



AN OVERVIEW OF *STREBLUS ASPER* LOUR

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ABSTRACT

Streblus asper (family-Moraceae) is a little tree which is native to tropical nations, for example, India, Srilanka, Philippines and Thailand. In India it is appropriated in the Himalayas from Himachal Pradesh to West Bengal and in slopes and fields of Assam and Tripura. It is likewise found in the drier pieces of India. Different pieces of this plant are utilized in Ayurveda and other society medication for the treatment of various diseases, for example, Filariasis, Disease, Tooth hurt, Diarrhea, Dysentery, and Cancer. Root is utilized as application to the undesirable ulcers and sinuses, and as counteractant to snakebite, in epilepsy and weight. Stem is utilized in toothache, Stem bark is yielded fever, looseness of the bowels, the runs, stomach throb, urinary grievances, heaps, edema and wounds. This survey considered about the natural science, science, conventional utilizations, pharmacological movement and different works that are conveyed dependent on this medication and fundamental point of these audit is to accumulate refreshed data on the medication *Streblus asper* our for its more up to date improvement of substance constituents by utilizing different solvents of synthetic constituents and investigation by utilizing different created strategies.

KEYWORDS:-*Streblus asper*, Spectral analysis, antitumor, antibacterial, antioxidant, antidiabetic

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1 INTRODUCTION

*Streblus asper*Lour which belongs to Moraceae family is a small tree which is native to tropical countries like Philippines, Malaysia, srilanka and India². It is a rigid shrub or gnarled tree; branchletstomentose or pubescent. Leaves are 2–4 inch, rigid, elliptic, rhomboid, ovate or obovate, irregularly toothed; petiole 1/12 inch. Male heads globose, solitary or 2-nate, sometimes androgynous; peduncle short scabrid, flowers minute². Female flowers longer peduncled. Fruit pisiform; perianth yellow and it is a plant called by different vernacular names like Rudi, Sheora, Koi, Siameseroughbush and Tooth brush tree etc³.



A) Leaves of *Streblus asper* B) Flowers and Twigs of *Streblus asper*

Medicinal plants have been widely used in traditional system to treat several diseased conditions in the world. Hence therefore it became necessary to carry out the estimation of safety and effectiveness of chemical constituents that have been extracted. In ancient days it was used as tooth brush due strengthening effect of gums and teeth and also the various parts of the plant like extract of roots reported against cardiac activity, extract of leaves reported against epilepsy, leprosy, extract of stem reported as antimicrobial ,antibacterial⁴.The various chemical constituents reported were glycosides like cardiac glycosides, steroidal glycosides, terpenoids etc. This review is concerned about the isolation and extraction of phytoconstituents, pharmacological activity of the selected plant *etc.* Hence pharmacogony of the plant on different parts has been carried out. All the properties are filed and updated information as well gathered to complete review study on *S.asper* up to date^{5,6}.

Therefore this review is concerned about compiling of work from the beginning till to date and provided a new way outlet to carry out further research on the above mentioned drug.

2 PHYTOCHEMICALS AND DESCRIPTION

Streblus asper is rich in various chemical constituents according to the Indian folk medicine system and also has been reported in articles. The reported chemicals have also been proved for various pharmacological activity and also proven by many research works and few of the collected example are listed below. Phytochemical investigation of a methanol extract of the roots led to the isolation of two new compounds characterized as lup-20(29)-en-3 β -olyl octadec-9'-enoate and stigmast-5-en-3 β -olyl-26-oic acid-3 β -hexadecanoate, together with the four known constituents identified as lupeol linoleate , stigmasterol palmitate, cerotic acid and octacosanoic acid⁷. The reactions. Vidhu Aeri, Perwez Alam works disclosed about the other details of chemical constituents.

In recent articles Yulin Ren *et.,al* reported a new non-cytotoxic [(+)-17 β -hydroxystrebluside and two known cytotoxic [(+)-3'-de-O-methlkamaloside and (+)-strebluside cardiac glycosides were isolated and identified from the combined flowers, leaves, and twigs of *Streblus asper* this constituents they proved⁸

From the stem part of this plant, α -amyirin acetate, β -sitosterol, α -amyirin, lupeoland diol and Asperoside, Strebluside and Mansonin have been isolated, which are mentioned has structure 1, 2, 3.

STRUCTURE 1: ASPEROSIDE

STRUCTURE 2: STREBLOSIDE

STRUCTURE3: MANSONIN

Few otherpregnane class glycosides that are isolated from *Streblus asper*. The volatile oil from fresh leaves of *S. asper* was obtained in 0.005% yield as a brown liquid. The major constituents of the volatile oil reported are phytol (45.1%), α -farnesene (6.4%), trans-farnesyl acetate (5.8%), caryophyllene (4.9%) and trans-trans- α -farnesene (2.0%)⁹.

Phytochemical examination of the methanolic concentrate of the foundations of *Streblus asper* Lour. (Moraceae) prompted the confinement of three new esters described as hexacosyl-11'-enyl pentan-1, 5-olide (hexacosenyl lactone), β -D-glucopyranosyl hexacosyl-oate (cerotic corrosive glucoside) and nonadecanyl-2-O- β -D-glucopyranosyloxy benzoate (nonadecanyl salicylate glucoside) alongside n-octacosonic corrosive, nonadecanyl - 1-n-cosanoate and ursolic acid¹⁰. This are the various phytoconstituents and the parts from are they obtained mentioned in this review.

3 TRADITIONAL USES:

Streblus asper reported in many articles regarding uses of this plant, which can be seen in Ayurveda, pharmacopeia and even in many articles that is published and also it has various uses in the Indian traditional medicinal and parts which possess different activity is mentioned in the below table no:1

Table no:-1 ACTIVITY OF *STREBLUS ASPER*

S.No	Part of plant	Traditional uses
01	ROOT	Against unhealthy ulcer, sinuses, epilepsy, obesity ^{2,3}
02	STEM	Toothache ⁴
03	STEMBARK	Used against fever Dysentery, Diarrhea, Filariasis, lymphedema, against wounds ^{4,5}
04	LEAVES	Against eye complaints, cardiac glycosides ^{6,7}
05	LATEX	Antiseptic, Astringent, sore feet, Pneumonia ^{3,4}
06	FRUITS AND SEEDS	Epistaxis, Epilepsy, diarrhea ⁶

Other than mentioned uses in table no 1 *S. asper* also used against various types of cancer, cholera, colic, diarrhea, dysentery, inflammatory, swellings and parts or mixture of various parts can be used to treat the above mentioned disease but particular part as not been disclosed. These are various discovered diseases that are reported in various review or research articles.

4 PHYTOCHEMICAL ANALYSIS AND SPECTRAL ANALYSIS.

Different examination works has done to decide the presence of synthetic constituents and otherworldly investigations likewise assisted to discover a lead route for the distinguishing proof of more current constituents by different techniques or either by fractionating in segment with different solvents dependent on their extremity nature towards the solvents used. Based on numerous writing review it's been demonstrated that the presence of general compound constituents in the *Streblus asper* and the rundown has been referenced beneath about the accessibility of the substance constituents in the species *Streblus*¹¹. The different secondary metabolites that are present in this drug are mentioned in the below table no 2.

Table no:-2 phytochemical constituents of *S.asper*

S.NO	CHEMICAL CONSTITUENTS	Result
1	Alkaloids	+
2	Glycosides	+
3	Reducing sugars	+
4	Phenolic compounds	-
5	Flavonoids	+
6	Saponins	+
7	a-Amino acid	-
8	Carbohydrates	+
9	Tannins	-
10	Steroids	+
11	Cyanogenic glycosides	-

+ = present - = absent

The above mentioned result has provided source for the further various chemical moiety isolation using different solvent system for identifying which moiety is responsible for which activity. Few recently isolated structures of chemicals has been mentioned in this paper. It also contain further information about the spectral analysis and also helps in identifying about the chemical constituents using.

Chromatography methods like: -Thin layer chromatography, High performance thin layer chromatography. Spectrometric methods like: - Infrared spectroscopy, Mass spectroscopy *etc.*

The spectral studies has carried out for the various chemical constituents that are isolated from the *Streblus asper*. Few of the spectra's are mentioned in the below figures.

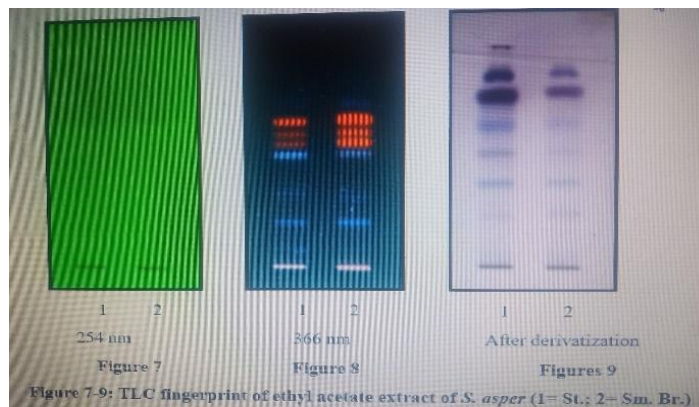


Figure: 1 describes about TLC fingerprint reference for the ethhylacetate extract of *Streblus asper*.

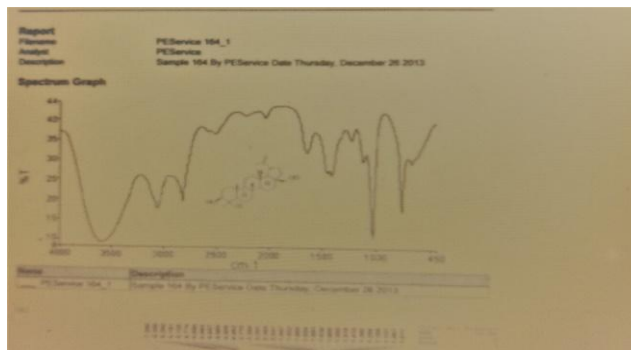


Figure: 2 describes about IR spectrum for the steroidal derivatives which are obtained from the extract of *Streblus asper*.

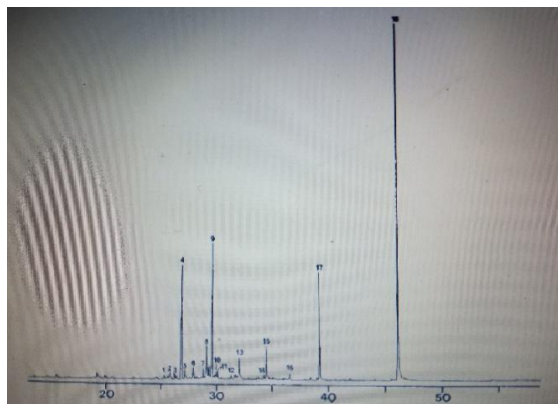


Figure: 3 describes about Gas chromatography for the extract of *Streblus asper*.

These were few spectral analysis which act as references for further studies on fractions that might obtained from the column after allowing several time for separation. It also helps for the further studies to identify the presence of chemical constituents in detailed manner. It also helps for the identification of spectra, molecular weight of compound, presence of various functional groups in the isolated compounds. This is about the detailed information on the phytochemical and spectral analysis of the chemical constituents that are present in the *Streblus asper* Lour¹².

5 PHARMACOLOGICAL ACTIVITY.

ANTITUMOR ACTIVITY.

The study of Suresh Kumar RB, Biswakanth KA showed that EASA (ethanoic extract of *Streblus asper*) treatment was found to significantly reduce tumor proliferation. From this study, it can be concluded that the ethyl acetate fraction of defatted methanol extract from *S. asper* bark demonstrated remarkable antitumor efficacy against Dalton's ascitic lymphoma in *Swiss albinomice*, mediated plausibly by virtue of ameliorating oxidative stress by augmenting the endogenous antioxidant status¹³.

Cardiac glycoside, (+)-strebloside, has been characterized as the main cytotoxic component of *S. asper*, which binds to Na⁺/K⁺-ATPase and inhibits the activity of this enzyme. However, (+)-17 β -hydroxystrebloside, C-17 hydroxylated (+)-strebloside which was isolated from *S. asper* doesn't provide an efficient action against Human cancer cell line by using Na⁺/K⁺-ATPase enzyme, and this work was proved by Ren Y, et.al., and their team. They also proved by docking studies that is structure 4:(+)-strebloside has an efficient action as antitumor moiety on comparing with reference **ouabain**, i.e structure 5, for the docking studies⁸.

STRUCTURE 4:(+)-strebloside

STRUCTURE 5: Ouabain

- The work done by Dan Miao and his team on cytotoxic and melanogenesis-inhibitory activities was provided a proof that *Streblus asper* root as action against cancer¹⁴ which further their team done work on isolation of chemical derivatives with various substitutions, which are mentioned as structure 6 and structure 7. Later it was proved by using COSY, NOSY for identification as well for determination about the structure that has been isolated.

STRUCTURE 6: β -sitosterol-3-O- β -D-glucopyranoside**STRUCTURE 7: β -sitosterol**

The major constituents of the volatile oil of *S. asper* were phytol (45.1%), α -farnesene (6.4%), trans-farnesyl acetate (5.8%), caryophyllene (4.9%) and trans- α -farnesene (2.0%). In addition, the volatile oil showed significant anticancer activity at effective dose *i.e.* (ED₅₀ < 30 μ g/ml) from cytotoxicity primary screening tests with P388 (mouse lymphocytic leukemia) cells. This work was done by Phudhawong W and their team and also they described about dose required to exhibit anticancer activity¹⁵.

6 ANTIBACTERIAL ACTIVITY.

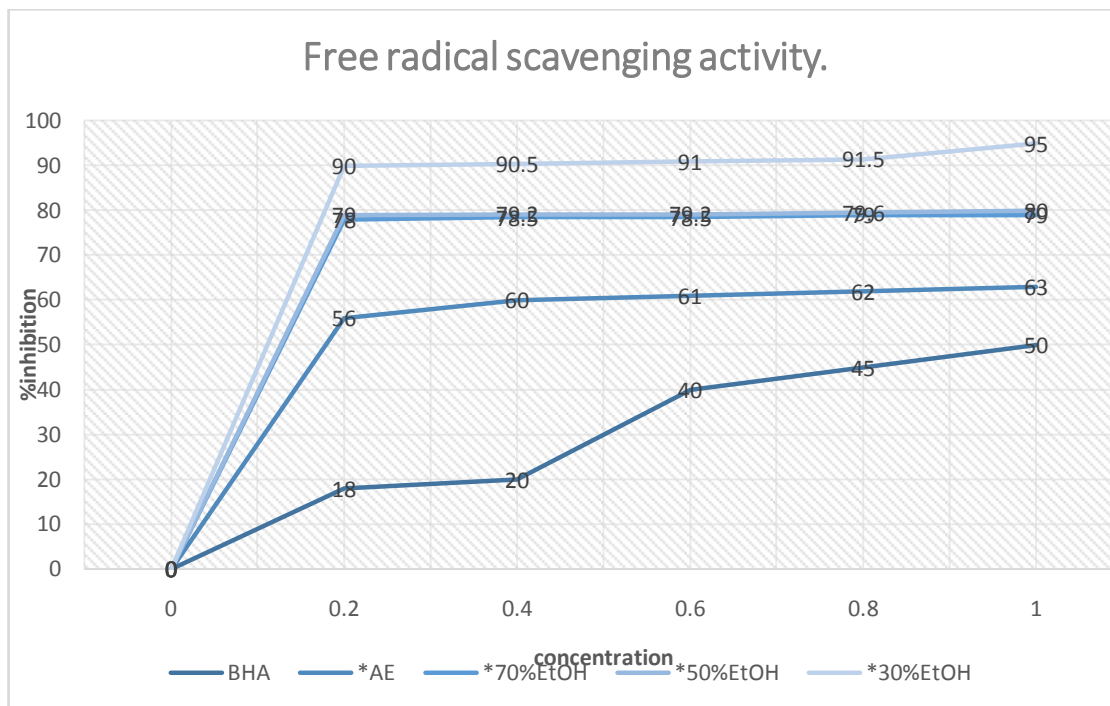
Different studies found that *Streblus Asper* leaf, alcohol and aqueous extract both had antimicrobial properties, which act by reducing plaque formation and Colony forming unit counts of *Streptococcusmutants* and *Aactinomycetemcomitans* against chlorohexidine mouthrinse which is a gold standard mouth rinse. So, Gunjan Kumar and their team tried to prove that adding an herbal extract of *Streblusasper* to the chlorohexidine mouthrinse which is a gold standard mouth can enhance the antimicrobial effect by showing synergistic effect¹⁶.

Bactericidal activity was found in the 50% ethanol (v/v) extract of *Streblusasper* leaves possessed a selective bactericidal activity towards *Streptococcus*, especially to *Streptococcus mutants* which has been shown to be strongly associated with dental caries. The extract had no effect on cultures of *Escherichia coli*, *Staphylococcus aureus* and *Pseudomonas aeruginosa*, *Staphylococcus coagulase positive*, *Staphylococcus coagulase negative*, *Serratiamarcescens*, *Klebsiellapneumoniae*, *Enterobacter*, *Pseudomonas aeruginosa*, *Burkholderiapseudomallei* and *Candida albicans*. The minimum growth inhibitory

concentration and the minimum bactericidal concentration of *S. asper* extract was found 2 mg/mL from the studies disclosed by Wongkham s and their team¹⁷. Therefore few studies disclosed that *Streblus asper* can also be used as effective drug in some condition it doesn't possess any activity.

7 ANTIOXIDANT PROPERTY.

The studies supported that various extract from the different parts of *Streblus asper* has been proven for the effective antioxidant property. The study of Nor Mawarti Ibrahim revealed about the antioxidant property from the leaves of *Streblus asper* by using DPPH free radical scavenging activity (%) by using aqueous and ethanolic extracts of *Streblus asper*



1, 1-Diphenyl-1-picrylhydrazyl (DPPH) free radical scavenging activity (%) of the aqueous and ethanol extract of *Streblus asper* was carried out to determine antioxidant activity. BHA = Butylated hydroxyanisole, AE = aqueous extract, 70% EtOH = 70% ethanol extract, 50% EtOH = 50% ethanol extract, 30% EtOH = 30% ethanol extract.

Due to the presence of phenolic compounds and flavonoids in the extracts, which were detected by Folin and colorimetric assays, respectively, may be responsible for the antioxidant activities of *S. asper*¹⁸.

The methanolic extract from leaves of *Streblus asper* Lour was extracted and processed for in vitro antioxidant activity by using DPPH and H₂O₂ (hydrogen peroxide), for their free radical scavenging property. The data were expressed as inhibitory concentration *i.e* IC₅₀ and compared with ascorbic acid and tocoferol that served as reference standard. The leaf extract showed an IC₅₀ of 1.01 mg/ml and 700 µg/ml as compared to the standards, ascorbic acid and tocoferol that showed an IC₅₀ of 4nm and 215 µg/ml respectively .hence, Gadidasu K and their team worked to prove that *Streblus asper* also possess antioxidant activity¹⁹.

8 ANTI DIABETIC ACTIVITY.

The resulted reduction in serum glucose levels in *Streptozotocin* induced hyperglycemic rats treated with leaf extract (200 and 400 mg/kg body weight), and the standard drug Glibenclamide (¹⁰mg/kg body weight) was taken. Gadidasu k and their team worked on the *Streblus asper* leaf and using petroleum extract the obtained α - amyryn acetate that is structure 9 from *Streblus asper*, produced as significant anti-hyperglycemic effect comparable to the standard drug Glibenclamide, *e* structure 8. This resulted in identification or served as proof for the determination of antidiabetic activity.

STRUCTURE: 8 Glibenclamide

STRUCUTRE: 9 α -amyrin acetate

Anti-diabetic activity was evaluated by the significant reduction in serum glucose levels in streptozotocin induced hyperglycemic rats treated with *Streblus asper* leaf extract (200 and 400 mg/kg body weight), and the standard drug glibenclamide (10mg/kg body weight). The leaf extract produced significant anti-hyperglycemic effect comparable to the standard drug glibenclamide. The study ofkaran S Kproved that petroleum ether extract of *Streblus asper* has produced significant antidiabetic activity by reducing serum glucose level²⁰.

9 ANTIALLERGIC ACTIVITY.

Streblus asper showed promising enemy of hypersensitive action in exploratory models. Hostile to PCA (Passive cutaneous anaphylaxis) and pole cell settling action of *S. asper* were researched in mice and rodents. Structure 6:-Disodium cromoglycate (DSCG) was utilized as standard antiallergic drug. *Streblus asper* (50–100 mg kg p.o.) [Where p.o; - parenterally or orally] in mice appeared 60–74% enemy of PCA action. In rodents it showed portion subordinate (50–200 mg kg⁻¹, p.o.) against PCA action (56–85%). The pole cell balancing out action in rodents (10 mg kg⁻¹, p.o. \times 4 days) showed 62% security against comp. 48/80 initiated degranulation. In egg whites initiated degranulation in sharpened rodents there was 67% security with *S.asper*. Therefore work of Amarnath Gupta and their team tried to prove that *Streblus asper* showed prominent role against hyper sensitive reactions²¹.

Structure 10:-Disodium cromoglycate

10 ANTIFILARIAL ACTIVITY.

The work done by Chatterjee, R.K and their team tried to prove that the crude extract of the stembark of *Streblus asper*, a traditionally used medicinal plant of India, revealed significant macrofilaricidal activity against *Tifomosoidescarini* and *Brugiamalayi* in rodents. The study revealed two cardiac glycosides, structure 1:- Asperoside and Structure 2:- Strebloside of the extract to be responsible for antifilarial activity. Of the two glycosides, the more effective macrofilaricide was KO29 which was active at 50 mg/kg orally against *L. carinii* (>90%), *B. malayi* (>70%), and *Acanthocheilonemavifeae* (>70%) in their respective hosts. The glycosides were also active in vitro against all the three filarial species that were selected for their studies and report was compared by using reference Structure 11: DEC (Diethylcarbamazine)²².

Structure 11: DEC (Diethylcarbamazine)

The aqueous and alcoholic extract of *Streblus asper* was studied on the spontaneous movements of the whole worm and nerve-muscle preparation of *Setariacervi* and on the survival of microfilariae in vitro. Aqueous as well as alcoholic extract caused inhibition of spontaneous motility of the whole worm and the nerve-muscle preparation of *S. cervi* characterized by decreased tone, amplitude and rate of contractions. The work done by Nazeen and their team stated that *Streblus asper*'s antifilarial activity⁷.

11 CARDIAC GLYCOSIDES.

A new non-cytotoxic (+)-17 β -hydroxystrebloside (structure 12) and two known cytotoxic (+)-3'-de-O-methylkamalOside (structure 13) and (+)-strebloside (structure 14M) cardiac glycosides were isolated and identified from the combined flowers, leaves, and twigs of *Streblus asper*



Structure 12 : (+)-17 β -hydroxystrebloside

Structure 13 : (+)-3'-de-O-methylkamalOside

The above mentioned isolated constituents are subjected to NMR studies as well Na⁺/K⁺-ATPase enzyme for cardiac activity was determined using docking studies⁸.

The studies done by Ranajit t and their team proved that *Streblus asper* also possess hepatoprotective activity. During these studies plant showed the presence of flavonoid & phenolic content which ultimately showed the synergistic effect of drug on combination with *Asparagus gonocladus*²³. Rastogi S²⁴ and their team has done work on review about *Streblus asper* can be used for various pharmacological activities like different types of cancer²⁵, anti diarrheal activity²⁶, antimicrobial, toothache treatment, anti HBV agent²⁷, anti inflammatory²⁸. The work done by Dan miao and their team reported that, three new cardiac glycosides obtained from the roots of *Streblus asper* Lour and their cytotoxic and melanogenesis-inhibitory activities for the extracted constituents of *Streblus asper*²⁹. Preethirawat described about Chemical Composition and Cytotoxic Activity of Methanol Extract and its Fractions of *Streblus asper* leaves on Human Cancer Cell Lines this proved about *Streblus asper* as wide range use in field of cancer³⁰.

12 CONCLUSION:

This review is concerned about the collection of information about the updated work that has been carried out using a raw material of *Streblus asper* and also includes about the various information like spectral analysis, phytochemical analysis etc. Although, it is evident that *S. asper* contains several important phytochemical constituents that are responsible for various pharmacological action as it possess drawback that many of the compounds have not been properly evaluated for their biological activities. Hence, isolation of phytochemical constituents from selected species is important as they can act as lead molecules or pharmacophores for synthesizing novel agent in dry lab synthesis or can be used for the various Ayurveda formulations which can possess a good pharmacological activity and get desired action for the diseases condition. The studies further leads to identifying about the drug use as novelty and also docking studies might help to minimize use of animals which can be involved in studies

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