

## FLORA OF SIDHI DISTRICT, MADHYA PRADESH—I

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## A B S T R A C T

Flora of Sidhi district, Madhya Pradesh based on the collections made during the 5 exploration tours conducted between 1962 and 1971 is presented. A short account of the vegetation and its floristic composition along with other essential features of topography, climate, geology and soil are given in this paper. Systematic enumeration of about 680 species belonging to 417 genera under 103 families with keys to the taxa, reference citation, description and critical notes will be published in part II, which is under preparation. 8 species have been recorded for the first time from Madhya Pradesh.

## INTRODUCTION

Sidhi district in Madhya Pradesh, at one time a part of the erstwhile Rewa State, has remained under-developed and inaccessible due to its unfavourable terrain and scanty communication lines. The district practically remained unexplored by earlier botanists. This is evident from the fact that Hooker *et al.* (1872-97) occasionally cited "Kaimore Hills", while Stewart & Brandis (1874) only once cited a locality from this district. Five exploration tours were conducted from the Central Circle to this district, two by G. Panigrahi in October, 1962 and in January, 1964, and the rest by G. Sen Gupta in July-August, 1968, in January, 1971 and lastly in February-March, 1971. These explorations have yielded about 680 species in all. A series of enumeration lists on plants of Madhya Pradesh, published by Panigrahi *et al.* between 1965 and 1967, include 209 species from Sidhi district. There is no other published botanical account on the district.

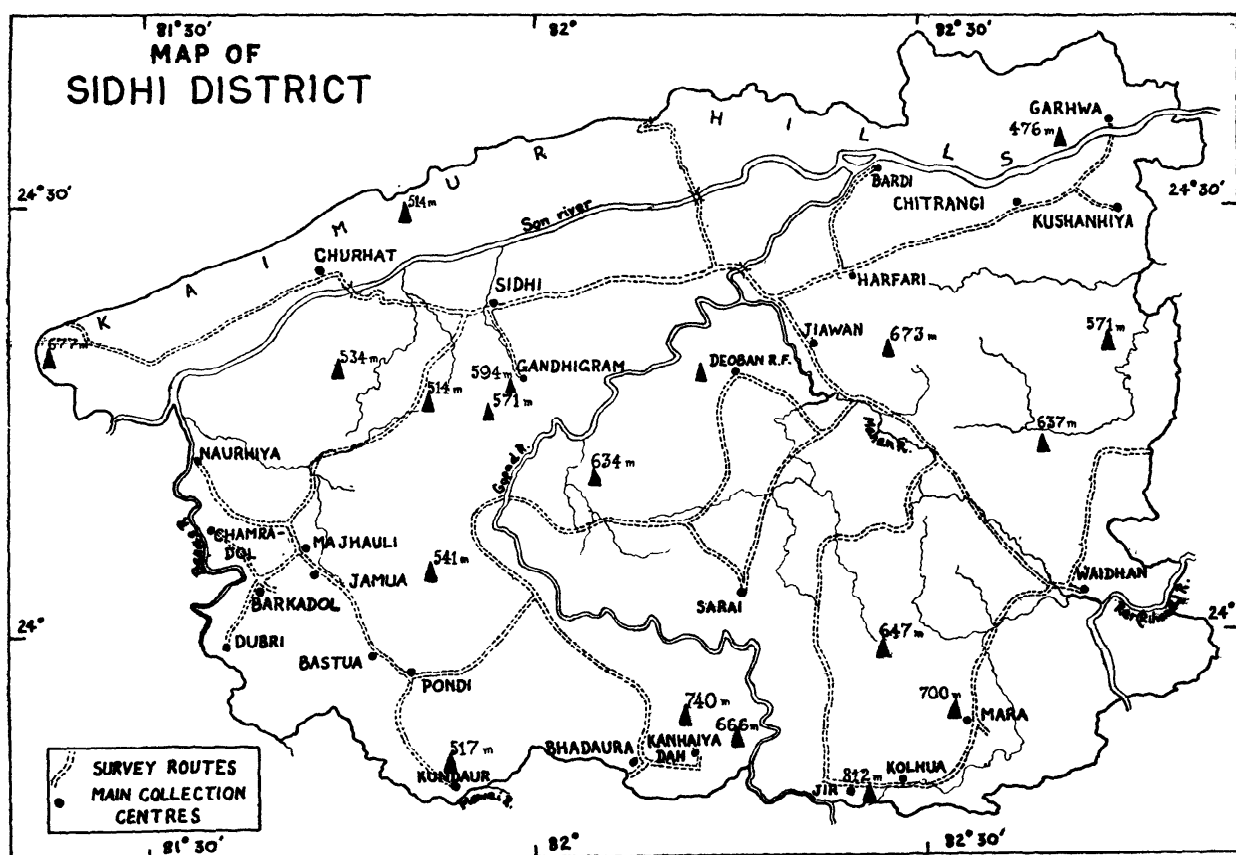
## AREA AND GEOGRAPHICAL POSITION

Sidhi district is situated between  $81^{\circ}19'$  and  $82^{\circ}51'$  E. long. and  $23^{\circ}45'$  and  $24^{\circ}43'$  N. lat. in north-eastern Madhya Pradesh. It is bounded on the north by Rewa and Mirzapur districts, on the east by Mirzapur dis-

trict again, on the south by Ambikapur (Surguja) district and on the west by Shahdol, Satna and Rewa districts. It has three tahsils, namely, Gopad-Banas, Deosar and Singrauli tahsils. The district has a total area of 10546 sq. km.

## PHYSICAL ASPECT

The general aspect is a medley of hill and valley, with comparatively very little level ground. The northern boundary is formed by the scarp of Kaimur hills and consists of a more or less continuous range of flat-topped hills running east-west, varying in elevation from 488 m to 678 m. The Son river, just south of Kaimur hills, flows from west to east, and is more or less parallel to the Kaimur range. The land south of Son valley again rises from 457 m level, through a series of undulating plains, numerous flat-topped hills (*pats*) and hill ranges, cut by innumerable streams and nalas, to over 800 m in height on the southern boundary. The few extensive plains are the Son valley, the Jiawan plains, the plains around Madwas and the broad valley of Waidhan. The *pats* of the Runda-Bhadaura block (740 m) and the Churi Pat (812 m), in the south, are the highest in the district. The river Son has two main tributaries, the Banas, which forms the western boundary of the district, and the



Gopad, which practically bifurcates the district south of the Son into two halves. Numerous smaller rivers, streams and nalas criss-cross the country-side, of which only a few are perennial. The overall drainage is towards the north-east. Severe erosion is evident in many parts of the district.

#### CLIMATE

The district, situated in the sub-tropical zone just north of the Tropic of Cancer, has three marked seasons. These are, a dry and hot summer from March to June, a rainy season from July to October, and a cool relatively dry winter from November to February. Summer temperatures shoot up to 42°C and the highest of 48.8°C has been recorded in May. Winter temperatures fall below 7°C and the minimum of 1°C has been recorded in December-January. The diurnal range of temperature is between 16.3°C and 17.4°C. The *pats* are comparatively cooler than the plains. The average annual rainfall is approximately 1100 mm for the district. For Sidhi town it is 961.7 mm, and for Deosar and Singrauli tahsils 1091.44 mm. Rainfall data is not available for the Gopad-Banas tahsil. Most of the rain falls during the months of July and August. The southern portion of the district receives the largest amount of rainfall. A chart showing the average monthly rainfall received by Sidhi town, during the period 1959-65, is given below. The figures are in mm :-

January	—	11.0	July	—	303.4
February	—	11.4	August	—	327.8
March	—	14.2	September	—	196.0
April	—	1.2	October	—	21.6
May	—	4.4	November	—	1.2
June	—	63.1	December	—	6.4

#### GEOLOGY

The Kaimur hills are composed of rocks of the Upper Vindhyan System. The Son valley and the Kehanjua hills to its south have rock formations of the Lower Vindhyan System. The remaining parts of the district are occupied by the Archaean formations and the Gondwana System. The geological

sequence of rocks is as follows—the Archaeans are composed of the Sidhi Series, Jiawan Series, Intrusive/Granite and basic rocks, and the Jungel Series of rock formations. The late pre-Cambrian is represented by the Semri Series of the Lower Vindhyan and the Kaimur Series of the Upper Vindhyan, while the Upper Triassic to Upper Carboniferous are represented by the Gondwana System and are composed of the Talchir, Barakar, Ranigunj and Mahadeo Series. Lastly, large tracts of the Son valley and other low-lying areas are covered with alluvium. There are considerable coal deposits in parts of the district, specially in the eastern side.

#### SOIL

The river valleys, streams and nala beds have deposits of fertile alluvium and the soil is deep, specially in the Son valley. The soils of slopes and elevations are shallow and are mixed red and yellow soils, and is prevalent over large areas. The granites and gneisses produce a reddish soil due to oxidation and diffusion of iron content in it, and may be coarse with ferric concretions. Yellow soil is loamy to sandy loam. Calcareous thin and sandy soil is met with in the north-western parts of the district and elsewhere. Lateritic soil, gravelly in nature, is found generally in regions where erosion is very evident. Patches of black-cotton soil are also present scattered throughout the district.

#### VEGETATION

The vegetation is predominantly dry deciduous, with Sal forests covering much of the country in the central and southern portions. The hilly moist country to the south and other scattered and localised patches with more precipitation or having humid conditions possess moist deciduous vegetation. *Dendrocalamus strictus* grows luxuriantly in moist or damp situations in the south and in other scattered regions in Sal forests and to some extent in the dry mixed forests. The

dry mixed forests occur scattered on the drier southern and western aspects of hills and slopes in the north of the district, and to a lesser extent to the south along riverain tracts of the Gopad and the Banas, and some of their larger tributaries. Dry teak forests are found confined to the north and the north-west on Kaimur hills and Kehanjua hills also.

The dry Sal forests on the plains quite often intergrade with moist Sal and mixed forests depending on edaphic and climatic factors. The usual associates of *Shorea robusta* in these forests are *Lagerstroemia parviflora*, *Anogeissus latifolia*, *Buchanania lanzan*, *Butea monosperma*, *Diospyros melanoxylon*, *Madhuca longifolia* var. *latifolia* and *Phyllanthus emblica* which are abundant. *Boswellia serrata*, *Albizia procera*, *Cassia fistula*, *Semecarpus anacardium*, *Adina cordifolia*, *Terminalia alata*, *Ficus racemosa*, *Lannea coromandelica*, *Mitragyna parvifolia* and others, are also frequently associated. Among other associated smaller trees, shrubs and woody climbers are: *Kydia calycina*, *Bauhinia racemosa*, *Mimosa himalayana*, *Ziziphus mauritiana*, *Z. oenoplia*, *Flacourtia indica*, *Carissa spinarum*, *Xeromphis spinosa*, *Casearia elliptica*, *Holarhena antidysenterica*, *Embelia tsjariamcottam*, *Woodfordia fruticosa*, the dwarf palm *Phoenix acaulis*, *Helicteres isora*, *Gardenia turgida*, *Indigofera cassioides*, *Wendlandia heynei*, *Moghania chappar*, *Vallaris solanacea*, *Milletia auriculata* and *Celastrus paniculatus*. The twiners and other herbaceous undergrowth consist of *Ampelocissus tomentosa*, *Asparagus racemosus*, *Dioscorea bulbifera*, *Cayratia carnosae*, *Smilax zeylanica*, *Urena lobata*, *Triumfetta pentandra*, *Sida* spp., *Achyranthes aspera*, *Rungia pectinata*, *Phyllanthus* spp., *Bidens biternata*, *Desmodium gangeticum*, *Crotalaria* spp., *Heliotropium strigosum*, *Euphorbia* spp., *Vernonia cinerea*, *Tridax procumbens*, *Pygmaeopremna herbacea*, *Dipteracanthus* spp., etc.

The epiphytic orchid *Vanda tesellata* and the parasitic epiphyte *Dendrophthoe falcata* are widespread on a number of common trees.

The dry hill slopes have an intermixture of dry deciduous Sal, dry mixed forests and scrubby vegetation. Of these, mixed forests usually are located on southern and western slopes. *Boswellia serrata*, *Ougeinia ougeinensis*, *Cochlospermum religiosum*, *Terminalia bellirica*, *Sterculia urens*, *Dillenia aurea*, *Ficus tomentosa*, *Euphorbia nivulia*, *Ziziphus xylopyrus*, *Gardenia latifolia*, *Nyctanthes arbor-tristis*, along with some widespread species like, *Anogeissus latifolia*, *Diospyros melanoxylon*, *Lannea coromandelica*, *Lagerstroemia parviflora*, *Phyllanthus emblica*, *Wrightia* spp. and occasionally with *Dendrocalamus strictus*, *Flacourtia indica*, *Bauhinia racemosa*, *Helicteres isora*, *Holarhena antidysenterica*, *Carissa spinarum*, *Phoenix acaulis*, *Pavetta tomentosa* are the main components of the vegetation on the hill slopes. Lianas and other herbaceous elements are *Vallaris solanacea*, *Milletia auriculata*, *Dioscorea bulbifera*, *Ampelocissus latifolia*, *Asparagus racemosus*, *Hemidesmus indicus*, *Vanda tesellata*, *Dendrophthoe falcata*, *Rungia pectinata*, *Oldenlandia affinis*, *Micromeria biflora*, *Crotalaria* spp., *Boerhavia diffusa*, *Heteropogon contortus* and *Capillipedium assimile*. Open forests of *Boswellia serrata* associated with *Anogeissus latifolia* and *Sterculia urens* are situated on pats, ridge tops and slopes on dry shallow soil on the southern face of Kaimur hills. *Hardwickia binata* occurs on higher elevation in Jethula, Rani Satti, Harbaro and Tatpahar blocks of Sidhi range and in Kushanhiya. Scrubby vegetation composed of stunted *Lagerstroemia parviflora* with *Madhuca longifolia* var. *latifolia* and *Ziziphus xylopyrus*, scattered here and there, is evident near Hanumangarh block on Kaimur hills and near Churhat.

*Chloroxylon sweitenia* is found on gravel-

ly soil in patches in Madwas, Pabai and Dori blocks and on Mara-Jir road in mixed forests. Some of the plains adjoining rivers have dry scrubby open or low forests, such as those near Tansar on the Mahan river, in the neighbourhood of Jhunki on the Sarai road, near Karwahi, and elsewhere. The soils are hard and lateritic, and due to a scant undergrowth, erosion is evident in these localities. *Acacia catechu* generally abounds in these localities, the other species being *Soymida febrifuga*, *Ziziphus xylopyrus* and *Aegle marmelos*. *Acacia catechu* at other sites, such as at Tansar, is associated with *Butea monosperma*, *Ziziphus* and *Lagerstroemia parviflora*. The Son river basin near Jogdaha bridge, mostly cleared up, has patches of *Lagerstroemia* with *Vitex negundo* and occasionally *Grewia hirsuta*. *Ziziphus* is a conspicuous feature in forests around Karwahi, with *Z. nummularia* and *Z. rugosus* and is associated with *Woodfordia fruticosa*, *Butea monosperma*, *Ficus* spp. etc. The climbers seen here are *Ziziphus oenophia*, *Smilax zeylanica* and *Ichnocarpus frutescens*.

The rugged southern terrain of the Domar Pat, Runda-Bhadaura area and Churi Pat, and parts of Ramgarh hills and the Sajhar hills to the west, alongwith other smaller hill ranges which receive more precipitation, favour the growth of moist Sal forests. Moist conditions prevailing in valleys, ravines, riverain tracts and depressions also favour the growth of such forests. The floristic elements, in the higher elevations and hills are *Anogeissus latifolia*, *Terminalia chebula*, *Diospyros melanoxylon*, *Pterocarpus marsupium*, *Terminalia alata*, *Miliusa tomentosa*, *Careya arborea*, *Buchanania lanzan*, *Phyllanthus emblica*, *Syzygium cerasioides*, *Gmelina arborea*, *Hymenodictyon excelsum* and *Bridelia retusa*. Pure and mixed stands of *Dendrocalamus strictus* occur under favourable conditions in areas like Runda-Bhadaura and elsewhere. Other associated

species are *Premna barbata*, *Terminalia citrina*, *Alangium salvifolium*, *Indigofera cassioides*, *Pavetta tomentosa*, *Eriolaena hookeri*, *Perilepta auriculata* and *Casearia graveolens*. *Symplocos beddomei* has been observed at Bhadaura only. Undergrowth components on these hills include *Grewia hirsuta*, *Phoenix acaulis*, *Desmodium heterocarpon*, *Moghania* spp., *Eranthemum purpurascens*, *Leea edgeworthii*, *Crotalaria albida*, *Phanera vahlii*, *Butea parviflora*, *Byttneria herbacea*, *Conyza stricta*, *Vernonia divergens*, *Leucas mollissima*, *Plectranthus mollis*, *Dysophylla cruciata*, *Iphigenia indica*, *Dimeris ornithopoda*, *Oplismenus compositus*, *Panicum notatum*, *Capillipedium assimile*, *Arundinella setosa* and *Chrysopogon fulvus*. A few submontane species inhabiting the pats and slopes of Runda-Bhadaura are not found elsewhere in the district. These submontane species are widespread in other parts of the central Indian highlands and are found in the sub-tropical zone of the Himalayas also. *Thalictrum foliolosum* occurs on the steep damp shady slopes at the top of the ravine near Kanhaiya dah. On a rocky hill-top near Bhadaura *Cephalostigma schimperi* grows side by side with a terrestrial orchid, *Habenaria marginata*. Close by, the source of a spring on the hill side forms a marshy and boggy patch where *Osbeckia rostrata* var. *sexangulata*, *O. chinensis* and *Fuirena umbellata* have been found growing. Under similar conditions, another terrestrial orchid, *Spiranthes sinensis*, and a prickly aroid, *Lasia spinosa*, have been collected at Mara. None of these species have been observed elsewhere.

The lower slopes of numerous river valleys and ravines are usually clothed with plants like *Terminalia arjuna*, *Syzygium heyneanum*, *S. cumini*, *Shorea robusta*, *Phyllanthus emblica*, *Diospyros melanoxylon*, *Bombax ceiba*, *Meliosma simplicifolia*, *Dendrocalamus strictus*, *Trema orientalis*, *Tamarix ericoides*, *Mallotus philippensis*, *Ficus*

*semicordata*, *Ixora arborea*. The shady undergrowth harbours *Casearia graveolens*, *Boehmeria platyphylla*, *Colebrookia oppositifolia*, *Grewia rothii*, *Indigofera cassioides*, *Woodfordia fruticosa*, *Baliospermum montanum*, *Perilepta auriculata*, *Thysanolaena maxima*, *Phragmites karka*, *Saccharum spontaneum*, *Reinwardtia indica*, *Leucas biflora*, *Campanula colorata*, *Cyathocline purpurea*, *Adenostemma lavenia* var. *rugosa*, *Piper longum*, *Desmodium* spp., *Chlorophytum tuberosum* and *Apluda mutica*. *Glochidion lanceolarium* and *G. zeylanicum* are found in these habitats at Jir and Bhadaura. Twiners and climbers are numerous and include *Smilax zeylanica*, *Dioscorea bulbifera*, *D. glabra*, *D. puber*, *Ampelocissus latifolia*, *Porana paniculata*, *Ventilago maderaspatana* var. *calyculata*, etc. *Combretum decandrum* was found growing at Mara and *Schefflera stellata* at Jir.

The numerous shallow watercourses and nalas traversing open plain country, the marshy depressions, the pools and the damp meadows all have a more or less similar type of vegetation. The assortment of herbaceous moisture-loving elements found growing under such conditions include *Exacum pedunculatum*, *Pouzolzia pentandra*, *Hydrocotyle sibthorpioides*, *Centella asiatica*, *Mollugo pentaphylla*, *Polygonum plebeium*, *P. glabrum*, *P. stagninum*, *P. hydropiper* ssp. *microcarpum* var. *lenticularis*, *Hypericum japonicum*, *Canscora diffusa*, *C. decussata*, *Rotala rotundifolia*, *Ludwigia octovalvis* ssp. *sessiliflora*, *Limnophila rugosa*, *L. aromatica*, *Rostellularia quinqueangularis*, *Polycarpaea corymbosa*, *Drosera burmanni*, *Utricularia wallichiana*, *U. aurea*, *Veronica anagallis*, *Monochoria vaginalis*, *Eriocaulon quinqueangulare*, *E. truncatum*, *Eleocharis atropurpurea*, *Fimbristylis* spp., *Scirpus* spp., *Lipocarpus chinensis*, *Cyperus rotundus*, *C. cyperoides*, *C. pumilus*, *C. squarrosus*, *Themeda triandra* and *Isachne dispar*.

*Heteropogon contortus* and *Themeda*

*quadrivalvis* are widespread grasses growing in open pastures, fallow land and on edges of cultivated fields. Other grass species in such sites are species of *Eragrostis*, along with *Imperata cylindrica*, *Dichanthium annulatum*, *Dactyloctenium aegyptium*, *Bothriochloa pertusa*, *Cynodon dactylon*, *Iseilema laxum*, *Echinochloa colonum*, *Eleusine indica*, *Setaria pallide-fusca* and *Aristida depressa*.

The dry deciduous teak forests of Kaimur hills and Kehanjua hills have a preponderance of *Tectona grandis* and *Lagerstroemia parviflora*, *Anogeissus latifolia*, *Ougeinia ougeinensis*, *Phyllanthus emblica*, along with *Boswellia serrata* and *Diospyros melanoxylon*. Other trees are *Sterculia urens*, *Dalbergia latifolia*, *Adina cordifolia*, *Albizia procera*, *Soyimida febrifuga* and some localised patches of *Dendrocalamus strictus*. Some of the common elements of mixed forests are also represented in these areas. The scanty undergrowth includes *Cassia tora*, *Grewia* spp., *Euphorbia tirucalli*, *Asparagus racemosus*, *Heteropogon contortus*, *Imperata cylindrica*, *Eulaliopsis binata*, *Eragrostis diarrhena* etc. Among the common climbers and twiners are *Asparagus racemosus*, *Abrus precatorius* and *Mucuna prurita*.

In and around the village shrubberies and orchards and in the roadside hedges and thickets abound many sub-spontaneous plants. These are *Mangifera indica*, *Tamarindus indica*, *Azadirachta indica*, *Aegle marmelos*, *Madhuca longifolia* var. *latifolia*, *Diospyros melanoxylon*, *Ficus bengalensis*, *Lagerstroemia parviflora*, *Acacia nilotica* ssp. *indica*, *Syzygium cumini*, *Morus* spp., *Moringa oleifera*, *Lawsonia inermis*, *Cordia dichotoma*, *Euphorbia nivulia*, *Vitex negundo*, *Jatropha curcas*, *Adhatoda vasica*, *Ipomoea fistulosa*, *Woodfordia fruticosa*, *Ziziphus mauritiana*, *Caesalpinia globulorum*, *Ricinus communis* and others.

Among the field crops cultivated in the district are *Oryza sativa*, *Triticum aestivum*,

*Hordeum vulgare*, *Zea mays*, *Sorghum vulgare*, *Phaseolus radiatus*, *P. mungo*, *Brassica campestris*, *Crotalaria juncea*, *Linum usitatissimum*, *Cajanus cajan*, *Lablab purpureus*, *Arachis hypogaea*, *Ricinus communis*, *Lens culinaris*, *Saccharum officinarum*, *Lathyrus sativus*, *Cicer arietinum*, *Nicotiana tabacum*, *Sesamum indicum*, *Paspalum scrobiculatum*, *Panicum sumatrense*, *Guizotia abyssinica*, *Echinochloa frumentaceum* and *Brachiaria eruciformis*.

#### FLORISTIC ANALYSIS

An analysis of the data indicates 10 dominant families, in order of abundance of species, as follows :

1. Poaceae	—	116 species
2. Fabaceae	—	61 species
3. Cyperaceae	—	41 species
4. Asteraceae	—	38 species
5. Euphorbiaceae	—	27 species
6. Acanthaceae	—	25 species
7. Labiatae	—	23 species
8. Malvaceae	—	19 species
9. Convolvulaceae	—	18 species
10. Amaranthaceae	—	17 species

The five exploration tours conducted have yielded 683 species under 417 genera in 103 families. These include 8 new records for Madhya Pradesh. These species are *Abelmoschus moschatus* Medic. ssp. *tuberosus* (Roxb. ex Hornem.) Borss. var. *pungens* (Roxb.) Hochr., *Sesbania bispinosa* (Jacq.) W. F. Wight var. *micrantha* (Chiov.) Gillett, *Trichosanthes cordata* Roxb., *Schefflera stel-*

*lata* (Gaertn.) Harms, *Symplocos beddomei* C. B. Clarke., *Rostellularia crinita* Nees, *Leucas clarkei* Hook. f. and *Fimbristylis scaberrima* Nees.

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