BERACA

RAIN FOREST 03710
(REFINED MURUMURU BUTTER)

RAIN FOREST
SPECIALTIES
BRASIL

BERACA presents a wide portfolio composed of fixed oils, butters, scrubs, clays and actives sustainably sourced from the Brazilian biodiversity. The ingredients come from extractive communities throughout Brazil and are manufactured to connect our biodiversity with thousands of consumers around the world. Through a relationship marked by transparency, traceability and innovation, Beraca contributes directly to regional development and environmental preservation.

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GENERAL INFORMATION

Product Code: BR03710B
Related codes: BR03710BA00, BR03710BX01, BR03710BS01, BR03710BS03, BR03710BX03, BR03710BX04, BR03710BX30
Previous code: RF3710

The *Astrocaryum murumuru* species belongs to the Arecaceae family, it is a native Amazonian plant, popularly known as Murumuru.

The palm of Murumuru is a tree from primary forests areas, both from dry lands and from flooded lands, and can still be found in roosts and cultivated pastures. It is a palm tree with appealing and exuberant size, can reach up to 10 m in height, undeveloped stem, long leaves up to 4 m. It is multiplied from the seeds. Distributed in all Amazon states, along rivers, in temporarily flooded areas and in dense or semi-open forest formations.

The fruiting of the species occurs between the months of December and April. The Murumuru seed contains a slightly conical-shaped almond, consisting of a white, hard mass. The outer surface of the almond (the shell of the seed), is gray in color.

COSMETIC USE

Murumuru butter, extracted from the fruit seeds, is rich in lauric, myristic and oleic acids. It has moisturizing and restoration properties for hair due to the high concentration of low molecular weight fatty acids.

It also enables the recovery of moisture and natural elasticity to the skin by strengthening the skin barrier, especially in dry and mistreated skins.

EFFICACY EVALUATION

INTRODUCTION

The skin is the largest organ of the human body, divided into three layers (epidermis, dermis and hypodermis) being responsible for the mechanical protection, coating, sensory functions, thermoregulation, among other functions.

The stratum corneum is the first layer of the epidermis, being formed by cells called denominated corneocytes, connected by a complex lipid matrix (Figure 1). This layer presents approximately 10 to 20% of water, and the percentage of hydration depends on the balance between the supply of water to skin and the loss of the water through evaporation. The water loss depends on the quantity of layers of corneocytes. The greater the number of layers, the greater the path to be followed by the water, the lower the evaporation.

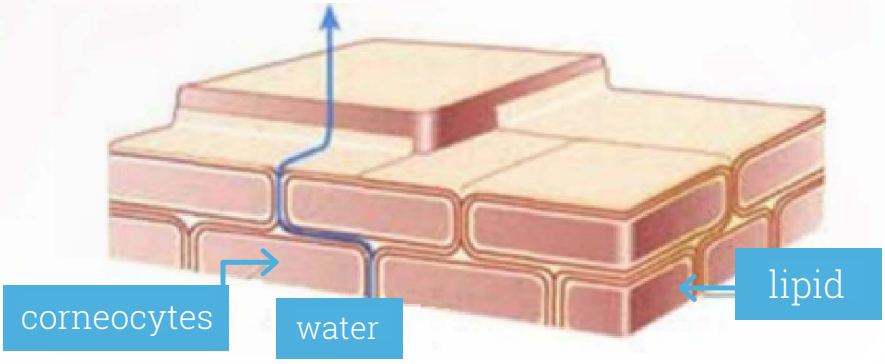


Figure 1. Schematic representation of the stratum corneum, illustrating the corneocytes and the lipid layer between them.

One of the harmful factors to the skin is dehydration. Besides the natural evaporation, some external factors may influence on the dehydration of the skin or destruction of the protective barrier, such as low atmospheric humidity, pollution, very low temperatures and the use of products abrasive to the skin, such as solvents, detergents, soap in excess and some other chemicals. The degree of water loss depends on the intensity of exposure to those factors.

Dehydrated skin presents a dry appearance, without firmness, elasticity or vigor. The use of moisturizing cosmetics can prevent the loss of water in two ways: by forming a barrier against the superficial evaporation or hydrating the stratum corneum (by water contained in these formulations or by absorption of atmospheric water).

In this context, Beraca presents the RAIN FOREST 03710 (REFINED MURUMURU BUTTER), with proven efficacy on the preservation of skin hydration and decrease in transepidermal water loss by strengthening the skin barrier.

OBJECTIVE

The aim of the study was to evaluate the moisturization of the superficial layer of the skin by corneometry and TEWL methods (transepidermal water loss) in subjects undergoing topical treatment with REFINED MURUMURU BUTTER at different concentrations in a moisturizer formulation.

METHODS

1. Laboratory

The studies were performed in independent laboratory, *Kosmoscience Ciência & Tecnologia Cosmética Ltda*. Study reference number: BC005-08 - R0.

2. Experimental groups and treatments

Experimental groups and their respective treatments for corneometry and TEWL assessments are listed in the following Table 1.

Table 1. Products used in the study. protocol BC011-08 - R0.

Experimental group	Treatment
CONTROL	No product applied
PLACEBO	Moisturizer without REFINED MURUMURU BUTTER
REFINED MURUMURU BUTTER AT 0.5%	Moisturizer with REFINED MURUMURU BUTTER (BR03710B) at 0.5%
REFINED MURUMURU BUTTER AT 1.5%	Moisturizer with REFINED MURUMURU BUTTER (BR03710B) at 1.5%
REFINED MURUMURU BUTTER AT 3.0%	Moisturizer with REFINED MURUMURU BUTTER (BR03710B) at 3.0%

All products were stored at room temperature for the duration of the study.

3. Procedure

3.1 Corneometry

The measurements were made using a Corneometer® 825 probe coupled to a Multi Probe Adapter MPA-5, which carries the probe. Simultaneously with each measurement, an Excel spreadsheet is automatically populated by the coefficient of variation (CV).

3.2 TEWL

Measurements were obtained by Tewameter® 300 coupled to a Multi Probe Adapter MPA-5, which carries the probe. For each area, independent measurements were performed.

Both studies consisted of applying the test product on 20 women between 18 and 60 years with dry skin characteristics. The women were instructed to not apply any product in the test area, in this case, the forearms, for 48 hours prior to the study.

Each volunteer was marked with five rectangles of 2.5 x 4.0 cm on both forearms. 20 uL of sample was applied randomly to the marked areas, and one of the marked areas was used as Control (without application of any product). The baseline measurements were made, prior to application of test products. After application, the volunteers remained in the laboratory for measurements after 2h, 4h, 6h and 8h of application for corneometry and 2h, 4h and 6h of application for TEWL.

The volunteers remained in environment with controlled temperature (22 ± 2°C) and relative humidity (55 ± 5%) throughout the study.

RESULTS

1. Corneometry

The data obtained through analysis of corneometry were performed using equations 1 and 2 below.

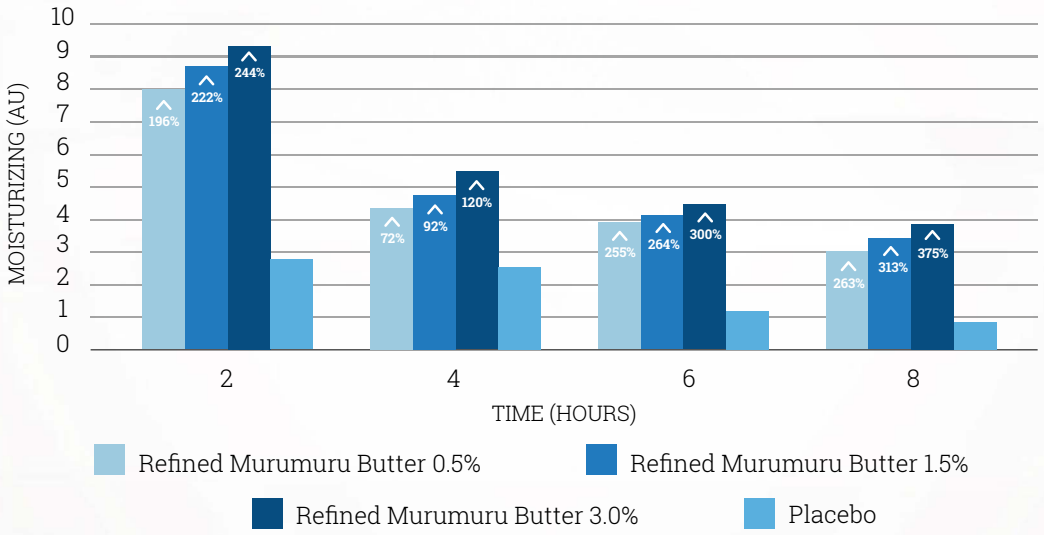
$$\Delta h = h_{ti} - h_{t0}$$

Equation 1. Difference in moisturizing between the reading of control and test products over time. Where: Δh = moisturizing difference, h_t = average of readings over time *ti* and h_{t0} = average of baseline measurements over time *t0*.

$$H_{ti} = \Delta h_{ti\ (product)} - \Delta h_{ti\ (control)}$$

Equation 2. moisturizing calculation, H_{ti} = moisturizing the skin after ti application time; $\Delta h_{ti\ (control)}$ *and* $\Delta h_{ti\ (product)}$ = difference in moisturizing intensity of control for the products compared to baseline measurements in ti time, respectively.

The higher the value of H_{ti}, higher the moisturizing observed by use of the test product relative to **Control** (reference values - not represented in the graph). Thus, the values obtained from equations 1 and 2 can be seen in Chart 1 below.

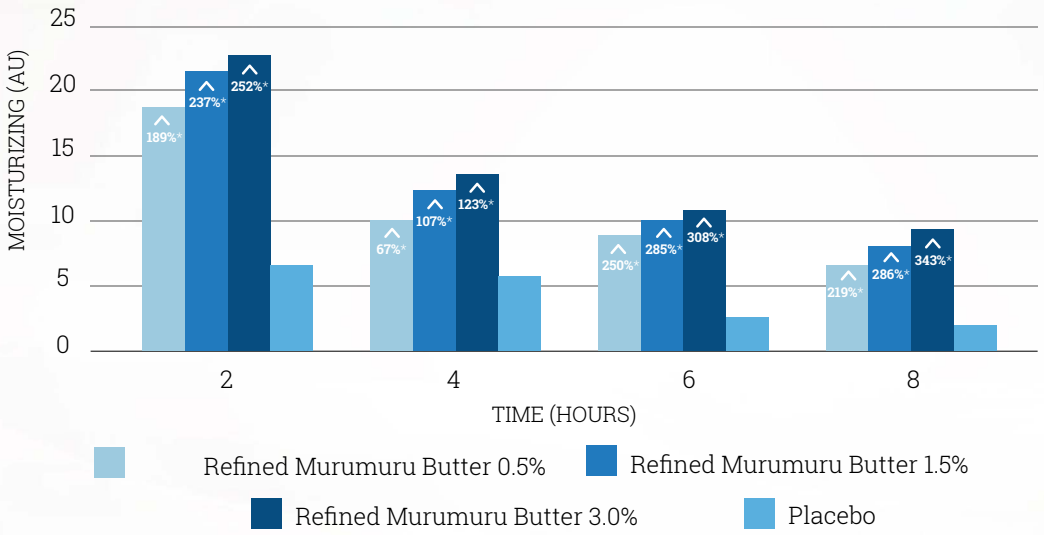


Graph 1. Moisturizing conferred by moisturizer samples with REFINED MURUMURU BUTTER at 0.5%, 1.5% and 3.0% in relation to placebo.

Chart 2 shows the percentage of moisturizing of the skin treated with the test product from equation 3 below.

$$\%\ Moisturizing = 100\ (H_{ti}/h_{t0})$$

Equation 3. Calculation of % moisturizing over ti time. H_{ti} = skin moisturizing after ti time for application of sample; h_{t0} = average of baseline measurement in *t0* time.



Graph 2. Percentage of moisturizing (%) conferred by moisturizer samples with REFINED MURUMURU BUTTER at 0.5%, 1.5% and 3.0% compared to placebo.

The difference in moisturizing values obtained from samples of moisturizer with REFINED MURUMURU BUTTER at 0.5%, 1.5% and 3.0% compared to placebo, were statistically compared using the bimodal, unpaired t-test method of Student, considering a 95% confidence interval.

According to the results, skin moisturizing obtained with moisturizer samples with REFINED MURUMURU BUTTER at 0.5%, 1.5% and 3.0% showed a statistically significant difference in 2, 4, 6 hours and 8 hours after the application when compared to control. This indicates that the formulations with REFINED MURUMURU BUTTER are capable of maintaining skin moisturizing for at least 8 hours after application.

The test products were compared by analysis of variance method (ANOVA) with Tukey's post-test, with 95% confidence interval.

According to the results illustrated in charts 1 and 2 and the results of the statistical analysis, you can see that:

• The moisturizer sample with REFINED MURUMURU BUTTER at 0.5% showed no significant difference between samples of moisturizer with REFINED MURUMURU BUTTER at 1.5% and 3.0%. However showed moisturizing significantly superior than placebo after 2 and 6 hours of application.

• The moisturizer sample with REFINED MURUMURU BUTTER at 1.5% showed no significant difference when compared to moisturizer samples with REFINED MURUMURU BUTTER at 0.5% and 3.0%. When compared to placebo, the samples also presented significant increase in 2 and 6 hours after application.

• The moisturizer sample with REFINED MURUMURU BUTTER at 3.0% presented significantly higher moisturizing compared to placebo in all evaluated times.

2. TEWL

To assess the significance of change of hydrolipidic barrier associated with TEWL, the values of Δe (equation 4) calculated for areas with moisturizer samples with REFINED MURUMURU BUTTER were statistically compared with calculated values for Control using the bimodal, unpaired t-test method of Student, considering a 95% confidence interval for each assessment.

$$\Delta e_{ti} = TEWL_{ti} - TEWL_{t0}$$

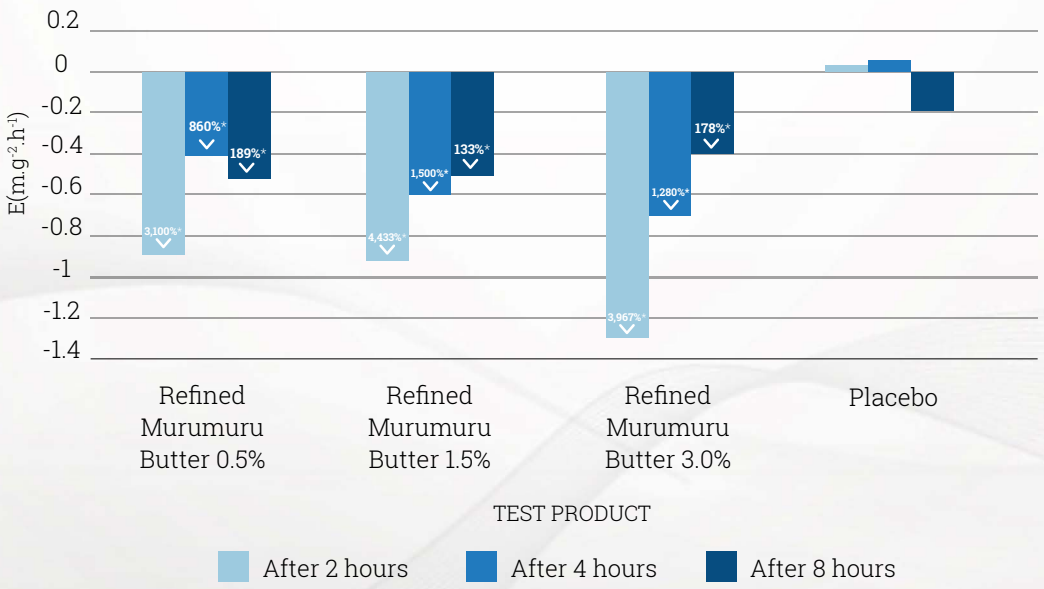
Equation 4. Difference in transepidermal water loss. Where: Δe = difference in transepidermal water loss; $TEWL_{ti}$ = reading averages per area over ti time and $TEWL_{t0}$ = average of baseline measurement over time *t0*.

According to the values calculated to Δe, it was observed that the moisturizer samples with REFINED MURUMURU BUTTER significantly reduced TEWL if compared to Control after 2 hours of application. For other time periods, there was no significant difference.
As for placebo, there was no significant difference in any of the evaluated times.

For a comparative evaluation, TEWL was calculated on the basis of Control (E_{ti}) using equation 5. Chart 3 shows the results after experimental application times.

$$E_{ti} = \Delta e_{(product,\ ti)} - \Delta e_{(control,\ ti)}$$

Equation 5. Calculation of transepidermal water loss due to the control, where: E_{ti} = transepidermal water loss after ti time of application of moisturizer samples with REFINED MURUMURU BUTTER. $\Delta e_{(placebo,\ ti)}$ e $\Delta e_{(control,\ ti)}$ = difference in *TEWL* for test products and control compared to the baseline measurement in the ti time, respectively.



Graph 3. TEWL for moisturizer samples with REFINED MURUMURU BUTTER at 0.5, 1.5% and 3.0% and Placebo assessed after 2h, 4h and 6h of application.

According to the results shown in Figure 5, we observed a decrease in TEWL at 2h, 4h and 6h after application of moisturizer with REFINED MURUMURU BUTTER at 0.5%, 1.5% and 3.0%, which may be indicative of the decreased TEWL by forming a film on the skin.

Placebo did not presented significant reduction of TEWL in any of the evaluated times.

CONCLUSION

1. Corneometry

According to the results, skin moisturizing checked by moisturizer samples with REFINED MURUMURU BUTTER at 0.5%, 1.5% and 3.0% showed a significant difference after 2, 4, 6 and 8 hours of application compared to Control. This indicates that the REFINED MURUMURU BUTTER can maintain skin moisturize for at least 8 hours.

The Placebo sample showed a significant difference after 2 hours and 4 hours of application compared to control. This indicates that its application maintained moisturizing for a maximum of 4 hours.

2. TEWL (Transepidermal Water Loss)

According to the obtained results, it was observed that the moisturizer samples with REFINED MURUMURU BUTTER at 0.5%, 1.5% and 3.0% significantly reduced the transepidermal water loss (TEWL) compared to Control after 2 hours. The results are an indication that the reduction in TEWL occurred because of the formation of a film on the skin.

Regarding Placebo, there was no significant reduction in any assessed times then compared to Control.

ATTACHMENT

FORMULATIONS USED IN TESTS

PLACEBO GROUP	
INGREDIENTS	**% w/w**
Aqua	Up to 100%
Tetrasodium EDTA	0.01
Beracare APS	4.00
Cetearyl Alcohol	4.00
Carbopol 940 (10% sol.)	2.00
Aqua	10.00
Germal 115	0.30

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REFINED MURUMURU BUTTER GROUP AT 0.5%	
INGREDIENTS	**% w/w**
Aqua	Up to 100%
Tetrasodium EDTA	0.01
BR03710B – REFINED MURUMURU BUTTER	0.50
Beracare APS	4.00
Cetearyl Alcohol	4.00
Carbopol 940 (10% sol.)	2.00
Aqua	10.00
Germal 115	0.30

REFINED MURUMURU BUTTER GROUP AT 1.5%	
INGREDIENTS	**% w/w**
Aqua	Up to 100%
Tetrasodium EDTA	0.01
BR03710B – REFINED MURUMURU BUTTER	1.50
Beracare APS	4.00
Cetearyl Alcohol	4.00
Carbopol 940 (10% sol.)	2.00
Aqua	10.00
Germal 115	0.30

REFINED MURUMURU BUTTER GROUP AT 3.0%	
INGREDIENTS	**% w/w**
Aqua	Up to 100%
Tetrasodium EDTA	0.01
BR03710B – REFINED MURUMURU BUTTER	3.00
Beracare APS	4.00
Cetearyl Alcohol	4.00
Carbopol 940 (10% sol.)	2.00
Aqua	10.00
Germal 115	0.30

APPLICATION

SUGGESTION OF FORMULATION

Formulation:	**NOURISHING FACIAL CREAM**
Reference number:	**FAC 032-0714**

INGREDIENTS	INCI	%w/w	SUPPLIER
PHASE A			
WATER	*Aqua*	q.s.p	-
DERMOFEEL PA-3	*Sodium Phytate, Aqua, Alcohol*	0.10	-
GLYCERIN	*Glycerin*	5.00	-
DERMOSOFT OMP	*Methylpropanediol, caprylyl glycol, phenylpropanol*	3.00	-
PHASE A1			
ARISTOFLEX AVC	*Ammonium Acryloyldimethyltaurate/VP Copolymer*	0.50	-

PHASE B			
SYMBIO MULS GC	*Glyceryl stearate citrate, cetearyl alcohol, glyceryl caprylate*	4.50	-
DERMOFEEL BGC	*Butylene Glycol Dicaprylate/Dicaprate*	6.00	-
CETEARYL ALCOHOL	***Cetearyl Alcohol***	2.00	-
BR03510B RAIN FOREST 03510 (REFINED PASSION FRUIT OIL)	***Passiflora edulis seed oil, tocopherol***	**1.00**	**BERACA**
BR03710B RAIN FOREST 03710 (REFINED MURUMURU BUTTER)	***Astrocaryum murumuru seed butter, Tocopherol***	**5.00**	**BERACA**
BR04010B RAIN FOREST 04010 (REFINED BABAÇU OIL)	***Orbignya oleifera seed oil, Tocopherol***	**2.00**	**BERACA**
DERMOFEEL TOCO 70 NON-GMO	*Tocopherol (and) Helianthus Annuus (Sunflower) Seed Oil*	0.50	-

PHASE C			
DERMAL PROTECTIVE SYSTEM	*Coffea arabica seed extract, Zingiber officinale rhizome extract, Melissa officinalis leaf extract, Maltodextrin, Silica, Caffein, Sodium benzoate, Potassium sorbate*	1.50	-
WATER	*Aqua*	10.00	-

PHASE D			
FRAGRANCE	*Fragrance*	0.50	-

Procedure:
Weigh all the ingredients of phase A and homogenize.
Disperse the phase A1 in phase A and wait 5 minutes to hydrate the polymer.
Add heat without stirring. Let reach 75°C - 80°C and stir until a gel is formed.
Weigh all the ingredients of phase B, heat to 75°C - 80°C.
Add phase B in phase A/A1 stirring. Homogenize for approximately 1-2 minutes using a Ultra Turrax.
Add the phase C and phase D solubilized below 35°C.

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PHYSICAL AND CHEMICAL PROPERTIES

ANALYSIS	UNITS	SPECIFICATIONS
Appearance	Visual	Waxy
Color	Visual	White to yellow
Odor	-	Characteristic
Melting Point	°C	25 - 37
Acid value (as oleic acid)	%	≤ 2.0
Peroxide value	meqO_2/Kg	≤ 10.0
Iodine value	gI_2/100g	≤ 25.0
Saponification value	mgKOH/g	230 – 310

FATTY ACID COMPOSITION

Caprylic acid (C8:0)	%	≤ 3.0
Capric acid (C10:0)	%	≤ 3.0
Lauric acid (C12:0)	%	35.0 – 50.0
Myristic acid (C14:0)	%	25.0 – 35.0
Palmitic acid (C16:0)	%	6.0 – 10.0
Stearic acid (C18:0)	%	2.0 – 6.0
Oleic acid (C18:1)	%	5.0 – 13.0
Linoleic acid (C18:2)	%	2.0 – 6.0

MICROBIOLOGICAL ANALYSIS

Total bacteria h. m.	cfu/g	< 100
Fungus and yeasts	cfu/g	< 100

STORAGE INFORMATION

- **Shelf Life** → 30 months
- **Conditions** → Dry, cool, airy place away from light and heat and in an environment with constant temperature not exceeding 25°C

IMPORTANT OBSERVATIONS

• Considering that this is a natural product, if the storage guidelines are not met, the physicochemical characteristics may vary, reducing the shelf life.

•After opening the product it should be used as soon as possible. Contact with oxygen generates an oxidative process by decreasing the shelf-life of the product.

• Due to the uniqueness of each butter, it is not possible to establish an oxidative parameter for the period of exposure.

• Natural oil substances and waxes could settle during storage and develop a slight sedimentation at the bottom of the container. Please have this in mind when emptying the container.

• The above information has been developed with the methods and practices set out in AOCS (American Oil Chemists' Society).

REGULATORY INFORMATION

INCI Name (PCPC / COSING)	CAS number
ASTROCARYUM MURUMURU SEED BUTTER	356065-49-1
TOCOPHEROL	59-02-9, 16698-35-4, 54-28-4, 119-13-1

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