given, and that is best provided by a series of through-and-through sutures of stout silkworm-gut or silk. These must be passed through all the structures except the peritoneum; they should be inserted about every inch and a half and should enter the tissue about half an inch from the edge of the incision. They must be tied firmly to give sure support, but not as tightly as possible, or the tissues within their grasp will simply give way before the tension created. In the after-care do not worry the bowels. As soon as the patient can face it, probably about the third day, a daily dose of liquid paraffin may be useful as a lubricant. If vomiting or distension is troublesome the stomach tube, usually of the Ryle or Waggenstein type, is invaluable. For lower abdominal distension a glycerin enema, the least disturbing of all enemata, may work wonders, but should it belie the reputation I give it one can always resort to the other less comfortable but more drastic clysters.

Locating the Injury

Whatever may be said for the various incisions which are employed for opening the abdomen, when confronted with a severe emergency, there can be no doubt about the superiority of the middle-line approach. It may start above or below the umbilicus as the indication of location suggests, but unless the injury is limited to the lower small intestine it must be of ample length. The patient will not die from a big incision, but may very likely succumb if some important injury is overlooked. From half-way between the ensiform and umbilicus to just above the pubes will allow an opening wide enough for most purposes, but a further extension upwards may be most helpful in high abdominal injury. If damage to liver or spleen or colon demands a more lateral exposure the surgeon must not hesitate to make a cross-incision dividing the rectus and extending from the mid-line towards either flank. Once the peritoneal cavity is opened it is first necessary to determine the source of any considerable haemorrhage and to deal with it either finally or temporarily. Then a systematic search must be made for injury to the hollow viscera. There is usually some indication in the way of haemorrhage or bruising as to where to begin. Intestine which has been wounded, whether by firearms or otherwise, is usually more bulky and quiescent than other parts. But gunshot injuries are usually multiple, so the intestine must be examined either from some injured spot up and down or, in the absence of some hint as to the location of the injury, from below up. But, wherever begun, the search must be systematic so that it need not be repeated. The colon also must be inspected from caecum to lower sigmoid. When the large bowel is in question the nose of the surgeon often provides the first hint. In retroperitoneal tears a definite haematoma or at least blood-staining may be tell-tale. A wounded stomach is usually flaccid and a missile generally injures both walls. Discoloration or bulging of the gastro-colic or small omentum usually means injury to the posterior surface of the stomach or the pancreas.

The first injury discovered may be temporarily repaired, but only if what is done is part of what will be ultimately required. In such serious lesions, where time may be all-important, nothing must have to be done over again. A good plan is to clamp a piece of gauze over each lesion as found, using a short bowel clamp or a ring sponge handle, so that there is some guide to each area that must be subsequently repaired. It is unwise to try to decide what must be done in the way of repair until the

whole extent of the damage has been determined. To make a nice resection or a pleasing suture of damaged bowel only to discover later that the aorta has been torn or the pancreas lacerated is poor recompense for the time expended. Retroperitoneal ruptures of the large bowel are among the most serious of all the injuries, and will probably demand an independent posterior incision through the muscles right down to the lesion; no mere "stab wound"—a horrid device in any circumstances—will suffice. The incision should be at least three or four inches long and must freely open up the cellular tissue. If the laceration can be easily repaired it is worth while even though the suture does break down or the bowel sloughs later. It may help to detain infection until the cellular tissue is somewhat prepared, but no great time and care must be spent in this suturing, for in any case the wound should be lightly packed with antiseptic gauze and left completely open. To suture the wound partially and to leave in a rubber tube is fallacious.

While time should not be spent in searching for foreign bodies, those that are discovered should certainly be removed, for they are potential sources of danger, though retribution may be long delayed.

DENTAL HYPOPLASIA AND CARIES AMONG THE CHILDREN OF FINNISH LAPPS

BY

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This investigation was undertaken at the suggestion of Lady Mellanby, while I was on a month's tour of Finnish Lapland in June, 1939. The visit was primarily in connexion with other scientific work. Rather unfavourable weather conditions, combined with the extremely scattered nature of the Lapp population, resulted in the number of children examined being much smaller than was originally anticipated. The results, on the other hand, are so comparatively uniform that it is reasonable to assume that these children were a representative sample.

There are about 30,000 Lapps living in the northernmost areas in Norway, Sweden, and Finland; of these some 2,000 inhabit the area of Finland north of the Arctic Circle. The Finnish Lapps are not uniform in their culture: they speak three separate languages and provide a miniature colonial problem for the Finnish Government. Those living towards the western borders (the Fell Lapps) are mostly nomadic and exist principally by reindeer husbandry; no Fell Lapps were examined during this investigation. The second group, the Skoltje Lapps, live in the Petsamo area, in the extreme north-east of Finland; this area was ceded by Russia in 1920. Some Skoltje Lapps keep reindeer, but those living near the sea seem to have lost most of their original habits and to have adopted a mode of life similar to but on a lower level than that of the poorest Finns.

The third group are the Inari Lapps; they number about 900 and form the main subject of this investigation. They live in the central part of Finnish Lapland, which is well forested, and have for many years inhabited log houses. They keep reindeer, but also practise mixed farming on a small scale; they fish in the lakes and rivers in summer. The houses are often ten miles or more apart in a country which is not easy to traverse, since there are no roads, the rivers have fairly frequent rapids, and the forest paths are often swampy and mosquito-infested during summer. In comparison winter-time travelling with reindeer is simple. Even when a house was reached after a long walk

it often happened that some of the family were away fishing and no one knew where they were or when they would return. The inhabitants of this country, where for two months in summer the sun never sets and where for part of the winter it never rises, have little "sense of time," so that much patience is required for an investigation of this kind.

Scope of the Investigation and Methods Used

Only children between the ages of 2 and 14 years were examined. Some of these were seen in small groups of five or six at village schools such as Inari or Kaamanen, while a slightly larger number were living in the orphan home at Riutula. Further north the Skoltje Lapp villages of Mos-cova, Poshashsijt, and Koltokongas were visited, and at these we went round the houses with the aid of an interpreter, but only seventeen children were at home. The remainder of the children, except for three or four living very near Inari, were examined during a walking and motor-boat expedition to Angeli, on the Norwegian border. I was accompanied by Fröken Wide, the hostess from our hotel, to whom I am much indebted for the help she gave me.

Each mouth was examined with an illuminated mirror and probe and the teeth were charted for hypoplasia and caries. The method used for estimating the structure of the teeth was that described by M. Mellanby (1927a, 1927b, 1934). Each tooth with enough enamel surface intact was graded for hypoplasia by rubbing its buccal surface with a fairly sharp probe. Four grades of structure were distinguished: Grade 0—no hypoplasia; Grade 1—slight hypoplasia; Grade 2; and Grade 3. Any teeth with gross hypoplasia like that figured in textbooks—that is, hypoplasia which is easily visible in the mouth to the naked eye—were entered on the charts as such to distinguish them from Grade 3. In this paper the 1, 2, and 3 grades of hypoplasia will be referred to as "M-hypoplasia," whereas the textbook or gross type will be called "G-hypoplasia."

The extent of caries* in each tooth was estimated as 0, 1, 2, or 3, depending on the size of the cavity if one was present, the criterion for size being the same as that used by M. Mellanby and her colleagues (1934, 1936, etc.) and King (1938, 1939) in similar but much larger investigations. As no radiographs were taken of the teeth some caries was undoubtedly missed in the mirror-and-probe examination. To obtain comparative hypoplasia and caries figures for the children the total hypoplasia and caries figures for each mouth were added up separately and divided by the number of fully erupted teeth. This gave the average hypoplasia figure (A.H.F.) and the average caries figure (A.C.F.).

In this paper the structure of the teeth is stressed particularly because it is not usual in field surveys to pay any attention to structure. King (1939) made the first field survey of teeth in which structure was emphasized. The present investigation, though much smaller, is the second in which this has been done. Since structure in teeth is dependent on development (M. Mellanby, 1923a, 1923b, 1930, 1937) it seems reasonable to consider it first, and to deal with caries later.

Of the Inari Lapps the fifty-three children examined probably represent nearly one-third of the total child population between 2 and 14 years. As this group of Lapps inhabit an area remote from any towns or railway communication a study of their teeth should be of some interest. I was fortunate enough, through the kindness of Dr. Kivimäki, to be able to look at the collection of Inari Lapp skulls in the anatomy museum of Helsinki. The skulls are between fifty and two hundred years old, and among them were sixteen from children of 5 to 15 years approximately. A comparison of the teeth of the modern Inari Lapp child with those of his predecessors was therefore possible. Information about the former diet of these people was collected from old travel books, while particulars of their modern diet in

winter time were obtained from Mr. Michael Logan, who has spent part of several winters living in Lapp houses. I gained some information about their summer diet by eating in their houses.

The Structure of Lapp Children's Teeth

From an examination of Table I it will be seen that the teeth of both Inari and Skoltje Lapp children are of very imperfect structure, some grade of M-hypoplasia being found in 75 per cent. of the deciduous teeth—that is, only 25 per cent. of the deciduous teeth of these children could be regarded as of good structure. It is probable that even this figure for the deciduous teeth is too high, because they showed a very considerable amount of attrition. In the cases in which I tried to find the cause of this attrition it would appear to be due to the habit of chewing pieces of twigs. When a deciduous tooth, such as a first or second molar, has much of its crown worn away the small remaining area of buccal surface becomes more polished, and in estimating this structure the tooth may sometimes be given a higher standard than it originally developed. A higher percentage of the permanent teeth showed some M-hypoplasia than did the deciduous, only 6.7 per cent. being of good or normal structure. In both deciduous and permanent teeth many were so carious that no hypoplasia figure could be obtained for them. For example, 104 deciduous molars out of a total of 347 were too carious, as were also forty-seven permanent molars out of a total of 195. Since it has been shown that there is a direct association between this M-hypoplasia and caries (M. Mellanby, 1923a, 1923b, 1927a, 1927b, 1929, 1930; King, 1938) it is probable that these very carious teeth included a high proportion of Grade 2 and 3 types of hypoplasia. This would also result in making the teeth as a whole appear to be of better structure than they actually were. In the large field investigation of King (1939) dealing with the structure of teeth among children in the Scottish island of Lewis the question of attrition affecting the estimation of structure did not occur, because the teeth of these children showed very little attrition.

In Table I the M-hypoplasia figures for the Inari Lapp children are worked out separately so that they may be compared with the amount of M-hypoplasia found in the skulls of their predecessors from the same district.

TABLE I.—Structure of Teeth of Finnish Lapps: Grades of M-hypoplasia

	Total No. of Teeth	Percentages				Average M-hypo- plasia Figure
		0	1	2	3	
ALL LAPPS						
(a) <i>Deciduous teeth</i> :						
Simple	249	31.7	52.2	15.7	0.4	0.85
Complex	243	16.4	39.5	37.4	6.6	1.34
Total	492	24.2	45.7	26.5	3.5	1.09
(b) <i>Permanent teeth</i> :						
Simple	429	6.5	44.0	45.0	4.7	1.48
Complex	332	7.4	39.6	43.4	9.6	1.56
Total	761	6.7	42.1	44.7	6.7	1.51
(c) <i>All teeth</i>	1,253	14.6	43.5	35.7	5.6	1.35
INARI LAPPS						
(a) <i>Deciduous teeth</i> :						
Simple	216	32.4	54.0	12.9	0.4	0.81
Complex	221	15.4	40.2	38.5	5.8	1.35
Total	437	23.7	47.3	25.8	3.1	1.09
(b) <i>Permanent teeth</i> :						
Simple	316	8.5	48.6	39.9	3.4	1.38
Complex	236	9.7	40.5	39.5	10.1	1.50
Total	552	9.1	44.9	39.6	6.3	1.43
INARI LAPP SKULLS						
(a) <i>Deciduous teeth</i> :						
Complex only ..	52	82.7	17.3	0	0	0.17
(b) <i>Permanent teeth</i> :						
Complex only ..	51	43.1	50.9	5.9	0	0.63

Caries in Lapp Children's Teeth

As might be expected on the basis of the poor structure of the Lapp children's teeth caries is rampant. In Table II the incidence and extent of caries in three age groups of Inari Lapps and in the Skoltje Lapps will be seen. All children over 4 years old were affected by the disease, and out of the total of seventy children only three were caries-free, and

* Caries 0 denotes free from caries so far as can be judged by a probe and mirror; caries 1 means a pin-point cavity, or no visible caries but the probe sticks; caries 2 represents a cavity involving up to one-third of the crown; and caries 3 denotes a cavity larger than one-third of the crown.

TABLE II.—Incidence and Extent of Dental Caries in 70 Finnish Lapp Children

Age Group (Years)		All Teeth			Deciduous Teeth			Permanent Teeth		
		No.	Percentage Carious	Average Caries Figure	No.	Percentage Carious	Average Caries Figure	No.	Percentage Carious	Average Caries Figure
Under 6..	Inari Lapps	208	24.0	0.39	208	24.0	0.39			0.70
6-9 ..	" "	555	54.7	1.19	313	68.3	1.57	242	37.2	0.64
10-14 ..	" "	422	41.7	0.71	57	43.9	0.92	365	41.3	
All Ages:										
2-14 ..	" " " " " " " "	1,185	44.7	0.89	578	50.0	1.15	607	39.7	0.684
4-14 ..	Skoltje Lapps, Petsamo Area	404	62.9	1.41	132	78.7	2.34	272	55.1	1.04
2-14 ..	Skoltje and Inari Lapps together	1,589	49.4	1.00	710	55.3	1.44	879	44.5	0.77

these were between 2 and 3 years old. Taking all the Lapp children between 2 and 14 years together, 55.3 per cent. of their deciduous teeth were carious and 44.5 per cent. of their permanent teeth were also decayed. When this result is compared with that obtained by other workers for children of a similar age in different parts of the world it will be realized that the teeth of these Lapp children are at least as carious as any others in Europe for whom figures are available.

Modern children with the least caries (excluding natives of tropical countries) are probably those Eskimos examined by Pedersen (1938) in the remote parts of East Greenland, where he found that children aged 0 to 13 years had only 2 to 4 per cent. of their deciduous teeth attacked by caries and only 1 to 1.4 per cent. of their permanent teeth affected. In contrast to this, Pedersen (1937) found that between 31 per cent. and 34 per cent. of the teeth of children attending some Danish elementary schools were carious in the age group 7-13 years. The teeth of "civilized" West Greenlanders living in Julianehaab he found to be slightly worse than those of the Danes.

According to the figures of Ainsworth and Young (1925) the percentage of carious teeth in children aged 6 to 13 years attending a number of elementary schools in England and Wales was between 26 and 55 for deciduous teeth (upper jaws only), with an average of 43 per cent. Of the total permanent teeth the percentage carious was between 8 and 16, with an average of 13 per cent.

Where children's teeth in Europe are considered good—as, for instance, in the more remote parts of the island of Lewis which were investigated by King (1939)—there are still some 14 per cent. of the teeth carious, though 28 per cent. (and in some districts up to 50 per cent.) of the children have no caries at all.

Comparison between Inari Lapp Children's Teeth and those of the Skulls

The sixteen skulls of Inari Lapp children examined in the Helsinki anatomy museum contained only a proportion of the teeth present at death, the rest having fallen out of their sockets, as so often happens with skulls buried for long periods. The deciduous teeth present were as follows: two canines, twenty-three first and thirty-eight second molars. The permanent teeth were two incisors, one canine, five premolars, thirty-nine first molars, and nine second molars. In comparing the teeth of these skulls as regards structure and caries with those of the modern Inari Lapp child only the complex teeth can be considered, since nearly all the simple teeth in the skulls had been lost. In the matter of structure, the teeth from the skulls, particularly the deciduous ones, were much superior to those of the Inari Lapp children to-day. As will be seen from Table I, out of a total of fifty-two deciduous molars from the skulls only nine (17.3 per cent.) showed any degree of M-hypoplasia, and then it was only one degree. In other words, forty-three out of fifty-two (82.7 per cent.) skull deciduous molars were of perfect structure. In the present-day children, on the other hand, only thirty-four deciduous molars out of 221 (15.4 per cent.) showed no hypoplasia. Again, in the complex

permanent teeth the skulls showed considerable superiority of structure, twenty-two out of fifty-one (43.1 per cent.) being perfect, as compared with twenty-three out of 236 (9.7 per cent.) in the children's teeth. None of the skull teeth showed G-hypoplasia. It would seem, therefore, that in the modern Inari Lapp children the teeth are of much worse structure than those of their predecessors living between fifty and two hundred years ago.

The difference in the amount of caries in the skull teeth and the children's teeth is also very striking. Comparing the

	Deciduous Complex Teeth		Permanent Complex Teeth	
	No.	Percentage Carious	No.	Percentage Carious
Skulls ..	52	5.7	51	21.8
Children ..	300	73.3	288	74.0

deciduous teeth, the proportion of caries among the molars of the children was almost thirteen times that shown in the skulls. The difference in the permanent teeth was not so great, the children having only three and a half times the number of carious complex teeth present in the skulls.

From the evidence available in the small number of skulls it appears that not only have the teeth deteriorated in structure in the modern Lapp child but, as might be expected from previous evidence, they show a great increase in caries.

In addition to the sixteen skulls of Inari Lapp children in the museum there were more than 200 skulls from adults, most of them elderly people. The teeth in these old skulls showed so much attrition that it would not have been easy to calculate a caries figure, but it was obvious from a superficial examination that these people had died with the vast majority of their complex teeth in working order. No proper dental examination was made of any living adult Inari Lapps, but when speaking to them it was very noticeable that most of those under 35 years old had hardly a sound tooth in their heads. On the other hand some of the old Lapps whom I met on the journey to Angeli and elsewhere appeared to have most of their teeth in good condition. This suggests that the deterioration of the teeth in these Lapps is a fairly recent occurrence, probably beginning about 1900, when the Finns started to emigrate in numbers into Lapland.

Relation between Structure and Caries

1. IN THE CHILDREN'S TEETH

The high degree of association between the M type of hypoplasia and caries was first shown as long ago as 1923 by M. Mellanby, and it has been confirmed since by further work of M. Mellanby (1927a, 1927b, 1929, 1930, 1934, 1937), by the Medical Research Council report of the Dental Disease Committee (1936), by Davies (1939), and by King (1938, 1939). The first field survey recording structure in this sense and showing the association of structure and caries was made by King (1938, 1939) on the teeth of children living in the island of Lewis. There were not sufficient teeth in the present investigation to make it worth while to work out the association between caries and M-hypoplasia in each type of tooth, but the percentage of caries in normal and hypo-

plastic teeth is shown in Table III below for deciduous and permanent teeth, which have been further subdivided into simple and complex types.

TABLE III.—Percentage of Caries in Normal and Hypoplastic Teeth of Lapp Children

	Teeth with No Hypoplasia		Teeth with Grade 1-3 M-hypoplasia	
	No.	Percentage Carious	No.	Percentage Carious
Deciduous I. and C.	79	7.6	170	24.7
Deciduous molars ..	40	52.5	203	70.9
Permanent I. and C.	28	0	401	13.5
Permanent molars and premolars ..	24	50	308	76.3
Totals	171	22.8	1,082	43.9

It will be seen from the table that the teeth showing some degree of M-hypoplasia were much more liable to caries than were those of normal structure.

2. IN THE INARI LAPP CHILDREN'S TEETH AND THOSE OF THE SKULLS

In showing the association between surface structure and susceptibility to dental caries (Tables IV and V) in the Inari children's teeth and in the skulls only the complex types of teeth can be considered, as nearly all the simple teeth were absent from the skulls. In the deciduous molars of the skulls (Table IV) only three teeth showed any caries, and then

TABLE IV.—Association between Surface Structure of Teeth and Susceptibility to Dental Caries. Deciduous Molars of Inari Lapp Children. (Teeth showing G-hypoplasia are omitted.)

M-hypoplasia Grades	Caries Grades				Totals	Average Caries Figure
	0	1	2	3		
0	18 (41)	8 (2)	7	1	34 (43)	0.65 (0.05)
1	44 (8)	20 (1)	18	7	89 (9)	0.87 (0.11)
2	11	15	28	31	85	1.93
3	2	3	3	5	13	1.84
Totals {	75 (49)	46 (3)	56	44	221 (52)	1.31 (0.06)

For the data arranged in the form of a fourfold table the coefficient of association (Q_s) between quality of structure and incidence of caries is 0.706.

The figures in parentheses are those obtained from the skulls of Inari Lapp children.

Among the children examined fifty-nine deciduous molars were too carious for a hypoplasia figure to be obtained.

it was Grade 1; only nine out of fifty-two had any degree of M-hypoplasia. The Inari children's deciduous molars were very much more hypoplastic and more carious. In the children's teeth the average caries figure for each grade of M-hypoplasia from 0 to 3 steadily increases.

In Table V the permanent molars and premolars of the

TABLE V.—Association between Surface Structure of Teeth and Susceptibility to Dental Caries. Permanent Molars and Premolars of Inari Lapp Children. (Teeth showing G-hypoplasia are omitted.)

M-hypoplasia Grades	Caries Grades				Totals	Average Caries Figure
	0	1	2	3		
0	11 (17)	10 (5)	1	1	23 (22)	0.65 (0.23)
1	29 (21)	51 (3)	16 (2)	0	96 (26)	0.86 (0.27)
2	19 (1)	31 (2)	26	17	93 (3)	1.44 (0.66)
3	0	4	14	6	24	2.08
Totals {	59 (39)	96 (10)	57 (2)	24	236 (51)	1.19 (0.27)

For the data arranged in the form of a fourfold table the coefficient of association (Q_s) between quality of structure and incidence of caries is 0.686.

The figures in parentheses are those obtained from skulls of Inari Lapp children.

Among the children examined nineteen permanent molars were too carious for a hypoplasia figure to be obtained.

children are compared with those teeth from the skulls with regard to structure and caries. There is not so striking a difference in this case between the modern Lapps and their predecessors: this might be due in part to the fact that the skulls may have been from unhealthy children who for some years before their early death had been in a condition of ill-health which may have affected their tooth structure.

Statistical analysis of the data arranged in the form of a 2×2 contingency table gives values of χ^2 and P which indicate that the association between susceptibility to caries and quality of structure is definitely significant. The degree of association is of a fairly high order, as is seen by the coefficients of association (Q_s) of not less than 0.6. I am grateful to Dr. Matthew Young and Miss I. Allen for these and other statistical analyses of the data.

Discussion of the Results, with Special Reference to Diet

It is evident from the results that the teeth of the modern Finnish Lapp child are of poor structure as judged by grading their surface texture for M-hypoplasia. When the structure of the children's teeth from one part of Finnish Lapland is compared with that of their predecessors from the same district who lived some fifty to two hundred years ago it is seen that the teeth used to have a much better structure. Now the structure of teeth is dependent to a large extent on diet, as was originally shown by M. Mellanby (1918-1930). Since the general mode of living of the Inari Lapps is thought to have changed less than that of other Lapp communities with the advance of civilization, it seemed worth while to find out if much alteration had taken place in the type of food eaten. Only a general idea of the modern diet in winter and summer was obtained, but as the diet is restricted in the kinds of food consumed it is obvious that such an examination gives a far more accurate impression than would be obtained by using the same method on the inhabitants of a "civilized" town.

Particulars of the old Lapp diet were found in two travel books—one by Scheffer, published in 1674, and one by Acerbi, published in 1802. It is probable that the diet of the Inari Lapps remained relatively little changed until the migration northwards of the Finns took place about the beginning of the present century. The skulls in Helsinki are assumed to belong to a period when the types of food eaten were either exactly the same as those described by Acerbi or only slightly modified.

In the original Lapp diet reindeer and reindeer products were the staple food. Reindeer flesh was eaten raw or stewed, the entrails and bone marrow being also used. A small amount of cheese was made from reindeer milk, which is said to have four times the calcium content of cow's milk. The flesh of bears was eaten when this was available, as was much river and sea fish, including salmon. Some of the fish was dried and then pounded up into a kind of flour. A substitute for salt was made out of pine bark, and a large amount of wild fruit was taken raw or made into sauces. Scheffer comments on the complete absence of bread, while Acerbi says that very little bread was eaten, and what there was took the form of flat rye cakes. He states that fish livers were a great delicacy; a quotation from his book reads: "The liver of this [cod] and other fish, bruised and mixed with cranberries, is considered a very savoury dish, and this . . . is eaten without bread."

From these sources it appears that the original Lapp diet, like that of the "uncivilized" Eskimos, was almost entirely carnivorous. In both cases the possible low calcium intake, especially in relation to phosphorus, was made good by the habit of chewing bones.

The modern substitute which has succeeded this diet shows some important differences. The chief additions are cheap margarine, oatmeal, coffee, sugar, and potatoes. Cereals appear to be consumed in large quantities during the winter, as they can then be brought from long distances

by reindeer-sledge and they provide an easily stored non-perishable type of food. Oatmeal mixed with rye flour and water and cooked until it forms a thick porridge is a popular dish. A great deal of coffee is drunk by adults and much cane sugar is taken with it, so the children no doubt get some opportunity for obtaining sugar. They will readily eat sugary sweets when offered them, though I saw none in the houses; chocolate they refuse. Compared with children in this country their sugar consumption must be much lower, owing to lack of pocket money and shops in which to buy sweets.

Much reindeer meat is still eaten stewed or raw, also a good deal of lake fish and dried cod; the latter has often been dried for a long time and may therefore have little vitamin value. Practically all the salmon (with its high vitamin content) which they catch is sold to hotels and tourists, whereas there used to be no market for it. Many Lapps grow potatoes, which they cook fried in margarine, and the Finnish Government is now doing all it can to improve the diet of the Lapps by encouraging them to keep cows. This is fairly easy in summer, but difficulties are apt to arise in looking after the animals throughout the long Arctic winter of seven months. For this reason the animals are often killed when the snow begins to come. When consumed, cow's milk is seldom taken fresh but is allowed to go sour and solidify. Unlike the Finns, who use all this sour milk, the Lapps tend to eat only the cream off the top, thereby wasting valuable protein and salts. Very little fresh fruit is gathered nowadays.

It would seem from the foregoing account that there has been a great increase in the use of cereals, particularly in winter. This must to a large extent replace the carnivorous part of the food. The fat-soluble vitamin and calcium content is probably low. Their former diet was said by Acerbi to be extremely oily, but to-day most of the fat used in cooking and on their hard rye bread is cheap margarine. If allowance is made for the anti-calcifying effect of a high cereal content of the diet (E. Mellanby), in the presence of little fat-soluble vitamins and calcium, it seems possible to account for the deterioration in tooth structure that appears to have taken place in the modern Inari Lapp child as compared with its predecessors. This defective tooth structure has been shown to be correlated with a greater liability of the teeth to decay, so that the considerable changes in the Lapps' diet may be largely responsible for the very carious condition of the children's teeth.

Summary

The teeth of seventy Finnish Lapp children between 2 and 14 years of age were examined. Fifty-three of these children were Inari Lapps and seventeen were Skoltje Lapps.

The teeth of these children were on the whole badly formed as judged by the probe diagnosis of M. Mellanby. Some grade of M-hypoplasia was present in 75.8 per cent. of the deciduous teeth and in 93.3 per cent. of the permanent teeth. G-hypoplasia was found in 3.9 per cent. of the permanent teeth, but none was found in the deciduous teeth.

Much less M-hypoplasia was found in teeth from children's skulls from the Inari district which had been buried for between fifty and two hundred years. The skulls showed no gross or G-hypoplasia.

Caries was found to be very common in the modern Lapp child but much less prevalent in the Inari Lapp skulls. In the children 55.3 per cent. of the deciduous and 44.5 per cent. of the permanent teeth were decayed. No child over 4 years of age was caries-free.

A brief comparison is made between the former Lapp diet and its modern counterpart. Changes in the diet are thought to be partly responsible for the deterioration in tooth structure, and as M-hypoplasia has been shown to be correlated with a greater liability to caries this would account, at least in part, for the great increase in decay among the children's teeth as compared with those of their predecessors.

REFERENCES

- Acerbi, J. (1802). *Travels through Sweden, Finland, and Lapland in 1798 and 1799*, London.
Ainsworth, N. S., and Young, M. (1925). *Med. Res. Cncl., Sp. Rep. Ser.*, No. 97, London.
Davies, J. H. (1939). *Brit. dent. J.*, **67**, 66.
King, J. D. (1938). *Lancet*, **2**, 109.
— (1939). *Med. Res. Cncl., Sp. Rep. Ser.*, London (in press).
Mellanby, M. (1918). *Lancet*, **2**, 767.
— (1923a). *Proc. roy. Soc. Med. (Odont. Sect.)*, **16**, 74.
— (1923b). *Brit. dent. J.*, **44**, 1.
— (1927a). *Ibid.*, **48**, 737.
— (1927b). *Ibid.*, **48**, 1481.
— (1929). *Med. Res. Cncl., Sp. Rep. Ser.*, No. 140, London.
— (1930). *Ibid.*, No. 153.
— (1934). *Ibid.*, No. 191.
— (1936). *Ibid.*, No. 211.
— (1937). *Brit. dent. J.*, **62**, 241.
Pedersen, P. O. (1937). *Tandtbl.*, **5**, 255.
— (1938). *Dent. Rec.*, **58**, 191.
Scheffer, J. (1674). *The History of Lapland*, Oxford.

AN ABDUCTION SPLINT USED IN WAR SURGERY IN CHINA

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The outbreak of war in China in 1937 created a great demand for splints and appliances for dealing with gunshot and bomb injuries. One such appliance proved particularly satisfactory, and for this reason is brought to the attention of those preparing for war service in the West.

Description of Splint

The splint (Fig. 1) is similar in the principles of its construction to the abduction frame made out of Cramer's wire, used so extensively by Böhler in Vienna. The material in this case, however, is not Cramer's wire but thin sheet metal. To give sufficient rigidity the edges of

FIG. 1.—Showing the construction of the abduction splint.

the metal are turned round or "beaded" to include stout wire. The splint consists of four metal strips as follows:

1. A main strip or "body," bent at a right-angle to fit against the chest and under the upper arm. The right-angle in this strip is maintained not only in its "beaded" edges but by means of two wire struts.

2 and 3. Two narrower strips or "chest bands," riveted at right angles to the first piece, which can be bent to fit snugly to any size or shape of chest. Each of these strips carries near its end a hinged wire loop.

4. A forearm support. This is fixed to the body of the splint by a bolt and wing nut. The latter is adjustable in a