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A DENTAL EXAMINATION OF THE MIXED AND PERMANENT DENTITIONS IN A NUBIAN POPULATION

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INTRODUCTION

The present investigation was performed in 1966 as part of a project aiming at a study of skulls and dental conditions of ancient and present-day Nubians, undertaken by a research team organized by professor James Harris at the University of Michigan in 1965—1966.¹⁾ Before the High Dam of the Nile was completed about thousand skulls of ancient Nubians were taken care of and profile radiographs and other records collected. These skulls would otherwise have been lost in the bottom of the big lake between Assuan and Abu Simbel. In order to get present-day material for comparison with the skulls, similar records were collected also of present-day Nubians, moved from their old homes on shores of the Nile to a place near Assuan.

The aim of the dental examination was the collection of data regarding the number, size and condition of the teeth, the position of the teeth within the dental arches and the occlusion. In the following a report will be given of the findings as regards the present-day Nubian population.

MATERIAL AND METHODS

Two groups of individuals were examined, the first composed of a cross-section of the whole population in the village Ballana (*the family material*) and the second of pupils from the primary and secondary schools in the Komombo district, to which the village Ballana belonged (*the school material*).

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The family material. The present report is limited to dental conditions in the mixed and permanent dentitions. Altogether 544 such cases were examined, 232 males and 312 females, obtained from every tenth family in the village Ballana I. The reason why more females than men were included in the material was that many men were working outside the village to support their families and therefore could not come. The age and sex distribution is shown in Table I. The age distribution is probably only approximately true as some uncertainty regarding the exact ages was observed, resulting in more than an expected number of individuals reporting even numbers (30, 35 years etc.) for their ages. In some cases older women also seemed inclined to state their ages to be younger than what general appearance suggested.

The school material. Altogether 318 pupils were examined, 207 boys and 111 girls. The larger number of boys shows that more boys than girls were sent to school. The schools in Komombo do not exclusively take their pupils from the same Nubian population which constituted the family material. It is probable, therefore, that the school material is genetically less homogenous than the family material.

The material was originally chosen from every second grade in the school.

Table I.

Age and sex distribution of the family material (mixed and permanent dentitions) and the school material

Yrs	Family material		School material		
	Males	Females	Yrs	Males	Females
5—9	36	26			
10—14	56	57	6		12
15—19	22	39	7	28	15
20—24	8	24	8	23	9
25—29	16	32	9		2
30—34	11	23	10	38	18
35—39	10	29	11	2	
40—44	14	26	12	18	18
45—49	14	21	13	14	13
50—54	12	17	14	33	9
55—59	11	16	15	24	10
60—64	16	9	16	21	5
65—69	4	2	17	6	
70—74	2	1	18	1	
Total	232	312	Total	207	111

As it was possible to extend the studies to some more grades there is in the material a fairly good representation from the 7th to the 16th year with the exceptions of the 9th and the 11th years of age. The age and sex distribution is shown in Table I.

The *size of the teeth* were determined only for upper permanent incisors in all cases where measuring was possible for the central incisor, and in part of the material also for the lateral incisor. Measurements were made with a sliding caliper with pointed beaks to the nearest tenth of a mm.

Visible caries was recorded but as the investigation was performed without other lights than a good daylight through a window in front of the dental chair, and without facilities for cleaning the teeth before the examination, it is quite possible that smaller cavities, especially on the approximal surfaces, may have been overlooked. The location and approximal size of carious lesions were recorded by drawings on a form showing all teeth from the occlusal, facial and lingual surfaces of the teeth.

Crowding and spacing of the teeth was recorded but as no measurements could be ascertained the records in these respects must be looked upon as rather rough estimates of their incidence.

The degrees of *overjet* and *overbite* were measured with the sliding calipers, using the back end for the overjet (Fig. 1) and the ordinary end for the overbite. The overbite was marked on one of the lower incisors with help of a well pointed pencil, held parallel to the occlusal plane and resting on the edge of one of the upper incisors. The overbite was then measured as the distance between this mark and the edge of the lower incisor.

The *antero-posterior relation* of the first permanent molars and of the permanent cuspids were recorded and deviations from the normal were noted for the left and right sides. For the molar occlusion half-a-cusp and for the cuspid relation half a tooth were used as units.

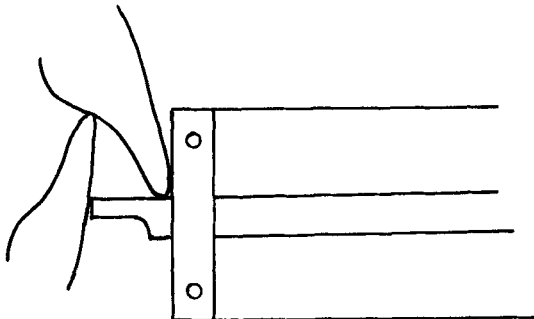


Fig. 1. Measurement of the overjet.

Table III.

Distribution of persons (in per cent) with varying numbers of teeth without visible caries in the adult population (20—74 years)

Years	20—29		30—39		40—49		50—59		60—69		70—74		Total		
	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	
29—32	34	14	44	4	4	7		3		8			16	7	10
25—28	21	48	17	16	8	11	19	16	12	8			15	23	20
21—24	29	19	22	27	32	24	24	29	18	5		50	25	21	22
17—20	8	14	6	27	24	24	14	9	29	8			16	18	18
13—16	8		11	12	20	20	9	12	12	30			12	11	12
9—12		5		6	4	7	14	9		15			3	7	6
5—8				4	4	5	5	9	12	15	50		5	5	5
1—4				4	4		5	6	18	8			5	3	3
0							2	5	18	12	8	100	3	5	4
Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

are still fairly complete, but even then some 25 per cent (23.5) have 21—24 teeth or less in their dental arches. Root-rests have not been counted as their functional value could be looked upon as nil. The average number of teeth per individual is in the same age-group 26.4 and decreases to the following figures in the older age-groups: 30—39 yrs 22.8, 40—49 yrs 20.4, 50—59 yrs 15.1, 60—69 yrs 13.6 and 70—79 yrs 9.7.

The condition of the teeth in regard to incidence of carious lesions can be expressed by the number of teeth without visible caries or fillings. The number of teeth with fillings was extremely low as the dental care the Nubians had received was almost entirely limited to extractions, in only a rather small proportion of cases in need thereof.

In Table III the percentage of teeth without visible caries or fillings are presented for males and females and for the different age-groups. It is obvious that the majority of teeth left in the dental arches do not show any visible caries. The extent to which this is true can be estimated by a comparison between the figures given for the average percentage of teeth in the dental arches and the corresponding figures for the average percentage of teeth without visible caries (Table IV).

It is of some interest to determine the incidence of missing teeth for different types of teeth. The figures of Table 5 show the percentages of missing incisors, canines, premolars and molars in the adult population of Ballana I.

Table IV.

Average total number of teeth and the average number of teeth without visible caries in the different age-groups of the family material

Age-group	Average number of teeth per individual	
	total	without visible caries
20—29 yrs	26.4	24.5
30—39 »	22.8	20.9
40—49 »	20.4	19.9
50—59 »	16.9	15.4
60—69 »	13.6	12.9
70—74 »	9.7	9.7
20—74 yrs	20.9	19.6

It is evident that the molars are the teeth that were most often missing. In round figures it can be stated that on an average 1—2 incisors, 0—1 canines, 2 premolars and 7—8 molars were missing.

There was a considerable dispersion in the number of teeth missing, also in rather narrow age-groups. For instance, in the 25—29 year-olds 15 individuals missed 1—4 molars, 25 individuals 5—8 molars and 8 individuals 9—11 molars with an average of 5.1 molars.

Periodontal disease. The condition of the periodontal tissues will be dealt with in a special study. Here it may be sufficient to state that periodontal disease was very common, starting in many cases in early childhood with gingivitis, often of a hyperplastic type, and developing later on into more or less severe conditions with heavy calculus, retraction of the gingival border and loosening or even loss of the teeth.

Table V.

Percentages of missing teeth for different types of teeth in the adult population

	Incisors	Canines	Premolars	Molars
Males	19.8	18.3	27.2	65.7
Females	17.6	15.7	26.2	58.8
Both sexes	18.4	16.6	26.6	61.1

Table VI

Means (\bar{x}) and standard deviations (S.D.) for the mesio-distal tooth diameters of the central and lateral incisors in the Ballana family material and in the school material

	Family material					
	Males			Females		
	N	\bar{x}	S.D.	N	\bar{x}	S.D.
Central incisor	181	8.90	0.73	289	8.61	0.63
Lateral incisor	90	6.77	0.61	151	6.63	0.53
	School material					
	Males			Females		
	N	\bar{x}	S.D.	N	\bar{x}	S.D.
Central incisor	163	8.86	0.60	81	8.56	0.52
Lateral incisor	146	6.86	0.58	70	7.70	0.53

Size of teeth. As already mentioned tooth-width measurements were performed for the upper central incisor and, in part of the material, also for the upper lateral incisor. The means and standard deviations for these teeth are given in Table VI.

No changes with age of the average tooth-width were found as would have been the case if approximal attrition had been an important factor.

Overjet and overbite. The overjet and overbite values show a fairly large variation range, especially towards cases with an excessive overjet. The histograms in Fig. 1 and Fig. 3 illustrate the findings. No clear trend indicating any change with increasing age was observed, hence the pooling of the whole material seems to be justified. For the males as well as for the females some skewness of the overjet distribution is evident. The females seem to have a little larger mean value for the overjet than the males (4.0 mm and 3.7 mm, respectively).

Antero-posterior relationship of permanent first molars and canines. A normal antero-posterior relationship at the first permanent molars was by far the most common finding. In cases where both sides could be recorded and where the same type of occlusion occurred on both sides a normal cuspal interdigitation was observed in 199 cases (104 males and 95 females), while a postnormal relationship (Class II of one half or one whole cusp) was found in 29 cases (11 males and 18 females) and a prenatal relationship (Class III) in 11 cases (6 males and 5 females), 3 of which were diagnosed as migration cases. Some cases with a unilateral malocclusion were also observed: 6 cases

with Class II of one half cusp and 4 cases with Class III, two of which were diagnosed as due to migration of lower first permanent molars. In 42 cases only one side could be recorded. Of these cases 27 were normal, 12 postnormal and 3 prenatal, two of which migration cases.

For the canine relationship similar findings were recorded. For symmetrical cases 203 were diagnosed as normal (84 males and 119 females) while 76 (20 males and 56 females) were postnormal and 9 (5 males and 4 females) prenatal. A rather common finding was a normal molar-relationship and half a cusp postnormal canine-relationship. In the unilateral cases 43 (27 males and 16 females) were postnormal and 5 prenatal (4 males and 1 female), the majority of which had a malocclusion of one half cusp. In six cases (all females) one side was postnormal by one cusp and the other side by one half cusp. Of 27 cases (9 males and 18 females), where only one side could be recorded, 18 were normal, 7 postnormal and 2 prenatal.

Crowding and spacing. The amount of crowding and spacing was not measured and it is therefore difficult to give any reliable figures for these anomalies, especially as there is no sharp limit between the normal and abnormal cases. Marked frontal crowding was, however, rather rare with some 15 cases for the upper and a similar number for the lower jaw. Slight crowding was noted for some 25 cases in the upper and some 35 cases for the lower jaw. Lateral crowding was observed in only 4 cases. It seems that a subjective evaluation of this kind has a rather limited value, at least for comparison with other materials. Frontal spacing was observed in some 40 cases in the upper and equally often in the lower jaw.

A medial diastema was observed in 32 cases in the upper and 5 cases in the lower jaw.

Lateral crossbite. Lateral crossbite was only rarely seen. In five cases (two bilateral and 3 unilateral) a true crossbite was recorded, while in 11 cases a partial crossbite was observed.

Other anomalies. One case of cleft palate was observed and one with a notch of the upper lip.

Congenitally missing teeth are difficult to diagnose, especially in the premolar and molar regions. One case with a most probably congenitally missing right upper lateral incisor was observed.

Three supernumerary lateral incisors, two upper and one lower were found.

Enamel hypoplasia was recorded for 10 cases, five of which symmetrical in the first permanent molars or the incisors and 5 of a local character.

Attrition was no severe problems, but extensive attrition was observed in some of the older persons.

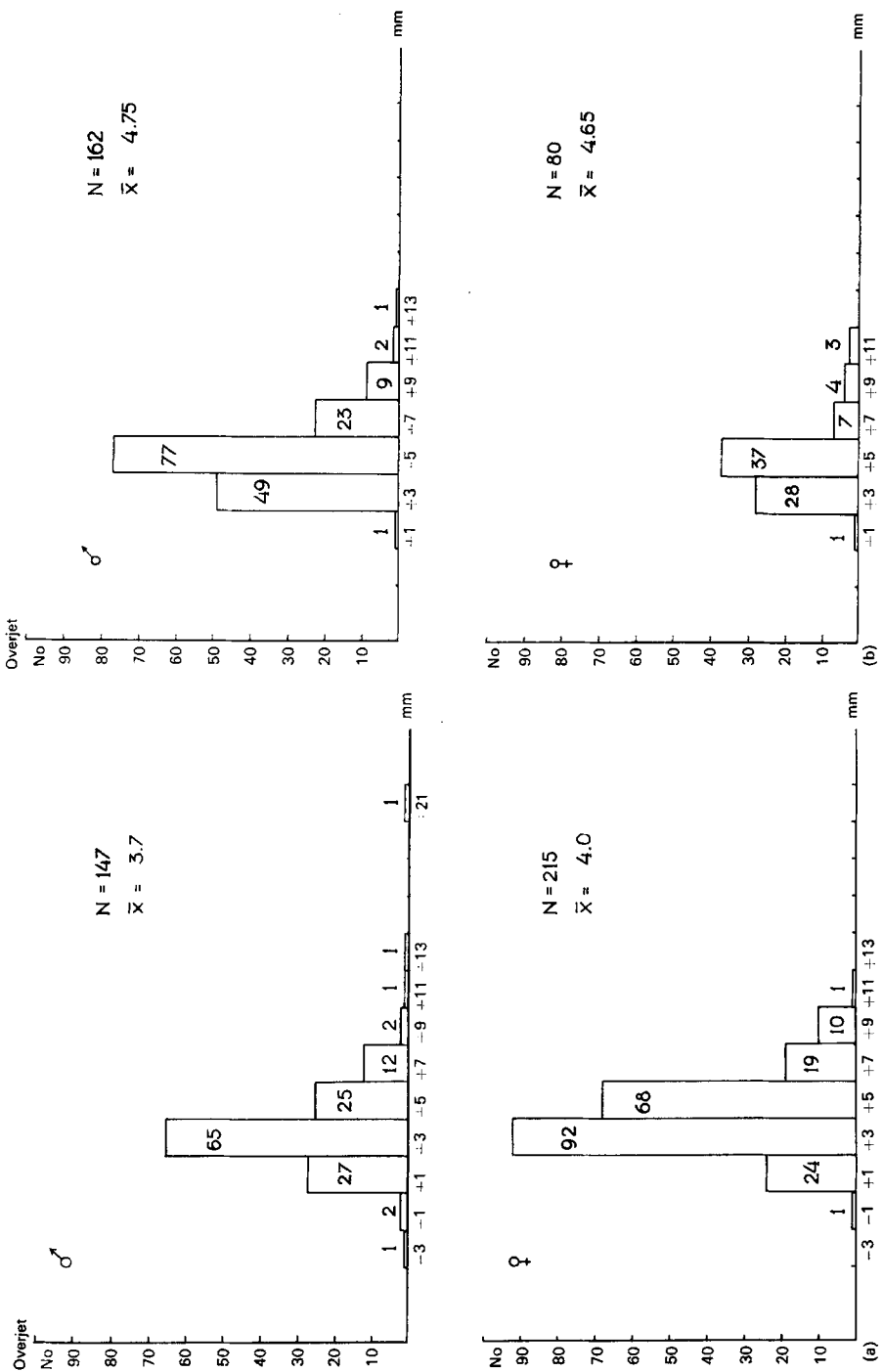


Fig. 2. Distribution of overjet in the family (a) and school (b) materials, respectively.

The school material

Number of permanent teeth in the dental arches. During the observation period the children pass from the deciduous or early mixed dentition stages to the young adult dentition, when 28 permanent teeth should be present in the dental arches. The process of eruption is therefore the main factor contributing to the number of teeth present at the different ages. Loss of teeth because of caries or other causes is, namely, only a minor problem in this material and occurs mainly as loss of the first permanent molars in a rather small number of children (32 children, with 17 cases missing one molar, 11 cases two molars, and 4 cases three molars). The ages of these children were: 1 eight years, 8 twelve years, 3 thirteen years, 3 fourteen years, 10 fifteen years, 4 sixteen and 3 seventeen years.

The quite small difference between the total number of teeth and the number of teeth without visible caries in Table VII shows that there were only a comparatively small number of teeth with visible caries (or fillings). The type of decay most often found in the school material was fissure caries in the molars. As almost no conservative treatment was given the caries lesion could develop without being arrested until the pulp was seriously involved and tooth-loss the final result.

Table VII.

Average total number of permanent teeth and average number of such teeth without visible caries in the school material

Age	Average number, total		Average number without visible caries	
	Male	Female	Male	Female
6		3.8		3.8
7	6.1	6.9	6.0	6.7
8	11.5	9.6	11.4	9.6
9		(12.0)		(12.0)
10	15.4	16.2	14.9	16.1
11	(19.5)		(19.0)	
12	23.1	24.6	22.2	24.4
13	25.8	25.9	25.5	24.6
14	26.2	26.9	25.8	26.6
15	27.2	26.2	26.8	25.2
16	27.2	27.8	26.7	27.0

Tooth-size of upper central and lateral incisors. Most of these measurements were performed by one investigator and this might be of some importance in any comparison with other material as it cannot be excluded that there are small differences in measuring technique between different investigators. The findings are presented in Table VI.

A comparison between the school and the family material shows that the values are rather similar. The slightly larger standard deviation for the central incisors in the family material could be due to the just mentioned fact about the different investigators. If the measurements of the same investigator for this tooth in the family material are separately analysed the following standard deviation for males and females are obtained: 0.62 for males (29 individuals) and 0.57 for females (71 individuals), which values are closer to the school values than those that were obtained for the whole family material, a fact that fits rather well with the hypothesis just stated.

Overjet and overbite. The distribution of overjet and overbite are given in Figs. 2 and 3. The values do not differ notably from those found in the family material, although the means are slightly higher for the overjet in this material (\bar{x} = 4.8 and 4.7 mm in males and females, respectively, as compared to 3.7 and 4.0 mm in the family material). No age-changes between 7 yrs and 15 yrs could be detected.

Antero-posterior molar and canine relationships. The molar relationship is also in this material normal in the great majority of cases. In the symmetrical cases this was true in 188 cases (122 males and 66 females). Postnormal occlusion occurred symmetrically in 21 cases (13 males and 8 females), 13 of which were postnormal by only one half cusp. Only two cases of Class III were observed, one of which was diagnosed as a Class III migration case.

Unilateral Class II was observed in 12 cases (9 males and 3 females), 9 of which postnormal by one half cusp. Unilateral Class III occurred in 12 cases, 8 of which were diagnosed as migration cases. The other 4 cases were prenormal by half-a-cusp (3 males and one female).

Class II by one cusp on one side and half a cusp on the other was observed in 3 cases, in two of which the difference between the two sides was attributed to migration of upper first permanent molars.

In 11 cases the molar occlusion could be registered on one side only and this was normal in 7 cases, postnormal in 3 (half-a-cusp in one case and one cusp in 2 cases) and prenormal (migration half-a-cusp) in one case.

Canine relationship at permanent canines. In the symmetrical cases a normal canine-relationship was observed in 67 cases (44 males and 23 females), postnormal in 29 (19 males and 10 females) and prenormal in one

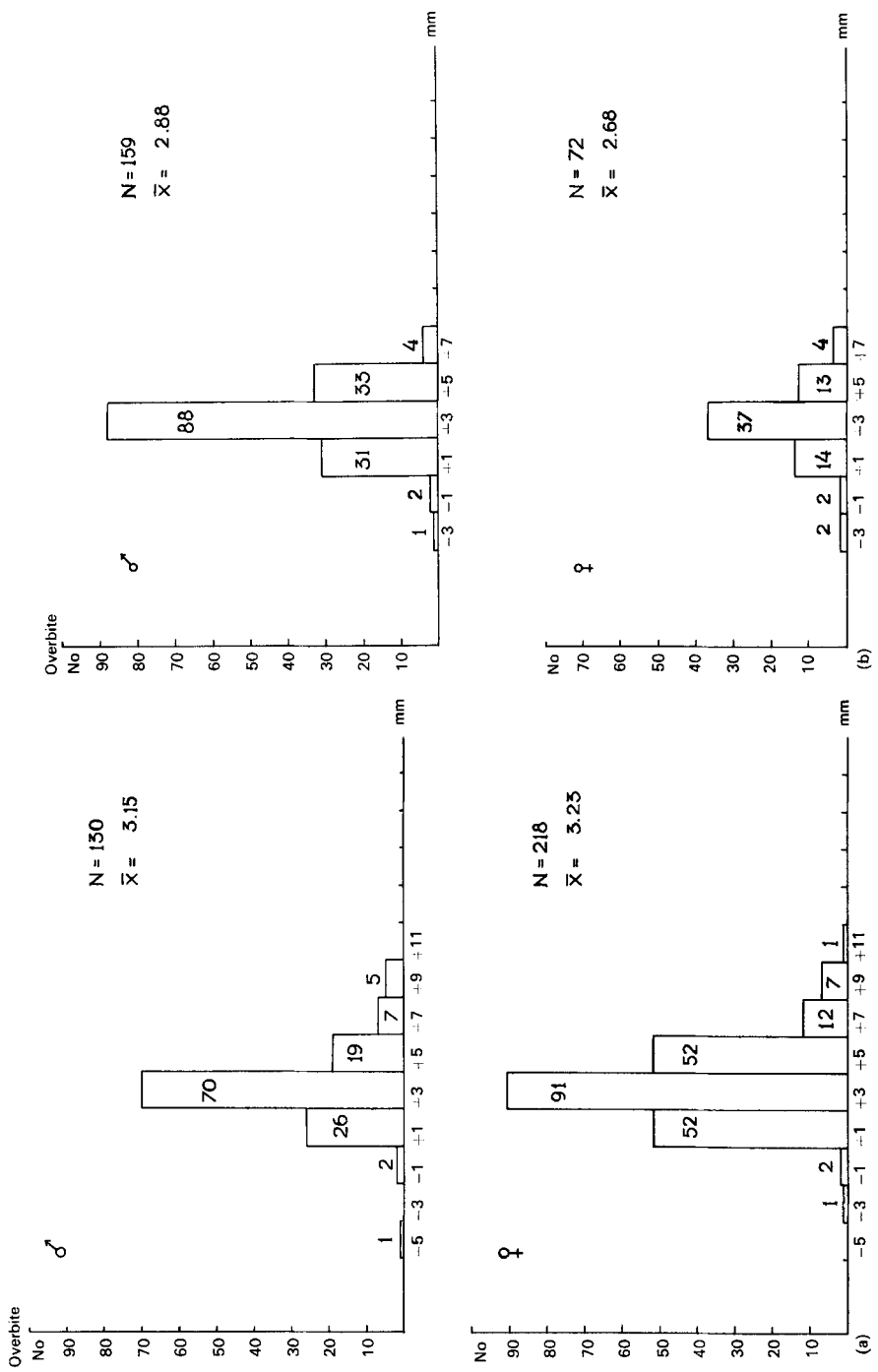


Fig. 3. Distribution of overbite in the family (a) and school (b) materials, respectively.

case (female). In only 3 of these cases a malocclusion of one full tooth-width was registered, all 3 postnormal cases. One of these cases had lower first permanent molars extracted, why it is possible that migration had contributed to the anomaly.

Unilateral postnormal occlusion was found in 30 cases (25 males and 4 females), 26 of which postnormal by half-a-cusp, two by one cusp and two diagnosed as migration cases.

In 7 cases (4 males and 3 females) there was a postnormal relationship of one cusp on one side and half-a-cusp on the other side. In 3 males and 1 female the canine relationship could be registered on one side only. One was normal and 3 postnormal by half-a-cusp.

Crowding and spacing. Crowding was registered in 33 upper and 49 lower jaws, and in 17 and 28 of these a marked crowding was observed. No difference between the sexes could be seen. Only six cases of crowding were found posterior to the canines in the premolar regions.

Spacing seemed to be more common in the upper (33 cases) than in the lower jaw (17 cases). Of these cases 24 in the upper jaw and 11 in the lower were denoted as marked.

Medial diastema was found in 26 cases (21 males and 5 females).

Crossbite. Only two cases of crossbite were registered, both unilateral (right side at first permanent molars).

Other anomalies. Enamel hypoplasia of the type usually associated with ricketts was seen in 4 cases and opaque areas, in one case with brown spots, in 3 cases. An impacted canine was observed in two cases, one of which in a labial position.

Lingual occlusion of upper incisors was a very rare anomaly. In one case the right central and lateral incisors were in such position.

In 3 cases buccal occlusion of upper premolars was observed, in one case on both sides for the first premolars. Tongue thrust was seen in a few cases of open bite and anterior spacing. From the point of view of tooth morphology it was of some interest to note one case of fused deciduous lower lateral incisor and canine. Carabelli cusps were not rare and in the lower six year molars an extra lingual cusp was found in 9 cases.

DISCUSSION

The results show that the examined Nubian population presented a fairly high incidence of caries and periodontal disease. Because of the virtual absence of facilities for conservative treatment fissure caries quite often led to pulpal gangrene and osteitis, and consequent loss of the affected teeth. This, together with a nonetheless moderate caries activity, is prob-

ably the reason why there is so small a difference between the total of residual teeth and the number of teeth without visible lesions. The decayed teeth encountered were often too badly damaged to be saved. In accordance with the agreement with the population, free extraction one day a week was also offered as a counter to their presenting themselves for examination. From the pathogenic aspect it may be pointed out that sugar cane is an important agricultural product in the area; it was not an uncommon sight to see children, in particular, chewing the soft stems of this plant.

In the older subjects loss of teeth due to periodontal disease undoubtedly contributed to the loss of teeth as a result of which, at an age of 50—59 about one half and at 70—74 about two thirds of the teeth had been lost.

Various forms of malocclusion were found in the series. The range of the values for overjet and overbite displayed no remarkable differences from what has been registered in other series (*Lundström*, 1943, 1953; *Seipel*, 1946; *Björk*, 1947; *Lundström & Lysell*, 1953). Nor in other respects did the frequency figures for various malocclusions differ appreciably from values reported for Scandinavian series (*Lundström*, 1943; *Seipel*, 1946). Lateral crossbite, however, would seem to be a comparatively rare anomaly (see *Telle*, 1951).

Because of difficulty in communicating with the Nubians even with the aid of available interpreters anamnestic information could be collected in only a very few cases.

SUMMARY

This report covers part of an anthropological investigation of ancient and present-day Nubians. The present study is concerned only with the latter group and is based on observations and measurements on a cross section of 544 persons from the population of one Nubian village and 318 school children (see Tables I and II).

The characteristics studied were: (1) The number of permanent teeth in the dental arches. (2) Size of the teeth. (3) Overjet and overbite. (4) Antero-posterior relationship of the first molars and the canines. (5) Crowding and spacing and (6) Lateral cross-bite.

The results are presented in Tables III—VII and Figures 2—3.

RÉSUMÉ

EXAMEN DENTAIRE DE LA DENTURE MIXTE ET DE LA DENTURE PERMANENTE
DANS UNE POPULATION NUBIENNE

Cet article rend compte d'une part des résultats de recherches anthropologiques sur les Nubiens de la préhistoire et de l'époque actuelle. La pré-

sente étude concerne seulement ce dernier groupe et est basée sur les observations et sur les mensurations faites dans une étude transversale d'un échantillon de population comprenant 544 habitants d'un village nubien et 318 écoliers (voir tableaux I et II).

Les caractéristiques étudiées étaient:

- (1) Le nombre de dents permanentes sur les arcades.
- (2) La grandeur des dents.
- (3) Le surplomb et la supraclusion.
- (4) Les relations antéro-postérieures des premières molaires et des canines.
- (5) L'encombrement dentaire et l'espacement dentaire.
- (6) L'articulé latéral croisé.

Les résultats sont présentés dans les tableaux III—VII et les figures 2 et 3.

ZUSAMMENFASSUNG

EINE ANTHROPOLOGISCHE UNTERSUCHUNG DES GEBISSES IN EINE NUBISCHE POPULATION

Diese Abhandlung enthält Teile einer anthropologischen Untersuchung prähistorischer und lebender Nubier. Die vorliegende Studie betrifft nur die letztere Gruppe und basiert auf Beobachtungen und Messungen, die an einer Durchschnittspopulation von 544 Bewohnern eines nubischen Dorfes und 318 Schulkindern vorgenommen wurde. (S. Tab. I und II).

Die untersuchten Merkmale waren:

- (1) Anzahl der bleibenden Zähne in den Zahnbögen.
- (2) Grösse der Zähne.
- (3) Sagitaler und vertikaler Überbiss.
- (4) Anterior-posteriore Beziehungen der ersten Molaren und der Eckzähne.
- (5) Engstand und Lückenstand.
- (6) Kreuzbiss.

Die Ergebnisse sind in den Tabellen III—VII und der Abbildungen 2—3 dargestellt.

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