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## DETERMINATION OF THE DENTAL AGE ON OSTEOLOGICAL MATERIAL OF IMMATURE INDIVIDUALS

The state of dentition is an important factor when the age of the child is determined and the age reached at the time of single teeth eruption can be a valuable sign for considering the physical progress of child's development. For this reason many authors focus their attention to the state of deciduous or mixed dentition when studying the somatic development of the child and determining the age of the individual.

When osteological material is evaluated the age of immature individuals is determined first of all according to the eruption of the teeth. The eruption of the first and second permanent molars is decisive for dividing the individuals into the age groups: infans I, infans II and juvenis. As the time of the eruption of permanent dentition depends considerably on different factors, the method by J. Komínek, E. Rozkovicová and J. Vášková (1975) was proposed for determining the age of the individuals. It is based on x-ray examination of the teeth, recording the separate phases of teeth development.

The above mentioned authors worked out the criteria for determination of the age of the individuals from 3 to 15 years on the basis of the teeth development. The period of this development (from the forming of a dental sac till the convergence of a root canal) is divided into 7 phases, each of which can be exactly distinguished in the x-ray pictures. Stage I, characterized by forming tooth follicle and tooth germ before calcification can be seen in the x-ray picture as a round up to oval equable clearness sharply bordered by a thick line. The mineralization of incisal edge of the cusps begins in the








	I	tooth follicle
	II	beginning mineralization and the incisal edge or of the cusps of the crown to their coalescence
	III	advanced mineralization and forming of the anatomical crown
	IV	beginning mineralization of the root
	V	the walls of the root canals are divergent
	VI	the walls of the root canals are parallel
	VII	the walls of the root canals are convergent

TABLE 1. *The developmental stages of the lower molar available for dental age determination (according to Komínek J., Rozkovicová E., Vášková J., 1975).*

TABLE 2

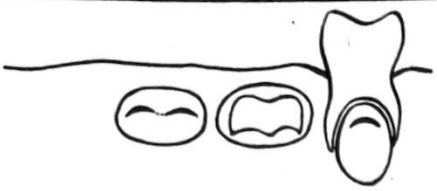


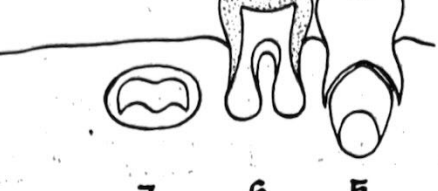
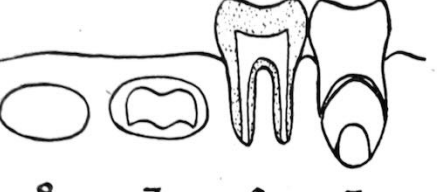

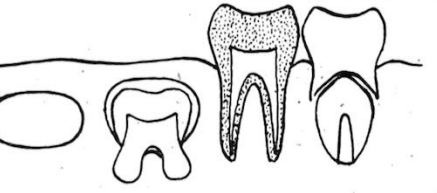


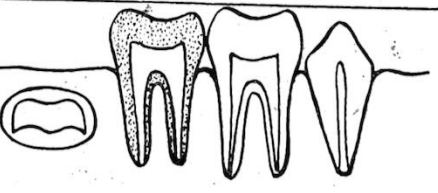

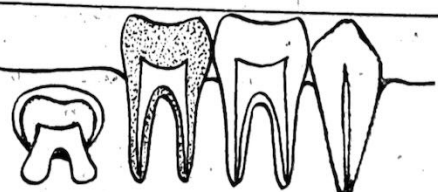
 <p>7 6 5 II. III. II. 4 years</p>	 <p>7 6 5 III. IV. III. 5 years</p>
 <p>7 6 5 III. V. III. 6 years</p>	 <p>7 6 5 III. V. III. 7 years</p>
 <p>8 7 6 5 I. III. VI. III. 8 years</p>	 <p>8 7 6 5 I. IV. VI. IV. 9 years</p>
 <p>8 7 6 5 I. IV. VII. IV. 10 years</p>	 <p>8 7 6 5 II. V. VII. V. 11 years</p>
 <p>8 7 6 5 III. V. VII. VI. 12 years</p>	 <p>8 7 6 5 III. VI. VII. VI. 13 years</p>
 <p>8 7 6 5 IV. VI. VII. VII. 14 years</p>	 <p>8 7 6 5 IV. VII. VII. VII. 15 years</p>

TABLE 3.

Age determination of the individual according to the eruption of the teeth and according to the development of the teeth

eruption of the teeth	inf. I					inf. II					juv.	
	age	4	5	6	7	8	9	10	11	12		13
number		4	3			8	10	19	4	6	4	
total		7					51					42

## development of the teeth

age	4	5	6	7	8	9	10	11	12	13	
number	1	1	4	4	7	20	6	4	7	7	
total	10					51					39

TABLE 2.

The developmental stages of the teeth characterized for separate age periods (according to Komínek J., Rozkovicová E., Vášková J., 1975).

stage II., advanced mineralization of the crown appears in the stage III., the beginning of root mineralization is found in the stage IV., the divergence of root canal walls is typical for the stage V., the parallelity of root canal walls for the stage VI., and the convergence of root canal walls is observed in the stage VII. (Table 1.)

The dental age is determined by comparing the x-ray pictures of the jaw in oblique lateral projection and schemes. The development of the first and the second permanent molars, showing the lowest percentage of deviations from normal, is evaluated. The development stages of the second premolar and the third molars are taken into account as additional values. The age of the individual corresponds to the development stages in x-ray pictures (Table 2.)

## MATERIAL AND METHODS

The set of 100 skulls of immature individuals from osteological material obtained from Broumov ossuary (XIII.—XVIII. century) was selected for medical-anthropological evaluation. The age determination of the individuals, and division into classic age groups was done first in traditional way according to the eruption of the teeth and in second phase the age was reevaluated according to the development of the teeth.

DETERMINATION OF THE AGE OF THE INDIVIDUAL ACCORDING TO THE DEVELOPMENT OF THE TEETH

Eruption of the first and of the second permanent molars was observed to divide the skulls of immature individuals into the age groups. 7 skulls were placed into the group infans I, (up to the age 7 years), 51 skulls belonged to the group infans II, (up to the age 13 years) and the group juvenis (up to the age 18—22 years) contained 42 skulls.

The age of each individual in the group infans I and infans II was further determined according

to the eruption of separate teeth with regard to the scheme of eruption of the teeth (Wachsmann K., 1958 — Komínek J., Toman J., Rozkovicová E., 1974). 4 skulls were in the group of 5 years old and 3 skulls were in the group of 6 years old, both in the range of infans I. In the age infans II 8 skulls belonged to the age group of 8 years old, 10 skulls to the age group of 9 years old, 19 skulls to the age group of 10 years old, 4 skulls to the age group of 11 years old, 6 skulls to the age group of 12 years old and 4 skulls to the age group of 13 years old (Table 3).

DETERMINATION OF THE AGE OF THE INDIVIDUAL ACCORDING TO THE DEVELOPMENT OF THE TEETH

The method based on the x-ray examination of the denture proposed by Komínek J., Rozkovicová E., Vášková J. (1975) was used for determining the age of the individuals. X-ray pictures of upper jaw in oblique lateral projection of the skulls (without lower jaw) from the set of children and immature individuals (Hořejš J., 1974) were taken. X-ray pictures were compared with given schemes. Upper molars and the first premolar were used for the evaluation and the age of the individuals was determined according to the developmental signs characteristic for each group.

Classification of the skulls into the age groups was as follows: 1 skull was placed in both the groups of 4 and 5 years old, into the groups of 6 and 7 years old 4 skulls were classified. 7 skulls were in the group of 8 years old, 20 skulls in the group of 9 years old, 6 skulls in the group of 10 years old, 4 skulls in the group of the 11 years old, 7 skulls in the group of 12 years old and 7 skulls in the group of 13 years old. If we keep the range of age of immature individuals in the group infans I up to 7 years, infans II up to 13 years and juvenis up to 18—22 years, the first group contained 10 skulls, the second group 51 skulls and the third group 39 skulls (Table 3).

		age determined according to the eruption of the teeth										juvenis	total	
		infans I			infans II									
		5	6	7	8	9	10	11	12	13				
age determined according to the teeth development	infans I	4	1											1
		5	1											1
		6	2	2										4
		7		1		3								4
	infans II	8				4	3							7
		9				1	7	9	3					20
		10						6						6
		11						3	1					4
		12						1		3	2	1	7	7
		13								3	2	2	7	7
	juvenis	14											10	10
													29	29
	total		4	3	—	8	10	19	4	6	4	42	100	

TABLE 4. Identity and differences of the age determination of the individual using both methods

### DISCUSSION

Some differences occur when we determine the age of the individuals in the set of 100 skulls according to the teeth eruption and on the basis of the teeth development. The greatest differences are found in the group infans II, mainly in the age of 9 and 10 years. 19 skulls were placed into the group of 10 years old according to the teeth eruption. After reevaluating according to the development of the teeth only 6 skulls remained in this group, the remaining 9 skulls were shifted into the group of 9 years old.

Significant difference in the age determination can be found even in the whole group of infans I — 4 skulls placed according to the teeth eruption into the group of 5 years old were only in one case determined correctly. 2 skulls from this group were classified as the ones belonging to the group of 6 year old individuals and one was determined as the skull of 4 year old individual, 3 skulls placed according to the teeth eruption into the group of 6 years old were in two case classified correctly according to the development of the teeth and 1 skull was shifted to the group of 7 years old. The development of the teeth is practically finished in the group of juvenis and the age determination of this stage is limited and so even the differences in

the age determination of the individual are not so evident.

When comparing the results of both methods, the age determination was in agreement in 65%. The differences in age determination were in the range of  $\pm 1-2$  years. Only in 11% the age of the individuals according to development was higher and in 24% according to development of the teeth the individuals were younger.

It is comprehensible that none of both methods can be quite correctly used for classification of the individuals into the corresponding age groups of historic and prehistoric population, as they are based on development and eruption of the teeth in the contemporary population.

Many authors noted that the significant acceleration of development of the teeth in accordance with the physical development of children has

-2 years	-1 year	Identity	+1 year	+2 years
4%	20%	65%	10%	1%

TABLE 5. Comparison of the results of both methods

occured in last 40 years (Valšík J. A., Klust Z., GrümMOVÁ J., Bulíčková M., Olejníčková E., 1952, — Poncová V., Hájek J., 1959 — Rákoši T., Fuker T. 1959 — Skaloud F. 1965, 1975 — Fábryová E., 1965, 1966). This phenomenon is accompanied also by the change in sequence eruption of the first permanent tooth (Valšík J. A., 1974, 1975).

#### SUMMARY

The age of immature individuals was determined in the set of 100 skulls originating from Broumov ossuary (XIII.—XVIII. century) by two methods:

1. according to the eruption of the teeth
2. on the basis of x-ray pictures showing development of separate tooth

The results obtained by both methods were compared and classified.

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