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ANALYSIS OF *PHALAKALYANA GHRITA*– AN AYURVEDIC POLYHERBAL FORMULATION FOR INFERTILITY

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ABSTRACT

Background: In Indian scenario, Infertility is the biggest issue for married couple in society. "Infertility is defined as failure to conceive within one or more years having regular unprotected coitus.[1] According to the Indian society of assisted reproduction, Infertility currently affects about 10 to 14% of the Indian population. Among them female is directly responsible about 40%. The sub factors of female infertility are Ovarian, Endometrial, Tubal and Uterine etc. In Ayurveda so many formulation are given for infertility. *Phalakalyana Ghrita* is a commonly used and prescribed Ayurvedic poly herbal formulation in all types of infertility. **Aim:** To analyze the pharmacognostical and pharmaceutical evaluation of *Phalakalyan Ghrita*. **Material and Method:** *Phalakalyana Ghrita* was subjected to pharmacognostical and physiochemical analysis such as microscopic study, acid value, specific gravity etc. **Result:** Pharmacognostical study showed the presence of contents such as Parenchyma cells, Acicular crystals of *Shatavari*, prismatic crystals of *ksheervidari*, starch grains of *Yashthimadhu*, sieve tubes of *Ashwagandha*, starch grains and pitted vessels of *Manjishtha*, Oil globules and prismatic crystals of *kushtha*, Epicarp cells and mesocarp cells of *Triphala*, aleurone grains and scalariform vessels of *Ajamoda*, aleurone grains of *Haridra*, Epidermal cells and unicellular hairs of *Daruharidra* etc. Physico chemical constants like acid value, specific gravity, saponification value, iodine value, refrective index, HPTLC(High Performance Thin Layer Chromatography) where evaluated along with organoleptic characteristics. **Conclusion:** Pharmacognostical and physicochemical analysis study confirm that all the characters were found in ingredient drugs of *Phalakalyana Ghrita*.

KEYWORDS: *Phalakalyana Ghrita*, HPTLC, Tubal blockage, IUUB, Pharmaceutics, Pharmacognocy.

INTRODUCTION

Tubal and peritoneal pathology is among the most common cause of infertility. The American Society for Reproductive Medicine (ASRM) says that 25 to 35% of female infertility is due to tubal factor. So it is selected for study. The mechanisms responsible for tubal factor infertility obviously involve anatomic abnormalities that prevent the union of sperm and ovum. Fallopian tubes can be correlated with the *Artavavaha* (*Artava-beeja-vaha*) *Srotasa*, its block can be compared as *Sanga* type of *Srotodushti*. Tubal blockage has been considered as the *Tridoshaja* condition dominantly *Vata-Kapha Dosha*. The drug assumed as effective to open the fallopian tube was considered to have *Vatakaphashamaka* & *Tridoshaghna* properties.

Uttarabasti [Intra Uterine *Uttarabasti* (IUUB)] with various medicated oil / Ghee is an unique procedure mentioned in Ayurveda especially for the treatment of all gynecological disorders: *Vandhyatva, Artavadusti* and other *Yonirogas* where other treatments become failure. *Uttarabasti* acts on endometrium and increases receptivity of endometrium and facilitate nidation of fertilized ovum. So keeping this in mind, *Apamarga Kshara Taila*[2] is selected for opening of the tube for its *Lekhana* (scraping) property. *Phalakalyana Ghrita*[3] is selected for *Ropana karma* and re-establish the function of fallopian tube. It is mentioned in *Bhaishajya Ratnavali* in chapter *Yoni Vyapad Chikitsa* containing medicine with *Balya* and *Brimhana, Vrishya, Garbhashayuttejaka* properties. It contains 22 drugs which are commonly used in gynecological disorder. *Phalakalyana Ghrita* (PKG) is a commonly prescribed poly herbal formulation in all type of infertility. Prime ingredients of PKG are *Shatavari. Kakoli* & *ksheerakakoli* were replaced with *Ashwagandha* and *Meda* were replaced with *Shatavari* due to its unavailability.

MATERIALS AND METHODS

Collection of Raw materials for *Phalakalyana Ghrita*

The raw drug materials were collected from the pharmacy department, GAU, Jamnagar.

Table No. 1: Ingredients of *Phalakalyana Ghrita.*

Contents	Latin Name	Part Used	Form	Ratio
Shatavari	*Asparagus racemosa* Willd.	*Moola* (Root)	*Svarasa* (Juice)	16 part
Manjistha	*Rubia cordifolia* Linn.	*Moola* (Root)	*Kalka*(Paste)	1 part
Yastimadhu	*Glycyrrhiza glabra* Linn.	*Moola* (Root)	*Kalka*	1 part
Kustha	*Saussurea lappa* C.B. Clarke	*Moola* (Root)	*Kalka*	1 part
Triphala	*Emblica officinalis* Gaertn. *Terminalia bellirica* Roxb. *Terminalia chebula* Retz.	*Phala* (Dry Fruit)	*Kalka*	1 part
Balamoola	*Sida cordifolia* Linn.	*Moola*	*Kalka*	1 part
Meda/satavari	*Litseagluinosa* Lour /*Asparagous recemosus* Willd.	*Moola*	*Kalka*	1 part
Ksheervidari	*Ipomoea digitata* Linn.	*Kanda* (Tuber)	*Kalka*	1 part
Ashwagandha	*Withania somnifera* Linn.	*Moola*	*Kalka*	1 part
Ajamoda	*Carum roxburghianum* Craib.	*Phala* (Dry Fruit)	*Churna* (Fine powder)	1 part
Haridra	*Curcuma longa* Linn.	*Kanda* (Rhizome)	*Kalka*	1 part
Daruharidra	*Berberis aristata* Roxb.	*Kandsara* (Heartwood)	*Kalka*	1 part
GhritabhrustaHing	*Ferula narthex* Boiss.	*Niryas* (Regin)	*Kalka*	1 part
Katuki	*Picrorhiza kurroa* Royle	*Moola*	*Kalka*	1 part
Neelkamal	*Nelumbonucifera* Gaertn.	*Pushpa* (Flower)	*Kalka*	1 part
KumudaPuspa	*Nymphaeanouchali* Burm.	*Pushpa*	*Kalka*	1 part
Draksha	*Vitis vinifera* Linn.	*Phala* (Dry fruits)	*Kalka*	1 part
Kakolee+Ksheerkakolee/ Ashwagandha	(*Abhava dravya*) *Withania somnifera* Linn.	*Moola*	*Kalka*	1 part
Raktachandan	*Pterocarpus santalinus* Linn. f.	*Kandsara*	*Kalka*	1 part
Swetchandana	*Santalum album* Linn.	*Kandsara*	*Kalka*	1 part
Sharkara	*Saccharum officinarum* Linn.	*Ghana(crystal)*	Sugar	1 part
Go Ghrita	----------	----------	Liquid	4 part
Go Dugdha	----------	----------	Liquid	16 part

Method of preparation of *Phalakalyana ghrita*

The drugs enlisted in the TABLE 1 were taken and PKG was prepared as per classics.

- *Kalka Dravyas* - Each12 gm (coarse powder)
- *Drava Dravyas – Godugdha* -3 litre, *Shatavari Swarasa*- 3 litre
- *Sneha Dravya - Goghrita* – 750 ml.

Organoleptic Characters

Contents of PKG were evaluated for organoleptic characters like taste, odour and colour etc**.**

Microscopical Evaluation of *Phalakalyana Ghrita*

The individual powered drug are first examined under distilled water for the observation of calcium oxalate crystals and other cellular materials, then stained with Phloroglucinal and conc. HCl for the lignified characters, then stained with iodine to observe the starch grains. Raw drugs were separately studied under microscope, the diagnostic characters microphotographs are taken by using Carl zeiss trinocular microscope.

Physico-Chemical Analysis

Phalakalyana ghrita was subjected to physicochemical study in order to develop analytical profiles. In this phase following parameter were carried out- Loss on drying at 1100C, pH value, ash value, water soluble extractive, alcohol soluble extractive.

High Performance Thin Layer Chromatography (Hptlc)

In HPTLC study of *Phalakalyana Ghrita*, methanol extraxt of *Phalakalyana Ghrita* was spotted on pre-coated silica gel 60254 aluminum plate by mean of Camag Linomate V sample applicator fitted with a 100µl Hamilton syringe. The mobile consisted of toluene: Ethyl acetate a ratio of 9:1 v/v. After development, densitometric scan was performed with a camag TLC scanner III in reflectance in absorbance mode at 254nm and 366nm under control of win CATS software. Then the plate was sprayed with vanillin sulphuric acid followed by heating and then visualized in day light.

OBSERVATION AND RESULT

Pharmacognostical Study

Table no.2: Organoleptic characters.

Sr.No	Characters	Observed
1	Touch	Viscous
2	Colour	Yellowish
3	Taste	Bitter & Slight Sweet
4	Consistency	Semi-Solid
5	Odour	Agreeable

Table no. 3: Microscopic characters of raw drugs of *Phalakalyana Ghrita.*

Sr. No.	Name of Drug	Part used	Characters Observed
1.	*Shatavari*	Root	Parenchyma cells, Acicular crystals and raphides of calcium oxalate, scalariform vessels, Fragments of cork in surface view
2.	*Ksheervidari*	Tuber	Simple and compound starch grains, fibres, prismatic crystals, parenchyma cells
3.	*Y(ashthimadhu*	Root	Fibres with narrow lumen, prismatic crystals, stone cells, oil globules, starch grains, yellowish matter
4.	*Ashwagandha*	Root	Fragments of pitted vessels, cork exfoliated or crushed, sievetubes, companion cells.
5.	*Manjistha*	Root	Prismatic and acicular crystal of calcium oxalate, fibres, cork in surface view, simple starch grains, brown contents, pitted vessel
6.	*Kushtha*	Root	Oil globules, prismatic crystals, starch granules, spiral vessels, sceleriform vessels, parenchyma cells, Stone cells
7.	*Triphala: Haritaki* *Bibhitaki* *Amalaki*	Fruit	Epicarp cells, epidermal cells, sc1ereids, group of stone cells, tannin content and starch grains simple rounded or oval in shape. Epicarp cells, mesocarp cells, Stone cells in groups, rosettes of calcium oxalate and trichome Silica crystals, scleroids, fibres, mesocarp cells, epicarp cells
8.	*Ajamoda*	Fruit	Vittae cells, oil globules, aleurone grains, lignified parenchyma cells, spiral, scalariform vessels, epidermal cells
9.	*Haridra*	Tuber	Vittae cells, oil globules, aleurone grains, lignified parenchyma cells
10.	*Daruharidra*	Heartwood	Epidermal cells, unicellular hairs, multibranched lignified trichomes, fragments of spongy parenchymatous cells, stomata, tanniniferous contents, pollen grains
11	*Draksha*	Fruit	Acicular, rosette and prismatic crystals of calcium oxalate, endosperm cells, thick-walled yellowish cells; endosperm composed of angular parenchymatous cells, oilglobules and cluster crystals of calcium oxalate
12	*Shweta Chandana*	Heartwood	Lignified fibres, crystal fibres, oil globules, border pitted vessels, starch grains
13	*Rakta Chandana*	Heartwood	Vessels large border pitted, prismatic crystals of calcium oxalate occur in a few cells, red colouring matter, fibres abundant, and starch grains.
14	*Atibala*	Root	Multibranched trichomes, fibres, cork in surface view, fragment of spiral vessel, starch grains, prismatic crystals
15	*Kumuda*	Flower	Multibranched trichome, pollen grains
	Utapala	Flower	Watery trichome with pollen grains, lignified trichome
16	*Katuki*	Root	Tannin content, pitted vessels

Physico chemical analysis

Physicochemical analysis of PKG revealed the loss on drying value was 0.0% w/w, Specific gravity was 0.9112, Refractive index was 1.4700, Iodine value was 46.52, Saponification value was 210.67 and Acid value was 3.26 (TABLE- 4)

Table No. 4.

Sr.No.	Parameters	*Dashmoola Taila*
1.	Specific Gravity at room temp. at 32^0 C	0.9112
2.	Referactive Index at 40^0 C	1.47
3.	Acid value	3.26
4.	Iodine Value	46.52
5.	Saponification	210.67

High performance thin layer chromatography (HPTLC)

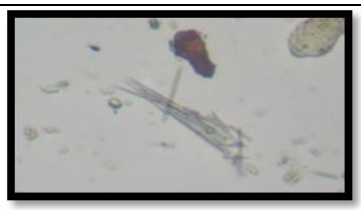
Chromatographic study (HPTLC) was carried out under 254 and 366 nm UV to establish Finger printing profile. It showed 7 spots at 254 nm with Rf values and 5 spots at 366 nm with Rf values were recorded which may be responsible for expression of its pharmacological and clinical actions. (PLATE- 2).

Table No. 5.

Sr. No.	Samples	Conditions	No. Of Spots	Rf
1	*Phalakalyana ghrita*	Short UV–254 nm	7	0.05,0.23,0.27,0.35,0.42,0.71,0.85
		Long UV–366 Nm	5	0.06,0.23,0.35,0.41,0.85

PLATE NO -1

Microphotographs Of *Phalakalyana Ghrita*

<table>
<tr>
<td> 
Acicular crystals of Manjista</td>
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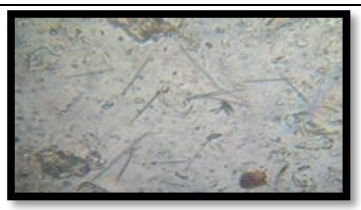
Border pitted vessels of Manjistha</td>
<td> 
Acicular crystals of Shatavari</td>
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<td> 
Cork in surface view of Shatavari</td>
<td> 
Prismatic crystals of Yastimadhu</td>
<td> 
Pitted vessels of Yastimadhu</td>
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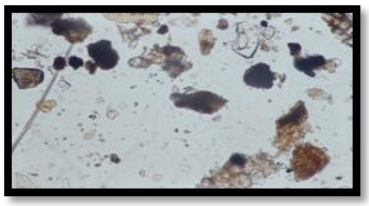
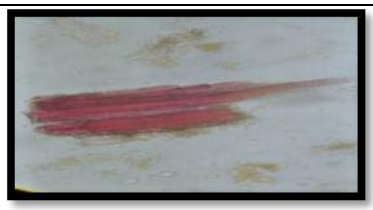
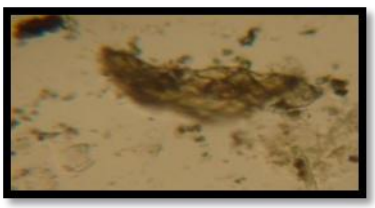
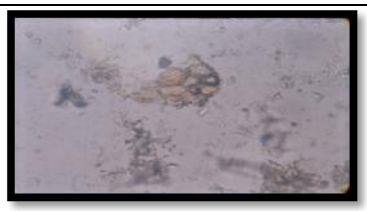
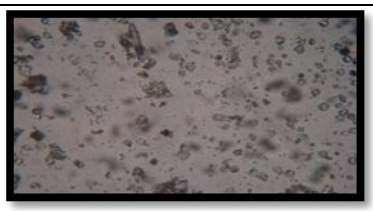
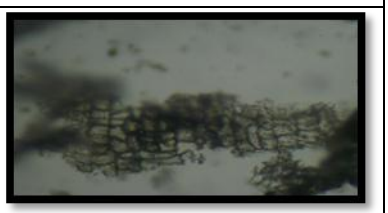
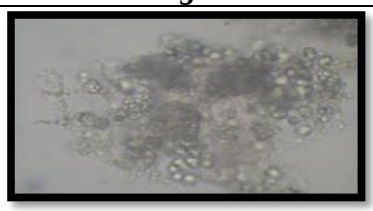
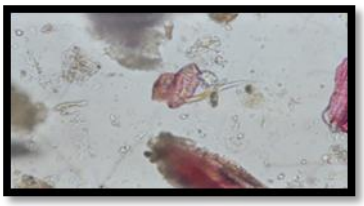
 **Tannin content of *Katuki***	 **Pitted vessels of *Katuki***	 **Multibranched trichome of *Kumuda***
 **Pollen grains of *Kumuda***	 **Lignified trichomes of *Utpala***	 **Warty trichome with pollen grain of *Utpala***
 **Lignified fibres of *Raktachandana***	 **Prismatic crystals of *Raktachandana***	 **Borderpitted vessels of *Chandana***
 **Rhomboidal crystal of *Chandana***	 **Scleroids of *Amalaki***	 **Epidermal cells of *Amalaki***
 **Cork in surface view of *Ashwagandha***	 **Simple starch grains of *Ashwagandha***	 **Cork in tangential view of *Bala***
 **Parenchyma cells with starch grains of *Bala***	 **Stone cells of *Bibitaki***	 **Fibres of *Bibitaki***

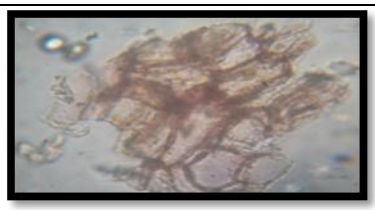
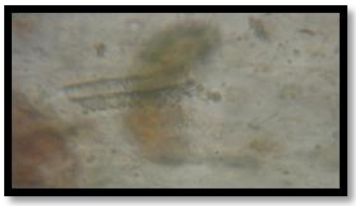
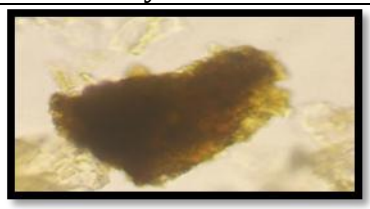
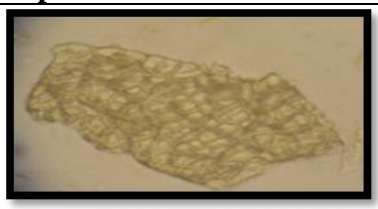
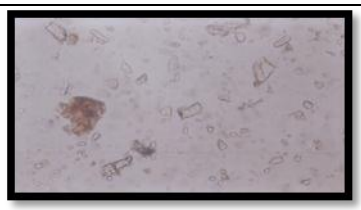
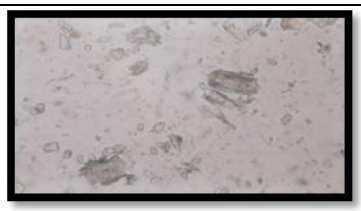
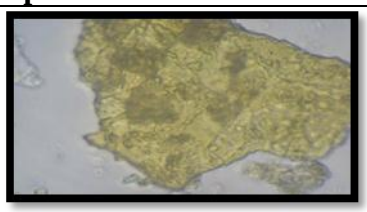
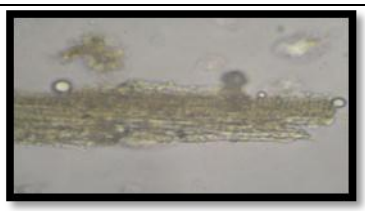
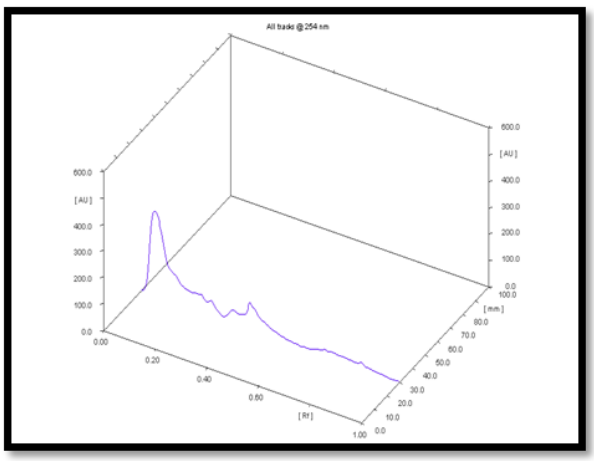
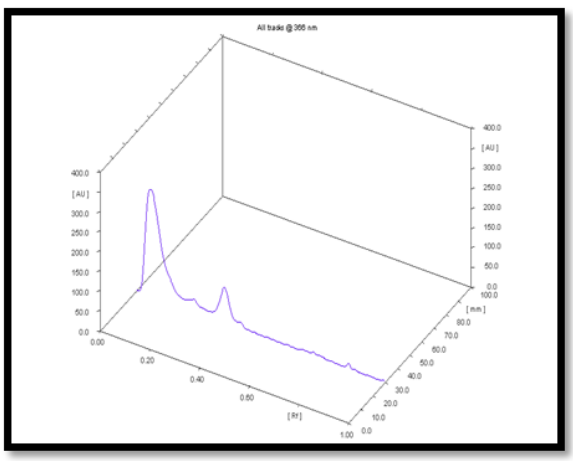
		
Cork in surface *Daruharidra*	**Borderpitted vessels of *Daruharidra***	**Spiral vessels of *Draksha***
		
Rosette crystal of *Draksha*	**Spiral vessels of *Haridra***	**Olioresine of *Haridra***
		
Tannin contant of *Haritaki*	**Epidermal cells of *Haritaki***	**Olioresine of *Kushta***
		
Pitted vessels of *Kushta*	**Epidermal cells with oilglobules of *Ajmoda***	**Fibres with oil globules of *Ajmoda***

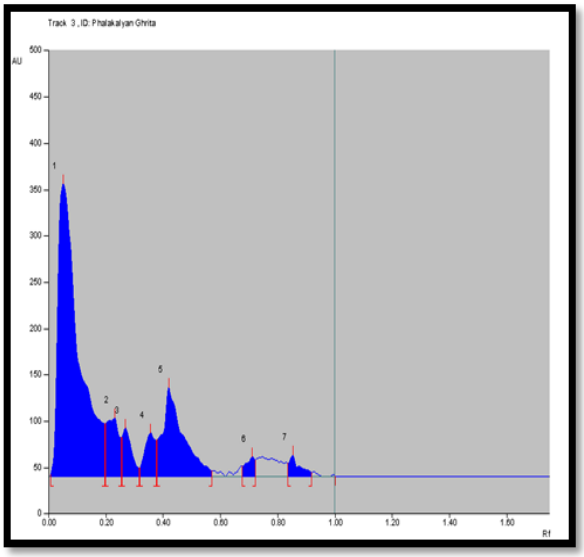
Plate No. 2



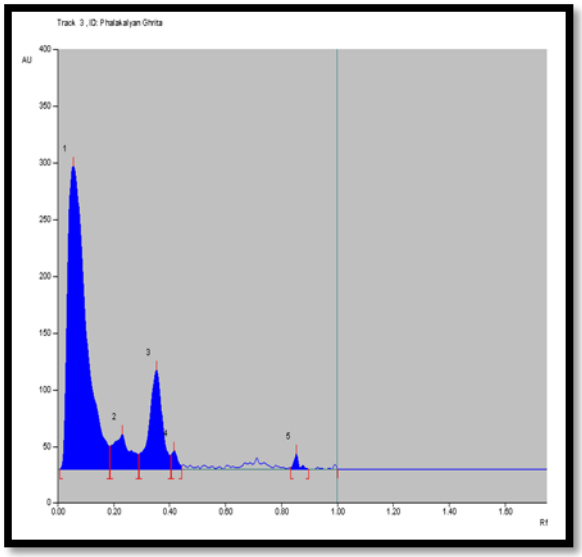
3D Graph: 366nm of *Phalakalyana ghrita*



3D Graph: 254 nm of *Phalakalyana ghrita*



Chromatographic Results (Peak display) of *Phalakalyana Ghrita* at Short ultra violet (254 nm)



Chromatographic Results (Peak display) of *Phalakalyana Ghrita* at Short ultra violet (366 nm)

DISCUSSION

Pharmacognosy and pharmaceutical evaluation of *Phalakalyana Ghrita* were performed. Pharmacognostical evalution showed that organoleptic characters of the sample was yellowish in color, Agreeable in odour, bitter &slight sweet, viscous in touch and semi solid consistency. In physiochemical analysis; referactive index at 40^0C is 1.47, specific gravity at room temp. at 32^o C is 0.9112, acid value is 3.26, iodine value is 46.52, saponification value is 210.67. Some additional important analysis and investigations are required for the identification of all the active chemical constituents of the test drug to substantiate the clinical efficacy.

CONCLUSION

Pharmacognostical study confirm that all the characters were found in ingredient drugs of *Phalakalyana Ghrita.* The physicochemical analysis inferred that the formulation meets maximum qualitative standards and parameters. The Outcome of the study can be taken as standard references for the further studies.

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