

les plus jeunes, une absence relative de pleurésie séro-fibrineuse et une fréquence élevée de tuberculose osseuse. La promiscuité familiale avec un tuberculeux et la présence de ganglions paratrachéaux visibles à la radiographie pulmonaire furent des éléments aggravants du pronostic.

La comparaison de ces observations avec celles qui ont été faites sur des groupes d'enfants blancs atteints de tuberculose primaire a révélé que les perspectives étaient plus sombres pour les petits Indiens. Selon toute vraisemblance, les Indiens qui ont été dans leur enfance, il y a 20 ou 30 ans, fortement exposés à la tuberculose continueront de payer un lourd tribut à la maladie pendant les

années à venir et on ne pourra réduire la morbidité que par un usage étendu de la chimiothérapie préventive.

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The Heights and Weights of Indian and Eskimo School Children on James Bay and Hudson Bay

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ALTHOUGH much is known about the morbidity and mortality of Canadian Indians and Eskimos, very little is known about their general health. This prompted us to collect and present data on the heights and weights of Indian and Eskimo school children.

POPULATION AND METHODS

These data are mainly cross-sectional and consist of heights and weights recorded by the public health nurses as part of the routine school examination.

Three groups of children were studied:

(1) Eskimos on the east coast of Hudson Bay (263 children). Measurements taken in September 1965 were collected from the settlements at Great Whale River, Port Harrison, Povungnituk and Sugluk.

(2) Cree Indians in the region of James Bay (754 children). The population is mainly concentrated in the towns of Moosonee and Moose Factory at the southern end of James Bay, but measurements were also obtained of school children from the settlements of Attawapiskat,

Fort Albany, East Main, Paint Hills, Fort George and Great Whale River on James Bay or the neighbouring parts of Hudson Bay. The measurements were taken in September 1965. The birth weights of 768 babies born in these settlements between 1959 and 1965 were also collected.

(3) Mohawk Indians of the Tyendinaga Reserve (119 children). Measurements of these children were taken in 1966.

A description of James Bay and the east coast of Hudson Bay has already been published in this Journal.¹ The Eskimos live in settlements on the coast north of the tree line from Great Whale River to Sugluk (Fig. 1); the climate is cold and harsh (Table I). The Cree Indians live in coastal settlements south of the tree line and in the towns of Moosonee and Moose Factory, where the climate is subarctic. The Mohawk Indians live at Tyendinaga, a small reserve some 30 miles west of Kingston in southeastern Ontario. The population is predominantly rural and comparatively prosperous.

Most of the measurements were made on bar scales with a height attachment. A spring scale was used at Tyendinaga and this was checked repeatedly against a bar scale. Standing height was taken without shoes and weight was measured with the child partly clothed. Height was recorded to the nearest 1/2 inch and weight to the nearest 1/4 lb.; the data were subsequently smoothed to the nearest inch or pound and con-

This paper is part of a symposium organized by the Indian and Eskimo Child Health Committee of the Canadian Paediatric Society. From the Department of Paediatrics, Queen's University, Kingston, Ontario.

This study was supported by the Queen Elizabeth II Canadian Research Fund and by the Ontario Association for the Mentally Retarded.

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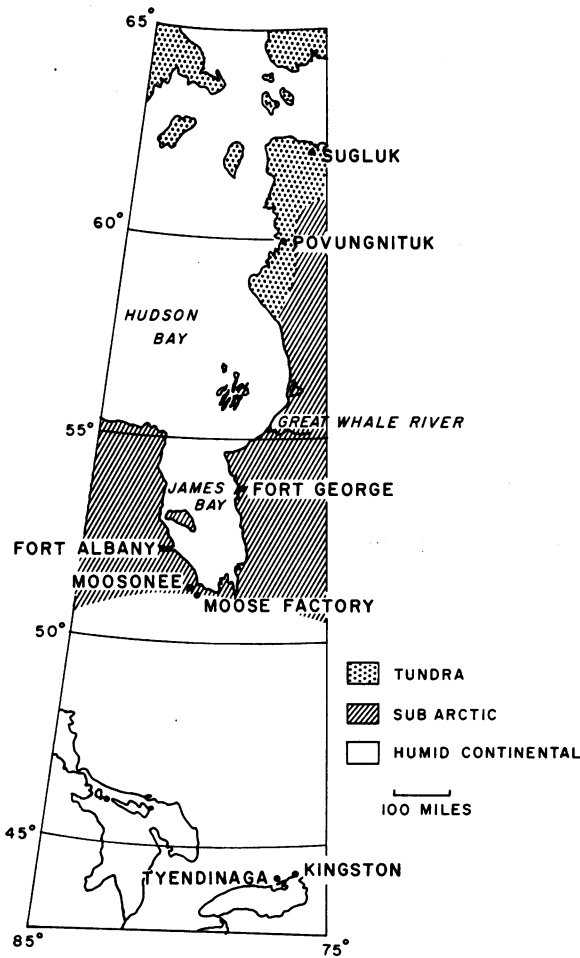


Fig. 1.—Sketch map of James Bay, Hudson Bay and Southern Ontario showing the sites and climate of the main places mentioned in the text.

verted to the metric system. Dates of birth and dates of measurement were known accurately. The school children have been grouped by years of age. Thus all children aged 6 years to 6 years 11 months are included in the 6-year age group and the group mean has been plotted on the graphs at 6½ years.

Birth weights were measured in a variety of ways but most commonly on bar scales. The weight was recorded in pounds and ounces and has not been converted to the metric system.

RESULTS

The Eskimos on the East Coast of Hudson Bay

Measurements of the heights and weights of 263 children aged 5 to 15 years were collected. There were more boys than girls, with a particular deficiency of 9- to 11-year-old girls. These data are presented in Table II by yearly age groups from 5 to 15 for each sex. The number of observations, mean values and standard deviations for each age group are given. The data are shown graphically in Fig. 2. On average, the 5- to 11-year-old boys were taller and heavier than the girls of the same age; the 12- to 14-year-old girls were taller and heavier than the boys, but the boys had caught up to and surpassed them by the age of 15 years.

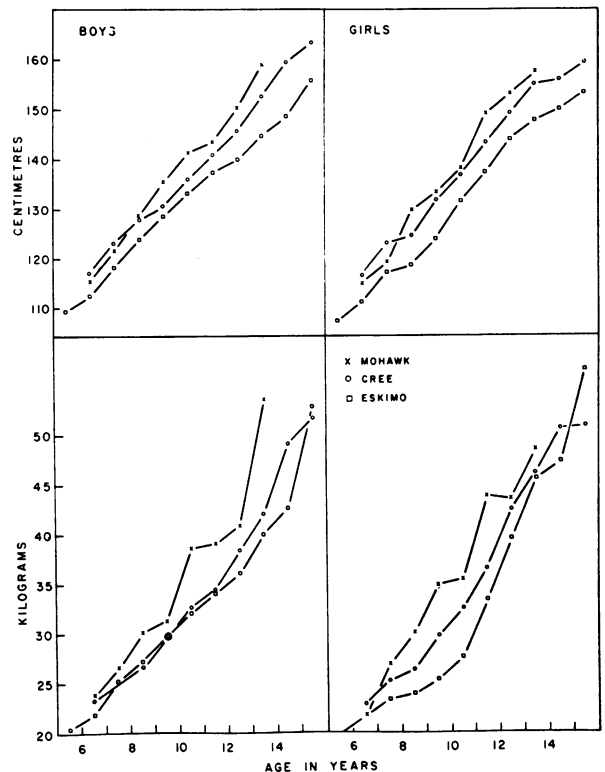


Fig. 2.—Mean heights and weights of the three groups of school children by age and sex.

TABLE I.—CLIMATE AND TEMPERATURE OF SETTLEMENTS ON JAMES BAY, HUDSON BAY AND IN SOUTHERN ONTARIO²

Racial group	Town or settlement	Approximate latitude (° North)	Climate	Mean daily temperature (°F.)	
				January	July
Eskimo	Sugluk	62	Tundra	-15 to -10	45 to 50
Eskimo	Povungnituk	60	Tundra	-15 to -10	45 to 50
Eskimo and Cree Indian	Great Whale River	55	Subarctic	-15 to -10	50
Cree Indian	Fort George	54	Subarctic	-10 to -5	50 to 55
Cree Indian	Moosonee and Moose Factory	51	Subarctic	-10 to -5	50 to 55
Mohawk Indian	Tyendinaga	44	Humid continental	15 to 20	65 to 70

TABLE II.—THE HEIGHTS AND WEIGHTS OF ESKIMO SCHOOL CHILDREN ON THE EAST COAST OF HUDSON BAY, 1965

Age (years)	Boys					Girls				
	N*	Height (cm.)		Weight (kg.)		N	Height (cm.)		Weight (kg.)	
		Mean	S.D.†	Mean	S.D.		Mean	S.D.	Mean	S.D.
5	5	109.7	2.8	20.5	1.6	5	107.7	5.8	20.0	2.8
6	20	112.8	5.3	21.8	2.6	14	111.5	3.8	21.8	1.5
7	18	118.6	5.8	25.3	6.9	15	117.1	5.8	23.4	3.5
8	19	124.0	5.8	26.7	2.8	16	118.9	4.3	23.9	2.1
9	19	128.8	6.6	29.8	4.0	9	124.0	4.9	25.3	2.3
10	19	133.4	6.9	32.3	4.8	6	132.6	5.7	27.7	3.1
11	13	137.4	4.6	34.1	2.8	7	137.2	5.7	33.3	4.7
12	17	140.2	5.8	36.1	4.7	14	144.0	7.1	39.5	8.4
13	7	144.8	5.3	40.1	5.5	7	147.6	6.4	45.7	7.3
14	9	148.8	5.3	42.8	5.5	11	150.0	6.9	47.3	7.2
15	8	156.0	6.6	52.9	10.2	5	153.4	2.5	56.5	6.3

*N = number of children. †S.D. = standard deviation.

Cree Indians in the James Bay area

Measurements of weight were available for 754 children and of height in about 90% of these; there were approximately equal numbers of boys and girls (Table III, Fig. 2). As with the Eskimo children, the boys were taller and heavier than the girls except in the 11- to 14-year-old groups. At any given age the Indians were, on average, taller and heavier than the Eskimos; the weight differences were more marked in the girls than in the boys.

Birth Weights.—The distribution of the birth weights of 768 Cree Indian babies born in this area between 1959 and 1965 is shown in Table IV; stillbirths have been excluded and figures for both sexes are presented together. The average birth weight was computed by multiplying the average birth weight of the class by the number in that class and dividing the total weight of the series by the number of babies. The average birth weight was found to be 8 lbs. 5 oz. (3.78 kg.). This is about a pound heavier than the North American average for white children.³ It is also exactly a pound heavier than the average birth weight of 5598

Indians born across Canada in 1962.⁴ It should be noted that the distribution of birth weights shown in Table IV is roughly symmetrical so

TABLE IV.—THE BIRTH WEIGHTS OF 768 CREE INDIANS BORN IN THE JAMES BAY AREA, 1959-1965

Weight range			Weight range		
lb. oz.	lb. oz.	Number	lb. oz.	lb. oz.	Number
1.7 to 1.15		1	7.8 to 7.15		107
2.0 — 2.7		1	8.0 — 8.7		125
2.8 — 2.15		0	8.8 — 8.15		104
3.0 — 3.7		0	9.0 — 9.7		88
3.8 — 3.15		1	9.8 — 9.15		49
4.0 — 4.7		1	10.0 — 10.7		45
4.8 — 4.15		9	10.8 — 10.15		13
5.0 — 5.7		7	11.0 — 11.7		20
5.8 — 5.15		16	11.8 — 11.15		5
6.0 — 6.7		24	12.0 — 12.7		5
6.8 — 6.15		58	12.8 — 12.15		1
7.0 — 7.7		87	13+		1

Average = 8 lb. 5 oz. (3.78 kg.).

that the high average birth weight was not simply due to an inordinate number of very heavy babies.

TABLE III.—THE HEIGHTS AND WEIGHTS OF CREE INDIAN SCHOOL CHILDREN IN THE JAMES BAY AREA, 1965

Age (years)	Boys						Girls					
	N*	Height (cm.)		N	Weight (kg.)		N	Height (cm.)		N	Weight (kg.)	
		Mean	S.D.†		Mean	S.D.		Mean	S.D.		Mean	S.D.
6	30	117.3	7.0	32	23.3	1.9	38	116.8	9.3	42	22.8	4.3
7	36	123.1	7.3	42	25.3	2.9	48	123.3	8.8	54	25.2	3.5
8	46	128.3	4.9	47	27.2	2.9	35	124.5	10.5	37	26.3	3.8
9	43	131.7	5.6	44	29.7	3.7	41	132.0	5.2	46	29.8	4.8
10	43	136.1	6.4	46	32.5	6.0	44	136.8	8.2	50	32.5	4.1
11	36	141.0	5.0	39	34.4	5.0	34	143.4	10.0	37	36.5	6.4
12	32	145.9	7.8	36	38.4	6.1	34	149.1	8.5	36	42.5	6.8
13	16	152.9	7.4	22	42.1	7.0	22	155.1	7.2	27	46.1	9.7
14	35	159.6	11.4	38	49.2	8.0	28	156.1	8.5	29	50.7	7.2
15	26	163.7	8.4	27	51.8	7.1	20	159.6	9.3	23	50.9	7.9

*N = number of children. †S.D. = standard deviation.

TABLE V.—THE HEIGHTS AND WEIGHTS OF MOHAWK INDIAN SCHOOL CHILDREN ON THE TYENDINAGA RESERVE, 1965

Age (years)	N*	Boys				Girls				
		Height (cm.)		Weight (kg.)		N	Height (cm.)		Weight (kg.)	
		Mean	S.D.†	Mean	S.D.		Mean	S.D.	Mean	S.D.
6	7	115.8	4.0	23.6	1.7	6	115.1	4.3	21.8	2.5
7	4	121.9	4.8	26.7	2.1	12	119.4	5.4	26.9	5.7
8	9	128.5	6.1	30.2	3.7	8	130.0	10.3	30.0	6.2
9	4	135.9	5.5	31.4	4.4	6	133.4	2.8	35.0	3.4
10	8	141.7	6.1	38.7	11.5	11	138.2	6.1	35.5	7.3
11	9	143.5	5.2	39.0	6.7	8	149.1	6.1	43.9	6.7
12	3	150.6	—	40.9	—	6	153.2	4.8	43.6	6.1
13	11	159.0	6.1	53.6	11.7	7	157.7	3.2	48.7	6.1

*N = number of children. †S.D. = standard deviation.

MOHAWK INDIANS OF THE TYENDINAGA RESERVE

Measurements of height and weight were taken of 119 school children aged 6 to 13 years (Table V, Fig. 2). There were a few more girls than boys. The boys were taller and heavier than the girls except for the 11- to 12-year-olds. On the average, at any age beyond 7 years, the Mohawk children were taller and considerably heavier than the Cree children.

Growth Patterns

Three quite different growth patterns are evident from these data. In general, at a given age, the Mohawk Indians were taller and heavier than the Crees, whereas the Eskimo children were shorter but not necessarily lighter. The height/weight relationships of the different groups are shown in Fig. 3. It can be seen that the Eskimo boys had a consistently greater weight for height than the Cree Indians at all ages; the same pattern was present with the girls except for the anomalous group of 9- to 11-year-old Eskimos. The younger Mohawk boys had similar height/weight relationships to the

younger Eskimos, but this was not maintained throughout childhood. The younger Mohawk girls were considerably heavier for their height than either Cree or Eskimo girls, but this was reversed in later childhood.

These differences in growth pattern could be racial and genetic or they could be due to environmental factors such as climate or socio-economic conditions. Great Whale River is a settlement on the east coast of Hudson Bay where Eskimos and Indians live side-by-side; there are more Eskimos than Indians in the settlement. The 22 Indian school children were paired at random with Eskimo children of the same age and sex and the means of the differences between the pairs of heights and weights were examined by t-tests (Table VI). It was found that the Indians were taller and heavier than the Eskimos; these differences are highly significant statistically.

Similar paired comparisons of boys' heights were made between successive settlements from north to south (Table VII, Fig. 2); no significant differences were found between the heights of Eskimo boys in Sugluk, Povungnituk or Great Whale River. Cree Indian boys in Fort George were significantly taller than Eskimo boys. There were no significant differences between the heights of Cree Indian boys in Fort George and those in Moosonee and Moose Factory. The Mohawk boys at Tyendinaga in southern Ontario were significantly taller than the Cree Indians on James Bay and Hudson Bay.

Secular Trends

Long-term, widespread, generation-to-generation changes in the growth and development of a population are known as "secular" trends.⁵ Secular increases in the heights and weights of school children have been well documented in a variety of populations over the past 100

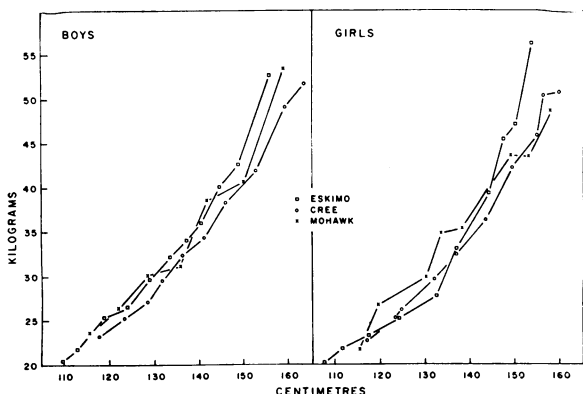


Fig. 3.—Mean height/weight relationships of three groups of school children.

TABLE VI.—PAIRED COMPARISON BETWEEN THE HEIGHTS AND WEIGHTS OF INDIAN AND ESKIMO SCHOOL CHILDREN AT GREAT WHALE RIVER

	Age (years)	Height (cm.)			Weight (kg.)				
		Eskimo	Indian	Difference	Eskimo	Indian	Difference		
Boys	5	107	112	+	—	20.4	20.0	+	—
		112	140	5	—	22.7	25.0	2.3	0.4
	6	112	117	5	—	20.4	22.7	2.3	—
		114	97	—	17	19.5	23.6	4.1	—
	7	119	127	8	—	23.2	25.9	2.7	—
	9	140	135	—	5	36.8	31.3	—	5.5
		127	150	23	—	27.7	64.5	36.8	—
12	145	147	2	—	39.5	38.6	—	0.9	
	140	160	20	—	34.1	49.9	15.8	—	
14	142	158	16	—	35.0	46.3	11.3	—	
Girls	6	109	119	10	—	20.0	25.4	5.4	—
		114	125	11	—	20.4	45.4	25.0	—
		112	119	7	—	20.0	24.1	4.1	—
		107	117	10	—	19.5	21.8	2.3	—
	7	125	112	—	13	23.2	18.2	—	5.0
	8	107	137	30	—	17.7	28.2	10.5	—
		122	130	8	—	24.5	29.5	5.0	—
	9	125	137	12	—	24.1	33.1	9.0	—
		125	132	7	—	25.4	37.2	11.8	—
	13	155	155	—	—	49.9	79.9	30.0	—
	15	150	160	10	—	52.2	56.3	4.1	—
		152	160	8	—	51.8	57.2	5.4	—
	Mean of the differences =				+8.3 cm.		+7.57 kg.		
Value of t				3.43		3.41			
Value of P				<0.005		<0.005			

years.⁵⁻⁷ Fig. 4 shows the mean heights and weights of the three groups of native Canadian school children related to the heights and weights of white Canadian school children collected between 1892 and 1951.⁸⁻¹⁰ In a general way, the Mohawk children correspond to the white school children in 1951, the Cree Indians to the white school children in 1939 and the Eskimos fall between the white school children in 1892 and 1923.

We have no previous data on either group of Indians with which to compare our findings. However, our data on the Eskimos correspond closely with those of Heller, Scott and Hammes¹¹ for Alaskan Eskimos collected between 1956 and 1959. Hrdlicka¹² had studied the same group of Alaskan Eskimos between 1928 and 1932. These three sets of data are shown in Fig. 5; the similarity of the measurements is striking. Fig. 6 shows the secular change in heights of 6-, 8-,

TABLE VII.—PAIRED COMPARISONS OF THE HEIGHTS OF INDIAN AND ESKIMO BOYS IN SUCCESSIVE TOWNS OR SETTLEMENTS FROM NORTH TO SOUTH

Racial group	Town or settlement	Number of pairs	Mean difference (cm.)	Approximate value of t	P
Eskimo	Sugluk	25	-0.51	0.29	0.75
Eskimo	Povungnituk	43	+1.83	1.58	0.15
Eskimo	Great Whale River	53	+2.44	2.27	0.02
Cree Indian	Fort George	73	+0.08	0.05	0.95
Cree Indian	Moosonee and Moose Factory	49	+1.71	3.56	0.001
Mohawk Indian	Tyendinaga				

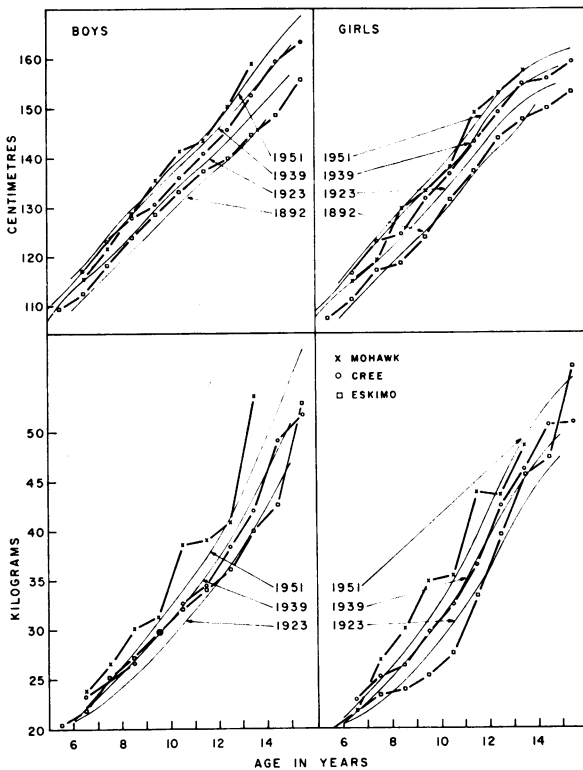


Fig. 4.—Mean heights and weights of the Indian and Eskimo school children related to those of white Canadian school children (continuous lines) measured between 1892 and 1951.

10-, 12- and 14-year-old white Canadian boys and girls from 1892 to 1951. As with other populations there has been an increase of about 1.5 cm. per decade.⁵ Fig. 6 also shows similar data for Eskimo school children from 1930 to 1965; no consistent increases in heights were found.

DISCUSSION

We would like to emphasize that all the heights and weights, except those at Tyendinaga, were collected from the records of routine school examinations. No particular effort had been made to standardize the way in which the measurements were taken. All the measurements collected have been included except for those of a very few children who showed a wide divergence from the average. We estimate that more than 90% of the school children in the various areas were included. Obviously these data should be treated with caution.^{5, 13} Nevertheless, three remarkably different and consistent growth patterns have been disclosed.

These differences, particularly those between the Indian and the Eskimo, could be due predominantly to racial and genetic factors. Eskimos and Indians are obviously different racial groups. The Eskimo adult is stockier than the Indian

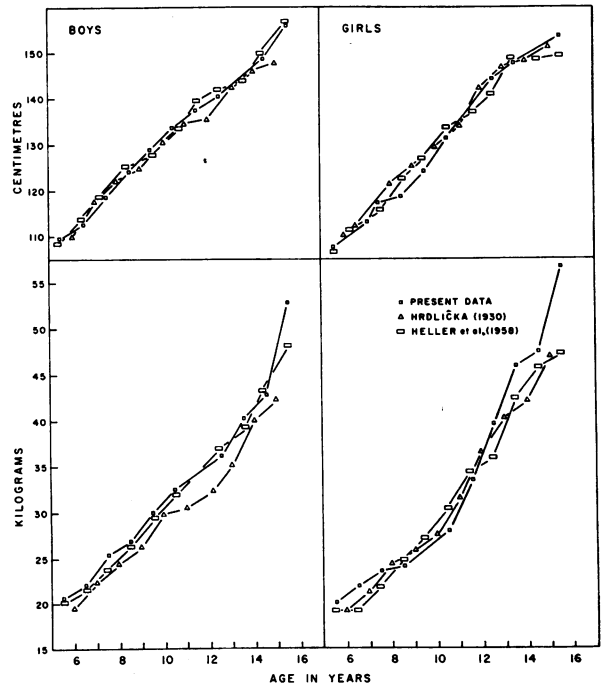


Fig. 5.—Mean heights and weights of Eskimo school children on Hudson Bay in 1965 compared with those in southwestern Alaska in 1958¹¹ and in 1930.¹²

or white, i.e., he is shorter and heavier for his

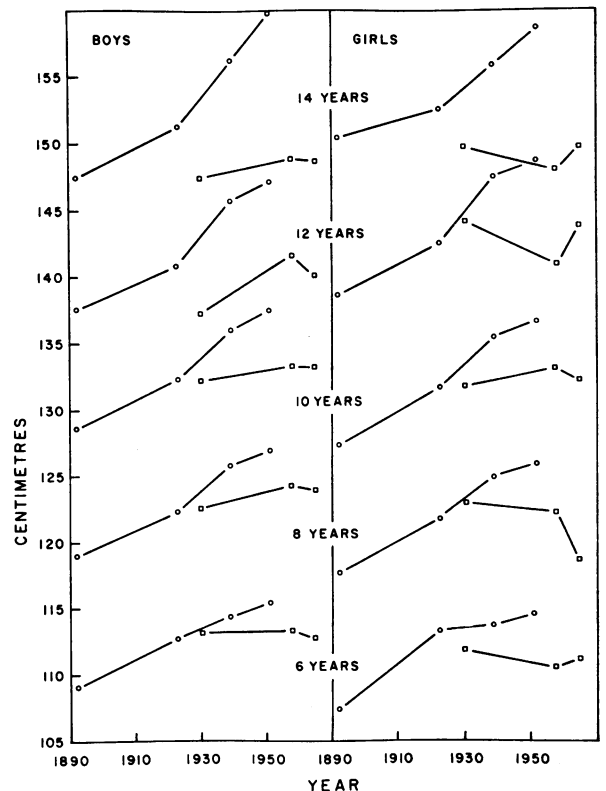


Fig. 6.—Secular changes in the heights of white Canadian school children from 1892 to 1951 compared with those of Eskimo children from 1930 to 1965.

height.¹⁴ These characteristics were present in the school children in our study, particularly in the boys, and, in the words of Heller, Scott and Hammes,¹¹ Eskimo children may just grow "in a manner consistent with their adult habitus". These authors found that although there was no difference between Alaskan Eskimo and white babies at birth, the characteristic body proportions of the Eskimo appear in early infancy and persist throughout childhood and adolescence. The comparison between Indian and Eskimo school children living side by side at Great Whale River showed that the Indians were both taller and heavier. No difference was found between the Eskimo school children living at Great Whale River and those at Sugluk, some 7 degrees farther north. The Eskimo children on Hudson Bay were remarkably similar in height and weight to those living in southwestern Alaska.

The Cree Indian children also formed a homogeneous group. There were no significant differences between Cree Indians at Fort George and those in Moose Factory, 3 degrees farther south, living in semi-urban rather than settlement conditions. The Mohawks in the much more temperate climate of Southern Ontario were significantly taller and heavier. These differences could be racial, since the Cree and Mohawk Indians have different histories and have been geographically separated for at least three centuries.¹⁵ Nevertheless, there is a marked socio-economic difference between the two groups in that the Mohawks are more prosperous. It is possible that the factors responsible for the secular increases in height and weight have affected the Mohawk children in the same way as white Canadians but their effects on the Crees have been delayed some 30 years and have not yet reached the Eskimos.

The failure to find a secular increase in the height of Eskimo school children over a period of 30 years is remarkable. Heller and his colleagues¹¹ could find no evidence of a significant increase in the heights of a small group of Eskimo adults between 1897 and 1958. Clearly the data are inadequate to demonstrate unequivocally that no secular change has occurred, but if this finding is confirmed, the Eskimo is unique in this respect. It is only recently that white civilization has wrought major changes in the life of the Eskimo, and the emergence of a secular change in growth during the next few decades may give some clue as to how these changes are caused.

Roberts¹⁶ has found a negative correlation between weight per unit of stature and average

annual temperature in 6- to 14-year-old boys. He suggests that a lower weight for height is better adapted to a hot climate. Presumably a high weight for height would best suit a cold climate, and this is in accord with our findings in Eskimos. However, data on the Crees and Mohawks are the reverse of what one would expect from this hypothesis.

The average birth weights of the Cree Indians are of interest and confirm the impression of the local doctors and nurses that Indian babies are large at birth.

Summary The heights and weights of 263 Eskimo school children from the east coast of Hudson Bay, 754 Cree Indian children from the James Bay area and 119 Mohawk children in Southern Ontario are presented. In general the Mohawk children were taller and heavier than the Crees, who were taller and heavier than the Eskimos.

A study of height/weight relationships and paired comparisons of Indian and Eskimo children living in the same settlement provided some evidence that the differences in height and weight between the Eskimos and Cree Indians are predominantly racial or genetic.

No evidence of a secular increase in the height of Eskimo school children over the past 30 years was found.

The average birth weight of 768 Cree Indians born in the James Bay area was 8 lbs. 5 oz. (3.78 kg.).

Résumé L'article donne les statistiques de taille et de poids de 263 enfants esquimaux d'âge scolaire de la côte est de la baie d'Hudson, de 754 jeunes Indiens Cris de la région de la baie James et de 119 enfants Mohawk du sud de l'Ontario. Dans l'ensemble, les enfants Mohawk sont plus grands et plus lourds que les Cris, qui dépassent eux-mêmes les Esquimaux en taille et en poids.

Une étude du rapport taille-poids et des comparaisons jumelées entre enfants indiens et esquimaux vivant dans la même colonie semblent indiquer que les différences de taille et de poids entre les Esquimaux et les Indiens Cris sont à prédominance raciale ou génétique.

On n'a trouvé aucun signe d'augmentation séculaire de la taille des enfants esquimaux d'âge scolaire au cours des 30 dernières années.

Le poids moyen à la naissance de 768 Indiens Cris nés dans la région de la baie James s'établit à 8 lb 5 on. (3.78 kg.).

We wish to thank the staff of the Indian and Northern Health Service in the James Bay Zone, particularly the public health nurses, for their generous co-operation. We would also like to thank Dr. John Read of the Department of Preventive Medicine at Queen's University for help with collection of data from Tyendinaga.

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Rheumatoid Arthritis and Ankylosing Spondylitis in British Columbia Indians:

Their Prevalence and the Challenge of Management

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CURRENT information regarding the prevalence of rheumatoid arthritis and Marie-Strümpell spondylitis in the Indian population of British Columbia indicates not only important similarities but also intriguing differences from reported prevalence rates of these diseases in other populations of the world.

RHEUMATOID ARTHRITIS

Most of the few reported epidemiological population studies have been set up to determine the point prevalence of arthritis in a known population 15 years of age and over. A defined population is usually interviewed and examined. Predetermined radiographs, including the hands, feet and often the neck, are taken and serum rheumatoid factors are determined. The study is usually carried out over a brief period and the results indicate the amount of arthritis in a population at that point in time.

This paper is part of a symposium organized by the Indian and Eskimo Child Health Committee of the Canadian Paediatric Society.

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The single published study on the prevalence in Canadian Indians is a point prevalence study of this type.¹ The sample consisted of 492 Haida Indians aged 15 and over who were on the Reserve Band list and permanent residents of two major reservations in the Queen Charlotte Islands. Four hundred and thirty-six adults were studied, representing a completion rate of 88.6%. Four cases of definite rheumatoid arthritis satisfying the criteria of the American Rheumatism Association (A.R.A.)² were found and five cases were designated as probable. For individuals over 35 years with definite disease a point prevalence of 1.4% was established which is identical with that found in Wensleydale, England, and similar to that reported in other parts of Britain, Germany, Jamaica and the United States of America.³ The United States studies include Blackfeet Indians in Montana and Pima Indians in Arizona. We are not aware of any studies of the point prevalence of rheumatoid arthritis in children, but the incidence is much lower than in adults. Estimates have been made on the basis of numbers referred to particular hospitals or clinics in relation to the total populations they serve. Laaksonen⁴ reports an annual incidence between 1956 and 1961 of 3.8 new cases per 100,000 of the total population under 15 referred to the Rheumatism Foundation Hospital in Turku, Finland. Our experience with arthritis in Indian children in British Columbia is of interest in this regard.