

POLYGALA SENEGA LINN.

POLYGALA SENEGA belongs to a widely distributed family *Polygalaceæ* which consists of 10 genera and nearly 700 species spread all over the world with the exception of New Zealand, Polynesia and Arctic Zone. Most members of this vast family are more or less toxic and expectorants, some bitter and emetic, and a few acrid and poisonous.

P. senega is a plant of the Central and North America. The dried roots (senega snakeroot) as they appear on the market are irregular, twisted and taper from a thickened tuber bearing the remains of the small stem. The root bark is yellowish in colour, with a peculiar, somewhat rancid, odour recalling that of gaultheria. Taste is acid, sweetish and somewhat acidic.

Senega root which is tonic, expectorant and emetic, normally contains 3-4.5 per cent. of a mixture of saponin, a neutral saponin senegin ($C_{22}H_{50}O_7$) and an acid saponin polygolic acid ($C_{20}H_{36}O_{10}$)¹; a volatile oil (about 0.3 per cent.) which has been identified as methyl salicylate and valerate² and free salicylic acid (0.06 per cent.). The root contains about 5 per cent. of a fixed oil (Sp. gr. 0.9616 at 18° C.) consisting of olein (74 per cent.) palmitein (8 per cent.) and a little valereine.³ Apart from the above a small quantity of a glucoside gaultherin has also been traced.

The constituents on which the pharmaceutical value of senega depends are the saponins and the glucoside gaultherin which on enzymic hydrolysis yields the methyl salicylate in the plant. These constituents are found in varying proportions in the following species.

1. Neutral and acid saponins:

In the root of *Polygala amara* Linn., *P. alba* Nutt. (Bastard senega), *P. senega* Linn. (snake root) and *P. tenuifolia* Willd. (Japanese senega).

In the root barks of *P. major* Jocq., *P. angulata* DC., *P. boykini* Nutt., *P. Caracasana* HBK, *P. diversifolia* Linn., *P. latifolia* Torr., *P. pauciflora* Willd., *P. purpurea* Nutt., *P. sanguinea* Michx., *P. chambæbuxus* Linn., *P. monticola* H. et B., *P. virginica*, *P. paniculata* Linn. and *P. vulgaris* Linn.

2. Methyl salicylate:

In the root and root bark of *P. senega* Linn., *P. senega* L. var *latifolia* Torr et Gr., *P. boykini* Nutt., *P. rarifolia* DC., *P. javana* DC., *P. variabilis* HBK, *P. baldwinii* Nutt., *P. serpyllacea* Weihe, *P. calcarea* Schultz, *P. depressa* Wend, *P. alba* Nutt., *P. oleifera* Heck, *P. violacea* St. Hil, *P. vulgaris* Linn., *P. tenuifolia* Willd. and *P. amara* Linn.

Those species which have both the saponins and the methyl salicylate, therefore, are *P.*

senega Linn., *P. boykini* Nutt., *P. amara* Linn., *P. tenuifolia* Willd., and *P. vulgaris* Linn. Consequently these are the ones which are officinal in various pharmacopœias. Roots of *P. senega* Linn. is officinal in Europe, Great Britain, and United States of America, root of *P. tenuifolia* Willd. in Japan, root of *P. vulgaris* Linn. and flowering tops of *P. amara* Linn. in Portugal.

Apart from the officinal species many others are stated to be used medicinally. These are *P. calcarea* Schultz, *P. major* Jocq., and *P. serpyllacea* Weihe in Europe; *P. sanguinea* Michx. and *P. alba* Nutt. in North America; *P. paniculata* Linn. in Brazil; *P. myrtifolia* Linn. and *P. tenuifolia* Willd. in South Africa and *P. Siberica* Linn. in China, Japan, Indo-China and Malaya.

The common adulterants of *P. senega* are twigs and shoots of *P. senega*, the root of *P. alba* which contains 1 per cent. senegin and some methyl salicylate,⁴ *Parrax quinquefolius*, *Cyperipedium pubescens* and *Ionidium speciosum*.⁵ Grimme⁶ has suggested that senega the active principle of which is saponine can be replaced by radix primulae.

In India the following polygala have been used in the indigenous system of medicine:—

P. crotalarioides Ham [Vern Nilkanth (Hindi—a perennial herb of temperate Himalayas), *P. chinensis* Linn. [Vern Common Indian milk wort (Eng.), Merudu or Miragu (Hind) an annual herb found throughout India upto 5,000'], *P. telephioides* Willd. (an annual herb found in Carnatic, Nellore or Travancore) *P. glomerata* Lour. (found in Sikkim, Assam and Khasia Hills) and *P. sibirica* Linn. syn. *P. Heyneana* Wight and Arn (found in temperate and sub-tropical Himalayas, N.W.F. Province, Punjab, Khasia Hills and Western Ghats chiefly above 6,000').

Dymock in *Pharmacographia Indica* remarks that *P. telephioides* Willd. and *P. chinensis* Linn. "like senega owe their medicinal properties to the presence of a substance closely related to if not identical, with saponine". Based on these remarks Watt, in *Dictionary of Economic Products of India* states that "Indian species of polygala may prove efficient substitutes for *P. senega*, which is neither a native of this country nor cultivated here".

There is no chemical literature on any of the Indian polygala and it is, therefore, impossible to say as to which of these may be a substitute for *P. senega*. It is possible that *P. sibirica* of Indian origin may be found to contain the same active constituents as the Japanese species which in that country is used medicinally. Nothing, however, can be stated with any confidence in absence of any published work.

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¹ Kobert, *Arch. Path. Pharm.*, **23**, 233.

² Reuter, *Arch. Pharm.*, **27**, 309.

³ Schroeder, *Arch. Pharm.*, **243**, 628.

⁴ Maish, *Amer. J. Pharm.*, 1892, **177**, Rusby, *Bull. Pharm.*, 1892, 163.

⁵ Tunmann, *Pharm. Central.*, **49**, 61.

⁶ Grimme, *Munch. Med. Wochschr.*, **69**, 50.