

An Address
ON
THE CAUSES OF THE DECLINE IN
TUBERCULOSIS MORTALITY.*

BY

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LET me crave indulgence for the introduction of a brief personal reference which has bearing on the significance of our discussion to-day. While tuberculosis has been known from all times it has, during the past fifty years, assumed a new aspect. Throughout the latter period we have come to realize, as never before, what we are up against. It so happens that my medical history covers that period of fifty years almost to a day. During the first four years, as an undergraduate in medicine, one became familiar with the general helplessness and hopelessness of medicine in respect of tuberculous disease. Pathology had revealed much regarding the morbid anatomy of tubercle, but little regarding the natural history of the disease. Diagnosis was limited to pronounced cases; prognosis was, for the most part, pessimistic; and treatment empirical. Tuberculosis remained, as I ventured to call it in my graduation thesis, the opprobrium of medicine.

Although the old-time conception of its infective character had already received scientific confirmation in the seventies by the prolonged investigations of Villemin, it was in 1882-83 that bacteriology demonstrated, once for all, the causal organism. I remember vividly the repercussion of Koch's pronouncement. To those of us who were working in laboratory at the time it called for pause. Microscopical work on other lines was arrested in favour of a consideration of the new claim.

Fresh Horizon.

It was the coming of that event at that particular moment which determined the interest of a lifetime—an interest as fresh to-day as when it was kindled. Combined laboratory and clinical observation compelled one gradually to the conclusion that the attitude of medicine to tuberculosis was wrong. Attention had been concentrated on end-results, and these especially in the lung. The physician waited until the disease presented itself in aggravated form.

The basal fact of infection having been accepted, it seemed clear that the principles which governed the detection and control of other infections might be applied to tuberculosis, and, especially, that in place of waiting until the effects of the tubercle bacillus were clamant—often evident to the man in the street—our aim should be to search for the earliest manifestations of infection and probe into conditions which conduced to grosser disease. It was study of the nature of the infection and of the essential cause of death in tuberculosis which led to the proposal for special centres of observation and the establishment, in 1887, of the tuberculosis dispensary.

The circumstances were thought-compelling. Why was the prognosis commonly so unfavourable? Why did most of the patients die? Why were the cases under treatment so largely those of advanced disease? What was the natural history of the disease? Why, and how, was the infection contracted of which those cases were the final fruit? Why was the disease undetected at the earlier stages? Answers to these questions were gradually evolved. It emerged that the advanced stage constituted but the last scene in the long drama of infection. It became evident that the earlier stages of infection must be sought for. The infection must be traced to its source and the commencing stigmata of disease determined. Observations on those lines led to the conception of tuberculosis as a household disease and, presently, to the systematic examination of the household group and of the home itself and other environmental conditions. Thus came to be instituted the examination of contacts and domiciliary visitation.

* Introductory to a discussion at a meeting of the Society of Medical Officers of Health held at Bath, April 20th, 1928.

Gradually the problem extended. Tuberculous infection was seen to be widespread throughout civilized communities. For the most part it was contracted in childhood. Varying degree of resistance to the infection was offered by different individuals. The resultant of the infection depended on the amount of the infecting dose and its repetition, and on the resistance offered by the individual. The degree of resistance was influenced greatly by environment—interpreting that term in a wide sense—and to some extent by racial quality. In consequence of this the outward manifestations of the infection differed much in character and degree.

All this meant a revision of the medical outlook. Attention had to be directed: (1) towards the detection of the infection at the earliest possible moment; (2) towards detuberculation of the tuberculized individual as speedily and thoroughly as might be; (3) towards the elimination, or at least progressive lessening, of environmental conditions which fostered the advance of infection by lowering individual resistance; (4) towards securing sufficient duration of efficient treatment in presence of pronounced disease; (5) towards the limitation of the spread of infection from advanced cases.

Evolution of the Tuberculosis Scheme.

In order to meet the different issues there evolved progressively the several elements in what is now described as the tuberculosis scheme, generally applied throughout the land. In so far as it has really met the issues and been efficiently handled the machinery has proved serviceable. If experience has shown that the quality and temper of the machine, as erected in different areas, have not always been equal, nor the standard of the personnel in charge, that is only what was to be expected.

Specialized Training.

Time is improving both the machinery and the personnel. The purposes and hang of its different parts are becoming better understood; the training of the officers in charge is being progressively adapted to the needs. Thus, at the University of Edinburgh the undergraduate in medicine has a course of thirty meetings on tuberculosis. The course is practical and compulsory, and tuberculosis is included among the subjects for the final examination in medicine. Candidates for the Diploma in Public Health attend a further course of twenty meetings, and the subject forms part of the examination for the diploma.

The Departmental Committee on Tuberculosis recognized and enforced the need for special training and experience in dealing with the disease. It seems singularly inopportune that, just when the machinery is getting into motion throughout the country, the proposal has been made to replace the specialized staff by officers in the public health service who happen to have time, but may have little experience of or interest in the complex problems. The issues involved are critical. It is not good policy to swap horses in crossing the ford.

Decline of Mortality: Accelerating Drop.

Turning to the subject more definitely before us to-day, the title of the discussion assumes that there has been a decline in mortality. One wonders whether the extent of the decline is quite realized. Judging by loose statements in the press, it is clear that there is need to emphasize its remarkable extent.

The graphs showing the decline in mortality from tuberculosis in Scotland from 1871 up to the present date tell their own story. The remarkable decline has been continuous throughout the period. This is, however, not all. Closer examination reveals that the rate of decline has been an accelerating one. This is evidenced by the sharp downward trend of the line of mortality. Had there been no increasing rate of drop throughout the period the downward trend of the curve would have been less steep. As the Registrar-General for England (Annual Report for 1920) says:

“Not only is the absolute fall (of mortality) greater, but, as compared with the lower level of mortality prevalent at the present day, the relative fall is very much greater than would have

resulted from an equal absolute fall at an earlier period, had it ever occurred.

"The uniformity of the average annual decrement of mortality represents an ever-increasing acceleration of the rate of fall, when measured in proportion to the total extent of mortality remaining."

The acceleration of the drop of the death rate of all tuberculosis for England and Scotland respectively is illustrated in Tables I and II. The numbers on the tables are five-yearly means, centring on the year selected. If, in the case of England, we compare successively the death rate of each of the years 1881, 1891, 1901, 1911, and 1921 with that of ten years before, the 1881 death rate in England shows a drop of 14 per cent., the 1891 death rate a drop of 15 per cent., the 1901 death rate a drop of 19 per cent., the 1911 death rate a drop of 21 per cent., and the 1921 death rate a drop of 20 per cent.

The corresponding figures for Scotland are: the 1881 death rate shows a drop of 17 per cent., that of 1891 a drop of 21 per cent., that of 1901 a drop of 9 per cent., that of 1911 a drop of 21 per cent., and that of 1921 a drop of 31 per cent.

The figures from Ireland (as shown in Table III) are similarly instructive.

In Excess of Decline from Other Causes.

All very well, says the critic; but the decline in tuberculosis mortality is in line with the drop in the general death rate, of which it is but part expression.

This is not so. The accelerating drop in the tuberculosis death rate exceeds greatly the drop in mortality from all diseases throughout the same period. The extent to which the decline in the death rate from tuberculosis (all tuberculosis, pulmonary tuberculosis) has exceeded that from all diseases is illustrated likewise in Tables I, II, and III.

If we take the last complete decennium, 1911-1921, the drop in the all tuberculosis death rate in Scotland (Table II) amounted to 31 per cent., and the drop in the pulmonary tuberculosis death rate to 27 per cent., as against a drop of 7 per cent. in the death rate from all diseases. Taking the entire period of fifty years, the death rate from tuberculosis was reduced by two-thirds, while that from all diseases was reduced by rather less

than one-half; or, viewed in another way (Table IV), while in 1871 the deaths from all tuberculosis constituted 16.8 per cent. of deaths from all diseases, in 1921 the deaths from all tuberculosis constituted only 9 per cent. of the deaths from all diseases. And, similarly, while in 1871 the deaths from pulmonary tuberculosis constituted 11.8 per cent. of deaths from all diseases, in 1921 they constituted only 6.2 per cent. of the deaths from all diseases.

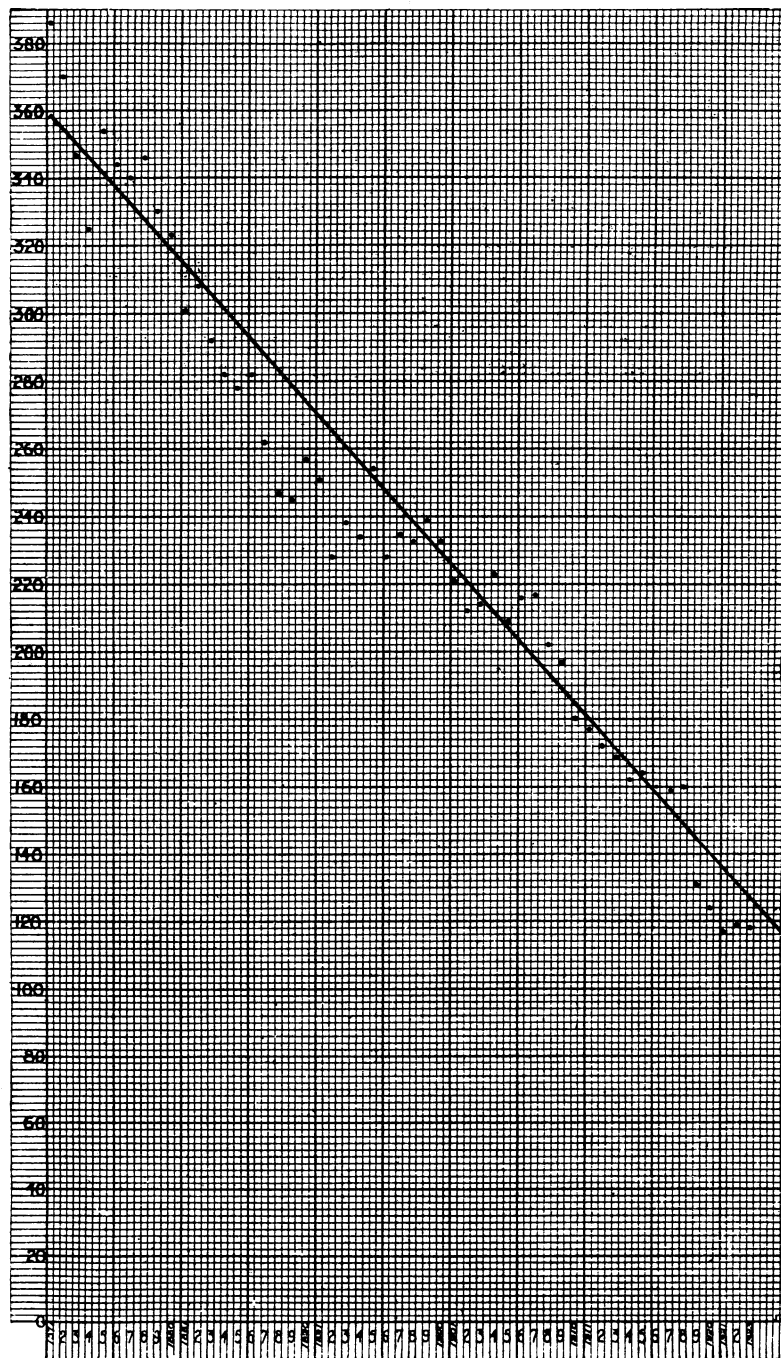
The next point that occurs to one is, How does the decline in mortality from tuberculosis stand in relation to mortality from other groups of killing diseases? The facts are so well known to you that detailed statistics are unnecessary. Broadly speaking, if we compare (Table V, Scotland) the mortality of 1891 (mean of three years round 1891) with the mortality of 1921 (mean of three years round 1921), we find that, of a total annual saving of life in respect of all causes of death of 557 per 100,000 of the population, the decline in tuberculosis mortality is responsible for a saving of 126. Compared with this, the group of heart diseases shows a negligible saving only, while kidney and vascular diseases show an actual increase of mortality, and cancer a marked increase.

Not Uniform Throughout the World.

A comparison of the mortality from tuberculosis in Great Britain with that of other countries is instructive. The mortality records in different lands vary much, and the decline in the death rate is correspondingly various. If we take Paris, as representing France, and Vienna, as representing Austria, attention is at once arrested by the high death rate from tuberculosis prevailing in these old centres of civilization. Incidentally, these high figures are illuminating in view of the suggestion frequently made that diminution in mortality from tuberculosis throughout the world is the result of an advancing immunization of civilized populations against the disease. In Paris prior to the war the death rate ran about 400 per 100,000, and in Vienna apparently about the same number. After the war France began to look into the matter, and during the past few years there has been gradually instituted an anti-

FIG. 1.—SCOTLAND.

TUBERCULOSIS — DEATH RATES — 1871 to 1923.



tuberculosis movement. In 1921 the death rate for Paris was 286 per 100,000. In 1920 the death rate for Vienna, where medical endeavour was much disorganized, was reported as 405 per 100,000.

Taking the several arrondissements (districts) of Paris, M. Henri Sellier, of the Office Public d'Hygiène Sociale du Département de la Seine (Rapport présenté au Conseil Général de la Seine, December, 1927), indicates that considerable differences are beginning to show themselves in the mortality rates, and that these differences are referable to the differences in respect of antituberculosis activity.

The variation in death rate, and the amount of its recent decrease (or increase) in the several arrondissements is illustrated in the chart of Paris (p. 705) prepared by M. Marcel Moine, statistician to the Comité National.

A similar observation has been published by Professor Courmont in relation to the city of Lyons, where antituberculosis measures have been applied for some twenty years.

Of countries which hold a conspicuous place in respect of concerted effort against tuberculosis we may take as an example from Europe (apart from Great Britain) Denmark, and from outside Europe the United States.

In Denmark an intensive campaign has been maintained for some twenty-five years, with large contributions on the part of the Government. In 1901 the tuberculosis mortality of Denmark was 210 per 100,000, and in 1922 it was 95 per 100,000. Professor Knud Faber of Copenhagen, whose judgement is worthy of high consideration, states that at the present time Denmark has the lowest death rate from tuberculosis in Europe, and traces this decline to the highly concerted effort directed against the infection.

Taking New York as typical of American antituberculosis work, for the initiation of which the late Dr. Hermann Biggs was especially responsible, the figures are striking. Thus, in 1907, at the commencement of a special effort to

FIG. 2.—SCOTLAND.

TUBERCULOSIS—AGE DEATH RATES.

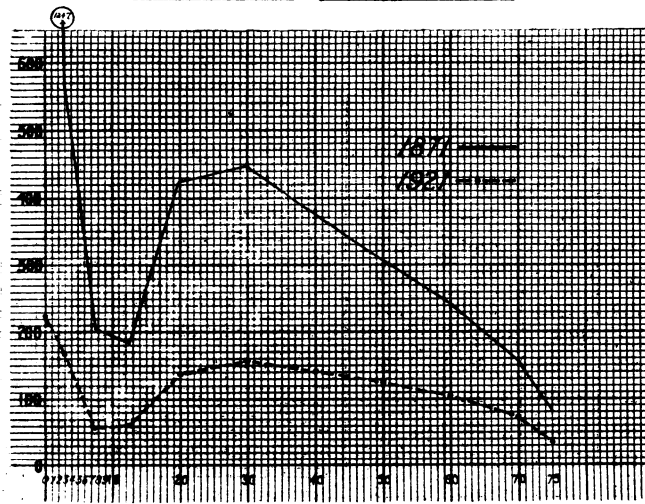


TABLE I.—ENGLAND AND WALES.

Deaths from All Causes, from Tuberculosis, and from Pulmonary Tuberculosis.

(Numbers are five-yearly means centring on the year named.)

| Year. | All Causes. | Tuberculosis. | | Pulmonary Tuberculosis. | | | |
|---|-------------|---------------|--------|-------------------------|-------------|--------|----------|
| | Both Sexes. | Both Sexes. | Males. | Females. | Both Sexes. | Males. | Females. |
| <i>Number of Deaths.</i> | | | | | | | |
| 1871 | 501,964 | 69,593 | 35,739 | 33,851 | 52,764 | 26,423 | 26,341 |
| 1881 | 517,293 | 68,617 | 35,760 | 32,887 | 49,156 | 25,099 | 24,058 |
| 1891 | 559,634 | 65,246 | 35,022 | 30,224 | 45,315 | 24,335 | 20,980 |
| 1901 | 554,276 | 59,302 | 33,062 | 26,240 | 41,484 | 23,619 | 17,866 |
| 1911 | 504,195 | 51,668 | 28,666 | 23,001 | 37,364 | 21,158 | 16,206 |
| 1921 | 472,105 | 43,023 | 23,154 | 19,866 | 33,659 | 18,294 | 15,366 |
| <i>Death Rates per 100,000 of Population.</i> | | | | | | | |
| 1871 | 2,210 | 306 | 323 | 290 | 232 | 239 | 226 |
| 1881 | 1,992 | 264 | 283 | 247 | 189 | 199 | 180 |
| 1891 | 1,930 | 225 | 249 | 202 | 156 | 173 | 140 |
| 1901 | 1,704 | 182 | 210 | 156 | 128 | 150 | 106 |
| 1911 | 1,398 | 143 | 164 | 123 | 104 | 121 | 87 |
| 1921 | 1,246 | 114 | 128 | 100 | 89 | 101 | 78 |
| <i>Comparison with 1871 (=100).</i> | | | | | | | |
| 1871 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| 1881 | 90 | 86 | 88 | 85 | 81 | 83 | 80 |
| 1891 | 87 | 74 | 77 | 70 | 67 | 72 | 62 |
| 1901 | 77 | 59 | 65 | 54 | 55 | 63 | 47 |
| 1911 | 63 | 47 | 51 | 42 | 45 | 51 | 38 |
| 1921 | 56 | 37 | 40 | 34 | 38 | 42 | 35 |
| <i>Percentage Decrease of Death Rate—Decennial.</i> | | | | | | | |
| 1871-1881 | 10 | 14 | 12 | 15 | 19 | 17 | 20 |
| 1881-1891 | 3 | 15 | 12 | 18 | 17 | 13 | 22 |
| 1891-1901 | 12 | 19 | 16 | 23 | 18 | 13 | 24 |
| 1901-1911 | 18 | 21 | 22 | 21 | 19 | 19 | 18 |
| 1911-1921 | 11 | 20 | 22 | 19 | 14 | 17 | 10 |

TABLE II.—SCOTLAND.

Deaths from All Causes, from Tuberculosis, and from Pulmonary Tuberculosis.

(Numbers are five-yearly means centring on the year named.)

| Year. | All Causes. | Tuberculosis. | | Pulmonary Tuberculosis. | | | |
|---|-------------|---------------|--------|-------------------------|-------------|--------|----------|
| | Both Sexes. | Both Sexes. | Males. | Females. | Both Sexes. | Males. | Females. |
| <i>Number of Deaths.</i> | | | | | | | |
| 1871 | 75,498 | 12,533 | 6,111 | 6,422 | 8,755 | 4,029 | 4,726 |
| 1881 | 74,271 | 11,612 | 5,587 | 6,025 | 8,112 | 3,713 | 4,399 |
| 1891 | 78,206 | 9,855 | 4,858 | 4,997 | 7,161 | 3,426 | 3,725 |
| 1901 | 79,188 | 10,001 | 5,073 | 4,928 | 6,910 | 3,439 | 3,471 |
| 1911 | 72,808 | 8,406 | 4,315 | 4,151 | 5,454 | 2,761 | 2,693 |
| 1921 | 69,145 | 5,942 | 3,025 | 2,917 | 4,091 | 2,066 | 2,025 |
| <i>Rates per 100,000.</i> | | | | | | | |
| 1871 | 2,247 | 373 | 381 | 366 | 261 | 252 | 269 |
| 1881 | 1,988 | 311 | 310 | 311 | 217 | 206 | 227 |
| 1891 | 1,943 | 245 | 250 | 240 | 178 | 176 | 179 |
| 1901 | 1,771 | 224 | 233 | 214 | 155 | 158 | 151 |
| 1911 | 1,529 | 178 | 187 | 169 | 115 | 120 | 110 |
| 1921 | 1,416 | 122 | 129 | 115 | 84 | 88 | 80 |
| <i>Comparison with 1871.</i> | | | | | | | |
| 1871 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| 1881 | 88 | 83 | 81 | 85 | 83 | 82 | 84 |
| 1891 | 86 | 66 | 66 | 66 | 68 | 70 | 67 |
| 1901 | 79 | 60 | 61 | 58 | 59 | 63 | 56 |
| 1911 | 68 | 48 | 49 | 46 | 44 | 48 | 41 |
| 1921 | 63 | 33 | 34 | 31 | 32 | 35 | 30 |
| <i>Percentage Decrease of Rate—Decennial.</i> | | | | | | | |
| 1871-1881 | 12 | 17 | 19 | 15 | 17 | 18 | 16 |
| 1881-1891 | 2 | 21 | 19 | 23 | 18 | 15 | 21 |
| 1891-1901 | 9 | 9 | 7 | 11 | 13 | 10 | 16 |
| 1901-1911 | 14 | 21 | 20 | 21 | 26 | 24 | 27 |
| 1911-1921 | 7 | 31 | 31 | 32 | 27 | 27 | 27 |

TABLE III.—IRELAND.
Deaths from All Causes, from Tuberculosis, and from Pulmonary Tuberculosis.

(Numbers are five-yearly means centring on the year named.)

| Year. | All Causes. | | Tuberculosis. | | Pulmonary Tuberculosis. | | |
|---|-------------|-------------|---------------|----------|-------------------------|--------|----------|
| | Both Sexes. | Both Sexes. | Males. | Females. | Both Sexes. | Males. | Females. |
| <i>Number of Deaths.</i> | | | | | | | |
| 1871 | 92,647 | 13,673 | 6,775 | 6,198 | 10,234 | 4,910 | 5,294 |
| 1881 | 96,552 | 13,804 | 6,550 | 7,224 | 10,561 | 4,881 | 5,680 |
| 1891 | 85,521 | 12,787 | 6,099 | 6,633 | 10,016 | 4,688 | 5,328 |
| 1901 | 80,292 | 12,407 | 6,109 | 6,298 | 9,613 | 4,683 | 4,930 |
| 1911 | 73,845 | 9,811 | 4,879 | 4,932 | 7,593 | 3,754 | 3,842 |
| 1921 | 66,867 | 7,318 | 3,489 | 3,829 | 5,689 | 2,671 | 3,018 |
| <i>Rates per 100,000.</i> | | | | | | | |
| 1871 | 1,712 | 253 | 257 | 249 | 189 | 187 | 191 |
| 1881 | 1,856 | 27 | 260 | 273 | 204 | 193 | 215 |
| 1891 | 1,818 | 272 | 253 | 280 | 213 | 202 | 223 |
| 1901 | 1,801 | 278 | 278 | 279 | 216 | 213 | 218 |
| 1911 | 1,582 | 223 | 223 | 224 | 173 | 171 | 175 |
| 1921 | 1,526 | 163 | 158 | 178 | 131 | 121 | 141 |
| <i>Comparison with 1871.</i> | | | | | | | |
| 1871 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| 1881 | 109 | 106 | 101 | 110 | 108 | 103 | 113 |
| 1891 | 106 | 108 | 102 | 112 | 113 | 108 | 117 |
| 1901 | 105 | 110 | 108 | 112 | 114 | 114 | 114 |
| 1911 | 93 | 88 | 87 | 90 | 92 | 91 | 92 |
| 1921 | 90 | 66 | 61 | 71 | 69 | 65 | 74 |
| <i>Percentage Increase or Decrease of Rate—Decennial.</i> | | | | | | | |
| 1871-1881 | +9 | +6 | +1 | +10 | +8 | +3 | +13 |
| 1881-891 | -3 | +2 | +1 | +3 | +4 | +5 | +4 |
| 1891-1901 | -1 | +2 | +6 | 0 | +1 | +5 | -2 |
| 1901-1911 | -7 | -20 | -20 | -20 | -20 | -20 | -20 |
| 1911-1921 | -9 | -25 | -29 | -21 | -21 | -29 | -19 |

TABLE IV.—ENGLAND AND SCOTLAND.
Death Rates from All Causes, from Tuberculosis, and from Pulmonary Tuberculosis.

(Based on five-yearly means centring on the year named.)

| Year. | Death Rate per 1,000 from All Causes. | | Death Rate per 100,000. | | | | Deaths per cent. of Deaths from All Causes. | | | |
|-------|---------------------------------------|------------|-------------------------|------------|-------------------------|------------|---|------------|-------------------------|------------|
| | | | Tuberculosis. | | Pulmonary Tuberculosis. | | Tuberculosis. | | Pulmonary Tuberculosis. | |
| | Eng-land. | Scot-land. | Eng-land. | Scot-land. | Eng-land. | Scot-land. | Eng-land. | Scot-land. | Eng-land. | Scot-land. |
| 1871 | 22.10 | 22.47 | 306 | 373 | 232 | 261 | 13.9 | 16.8 | 10.5 | 11.8 |
| 1881 | 19.22 | 19.28 | 264 | 311 | 189 | 217 | 13.3 | 16.1 | 9.5 | 11.2 |
| 1891 | 19.30 | 19.43 | 225 | 245 | 156 | 178 | 11.7 | 11.8 | 8.1 | 8.6 |
| 1901 | 17.04 | 17.71 | 182 | 224 | 128 | 155 | 10.7 | 12.5 | 7.5 | 8.7 |
| 1911 | 13.98 | 15.29 | 143 | 178 | 104 | 115 | 10.2 | 11.8 | 7.4 | 7.6 |
| 1921 | 12.46 | 14.16 | 114 | 122 | 89 | 84 | 9.1 | 9.0 | 7.1 | 6.2 |

co-ordinate antituberculosis activities, more particularly by a combination of the institutions concerned with the dispensary control of tuberculosis, the tuberculosis death rate was 238 per 100,000. In 1921, notwithstanding an increase in population of a million and a half, the death rate from tuberculosis stood at 106 per 100,000.

From the cities and counties in Great Britain various illustrations might be cited. For the present purpose one will suffice. The administrative county of Lancaster, with

TABLE V.—ENGLAND AND SCOTLAND.
Saving of Life per 100,000 of Population, 1891-1921 (3-yearly means).

| | All ages. | Age Groups | | | | | | | | | | |
|-----------------------------|-----------|------------|-------|-----|-----|-----|-----|-----|-----|-------|-------|-------|
| | | -1 | 1- | 5- | 10- | 15- | 25- | 35- | 45- | 55- | 65- | 75- |
| <i>England and Wales—</i> | | | | | | | | | | | | |
| All causes ... | 723 | 8,965 | 1,483 | 192 | 89 | 158 | 318 | 587 | 837 | 1,338 | 2,122 | 3,330 |
| Pulmonary tuber- culosis | 70 | 65 | 21 | 15 | 22 | 52 | 126 | 166 | 141 | 109 | 59 | 19 |
| Other tuber- culosis | 65 | 818 | 155 | 27 | 11 | 2 | 2 | 2 | 1 | +2 | +3 | +7 |
| Respiratory dis- orders | 203 | 1,756 | 349 | 21 | 6 | 17 | 46 | 120 | 265 | 737 | 900 | 1,147 |
| All other causes | 405 | 6,221 | 958 | 129 | 50 | 87 | 144 | 299 | 430 | 494 | 1,090 | 2,171 |
| <i>Scotland—</i> | | | | | | | | | | | | |
| All causes ... | 557 | 3,981 | 1,218 | 293 | 178 | 252 | 357 | 493 | 662 | 870 | 1,154 | 1,352 |
| Pulmonary tuber- culosis | 97 | 65 | 33 | 33 | 58 | 155 | 175 | 151 | 96 | 68 | 46 | 18 |
| Other tuber- culosis | 29 | 362 | 114 | 40 | 16 | +2 | +4 | +4 | +8 | +8 | +7 | — |
| Respiratory dis- orders | 148 | 933 | 193 | 29 | 15 | 22 | 37 | 110 | 252 | 442 | 655 | 551 |
| All other causes | 283 | 2,621 | 878 | 191 | 89 | 117 | 148 | 236 | 322 | 362 | 498 | 783 |

a population of nearly two million, has, by common agreement, one of the most comprehensive schemes, with whole-time consultant tuberculosis officers. The following table compares ten years pre-war, when there was no complete tuberculosis scheme, with nine years post-war, when the tuberculosis scheme was more developed.

| Year. | Pulmonary Tuberculosis Death Rate per 100,000 of Population. | Average Death Rate. | Year. | Pulmonary Tuberculosis Death Rate per 100,000 of Population. | Average Death Rate. |
|----------|--|---------------------|-----------|--|---------------------|
| Pre-war. | | 86 | Post-war. | | 70 |
| 1905 | 85 | | 1919 | 80 | |
| 1906 | 85 | | 1920 | 76 | |
| 1907 | 94 | | 1921 | 73 | |
| 1908 | 85 | | 1922 | 77 | |
| 1909 | 89 | | 1923 | 70 | |
| 1910 | 80 | | 1924 | 68 | |
| 1911 | 88 | | 1925 | 67 | |
| 1912 | 85 | | 1926 | 64 | |
| 1913 | 82 | | 1927 | 61 | |
| 1914 | 87 | | | | |

These examples might be multiplied. Enough has been cited to support the view that, where special anti-tuberculosis work is undertaken, results follow, and that, conversely, in proportion as a *laissez-faire* policy is pursued, little happens. Taking the map of the world, it seems fair to say that the more striking decline in mortality from tuberculosis is to be found in those countries where co-ordinated measures against tuberculosis have been continuously applied throughout a sufficiently prolonged period. Where there is no marked decline one may pretty surely predicate the absence or slackness of concerted effort.

A further interesting comparison is to be found between urban and rural districts. It is frequently stated that tuberculosis is a disease of cities and that country areas are relatively exempt. This is doubtless true for the most part. Referring to the point, however, a recent writer in the *American Review of Tuberculosis* (October, 1927, p. 535) says that, while it was true at the beginning of the century, "there is now evidence that in rural New York (State) the mortality from tuberculosis has since 1920 been in excess of the urban mortality, and that this excess has increased year by year"; and with reference to the same point, the editor of that review says, "We are justified in the assumption that the antituberculosis campaign, immeasurably better carried on in the cities, is beginning to tell, is therefore fundamentally sound and effective, and must be organized to more purpose in the

country." In keeping with this are the present high mortality rates recorded from the islands of Scotland in comparison with those of the country as a whole.

Interpretation of Decline: Contributory Factors.

The facts relating to the decline in mortality are very remarkable. How, then, are they to be interpreted? What has caused the decline? In seeking to formulate an answer, let me put it to you that it is likely that there have been numerous contributory factors. We shall all agree that every influence which has made for the physiological welfare of the community has played its part in the reduction of the tuberculosis death rate as of the general mortality rate.

There can be no doubt that the wave of awakened interest in sanitary matters, which commenced in Britain some eighty years ago and resulted in the appointment of the Royal Commission of 1869, was a primary factor of first importance. The report of that Commission in 1871, and the establishment of the Local Government Board, meant a practical awakening throughout the land. The powerful wash of the wave is well illustrated by the remarkable words of Lord Beaconsfield at Manchester in 1872: "After all, the first consideration of a Minister should be the health of the people." It is noteworthy that the great statesman looked beyond disease to the goal of health.

Another significant influence has been the general education of the people during the past fifty years. This has meant a wide diffusion of knowledge hitherto restricted to a limited portion of the community. Alongside of this we note the various movements for the betterment of housing and working conditions, the associated rise of the standard of living, better wages and better supplies, and the regulation of working hours, with greater facilities for regulated rest and open-air activity.

Among measures directed particularly towards the maintenance of health should be included the National Health Insurance Act and the medical examination of school children. The health interests of the insured portion of the community were placed more definitely in the hands of the general body of the medical profession, and the child was submitted at an important stage of his development to the trained medical eye of the school officer. With this should be linked the more recent direction of attention to problems of maternity and child welfare. By these several avenues it has been possible to approach and anticipate the beginnings of disease in a way previously impossible.

Those influences—and the brief catalogue might be extended—have tended to increase communal vitality and to limit the tendency to, and the ravages of, disease. They have been the cause of the gratifying drop in the general death rate of the country, urban and rural, and in the mortality rate registrable in special groups and areas. It is impossible to emphasize overmuch the sanitary advantages which have accrued from the establishment throughout the country of a uniform co-ordinated health service composed of highly trained graduates in medicine, under the inspiration of, and responsible to, a

department of the State, which in turn functions and directs in obedience to the demand of enlightened public opinion.

Those wide influences, which have been reflected in the reduction of the general mortality bill of the country, have no less certainly played their part in the decline of tuberculosis mortality. The more the natural history of tuberculosis is comprehended, the more freely will their value be admitted. No serious worker in tuberculosis will fail to give them their proper place.

Specialized Direction of Effort.

None the less, the student of tuberculosis cannot but believe that those general influences would not have brought us to the fortunate position in which we stand to-day, apart from the more definite direction and concentration of effort towards the special problem of tuberculosis. Indeed, this concentration of study with regard to an infection whose blighting properties may be traced

from the cradle to old age has actually impelled many of the advances in hygiene which our generation has witnessed. The tracing of tuberculous infection to the home, and the determination of its early manifestations in the child and of its presence in other contacts, the recognition of prejudicial influences in certain occupations, the revelation by the sanatorium of the marvellous influence of open air and sunlight, have widened the horizon of preventive medicine. The recognition and application of those principles has led to progress in other fields beyond tuberculosis.

In an address urging the establishment of sanatoriums at the first British Congress of Tuberculosis in 1901 I ventured to say:

"It seems to me that we are on the threshold of a still wider development in the application of the open-air principle. In our treatment of disease we want to realize more fully that the action of pure fresh air is directly curative. In the adaptation of the system to other medical conditions there seems to exist the potential of successes comparable to, if not so striking in character as, those obtained in surgery through the adoption of aseptic measures."

Only the other day Professor G. M. Robertson of the Royal Edinburgh Hospital for Mental and Nervous Diseases, in pleading in his annual report for a larger outlook on mental disease, says:

"How comparable is this new psychiatric crusade to the successful campaign against tuberculosis. . . . Forty years ago patients were sent to hospitals with cavities in their lungs and in the last stages of the disease. Arrangements were therefore made to discover the disease at an earlier and more hopeful stage; out-patient clinics and dispensaries were instituted; finally, the family and the home came under review for early and preventive treatment. Let psychiatrists go and do likewise, and may they be as successful."

The forward march of preventive medicine during the past fifty years, in which members of this society have had an honourable place, has led to numerous triumphs. These have been achieved by many means—sometimes by the application of general physiological principles which, in proportion to success in application, negative disease,

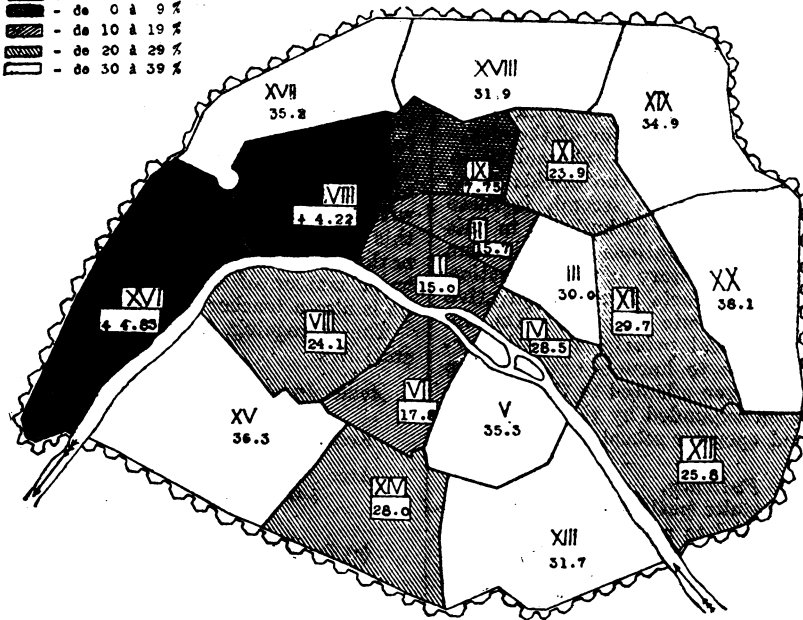
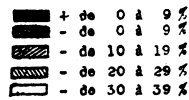


FIG. 3.—Decline of annual mean death rate from pulmonary tuberculosis in the various districts of Paris between the periods 1909-13 and 1919-23.

sometimes by specialized determination of effort towards particular issues. In relation to tuberculosis both lines of approach have tended towards the decline of mortality.

A Tubercle-free Herd.

My view regarding the control of tuberculosis in the human species is in keeping with the lines on which the farmer can establish and maintain a tubercle-free herd. When the Tuberculosis Trust of Scotland resolved to form such a herd procedure took two directions: (1) towards the elimination of infection within and the exclusion of risk of fresh infection from without; (2) towards the maintenance of the herd under completely physiological conditions of environment. The first requirement was met by the institution of careful antituberculosis measures and application of tuberculin tests, and the second by scrupulous regard to air, sunlight, space, nutrition, cleanliness, and the education of farm and dairy hands. Incidentally, it may interest members of the society to know that the young immature stock (prior to milking age) passed the whole of last summer—wet though it was—and the whole of this winter—cold and stormy as it has been—on a hill pasture at an elevation of 800 to 1,000 feet, in the open air, day, and night, without one case of sickness. We began operations five years ago, and for the last three years the entire stock, numbering 109, has stood the rigid tests imposed by the chief veterinary inspector of the city.

In handling the more complex problem of tuberculosis in man, medicine has in view both sides of the shield: first, the limitation (exclusion?) of infection; second, increase of resistance. The tuberculosis scheme, as built up in this country, rests largely on those foundations. On the one hand, every fact in the natural history of the infection comes to have value, along with facts from comparative study of other endemic and epidemic diseases. On the other hand, the great physiological principles which preventive medicine has known how to harness and hitch to her wagon on other roads have been adapted to the problem of tuberculosis, and have been expanded by the convincing lesson of the sanatorium and open-air school.

Scientific Patience.

For the appraisal of results patience is necessary—scientific patience. It is essential to remember that tuberculosis differs from other infective diseases in respect of duration and of clinical expression. It is a disease of a lifetime—it may be from infancy to old age—and its protean manifestations change with the seven ages of man. Assuming that our antituberculosis measures are sound, we cannot expect the entire effects to be registered quickly. The gains can be gradual only, with acceleration of the pace as time goes on. More marked reduction is likely to be evident at certain ages in relation to certain aspects of intensive activity. That is pretty much what we are finding—a postponement of death, a saving of life in childhood and in early adult life.

The Registrar-General for Scotland, Dr. J. C. Dunlop, to whom I am indebted for invaluable co-operation on the statistical side, has drawn my attention to the remarkable fact (Table V) that, out of a total saving of life in Scotland between the ages of 15 and 35 during the year 1921, as compared with 1891 (three-year mean), more than half was due to reduction in mortality from pulmonary tuberculosis.

To me, as a fairly seasoned hand, the outcome appears satisfactory. In so complex a situation it is hazardous to attach rigidly cause to effect. Rather than try to credit the result to this or that particular factor it is, in my opinion, more just and sound to admit that there have been numerous contributory factors. The continuous decline in mortality, the recent acceleration of that rate of decline, and the displacement of tuberculosis from chief place in the list of killing diseases, have been due to a combination of influences and activities which have found practical expression in the tuberculosis schemes of the country. To this it should be added that, when all is said and done from the side of medicine, another factor of governing importance must not be lost sight of—namely, the determination of the nation to face the issue, cost what it may.

THE TREATMENT OF ACUTE APPENDICITIS.*

BY

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In a consideration of the treatment of acute appendicitis it is relevant to point out that the number of deaths from this disease in England and Wales has not diminished during the past fifteen years, yet it is certain that the proportion of favourable cases—that is, the early cases—that are submitted to operation is much higher now than it was fifteen years ago, and also it is fair to assume that the improvement in operative technique during the same period must have helped to reduce the case mortality.

It may be suggested, therefore, that the maintained national mortality rate is due to an increase in the number of cases—an actual increase or an increased recognition of the disease. An examination of the annual statistical reports of the Manchester Royal Infirmary shows a steady and substantial increase in the number of these cases during the last fifteen years, but during the same period at this hospital the case mortality of the disease has fallen to such an extent that the gross number of deaths per annum at the end of the period is much less than it was at the beginning. Thus in the practice of one of the largest general hospitals in the country a steady increase in the number of cases during the past fifteen years synchronizes with a substantial fall in the actual number of deaths from this disease, and, that being the case, the maintained national mortality rate of acute appendicitis ought to be a matter of concern to the surgeon, particularly if he is also a teacher of surgery.

The foregoing remarks are based on the following statistics.

Acute Appendicitis and Perityphlitis in England and Wales.

(From the Registrar-General's Returns.)

Average annual number of deaths per million persons during the four years ending 1914=70.

Average annual number of deaths per million persons during the four years ending 1926=72.

Manchester Royal Infirmary.

(a) In the three years ending 1915 the average annual number of admissions of acute appendicitis = 550, or 5.4 per cent. of the total admissions to hospital.

Average annual number of deaths from acute appendicitis in same years=69.

(b) In the three years ending 1926 the average annual number of admissions of acute appendicitis=830, or 7.6 per cent. of the total admissions to hospital.

Average annual number of deaths from acute appendicitis in same years=48.

POLICY OF IMMEDIATE OPERATION.

An account of the treatment of acute appendicitis cannot ignore the divergence of opinion among surgeons on the policy of immediate operation in all cases irrespective of the duration and pathological development of the disease. Surgeons in this and in all other countries in which appendicitis is prevalent agree in advocating removal of the appendix in all cases in which the disease is still limited to the appendix, before perforation or before the onset of a local or spreading peritonitis, and no one with any experience of abdominal surgery, I think, would venture to criticize this policy. It may be asserted with confidence that there is no more beneficial operation in surgery than the removal of a gangrenous or tightly distended appendix whilst this is still intact. So, too, at the other end of the scale, when a case is seen for the first time late in the course of the disease, and on the one hand there is clearly an abscess, or on the other hand the disease is manifestly subsiding without suppuration, no one would dispute the propriety of operation for evacuation of the abscess in the one or of a policy of masterly inactivity in the other. But it is in between these two stages that the surgeon first encounters the great majority of his cases; in this large group peritoneal infection has taken place which may be localized or diffuse, and even if

* A paper read before the Manchester Surgical Society at December 6th, 1927.