



CANADA

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DEATHS AMONG WAR PENSIONERS

1918 - 1936

*Published by authority of*

*The Hon. Ian MacKenzie, K.C.,*

MINISTER OF PENSIONS AND NATIONAL HEALTH

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OTTAWA

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## DEATHS AMONG WAR PENSIONERS<sup>x</sup>

by

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Department Pensions & National Health, Ottawa.

In considering medical statistics for those pensioned for injury or disease due to war service, it was known that approximately 16,000 such pensioners had died, and before undertaking any extensive investigation on the larger group, the living pensioners, it was deemed advisable to make a complete study of those who had died, because for this group the books have been closed and the end results are known. Further, their numbers were great enough for the striking of satisfactory death rates.

We have no records for the large body of returned men who have not been awarded pension. It must be borne in mind that the advantages enjoyed by the pensioner respecting treatment, hospitalization, and financial security, which have undoubtedly been a factor in causing his bettered expectancy of life, do not apply to the non-pensioner, or, for that matter, to the bulk of the civilian population.

We have endeavoured to find out whether or not pensioners are dying of the same causes as the male population of Canada, and at what rate, and we have tried to measure the effect of war service on the death rate and to determine what diseases are most influenced by war service.

At the beginning of the work we were under the impression that we would find certain phases marked out by well-defined points of time. We had precedent for this, because certain things happened in certain calendar years; for example, the war began in 1914, ended in 1918, general demobilization in 1919, etc., but we were generally forced to a different conception because we found that the age of the veteran was the principal guiding factor. The man's age dominates all other considerations.

We coded diseases, war disabilities and deaths by means of the Standard Morbidity Code based on the same classification as the International List of Causes of Death. This made it possible to compare our rates with those of the Dominion Bureau of Statistics. The information for the study was collected from the Master Pension Card, the Treatment Card, the Death Card, and, when necessary, from the military files and original military documents.

We endeavoured to record the causes of death, both primary and secondary, pensioned conditions up to three in number, year of pension award, year of major pension award, amount of pension on award and at death. We paid some attention to the latter point because it was known that the Pension Commission was concerned with the steady rise in the per cent of pension awarded for chronic disease, and it is in the mind of the Commission that there should be some point of time at which a halt in this increase could honourably be called. We now know that any halt in increase should be governed by the age of the pensioner and the condition from which he suffers rather than by a calendar year.

We first took the number of pensioners and total deaths among them by calendar years, and had a table prepared by an actuary, in order to find the trend in deaths of pensioners as against the Canadian male population of similar age-structure. Owing to a large movement in and out of the pension group between the years 1920 and 1932, the first table was prepared by using certain "smoothing" procedures.

Upon closer study and upon the advice of the Dominion Bureau of Statistics a second table was prepared by them, using only the exact figures for the number of pensioners and deaths by calendar years, and from the latter the various rates were struck. The general trend in both tables is approximately the same.

There has been much conjecture concerning the pre-aging of war veterans, and rough estimates ranging from five to ten years of lessened expectancy of life have been made.

<sup>x</sup> Read in part before Canadian Public Health Association, Section of Vital Statistics and Epidemiology at Ottawa, June, 1936.

Note: This study was undertaken by permission of R.E. Wodehouse, O.B.E., M.D., D.P.H., Deputy Minister of the Department of Pensions and National Health.

The impression is abroad that the pensioners, and probably all veterans, are now approaching a period in which their death rate will be excessive as compared with the Canadian males. This study proves the reverse to be true so far as the pensioners are concerned. The highest death rate was suffered just at the end of the war and among the younger age groups, but from 1921 to the present there has been a steady decline in the pensioners' death rate until today it is comparable with the rate for Canadian males, as seen in Table 1.

TABLE 1

Year	Pensioner population exposed	Actual deaths among pensioners	Expected deaths on basis of Canadian Life Table - 1930-32	Ratio of Actual to Expected Deaths
	A	B	C	D
1918	15,335			
1919	42,932	1796	577	3.28
1920	69,203			
1921	51,452	530	246	2.16
1922	45,133	729	225	3.24
1923	43,263	536	225	2.38
1924	43,300	537	236	2.28
1925	44,598	505	255	1.98
1926	46,385	590	278	2.12
1927	48,027	605	305	1.99
1928	50,635	671	339	1.98
1929	54,620	637	388	1.64
1930	56,996	723	430	1.68
1931	66,669	719	532	1.35
1932	75,878	845	645	1.31
1933	77,967	874	704	1.24
1934	77,855	927	749	1.24
1935	78,404	990	806	1.23
1936	79,124	1040	869	1.20

Column "D" shows the steady decline in the ratio of actual to expected deaths among pensioners - 1.20 approximating normal.

SUMMARY

WOUNDS AND DISEASE

Non-fatal wounds	126,512)	
" " gassing	11,641)	138,153
" " accidents	34,352	
Total non-fatal casualties) other than disease	172,505	
<hr/>		
Total pensioned for wounds		45,478
*Major pension disability wounds	29,769)	
" " amputations	2,596)	32,365
<hr/>		
<u>Deaths from disease during war</u>		
Deaths due to influenza and pneumonia		3,510
Deaths from all other diseases		3,256
Total deaths due to disease during the war		6,767
<hr/>		
Major pension disability wounds		32,365
" " " disease		47,424
Total pensioners (March, 1937)		79,789

\*The term "Major pension disability" is used to indicate the chief pensionable condition where more than one exists.

From the above summary it will be seen that while non-fatal wounds and gassing account for 138,153 casualties, the total living pensioned for these conditions number 45,478, and of these 32,365 have wounding as the major pension disability. Major pension disabilities from disease number 47,424.

If we now examine the first half of Graph No. II (see page 4) we find a month by month crude death rate from disease for the five consecutive years between mobilization and final demobilization superimposed upon the normal death rate for Canadian males of similar age for the registration area of Canada for the year 1921. It will be seen that for the first four years of the war the military death rate is slightly lower than that for Canadian males. The sharp rise in October, 1918, due to the influenza epidemic, is comparable in time and height with the civilian deaths, as recorded for Ontario during the same period (see graph insert). The rise in 1919 represents the second influenza outbreak, but as the number of men not yet demobilized was small this rise may be out of proportion and unreliable.

If we consider that for the duration the enlisted men suffered a death rate from disease which was a little lower than that for civilian males, it is rather surprising that the major pensions awarded for diseases incurred on service far outnumber the major pensions awarded for non-fatal wounds. This seems more evident since we now know that the pensioners as a group have had an approximately normal death rate since 1930.

The generosity of the government in awarding pensions for chronic disease is amply borne out by the above findings, which also indicate that adequate medical service, as provided in the army and to the pensioners after the war, is undoubtedly a factor in lowering the expected death rate and prolonging the expectancy of life.

We might with propriety say a word in commendation of the two medical services concerned: the C.A.M.C., which for five years maintained among enlisted men such a splendid health record; and the medical service of the Department of Pensions and National Health, which assumed the responsibility for treatment of the pensioners, all impaired in health to some degree. The death ratio among these men was actually reduced in ten years from 3.28 to 1.35, or almost to normal, and this figure still continued to fall until it reached 1.20, as compared to 1.00 for civilian males, by the end of 1936. (See second half of Graph No. II, page 5).

#### Graph No. II

The complete graph follows the soldiers' death ratio due to disease, from the beginning of the war until the last surviving pensioners are dead. (Following demobilization, the number who died solely from the after results of enemy action was so small that the disease rate is not influenced by their inclusion).

It is evident that the total number under observation following demobilization, including those who died during the period is in the neighbourhood of 100,000 men of adult age, and from the study of this large group suffering from widely diversified ailments emerges certain new information:-

- (a) Impaired men do not tend to become relatively more impaired as a group.
- (b) With adequate medical care many pensioned conditions eventually prove to be curable or become arrested.
- (c) With the passage of time there is a persistent and progressive tendency towards the normal average for age.

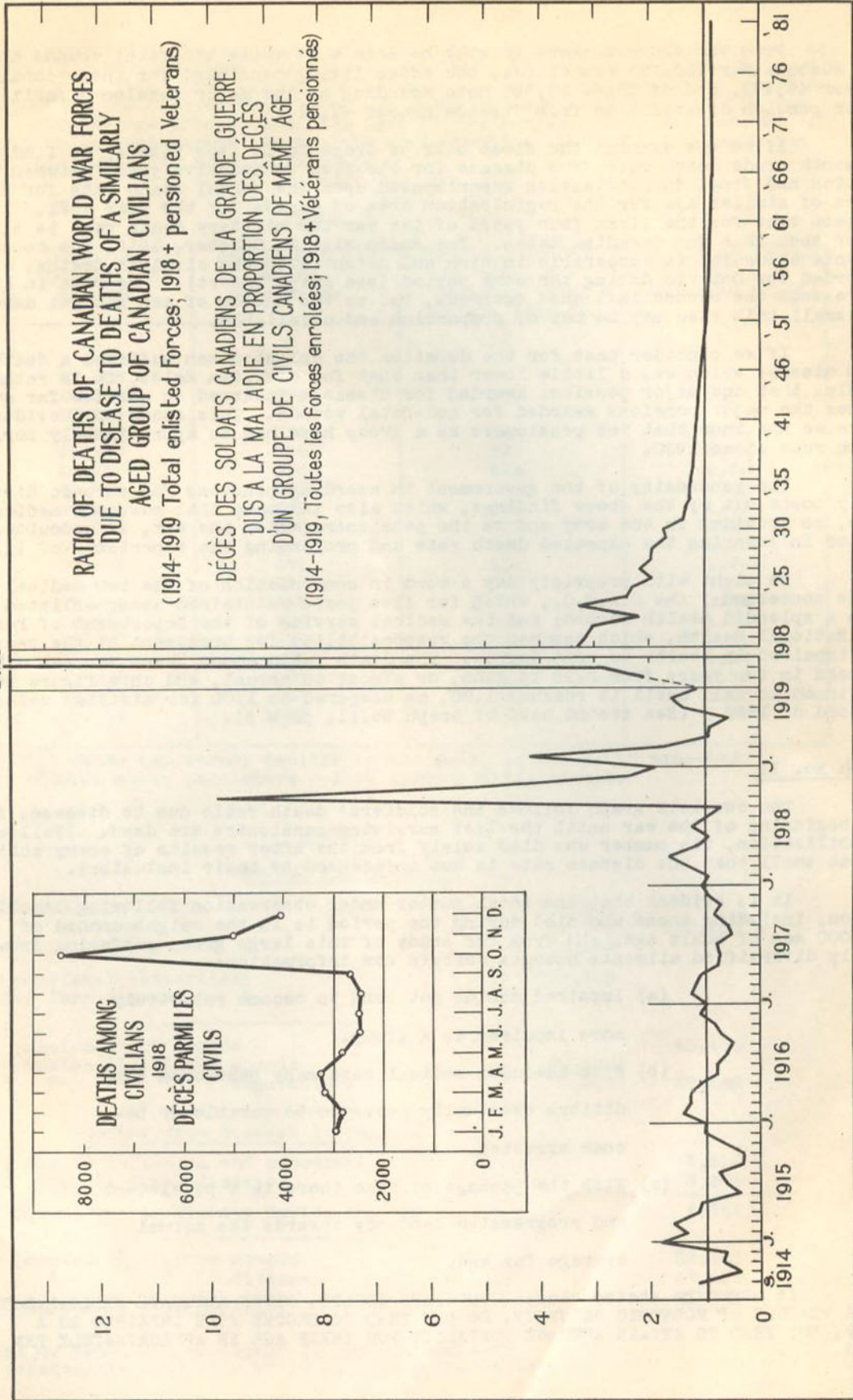
It might be stated thus: - IMPAIRED ADULTS, GIVEN ADEQUATE MEDICAL CARE AND A MEASURE OF ECONOMIC SECURITY, DO NOT TEND TO BECOME MORE IMPAIRED AS A GROUP, BUT TEND TO ATTAIN AVERAGE MORTALITY FOR THEIR AGE IN APPROXIMATELY TEN YEARS.

GRAPH II

DEATH RATIO (DISEASE ONLY) OF ENLISTED MEN, 1914-1919.  
DE MORTALITE (PAR MALADIE SEULEMENT) D'HOMMES SOUS LES DRAPEAUX,  
1914-1919.

DEATH RATIO OF PENSIONERS SINCE DEMOBILIZATION.  
TAUX DE MORTALITE DES PENSIONNES DEPUIS LA DEMOBILISATION.

24.63



At the end of March, 1937, living pensioners were distributed by chief causes of disability according to the table below. It also shows the number of pensioners who have minor as well as major disabilities, together with the total disabilities suffered by the 79,789 pensioners.

DISTRIBUTION OF DISABILITIES BY CHIEF CAUSES

<u>Disease or Disability</u>	<u>Number of Pensioners where Disability is</u>		<u>Total Number of Disabilities</u>
	<u>"Major"</u>	<u>"Minor"</u>	
Tuberculosis	4,460	611	5,071
T.B. other than pulmonary	250	281	531
Total Tuberculosis	4,710	892	5,602
Cancer - Tumours	113	100	213
Rheumatism - Nutrition	6,035	3,611	9,646
Blood and Blood-Forming Organs	26	40	66
Intoxication - Chronic poisoning	-	-	-
Nervous System	4,257	2,965	7,222
Circulatory	6,628	4,532	11,160
Respiratory	8,242	5,260	13,502
Digestive	3,175	2,655	5,830
Genito- Urinary	1,766	1,281	3,047
Amputations	2,596	2,231	4,827
G.S.W.'s - involving joints	6,070	2,524	8,594
G.S.W.'s - All other	23,699	8,358	32,057
Other disabilities	12,472	10,424	22,896
Grand total	79,789	44,873	124,662

Fifty years ago, 94 per cent of all mortality from disease was due to acute illness (epidemic diseases such as smallpox, typhoid, diphtheria, etc.). Today, 75 per cent of all deaths from disease are due to chronic illness and the causes fall under a very few heads, the chief of these being tuberculosis, heart disease, respiratory disease, cancer and nervous diseases. If we apply these same few causes to pensioners' deaths, we can account for more than 90 per cent of those dying. (See Table III, page 6.)

The Great War might be cited as a war in which there was very little serious disease causing death as compared with former wars. (There were, of course, many cases of non-fatal disease and minor ailments). The only epidemic of any consequence was that of influenza, which appeared in 1918. The proof of the above statement is borne out by the fact that deaths from disease for the

TABLE III

TOTAL DEATHS AMONG PENSIONERS - 15,576  
1918 to 1936 inclusive

Distributed by chief causes of death and theatre of service, i.e. Canada, England, France, and other theatres of war. The deaths are further separated into three groups, those due to a service related condition, those not due to a service related condition, and those in which relationship to service is not stated.

DEATHS DUE TO SERVICE: 7530.

CHIEF CAUSES	SERVICE IN CANADA		SERVICE IN ENGLAND		SERVICE IN FRANCE		SERVICE IN OTHER THEATRES		TOTAL	
	Number	%	Number	%	Number	%	Number	%	Number	%
TUBERCULOSIS.....	294	51.0	479	44.2	2133	36.8	36	46.0	2942	39.0
CIRCULATORY SYSTEM.....	118	20.5	250	23.0	1529	26.4	17	21.7	1914	25.0
RESPIRATORY SYSTEM.....	48	8.3	116	10.7	592	10.2	6	7.6	762	10.0
GENITO-URINARY SYSTEM....	34	6.0	51	4.7	400	6.9	5	6.4	490	6.5
NERVOUS SYSTEM.....	34	6.0	50	4.6	339	5.8	7	8.9	430	5.7
DIGESTIVE SYSTEM.....	15	2.6	49	4.5	215	3.7	0	-	279	3.7
CANCER AND OTHER TUMORS..	12	2.0	36	3.3	196	3.4	3	3.8	247	3.2
ACCIDENTS AND SUICIDES...	3	0.5	7	0.6	104	1.8	1	1.2	115	1.5
WOUNDS.....	0	-	0	-	19	0.3	1	1.2	20	0.3
OTHER CAUSES.....	18	3.1	45	4.1	266	4.6	2	2.6	331	4.4
TOTAL.....	576		1083		5793		78		7530	

DEATHS NOT DUE TO SERVICE: 7367.

CHIEF CAUSES	SERVICE IN CANADA		SERVICE IN ENGLAND		SERVICE IN FRANCE		SERVICE IN OTHER THEATRES		TOTAL	
	Number	%	Number	%	Number	%	Number	%	Number	%
TUBERCULOSIS.....	70	13.5	98	8.7	461	8.1	4	6.2	633	8.6
CIRCULATORY SYSTEM.....	133	25.6	287	25.5	1019	17.9	10	15.5	1449	19.7
RESPIRATORY SYSTEM.....	51	9.8	117	10.4	593	10.4	2	3.1	763	10.3
GENITO-URINARY SYSTEM....	25	4.8	48	4.3	194	3.4	3	4.6	270	3.6
NERVOUS SYSTEM.....	47	9.0	100	8.9	444	7.8	4	6.2	595	8.1
DIGESTIVE SYSTEM.....	35	6.7	70	6.2	419	7.4	4	6.2	528	7.2
CANCER AND OTHER TUMORS..	63	12.1	186	16.5	918	16.1	6	9.3	1173	16.0
ACCIDENTS AND SUICIDES...	62	11.9	140	12.4	1115	19.7	29	45.0	1346	18.3
OTHER CAUSES.....	33	6.4	79	7.0	496	8.8	2	3.1	610	8.3
TOTAL.....	519		1125		5659		64		7367	

RELATIONSHIP TO SERVICE NOT STATED: 679.

CHIEF CAUSES	SERVICE IN CANADA		SERVICE IN ENGLAND		SERVICE IN FRANCE		SERVICE IN OTHER THEATRES		TOTAL	
	Number	%	Number	%	Number	%	Number	%	Number	%
TUBERCULOSIS.....	1	2.0	9	8.4	22	4.2	0	-	32	4.7
CIRCULATORY SYSTEM.....	7	14.0	9	8.4	31	5.9	0	-	47	6.9
RESPIRATORY SYSTEM.....	5	10.0	8	7.5	31	5.9	0	-	44	6.4
GENITO-URINARY SYSTEM....	2	4.0	0	-	9	1.7	0	-	11	1.6
NERVOUS SYSTEM.....	0	-	3	2.8	22	4.2	0	-	25	3.6
DIGESTIVE SYSTEM.....	0	-	3	2.8	24	4.6	0	-	27	3.9
CANCER AND OTHER TUMORS..	3	6.0	12	11.2	35	6.7	1	50.0	51	7.5
ACCIDENTS AND SUICIDES...	27	54.0	56	52.5	310	59.0	1	50.0	394	58.0
OTHER CAUSES.....	5	10.0	6	5.7	37	7.1	0	-	48	7.1
TOTAL.....	50		106		521		2		679	



duration numbered only 6,767 and influenza and pneumonia, acute diseases, accounted for over 50 per cent of these deaths. This leaves about 3,000 deaths from all other disease causes. There were approximately 127,000 non-fatal wounds. Thirty-nine to forty per cent of those serving in a theatre of war suffered non-fatal wounds, and 54 per cent suffered both non-fatal and fatal wounds. These figures are introduced to show the discrepancy between the number of pensioners who died of chronic disease related to service and those who subsequently died as a direct result of wounding. (See Table IV, page 8).

It must be borne in mind that all individuals in this study were discharged from the expeditionary force to pension. Therefore, wounded men who eventually died in hospital and who were never struck off strength are not included.

Graph No. V - Served in Canada only.

This graph shows the pension disposition of 576 men who served in Canada only and whose deaths were attributable to service. These constitute 50 per cent of the total. (Total deaths of those who served in Canada only - 1,145).

It is noted that 186 received 100 per cent on award, but at death 312 were receiving 100 per cent.

The high death rate from tuberculosis is probably due to the fact that the disease was discovered soon after enlistment and the men were weeded out as unfit for service abroad and boarded to pension. This process concentrated the amount of tuberculosis in those who served in Canada only.

CONSIDERATIONS

Future Enlistments:-

There are certain matters that the Department of National Defence might well consider in connection with any large scale mobilization in the future. First, it is evident that an X-Ray record of every chest should be made and studied before finally accepting recruits. Out of 15,576 deaths, 3,607 (23 per cent) were caused by tuberculosis, and the men averaged two years in hospital. This X-Ray would, at the same time, give information regarding certain types of cardio-vascular disease, and there should also be a complete urinalysis. We know that many suffering from an incipient chronic disease, as well as others with well established pathology, such as aneurysm, were enlisted, to become pensioners at a later date.

Age:-

It seems probable that too much stress has been laid on enlisting the youth for service in the field, and the table below shows the numbers that enlisted at certain ages -

Under 18 years	9,336
Age 18 "	46,424
" 19 "	37,631
Total under 20 years	93,391

The study shows that those enlisting at the minimum age suffered a high death rate from disease, chiefly tuberculosis, and that the average age for the tuberculous pensioner is two years less than the average age for the whole pension group. This is a most significant finding. It is also known that those of minor years were the hardest to rehabilitate upon their return to civil life.

It might be suggested that the younger men be mobilized for the production of war materials and supplies. Thus they would in most respects lead the lives of civilians, release more mature men for service and, incidentally, learn regular work habits and a trade.

The death rate from disease indicates that the after-effects of war service had a less adverse influence on the seasoned men of 30 years and over than on those 24 years and younger.

TABLE IV

DETAIL OF DEATHS OF PENSIONERS DUE TO ENEMY ACTION

TABLEAU FOURNISSANT CERTAINS DÉTAILS SUR LES DÉCÈS DE PENSIONNÉS,  
DÉCÈS IMPUTABLES À UN ACTE HOSTILE DE L'ENNEMI

	PRIMARY CAUSE  CAUSE PREMIERE	CONTRIBUTORY OR SECONDARY CAUSE  CAUSE ACCESSOIRE OU SECONDAIRE
PENETRATING WOUND, SKULL BLESSURE PÉNÉTRANTE, CRÂNE	2	13
PENETRATING WOUND, CHEST BLESSURE PÉNÉTRANTE, POITRINE	2	7
PENETRATING WOUND, ABDOMEN BLESSURE PÉNÉTRANTE, ABDOMEN	2	1
WOUND WITH LOSS OF EYE BLESSURE AVEC PERTE D'UN OEIL	1	-
WOUND, SPINAL CORD BLESSURE, MOELLE ÉPINIÈRE	8	1
WOUND, SEVERE, ANY SITE BLESSURE GRAVE, SANS DISTINCTION DE LOCALISATION	2	11
WOUND, SLIGHT, ANY SITE BLESSURE LÉGÈRE, SANS DISTINCTION DE LOCALISATION	-	1
WOUND, WITH AMPUTATION BLESSURE ENTRAÎNANT UNE AMPUTATION	-	2
WOUND, FRACTURE CRANIUM BLESSURE, FRACTURE DU CRÂNE	1	1
WOUND, FRACTURE PELVIS BLESSURE, FRACTURE DU BASSIN	1	-
WOUND, FRACTURE LOWER LIMB BLESSURE, FRACTURE D'UN MEMBRE INFÉRIEUR	-	2
WOUND, INVOLVING HIP JOINT BLESSURE INTÉRESSANT L'ARTICULATION DE LA HANCHE	-	1
SHELL SHOCK OBUSITE	1	1
GAS INTOXICATION PAR LES GAZ DE GUERRE	-	5
	20	46

PERCENTAGE OF "DUE TO SERVICE DEATHS" ATTRIBUTABLE  
SOLELY TO THE AFTER RESULTS OF ENEMY ACTION..... 0.3%

PROPORTION DES DÉCÈS IMPUTABLES EXCLUSIVEMENT  
AUX SÉQUELLES D'UN ACTE HOSTILE DE L'ENNEMI..... 0.3%

GRAPH V

# SERVED IN CANADA ONLY SERVICE AU CANADA SEULEMENT

576 DIED DUE TO SERVICE  
576 DÉCÈS IMPUTABLES AU SERVICE

GRAPH SHOWS NUMBER OF MEN  
WITH % OF PENSION ON AWARD  
AND % OF PENSION AT DEATH

OF THE 576 DEATHS DUE TO SERVICE  
294 OR 51% WERE DUE TO T.B.

GRAPHIQUE INDIQUANT LE  
NOMBRE DE PENSIONNÉS AINSI  
QUE LE TAUX DE LA PENSION  
À L'ALLOCATION ET AU DÉCÈS

DES 576 DÉCÈS IMPUTABLES AU  
SERVICE, 294 OU 51 POUR CENT  
ÉTAIENT DUS À LA TUBERCULOSE

ON AWARD = - - - - AT DEATH = ———  
À L'ALLOCATION = - - - - AU DÉCÈS = ———

↑  
NUMBER OF  
PENSIONERS  
NOMBRE DE  
PENSIONNÉS  
↓

300

312  
AT DEATH  
312  
AU DÉCÈS

200

186  
ON AWARD  
186 À  
L'ALLOCATION

100

90

80

70

60

50

40

30

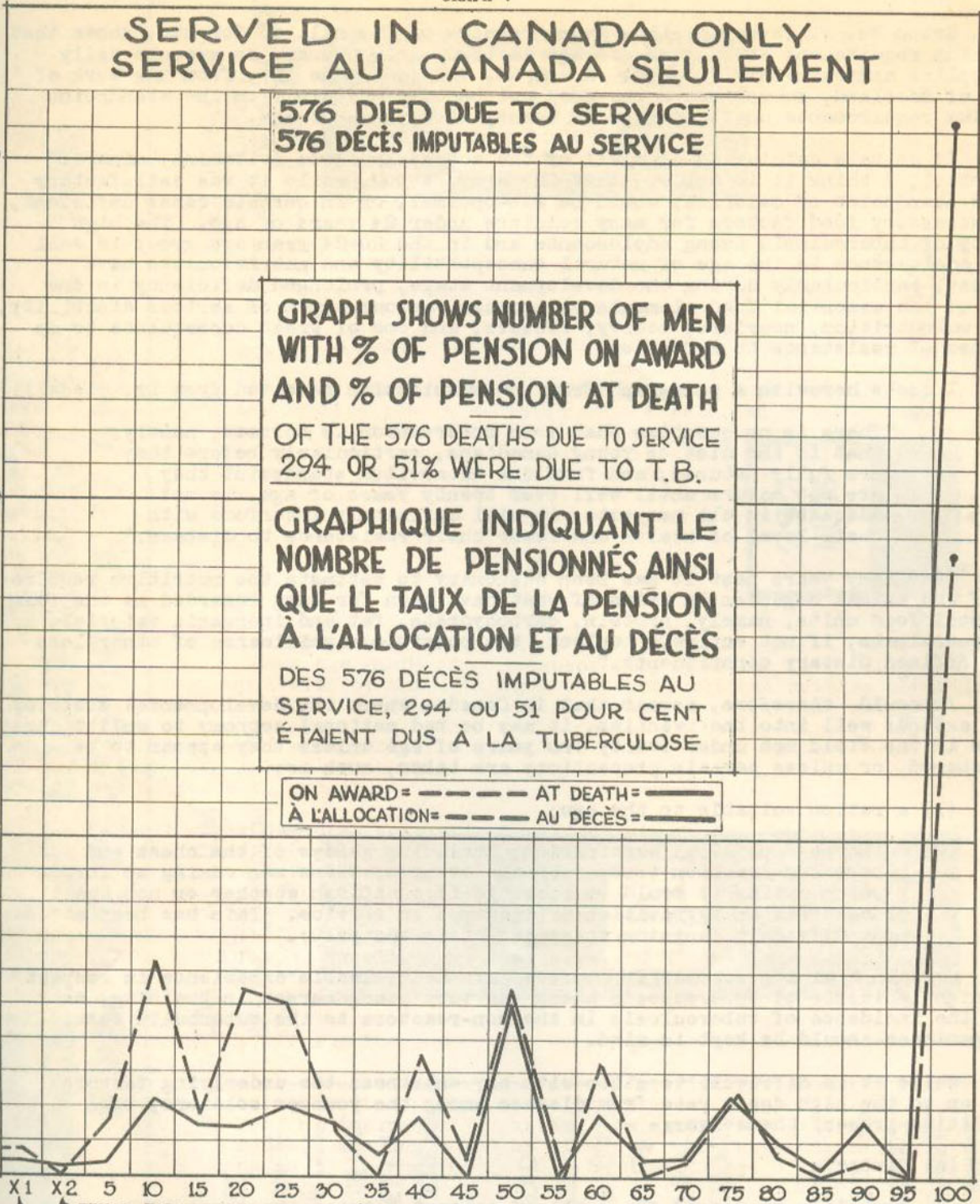
20

10

0

X1 X2 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100

FINAL PAY ~ PAIEMENT DÉFINITIF  
GRATUITY ~ GRATIFICATION



Graph No. VI (see page 11), from the work of Tisdall, of Toronto, shows that the calcium requirement at 17 years of age is 1500 mgs., whereas an average daily diet supplies approximately 500 mgs. Graph No. VII (see page 12), from the work of Leitch, of Scotland, shows that a boy does not become an adult from the standpoint of calcium requirements until upwards of twenty-five years of age.

If we take calcium to mean all of the accessory foods (vitamins, mineral salts, etc.), I think it is evident that the army ration, while it was satisfactory from the standpoint of calories, would be sub-optimal, or in certain cases deficient, in the accessory food factors for many soldiers under 24 years of age. The high morbidity of tuberculosis among adolescents and in the 20-24 year age group is well known. Adolescence is the age of natural susceptibility and nutritionists have shown that, particularly during the development stage, prolonged deficiency in one or more of the essential food elements will cause various types of serious disability, namely, malnutrition, neuritis, scurvy, rickets, and one of great consequence to an army, loss of resistance to infection.

I quote herewith a paragraph from a communication received from Dr. Tisdall:

"There is no question that your observation is correct, namely, that if the diet of young Canadians, particularly before they are fully matured, and from the metabolism standpoint they are not mature until well over twenty years of age, is not adequate in all respects, it will definitely interfere with their level of health and lower their resistance to disease."

<sup>x</sup>"For many years past it has been customary to estimate the nutritive requirements of the animal organism in terms of what have been for long regarded as the four fundamental food units, namely, protein, carbohydrate, fat and inorganic material, and to under-estimate, if not entirely neglect, the possible significance of other less clearly defined dietary constituents."

It would therefore, appear that in Canada, where the developmental stage of a youth extends well into the twenties, it may be bad national economy to enlist for services in the field men under twenty-one years of age unless they appear to be fully matured, or unless certain precautions are taken, such as:-

- (1) a ration suitable to the age;
- (2) a thorough physical examination, including X-Rays of the chest and tuberculin reaction test. (In the event of these men coming up for pension rating it would be possible to establish whether or not the disease was an aggravation or incurred on service. This has been a most difficult decision to arrive at in the past).

Certain training schools for nurses have had valuable experience in respect to the high incidence of tuberculosis among the very young nurses in training, as well as the incidence of tuberculosis in the non-reactors to the tuberculin test. This experience should be kept in mind.

While it is difficult to state with any exactness the underlying factors leading up to the high death rate from disease among the younger soldiers, two possibilities present themselves:-

(a) Contact.

Army life increased the ratio of contact between the susceptible and the infective individuals, but, even accepting this fact, it is hard to reconcile the total increase in the death rate as being entirely due to this circumstance.

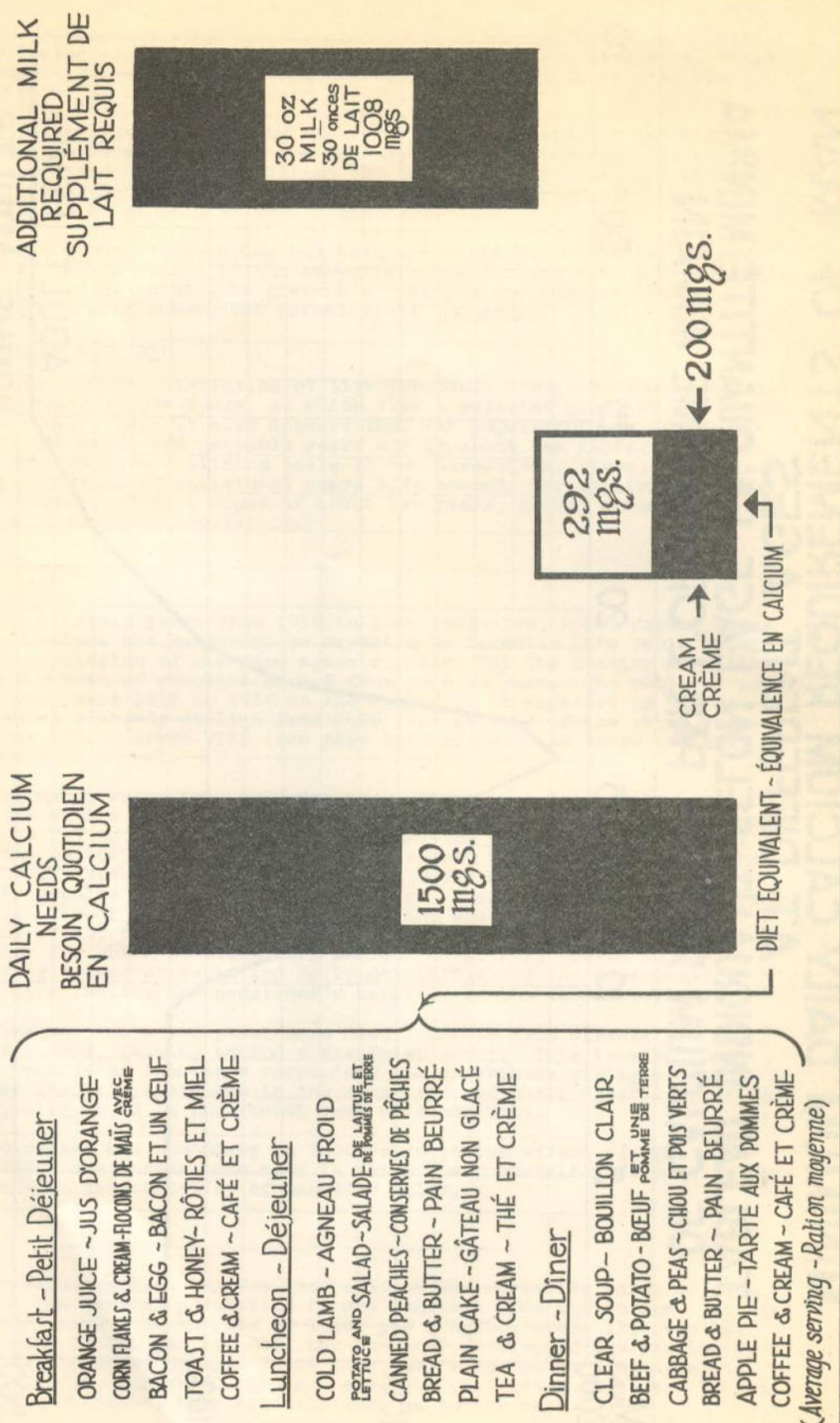
(b) Rations.

We have factual evidence that the death rate of the young was excessive and greater than that to be expected from sheer contact alone. It, therefore, seems reasonable to assume, in the absence of other proof, that with the country on a war footing, the army ration as provided during the Great War, while otherwise adequate

<sup>x</sup>Report, Medical Research Council, England.

# IMPORTANCE OF MILK AS A SOURCE OF CALCIUM FOR THE 17 YEAR OLD CHILD

# IMPORTANCE DU LAIT COMME ALIMENT CALCIFÈRE POUR UNE PERSONNE DE 17 ANS



DAILY CALCIUM NEEDS  
BESOIN QUOTIDIEN EN CALCIUM

- Breakfast - Petit Déjeuner
- ORANGE JUICE ~ JUS D'ORANGE
  - CORN FLAKES & CREAM-FLOCONS DE MAÏS AVEC CRÈME
  - BACON & EGG - BACON ET UN ŒUF
  - TOAST & HONEY-RÔTIÉS ET MIEL
  - COFFEE & CREAM - CAFÉ ET CRÈME
- Luncheon - Déjeuner
- COLD LAMB - AGNEAU FROID
  - POTATO AND SALAD - SALADE DE LÉGUMES ET DE LAITUE ET LETTUCE
  - CANNED PEACHES - CONSERVES DE PÊCHES
  - BREAD & BUTTER - PAIN BEURRÉ
  - PLAIN CAKE - GÂTEAU NON GLACÉ
  - TEA & CREAM - THÉ ET CRÈME
- Dinner - Dîner
- CLEAR SOUP - BOUILLON CLAIR
  - BEEF & POTATO - BŒUF ET UNE POMME DE TERRE
  - CABBAGE & PEAS - CHOU ET POIS VERTS
  - BREAD & BUTTER - PAIN BEURRÉ
  - APPLE PIE - TARTE AUX POMMES
  - COFFEE & CREAM - CAFÉ ET CRÈME
- (Average serving - Ration moyenne)

DIET EQUIVALENT - ÉQUIVALENCE EN CALCIUM

292 mgs.

CREAM  
CRÈME

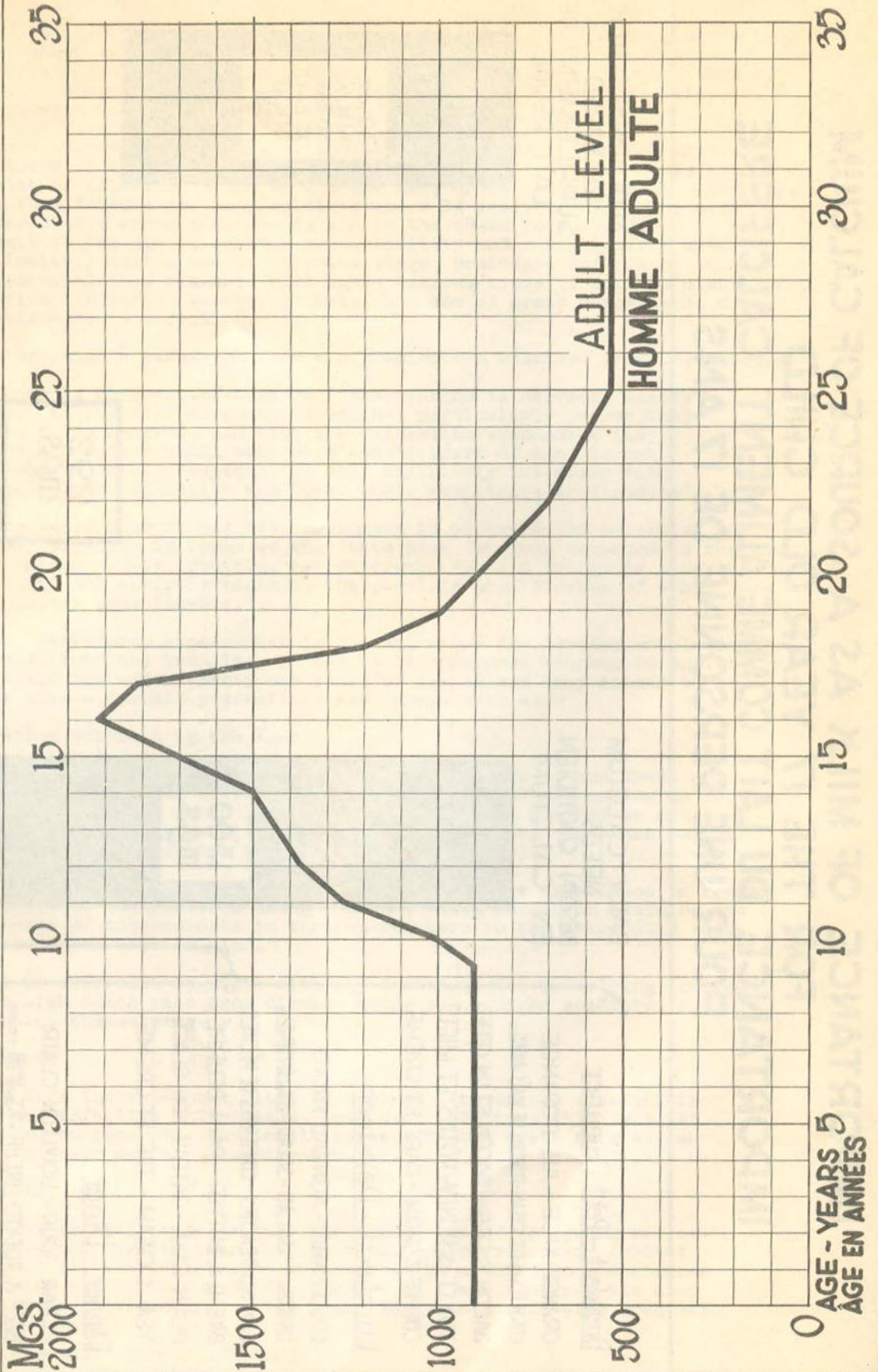
← 200 mgs.

30 oz  
MILK  
30 onces  
DE LAIT  
1008  
mgs

ADDITIONAL MILK  
REQUIRED  
SUPPLÉMENT DE  
LAIT REQUIS

GRAPH VII

**MINIMUM DAILY CALCIUM REQUIREMENTS OF MAN  
AT DIFFERENT AGES**  
**TABLEAU INDICQUANT, SELON L'ÂGE, LA QUANTITÉ MINIMA  
DE CALCIUM REQUISE PAR L'ORGANISME HUMAIN**



may have been deficient in the protective elements, and as a result contributed to the loss of man power by permitting the physical breaking down of many in the younger age groups, and by increasing the difficulty of all ages to ward off infections.

This view is strengthened by the fact that the deaths in question took place late in the war and immediately following demobilization, and consisted of men demobilized for unfitness and pensioned before hostilities had ended, and of others who died shortly after being discharged to pension at demobilization.

In other words, those dying had been mobilized for a sufficient period of time in which, if the essential food factors were not supplied, there would be nothing to prevent a steadily progressive loss of resistance with subsequent pathological changes.

#### Selectivity and War-Impairment:-

It is known from the statistics of life insurance companies that selectivity wears off in approximately five years, at which time a selected group of men return to the average for their age. It also appears that war impairment has its greatest effect close up to the event and probably wears off in about ten years. It would seem, therefore, that we have a sliding scale in two directions, first, the selectivity employed at the time of enlistment wears off; second, war impairment wears off, leaving in each instance, after a lapse of about ten years, groups comparable with similar age groups of the male population.

#### TRENDS

During the nineteen years from 1918 to 1936, inclusive, total deaths among pensioners were 1.70 times the number to be expected by Canadian Life Table No. 1A (Males, 1931) in a population of the same age-structure, but the heavier mortality of pensioners has not been of constant amount from year to year. The ratio of actual deaths in each of the years 1918 to 1936 to the deaths to be expected by the Canadian Life Table shows a steady decline from 3.28 (the average of the three years 1918-20) to 1.20 for 1936. Graph VIII (see page 14) indicates in curve (c) the slope of the approach to normal.

Several elements enter into this decline. First, the death rate per 1,000 population among the entire body of Canadian males, including war veterans, dropped from 11.5 in 1921 to 9.7 in 1936, the result of improving facilities for medical care, sanitation and better public health procedures both for the veteran and the civilian. It is to be expected that the pensioners would share with the rest of the population this secular improvement in mortality. Apart from the foregoing the pensioner has in his favour excellent medical care and another element of great importance, partial if not total freedom from financial worry. It seems evident that many conditions for which pensions were awarded eventually proved to be curable, in that they became arrested and no longer influenced the expectancy of life, although still affecting the pensioner's capacity in the labour market.

Second, the most disabled pensioners died (chiefly from disease) in the early years of the record, leaving behind a healthier group. This is also shown in the disability records of insurance companies, one experience giving a death rate among disabled insured pensioners in the first year of their disability of 94 per thousand, declining to 33 in the fourth year of disability.

But these causes are secondary in importance to the effect of age. Pensioners becoming older are thrown into ages in which their mortality is more favourable in comparison with the mortality of Canadian males.

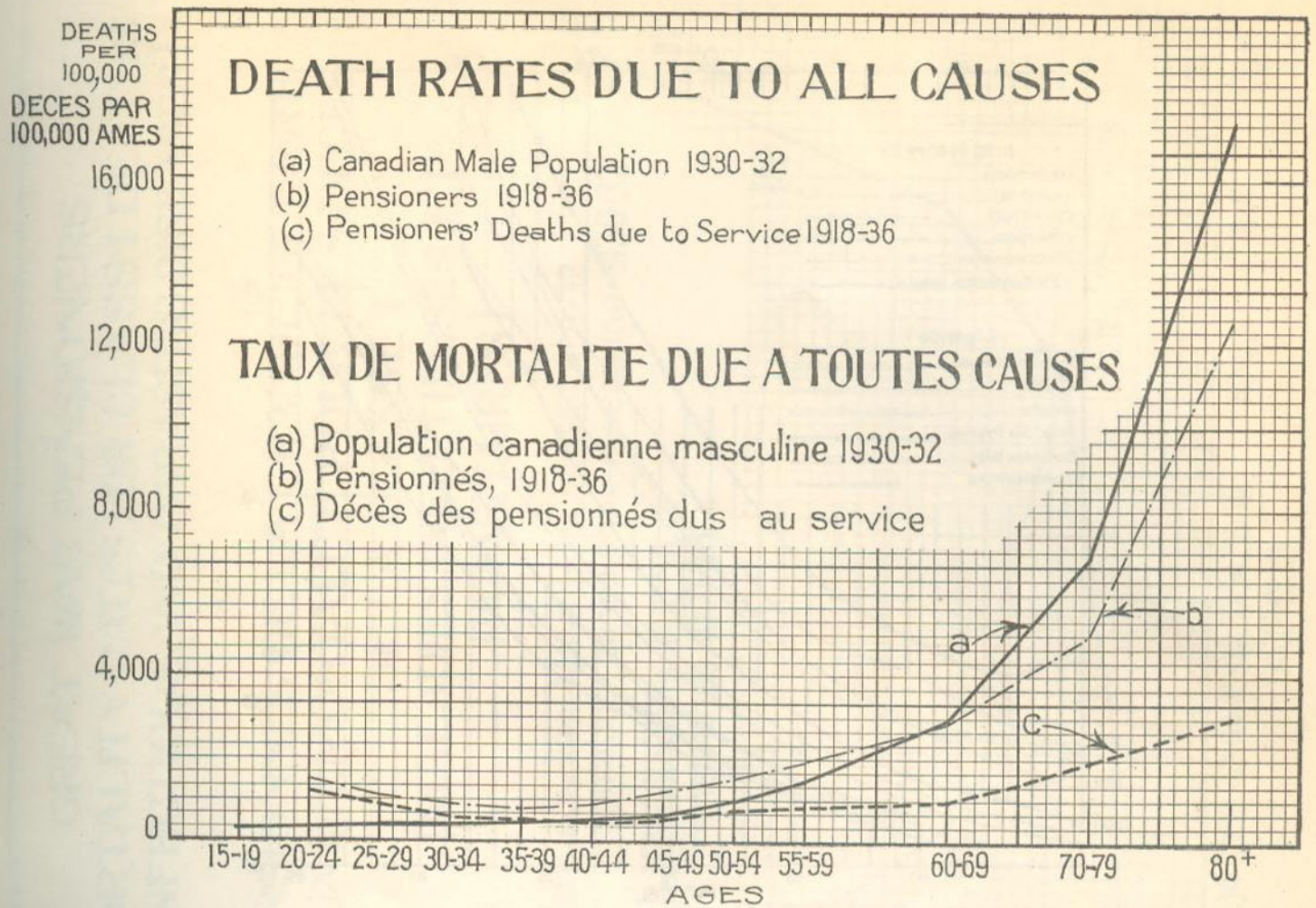
#### DEATH RATES BY AGE

The above result arises because the ratio of the mortality rates of pensioners to those of the general population is not constant from age to age. At ages 20-24, the pensioners have a death rate of 1,440 per 100,000 (Graph IX, page 15) against a general rate of 331 per 100,000, but the poor showing of the pensioners does not continue far in life; by ages 35-39 they have only double the mortality of the general population, and at 60 they are equal to it. After that, and to the end of the exposures available, they actually show a better rate.





GRAPH IX



It is thus plain that as the pensioners grow older there will be a tendency to an approach to general mortality INDEPENDENTLY OF ANY IMPROVEMENT IN AGE-SPECIFIC RATES. This is a principal cause of the apparently rapid improvement in pensioner mortality with time that is shown during the period 1918-1936. From the age-specific rates a life table for pensioners has been made, which is appropriate for the calculation of expected deaths in each year, and as we see in curve (a) (Graph VIII) the ratio of actual to expected deaths on such a table also decreases steadily through the period, but at a much diminished rate.

CANADA'S REGIONAL DIVISIONS

Graph X (see page 16) shows the age-by-age mortality rates of males in each of the five regional divisions of Canada along with the rates of pensioners, 1930-36 (all graduated by the third-difference osculatory method of George King). Until the age of 61, the pensioners are higher than the highest of the curves for Canada's regional divisions, but by age 67 they have crossed them all, including the Prairies which are lowest, and remain below for the remainder of the available exposures.

# ANNUAL RATES OF MORTALITY

GRAPH X

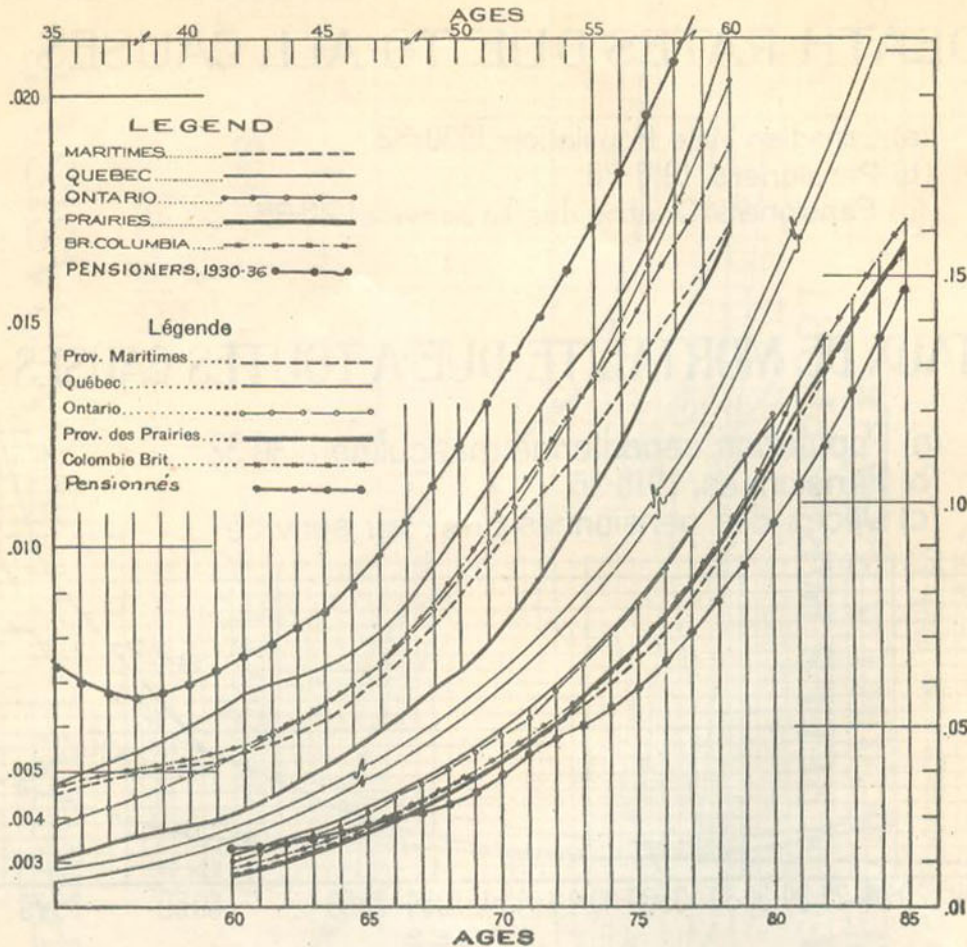
# TAUX ANNUELS DE MORTALITE

(A) MALES

(A) Hommes

POPULATION, 1931—DEATHS, 1930-32

Population, 1931—Décès, 1930-32



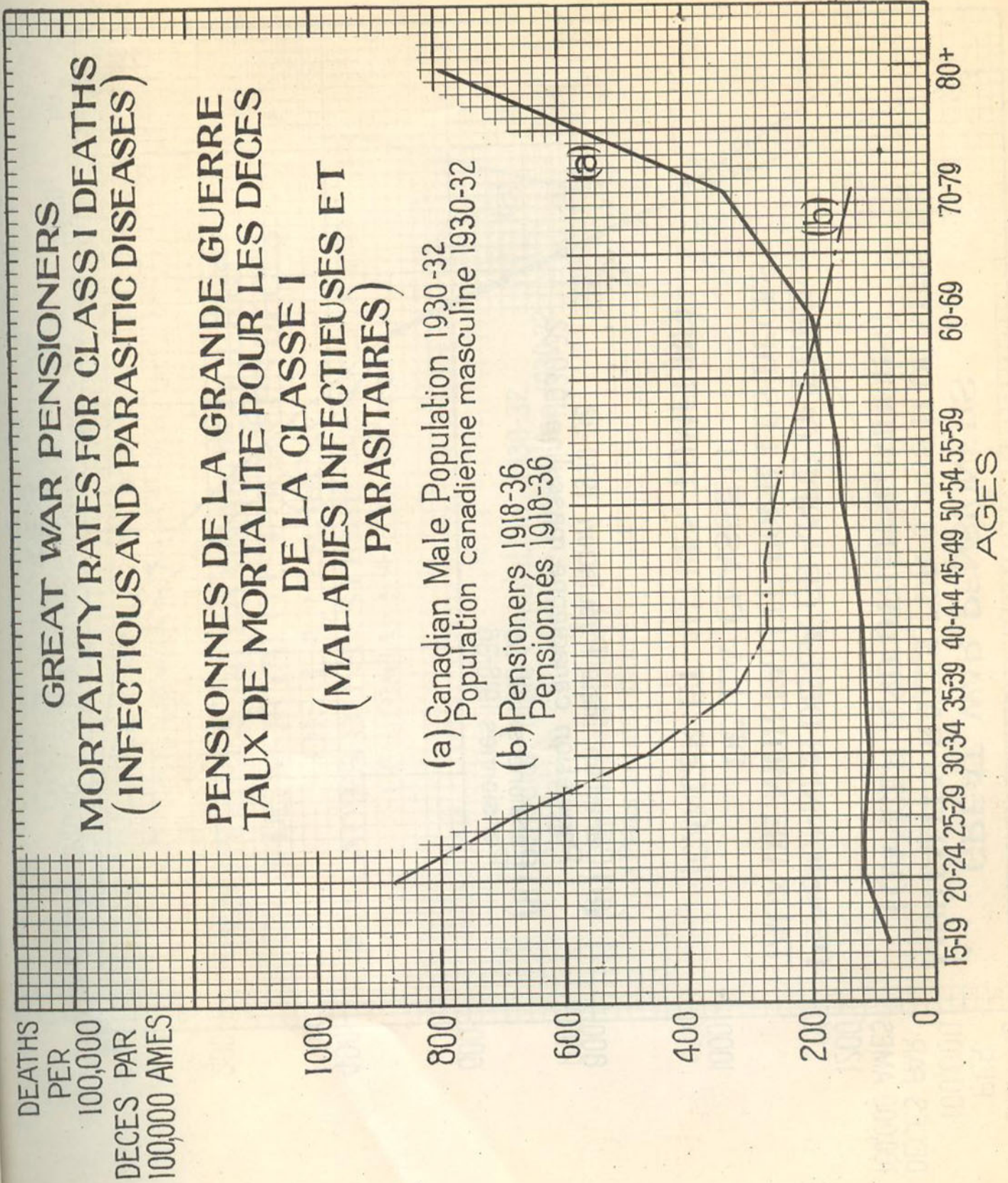
## CAUSES OF DEATH

The main causes of death which showed more than twice the normal incidence among pensioners during 1918-1936 were: tuberculosis, endocarditis, myocarditis, bronchitis and pneumonia. The pensioners were normal in deaths associated with diseases of the arteries and veins, the lymphatic system, the digestive system, the genito-urinary system, and with cancer. They were lower than normal in rheumatic diseases, diseases of nutrition, etc., chronic poisonings and intoxications, arteriosclerosis, and appendicitis.

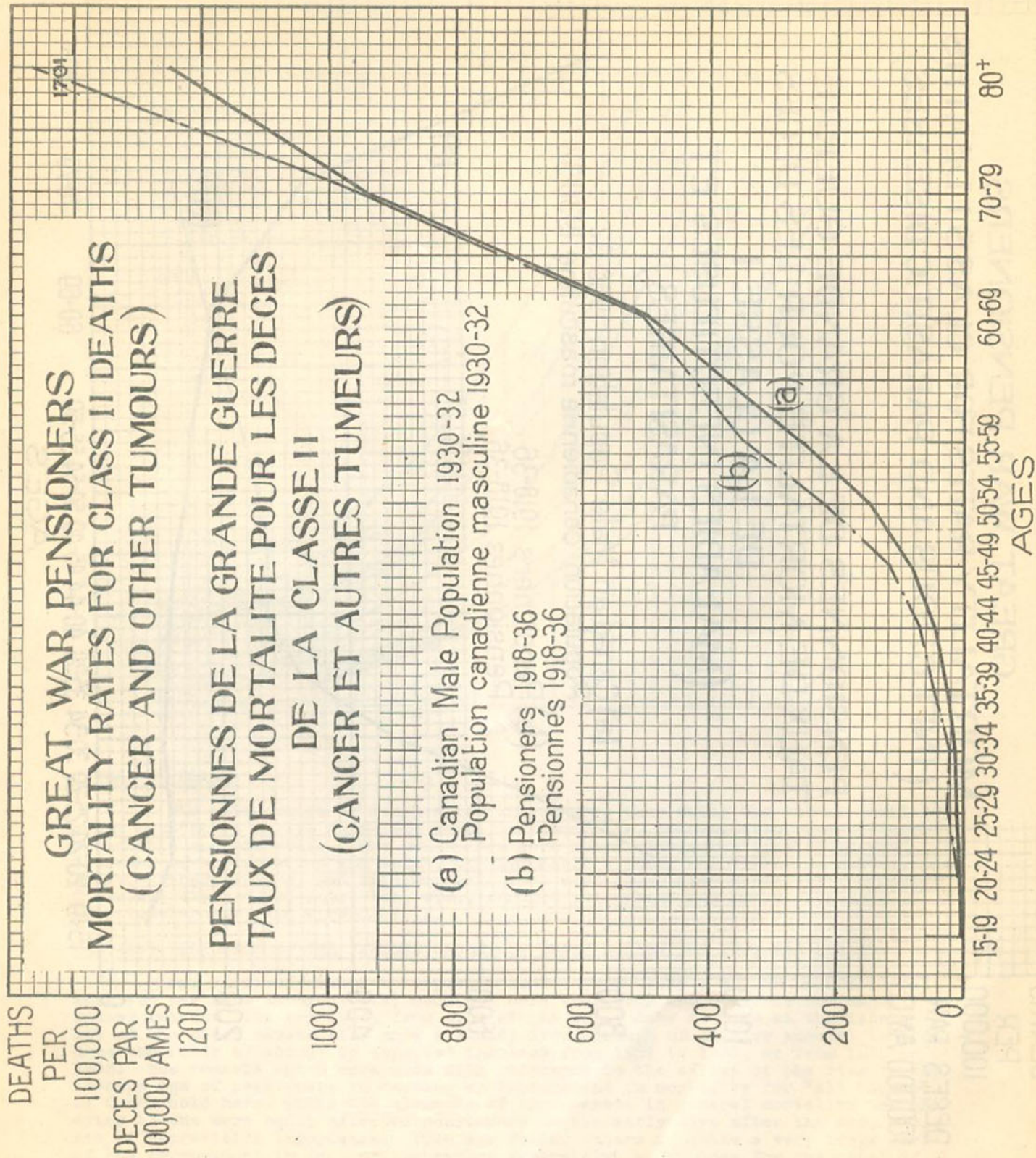
## CHANGING INCIDENCE OF THE VARIOUS CAUSES OF DEATH DURING THE POST-WAR PERIOD

The ratio of actual to expected deaths from Class 1 of the International List (88 per cent tuberculosis) declined more than from any other of the major causes between 1922 and 1936, from 4.32 at the early date to 1.16 at the later. All of the other causes also show a steady drop, though of smaller amount; in none does the ratio of actual to expected increase from 1922 to 1930, or from 1930 to 1936. The remarks which were made with reference to the effect of the rise in the average age of pensioners in causing an improvement in mortality for "All Causes" of death hold here, while the elements of improvement in general mortality and the dying of the more badly affected pensioners in the early days after the war, etc., are of appreciable importance. (The age factor enters to cause a very large part of the improvement in each of the causes separately, as it does for the total of "All Classes").

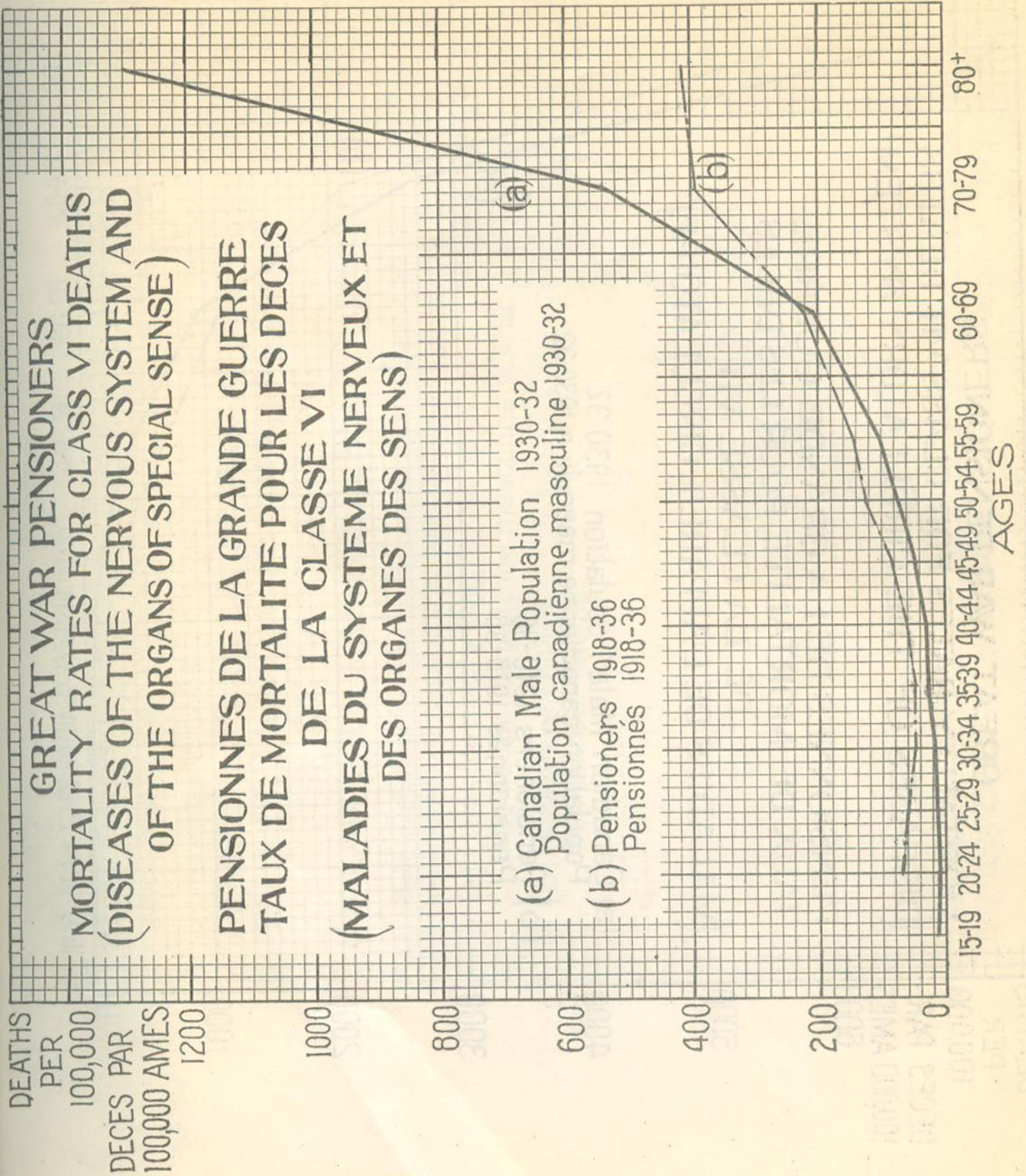
GRAPH XI



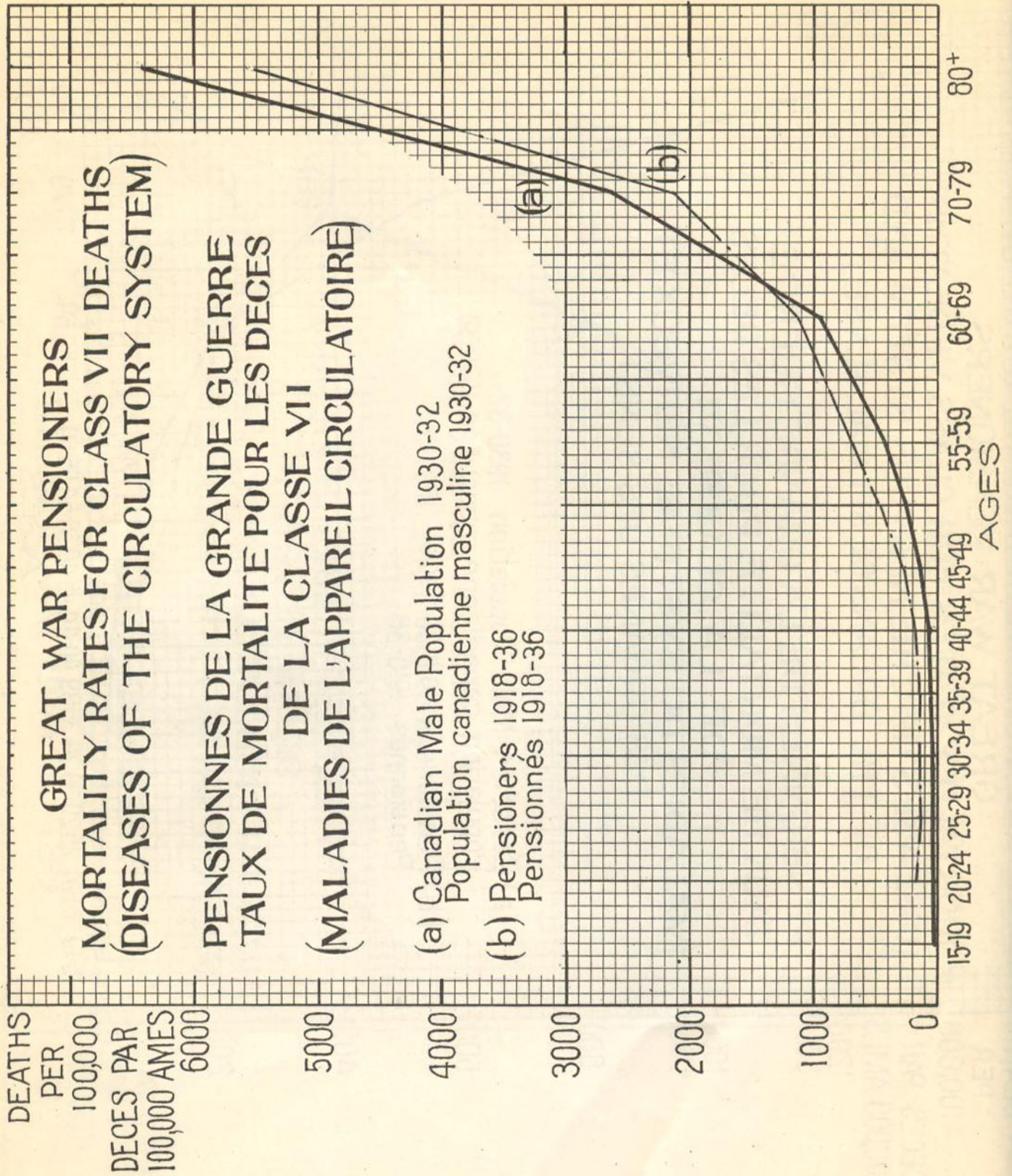
GRAPH XII



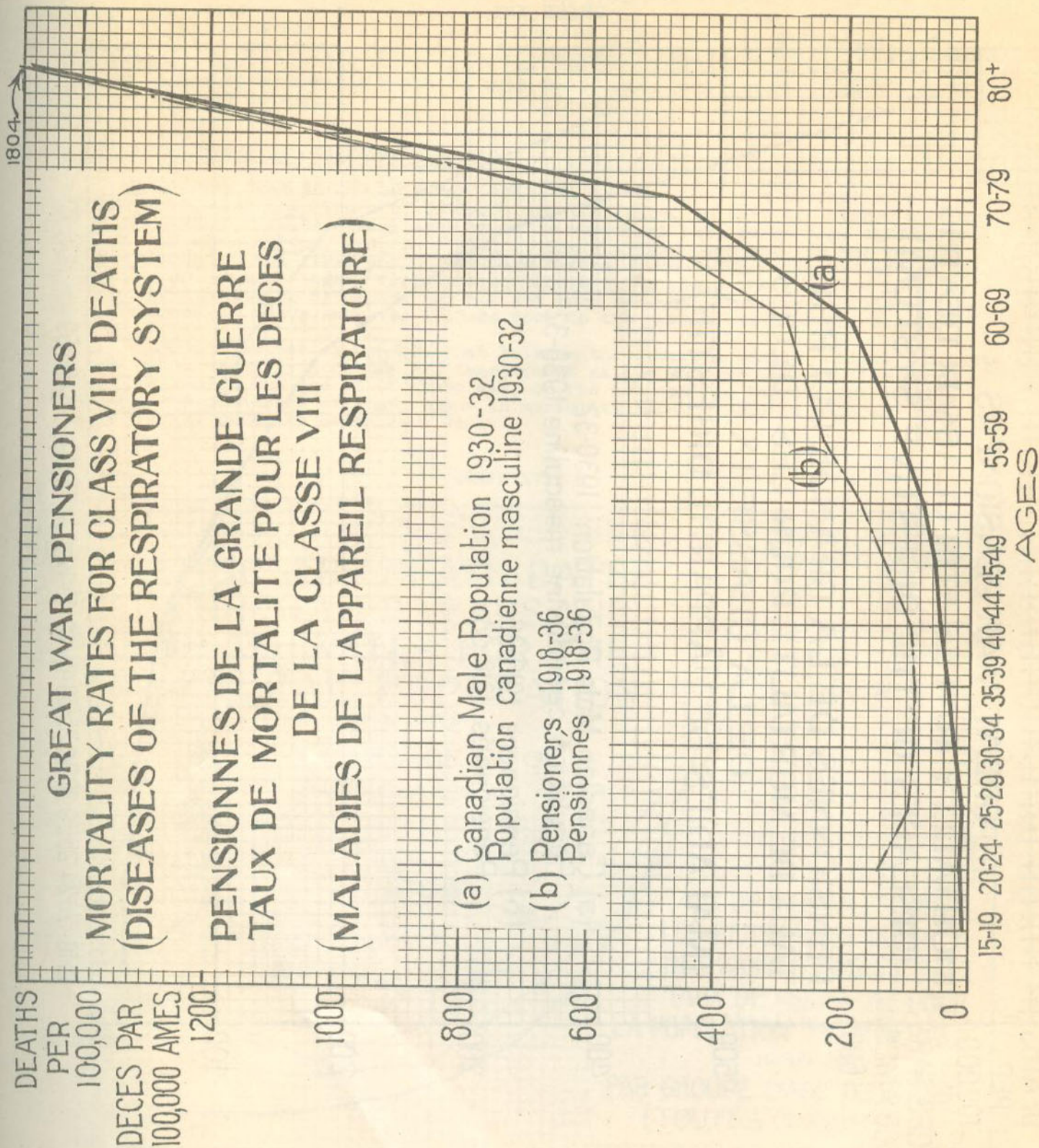
GRAPH XIII



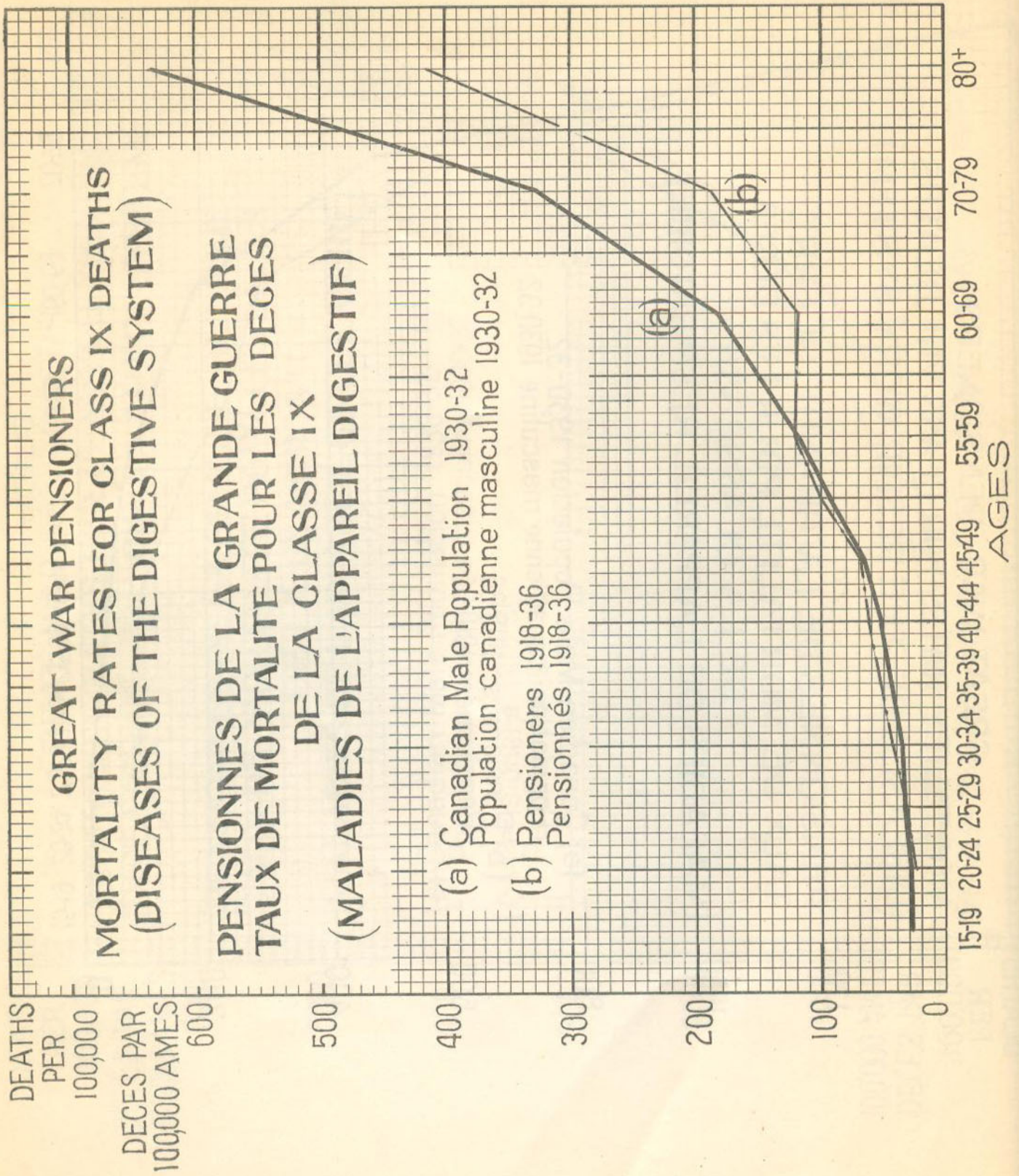
GRAPH XIV



GRAPH XV



GRAPH XVI





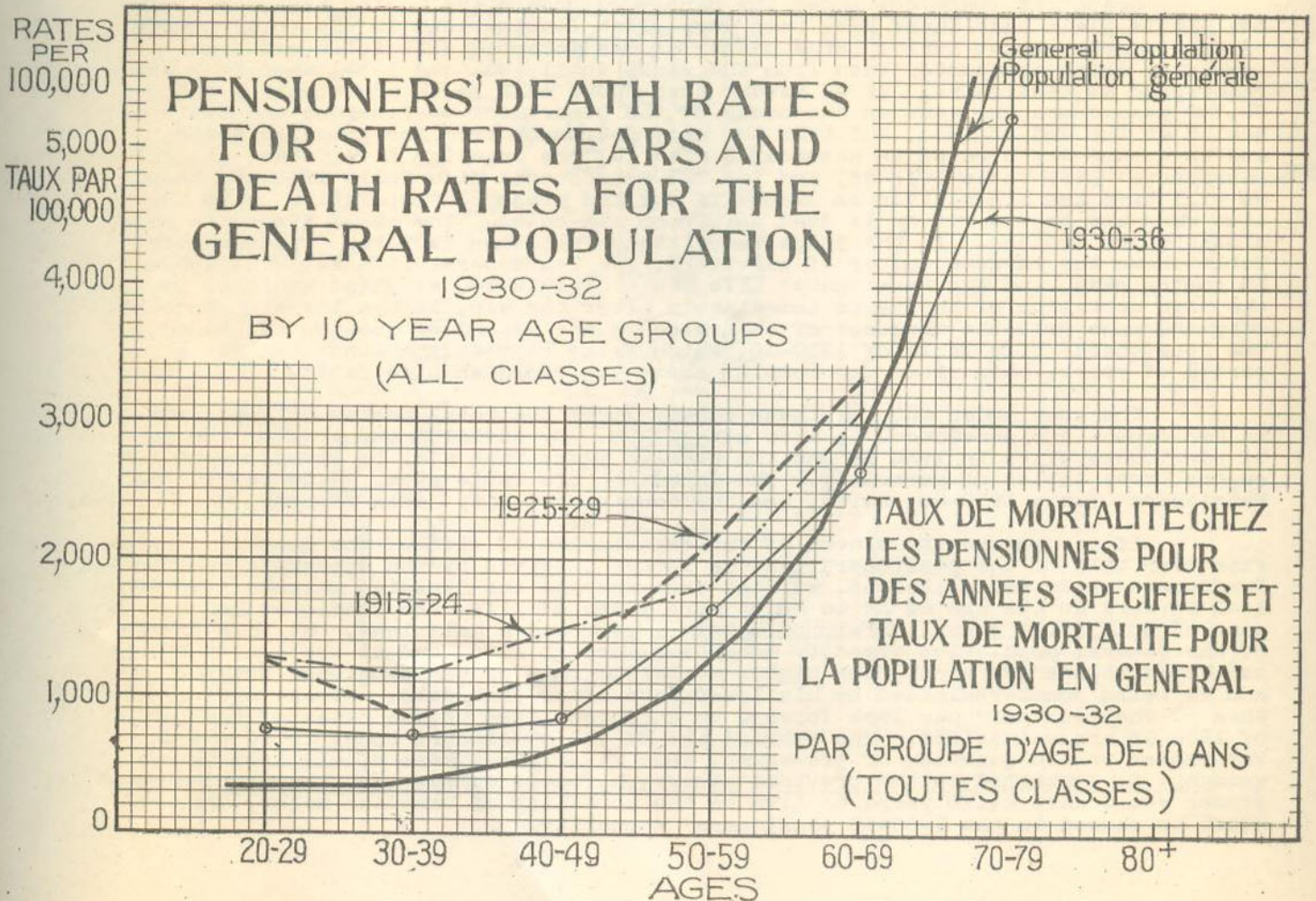
Each of the causes of death, with the exception of tuberculosis, has a flatter incidence by age for the pensioners than for the Canadian male population. At the younger ages the rates for pensioners are higher and, in general, at the older ages they are lower. In each of five principal causes of death it is possible to estimate roughly the age below which the 1930-36 pensioners are more, and above which they are less, heavily affected than the general population. (See Graphs XI to XVI, pages 17 to 22).

DEATH RATES BY AGE AND CALENDAR YEAR

Between ages 20 and 50 (Graph XVII) it is seen that the mortality rates of 1915-24 are higher than those of 1925-29, and the latter in turn are higher than the rates of 1930-36. At the later ages there is very much less percentage difference between the three curves, and, in addition, the downward sequence for the younger ages is lost, for the first period rates are intermediate between the second and the last. At the youngest ages, furthermore, though it is plain that the low level of the general population of Canada has not yet been reached, about two-thirds of the distance from the heavy rates of 1915-24 down to the normal has been traversed.

It is interesting to note that between the civilian census of 1921 and that of 1931 there was very considerable improvement at the younger ages of life among males, but beyond the age of 55 there was, on the average, no improvement at all. Thus, the age-incidence of improvement in mortality among pensioned veterans reflects that of Canadian males as a whole.

GRAPH XVII



It can be seen (Graph IX) that the death rates "Due to Service" form a larger part of total pensioner death rates at the young ages than they do at the older. This is because in late life the degenerative diseases attack pensioners and general population alike with steadily increasing intensity, while death rates "Due to Service" are more nearly constant in age-incidence. An analysis by calendar year showed that in 1923 the "Due" deaths were double the "Not Due", and that by 1936 they had gone down to half. The absolute number of "Due" deaths did not change greatly in the period, but the "Not Due" increased from 156 to 602.

#### FORECAST OF DEATHS

Actual deaths among pensioners drop in relation to the deaths expected by the Canadian Life Table (as we saw in Table 1, and here again in Graph XVIII, page 25), but there is also a fall in the number of deaths to be expected on the basis of the Pensioners' Life Table (1930-36), when taken with reference to the expected on the Canadian Table; the heavy line shows, in fact, the amount of decrease that could be attributed solely to increasing average age without any change in the rates of death at individual ages. Carrying this curve forward by operating on the pensioned group to be expected for the future, if deaths are in accordance with the 1930-36 pensioners' experience, we get a steady decline in the deaths expected by pensioners' mortality relative to those expected on the Canadian Life Table. The ratio has dropped to unity in 1950, and, continuing downward, reaches approximately 0.85 in 1961, thereafter levelling off. While the deaths thus considered with reference to the Canadian Life Table fall, their absolute annual number increases with time, attaining a maximum of over 2,000 about 1960.

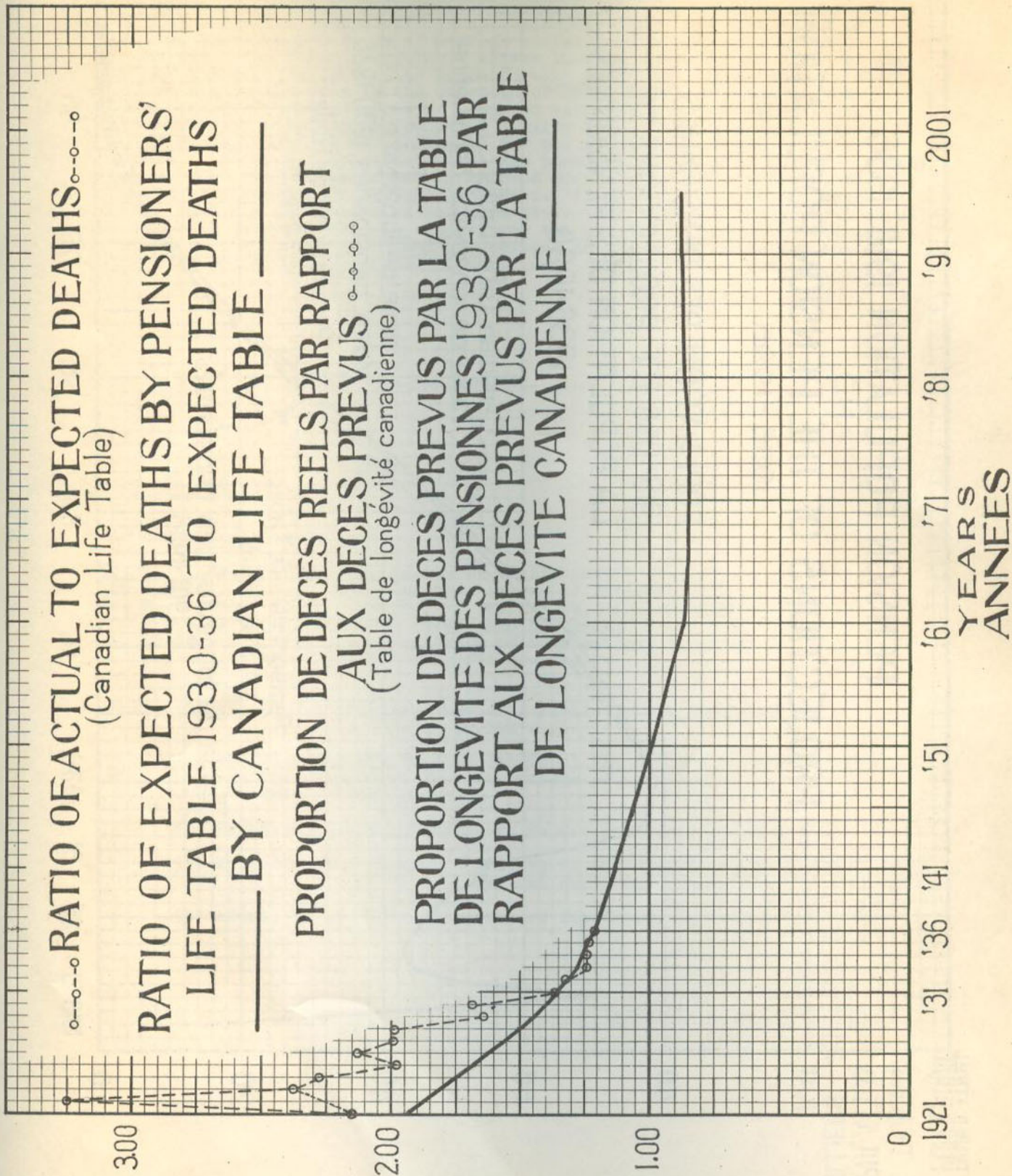
#### LIFE EXPECTATION OF PENSIONERS AND GENERAL POPULATION

Graph XIX (page 26) shows the pensioned population during the years 1918-36. It is plain that there have been very great fluctuations in the total number of pensioners. About 1921 a large number of men accepted gratuities and final payments, which eliminated them from the ranks until 1931 and 1932, when they were reaccepted as pensioners. If we assume that there will be no additions to the 79,789 pensioners who were on the books of the Department of Pensions and National Health at the end of 1936, and that the only decrement from the group is death, and we assume death rates in accordance with (a) the Canadian Life Table, (b) the Pensioners' Life Table 1918-36, and (c) the Pensioners' Life Table 1930-36, then we will have the lines given on Graph XIX for the projected population up to the time when the last survivor is dead - 1996 on all bases. The three lines are very close to one another. In the years immediately following 1936 the Canadian Life Table shows the largest number of survivors, the Pensioners' Life Table of 1930-36 coming next, and the Pensioners' Life Table of 1918-36, weighted as it is by the high mortality of the years immediately after the war, is the lowest. Undoubtedly the most reliable forecast of the three is the second projection mentioned, the Pensioners' Life Table of 1930-36, which falls between the other two for a period of years, then rises and remains above the Canadian Life Table.

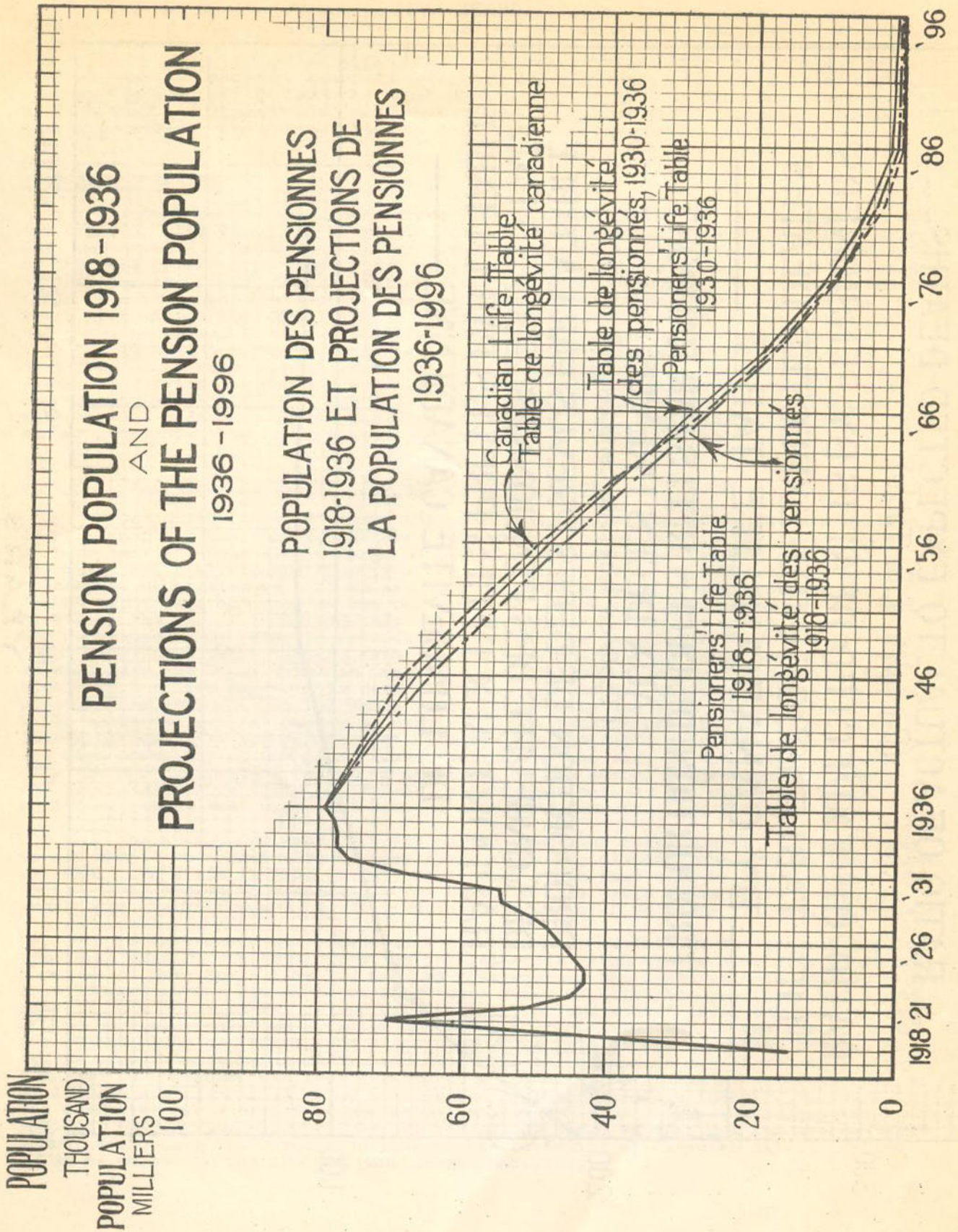
The area under each of these curves gives the total number of years which we can expect the pensioners to live after 1936. By dividing the area by the number of pensioners alive in 1936 we get the average years that will be lived beyond 1936 on the three tables of mortality. The Canadian Life Table gives 24.70 years, the Pensioners' Table 1930-36, 24.65, and the Pensioners' Life Table 1918-36, 23.70 years.

If we compare the excess of the expectation of life of the general population over that of the pensioners, as the latter is given by the specially constructed Pensioners' Life Table 1930-36, we find that whereas the Canadian male in 1930 could look forward at the age of 32 to 38.82 more years of life, the pensioner had a prospect of only 37.24 years, or approximately a year and a half less, but this excess of the general population steadily decreases through life, and at the age of 52 the two expectations are equal, the higher mortality rate of the pensioner between 52 and 64 being counterbalanced by his lower rate after that date. At all ages greater than 52 the pensioner can look forward to a longer life, if the rates of the period of 1930-36 are maintained. The average age of the pensioners today is 50 years. The answer to the question of pre-aging, that takes pensioners of all ages into account, is contained in the previous paragraph, where we saw that the average pensioner would have 24.70 years to live on the mortality of Canadian males, against 24.65 he showed in the 1930-36 pensioners' mortality.

GRAPH XVIII



GRAPH XIX



An important consideration, however, is that although the pensioners were a selected group at the time of their enlistment, it is well known to insurance companies that selection "wears off" in approximately the first five years of insurance, leaving behind a group of average mortality. If one were asked to estimate the war influence, the probable answer lies in the downward trend of the first part of the B and C curves, as compared with the normal line, seen in Graph IX; but if we are concerned with the question of the cost of pensions to the present disabled World War veterans as compared with the cost for Canadian males, a definite answer is obtained by comparing annuity rates. The average present value (as of March, 1938) of an annuity of \$50 per month to a random group of Canadian males similar in age-structure to the pensioners, would be \$9,458 per man; for the pensioners themselves (on their 1930-36 mortality) it would be \$9,363, calculated in both cases at 3 per cent interest. It is plain that the present value of the cost for pensioners is not much lower than that for the general population. Since it is reasonable to suppose for the pensioners inferior vitality to the veterans as a whole, rates and projections on a similar basis for the latter, if such could be made, would probably show an even higher cost.

-o-o-o-o-o-o-o-o-o-

Note: Appreciation

Our thanks are due to

Mr. M. C. McLean, Dominion Bureau of Statistics;  
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