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STUDIES ON DASAMULA – ITS CHEMISTRY, BOTANY & BIOLOGY PART – I PRISNIPARNI

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ABSTRACT: *In this detailed review article called studies on Dasamula, the first part, 'Prisniparni', covering its Chemistry, Botany and Biology is presented here.*

INTRODUCTION

In the Ayurvedic literature certain drugs have been clubbed together and given group names. Dasamula which literally means the ten roots, in one such group. Factually only nine of them are roots, the 10th one Gokshura, the anatomical part of which used is the fruit. Prisniparni* is an ingredient of Dasamula and is botanically identified as *Desmodium gangeticum* Dc. Family leguminosae. According to Bavaprakasa[1], the following descriptive synonyms are given.

Prisniparni prthkparni chitrparnyahi parnyapi
Krestuvinna simhapucchi kalasi dhavaniguha

The Dasamula itself is further grouped as hrasva panchamula or the five minor roots and vrihat panchamula or the five major roots.

The Dasamula kvatha is considered to be antipuretic, alterative and bitter tonic given in doses of 1 – 2 ounces twice a day. A decoction of the hrasva panchamula is used in catarrhal cough and other diseases supposed to be caused by deranged kapha. Vrihat panchamula is used in fever and other diseases supposed to be caused by deranged vata. The ten drugs together are used in the remittent fever and puerperal fever, inflammation of the chest and affections of the brain and in generally other diseases caused by tridoshas. It is an ingredient of drugs of hrasva panchamula[2].

* Some books on Indian Materia Medica equate *Uraria picta* as the source of prisniparni. Here *Desmodium gangeticum* Dc. called orillai in Tamil and Malayalam is equated as prisniparni.

Officinal anatomical parts use : Root
Habit and habitat

A common shrub: 2 – 4 ft high, found almost throughout India ascending to 5000 ft from Himalayas. It is very variable and is met with in its various forms in forests and waste land.

Family : - Loguminosae
Synonyms

Desmodium latifolium, Hedysarum gangeticum and H. Collinum[3]

Regional names[4]

Sanskrit	– Prisniparni
Hindi	- Salpana, Salpani
Bengali	- Salpani
Gujarati	- Salwan
Marati	- Radbhal
Malayalam	- Pullati, Orila
Tamil	- Pulladi, Orilai
Telugu	- Gitanaram, Kolakuporna
Urdu	- Shalwan
Canarese	- Murelehonne

Description

A common shrub, 2 – 4 ft, high found almost throughout India ascending to 5000 ft in the Himalayas. It is very variable and is met with, in its various forms in forests and waste lands5. It is slender, suberect, diffusely branched under shrub, 2 – 3 ft high; stem woody, branches, slender, irregularly angled and clothed with upwardly directed short soft grey hairs. Leaves unifoliate, alternate, stipulate; petioles 1 – 2 cm long; stipules scarious 6 – 8 mm long, linear – subulate, striate at the base; blade ovate or ovate lanceolate, acute the margins some what waves, glabrous and green above, paler and clothed with dense, soft, whitish appressed hairs beneath, reticulately veined, base rounded, truncate or subcordate; main nerves 8 -12 pairs.

The inflorescence is a terminal or axillary, many flowered, slender, chongate raceme, 15 – 30 cm long with a few ascending branches in the lower part. Rachis slender, pubescent and somewhat angular. Flowers small with minute setaceous bracts on short upwardly directed pedicols. Galyx tube short, companulate, finely downy, and cleft to the middle into two lips; upper lip two cleft, the lower three partite; teeth short and triangular. Corolla exserted 4mm long, violet or white: standard 3mm broad, orbicular, cuneate at base; wings obliquely oblong, more or less adhering to the keel; keelpotals obtuse, incurved. Stamens diadelphous – one and nine, - anthers uniform. Ovary sessile or stipitate, many ovuled; style filiform, incurved, with minute capitate stigma. Fruits compressed, slightly falcate, moniliform, six to eight jointed glabrescent Iomentum, slightly indented above, joints separating when ripe, indehiscent, one seeded, more or less straight or slightly curved above and rounded on the lower side. Seeds compressed, reniform without a strophiole.[6] (Fig.I) Dry seeds when mechanically injured and kept for germination could break the seed dormancy giving 22% germination.[7]

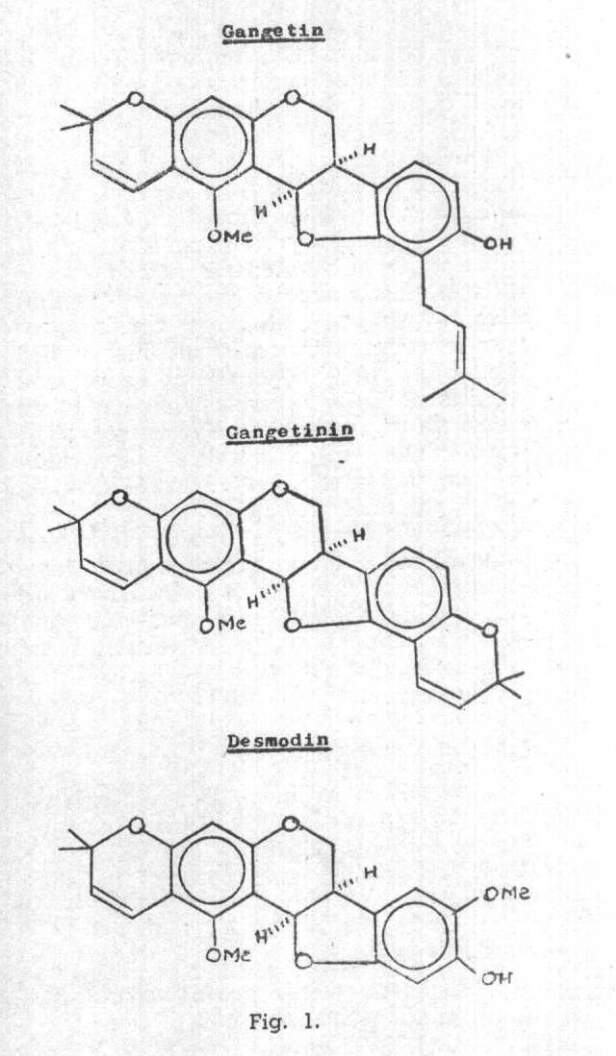


Fig. 1.

Macroscopic characters of root

The tap root is poorly developed and the lateral roots are very strong, nearly uniformly cylindrical, light yellow and smooth. They have a thick central strand of wood surrounded by a comparatively thin but tough bark and bear at their distal ends a large number of small very much branched fibrous rootlets with several bacterial nodules of various sizes attached to them.

The root bark is yellowish white in colour and has a leathery texture. It is easily peelable. The outer skin is very soft. The middle bark has a slight yellowish tint and the inner bark appears lighter coloured than the parts outside. The wood itself is whitish. The bark has no characterstic smell but possesses a slightly mucilaginous sweetish taste.[6]

Microscopic characters of root

The transverse section is circular in out line. The cork tissue consists of four to eight or more rows of rectangular cells with thick brown walls and measuring 24 – 30 - 43µ x 10 – 16 - 22µ. The pheliogen is evident as a narrow layer. The cortex is broad and composed of several rows of thin walled oblong cells with the broadened distal ends

of the modullary rays radiating across. The entire region in between the rays is littered with sclerenchymatous groups of various sizes and shapes, each group consisting of four to twenty or more small thick walled cells. The bast is a narrow zone and consists of phloem parenchyma and sieve tubes. A distinct cambium is present. The wood consists of phloem parenchyma and sieve tubes. A distinct cambium is present. The wood consists of thick walled xylem parenchyma measures 28 – 44 - 92 µ x 18 – 26 – 42 µ, radial rows of vessels of various sizes, patches of sclerenchyma mostly associated with the vessels, and the modullary rays. The modulary rays are not many. They are uni or biseriate but those that reach the centre are broad and three seriate, some cells contain starch grains. There is no pith in the centre (Fig. II – V).

Substitutes and Adulterants

Desmodium latifolium Dc. is often used as a substitute for *D. gangeticum* in parts of Travancore and Cochin. *Uraria picta* Desv. is used in some parts of India as prisniparni[6].

Standard and Tests

The shade dried, preserved root has been used for standardisation.

Analytical Values

Foreign organic matter	- Nil
Moisture content	- 8.5%
Ash value	- 3.0%
Water soluble ash	- 0.17%
Acid insoluble ash	- 0.36%
Crude fibre	- 66.00%
Tannins	- 1.55%

Extractive Values

Hexane	- 0.567%
Ether	- 0.46%
Chloroform	- 0.13%
Alcohol	- 0.19%
Water	- 2.59%

Qualitative Tests

Inorganic – Carbonate, chloride, sulphate, phosphate, silca, iron, aluminium, magnesium and potassium.

Organic – Sterols, pterocarpans[8].

Constituents

D. gangeticum on chemical examination yielded pterocarpans – gangetin, gangetinin and desmodin. [9-10]

Gangetin

Gangetin m. p. 98 – 100 $(\alpha)_D$ – 204.5 ($CHCL_3$) M.F.C_2 H_{28} O_5. IR: (CCl_4) 3618 and 3470 cm^{-1}. UVλ $^{Alc}_{max}$ 277 sh, 286, 303 sh and 314 nm. NMRS 1.46, 1.5 (each 3H, s, CMe_2), 1.79 br, 1.83 br (each 3H, CH : CMe_2), 3.37 br (2H, d, CH_2 – CH : CMe_2), 4.01 (3H, s, OMe), 5.33 (1H, m, CH : CMe2) 5.58, 6.58 (ABq, J = 10 Hz, chromen protons), 6.25 (1H, s, AH), 6.37, 6.37, 6.96 (2H, ABq, J = 8Hz, ArH).

Gangetinin

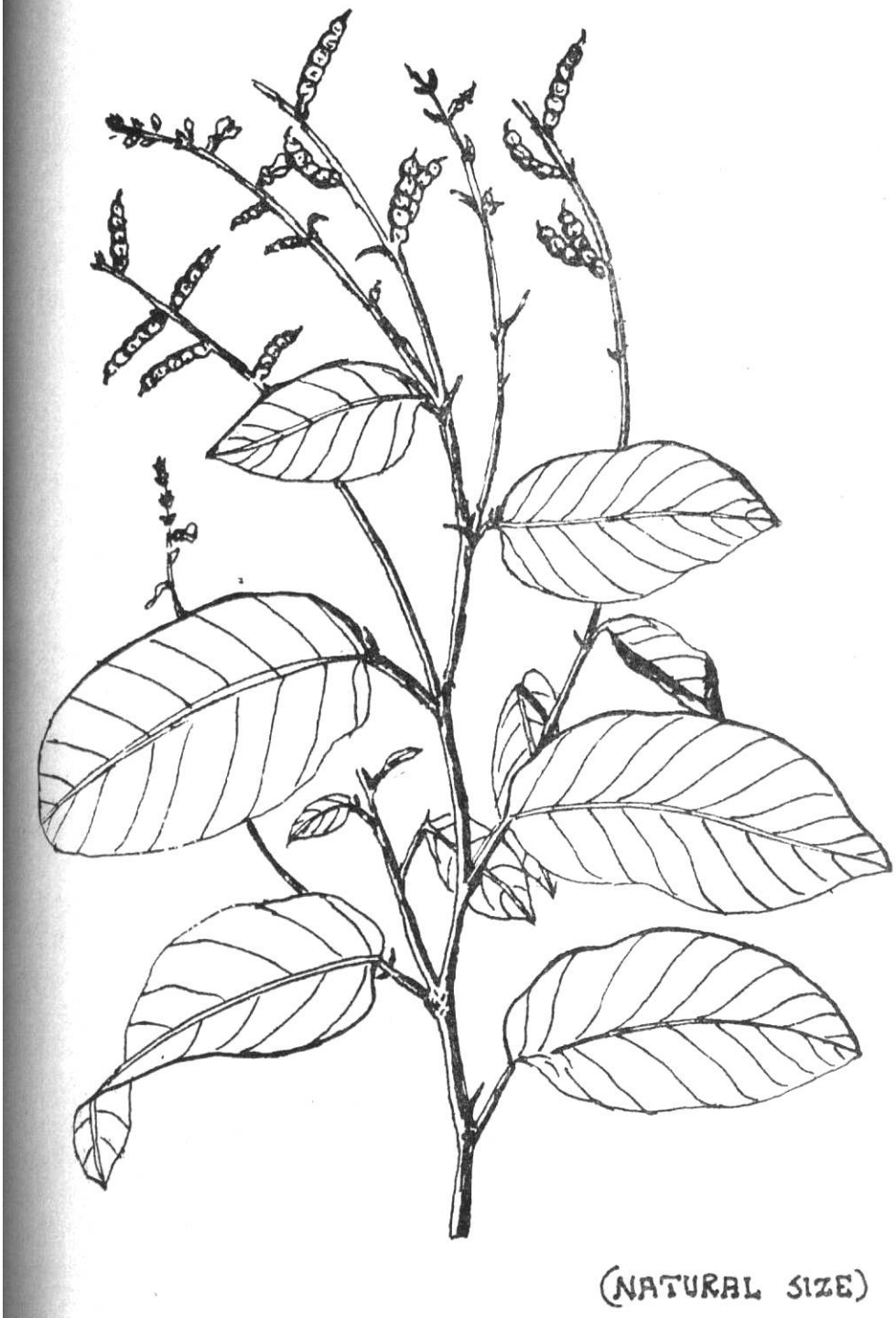
Gangetinin m. p. 136 – 8°, M. F. $C_{26}H_{26}O_5$ $(\alpha)_D$ – 200^0 (CHCl3), m/z 418λ $^{Alc}_{max}$234, 278 and 318 nm. N. M. R. δ 3.40 (1H, m, H: 6a), 4.21 (1H, q, J = 6, 10 Hz, H – 11a).

Desmodin

Desmodin m. p. 236 – $8^o(\alpha)_D$ – 200^0 ($CHCl_3$), M. F. $C_{22}H_{22}O_6$, /z 418λ $^{Alc}_{max}$228, 287 and 303 nm. N. M. R. δ 3.3 (1H, m, H: 6a), 3.66 (1H, t, J = 10 Hz, H – 6ax), 4.21 (1H, q, J=6, 10Hz, H-6 sq) and 5.60 (1H, d, J = 6 Hz, H – 11a).

A part from the above three pterocarpans seven alkaloids viz. NN – dimethyl tryptamine and its Nb oxide, hypaporsine, hordenine, candicine, N – methyl tyramine and β-phenylethylamine have been reported from the roots.[11]

DESMODIUM GANGETICUM DC. A TWIG Fig. 2.



DESMODIUM GANGETICUM DC. T. S. OF ROOT (DIAGRAMMATIC)

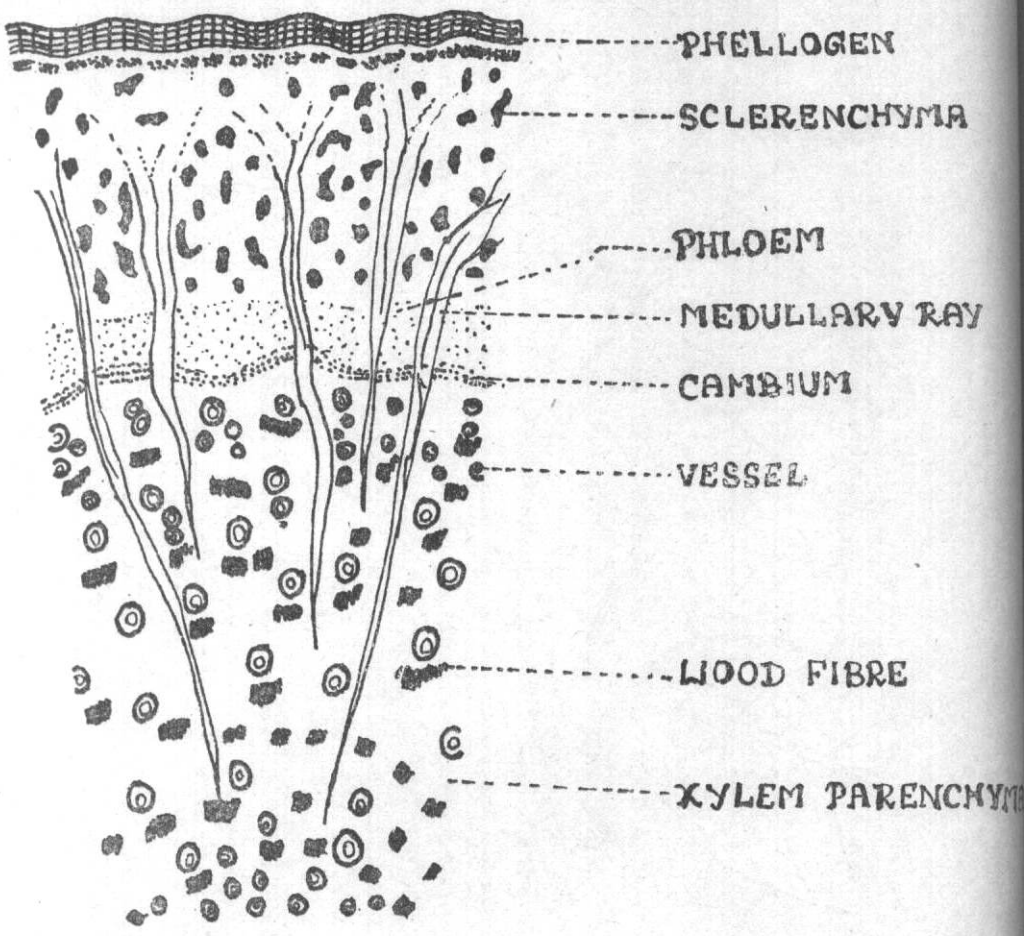


Fig. 3.

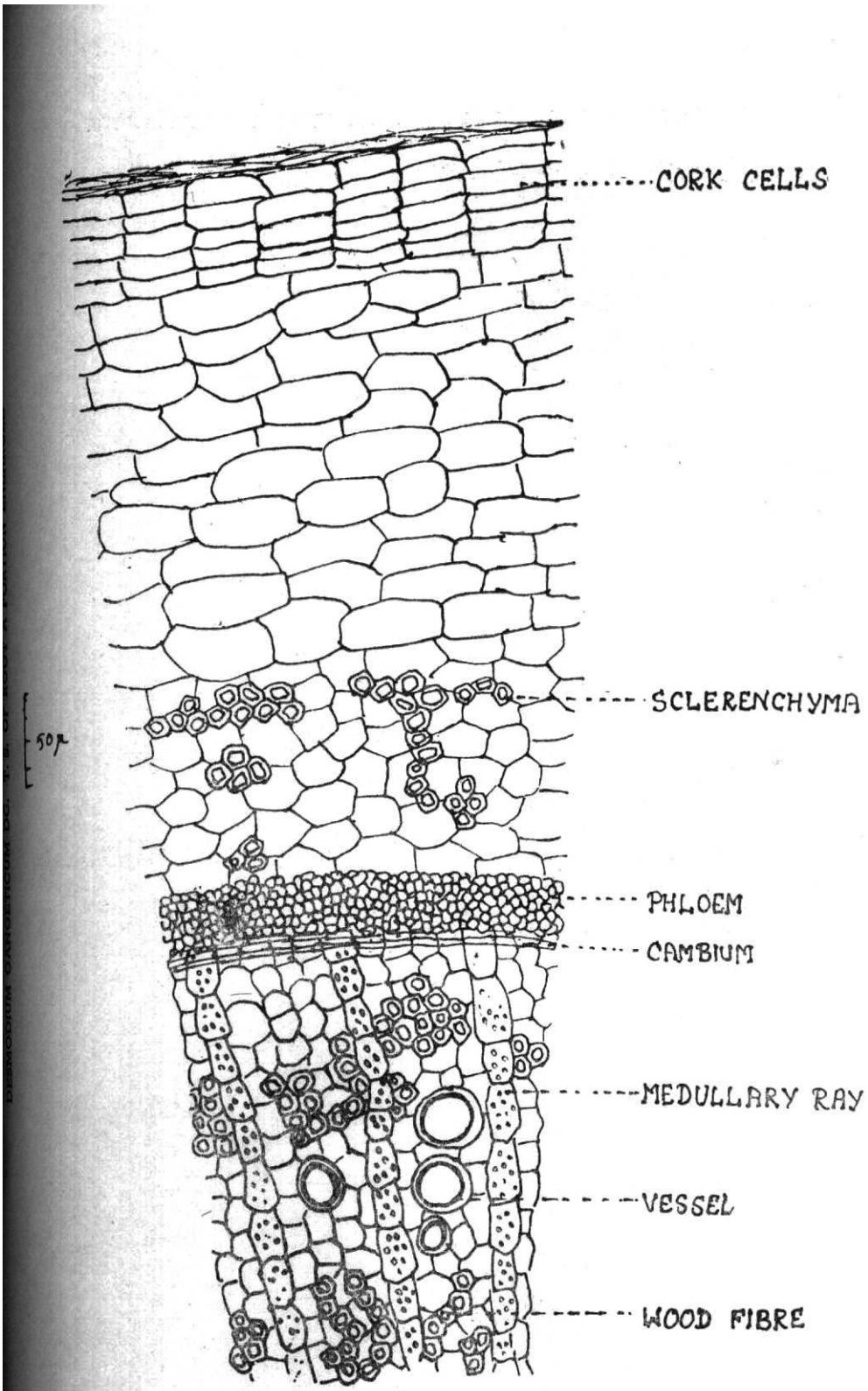
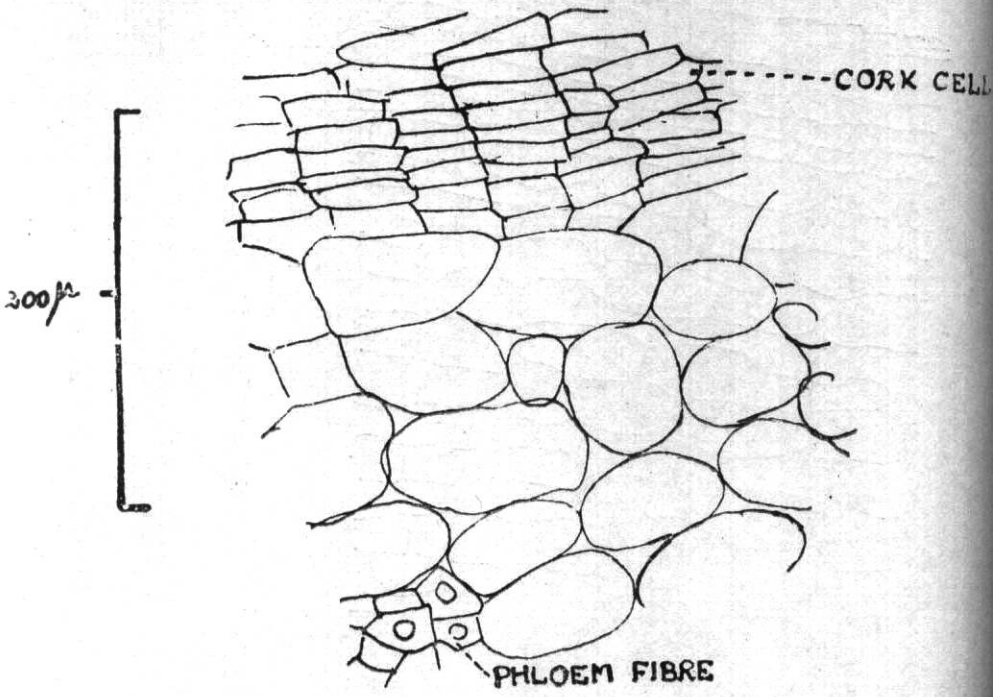
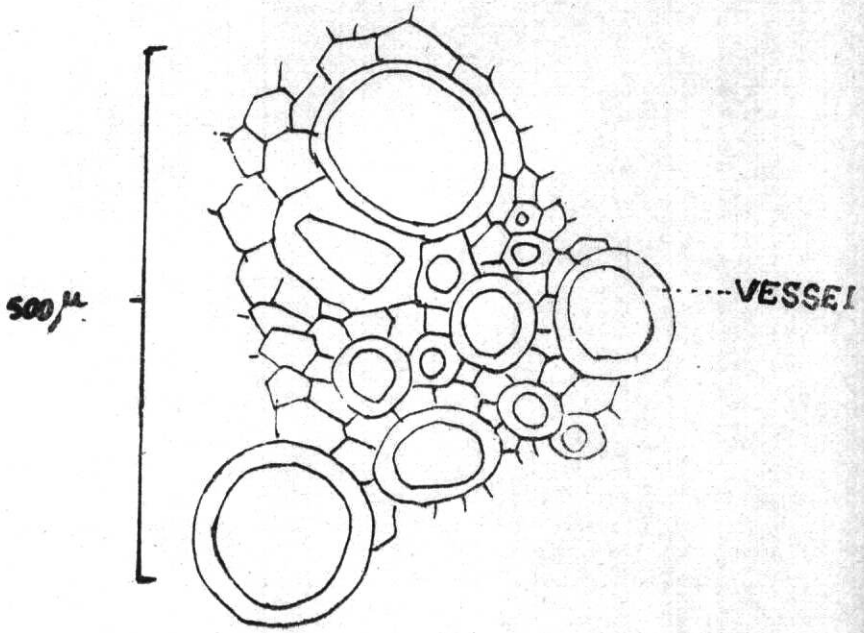

CORK CELLS
SCLERENCHYMA
50μ
PHLOEM
CAMBIUM
MEDULLARY RAY
VESSEL
WOOD FIBRE

Fig. 4.

Fig. 5. DESMODIUM GANGETICUM DC. T. S. OF ROOT OUTER CORTEX



ARRANGEMENT OF VESSELS



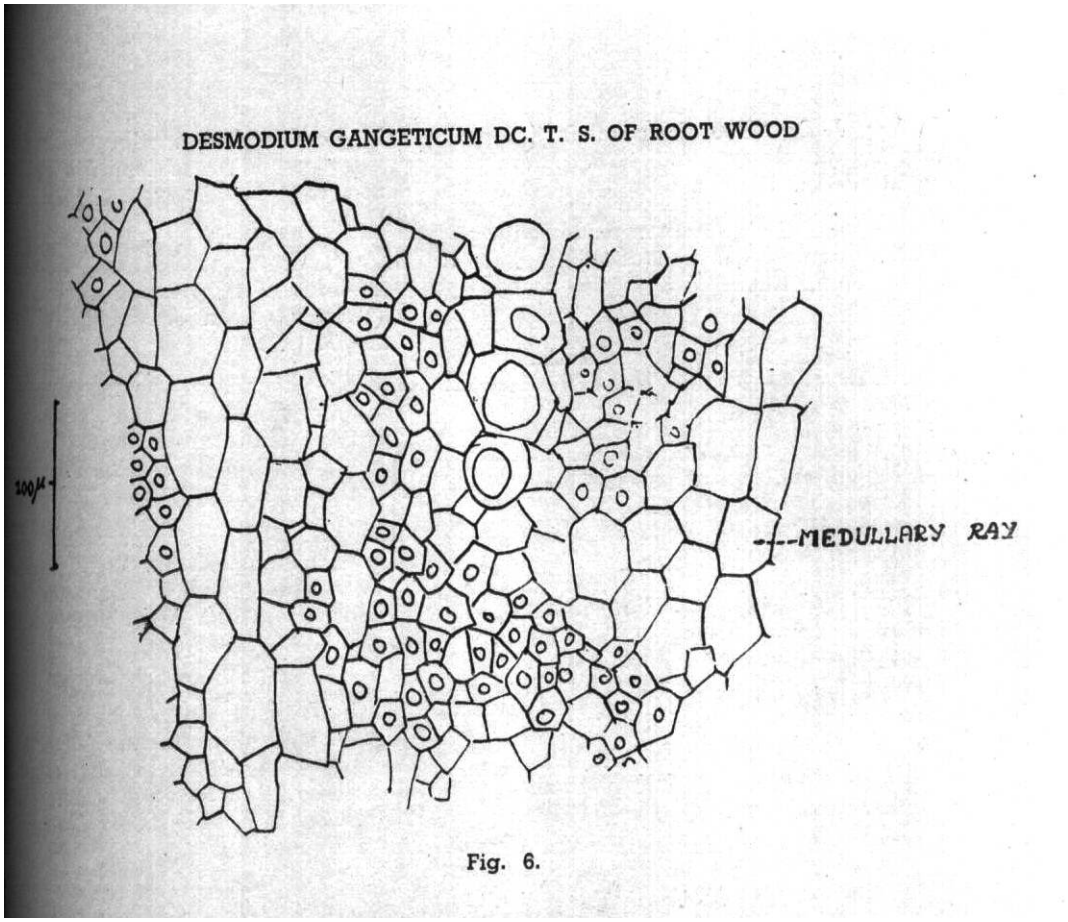


Fig. 6.

Biological activity

Gangetin showed significant anti – inflammatory activity in the exudative and proliferative phases of inflammation in the doses of 50 and 100 mg/kg orally. The compound showed significant analgesic activity, but no antifertility and antifertility and antipyretic activity in albino rats. It did not show any acute toxicity in mice up to 7g / kg orally.[12] Gangetin showed moderate anti-implantation activity in female albino rats at levels of 40, 60.6, 50 and 62.5% at dose levels 20, 40, 80 and 160 mg/kg. It did not show any antieostrogenic activity[13]. Biochemical studies in uterus of female albino rats after the administration of Gangetin showed that it did not change pH, Sodium or potassium but decreased glycogen, acid phosphatase and alkaline phosphatase[14]. Seed extract of *D. gangeticum* was tested for agglutination of 11 different types of *Pseudomonas aeruginosa.* The result indicates the possibility of differentiating *D. aeruginosa* by plant seed extract.[15] Gangetin showed 87.5% antimplantation activity at 100 mg/kg body weight and 50% at 50 mg/kg body weight in female rats. In male rats the sterility studies of seminal vesicle and testes showed no change in pH, alkaline and acid phosphatase, reducing sugar, protein, sodium, potassium and calcium.[16]

Important Formulations

1. Dasamularishtam
2. Chyavanaprasam
3. Agusthya Rasayanam
4. Sukumara gritham
5. Dasamula Katuthiayadi kashayam
6. Dasamula thailam
7. Danvantra thailam
8. Mahamasah thailam
9. Anu thailam
10. Vidaryadi gritham

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