From the Dental School of Copenhagen.
(Dean: Professor E. BUDTZ-JØRGENSEN.)

Numerical Variations in Greenland Eskimo Dentition.

A Contribution to Comparative Racial Odontography.

By

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With the Assistance of E. HINSCH.[1]

616.314007.

It is generally accepted that thorough studies of the dentition and dental conditions of various people and races render useful contributions to the general anthropological and medical census taken in all parts of the world to provide material for the advance of knowledge of human anatomy and pathology. In fact studies of teeth and jaws have added much to our present knowledge of man's evolution as well as of ethnic pathology. As has been pointed out very clearly by ARTHUR KEITH teeth are key structures — providing clues to bodily health and evolution. There is abundant evidence that the teeth are at least as sensitive to changes brought about by civilization as any other structures of the human body. A dental survey of ancient and modern Greenland natives carried out during the past few years by the present author under the joint sponsorship of the Royal Greenland Administration and The Dental School of Copenhagen[2] has on a large scale confirmed this well-known fact. It may be assumed now that the wealth of material from Greenland, collected by the writer, should also prove interesting from an evolutionary and comparative racial point of view. As far as the latter points are concerned the occurrence of variations in number of teeth

[1] Mr. E. HINSCH made part of the routine dental work in East Greenland, made all roentgenograms of the skulls, tabulated the material, and calculated the means.

[2] Support was received from the P. CARL PETERSEN Foundation.

has often been paid attention to and is generally considered of interest in connection with evolution and racial relationship of the dentition of hominids. Accordingly this essay presents in details the incidence and character of variations (or anomalies) in number of (permanent) teeth as found in ancient and modern Greenlanders. A preliminary report on the dental survey in Greenland, part of which is going to be dealt with in this paper has previously been published (PEDERSEN 67, 68). It is, however, necessary to repeat some few principal data as to the material and the origin of the latter.

Material and Methods.

The material comprises three main groups:

1. Eskimo Skulls.

In the *Copenhagen University Institute of Normal Anatomy* (Director: Professor Dr. med. H. M. HOU-JENSEN) we have by far the largest collection of Greenland Eskimo skulls in the world. 527 of these skulls were submitted to a thorough dental examination by the writer (1936). The skulls examined were brought home by several Danish Arctic Expeditions. They date from the time before or about the first Danish colonisation. Consequently they are at least 200 years old. In a few cases white admixture cannot be definitely excluded. By far the greatest number of skulls, however, is of unmixed Eskimo origin. This holds true of all East Greenland skulls.

On examination of the skull material records were made of supernumerary teeth as well as of congenital absence. In all cases showing the latter condition roentgenograms were made to decide whether it was a case of missing or impaction. Routine x-ray examination of all areas of the jaws was not made. Accordingly it must be emphasised that the frequency with which supernumerary teeth occur is only indicated approximately by the ranges given below. No doubt such teeth might have been found to a somewhat greater extent if all jaws had been thoroughly x-rayed. Impacted supernumerary teeth tabulated and described in the following chapter have been found by chance in roentgenograms made for other purposes. The information concerning congenitally missing teeth is as reliable as is by any means possible

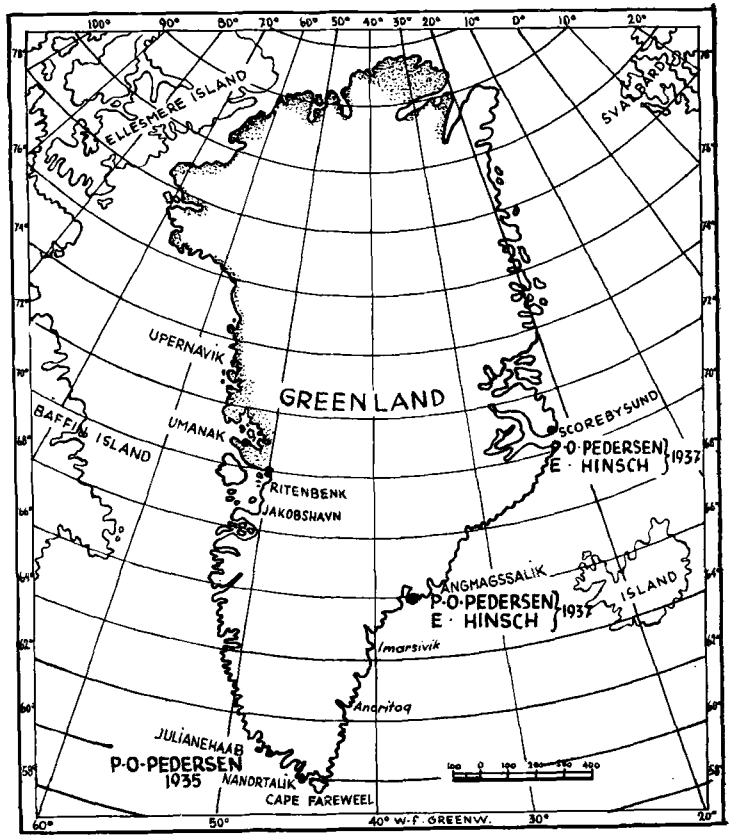

Fig. 1.

to obtain. In some cases where *antemortem* loss of several teeth occurred in advanced age it was impossible to decide, whether congenital absence or *antemortem* loss should be recorded. A number of such cases was eliminated from the present material.

2. Modern East Greenland Eskimo.

The second main group of material was collected in *East Greenland* 1937 by the author assisted by Mrs. INGER PEDERSEN and Mr. E. HINSCH. The Danish Dental Expedition to East Greenland 1937 was the first ever made to this area. In the territories, *Angmagssalik* (65° 40′ lat. N.) and *Scoresbysund* (70° 31′ lat. N.) 860 natives of unmixed Eskimo race were examined (i. e. 95 per cent of the entire native population of East Greenland). By

courtesy of SIEMENS an x-ray machine was at our disposal. Current was supplied by the radio station of Angmagssalik. In Scoresbysund no x-ray examinations were made. At Angmagssalik almost all cases suspected of having congenitally missing teeth were proved by x-ray. Very few embedded teeth were found. The incidence of impacted teeth, however, is not to be considered in this report. A detailed account of this condition will be given on some future occasion.

3. Modern West Greenlanders.

The third group of material was collected by the writer 1935 in the Julianehaab District, South-West Greenland. 1634 natives (about 50 per cent of the native population living in this territory) were examined clinically. The West Greenland material may be divided in two groups, within which white admixture is of different significance (*vide infra*). Generally speaking it must be born in mind that very considerable white admixture has taken place in West Greenland during at least two centuries.

In all, 3,074 Greenlanders (including 55 West Greenland hybrids living in East Greenland) were examined.

Increase in the Number of Permanent Teeth.

Some authors subdivide this main group of variations in the dentition of primates in 1) supplementary and 2) supernumerary teeth (PECKERT 66, LACAISSE 52, BUSCH 14) considering the former (1) to be true reproductions or duplicates of normal individual teeth, the latter (2) to be real additional specimens. Such classification, however, seems to be of little or no practical value, since a fairly great number of cases cannot with any certainty be classified according to these subdivisions. The author, therefore, will confine himself to give records of supernumerary teeth without further distinction than that made in the tables and the illustrations showing various prototypes of variations. As is the case in most publications dealing with increase in number of teeth the occurrence of supernumerary cusps (including paramolar tubercles) and enamel nodules — both very common in the Eskimo — is not considered in this paper. Likewise dentigerous cysts have been omitted. Supernumerary teeth only occurred in the permanent dentition.

1. Eskimo Skulls.

513 crania, calvaria or mandibles more than 6—7 years of age have been studied. Supernumerary upper incisors were found in four skulls, each having one, viz. one erupted and three impacted. Three upper fourth molars (all impacted) were observed in two different skulls. The various cases are given in table 1.

Table 1.

Supernumerary teeth found in ancient Eskimo skulls from Greenland.

Case No.	Museum No.	Locality	Sex	Age	Supernumerary teeth	Eruption	Illustration
1	171	*Kutek* South-East Gr.	♂	adult	Empty socket between 2+ and 1+[1]	erupted	
2	490	*Umanak* West Greenl.	○	juvenile	Small pegshaped incisor palatinally to 2+	impacted	Fig. 2
3	60	*Nusak*, Umanak Distr. W. Gr.	♀	adult	Small conical tooth palatinally to +1	impacted	
4	TM/32 grave no. 4	*Unartoq*, Julianehaab District W. Gr.	♂	adult	Inverted conical tooth in the floor of the left naris	aberrant impacted	Fig. 3
5	49	*Ata*, Ritenbenk Distr. W. Gr.	♀	adult	Two upper 4. molars (distomolars) of minor size. One lost *post mortem*	impacted	Fig. 4
6	B. 13/18	*Ikerasak*, Umanak Distr. W. Gr.	♀	mature	Empty socket of small upper fourth molar (distomolar)		

The aberrant eruption in case no. 4 is of special interest:

Near the midline the crown of a conical incisor was found erupting through the floor of the left naris into the nasal cavity (Fig. 3). Unfortunately the anterior part of the maxilla has been greatly damaged. Thus it may only be suggested that it is most *likely* the question of a supernumerary tooth and not of a peg-shaped lateral incisor that should normally be present.

Inversion and nasal eruption of supernumerary teeth is generally associated with hare-lip and cleft palate. Cleft palate is not found in case 4, but on account of the damage of the jaw one can have no idea of the presence or absence of cleft alveolar process.

[1] According to the HADERUP (38) Dental Stenography + indicates the upper jaw, ÷ the lower jaw. If the sign is placed to the right of the figure, the right side is indicated and *vice versa*.

A considerable number of records has been given in literature of aberrant eruption of supernumerary teeth to the nasal cavity in the white race (GOETHE, THOMPSON 87, SCHEFF 79, LONG 55, FEDERICI 28, BAUMGARTEN 6, BERTELSEN 7, RIHA 72 a. o.). In the Eskimo LEIGH (54) observed one case (*vide infra*). Even aberrasion to the orbit has been reported (DE LAPERSONNE and MONIER 53).

Table 1 shows that the number of individuals having one or more supernumerary teeth out of a total number of 513 skulls (aged more than 6—7 years) is 6 (1.1 per cent). It may however be assumed that full x-ray examination of all skulls would have revealed some further totally embedded specimens, especially small vestigial teeth (odontoids) in the premaxilla. For this reason the incidence of 1.1 per cent should merely be considered preliminary, indicating minimum occurrence of supernumerary teeth.

LEIGH studying a series of 325 modern Eskimo skulls from the American Continent noticed seven cases of supernumerary teeth, viz.

»One lying near the anterior border of the left naris (like our case no. 4), three between the upper central and lateral incisors (like our case no. 1), one buccally between the upper right first and second premolars, one on the palate opposite the left second premolar» (54, pag. 887).

X-ray examination was not made by LEIGH, but since no completely hidden teeth were found by us either, a direct comparison of our findings may be considered adequate. Thus we learn that the incidence of supernumerary teeth found by LEIGH in modern American Eskimo skulls ranges somewhat higher (2.2 per cent) than that observed by us in ancient Greenland Eskimo crania (1.1 per cent). It does not appear quite clearly from the article by LEIGH, whether his material includes children and adolescents, but even if we calculate the Greenland percentage out of the number of adult skulls examined (437) the range (1.4 per cent) would still be surpassed by that of the American material.

One further dental examination of American Eskimo crania has been presented by RITCHIE (73), who studied teeth and jaws of about 50 skulls originating from Arctic Canada and Alaska (Canad. Arctic Exp. 1913—18). RITCHIE does not mention any case of supernumerary teeth.

2. Modern East Greenland Eskimo.

702 Eskimos more than 7 years of age were examined at Angmagssalik and Scoresbysund.

Eight supernumerary upper incisors (five of them erupted, three impacted) were found in seven various persons. There was one case with one supernumerary lower bicuspid erupted. In another case two upper fourth molars (paramolars) had erupted buccally to the third molars. The various cases are listed in table 2.

Table 2.

Supernumerary teeth found in modern East Greenland Eskimo.

Case No.	Current No.	Locality	Sex	Age	Supernumerary teeth	Eruption	Notes	Illustrations
1	19	Scoresbysund	♀	28	one peg-shaped tooth of considerable size between 1+1	erupted		
2	74	»	♂	32	one small conical tooth palatinally to the interprox. space of 1+1	erupted		
3	168	Angmagssalik	♂	16	two small atypical teeth replace +2	erupted	nanosomia	Fig. 5
4	245	»	♀	18	one small conical tooth palatinally to +1	erupted		Fig. 6
5	149	»	♂	42	above and palatinally to apices of 1+1 two vestigial teeth of blunt conical shape	embedded	revealed by x-ray	
6	364	»	♂	43	one supernumerary tooth between 1+1 has recently been lost		severe malposition of front teeth	Fig. 7
7	418	»	♀	31	one small conical tooth (similar to case no. 4) above and palat. to +1	embedded	revealed by x-ray	
8	232	»	♂	27	blunt tooth of minor size lingually to interprox. space of $\frac{4}{5}$	erupted		Fig. 8
9	331	»	♂	36	two upper paramolars	erupted	2 lower incisors congenit. missing	Fig. 9 a and b

It was found that out of a total number of 702 Eskimos (more than 7 years of age) examined in East Greenland 7 presented one or more supernumerary teeth erupted (1.0 per cent). Including two cases with embedded anteriors the incidence of individuals having supernumerary teeth is 1.3 per cent. (The error brought about by omitting x-ray examination is less predominant than in the skull examination as full roentgenograms were made in 150 East Greenlanders.) Accordingly the occurrence of supernumerary teeth in the modern Greenland Eskimo approximately corresponds to that found by the writer in Greenland Eskimo skulls. The incidence, on the other hand, is somewhat lower than that observed by LEIGH (54) in modern American Eskimo skulls, even if we include our two x-ray cases. It must be emphasised, however, that the number of individuals examined by LEIGH and by the author is too small to provide anything but approximate evidence of difference in the incidence of supernumerary teeth in various Eskimo groups. Moreover the methods of examination applied are more or less imperfect. This indeed holds true of most — if not all — studies hitherto published on the increase in number of teeth in primitive races.

3. Modern West Greenlanders.

1,436 natives aged more than 7 were examined. On inspection 17 supernumerary teeth were found in 12 various natives. X-ray examination was only carried out in very few cases, and no supernumerary impacted teeth were revealed.

Out of a total number of 1,436 West-Greenlanders (aged more than 7 years) living in the territory of Julianehaab 12 (0.8 per cent) had supernumerary teeth erupted in the permanent dentition. About 50 per cent of the natives examined live in Nanortalik (see Fig. 1) and between the latter settlement and Cape Farewell. These natives are descendants of immigrated East-Greenland Eskimos. Only an insignificant white admixture has (during recent years) taken place in this area. One half of the material originates from the main trading station of Julianehaab and neighbouring settlements. The latter group is, with few exceptions, hybrids. Supernumerary teeth were not found to occur more frequently in the one of the said groups than in the other. Nor is any striking difference found as to the incidence of super-

Table 3.

Supernumerary teeth found in modern West-Greenlanders.

Case No.	Current No.	Locality	Sex	Age	Supernumerary teeth	Illustrations
1	1616	Tuapait[1]	♂	9	two small conical teeth between 1+1	Fig. 10
2	1064	Nigertut[1]	♀	12	one conical tooth palatinally to 1+	
3	1102	Angpilagtok[1]	♂	23	one conical tooth palatinally to +1,2	
4	1477	Nanortalik[1]	♂	15	one conical tooth between 1+1	
5	155	Julianehaab	♂	16	*ut supra*	
6	1634	»	♀	24	*ut supra*	
7	151	»	♀	24	one peg-shaped tooth palatinally to +1	Fig. 11
8	121	Sarkamiut	♂	8	one conical tooth between 1+1	
9	643	Julianehaab	♂	18	one conical tooth palatinally to 2, 1+ and paramolar buccally to +6, 7	
10	1576	Nanortalik[1]	♂	52	Fourth molars (distomolars) bilaterally in the upper jaw and two left lower bicuspids	Fig. 12 and Fig. 13
11	1541	»	♀	53	Small multicusped left upper fourth molar (distomolar)	
12	595	Julianehaab	♀	15	one conical paramolar buccally to 7+	

numerary teeth in modern East and West Greenland groups examined by the writer (Table 4).

Table 4 tabulates the incidence of supernumerary teeth found in various Greenland groups. In order to facilitate orientation and to make comparison easier a few records from other racial groups have been compiled from the literature available to the writer.

The only findings from a dental survey of a fairly large number of West Greenland natives previously published are those by KAMMA BUDTZ-JÖRGENSEN (13). This author observed three supernumerary peg-shaped anteriors situated between 1 + 1 in three cases out of a total number of 1,208 West-Greenland hybrids examined 1923—24. KAMMA BUDTZ-JÖRGENSEN did not make

[1] Territories inhabited principally by descendants of immigrated East Greenlanders, i. e. areas almost without white admixture.

Table 4.

Racial survey of supernumerary teeth.

Racial group	Author	Number of cases examined	Persons having supernumerary teeth	
			erupted	erupted and impacted
Ancient Eskimo skulls from Greenland	Pedersen	513[1]	1 (*0.2* per cent)	6 (*1.1* per cent)
Modern East Greenland Eskimo	»	702[1]	7 (*1.0* per cent)	9 (*1.3* per cent)
Modern West Greenland natives	»	1456[1]	12 (*0.8* per cent)	
Modern American Eskimo skulls	Leigh[54]	325	7 (*2.2* per cent)	
Chinese (living and skulls)	Oshima[64]	1200	*2.6* per cent	
Japanese (living)	Saito *et alieni*[77]	2600	*0.4* per cent	
South African Bantu (living and skulls)	Middleton-Shaw[82]	489	13 (*2.7* per cent)	
South African natives	Proell[70]	961	4 (*0.5* per cent)	
Bushmen	Drennan[23]	50	1 (*0.5* per cent)	
White North Americans	Stafne[83]	48550	441 (*0.9* per cent)	

further records of increase in number of teeth. One single case was incidentally observed by the physician, MELDORF (60), who presented a thorough description of the eruption of a small conical tooth on the palate in a West-Greenland child living at Julianehaab about 1900.

Discussion.

The general practioner now and then comes across supernumerary teeth in white people and so does very often the orthodontist. The writer takes the opportunity of showing three interesting cases (Fig. 14, 15, 16) from the Department of Orthodontics, Dental School of Copenhagen.[2]

By far the greatest material elucidating the incidence of supernumerary teeth ever published is that by STAFNE (83). His important study comprises 48,550 patients from the Mayo Clinic (Rochester) for whom complete dental roentgenograms were made. 441 (0.9 per cent) of these patients had one or more

[1] aged more than 7 years.
[2] Courtesy of the Director, Professor E. BUDTZ-JÖRGENSEN.

supernumerary teeth. STAFNE (83) says, however, that since supernumerary teeth are probably more numerous than found in these cases »it may be assumed that their incidence is at least one for every 100 persons». Hence we may state: Increase in the number of teeth is neither actually higher in the Greenland Eskimo nor in the West Greenland hybrid than in the white race represented by North Americans. On the other hand supernumerary teeth are somewhat more frequently met with in certain coloured races, e. g. in the South African Bantu. Very few comprehensive studies, directly comparable to those by the present author, have so far been published. The findings listed in table 4, however, clearly indicate that considerable variation may be found within the same racial stock.

Special attention has been paid to the occurrence of *fourth molars* (paramolars of *Bolk* as well as distomolars) from an evolutionary point of view. It has very often been claimed that fourth molars are more frequently present in coloured races than in white man. MARTIN (57) says of fourth molars that they until now were found to occur most frequently in Australian aborigines, New Caledonians, Tasmanians and Negroes. SCHWARZ (80) recorded in 267 New Caledonian skulls 7 fourth molars (including 3 paramolars), and among 400 skulls from the New Hebrides two paramolars. PROELL (70) reported one case from Uhaga-Togo with fourth upper distomolars bilaterally. Among several hundred skulls from the South Sea Islands FABIAN (25) failed to record more than one single case (exactly like our case 5, table 1). MIDDLETON-SHAW (82) in his excellent book on the teeth and jaws of the South African Bantu records three *lower* fourth molars in 248 living Bantu. On examination of 141 Bantu skulls this author found no supernumerary molars. In recent publications by T. D. CAMPBELL (16, 17) dealing with comprehensive studies of a considerable number of modern Australian aborigines no fourth molars are mentioned, and only one single case was observed with a »conical crown supernumerary tooth in the upper arch situated *labially* and a little to the left of the midline» (16, April, pag. 123). RÖSE (75) observed among 12,250 young adult males from Central and North Europe one single case. STAFNE (83) found fourth molars to be more common in North American whites than generally assumed, viz. 58 paramolars and 141 distomolars out of a total number of 800 supernumerary teeth observed in 48,550 patients in the Mayo Clinic.

A great number of fourth molar cases has been reported in dental literature (e. g. by BONNEY 11, FIELD 29, FLEDMANN 31, HENNINGSON 43, KAUFMANN 50, MEYER 61, MORRISON 62, PALAZZI 65). In Copenhagen several cases (even one bilateral) have been referred to the writer by dental practioners.

The author agrees with FABIAN (25), who is of opinion that it has not been definitely proved that fourth molars are more frequently occurring in "lower" races than in whites.

As far as the Greenland Eskimos are concerned neither the occurrence of fourth molars nor the incidence of supernumerary teeth taken as a whole has proved actually higher than those of the white race. Judging from the increase in number of erupted teeth in West Greenland hybrids as compared with that in unmixed East Greenland Eskimos it may also be assumed that white admixture has not interfered with the susceptibility to hyperproductivity of the dental lamina to any appreciable extent.

According to many authorities the occurrence of fourth molars is an atavism pointing back to some remote ancestors of recent man.[1] As late as 1928 R. MARTIN (57) states that it must be considered an accepted fact that fourth molars are an atavism. It has been claimed that the frequent occurrence of these molars in anthropoid apes (SELENKA (81) reports 20 per cent in the orang) suggests that fourth molars in hominids are an atavism. This argument however cannot be accepted hence the opinion that anthropoid apes are the ancestors of man has now been abandoned by most students of man's evolution. GREGORY (36) disagrees with the atavism-hypothesis, saying that it "totally disregards taxonomic and paleontological evidence". GREGORY puts forward the opinion that fourth molars are probably neomorphs in man "as well as in anthropoids, the results of various phyla of the man-anthropoid group independently acquiring a new power of growth at the posterior end of the dental lamina».

Studies carried out by MIDDLETON-SHAW (82) in baboon skulls suggest that the occurrence of M_4 is associated with exuberant growth of the retromolar space of the alveolar process. Thus, in the words of PROELL, "the dental lamina, when abundant space is available, acquires the power to bud off more teeth than should normally be present" (70, pag. 83). ADLOFF (2) well sums up the

[1] Judging from the photographs and tabulations in the excellent monograph by WEIDENREICH (91) on the dentition of *Sinanthropus Pekinensis* no fourth molars were present in that fossil hominid.

situation thus, "dass das Vorkommen vierter Molaren nicht etwa auf eine Urform mit vier Mahlzähnen hinweist, ist wohl sicher. Wenn überhaupt, sind diese M. 4 nur in dem Sinne atavistisch zu deuten, dass die Zahnleiste ursprünglich die Tendenz hatte, nach hinten in den Kiefer hineinzuwachsen und andauernd neue Zahnanlage zu produzieren von welcher Fähigkeit sie dann auch heute noch Gebrauch macht."

Congenital Absence of Permanent Teeth with Exception of Third Molars.

1. Eskimo Skulls.

Nine individuals out of 515 ancient Greenland Eskimo skulls aged more than 6—7 years showed decrease in number of (permanent) teeth (1.8 per cent).[1]

The various cases are given in table 5.

Special attention is called to case no. 9 (Fig. 22 a and b). A thorough description of this exceedingly rare case will be published elsewhere. The writer tentatively puts forward the opinion that M_1 sup. sin. is congenitally missing in this skull[2] and likewise both lower P_2's and M_1's. The difficulty however in determining which molars are missing is quite often conspicuous: Fig. 23 shows the upper jaw of a young male Eskimo skull. Judging from the shape of the anterior left molar and from the socket of the corresponding right molar it should be assumed that M_1 is missing bilaterally. On account of the fact that the first molar is generally supposed to be constantly present, and as *third* molars in numerous cases are absent in the Eskimo, the writer does not venture to suggest that M_1 is missing in this case. To justify this point of view a few further considerations can hardly be dispensed with. As is the case in the white race a considerable morphological variability of molar crown and root shape is found in the Eskimo arch. Striking evidence of this fact is given in Fig. 24: An Eskimo child aged about 6 years had two permanent molars erupted. The left molar was lost *post mortem*. The right one bears a deceptive resemblance to a second molar and would most likely have been considered a M_2 if found in an adult specimen.

[1] All figures given in this chapter do not concern third molars.

[2] Congenital absence of one upper first molar was found to be associated with severe disturbance of facial growth in a foetus examined histologically by BRECKWOLDT (12).

Table 5.

Ancient Greenland Eskimo skulls with congenitally missing teeth excl. of third molars.

Case no.	Museum no.	Locality	Sex	Age	Congenital absence of	Notes	Illustrations
1	488	Umanak W. G.	♀	Adult	2 + 2		
2	162	Anoretok (65° 5′ N.) E. G.	♂	Adult	2 + 2 (+ 8)	+ 7 paramolar tubercle 8 + vestigial ∴ 8 impacted	Fig. 17 and Fig. 18
3	36	Ekaluit, Upernavik District W. G.	♀	Adult	1 ÷		
4	115	Jakobshavn W. G.	♂	Adult	One lower incisor	8 + impacted	Fig. 19
5	28	Julianehaab W. G.	♀	Adult	Two lower incisors (1 ÷ 1), (8 + 8)		Fig. 20
6	5. Thule Exp.[1]	Baffin Island, Canada	♂	Mature	Two lower incisors	800 years old[1]; molars lost *ante mortem*	Fig. 21
7	Alaska	Prince William Sound, Alaska	♂	Adult	2 ÷		
8	32	Kuk, Upernavik District W. G.	♂	Mature	5 ÷ 5		
9	506	Umanak W. G.	♀	Adult	+ 6, 6, 5 ÷ 5, 6	Cleft palate, *vide text*	Fig. 22 a and Fig. 22 b

E. G. = East Greenland.
W. G. = West Greenland.
[1] See *Mathiassen*[58] and *Fischer-Möller*[38]

Table 5 shows an astonishing high incidence of missing *lower* incisors. This condition is also frequently to be found in the living Greenland Eskimo as dealt with in the following section of this chapter.

2. Modern East Greenland Eskimo.

As x-ray examination could be made in Angmagssalik only, the material was reduced to 603 cases over 7 years of age. 18 natives showed congenital absence (3.0 per cent). The various cases are given in table 6.

Table 6.

Congenitally missing teeth (excl. third molars) in modern Angmagssalik Eskimo.

Case No.	Current No.	Sex	Age	Congenital absence of	Notes	Illustrations
1	513	♀	29	2+2		Fig. 25
2	535	♀	23	2+2	02+02, 03 retained +3 impacted	Fig. 26
3	65	♀	28	2+		
4	75	♂	23	2+		
5	350	♀	38	2+		
6	679	♀	36	2+		
7	757	♀	23	2+ (8+8)		
8	338	♂	21	1−1, (8−8, 8+8)		Fig. 27
9	479	♂	10	1−1		
10	331	♂	36	2−2	two upper paramolars	(Fig. 9 a and 9 b)
11	416	♀	15	−1, (8+8)		Fig. 28
12	524	♂	40	1−, (+8)		Fig. 29
13	533	♂	22	−1, (−8)		
14	690	♀	21	5+, 5−	05+, 05− retained	
15	646	♀	39	7+		
16	459	♂	23	7+7, −7 (8−8, 8+8)		
17	158	♂	14	−7		
18	183	♀	27	+6 (or +7)		Fig. 30

The decrease in number of teeth in the modern East Greenland Eskimo (table 6) shows interesting features: It is rather peculiar that seven right lateral incisors are absent in the upper jaw, but

only two left incisors. As is the case in the white race (RÖSE, 75) the females more frequently show absence of upper lateral incisors than do the males. Very surprising is the high incidence of missing *lower* incisors in males. Finally the writer calls attention to the molar cases, especially case no. 18 (fig. 30) in which two upper left molars are absent. Though it cannot be definitely proved that the left upper molar tooth in the dental alignment is M_2 it must be assumed to be the second molar, M_1 and M_3 being congenitally absent. No molars were impacted (x-ray), and none were lost.

Discussion.

A direct comparison of the findings in ancient and modern Eskimo indicates a more advanced decrease in number of teeth in the latter group. This is principally brought about by a somewhat higher incidence of congenitally missing upper incisors in modern East Greenland females and by a few rare cases, where molars are missing.

Taken as a whole the character of congenital absence in our material is very strange and differs from that of white population groups. In the skull material absence of lower incisors is *more frequent* than absence of upper incisors. (In the East Greenland material absence of upper and lower incisors is almost equal.) Further it is conspicuous that absence of upper (lateral) incisors is met with principally in females, and that absence of lower (median and lateral) incisors is most frequent in males. Finally it is interesting that absence of lower bicuspids, quite common in white man, is not found to any appreciable extent in the Greenland Eskimo.

Turning to other racial groups to provide data for the purpose of comparison, we learn from the findings of RÖSE (75), widely quoted in literature, that I_2 sup. is missing or vestigial in 2.4 per cent of young Scandinavians and Central Europeans. (Scandinavians 5.9 per cent, Central Europeans 2.3—3.6 per cent). RÖSE found 0 per cent missing I_2's in Chinese and Japanese skulls, 0.6 per cent in Melanesian skulls, 0.8 per cent in Indian skulls, 1.9 per cent in Malayan skulls, and 6.0 per cent in Australian aboriginal skulls. In all RÖSE found complete absence of lateral upper incisors in 1.1 per cent of 2,811 skulls from coloured races. The findings of RÖSE do not harmonize with those of MIDDLETON-SHAW from the South African Bantu and those of T. D. CAMPBELL

from Australian aborigines. Both failed to record any elimination of upper lateral incisors. In the Bantu SHAW did not observe any absence whatsoever of incisors, canines and premolars. DORSEY (21, 22) found among 16 ancient Peruvian skulls (Inca) two with "suppressed" upper lateral incisors. HRDLICKA (46) states that 3 per cent of I_2's are missing in white Americans. OHASHI and TONIHARA report that 4.5 per cent are lacking in the population of Formosa. The upper lateral incisors were congenitally absent in one case out of 50 Canadian Eskimo skulls examined by RITCHIE (73). In modern American Eskimo skulls LEIGH (54) recorded 7 cases (2.2 per cent). The writer observed 2 cases in skulls (0.4 per cent) and 7 in living Greenland Eskimo (1.1 per cent).

RÖSE (75) says that there is a definite relation between missing I_2 sup. and the cranial Length-Breadth-Index. He supposes dolichocephalic individuals to have more frequently such absence than brachycephalic individuals. Concerning this statement the writer wishes to point out that the Eskimo cranium is markedly dolichocephalic, not seldom (25 per cent) hyperdolichocephalic (FÜRST and HANSEN, 32) and accordingly should be expected to have a very high percentage of missing upper I_2's. The writer has proved that this is not the case in the Greenland Eskimo. Thus there is evidence that absence of upper lateral incisors does not tend to be correlated with the shape of the skull as indicated by the Length-Breadth-Index. RÖSE (75) also says (pag. 250), "the greater the number of wisdom teeth, the less frequent the reduction of upper lateral incisors". Our findings seem to indicate rather the opposite correlation (few I_2's missing, numerous M_3's absent).

Concerning the absence of *lower* incisors a number of case reports are available from white man, especially in American dental literature (COOPER 18, STELZER 84, DAHLBERG 19 a. o.). In the Copenhagen Dental School the writer recorded some few cases. One Danish case observed by MOESGAARD is shown in Fig. 31. TRATMAN (89) (Singapore) published one case with lower lateral incisors missing in a Chinese girl aged thirteen and kindly referred to the writer one further case with both lower central incisors missing in a male Chinese. The observations of TRATMAN in connection with records of the lower incisor absence in Japanese (OHASHI and TONIHARA) referred to the author by Professor SHIBATA (Tokyo) suggest that this condition is not as rare in the Mongolian stock as in the white race. OHASHI and TONIHARA (63) reported the

astonishing high ranges of 3.6 per cent of I_2's inf. and 5.8 per cent of I_1's inf. missing in recent Japanese in Formosa. In our Greenland material absence of lower incisors was found in 0.97 per cent of skulls and 1.0 per cent of living Eskimo. Although our ranges are by far surpassed by those of Japanese authors we still claim that the incidence of missing lower incisors in the Greenland Eskimo ranges among the very highest hitherto found in any racial group. In fact we observed that lower incisors are almost as frequently missing as are upper lateral incisors. OHASHI and TONIHARA record *higher* incidence of missing I_1 inf. (5.8 per cent) than of I_2 sup. (4.5 per cent.). According to DOLDER[1] congenitally absent I_1 inf. averaged 2.2 per cent of all teeth found to be missing in 10,000 children from Switzerland; I_2 inf. averaged 1.1 per cent; I_2 sup. 12.3 per cent; and P_1 inf. 47.3 per cent.

Proceeding to the missing premolars, we find that QUINTERO (71) is of opinion that P_2 inf. comes next to I_2 sup. as far as congenital absence is concerned. HAMANO (39) studying congenital absence of teeth in modern Japanese (using x-ray) found the sequence of missing teeth to be the following: P_2 I_2 C I_1 P_1 M_2. DOLDER found in Switzerland this sequence: P_2 inf. P_2 sup. I_2 sup. P_1 sup. P_1 inf. I_1 inf. C sup. I_2 inf. M_2 sup. M_2 inf.

The writer has compiled various data suggesting close resemblance of the Eskimo dentition to that of the Mongolian stock proper (three-rooted lower molars of TRATMAN (89), shovel-shaped incisors of HRDLICKA (45), incidence and character of numerical variations etc.) Therefore it is very peculiar that in the Eskimo material very few premolars (two lower, one upper) are congenitally missing as P_2's according to HAMANO are the teeth most frequently missing in the Japanese.

Congenital Absence of Third Molars.

In an essay on skeletal remains of East Greenland Eskimo the Danish anthropologist SÖREN HANSEN (40) 1895 called attention to the frequent absence of third molars in 14 skulls unearthed by HOLM and GARDE (44) in South-East Greenland. In two cases SÖREN HANSEN also noticed missing incisors. The present paper includes the material examined and described by SÖREN HANSEN (e. g. the interesting case no. 2, Table 5).

[1] Schweiz. Mschr. Zahnhlk. No. 7, 1936.

1. Ancient Eskimo Skulls.

Tables 7 and 8 give the incidence of congenital absence of third molars in 410 upper jaws and 345 lower jaws of ancient Greenland Eskimos. Table 7 conforms to the style of tabulation applied by GOLDSTEIN (35) in his study of congenital absence and impaction of third molars in 759 modern American Eskimo mandibles kept in U. S. National Museum. (Washington D. C.). It is supposed that by following on exactly the same line as the above author comparison of the various Eskimo groups may be more easily made. On retrogression of *upper* third molars no previous studies have been made in the Eskimo.

Table 7.

Congenital absence of third molars in adult ancient Greenland Eskimo. Numbers and percentages of cases.

	Sex	M_3 missing on both sides	M_3 missing on one side		Total jaws with congenitally missing M_3	Per cent of jaws with congenitally missing M_3
			right	left		
upper jaw	males (213) . . .	4	4	4	12	*5.6*
	females (181) . .	3	3	4	10	*5.5*
	unsexed (16) . . .	0	0	1	1	*6.3*
	Totals	7	7	9	23	*5.6*
	Per cent of total adult maxillae (410)	*1.7*	*1.7*	*2.2*	*5.6*	
lower jaw	males (169) . . .	16	4	4	24	*14.2*
	females (149) . .	18	6	7	31	*20.8*
	unsexed (27) . . .	0	1	2	3	*11.1*
	Totals	34	11	13	58	*16.8*
	Per cent of total adult mandibles (345)	*9.9*	*3.2*	*3.8*	*16.8*	

Comparing our findings (table 7) with those of GOLDSTEIN (table 9) we find that the *very same incidence of third-molar absence has been recorded in 345 ancient adult Greenland and 759 modern adult American Eskimo mandibles.* In conformity with GOLDSTEIN we also find that the third mandibular molar is somewhat more

Table 8.

Incidence of congenitally absent third molars in ancient adult Greenland Eskimo. Numbers and percentages of teeth.

	Sex	M_3 dext.			M_3 sin.			M_3 dext. + M_3 sin.		
		Number of teeth that should normally be present	Number of teeth congenitally missing	Per cent of teeth congenitally missing	Number of theeth that should normally be present	Number of teeth congenitally missing	Per cent of teeth congenitally missing	Number of teeth that should normally be present	Number of teeth congenitally missiug	Per cent of teeth congenitally missing
Upper jaw	males (213)	213	8	*3.8*	213	8	*3.8*	426	16	*3.8*
	females (181)	181	6	*3.3*	181	7	*3.9*	362	13	*3.6*
	unsexed (16)	16	0	*0*	16	1	*6.3*	32	1	*3.1*
	Totals (410)	410	14	*3.4*	410	16	*3.9*	820	30	*3.7*
Lower jaw	males (169)	169	20	*11.8*	169	20	*11.8*	338	40	*11.8*
	females (149)	149	25	*16.8*	149	24	*16.1*	298	49	*16.4*
	unsexed (27)	27	1	*3.7*	27	2	*7.4*	54	3	*5.6*
	Totals (345)	345	46	*13.3*	345	46	*13.3*	690	92	*13.3*

frequently missing, absolutely and relatively, in females than in males. In the upper jaw the sex-ratio is almost 1 : 1.

Table 9.
(study by *Goldstein*).

Congenital absence of the lower third molar in adult American Eskimo mandibles.

Sex	M_3 missing on both sides	M_3 missing on one side		Total jaws with congenitally missing M_3	Per cent of jaws with congenitally missing M_3	Per cent of M_3 missing to M_3 that should be present
		right	left			
Males (363) . . .	32	10	18	60	*16.50*	*12.67*
Females (380) . .	44	11	11	66	*17.36*	*14.47*
Totals	76	21	29	126		
Per cent of total adult mandibles (759)[1]	*10.0*	*2.8*	*3.8*	*16.6*		*13.31*

GOLDSTEIN has found that distinct differences appear to exist in the mandibular third-molar absence in various American Eskimo groups as follows:

Eskimo group according to *Hrdlicka* (47)	Per cent of mandibles missing M_3	Per cent of M_3's missing
Southwest and midwest (477)	*14.9*	*12.5*
Northwest (232)	*19.0*	*15.5*
North and northeast (40)	*22.5*	*13.8*

GOLDSTEIN says, "a consistent percental increase of individuals lacking one or more lower third molars is noted from the southwest to the northwest to the north-northeast" (35, pag. 383).

Tables 7 and 8 show that our total Greenland skull material — belonging to the north and northeast Eskimo group of HRDLICKA (47) — does not show the same high percentage of congenitally missing mandibular third molar as does the rather small number of mandibles (40) from the same group examined by GOLDSTEIN.

We will now go thoroughly into this question which might prove of interest in connection with physical anthropology, mutual

[1] including 16 unsexed.

Table 10.

Congenital absence of third molars in ancient East Greenland skulls.

Sex and group	Upper jaw						Sex and group	Lower jaw					
	M_3 missing on both sides	M_3 missing on one side		Total jaws with missing M_3	Per cent of jaws with missing M_3	Per cent of M_3 missing to M_3 that should be present		M_3 missing on both sides	M_3 missing on one side		Total jaws with missing M_3	Per cent of jaws with missing M_3	Per cent of M_3 missing to M_3 that should be present
		right	left						right	left			
♂ (32)	1	0	1	2	*6.3*	*4.7*	♂ (24)	3	0	1	4	*16.7*	*14.6*
♀ (20)	0	1	1	2	*10.0*	*5.0*	♀ (15)	4	0	0	4	*26.6*	*26.6*
o (1)	0	0	0	0	*0*	*0*	o (0)	—	—	—	—	—	—
Totals							Totals						
Group A [1] (53)	1	1	2	4	*7.6*	*4.7*	Group A [1] (39)	7	0	1	8	*20.5*	*19.2*
Group B [2] (56)	4	2	2	8	*14.3*	*10.7*	Group B [2] (42)	8	2	5	15	*35.8*	*27.4*
Total adult East Greenland upper jaws . .	5	3	4	12	*11.0*	*7.8*	Total adult East Greenland lower jaws . .	15	2	6	23	*28.4*	*23.5*
Per cent of upper jaws (109) . .	*4.6*	*2.8*	*3.7*	*11.0*			Per cent of lower jaws (81) . .	*18.5*	*2.5*	*7.4*	*28.4*		

[1] Group A = E. G. skulls included in tables 7 and 8.
[2] Group B = E. G. skulls not included in tables 7 and 8.

relationship, and migrations of various Eskimo tribes. Therefore we have examined the easternmost Eskimo group in the Arctic — viz. that of East Greenland — apart from the West Greenland skulls. As the East Greenland skull material included in tables 7 and 8 is rather small, we have endeavoured to provide more material for that group. We have added a number of other East Greenland skulls kept in the Institute of Normal Anatomy, Copenhagen, as well as a few skulls examined 1937 by the writer in graves at Imarsivik, South-East Greenland (60° 40′ lat. N.). Thus a total number of 109 ancient East Greenland Eskimo skulls, principally from the southern part of the coast, has been studied. The results of this study are given in table 10. It is conspicuous that third molars (uppers as well as lowers) are much more frequently absent in East Greenland Eskimo skulls than in those from West Greenland. In the first place the sub-group A, which is included in the total material tabulated in tables 7 and 8, by far surpasses the average of the combined East-West Greenland material. In the second place the sub-group B, originating in the same areas, shows a still higher incidence of absent upper and lower M_3's.

Table 11.

Congenital absence of third molars in modern adult Angmagssalik Eskimo. Numbers and percentages of cases.

	Sex	M_3 missing on both sides	M_3 missing on one side		Total jaws with missing M_3	Per cent of jaws with missing M_3
			right	left		
Upper jaw	males (115) . . .	11	12	3	26	*22.6*
	females (142) . .	14	5	8	27	*19.0*
	Totals	25	17	11	53	
	Per cent of total adult upper jaws (257)	*9.7*	*6.6*	*4.3*	*20.6*	
Lower jaw	males (115) . . .	30	9	0	39	*33.9*
	females (142) . .	27	6	8	41	*28.8*
	Totals	57	15	8	80	
	Per cent of total adult mandibles (257)	*22.2*	*5.8*	*3.1*	*31.1*	

Table 12.

Congenital absence of M_3 in modern adult Angmagssalik Eskimo. Numbers and percentages of teeth.

	Sex	M_3 dext.			M_3 sin.			M_3 dext. + M_3 sin.		
		Number of M_3 that should normally be present	Number of congenitally missing M_3	Per cent of congenitally missing M_3	Number of M_3 that should normally be present	Number of congenitally missing M_3	Per cent of congenitally missing M_3	Number of M_3 that should normally be present	Number of congenitally missing M_3	Per cent of congenitally missing M_3
Upper jaw	males	115	23	*20.0*	115	14	*12.2*	230	37	*16.1*
	females	142	19	*13.4*	142	22	*15.5*	284	41	*14.4*
	Totals	257	42	*16.3*	257	36	*14.0*	514	78	*15.2*
Lower jaw	males	115	39	*33.9*	115	30	*26.1*	230	69	*30.0*
	females	142	33	*23.2*	142	35	*24.6*	284	68	*23.9*
	Totals	257	72	*28.0*	257	65	*25.3*	514	137	*26.7*

Table 13.

Distribution of congenitally missing third molars in modern adult Angmagssalik Eskimo.

Sex	Individuals missing																					
	no M_3's	one M_3					two M_3's										three M_3's				four M_3's	one or more M_3's
	$\frac{8\|8}{8\|8}$	$\frac{8\|8}{8\|}$	$\frac{8\|8}{\|8}$	$\frac{8\|}{8\|8}$	$\frac{\|8}{8\|8}$	$\frac{8\|8}{\|}$	$\frac{8\|}{8\|}$	$\frac{8\|}{\|8}$	$\frac{\|8}{8\|}$	$\frac{\|8}{\|8}$	$\frac{\|}{8\|8}$	$\frac{8\|}{\|}$	$\frac{\|8}{\|}$	$\frac{\|}{8\|}$	$\frac{\|}{\|8}$	$\frac{\|}{\|}$	
males (115)	69		6	3	2	14				3	2		7			9	46					
Per cent of adult male Eskimo	*60*		*9.6*			*16.5*							*6.1*			*7.8*	*40.0*					
females (142)	94	6	6	1	5	9	1				3	6	2	1		10	48					
Per cent of adult female Eskimo	*66.2*		*11.3*			*9.2*							*6.5*			*7.0*	*33.8*					
Totals	163	6	12	4	5	23	1			3	5	6	9	1		19	94					
Per cent of total adult Eskimo (257)	*63.5*		*10.5*			*12.5*							*6.2*			*7.4*	*36.6*					

2. Modern East Greenland Eskimo.

Tables 11, 12 and 13 deal with the congenital absence of third molars in 257 living adult Eskimo examined by the writer at Angmagssalik in 1937. 36.6 per cent of the individuals examined showed elimination of one or more third molars. 31.1 per cent of mandibles showed absence of third molars, and 26.7 per cent of mandibular third molars were found to be congenitally missing. Thus the decrease in number of lower- as well as upper-M_3's is still higher than in the ancient East Greenland skulls examined by the writer (compare table 11 with table 10). *The Eskimo tribe at Angmagssalik has the very highest incidence of third-molar absence of any fairly large group of present-day people thoroughly dealt with in dental literature.*

3. Modern West Greenlanders.

Although no x-ray examination has been made in West Greenland the writer does not hesitate to present his findings from this area. The error brought about by omitting x-ray examination is considered insignificant from a statistical point of view as far as the *third molar* absence is concerned.[1] To eliminate cases of delayed eruption only individuals more than 25 years of age have been recorded. To avoid too heavy mistakes in deciding whether congenitally absent or lost molars should be recorded individuals aged more than 50 were eliminated. Since it might be assumed that white admixture interferes with the incidence of decrease in tooth number a distinction was made between those localities where rather insignificant admixture has taken place (Nanortalik-Cape Farewell) and those where white admixture is ample (Julianehaab and neighbouring settlement). The practically unmixed area is dealt with in tables 14 and 15, the hybrid area in tables 16 and 17.

It appears from the figures given in tables 13, 14, 15, 16 that the hybrid group (15 and 16) has a remarkably lower incidence of absent mandibular third molars than has the almost unmixed group (13 and 14).

[1] Comp. GOLDSTEIN (35) and MEAD (59).

Table 14.

Congenital absence of third molars in practically unmixed modern South-West Greenland natives aged 25—50 Years. (Means of cases.)

	Sex	M_3 missing on both sides	M_3 missing on one side		Total jaws with missing M_3	Per cent of jaws with missing M_3	Per cent of M_3 missing to M_3 that should be present
			right	left			
Upper jaw	males (83) . .	7	5	0	12	*14.5*	*11.4*
	females (127) .	20	5	3	28	*22.0*	*18.9*
	Totals	27	10	3	40	*19.0*	*13.6*
	Per cent of total upper jaws (210)	*12.8*	*4.8*	*1.4*	*19.0*		
Lower jaws	males (83) . .	13	5	1	19	*22.9*	*19.3*
	females (127) .	17	9	3	29	*22.8*	*18.4*
	Totals	30	14	4	48	*22.9*	*18.6*
	Per cent of total lower jaws (210)	*14.3*	*6.7*	*1.9*	*22.9*		

Table 15.

Distribution of congenitally missing third molars in practically unmixed modern South-West Greenland natives aged 25—50.

Sex	Individuals showing congenital absence of				No M_3's missing	Per cent of individuals missing one or more M_3's
	one M_3	two M_3's	three M_3's	four M_3's		
males (83) . . .	7	10	4	3	59	
females (127) . .	9	12	7	10	89	
Totals	16	22	11	13	148	
Per cent of total individuals examined (210) .	*7.6*	*10.5*	*5.2*	*6.2*	*70.5*	*29.5*

Table 16.

Congenital absence of third molars in South-West Greenland hybrids aged 25—50. (Means of cases.)

	Sex	M_3 missing on both sides	M_3 missing on one side		Total jaws with congenitally missing M_3	Per cent with congenitally missing M_3	Per cent of M_3 missing to M_3 that should be present
			right	left			
Upper jaw	males (143) . .	8	3	5	16	*11.2*	*8.4*
	females (176) .	12	2	5	19	*10.8*	*8.8*
	Totals	20	5	10	35	*11.0*	*8.6*
	Per cent of total upper jaws (319)	*6.3*	*1.6*	*3.1*	*11.0*		
Lower jaws	males (143) . .	12	2	10	24	*16.8*	*12.6*
	females (176) .	11	9	3	23	*13.1*	*9.7*
	Totals	23	11	13	47	*14.7*	*11.0*
	Per cent of total lower jaws (319)	*7.2*	*3.4*	*4.1*	*14.7*		

Table 17.

Distribution of congenitally missing third molars in South-West Greenland hybrids aged 25—50.

Sex	Individuals showing congenital absence of				No M_3's missing	Per cent of individuals missing one or more M_3's
	one M_3	two M_3's	three M_3's	four M_3's		
males (143) . . .	9	19	3	1	111	
females (176) . .	14	9	3	6	144	
Totals (319)	23	28	6	7	255	
Per cent of total individuals examined	*7.2*	*8.8*	*1.9*	*2.2*	*80.0*	*20.0*

Discussion.

The principal results made available by our survey may be tabulated as follows (table 18):

Table 18.

Survey of various Eskimo groups concerning congenital absence of lower third molars in 1,902 mandibles examined by Goldstein and the writer.

Group and author	Number of mandibles examined	Per cent of mandibles missing one or two M_3's	Per cent of mandibular M_3 that should be present
Modern Angmagssalik Eskimo (Pedersen)	237	*31.1*	*26.7*
Ancient East Greenland skulls (Pedersen)	81	*28.4*	*23.5*
Modern West-Greenlanders, almost unmixed (Pedersen)	210	*22.9*	*18.6*
Skulls of modern north and northeast Eskimo (Goldstein)	40	*22.5*	*13.8*
Skulls of modern northwest Eskimo (Goldstein)	232	*19.0*	*15.5*
Ancient Eskimo skulls from all parts of Greenland (Pedersen) .	345	*16.8*	*13.5*
Skulls of modern South and midwest Eskimo (Goldstein)	477	*14.9*	*12.5*
Modern West Greenland hybrids (Pedersen)	319	*14.7*	*11.0*

The above tabulations of congenitally absent third molars present evidence that considerable differences occur between various Eskimo groups. The very highest incidence was found in modern Angmagssalik Eskimo. Next to this tribe comes the ancient East Greenland Eskimo. The third group comprises descendants from East Greenland Eskimo. Thus we are in accordance with GOLDSTEIN's conclusion that the percental increase in third-molar absence ranges higher in the eastern Eskimo than in the southwestern groups. It seems to be of the greatest interest from a racial point of view that the very lowest range is found in the West Greenland hybrids.

The writer does not intend to make a complete survey of the abundant literature on congenital absence of third molars. A

reference to some few principal data, however, can hardly be dispensed with if we shall be able to determine the range of absent third molars in the Eskimo in proportion to that of other racial groups.

About the Mongolian stock, to which the Eskimo is generally supposed to be related, an excellent study was published by SAITO and OZAKI (76), who examined 4,347 young male Japanese, using x-ray. 34 per cent of third molars, that should normally be present, were absent. HAMANO (39) reported that out of 1,300 Japanese 239 cases had third molars missing. HELLMAN (42) studying 19 Chinese skulls found 32 per cent to miss M_3's, while in 21 Mongoloid Buriats 17 per cent missed M_3's. KNAP (51) from Java recorded in 64 Chinese 31.2 per cent lacking one or more third molars and found 17.6 per cent of M_3's to be absent. In 71 Javanesians the corresponding percentages according to KNAP were 22.7 and 17.6 per cent; in 90 Europeans 27.9 and 14.2 per cent. GOLDSTEIN (35) says that the Mongoloid people, taken as a whole, appear to be the most advanced in respect of congenitally missing mandibular third molars. HELLMAN (41), however, making comprehensive studies of 19 various racial and local groups (849 skulls), including Mongoloids, found European whites from Hungary to be most advanced as far as third-molar absence was concerned.

Almost incredible are the figures put forward long ago by TALBOT (85) who reports 42 per cent of male and 58 per cent(!) of female Europeans to lack third molars. GOLBIRSCH (34) studied 2,112 white Americans by x-ray and found 9.0 per cent individuals with congenitally missing M_3's. 5.2 per cent of third molars had not developed. HELLMAN (41) in 261 American male students observed 21.7 per cent having congenitally missing M_3's, in 172 female students the percentage was 30.8. BANKS (5) (Colorado) found among 461 cases 19.7 per cent missing one or more third molars. EULER (24) making interesting comparative studies of neolithic skulls and recent Germans recorded in 150 Breslau students only 1.3 per cent with congenitally missing M_3's. EULER observed in 41 neolithic lower jaws from Silesia absence of M_3's in 26.8 per cent of the jaws examined. In ancient Egyptians according to RUFFER (74) only 3.2 per cent out of a total number of 156 individuals had congenitally missing M_3's. According to HELLMAN the Tasmanians also had an exceedingly low occurrence of this condition.

From the data given above it may very easily be seen that the statement by R. MARTIN, "M_3 hat die Tendenz zu verschwinden, und zwar bei Kulturrassen in viel höherem Grad als bei Naturvölkern" (57, pag. 989) cannot be corroborated. Neither can the writer agree with BLUNTSCHLI (8) who maintains that congenitally missing I_2's and M_3's very seldom occur in "lower" races, (if by "lower" races is meant coloured races). Likewise FALERO is mistaken in saying that, "this molar (M_3) is never (!) wanting in primitive races" (26). Contrary to the authors quoted, RÖSE (75) as early as 1906 stated that the wisdom tooth frequently shows retrogression of number and size not only in Europeans but *also* in coloured races. The research of recent years (ADLOFF, SHAW and the authors quoted above) has proved that this statement of RÖSE holds true. As a matter of fact there is abundant evidence that congenital absence of the third molar tooth in Eskimos and in Mongolians proper ranges at least as high, and probably higher, than in any other racial or local group. The incidence of missing M_3's in the Eskimo exceeds by far that of white man generally indicated in literature. As appears from the ranges quoted above it certainly must be admitted that extreme variations occur in the percentage given in literature on missing third molars in white man. Judging from his findings in modern West Greenland hybrids as compared with other Arctic groups the writer assumes that white admixture brings about a distinct lower range of missing M_3's.

Attempts to explain the cause of the absence of third molars have been made by many authors, some of whom (FALERO 26 a. o.) maintain that the (supposed) higher incidence of this condition in white man is connected with civilisation. These authors are of opinion that civilisation (urbanisation) reduces function of the masticatory apparatus and thus causes reduction of the size of the jaws. DARWIN (20), MANTEGAZZA (56), TOMES (88) and others proposed the causative factor to be, in the words of TOMES, "a consequence of want of space during the formative period" (p. 530, quoted by GOLDSTEIN 35). It is conspicuous that civilisation cannot be responsible for the very high amount of missing M_3's in the Eskimo, neither does any lack of room or space generally occur in the jaws of this group, nor in other native people in whom absence of M_3's is frequently met with. In most Eskimo jaws indeed abundant space is available for the third molar (Fig. 32). It has not been proved that the congenital ab-

sence of M_3's in any way is correlated with the space available for its accomodation. ADLOFF in his notes to the third molar study of EULER very clearly points out that decrease of function can only be the cause of alteration (e. g. reduction) concerning the *total* dental arch and not one single tooth. ADLOFF also calls attention to the fact that retrogression of the third molar was already present in fossil hominids. According to ADLOFF (4) the absence of third molars is exclusively a question of phylogenesis, though he admits that decrease of function may be a factor accelerating the tendency of retrogression in human dentition. WEIDENREICH says,

"Everything that occurs in the dentition is *only* a consequence of general transformation and cannot be the result of any accidental and direct influence upon teeth such as a change in nutrition, nor of a selection of unlimited chance variations. Neither can the different structures peculiar to hominids or other members of the anthropoid groups be caused by differences in the nutrition. They are peculiarities genuinely adherent to their special type like all other characteristics of the body."

If high incidence of congenitally missing third molars indicates advanced evolution of a human race, as is generally assumed, evidence has been presented by the writer as well as by GOLDSTEIN (35) that the Eskimo from an evolutionary standpoint ranges among the most advanced racial groups of the world.

Concerning the interpretation of racial relationship between the Eskimo and the peoples — aboriginal and recent — of America and northeastern Asia no conclusions, not even tentative, may be derived from the studies of the present writer. It seems noteworthy, however, to consider numerical variations in the dentition of various Mongolians and perhaps even more in Indians,[1] when further attempts are made by physical anthropologists to approach the interesting question of racial origin of the Eskimo and mutual relationship of various Eskimo groups.

In conclusion the writer wishes to acknowledge his indebtedness to the Royal Greenland Administration, the Copenhagen University Institute of Normal Anatomy, the Dental School of Copenhagen, and the P. Carl Petersen Foundation for facilitating and supporting his studies. I extend my most cordial thanks to

[1] DORSEY says 1887, "variations in the number and arrangement of the teeth are very frequent, and it is surprising to see how often it is the case among aboriginal American crania" (22 p. 213).

Professor of Anatomy, Dr. med. H. M. HOU-JENSEN for the privileges given me to examine the skull material and to the Dean of the Dental School, Professor E. BUDTZ-JÖRGENSEN for kind assistance in many ways.

My thanks are due to Dr. N. J. MOESGAARD, Assistant Professor of Orthodontics for making all photographs of the casts.

Finally I wish to forward my thanks to scientists abroad, who made data available to me from East Asiatic people, viz. Professors SHAMAMINE, SHIBATA, and MATSUDA (Tokyo), TRATMAN (Singapore), and KNAP (Soerabaia).

Summary.

The present essay deals with *numerical variations* in the dentition of ancient and modern *Greenland natives* compared with those of various other racial and local groups.

Material and methods of examination are described.

The material comprises three main groups, viz. (1) 525 ancient Greenland skulls, (2) 860 modern East Greenland Eskimo without any white admixture, and (3) 1634 Southwest Greenland natives, principally hybrids.

On examination of (1) and (2) roentgenograms were made in most cases.

The following variations in number of teeth are dealt with for each main group of material separately:

Increase in number of teeth:

1.1 per cent of ancient Eskimo skulls and

1.3 per cent of modern East Greenland Eskimo had supernumerary teeth erupted or impacted.

0.8 per cent of modern West Greenlanders had supernumerary teeth erupted.

Increase in number of permanent teeth was not found to be actually higher in the Eskimo than in white races. Nor has any reliable difference been found between the incidence of supernumerary teeth in ancient and modern Greenland Eskimo and that of West Greenland hybrids of the present day.

Special attention has been paid to the occurrence of fourth molars from an evolutionary point of view. There is no evidence that fourth molars occur more frequently in the Eskimo than in whites.

Decrease in number of teeth with exception of third molar-absence:

The character of congenital absence in the Eskimo dentition is very strange and distinctly differs from that of white population groups, whereas an appreciable resemblance seems to exist to that of the Mongolian stock:

In the Greenland Eskimo

lower incisors are absent almost as frequently as are upper lateral incisors,

lower second bicuspids — frequently absent in whites — are very seldom found to be missing, and

second and even first molars were found to be missing in a few cases.

Congenital absence of third molars.

This condition is very commonly met with in the Eskimo. The writer agrees with GOLDSTEIN stating that an increase of M_3-absence appears to exist from the southwest to the northeast Eskimo groups. The very highest range of congenital absence was found by the writer in the East Greenland Eskimo (skulls and living). White admixture seems to bring about a lower incidence of missing third molars.

Studies on dental numerical variations may prove of interest in connection with anthropological and ethnological research of the problem of racial origin of the Eskimo as well as of the mutual relationship and migrations of various Subarctic and Arctic groups.

Zusammenfassung.

Gegenwärtige Arbeit behandelt Variationen der Anzahl der Zähne bei präkolonisatorischen und heutigen grönländischen Eingeborenen, verglichen mit solchen bei anderen Rassen- und Volksgruppen.

Untersuchungsmaterial und -methoden werden beschrieben.

Das Material umfasst 3 Hauptgruppen, nämlich:

1. 525 Eskimoschädel aus Grönland, herrührend von der Zeit vor und um Beginn der Kolonisation.
2. 860 heutige ostgrönländische Eskimos ungemischter Rasse.
3. 1,634 heutige Südwestgrönländer, hauptsächlich gemischter Rasse.

Bei den Untersuchungen von 1. und 2. wurden in den meisten Fällen Röntgenbilder aufgenommen.

Folgende Variationen in der Anzahl der Zähne werden für jede der drei Materialhauptgruppen gesondert behandelt:

Überzahl der Zähne:

1.1 v. H. präkolonisatorische Eskimoschädel und

1.3 v. H. heutige ostgrönländische Eskimos hatten Überzahl durchgebrochener und retinierter Zähne.

0.8 v. H. heutige Westgrönländer hatten durchgebrochene überzählige Zähne.

Nicht mit grösserer Häufigkeit bei Eskimos als bei der weissen Rasse ist Überzahl vorhanden. Auch gab es keinen deutlichen Unterschied zwischen dem Vorhandensein von überzähligen Zähnen bei grönländischen Eskimos (Schädeln und heutigen) und bei westgrönländischen Mischlingen.

Besondere Aufmerksamkeit ist von einem phylogenetischen Gesichtspunkt aus dem Vorhandensein vierter Molaren gewidmet. Es liegt Beweis nicht vor, dass vierte Molaren häufiger bei Eskimos als bei der weissen Rasse vorkommen.

Unterzahl der Zähne, abgesehen vom Fehlen der Weisheitzähne.

Der Charakter der Unterzahl der Zähne im eskimoischen Zahnsystem ist sehr interessant und weicht von der entsprechenden bei europäischen Bevölkerungsgruppen deutlich ab, wohingegen sie erhebliche Ähnlichkeit mit der Unterzahl bei Mongolen aufweist:

Bei grönländischen Eskimos ist der Unterzahl der unteren Incisivi fast ebenso häufig wie die der oberen lateralen Schneidezähne.

Die zweiten unteren Prämolaren, die bei Europäern so häufig fehlen, weisen bei grönländischen Eskimos sehr selten Unterzahl auf.

Unterzahl der zweiten und sogar der ersten Molaren ist in einigen wenigen Fällen vorgefunden.

Unterzahl der dritten Molaren.

Unterzahl der Weisheitzähne trifft man besonders häufig bei den Eskimos. Der Verfasser stimmt mit GOLDSTEIN überein, der festgestellt hat, dass es ein zunehmendes Vorkommen von Unterzahl der Weisheitzähne von den südwestlichen bis zu den nordöstlichen Eskimogruppen zu geben scheint. Die allerhöchsten Prozentsätze kongenital fehlender dritter Molaren wurden von uns bei den ostgrönländischen Eskimos (Schädeln und lebenden)

vorgefunden. Die Einmischung von weissem Blut scheint eine weniger häufige Unterzahl der Weisheitzähne zu verursachen.

Untersuchungen über Variationen der Anzahl der Zähne sind vermeintlich von Interesse in Verbindung mit anthropologischen und ethnologischen Forschungen über die Frage des rassenmässigen Ursprungs der Eskimos, sowie über die gegenseitige Verwandtschaft und die Wanderungen verschiedener subarktischer und arktischer Volksgruppen.

Résumé.

L'essai présent s'occupe des variations dans le nombre des dents chez les indigènes du Grœnland — non seulement avant la colonisation, mais aussi de nos jours — comparées avec les variations chez autres groupes des races et des nations.

Les matériaux et méthodes d'examen sont décrits.

Les matériaux renferment 3 groupes principaux:

1. 525 crânes des Esquimaux, provenants du temps avant et environ le commencement de la colonisation.

2. 860 Esquimaux actuels en Grœnland oriental, de la race pure.

3. 1,634 Esquimaux actuels en Grœnland du Sud-Ouest, de la race croisée.

En faisant les examens au sujet de 1. et de 2. on a fait des radiographies dans la plupart des cas.

Les variations suivantes au sujet du nombre des dents sont traitées à part pour chacun des trois groupes principaux des matériaux.

Les dents surnuméraires.

1.1 pour cent crânes des Esquimaux du temps avant la colonisation et

1.3 pour cent Esquimaux actuels en Grœnland orientala vaient des dents surnuméraires éruptives et retenues et

0.8 pour cent Esquimaux actuels en Grœnland occidental avaient des dents éruptives surnuméraires.

Les dents surnuméraires ne se trouvent pas plus fréquemment chez les Esquimaux que chez la race blanche.

Aussi n'y avait il une différence marquée entre l'occurrence des dents en surnombre chez les Esquimaux grœnlandais (crânes et de nos jours) et les hybrides en Grœnland occidental de nos jours.

De l'attention particulière a été apportée à l'occurrence des molaires quatrièmes d'un point de vue d'évolution. Il n'existe pas une preuve que les molaires quatrièmes se trouvent plus fréquemment chez les Esquimaux que chez la race blanche.

Nombre de dents plus petit que la normale, exception faite pour les dents de sagesse.

Le caractère de ce nombre plus petit dans la rangée de dents chez les Esquimaux est très intéressant et diffère distinctement de celui des groupes nationaux européens, tandis qu'il montre une conformité considérable avec le nombre de dents plus petit chez les Mongols.

Chez les Esquimaux grœnlandais le nombre plus petit des incisives inférieures est presque aussi fréquent que celui des incisives latérales supérieures.

Les deuxièmes prémolaires inférieures, qui manquent si souvent chez les Européens, montrent très rarement le nombre plus petit chez les Esquimaux grœnlandais.

Le nombre plus petit des deuxièmes et même des premières molaires a été trouvé dans peu de cas.

Le nombre plus petit que la normale des troisièmes molaires.

Le nombre plus petit des dents de sagesse se trouve très fréquemment chez les Esquimaux. L'auteur est d'accord avec GOLDSTEIN, qui a affirmé, qu'il semble d'être là une occurrence croissante du nombre plus petit des dents de sagesse depuis les groupes d'Esquimaux du Sud-Ouest jusqu'aux groupes du Nord-Est. Les pourcentages les plus hauts des troisièmes molaires congénitalement manquantes étaient trouvés par nous chez les Esquimaux en Grœnland oriental (crânes et vivants). La hybridation avec du sang blanc semble de causer une manque des dents de sagesse moindre fréquente.

Il est probable que les examens au sujet des variations dans le nombre des dents sont d'intérêt, où il s'agit des investigations anthropologiques et ethnologiques sur les questions quant à l'origine raciale des Esquimaux, la parenté mutuelle et la migration de divers groupes sub-arctiques et arctiques.

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