**Original Research Article**

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**PHYTOMORPHOLOGICAL AND MEDICINAL PROPERTIES OF *BOSWELLIA OVALIFOLIOLATA* BAL. & HENRY AND *BOSWELLIA SERRATA* ROXB. ex COLEBR****G.V. Ranga Reddy<sup>1</sup>, D. Muralidhara Rao<sup>2\*</sup>**

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**ABSTRACT:** Man's reliance on plants for edible and medicinal purpose is an important topic in the past, present and future. Though advanced technology developed in medicine, majority of the world's population still depends almost exclusively on medicinal plants. But only few medicinal plants of high economic value have been cultivated under field conditions. The majority of plants used for medicines are collected from the wild. In the present investigation, we examined the morphological and medicinal properties of the both *Boswellia ovalifoliolata* Balakr. & A.N. Henry, Endemic to Seshachalam hill ranges (Tirumala, Kadapa) of Eastern ghats as IUCN Conservation status. *Boswellia serrata* Roxb. ex Colebr. is common in lower hill slopes of Tirumala and Talakona. Both the plants belongs to Burseraceae showed resemblances as well differences with respect to morphology and medicinal properties and Rare in open areas. Coimbatore, Dharmapuri, Salem, South Arcot, Central and North-West India. **Keywords:** Phytomorphology, medicinal properties, *B. ovalifoliolata*, *B.serrata*, IUCN Conserv Status.

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**1. INTRODUCTION**

The World Health Organization (WHO) estimates that about 80% of people in developing countries still rely on plant derived drugs and the main reason being their low price (Ekor, 2014). Moreover utilization of medicinal plants has getting momentum recently due to plants contain some complex

chemical compounds which may not be possible to synthesize in a laboratory and provides important clues for new medicines. Specifically in India, different species of plants have been reported to be used for medicinal purposes in the various systems of medicine and this country has been an important exporter of medicinal plants [1,8]. Long back it was estimated that the market potential for herbal drugs in the western portion of the world alone has increased to 47 billion [1,3]. Generally the medicinal plants have been subjected to rigorous chemical analysis to find bio-active components for particular disease [4,5,7]. Initially all the newly identified plants have been isolated, evaluated and later depend on the potential, increases the utility of that particular plant in large scale [11,17]. Moreover medicines are no longer sold only in the form of powders and also prepared in the form of crude extracts of roots, stems and leaves. So it is important that properly identified and certified planting material can be supplied to the growers for the preparation of medicine [1,12]. Several indigenous drug industries have been established in recently which supply readymade medicines. In this process, new drugs have been discovered and new uses have been found [8,6,2]. All this has necessitated the large scale collection of plants by collectors to supply raw material to industry leading to endangered and some are on the verge of extinction [9,10]. If efforts are made for systematic cultivation of medicinal plants either it may be tissue culture or other biotechnological methods for elite characters instead of collecting them from the wild, many of the problems mentioned above will be minimized [2,16]. Cultivation of plants can be planned to meet the needs of the industry in required quantities and at the required time [11,12]. *Boswellia ovalifoliolata* (Ln. Konda sambrani, Adavi sambrani, Guggilam) and *Boswellia serrata* (Ln. White Dammar, Dhupamu, Guggilam, Parangi) members of Burseraceae are important medicinal plants with potential benefits [13,15]. Both the plants were originated from India and *B. ovalifoliolata* was an endemic species to Seshachalam hill ranges of Palakonda region of Eastern Ghats of India [1,2,15]. Both the plants were medium-sized trees and differ morphologically from each other [2, 16]. The extracts of these plants were used for curing of osteoarthritis, rheumatoid arthritis, bronchial asthma, diabetes and showed antimicrobial activity for a range of species. Present study aims to know the morphological details of these two plants which belong to same family and also need to know the chemical properties specifically medicinal value [12,14].

## 2. MATERIALS AND METHODS

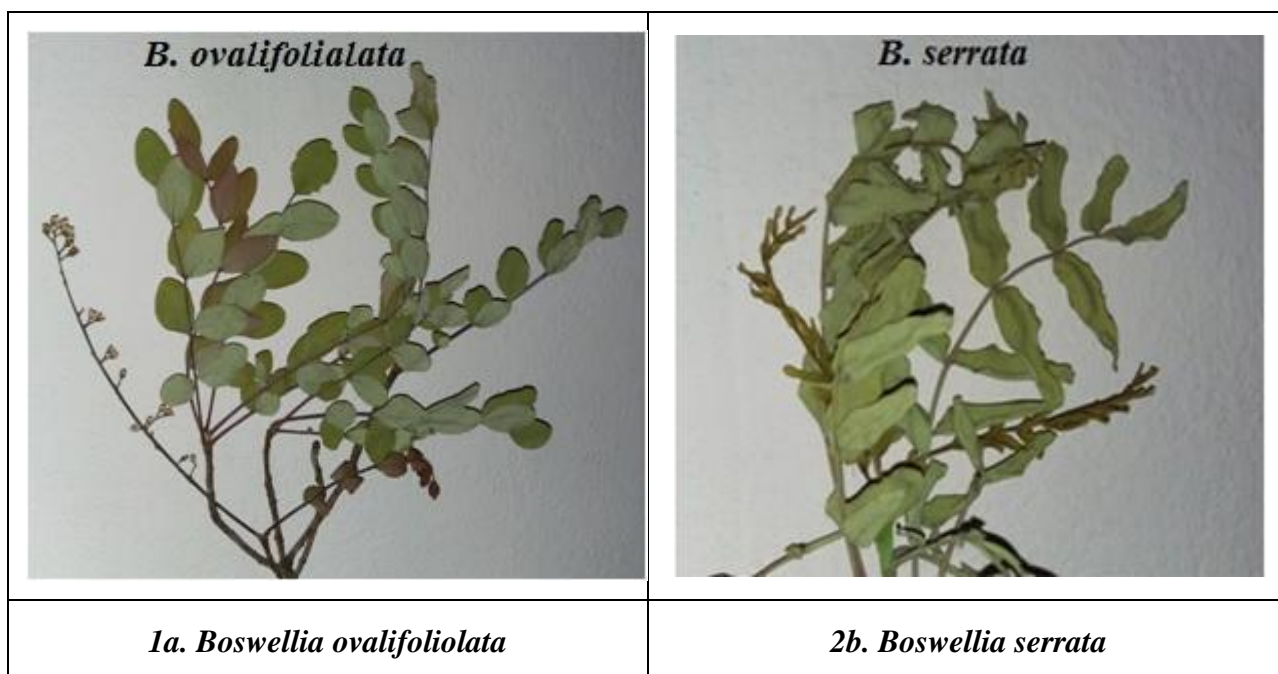
In the present investigation, two important medicinal taxa i.e *Boswellia ovalifoliolata* and *Boswellia serrata* of Burseraceae, were collected from wild in different places of Tirumala hills, Chittoor district of Andhra Pradesh. The botanical identification of the taxa was carried out by using regional and local floras [5,9,12,13]. The herbarium was prepared according to the method of [2, 14] and deposited in the department of botany [16,18]. In our studies we have observed that most of the tribals used plant parts like stem bark, leaf, fruit and resin gum, for curing numerous diseases. The medicinal and ethnomedicinal field survey was made and the data on the medicinal uses were

gathered from tribals, tribal physicians, local healers, age old persons, mid-wives, sadhus, wood cutters, herbal venders, forest officials and from present available literature [19,30]. The method of preparation, dosage, timing and mode of administration of each identified drug were recorded. The selected plant species are widely used in indigenous practices by traditional healers to cure numerous diseases and work has been under progress.

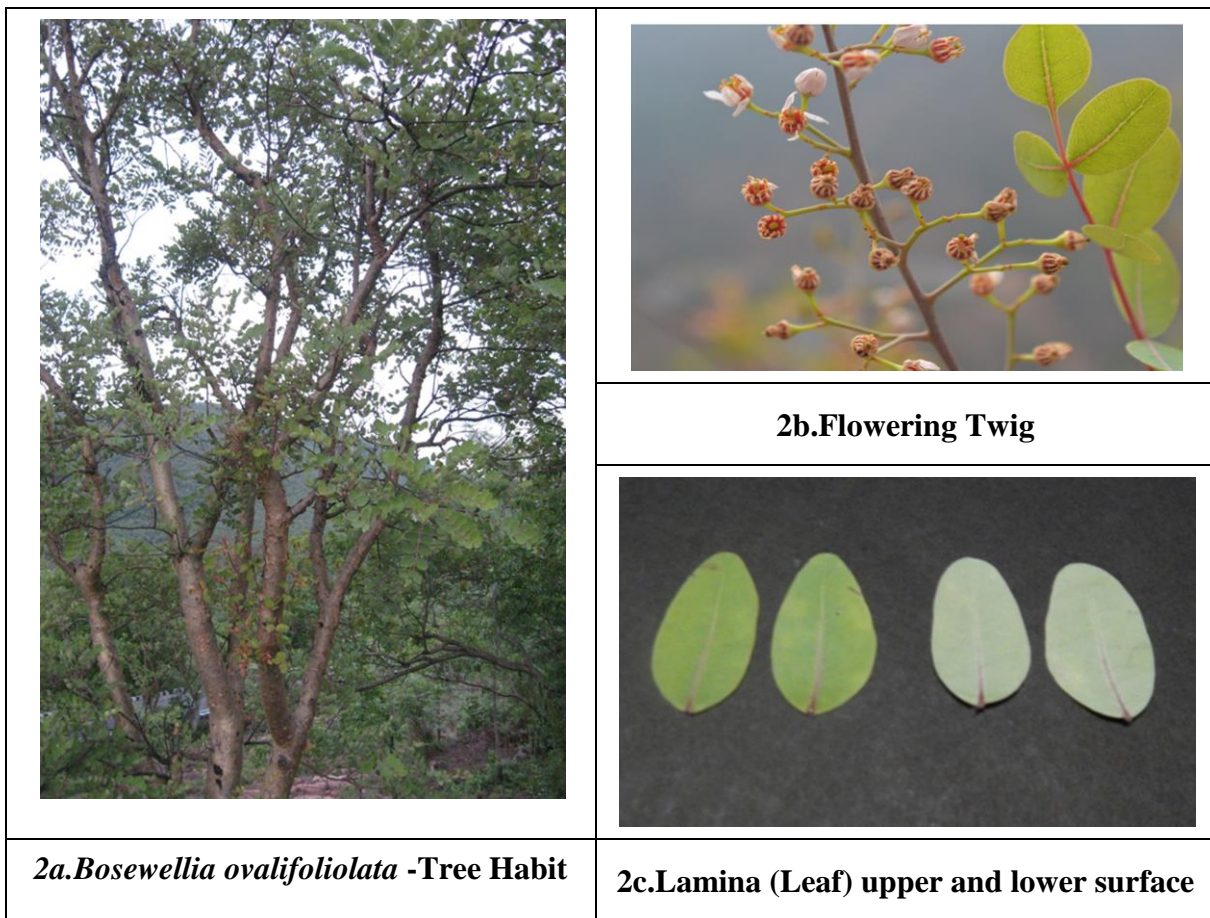
### 3. RESULTS AND DISCUSSION

In the present investigation, we observed the phytomorphological and functional similarities and differences between *B. ovalifoliolata* and *B. serrata* and all the results were documented below (Table-1). *B. ovalifoliolata* is a medium size deciduous tree with 7-10 m tall and branchlets were thick with red in colour and glabrous. Bark was appeared with thick green and contains 0.5-1.5 cm thickness and in peeling off conditions appeared with brown or yellow thin papery sheets or flakes. The bark of *B. ovalifoliolata* gives fragrant, red, yellow and white resin gum. Leaves were 9-25 cm long, alternate, crowded at the ends of branches, young foliage reddish, compound, imparipinnate and exstipulate [20,21]. Leaflets were opposite or alternate, basal and upper leaves smaller than middle one. Sometime upper leaves were larger and lower one's are very smaller, sessile, 9-13 pairs, coriaceous 1.7-7.5 x 1.0-5.3 cm ovate-oblong, sub orbicular and rounded at base, margin entire, tip obtuse and retuse, glabrous and glaucous beneath (Fig. 1). Secondary veins were 8-10 pairs, venation reticulate, leaf rachis and veins appear in thick reddish color. Flowers appears pale rose-pink or greenish white, 5 mm across, in large axillary much branched panicles. Panicles were longer than leaves with 5-35 cm long and pedicles were 4-6 mm long and both peduncles and pedicles were glabrous. Calyx 5-toothed, lobes short, broadly triangular, glabrous, persistent with 1x 2 mm. Petals were 5, smaller, distinct, imbricate, glabrous, narrowed at the base, obovate- oblong, 4-5 mm long, 2.5-3.0 mm wide and deciduous. Disc was annular, crenate, fleshy, adnate to the calyx tube. Stamens were 10, alternating long and short and inserted outside under the disc. Filaments subulate, base board, 1 mm long and papillose. Anthers were ditheous, versatile, longitudinally dehiscent and wall tuberculate. Ovary sessile, tricarpellary syncarpous, trilocular, ovules 1 or 2 in each locule, collateral, pendulous and style short, 2.5 mm long with four vertical grooves and stigma capitate. Fruit was drupe, green or greenish yellow, trigonous containing 3-pyrenes, 1.0-1.5 cm long, 0.5-0.8 cm wide and valves septical. Pyrenes was ovate or elliptic, bony, one or two seeded, finally separating from the trigonous axis. Seeds were cordate, winged, compressed, pendulous; testa membranous. The season for flowering and fruiting seeds was March-June every year [9,15]. (Fig-1a). *B. serrata* is a medium size deciduous tree with 10-15 m tall and branchlets green in color and young shoots are appeared with hairy. Bark green was 0.4-1.3 cm thickness and in peeling off, it appears light brown and brown or yellow thin papery flakes. Bark after chopping from the trunk the lower surface appears in whitish brown or light brown and after drying brown, aromatic smell and bitter taste [21,23]. Bark gives a fragrant thick red or white resin gum. Leaves were 12-42 cm long,

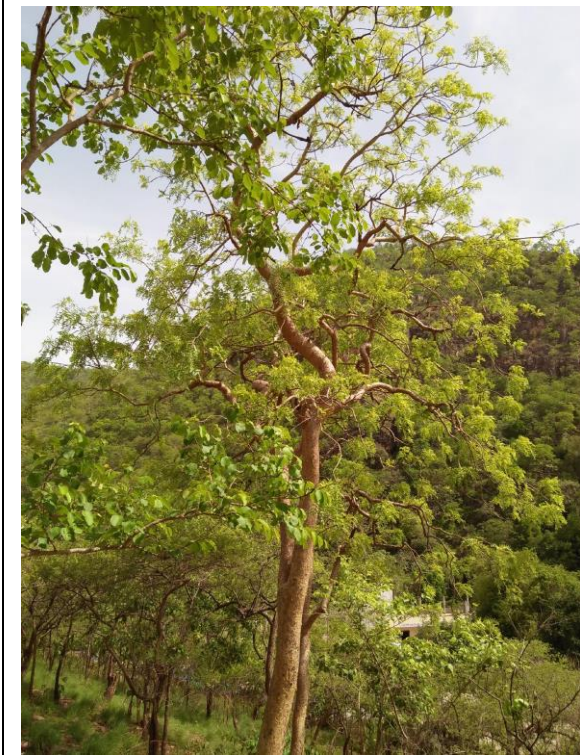
alternate, crowded at the ends of branches, young foliage yellow or light brown, compound, imparipinnate and exstipulate (Fig. 2). Leaflets were opposite or subopposite, basal pair much smaller than others, sometimes very variable in size, sessile, 17-27 pairs, thin-coriaceous, 0.5-7.2 X 0.5-2.1 cm, oblong-lanceolate, obtuse at base, margin entire or crenate or wavy, tip obtuse or subacute, pubescent on veins or nerves and greenish beneath. Secondary veins more than 16 pairs, venation reticulate and only mid vein light reddish [27,29]. Flowers were pinkish white in color, 4-5 mm across, in little branched axillary racemes and panicles were shorter than leaves, 3-20 cm long and pedicels were 2-4 mm long, both peduncles and pedicels pubescent. Calyx 5-toothed, short, triangular, puberulous outside, persistent and 0.5x1.5 mm. Petals 5, distinct, larger, imbricate, puberulous outside, obovate-oblong, 6-8 mm long, 3.0-3.5 mm wide and deciduous(23,28). Disc was annular, fleshy and adnate to the calyx lobes. Stamens were 10 and inserted below disc. Filaments were free, 1.1 mm long and anthers dithecous and dehiscing longitudinally(24,26). Ovary was sessile, tricarpeal syncarpous, trilocular, ovules one in each locule and pendulous. Style was simple short, 2.1 mm long and stigma undivided or lobed. Fruit was drupe, brown or green, trigonous with 3-pyrenes, 0.8-1.2 cm long, 0.3-0.5 cm wide, valves septicidal. Pyrenes were heart shaped, bony, 1-seeded, valves separating from the trigonous axis. Seeds were ovate-obovate of sub cordate winged, compressed, pendulous and testa membranous (Fig-1b).



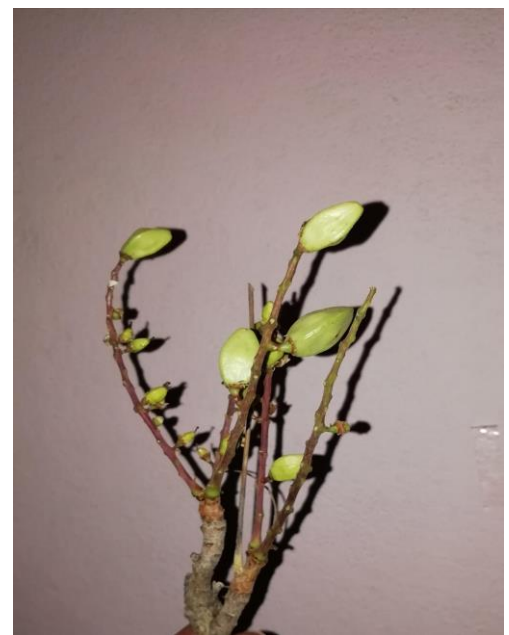
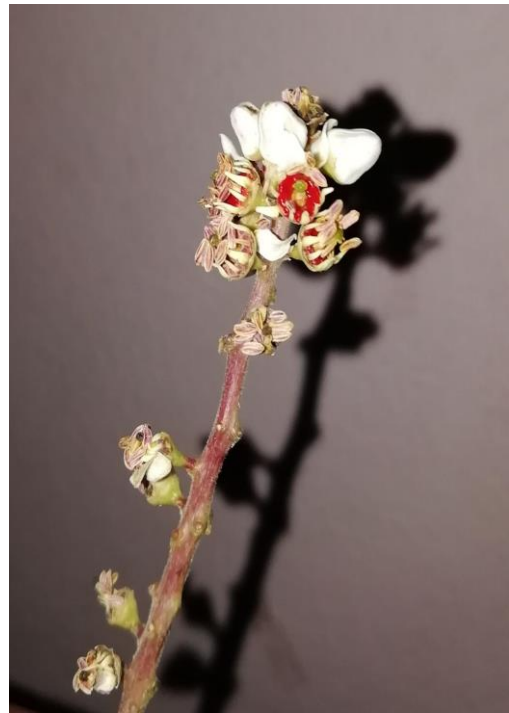
**Figure-1a&1b: Phytomorphological variations of *B. ovalifoliolata* and *B. serrata***



**Figure-2 a. *Bosewellia ovalifoliolata* -Tree Habit - 2b. Flowering Twig –  
2c. Lamina (Leaf) upper and lower surface**



**3a. *Boswellia serrata* tree habit**



**3b. Lamina (Leaf) upper and lower surface**

**3c. Flowering & Fruiting Twigs**

**Figure-33a. *Boswellia serrata* tree habit - 3b. Lamina (Leaf) upper and lower surface - 3c. Flowering & Fruiting Twigs**

**Table 1: Phytomorphological differences between *Boswellia ovalifoliata* and *Boswellia serrata***

<i>Boswellia ovalifoliata</i>	<i>Boswellia serrata</i>
1. Desiduous tree, 7-10 m tall; branchlets thick reddish.	1. Desiduous tree, 10-15 m tall; branchlets green.
2. Bark thick green, peels off in brown or yellow papary sheets or flakes.	2. Bark green, peels off in light brown or yellow papary sheets or flakes.
3. Bark after chopping from the trunk lower surface brown, after drying thick brown.	3. Bark after chopping from the trunk lower surface whitish brown or light brown, after drying brown.
4. Bark gives a fragrant yellowish red or white resin gum.	4. Bark gives a fragrant thick red or white resin gum.
5. Young foliage reddish.	5. Young foliage yellow or light brown.
6. Leaves 9-25 cm long, glabrous above, glaucous beneath; leaflets 9-13 pairs.	6. Leaves 12-42 cm long, pubescent on veins, greenish beneath; leaflets 17-27 pairs.
7. Leaflets ovate-oblong, suborbicular, rounded at base, margin entire, tip obtuse and retuse.	7. Leaflets oblong-lanceolate, margin entire or crenate or wavy, tip obtuse or sub acute.
8. Secondary veins 8-10 pairs.	8. Secondary veins more than 16 pairs.
9. Leaf rachis and veins thick reddish.	9. Only leaf mid vein light reddish.
10. Panicles 5-35 cm long, longer than the leaves in much branched panicles; pedicles 4-6 mm long; both peduncles and pedicles glabrous.	10. Panicles 3-20 cm long, shorter than leaves in little branched racemes; pedicles 2-4 mm long; both peduncles and pedicles pubescent.
11. Flowers pale rose-pink or greenish white.	11. Flowers pinkish-white.
12. Sepals and petals completely glabrous; petals smaller, 4-5 mm long, 2.5-3.0 mm wide, obovate-oblong.	12. Sepals and petals puberulous outside; petals larger, 6-8 mm long, 3.0-3.5mm wide, ovate-oblong.
13. Stamens 10, inserted outside under the disc.	13. Stamens 10, inserted below the disc.
14. Anthers wall tuberculate.	14. Anthers wall not tuberculate.
15. Ovules 1 or 2 in each carpel.	15. Ovules 1 in each carpel.
16. Style 2.5 mm long with four vertical groves.	16. Style 2.1mm long, vertical groves absent.
17. Drupe green or greenish yellow with 3 – pyrenes, each one is ovate or elliptic, 1 or 2 seeded.	17. Drupe brown or greenish with 3- pyrenes, each one is heart shaped, 1- seeded.
18. Seeds cordate.	18. Seeds ovate-obovate or subcordate.

The season for flowering and fruiting seeds were March-June every year. Several researchers worked on these plants and described taxonomical and chemical composition(4,9,12,13). Medicinal properties of both the plants were discussed in detail in the Table-2.

**Table 2: Medicinal properties of *B. ovalifoliolata* and *B. serrata***

S.No.	Name of the plant	Part used	Medicinal uses
1.	<i>Boswellia ovalifoliolata</i>  (Ln. Konda sambrani, Adavi sambrani, Guggilam)	Leaf	Throat ulcers.
		Bark	Stomach ulcers, diabetes, abdominal pain.
		Fruit	Aphthae.
		Resin	Joint pains, arthritis, inflammations, amoebic dysentery, diarrhoea and perfumery products.
2.	<i>Boswellia serrata</i>  (Ln. White Dammar, Dhupamu, Guggilam, Parangi)	Bark	Dysentery, diarrhoea and antiseptic to wounds, cuts, burns, boils and fractured bones for early healing.
		Resin	Boils and wounds, incense, cardiac diseases, haemorrhage, cough, dyspnoea, polyuria, leucorrhoea, oligospermia skin diseases, urinary disorders, urethritis, piles, ulcers, burns, purgative, diabetes, diarrhoea, dysentery, pulmonary affections and cutaneous troubles.
		Leaf	Boils and wounds.

**4. CONCLUSION**

Present work may be explores the possibility of gaining knowledge about two medicinal plants in the Burseraceae family. Moreover this paper may be useful for public who is following and practioners of the traditional medicine.

**ETHICS APPROVAL AND CONSENT TO PARTICIPATE**

Not applicable.

**HUMAN AND ANIMAL RIGHTS**

No Animals/Humans were used for studies that are base of this research.

**CONSENT FOR PUBLICATION**

Not applicable.

**AVAILABILITY OF DATA AND MATERIALS**

The authors confirm that the data supporting the findings of this research are available within the article.

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**CONFLICT OF INTEREST**

Authors have no conflict of interest.

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