

DEVELOPMENT AND STANDARDIZATION OF AAMRA LAVANA

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DOI: <https://doi.org/10.5281/zenodo.22157264>

How to cite this Article: Kshitija S. Kulkarni*¹. (2026). Development and Standardization of Aamra Lavana. European Journal of Pharmaceutical and Medical Research, 13(9), 82–89.

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Article Received on 31/07/2026

Article Revised on 21/08/2026

Article Published on 01/09/2026

ABSTRACT

Background: Lavana Kalpana represents a unique dosage form described in Ayurvedic pharmaceuticals wherein rock salt (Saindhava Lavana) is processed with herbal drugs through controlled heating. Classical formulations such as Arka Lavana and Narikela Lavana have long been employed therapeutically and have undergone varying degrees of pharmaceutical standardization. However, there remains considerable scope for the development of novel Lavana formulations based on traditional principles and supported by modern analytical validation.

Objective: The present work aims to introduce Aamra Lavana, a novel Ayurvedic medicated salt prepared from fresh leaves of *Mangifera indica* (Aamra) and Saindhava Lavana using a pharmaceutical procedure analogous to Arka Lavana. The study further aims to establish standardized pharmaceutical procedures and analytical parameters for the formulation. The present work is published as a part of ongoing research project and the exact quantitative composition, ingredient ratio and certain process- specific parameters have been intentionally withheld from this publication to preserve potential intellectual property rights. **Materials and Methods:** Fresh authenticated Aamra leaves and pharmaceutical-grade Saindhava Lavana constitute the principal ingredients. The formulation is prepared using the traditional Sharava Samputa technique followed by Laghu Puta heating. Three independent batches are proposed for pharmaceutical standardization. Organoleptic evaluation, physicochemical analysis, chromatographic profiling, microbial evaluation, X-ray analysis, heavy metal assessment and stability studies are planned according to standard Ayurvedic pharmaceutico-analytical protocols. **Results:** Preliminary pharmaceutical preparation demonstrated the successful formation of Aamra Lavana. Initial organoleptic and physicochemical observations indicated a black, smooth, saline formulation with alkaline pH and high total ash value, suggesting effective incorporation of herbal constituents into the salt matrix. These preliminary observations provide the foundation for comprehensive analytical standardization. **Conclusion:** Aamra Lavana represents a novel pharmaceutical innovation developed using classical Ayurvedic principles. Standardization of its manufacturing process together with detailed analytical evaluation may establish quality parameters for future therapeutic investigations, particularly in disorders of the throat such as Swarbheda and other Kantharogas.

KEYWORDS: Aamra Lavana, *Mangifera indica*, Lavana Kalpana, Rasashastra, Pharmaceutical Standardization, Ayurvedic Drug Development, Analytical Evaluation.

INTRODUCTION

Ayurvedic pharmaceuticals encompasses a wide spectrum of dosage forms developed to improve therapeutic efficacy, enhance stability, increase bioavailability, and ensure patient acceptability. Among these pharmaceutical preparations, Lavana Kalpana occupies a distinctive position owing to its unique method of preparation in which medicinal substances are processed

with salts under controlled heating. The pharmaceutical transformation achieved during this process facilitates the transfer of phytoconstituents from herbal ingredients into the salt matrix while simultaneously modifying the physicochemical properties of the final formulation.

Saindhava Lavana, regarded as the most therapeutically beneficial among the varieties of Lavana described in

Ayurveda, possesses Deepana, Pachana, Tridosha Shamana, Sukshma and Yogavahi properties.^[5,6,9] Owing to these characteristics, it serves not only as an active therapeutic ingredient but also as an efficient carrier for herbal bioactive constituents.^[17] Classical Ayurvedic literature describes several medicated salts including Arka Lavana, Narikela Lavana, Jambira Lavana and other Lavana Kalpanas, each prepared through specific pharmaceutical procedures involving Agni Samskara. These formulations are extensively employed in disorders related to digestion, metabolism and systemic diseases.^[9,6]

The process of pharmaceutical innovation in Ayurveda has traditionally relied upon the application of classical principles to locally available medicinal resources while preserving the fundamental concepts of Bhaishajya Kalpana. During routine pharmaceutical practical training on Arka Lavana preparation, temporary unavailability of Arka leaves necessitated the use of freshly collected Aamra (*Mangifera indica*) leaves solely for demonstration of the Sharava Samputa technique. Interestingly, the resulting preparation demonstrated encouraging pharmaceutical characteristics during preliminary analytical evaluation, which prompted further scientific investigation as an independent formulation rather than as a substitute for Arka Lavana. This accidental observation provided the conceptual basis for the development of Aamra Lavana as a novel medicated salt.

Aamra is one of the most extensively distributed medicinal trees in the Indian subcontinent and has been described in classical Ayurvedic literature under Phala Varga. Various parts of the plant possess Deepana, Balya, Ruchikara and therapeutic properties. Modern phytochemical investigations.^[18,19,20] have demonstrated that *Mangifera indica* contains mangiferin, flavonoids, polyphenols, tannins and numerous antioxidant compounds responsible for anti-inflammatory, antimicrobial, gastroprotective and tissue-protective activities.^[18] These findings provide scientific support for several traditional therapeutic applications of the plant.

An additional classical reference found in *Vanaushadhi Gunadarsha*^[17] describes the beneficial use of fresh Aamra leaves in Kantharoga and Swarbheda when administered appropriately. This therapeutic indication provides a rational basis for exploring the incorporation of Aamra leaves into a Lavana formulation intended primarily for disorders affecting the throat and voice.

Despite extensive pharmaceutical research on individual Lavana preparations and numerous pharmacological studies on *Mangifera indica*, no standardized pharmaceutical formulation designated as Aamra Lavana has been reported in contemporary Ayurvedic literature. The absence of standardized manufacturing procedures and analytical quality parameters highlights an important research gap.^[3,10,12,16] Therefore, the present study aims

to develop Aamra Lavana as a novel Ayurvedic pharmaceutical preparation using classical principles of Sharava Samputa and Laghu Puta, followed by comprehensive pharmaceutico-analytical standardization employing modern quality control techniques. Such an approach is expected to bridge traditional pharmaceutical knowledge with contemporary scientific validation and contribute to evidence-based Ayurvedic drug development.

The present work is published as a part of ongoing research project and the specific ratio of the ingredients and standard operating procedure has been kept confidential to protect potential intellectual property rights.

REVIEW OF LITERATURE

Lavana Kalpana in Ayurvedic Pharmaceutics^[9,13]

Lavana Kalpana is a distinctive dosage form described under Bhaishajya Kalpana, wherein various medicinal substances are processed with Lavana, predominantly Saindhava Lavana, through specific pharmaceutical procedures involving Agni Samskara. Unlike the Panchavidha Kashaya Kalpanas, Lavana Kalpana represents a separate pharmaceutical entity developed to improve palatability, facilitate absorption, enhance shelf life and potentiate the therapeutic efficacy of medicinal ingredients. The incorporation of herbal drugs into the salt matrix through controlled heating enables transformation of the physicochemical properties of the formulation while retaining the medicinal attributes of both herbal and mineral components.

Among the various salts described in Ayurveda, Saindhava Lavana is regarded as the most therapeutically beneficial because of its Madhura Rasa, Sheeta Virya, Tridosha Shamana, Deepana, Pachana, and Yogavahi properties. It is traditionally indicated for improving digestion, enhancing appetite, correcting metabolic disturbances and facilitating the absorption of medicinal principles. These pharmacological properties have made Saindhava Lavana the preferred ingredient in numerous Lavana formulations described in classical literature.

Classical Ayurvedic texts describe several medicated salts, including Arka Lavana, Narikela Lavana, Jambira Lavana, Palasha Lavana, and Patra Lavana, each prepared according to specific pharmaceutical principles and therapeutic indications. Most of these formulations are prepared using the Sharava Samputa technique followed by Puta, where herbal material and rock salt are sealed between two earthen saucers and subjected to controlled heating. This pharmaceutical process ensures gradual transfer of phytoconstituents into the salt while simultaneously producing characteristic organoleptic and physicochemical changes in the final formulation.

Recent pharmaceutico-analytical investigations have emphasized the importance of establishing Standard

Operating Procedures (SOPs), physicochemical standards and chromatographic fingerprints for Ayurvedic formulations. Standardization not only ensures reproducibility and quality control but also facilitates scientific validation and wider clinical acceptance of traditional medicines.^[3,10,12,16]

Review of Aamra (*Mangifera indica*)

Aamra (*Mangifera indica* Linn.) is one of the most important medicinal trees described in Ayurvedic literature. Belonging to the family Anacardiaceae, it is extensively distributed throughout the Indian subcontinent and has been used traditionally as both a dietary fruit and a medicinal plant. Classical texts such as Charaka Samhita, Sushruta Samhita, and Bhavaprakasha Nighantu describe Aamra under Phala Varga, highlighting its nutritional as well as therapeutic significance.^[17]

According to Ayurvedic pharmacology, Aamra possesses Madhura and Amla Rasa, Guru and Snigdha Guna, Ushna Virya, and Madhura Vipaka. These attributes contribute to its Deepana, Balya, Ruchikara and restorative properties. Traditionally, different parts of the plant including leaves, bark, flowers, fruits and seeds have been employed in various therapeutic preparations for gastrointestinal disorders, wound healing, inflammatory conditions and respiratory ailments.

Modern phytochemical studies have demonstrated that *Mangifera indica* contains numerous biologically active constituents like including mangiferin, quercetin, catechins, polyphenols, tannins, gallic acid, and various flavonoids. These compounds exhibit antioxidant, anti-inflammatory, antimicrobial, immunomodulatory, gastroprotective and tissue-protective activities.^[18,19,20] Experimental studies have further demonstrated free radical scavenging potential, inhibition of inflammatory mediators and antimicrobial effects against several pathogenic microorganisms, thereby supporting many of its traditional therapeutic applications.

Among the less explored traditional indications of Aamra is its application in Kantharoga (throat disorders). *Vanaushadhi Gunadarsha*^[17] describes the use of tender Aamra leaves in decoction form, administered with honey, for improving hoarseness of voice (Swarbheda). This classical therapeutic indication provides a rational basis for investigating the pharmaceutical incorporation of Aamra leaves into a Lavana formulation designed for disorders affecting the throat and vocal apparatus.

Previous Pharmaceutical Research

Extensive pharmaceutical studies have been conducted on Lavana Kalpana with particular emphasis on Arka Lavana, Narikela Lavana, and other classical formulations. These investigations have largely focused on pharmaceutical preparation, physicochemical characterization, chromatographic profiling and quality control. Modern analytical techniques including pH

determination, ash value analysis, extractive values, Thin Layer Chromatography (TLC), High Performance Thin Layer Chromatography (HPTLC), Fourier Transform Infrared Spectroscopy (FTIR) and X-ray diffraction have been successfully employed for standardization of these formulations.

Similarly, pharmacological investigations on *Mangifera indica*^[20] have predominantly evaluated antioxidant, anti-inflammatory, antimicrobial, antidiabetic and hepatoprotective properties of different plant parts. However, very limited work has explored its utilization within Ayurvedic pharmaceutical dosage forms, particularly medicated salts.

To the best of our knowledge, no published pharmaceutico-analytical study describing the preparation, standardization and analytical evaluation of Aamra Lavana is presently available. This identifies an important gap in Ayurvedic pharmaceutical research and provides justification for the present investigation.

Rationale and Novelty

Innovation in Ayurvedic pharmaceuticals does not necessarily involve deviation from classical principles but rather the scientific application of established pharmaceutical concepts to develop formulations supported by evidence-based standardization. The present study originated from an unexpected pharmaceutical observation during routine academic practical training in the Department of Rasashastra and Bhaishajya Kalpana. During demonstration of Arka Lavana preparation, the temporary unavailability of Arka leaves necessitated the use of freshly available Aamra leaves solely for illustrating the technique of Sharava Samputa, Mrittika Bandhana, and alternate layering of herbal material with Saindhava Lavana.

Following completion of the pharmaceutical process, the prepared formulation exhibited characteristic features of a properly processed Lavana preparation. Preliminary physicochemical evaluation further indicated promising pharmaceutical characteristics, encouraging detailed scientific investigation. Importantly, the intention was never to propose Aamra as a substitute for Arka. Instead, these observations led to the conceptualization of an entirely new formulation based upon classical pharmaceutical principles.

The novelty of the present investigation lies in

- Development of Aamra Lavana as a previously undescribed Ayurvedic medicated salt.
- Scientific standardization of its pharmaceutical preparation using classical Sharava Samputa and Laghu Puta techniques.
- Establishment of reproducible Standard Operating Procedures.
- Comprehensive pharmaceutico-analytical evaluation employing both traditional and modern quality control parameters.

- Generation of baseline analytical data for future pharmacological and clinical investigations.
- Exploration of a formulation with potential utility in Kantharoga, particularly Swarbheda, based on classical textual evidence.

The formulation was initially prepared as a pilot batch and presented as a Poster during the MUHS Avishkar Research Competition (2025–26), where preliminary analytical observations supported its further scientific evaluation. These pilot observations serve as the foundation for the present comprehensive pharmaceutico-analytical study.

The present work therefore represents an important step towards integrating classical Ayurvedic pharmaceutical wisdom with contemporary analytical science, thereby contributing to the development of standardized evidence-based Ayurvedic formulations suitable for future therapeutic evaluation.

AIM

To develop and pharmaceutically standardize Aamra Lavana, a novel Ayurvedic medicated salt prepared using fresh leaves of *Mangifera indica* and Saindhava Lavana, and to establish its analytical profile using contemporary quality assessment techniques.

OBJECTIVES

1. To standardize the pharmaceutical procedure for the preparation of Aamra Lavana using classical Ayurvedic principles.
2. To evaluate the organoleptic and physicochemical characteristics of the formulation.
3. To establish preliminary analytical standards through chromatographic, physicochemical, microbial, and instrumental analyses.
4. To generate baseline data for future pharmacological and clinical evaluation of Aamra Lavana.

Research Question

1. Can Aamra Lavana (AL) be prepared according to classical ayurvedic methods and standardized using modern analytical techniques?
2. Does AL demonstrate consistent quality and stability for therapeutic use?

Research Hypothesis

Null Hypothesis: There is no significant difference in the physico-chemical properties between Aamra Lavana (AL) & Narikela Lavana (NL).

Alternative Hypothesis: Aamra Lavana shows significant differences in physico-chemical properties compared to Narikela Lavana (NL), indicating its unique formulation characteristics.

MATERIALS AND METHODS

Study Design

The present investigation is designed as a pharmaceutico-analytical study aimed at developing a novel Ayurvedic formulation and establishing reproducible quality standards. The study is proposed to be completed over one year, including pharmaceutical preparation, analytical evaluation, inter-batch comparison, and documentation.

Raw Materials

Fresh leaves of *Mangifera indica* will be collected from authenticated medicinal plant sources. Pharmaceutical-grade Saindhava Lavana will be procured from a GMP-certified pharmacy. Authentication of the botanical material and mineral ingredient will be carried out by experts in Dravyaguna and Rasashastra respectively before pharmaceutical processing.

Pharmaceutical Preparation^[9,3,10,12]

The preparation of Aamra Lavana follows the classical pharmaceutical principles employed for Arka Lavana.

Fresh leaves are thoroughly washed and cleaned to remove extraneous matter. Saindhava Lavana is powdered uniformly using mortar and pestle. Alternate layers of fresh Aamra leaves and powdered rock salt are arranged within an earthen saucer (Sharava), ensuring that both the uppermost and lowermost layers consist of leaves.

A second Sharava is placed over the first, and the junction is sealed using mud-smeared cloth (Mrittika Bandhana) to prepare a Sharava Samputa. After complete drying, the assembly is subjected to Laghu Puta, employing ten cow-dung cakes as the primary heating source. The system is allowed to undergo self-cooling before opening.

The charred pharmaceutical mass is collected, triturated into a fine powder, weighed, coded and stored in airtight glass containers. Three independent batches are proposed to evaluate reproducibility and inter-batch consistency. Subject to availability of resources, comparative preparation using a muffle furnace may also be undertaken to assess the influence of modern heating techniques.



Fig.1: Material

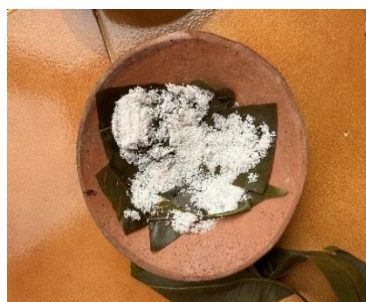
Fig.2: 1st Layer of SaindhavFig.3: 2nd Layer of Aamra PatraFig.4.:2nd Layer of Saindhava

Fig.5: Middle layer of Aamra Patra



Fig.6. Upper Last Layer of Aamra Patra



Fig.7: Sharav Samputa



Fig. 8: Putagni.



Fig. 9: Removing of Puta covering after Self.



Fig. 10: Final Product before and after Trituration.

Analytical Evaluation^[3,10,12,13]

Comprehensive analytical evaluation is proposed to establish pharmaceutical standards for *Aamra Lavana*.

Organoleptic Evaluation

The formulation will be assessed for colour, odour, taste and texture using standard sensory evaluation procedures.

Physicochemical Analysis

The following parameters will be determined according to Ayurvedic Pharmacopoeial procedures:

- Loss on drying
- pH
- Total ash
- Water-soluble ash
- Acid-insoluble ash
- Bulk density

- Tapped density
- Water-soluble extractive
- Alcohol-soluble extractive

Chromatographic Evaluation

Thin Layer Chromatography and advanced chromatographic techniques will be performed to establish the phytochemical fingerprint of the formulation and to compare it with the raw plant material.

Instrumental Analysis

Advanced analytical investigations including FTIR spectroscopy, X-ray diffraction (XRD), X-ray fluorescence (XRF), particle size analysis and thermal analysis are proposed to characterize the mineral and phytochemical composition of the formulation.

Microbiological and Safety Evaluation

Microbial load, pathogenic contamination, heavy metal estimation and stability assessment under controlled storage conditions will be performed to ensure pharmaceutical quality and safety.

Preliminary Observations

Pilot preparation successfully yielded a characteristic Lavana formulation. Preliminary organoleptic examination demonstrated a black coloured, smooth powder possessing a saline taste and non-specific odour. Physicochemical analysis indicated an alkaline pH with high total ash value and absence of acid-insoluble ash, suggesting effective pharmaceutical transformation during Agni Samskara.

Although these observations represent only preliminary findings, they indicate the feasibility of developing Aamra Lavana as a standardized Ayurvedic pharmaceutical formulation and justify further detailed analytical investigation.

Table No.1: Preliminary Findings.

Parameters	Results with Unit
Colour	Black
Odour	Non-Specific
Taste	Salty
Touch	Smooth
pH 5% Solution	8.69
Acid Insoluble Ash	Nil
Total Ash	97.96%

Probable Mode of Action of Drug: Aamra Lavana (AL) is expected to act in Kantha Rog (throat disorders) and Swarbheda (hoarseness) by combining the deepana-pachana (digestive stimulant) and rasayana (rejuvenative) properties of Aamra with the bioavailability-enhancing and samshodhana effects of Lavana.

• Ayurveda Perspective

- AL pacifies Vata and Kapha dosha in the throat region, reduces sanga (stagnation) and shotha (inflammation), and promotes koshtashuddhi (general metabolic balance).
- Lavana enhances Rasadhatu circulation, improving voice quality and throat strength.

• Modern Pharmacological Correlation

- Bioactive compounds in Aamra such as mangiferin, polyphenols, and flavonoids exhibit anti-inflammatory, antioxidant, and tissue-healing effects, which may reduce throat irritation and inflammation.
- Salts in Lavana facilitate absorption of active principles and may act as a mild expectorant and soothing agent for the throat mucosa.

Overall, Aamra Lavana may relieve soreness, improve voice clarity, and restore normal throat function, making it suitable for Kantha Rog / Swarbheda management.

DISCUSSION

Ayurvedic pharmaceuticals have historically evolved through systematic modification of dosage forms while preserving fundamental pharmaceutical principles. The present work extends this tradition by introducing Aamra Lavana as a novel medicated salt prepared according to the established concepts of Sharava Samputa and Laghu Puta.

Heat processing is expected to facilitate physicochemical transformation of the herbal material while enabling incorporation of phytoconstituents into the salt matrix. Saindhava Lavana may act not only as the principal mineral component but also as a carrier capable of enhancing the bioavailability of herbal constituents. The combined influence of Agni Samskara and herbal-mineral interaction is likely to contribute to the distinctive pharmaceutical characteristics of the formulation.

The documented presence of mangiferin, polyphenols, flavonoids and other antioxidant constituents in *Mangifera indica* suggests the possibility that some phytochemical markers may be retained following pharmaceutical processing. Establishing chromatographic fingerprints and physicochemical standards will therefore be essential for ensuring reproducibility and quality control.

The traditional reference describing the use of fresh Aamra leaves in disorders of the throat provides a rational basis for future pharmacological and clinical investigations, particularly in patients suffering from Swarbheda and other Kantharogas. Nevertheless, therapeutic efficacy cannot be concluded from the present pharmaceutico-analytical investigation alone. Controlled experimental and clinical studies will be necessary to validate these proposed applications.

The present investigation therefore serves as an important foundation for future evidence-based research while simultaneously contributing to the standardization of Ayurvedic pharmaceutical preparations.

Novelty of the Study

Sushruta Samhita, *Sharangdhara Samhita* and *Bhaishajya Ratnavali* mentions use of various leaves like *palash*, *Arjun*, *eranda*, *Narikela* etc and preparations like *jambir lavana* with similar procedure to *arka lavana* and emphasizes the preparation of *lavana* formulations. This study provides a foundation for this research project.

Although significant research has been carried out on the pharmacological properties of Aamra and the pharmaceutical aspects of Lavana Kalpana, specific research on the preparation, standardization, and

analytical evaluation of Aamra-based Lavana formulations is limited.

Therefore, there is a need to scientifically study and standardize such formulations using classical Ayurvedic principles along with modern analytical techniques. The present study is undertaken to explore the classical references related to Aamra and Lavana Kalpana, to prepare the formulation according to traditional pharmaceutical methods, and to evaluate it using standard analytical parameters.

Thus, the study aims to bridge the gap between classical Ayurvedic knowledge and modern scientific validation, thereby contributing to the quality control and standardization of Ayurvedic formulations.

Mode of Action of Drug: AamraLavana (AL) is expected to act in Kantha Rog (throat disorders) and Swarbheda (hoarseness) by combining the deepana-pachana (digestive stimulant) and rasayana (rejuvenative) properties of Aamra with the bioavailability enhancing and samshodhana effects of Lavana.

Ayurvedic Perspective: AL pacifies Vata and Kapha dosha in the throat region, reduces sanga (stagnation) and shotha (inflammation), and promotes koshtashuddhi (general metabolic balance). Lavana enhances Rasadhatu circulation, improving voice quality and throat strength.^[5,6,9]

Modern Pharmacological Correlation: Bioactive compounds in Aamra such as mangiferin, polyphenols, and flavonoids exhibit anti-inflammatory, antioxidant, and tissue-healing effects, which may reduce throat irritation and inflammation. Salts in Lavana facilitate absorption of active principles and may act as a mild expectorant and soothing agent for the throat mucosa. Overall, AamraLavana may relieve soreness, improve voice clarity, and restore normal throat function, making it suitable for Kantha Rog / Swarbheda management.^[17,18,19,20]

CONCLUSION

Aamra Lavana represents a novel Ayurvedic pharmaceutical formulation developed by applying classical principles of Lavana Kalpana to the medicinal leaves of *Mangifera indica*. The proposed pharmaceutical methodology is reproducible and suitable for standardization using modern analytical techniques.

Comprehensive pharmaceutico-analytical evaluation will establish baseline quality parameters, facilitate preparation of Standard Operating Procedures and support future quality control of the formulation. The preliminary observations obtained during pilot preparation indicate that Aamra Lavana possesses promising pharmaceutical characteristics warranting

further analytical, pharmacological and clinical evaluation.

The development of standardized Aamra Lavana may contribute to the expanding scientific evidence supporting Ayurvedic pharmaceuticals while preserving the integrity of classical pharmaceutical principles.

Conflict of Interest

The authors declare that there is no conflict of interest.

Funding

Self Funded.

Future Scope

Future investigations should focus on comprehensive phytochemical characterization, HPTLC fingerprinting, toxicity evaluation, pharmacological studies and well-designed clinical trials to establish the therapeutic efficacy and safety profile of Aamra Lavana with special reference to *swarbheda*. Comparative studies with established Lavana formulations such as Arka Lavana and Narikela Lavana may further elucidate its pharmaceutical uniqueness and therapeutic potential.

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