

## Chelioscopy and Molar Relationship among Young Adults

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### Abstract

Malocclusion is one of the most common oral health problems faced by mankind. Oral health problems can be partly explained by the fact that these diseases are genetically linked. It is a known fact that the epithelium of lips and tooth develop at the same time of intrauterine life. So, our study was an attempt to correlate the angle's molar relationship status in an individual with their lip patterns. A cross-sectional study was carried out on 168 dental students from origin of Tamil Nadu, Andhra Pradesh, Kerala and Karnataka. Age range of 18-30 years. The lip pattern was recorded and classified by Suzuki and Tsuchihashi, and molar relation was assessed using Angle's molar classification. The obtained data were subjected to statistical analysis using Chi-square test. More than 45% of the study participants from all the south Indian origin had combination type lip pattern. The second majority lip print who was predominant in the south Indian origin was type I lip pattern. Participants with type I lip pattern were significantly associated with Angle's class I molar relationship. Type I lip pattern was a predictive indicator Angle's molar relationship status, which had Class I angle's molar relationship respectively.

**Keywords:** Angles Molar Relationship, Chelioscopy, Lip Pattern, Lip Print, Malocclusion

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### 1. Introduction

The mouth is after all regarded as the organ system "where it all begins [1]." It opens up a wide range of forensic identification options. Soft oral and perioral tissue prints can also provide information in addition to tooth impressions. It is commonly known that the hard palate and the lips both have characteristics that can help identify a person. Lip prints, fingerprints, and palatal rugae are indelible markings that don't change with age. Lip prints are recognisable patterns of lines and fissures that appear where the outer skin of the human lip meets the inner labial mucosa. Lip prints are a common pattern created by the labial mucosa's creases and grooves. Chelioscopy is a forensic investigation procedure used to identify a person using their lip prints [2].

It can be characterised as "a technique for identifying a person based on distinctive arrangements of lines appearing on the red part of the lips or as a science dealing with lines appearing on red section of the lips [3]. Chelioscopy is the scientific study of lip prints. Chelioscopy comes from the Greek words cheilos, which means "lips," and ekopein, which means "to see." The lone exception being monozygotic twins, these patterns are crucial because they each bear a distinctive identifier. Even after herpes outbreaks, their lip print patterns remain recognisable as early as the sixth week of intrauterine life. Numerous orofacial and dental

disorders, including early childhood caries, malocclusion, periodontal illnesses, cleft lip and palate, and premalignant lesions and pathologies, have been linked to specific lip print patterns [4].

R. Fischer published the first description of chelioscopy in 1902. Two Japanese scientists, Y. Tsuchihashi and T. Suzuki, analysed 1364 individuals between 1968 and 1971 and established that the arrangement of furrows on the lips, which is particular to each human, may be used to identify a person. Lip prints are utilised for human identification because they remain consistent over the course of a person's life and return to their original pattern after any defects. This increases their forensic significance [5]. Numerous researchers have categorised these patterns in various ways, including the Suzuki and Tsuchihashi categorization [6].

Suzuki and Tsuchihashi classification is as follows

- a. Type I: Vertical groove across lips
- b. Type I': Partial groove pattern
- c. Type II: Branched
- d. Type III: Intersected pattern
- e. Type IV: Reticular pattern
- f. Type V: Other lip patterns

The pattern on the lips is most frequently classified using this system. Lip impressions can be captured in a variety of ways. Taking a photograph of the suspect's lips. Tracings of the grooves can be photographed, enlarged, and overlaid on a non-porous flat surface like a mirror. Using a finger printer, particularly a roller finger printer; applying lipstick, lip rouge, or other acceptable transfer mediums to the lips; and having the individual press his or her lips to a piece of paper, cellophane tape, or similar surface. By having the subject press his or her lips against a suitable surface without using lipstick or another recording material, then processing the resulting prints either with regular finger print developing powder or with a magna brush and magnetic powder [7].

The oral cavity is important for mastication, aesthetics, phonetics, communication, and emotional expression, among other things [8]. Oral health-related quality of life refers to how one's oral health affects their overall quality of life. Dental caries and malocclusion are the two major illnesses that are associated with this oral health-related quality of life. Dental caries is a complex illness that affects humans on a widespread basis. Malocclusion ranks third among the primary oral health issues, after periodontal disease and tooth caries. Malocclusion, or deviation from normal occlusion, causes teeth to be out of alignment, which has a negative impact on overall appearances and lowers one's sense of self-worth.

Genetic and environmental factors have the greatest influence on malocclusion. Malocclusion can be treated with a variety of procedures and preventative measures, but predicting the lip pattern may offer an alternative treatment for these oral disorders. It is well known that the lips, in particular, start to form during the sixth or seventh week of an embryo's life. It's interesting to note that teeth grow at the same time as foetuses do. If malocclusion is not appropriately channelled at an early level, it may result in a number of bone abnormalities in the future [5]. Thus, using lip pattern as a non-invasive diagnostic could help determine whether a person has malocclusion. Hence the present study aims to determine the correlation between different cheiloscopy patterns with the Angle's classification of molar relationships.

## 2. Materials and Methods

### 2.1. Study design

A cross sectional study

### 2.2. Study setting

The study was done among various dental colleges in Chennai, among the dental students who have their origin from Tamil Nadu, Andhra Pradesh, Kerala and Karnataka. The sample size was calculated using Epi Info sample size calculation software.  $N = z p (1 - p) / d^2$ . Where,  $z=1.96$  for 95% confidence interval,  $p =$  Highest prevalence of malocclusion among types of lip pattern is 87.5%, i.e., 95%  $d=$  acceptance margin of error i.e., 5% The sample size was calculated to be 168, whomever is willing to participate and provide informed consent will be recruited and cluster random sampling method will be used.

### 2.3. Inclusion criteria

- Participants between 18-30 years of age and are from Tamil Nadu, Andhra Pradesh, Kerala and Karnataka will be included in the study

- Participants who are willing to participate in this study and will provide informed consent

### 2.4. Exclusion criteria

- Participants with any pathology of lip will be excluded
- Participants who are already under orthodontic treatment
- Participants who have missing molar tooth will be excluded
- Participants who are not willing to participate in this study and will not provide informed consent

### 2.5. Study population

Students from various Dental Colleges in Chennai city will be recruited in the study based on the inclusion and the exclusion criteria. The participants will be informed about the study and informed consent will be obtained priorly. A total of 168 students were included in this study. Out of these 168 students 42 students belong to the origin of Tamil Nadu and 42 students belong to the origin of Andhra Pradesh and 42 students belongs to the origin of Kerala and 42 students belongs to the origin of Karnataka population in which quota sampling will be used to recruit the participants.

### 2.6. Study duration

The present study was done in December 2022 to February 2023

### 2.7. Methodology for recording lip prints

For recording lip prints, students were instructed to open their mouths wide and spread Vaseline around their lips before applying lipstick evenly to both their upper and lower lips in one move. They were instructed to softly touch both lips together to ensure uniform lipstick application. The lips were covered with cellophane tape that was cut with scissors. In order to avoid smearing the print, the tape was carefully taken from one end to the other and set on the white paper chart [9]. The recordings were divided based on origin once the lip pattern had been captured. The type of lip pattern was identified using the Tsuchihashi classification [10].

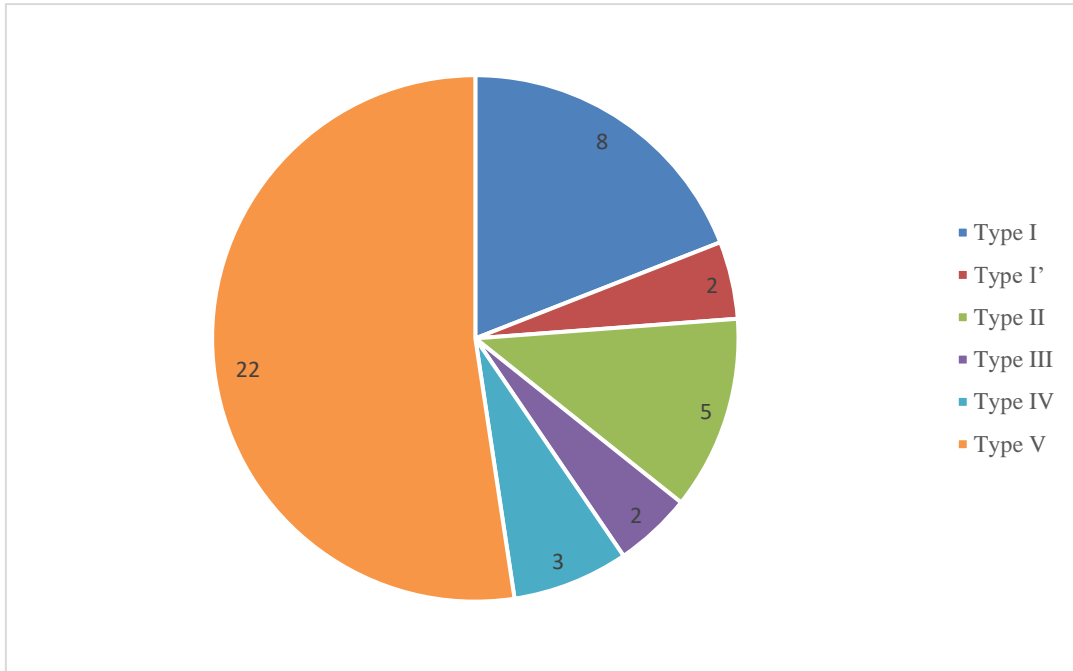
### 2.8. Statistical analysis

Data will be collected and analysed using the Statistical package of social sciences (SPSS) Version 24. Chi-square test will be used to determine the association between lip pattern with Angle's molar relationship. A P value of  $\leq 0.05$  is considered as statistically significant.

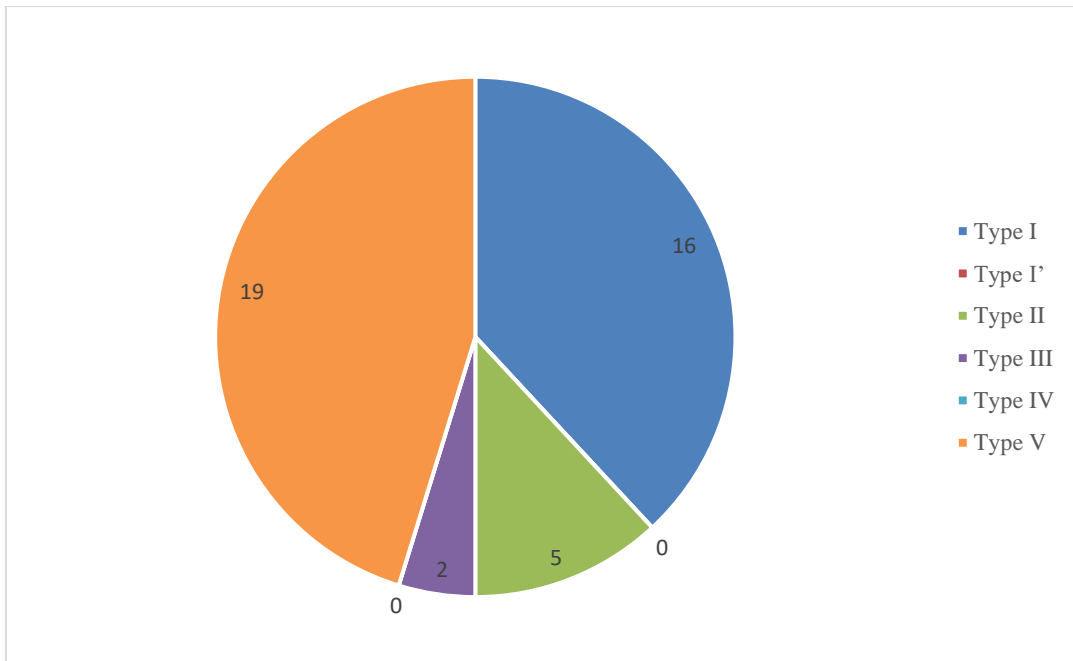
## 3. Results and discussion

### 3.1. Results

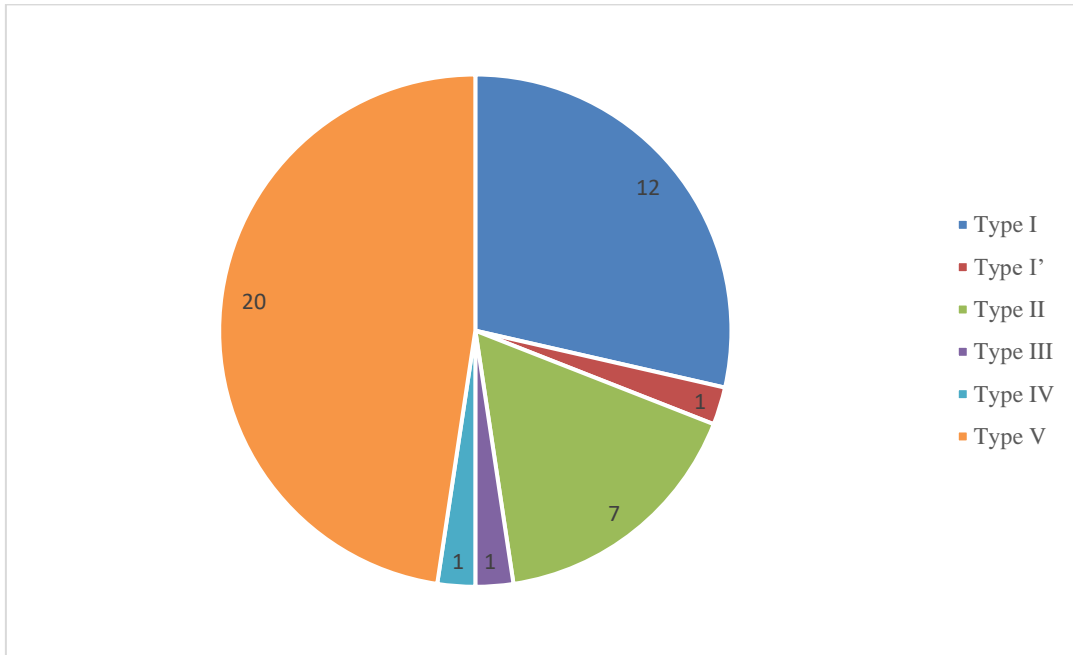
All the lip prints were cautiously observed and patterns were verified. Out of these 168 students 42 students belong to the origin of Tamil Nadu and 42 students belong to the origin of Andhra Pradesh and 42 students belongs to the origin of Kerala and 42 students belongs to the origin of Karnataka population. The mean age of the participants were  $20.06 \pm 1.69$ . The number of male participants were 26 and the number of female participants were 142. . Among Tamil Nadu study participants, lip patterns were distributed .



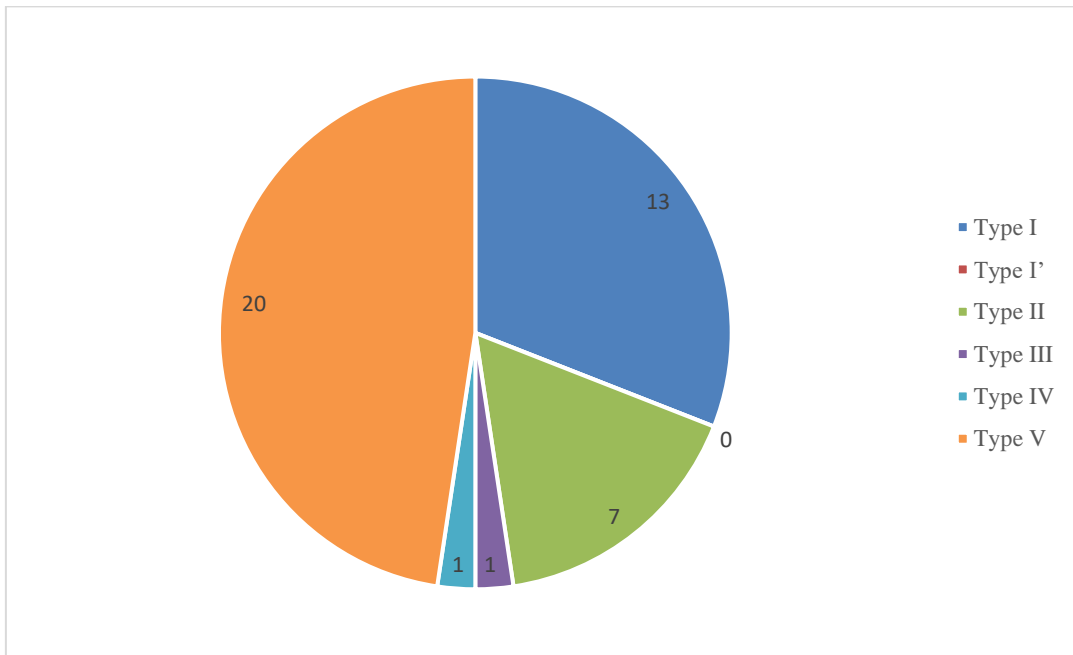
**Figure 1.** Distribution of lip pattern among Tamil Nadu origin study participants.



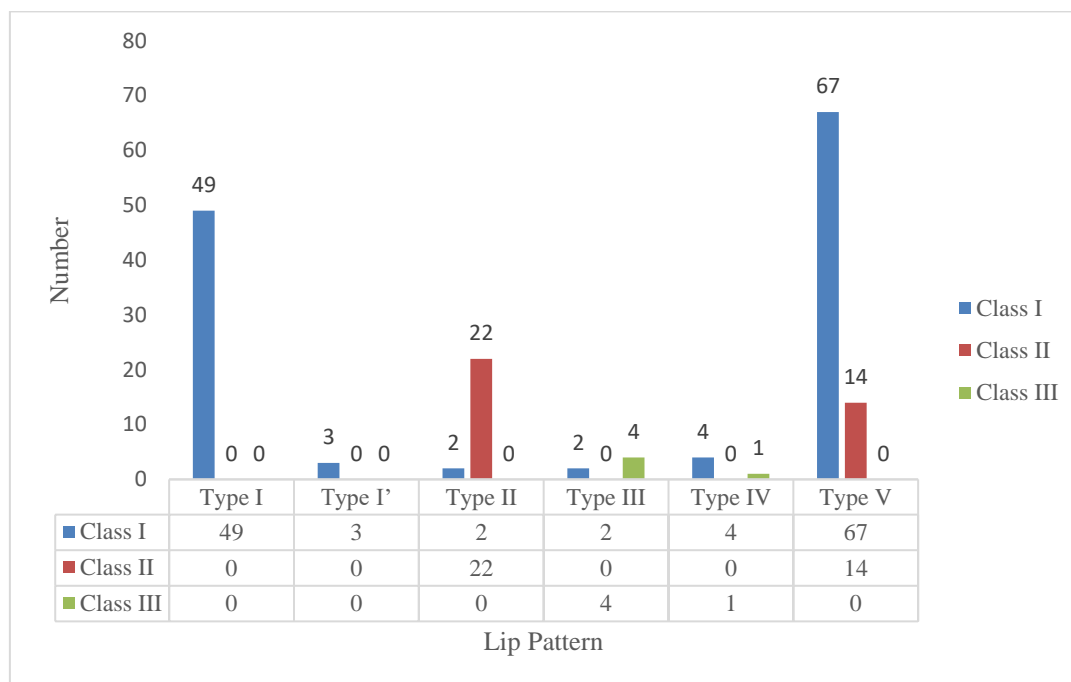
**Figure 2.** Distribution of lip pattern among Andhra Pradesh origin study participants.



**Figure 3.** Distribution of lip pattern among Kerala origin study participants.



**Figure 4.** Distribution of lip pattern among Karnataka origin study participants.



**Figure 5.** Bar chart depicting the association between lip pattern and Angle's malocclusion

**Table 1:** Association between lip pattern and Angle's molar relationship group.

Lip pattern	Angle's molar relationship			Total	X <sup>2</sup>	p
	Class I	Class II	Class III			
Type I	49	0	0	49	234.84	0.00*
Type I'	3	0	0	3		
Type II	2	22	0	24		
Type III	2	0	4	6		
Type IV	4	0	1	5		
Type V	67	14	0	81		
<b>Total</b>	127	36	5	168		

As, Type I (19.4%), Type I' pattern (4.8%) Type II pattern (11.9%), Type III pattern (4.8%), Type IV pattern (7.14%), Type V pattern (52.9%). [Figure 1]. Among the Andhra Pradesh study participants, the lip patterns were distributed as Type I (38.1%), Type I' pattern (0%) Type II pattern (11.9%), Type III pattern (4.8%), Type IV pattern (0%), Type V pattern (45.2%). [Figure 2]. Among Kerala study participants, lip patterns were distributed as Type I (28.5%), Type I' pattern (2.4%) Type II pattern (1.6%), Type III pattern (2.4%), Type IV pattern (2.4%), and Type V pattern (47.6%). [Figure 3].

Among the Karnataka study participants, the lip patterns were distributed as Type I (2.38%), Type I' pattern (0%) Type II pattern (1.6%), Type III pattern (2.4%), Type IV pattern (2.4%), and Type V pattern (47.6%). [Figure 4].

Correlating the determined lip patterns of all south Indian study participants, there was a significant association between lip pattern with malocclusion status (p-value=0.000) Vethika K et al., 2024

(Table1) [Figure 5]. Angle's class I molar relationship was most common among participants with Type I lip pattern 49(38.5%), Angle's class II molar relationship was most common among participants with Type II lip pattern 22(61.1%) and 4(80%) of participants with type III lip pattern had class III molar relation suggesting that participants with type III lip pattern was more prone to get malocclusion. None of the study participants with Type III lip pattern had Angle's class 1 molar relationship. The results also states that 67(52.8%) students in class I molar relationship had a combination lip patterns and 14(38.8%) students in class II molar relationship had a combination lip pattern.

### 3.2. Discussion

The physical features of the human lips may be helpful in the detection and diagnosis of congenital illnesses and defects because each person's lip print pattern is unique [11]. This study was conducted based on correlating lip

patterns with the most common oral problems, namely malocclusion. This was done since the facial structures like the lip, alveolus, teeth, and palate are created from the same embryonic tissues [12]. In this study, the majority of the south Indian population had a type I lip pattern. Lip pattern and malocclusion status had a strong correlation. The majority of the students with type I lip patterns had molar relationships for class I angles. The majority of the students who had type II lip patterns had molar relationships for class II angles. Therefore, lip pattern can be employed extensively in forensics as a sign for identifying malocclusion. This demonstrates how soft tissue analyses, such the pattern of lips, can be utilised in forensics to determine the condition of hard tissue [13].

In a study conducted by Vignesh et al., type I pattern was the most prevalent pattern, similar to the current study, and this suggests that lip prints can be used to predict the malocclusion status [8]. According to this study, class I malocclusions were more likely to have type I lip patterns than class II malocclusions. Males displayed an enhanced type III pattern for class III malocclusion, whereas females displayed an increased type IV pattern. In a different study conducted by Pradeep Raghav et al., participants with skeletal class I malocclusion had a considerably higher prevalence of the vertical lip pattern [14]. The author of the study by Srishti et al. suggested that lip prints would aid in criminal investigations and assist in predicting the type of malocclusion in advance to ensure the success of preventative and interceptive operations [15].

This study established that the partial vertical groove lip pattern was most common in the dental Class I group. According to a study by Anuradha et al., the skeleton class I group had a more branching structure. While skeleton class II group revealed branched patterns as the most frequent pattern, other patterns in decreasing order included intersected, reticular, and vertical lip patterns [4]. Govindarajan et al. found the highest caries prevalence in a study for type II branching patterns [16]. This study is not free from limitations, the results of the current study cannot be generalised to the whole of South Indian population as the sample size was sample and it only includes the students with 18-30 age group. Future research should be carried out in order to gain a deeper understanding and support the findings of this study, taking into account the huge sample size with varied age groups and of different cultural-socioeconomic backgrounds.

#### 4. Conclusions

The most prevalent lip pattern among research participants was type I, which was associated with Angle's class I molar relationship. The study's findings support the idea that lip pattern can be considered as a predictor of malocclusion status. Cheiloscopy can be used as a non-invasive assisting technique to identify the molar relations that can help in preventive orthodontic treatment within the confines of the current study, but bigger samples are required to validate these findings.

#### Acknowledgment

Nil

#### Conflict of Interest

Nil

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#### Author's Contribution

All the authors were equally involved in data collection.

#### Funding

Nil

#### Ethics Statement

Yes, ethical clearance was obtained from the college.

#### Informed Consent

Informed consent was obtained from the participants before the commencement of the study.

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