Hypericin inhibits epidermal growth factor (EG-F) receptor associated protein kinase CK-2 (caseinkinase 2) (Witte et al., 1993).

Lamiaceae

Sideritis balansae Boiss., *S. montana* Lacr., *S. syriaca* L., *S. romana* L., *S. canariensis* L.

(*Dyamryak* – whole Azerbaijan)

S. syriaca L. is used in traditional medicine to treat colds. *S. syriaca* contains diterpene-siderone, acylated flavone glycosydes (Venturella et al., 1995).

Salvia verticulata L., *S. nutans* L., *S. sclarea* L., *S. grandiflora* Ettling., *S. tesquicola* Klik. & Pobed., *S. silvestris* L., *S. dracocephaloides* Boss., *S. lavandulaefolia* Vahl., *S. hypargeia* Fish & Mey.

(*Sjurvja* – Karabakh & Shirshir)

The essential oil and terpenes of *S. lavandulaefolias* Vahl. possess inhibitory activity in *in vitro* human erythrocyte acetylcholinesterase. *S. lavandulaefolias* contains: camphor, 1,8-cineol, α - and β -pinene, linalool, terpineol, geraniol and γ -terpinene (Perry et al., 2000). *S. hypergeia* Fish & Mey. contains diterpenoids: ferruginol, aethiopinone and 6 α -hydroxytaxodone (Ulubelen et al., 1999).

Nitrariaceae

Nitraria schoberi L., *N. komarovii* Iljin & Lava

(*Shorgilya* – near village Balakhany, island Bulla)

MeOH extract of *N. schoberi* L. has serotonin-like activity in *in vitro* bioassay tests. *N. schoberi* contains alkaloids such as nitramine, nitraroxine, nitrarrarine, nitramidine, schoberine and schoberidine (Üstunes et al., 1991).

N. komarovii contains alkaloids: nitracine and nitrazine (Tulyaganov & Abdullayev, 1995).

Platanaceae

Platanus digifolia Palib., *P. orientalis* L.
(Barmaghjarpag – from Aghstafa, Zangelan)

The roots of *P. orientalis* L. are used as an antidote for poisoning from snake and insect bites.

The buds of *P. orientalis* are used in traditional medicine as an antimicrobial drug of the urinary system.

The decoction of the of fruit *P. orientalis* is used to treat bloody flux of horses and other domestic animals.

The extract of buds *P. orientalis* contain flavanoids, kaempherol and caffeic acid (Mitrokotsa et al., 1993)

Rosaceae

Rosa pomifera Herrn., *R. tuschetica* Boiss., *R. komarovii* D. Sosn., *R. floribunda* Stev., *R. azerbaijanica* Nopokr., *R. sachokiana* P. Jak., *R. spinosissima* L., *R. nizami* D. Sosn. *R. atropatana* D. Sosn., *R. prilipkoana* D. Sosn.
(*It burnu* – Yardimly, Ordubad district, Kedabek, Zakatala, mountains: Aterk, Shirshir, Saryjer, Pirsultan, Ketidag)

The seeds of *R. azerbaijanica* Nopokr. are used as a diuretic and the fruit as an antidiarrhoeic and astringent.

Thymelaceae

Daphne caucasica Pall., *D. transcaucasica* Pobed., *D. vesiculosum* Fish et Mey, *D. mezereum* L., *D. glomerata* Lam.
(*Dzanavargilyasy* – from Aghdaban, Gysylgaja, village Zeylik of Kelbadgar district, Pirsultan mountain)

The bark of of the young stems of *D. transcaucasica* L. and *D. caucasica* Pall. are used as an emetic, laxative and vesicant. In homeopathy, a tincture prepared from the fresh bark of *D. mezereum* L. is recommended for dermatitis. *D. mezereum* contains coumarins: daphnetin, umbelliferone, mezerein, daphnoretin and tricoumarin glycoside – triumbellin (Kreher et al., 1990).

Discussion

Local people were always willing to cooperate with us in this work, explaining the use of local herbs and guiding to the places where these plants grew. Elder people and practitioners who studied folk medicine from their parents often possessed the books of home cures, such as “Dictionary of East Drugs” written by Magomed Shirvani in 1825 (Damirov et al., 1983). The book “Karabeddin Kebir” by Sayid Gussein-Khan, which was published in 1830 (Ephendiyev, 1964), is well-known in all the Islamic East as an ancient Pharmacopia. Collecting the local names of the plants was connected with great difficulty, because some plants have the same common names, or because they do not have any names

at all. There are also cases when one plant is named differently in various regions, even located very close to each other.

The usual methods of application are as decoctions, tinctures, juices, infusions and oils. Some of the medicinal plants described in this study are still popular among the community, for example, *Euphorbia azerbaijanica* (popularly known as *syuddyuian*) for curing asthma and liver disorders, *Quercus macranthera* (or *palyd*) as a laxative and vesicant. Patients prefer to treat the above mentioned diseases by traditional methods rather than going to hospital. A review of literature reveals that information on biologically active compounds and the pharmacology of most of these plant species is similar to other cultures such as Mediterranean, Central Asia and Chinese (Wheelwright, 1990; Perry, 1980). Therefore, more phytochemical and pharmacological studies on these plants used in folk medicine is suggested.

Conclusion

The rural people know the useful properties of many of our growing wild plants, but not all of them, especially the presence of chemical compounds in these plants, owing to which their pharmacological activity might be caused. Therefore, the knowledge about the above-mentioned plants also taken from Azeri and foreign literature is given as well.

Acknowledgments

We wish to express our sincere thanks to the Royal Society for a grant to visit the U.K. We are grateful to the local Azeri people who provided us with useful information about their folk medicines. With special thanks to Mrs. Anna Kotova, herbal practitioner, Karabakh district. We also thank Dr. Aliyar Ibrahimov, Head of Herbarium Department at the Nakhichevan Scientific Research Centre and Dr. Zahid Radjabov, Scientific Research Officer of Zakatala Forest Nature Reserve for identifying herbaceous material and Mr. Vladimir Kuznetsov, the Tribal Forest Officer, Shemakha-Astrakhanovka, who was kind enough to provide us with the accommodation, transportation and facilities.

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