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REGIONAL FEATURES OF THE TERMS
OF PERMANENT TEETH ERUPTION IN EARLY
MIXED DENTITION AMONG CHILDREN
OF ODESA

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Summary

The eruption of permanent teeth in children is a complex physiological process that is important for the development of the dentoalveolar system. The timing of eruption is a key indicator of biological age and prenatal diagnosis of children's health. The need to update research on this topic is due both to changes in society and the importance of modern data for pediatric dentistry and public health.

The aim of the study was to determine the regional characteristics of the terms of eruption of permanent teeth in early mixed dentition among children of Odesa.

Material and methods. Dental examination was performed on children aged 4 to 8 years of both sexes. The examination was performed according to the generally accepted methodology, using standard dental instruments included in the examination kit. The children were divided into groups according to age and sex. Patients were examined on the basis of age and period of teeth eruption.

Results. The results of the study of the eruption of the permanent teeth of the upper and lower jaws in children aged 4.5-8.5 years in Odesa indicate an earlier eruption of the permanent teeth in girls. Thus, in girls the eruption of the first permanent molars began at the age of 4.5 years and ended at the age of 6 years. In boys, the age of onset of first molar eruption was 5 years and the age of completion was 6.5 years. It was found that the timing of the beginning and the end of the eruption of the central permanent incisors of the upper jaw was the same in boys and girls (6 years), but the average duration of eruption was different. The timing of the beginning and end of eruption of the upper lateral incisors was identical in boys and girls. However, differences in the average terms of eruption of permanent upper lateral incisors were obtained. The analysis of the results of the terms of eruption of the central permanent incisors of the lower jaw in boys and girls shows the same terms of beginning of eruption and average terms of eruption of these teeth. However, there were differences in the time of the end of eruption. The beginning of the eruption of the permanent central incisors of the upper jaw was noted earlier (at the age of 6 years) than the data given in the modern dental manuals of Ukraine and was completed at the age of 8 years. The age of the beginning and the end of eruption was one year earlier than the generally accepted data. The data on the time of eruption of the first permanent molars and incisors obtained as a result of the study are necessary for planning programs for prevention of dental caries in children in the period of early replacement dentition. The data obtained as a result of the study indicate the need for further epidemiological studies in other regions of Ukraine in order to establish the current national norms for the eruption of permanent teeth in children.

Conclusion. The discrepancy between the dates of eruption of permanent incisors and molars in Odesa children and the standard dates of eruption of teeth was revealed, which indicates the need to clarify them in each region. Gender differences were found – earlier eruption of permanent teeth in girls. The data of the conducted research substantiate the necessity to revise the terms of caries prophylaxis in Odessa children and the necessity to conduct in-depth examination of children with violation of the terms of teeth eruption.

Key words: Terms of the Eruption of Teeth; Incisors; Molars; Children.

Introduction

The eruption of permanent teeth is a complex, not fully understood physiological process that is an important stage in the development of the child's dentoalveolar system [1-3, 16-18, 21-24]. This process, along with growth indicators, is an important criterion for determining a child's developmental level and biological age [4]. Changes in the timing of eruption may indicate possible disorders of physical development and are included in the International Classification of Diseases, 10th Revision (K00.6 Disturbances in tooth eruption) [5]. In addition, biological maturity and tooth eruption are among the main criteria for prenatal diagnosis of early health deterioration in children [4, 6]. This determines special attention to dental eruption as an important indicator of

sanitary and epidemiological condition of the region, possible anthropogenic environmental pollution, social and economic status of the population. Taking into account the ongoing processes of acceleration of children and socio-economic changes in Ukraine, the regional data of tooth eruption should be updated and adjusted [7].

The analysis of literature shows that the last fundamental studies on the timing of eruption of teeth in children in the city of Odesa were carried out long enough ago, which indicates the necessity of such studies and the relevance of the task at hand.

The timing of eruption presented in modern educational materials has certain differences [8-10]. Table 1 shows the current norms for eruption of permanent teeth in children, which are included in modern dental teaching aids in Ukraine.

Table 1

Norms for the eruption of permanent first molars and incisors in children as presented in modern Ukrainian teaching aids

Teeth	Kaskova L.F. et al. 2011	Melnik V.S. et al. 2019		Khomenko L.O. et al. 2018	
		Lower jaw	Upper jaw	Lower jaw	Upper jaw
Central incisor	6-8	6-7	7-8	6-7	7-8
Lateral incisor	8-9	7-8	8-9	7-8	8-9
First molar	6	5-7	5-7	5-6	6-7

In somatically healthy children, the eruption of permanent teeth should occur at specific time intervals [11, 12]. Changes in the timing of eruption may indicate the influence of a number of factors. These include the child's diet, region of residence, presence of general medical conditions, and climatic conditions of residence [12-14, 18, 20, 25]. In addition, the process of tooth eruption is genetically determined [15, 19].

In view of the above, it seems to be an important task of pediatric dentistry to determine the real modern dates of tooth eruption, without which it is impossible to fully determine the age groups for the implementation of community prevention programs in pediatric dentistry aimed at preventing the development of major dental diseases in children.

Aim of the study – to determine the regional terms of molars and incisors eruption in children of the city of Odesa at the present time.

Material and methods

We conducted a dental examination of children aged 4 to 8 years of both sexes. The dental examination was conducted in the dental office at the clinical base of the Department of Pediatric Dentistry of Odesa National Medical University (Department of Pediatric Dental Health of the Multidisciplinary Medical Center of ONMedU) and the Department of Epidemiology and Prevention of Major Dental Diseases, Pediatric Dentistry and Orthodontics of SE «Institute of Stomatology and Maxillofacial Surgery of the National Academy of Medical Sciences of Ukraine» (SE «ISMFS NAMS»). The data of the examination were recorded in the charts of dental examination of the oral cavity of the child developed in the Department of pediatric dentistry of SE «ISMFS NAMS». The examination was performed according to the generally accepted methodology using standard dental instruments included in the examination kit. Children were divided into groups according to age and sex. Patients were examined according to the following scheme: the child's full day age, dental formula, and the degree of eruption of permanent teeth were recorded. The age at which a tooth erupted in 5 % of the patients was considered as the beginning of eruption; the age at which a tooth erupted in 50 % of the patients was considered as the mean age of eruption; the age at which a tooth erupted in 95 % or more of the patients was considered as the end of eruption.

The results were processed by variational statistical analysis methods using Microsoft Office Excel 2016 software.

Results and discussion

The results of the children's examination presented in the tables 2 (eruption of permanent teeth of upper jaw in children 4,5-8,5 years old in Odesa, %) and 3 (eruption of permanent teeth of lower jaw in children 4,5-8,5 years old in Odesa, %) indicate earlier eruption of permanent teeth in girls. Thus, the first permanent molars of the upper jaw erupted in 8 % of the girls aged 4.5 years, the right lower permanent molar was found in 6 % of the examined girls, and the right one in 8 % of the girls. At the same age, the lower first permanent molars erupted in 4 % of the boys and the upper first permanent molars in 2 % of the boys examined at the age of 4.5 years. It is worth noting that in some children the lower central incisors erupted before the molars.

The eruption of the lower central incisors was often asymmetrical (unpaired), with the left lower central incisor erupting first more often in girls. Thus, in 4 % of girls, the left central incisor was identified, while the right central incisor had not yet changed. It should be emphasized that the violation of the pairing was observed more often in the eruption of the lower permanent incisors than in the eruption of the first permanent molars. In addition, a tendency to earlier eruption of the right central incisor of the lower jaw than the left one was observed in boys. Thus, the lower right central incisor erupted in 68 % of the boys studied at the age of 5.5 years, and the left central incisor erupted in only 60 % of the boys at this age. The opposite trend was observed in girls. The left lower central incisor erupted in 66 % of the girls examined at the age of 5.5 years, and the right lower incisor erupted in only 60 % of the girls examined.

It should be noted that the process of physiological change of teeth of upper frontal sextant in both boys and girls is characterized by violation of symmetry of eruption of central and lateral incisors. At the same time, there was no violation of the eruption sequence in the upper frontal sextant. The eruption of the upper lateral incisors occurred after the eruption of the central incisors.

The eruption of permanent maxillary central incisors in girls was more symmetrical than the change of maxillary lateral incisors. Thus, 84 % of the examined girls at the age of 7.5 years had both right and left permanent maxillary incisors, right maxillary lateral incisors in 60 %, and left maxillary lateral incisors in 66 % of the examined girls at this age. The upper lateral incisors erupt later than any other teeth in the upper jaw. None of the children examined under the age of 6 years had permanent upper lateral incisors.

Table 2

The eruption of permanent teeth of the upper jaw in children 4.5-8.5 years old in Odesa (%)

Age	Sex	Tooth					
		1.6	1.2	1.1	2.1	2.2	2.6
4,5	Boys (n=50)	2	0	0	0	0	2
	Girls (n=50)	8	0	0	0	0	8
5	Boys (n=50)	34	0	0	0	0	36
	Girls (n=50)	52	0	0	0	0	50
5,5	Boys (n=50)	74	0	0	0	0	70
	Girls (n=50)	78	0	2	2	0	72
6	Boys (n=50)	86	2	8	6	0	84
	Girls (n=50)	96	4	10	12	6	98
6,5	Boys (n=50)	98	16	34	30	16	98
	Girls (n=50)	96	20	50	54	18	96
7	Boys (n=50)	98	38	64	68	36	98
	Girls (n=50)	98	46	72	72	48	98
7,5	Boys (n=50)	98	44	80	78	40	98
	Girls (n=50)	100	60	84	84	66	100
8	Boys (n=50)	100	80	98	96	84	100
	Girls (n=50)	100	86	98	98	92	100
8,5	Boys (n=50)	100	96	98	96	96	100
	Girls (n=50)	100	98	98	98	98	100

Table 3

The eruption of permanent teeth of the lower jaw in children 4.5-8.5 years old in Odesa (%)

Age	Sex	Tooth					
		4.6	4.2	4.1	3.1	3.2	3.6
4,5	Boys (n=50)	4	0	4	2	0	4
	Girls (n=50)	6	0	0	4	0	8
5	Boys (n=50)	40	0	34	30	0	42
	Girls (n=50)	44	0	38	44	0	42
5,5	Boys (n=50)	76	0	68	60	0	72
	Girls (n=50)	78	0	60	66	0	78
6	Boys (n=50)	88	20	74	70	22	88
	Girls (n=50)	96	28	72	70	20	96
6,5	Boys (n=50)	96	40	86	86	38	98
	Girls (n=50)	96	44	98	96	44	96
7	Boys (n=50)	98	52	96	96	50	96
	Girls (n=50)	98	74	100	98	76	98
7,5	Boys (n=50)	98	82	98	100	84	100
	Girls (n=50)	100	88	100	100	84	98
8	Boys (n=50)	100	90	100	100	92	100
	Girls (n=50)	100	94	98	98	94	100
8,5	Boys (n=50)	100	96	100	100	96	100
	Girls (n=50)	100	98	100	100	98	100

As a result of the conducted research the terms of beginning, completion and average terms of teeth eruption in the early mixed dentition of Odesa children have been determined. Earlier terms of teeth eruption in girls than in boys are noted. Thus, in girls the eruption of the first permanent molars began at the age of 4.5 years and ended at the age of 6 years. In boys, the age of the beginning of the eruption of the first molars was 5 years, and the age of its completion was 6.5 years (Fig. 1).

It was found that the time of the beginning and the end of the eruption of the central permanent incisors of the upper jaw coincided in boys and girls (6 years), but the average

period of eruption differed (Fig. 2). Thus, the average period of eruption of 1.1 and 2.1 teeth was 6.5 years in girls and 7 years in boys. The age of the end of eruption of permanent central incisors in the upper jaw was 6.5 years in girls and 7 years in boys. The end of eruption of 1.1 and 2.1 teeth should be considered at the age of 8 years. It is also worth noting the identical timing of the beginning and the end of eruption of upper lateral incisors in boys and girls (beginning at 6.5 years and ending at 8.5 years). However, there were differences in the average dates of eruption of permanent lateral incisors in the upper jaw. Thus, in girls the average time of eruption of teeth 1.2 and 2.2-7.5 years, and in boys – 8 years.

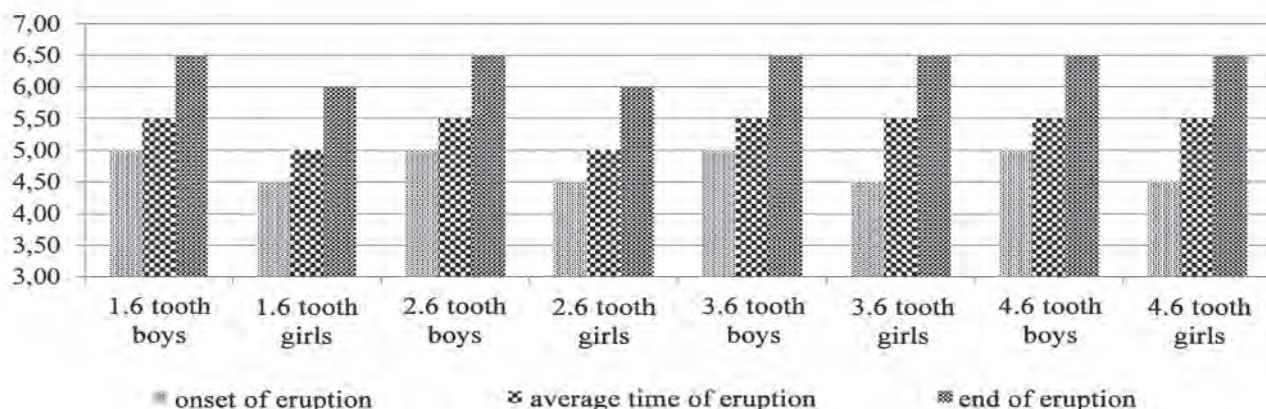


Fig. 1. Terms of eruption of the first permanent molars in Odesa children

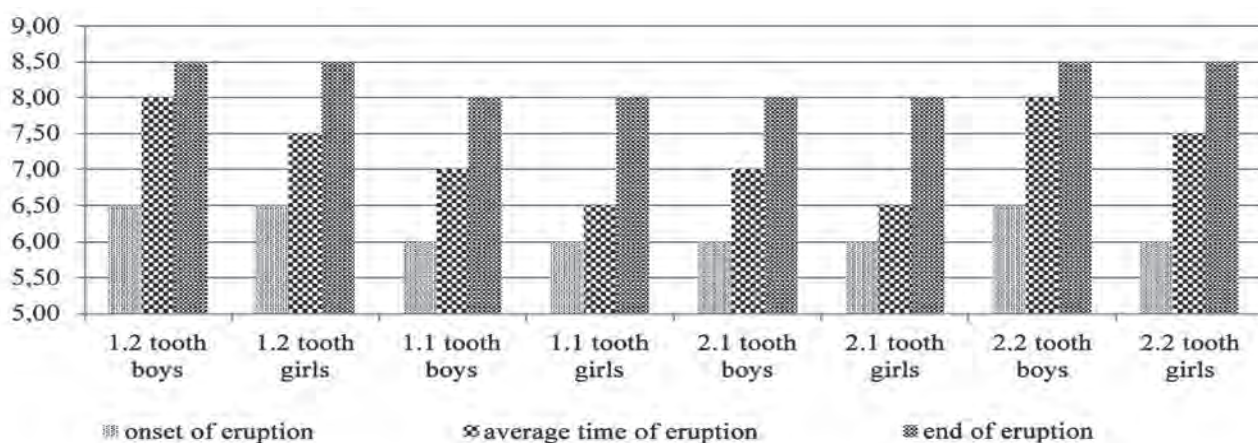


Fig. 2. Terms of eruption of permanent incisors of the maxilla in Odesa children

The analysis of the results of the terms of eruption of the central permanent incisors of the lower jaw in boys and girls shows the same time of the beginning of eruption and the average time of eruption of these teeth (Fig. 3). However, there were differences in the timing of the end of eruption. The established age of end of eruption of 3.1 and 4.1 teeth was 7 years in boys and 6.5 years in girls. The ages of beginning, middle, and end of eruption of 3.2 and 4.2 teeth in boys and girls coincided.

As a result of the study the regional terms of eruption of teeth in Odesa children in early dentition were determined, which are presented in Table 4. Analyzing the eruption terms

determined as a result of the study and the data given in modern dental teaching aids (Table 1), it is necessary to note the discrepancies in the eruption terms of some teeth. Thus, an earlier onset of eruption of the first permanent molars in children (4.5 years of age) and no significant difference between the eruption dates of upper and lower molars were noted. An earlier onset of eruption of the lower permanent central incisors (5 years of age) was found. The eruption of the lower lateral incisors also showed some differences. Earlier onset of eruption of 3.2 and 4.2 teeth (6 years of age) was noted. The lower lateral incisors had the longest period between the beginning and the end of eruption (from 6 to 8.5 years).

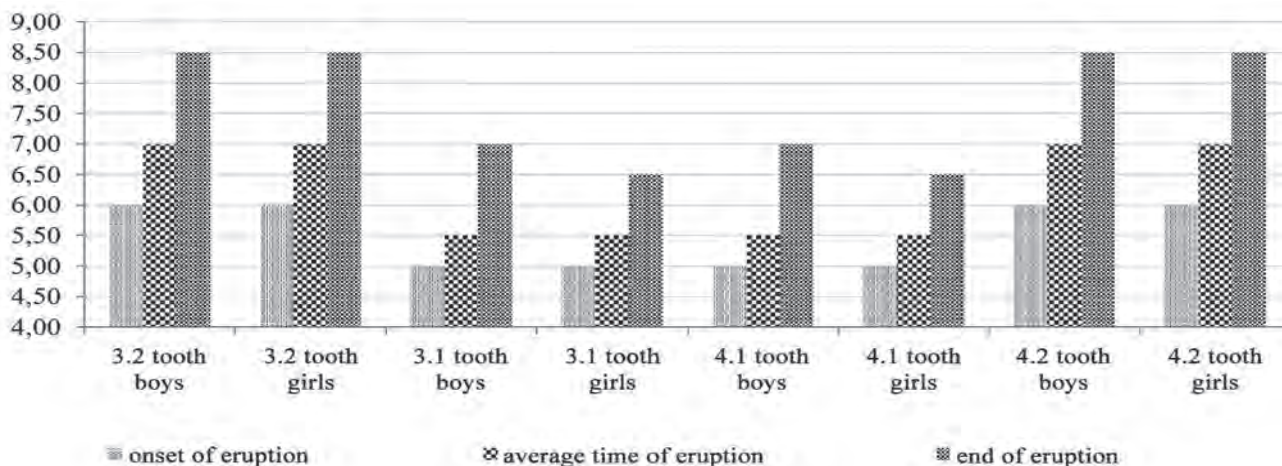


Fig. 3. Terms of eruption of permanent mandibular incisors in Odesa children

Table 4

Terms of tooth eruption in children of Odesa

Term	Teeth											
	1.6	1.2	1.1	2.1	2.2	2.6	3.6	3.2	3.1	4.1	4.2	4.6
Initial	4,5	6,5	6	6	6,5	4,5	4,5	6	5	5	6	4,5
Middle	5,5	7,5	7	7	7,5	5,5	5,5	7	5,5	5,5	7	5,5
Ending	6,5	8,5	8	8	8,5	6,5	6,5	8,5	7	7	8,5	6,5

The beginning of the eruption of the permanent central incisors of the upper jaw was noted earlier (at the age of 6 years) than the data given in the modern dentistry manuals of Ukraine, and it was completed at the age of 8 years. The ages of the beginning and the end of the eruption of 1.2 and 2.2 teeth were 6.5 and 8.5 years, respectively, which is one year earlier than the generally accepted data.

The data obtained as a result of the study on the timing of eruption of the first permanent molars and incisors are necessary for planning programs for prevention of dental caries in children during the early replacement dentition. The current data on tooth eruption should be taken into account in the planning of work in the children's dental clinic, as well as in the comprehensive assessment of the child's development.

The data obtained as a result of the study indicate the need for further epidemiological studies in other regions of Ukraine in order to establish modern national norms for the eruption of permanent teeth in children.

Conclusions

1. The conducted studies on eruption conditions of permanent incisors and molars in Odesa children show their discrepancy with the standard eruption conditions, which indicates the necessity of their clarification in each region.

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2. As a result of the conducted researches, gender differences have been established – earlier eruption of permanent teeth in girls.

3. The data of the conducted research substantiate the necessity to revise the terms of dental caries prophylaxis for children in Odesa and the necessity to conduct in-depth examination of children with violations of the eruption terms.

Prospects for further research. A detailed study of the factors influencing the development of the dentition in the region: Since studies have shown discrepancies between the standards for permanent tooth eruption in Odesa children and generally accepted norms, it is important to find out the factors that may influence these differences. These may include genetic, environmental, and other factors that influence the development of the dentition in this particular region. A thorough study of these aspects can make a significant contribution to the study of the mechanisms of dental growth and development in children and help to adapt the standards of eruption to local features.

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РЕГІОНАЛЬНІ ОСОБЛИВОСТІ ТЕРМІНІВ ПРОРІЗУВАННЯ ПОСТІЙНИХ ЗУБІВ У РАНЬОМУ ЗМІШАНОМУ ПРИКУСІ В ДІТЕЙ МІСТА ОДЕСИ

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Резюме.

Прорізування постійних зубів у дітей – складний фізіологічний процес, важливий для розвитку зубощелепної системи. Терміни прорізування є ключовим показником біологічного віку та донозологічної діагностики здоров'я дітей. Необхідність актуалізації досліджень на цю тему обумовлена як змінами в суспільстві, так і важливістю сучасних даних для дитячої стоматології та охорони здоров'я.

Мета дослідження – визначити регіональні особливості термінів прорізування постійних зубів у ранньому змішаному прикусі у дітей міста Одеси.

Матеріал і методи. Проведено стоматологічне обстеження дітей віком від 4 до 8 років обох статей. Обстеження проводили за загальноприйнятою методикою з використанням стандартного стоматологічного інструментарію, що входить до набору для обстеження. Діти були розподілені на групи відповідно до віку та статі. Пацієнтів обстежували на основі значень віку та періоду прорізування зубів.

Результати. Результати обстеження прорізування постійних зубів верхньої та нижньої щелепи у дітей 4,5-8,5 років м. Одеси свідчать про більш раннє прорізування постійних зубів у дівчаток. Так, у дівчаток прорізування перших постійних молярів почалося у віці 4,5 років і закінчилося у віці 6 років. У хлопчиків вік початку прорізування перших молярів становив 5 років, а вік завершення – 6,5 років. Встановлено, що терміни початку і закінчення прорізування центральних постійних різців верхньої щелепи збігалися у хлопчиків і дівчаток (6 років), але середній період прорізування відрізнявся. Терміни початку і закінчення прорізування верхніх бічних різців у хлопчиків і дівчаток були ідентичними. Однак були отримані відмінності в середніх термінах прорізування постійних бічних різців верхньої щелепи. Аналіз результатів термінів прорізування центральних постійних різців нижньої щелепи у хлопчиків і дівчаток свідчить про однакові терміни початку прорізування та середні терміни прорізування цих зубів. Проте спостерігалися відмінності в термінах закінчення прорізування. Початок прорізування постійних центральних різців верхньої щелепи відзначався раніше (в 6 років), ніж терміни, наведені в сучасних стоматологічних посібниках України, і завершувався у 8 років. Вік початку і закінчення прорізування зубів був на рік раніше загальноприйнятих даних. Отримані в результаті дослідження дані про терміни прорізування перших постійних молярів та різців необхідні при плануванні

програм профілактики карієсу зубів у дітей в період раннього змінного прикусу. Встановлені в результаті дослідження дані свідчать про подальшу необхідність проведення епідеміологічних досліджень в інших регіонах України з метою встановлення сучасних національних норм прорізування постійних зубів у дітей.

Висновок. Виявлено невідповідність термінів прорізування постійних різців і молярів у дітей м. Одеси стандартним датам прорізування зубів, що свідчить про необхідність їх уточнення в кожному регіоні. Встановлено гендерні відмінності – більш раннє прорізування постійних зубів у дівчаток. Дані проведеного дослідження обґрунтовують необхідність перегляду термінів профілактики карієсу зубів у дітей м. Одеси та необхідність проведення поглибленого обстеження дітей з порушенням термінів прорізування зубів.

Ключові слова: терміни прорізування зубів; різці; моляри; діти.

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