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TUBERCULOSIS IN LONDON IN WARTIME

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In order to assess the effect of war conditions upon the incidence of tuberculosis in London, a review of the notification records was undertaken. The results of such an analysis in respect of an urban area in which conditions immediately before the outbreak of hostilities were stable have helped to throw some light on the problem of controlling tuberculosis, and are recorded here in the hope that they will be of use to other workers in this field.

Pulmonary Tuberculosis

The general trend of pulmonary tuberculosis in London is indicated by Table I, which shows the numbers of formal primary notifications and the numbers of deaths since 1913, together with the corresponding rates.

TABLE I.—Primary Notifications (a) of and Deaths from Pulmonary Tuberculosis in the Administrative County of London

Year	Formal Primary Notifications		Deaths	
	No.	Annual Rate per 1,000 Living	No.	Annual Rate per 1,000 Living
1913	(b) 19,218	4.25	5,863	1.30
1914	(b) 16,467	3.64	6,331	1.40
1915	(b) 14,712	3.26	6,715	1.49
1916	(b) 13,547	3.01	6,364	1.41
1917	(b) 14,870	3.31	6,768	1.51
1918	(b) 15,670	3.50	6,920	1.55
1919	(b) 12,356	2.76	5,197	1.16
1920	9,202	2.06	4,675	1.04
1921-5	38,807	1.71	22,980	1.01
1926-30	34,353	1.53	20,247	0.90
1931-5	29,569	1.38	17,075	0.79
1936	5,176	1.25	2,849	0.69
1937	5,455	1.33	2,888	0.71
1938	5,200	1.28	2,590	0.64
1939	4,691	1.24	2,650 (d)	0.70
1940	4,326	1.32 (c)	2,687 (d)	0.87
1941	4,577	1.78 (c)	2,552 (d)	1.10

(a) Excluding posthumous cases. (b) Not checked for duplicates. (c) Based on the civilian population only—i.e., civil notifications per 1,000 civilians. (d) Excluding non-civilians from Sept. 3, 1939.

It will be seen that the decline in incidence, which had been continuous since the war of 1914-18, was arrested at the beginning of the present war. Although it is not clearly shown by the table, the increase in mortality actually preceded the increase in the rate of occurrence of new cases. The rise in the notification rate was not appreciable until the latter part of 1940; the notification rate for the first half of 1940 was not substantially above the level of the same period in 1938. The impact of war was reflected first in the earlier deaths of those in whom tuberculosis had already developed. It was not until later that the strain of war began to produce a rise in newly diagnosed infections.

The analysis of new cases which was made for the years 1938-41 embraced not only formal primary notifications but also posthumous notifications. The distribution of these new

cases by age and the estimated rates per 1,000 living are shown in Table II.

TABLE II.—New Cases of Pulmonary Tuberculosis in London (A.C.), 1938-41

Age Group	1938		1939		1940 (a)		1941 (a)		Increase in Rate for 1941 compared with 1938 %
	No.	Rate per 1,000	No.	Rate per 1,000	No.	Rate per 1,000	No.	Rate per 1,000	
0-4	105	0.42	76	0.40	60	0.53	104	1.64	290
5-14	228	0.42	161	0.39	103	0.55	198	1.74	314
15-24	1,484		1,353		1,130		1,150		
25-64	3,262		2,917		2,592		2,631		
65+	224	1.52	236	1.43	202	1.42	250	1.89	24
Not stated	2		24		18		24		
Total	5,305	1.31	4,767	1.26	4,105	1.33	4,357	1.87	43

(a) Excluding non-civilians.

It should be stressed that the validity of the rates shown in Table II depends upon the accuracy of population estimates on which they are based, the details of which cannot be adequately set out here owing to restrictions on space, but there is no doubt that the increase in the incidence of respiratory tuberculosis between 1938 and 1941, especially among children, is greater than that which could be attributed to errors in these estimates. Possible changes in the character of the population are dealt with in the discussion at the end of this article.

For comparative purposes the age distribution of deaths during the same period is shown in Table III.

TABLE III.—Deaths from Pulmonary Tuberculosis in London (A.C.), 1938-41 (see note d, Table I)

Age Group	1938		1939		1940		1941		Increase in Rate for 1941 compared with 1938 %
	No.	Rate per 1,000	No.	Rate per 1,000	No.	Rate per 1,000	No.	Rate per 1,000	
0-4	30	0.12	15	0.08	22	0.19	41	0.65	442
5-14	25	0.05	16	0.04	24	0.13	25	0.22	340
15-24	459		447		454		432		
25-64	1,863	0.77	1,922	0.83	1,965	0.95	1,827	1.16	51
65+	213		250		222		227		
Total	2,590	0.64	2,650	0.70	2,687	0.87	2,552	1.10	72

The sex distribution of new cases of pulmonary tuberculosis, 1938-41, is shown in Table IV.

For the purpose of Table IV non-civilians have been included in order that the sex proportions in the total populations to which the new cases are related can be regarded as comparatively stable. If non-civilians were excluded account would have to be taken of the different effect on the male and female civil populations of the calling up of Service personnel. It should be borne in mind, however, that the very fact that recruitment during the period under review has affected males

TABLE IV.—*New Cases of Pulmonary Tuberculosis in London (A.C.), 1938-41 (including Non-Civilians)*

Year	0-14			15-24			25-64			65 +			Age Group Total (a)		
	M	F	M/F	M	F	M/F	M	F	M/F	M	F	M/F	M	F	M/F
1938	173	160	1.08	661	823	0.80	2,133	1,129	1.89	152	72	2.11	3,121	2,184	1.43
1939	111	126	0.88	654	699	0.94	1,913	1,004	1.91	170	66	2.58	2,868	1,899	1.51
1940	70	93	0.75	573	669	0.86	1,835	898	2.04	152	50	3.04	2,638	1,720	1.53
1941	164	138	1.19	621	722	0.86	2,001	880	2.27	188	64	2.94	2,987	1,815	1.65

(a) Including cases in which the age is not known.

more than females implies that the search for new cases has been more intense among males than among females; this tends to produce a fictitious increase in the male-to-female ratio of new cases of respiratory tuberculosis.

When these considerations are taken into account it does not appear possible to draw from Table IV any sound conclusions as to the effect of the war upon the relative incidence of pulmonary tuberculosis among men and women respectively in the important 15-24 age group. At older ages it does appear clear that males have been more affected than females (as in the case of non-pulmonary tuberculosis, see Table VIII). With regard to ages under 15, the irregularity in the sex ratios is not greater than that which has been experienced in past years and which might be expected having regard to the small numbers involved.

In the absence of precise information as to the sex components of the population of London it is not possible to carry the sex incidence analysis any further.

Non-pulmonary Tuberculosis

With regard to non-pulmonary tuberculosis, the background is given by the following figures, which tell the same story as does Table I for pulmonary tuberculosis.

TABLE V.—*Primary Notifications (a) of and Deaths from Non-pulmonary Tuberculosis in the Administrative County of London*

Year	Formal Primary Notifications		Deaths	
	No.	Annual Rate per 1,000 Living	No.	Annual Rate per 1,000 Living
1913	(b) 6,436	1.42	1,611	0.36
1914	(b) 3,862	0.85	1,666	0.37
1915	(b) 3,949	0.88	1,841	0.41
1916	(b) 4,084	0.91	1,641	0.36
1917	(b) 3,864	0.86	1,715	0.38
1918	(b) 3,517	0.79	1,526	0.34
1919	(b) 3,231	0.72	1,127	0.25
1920	2,461	0.55	1,070	0.24
1921-5	10,881	0.48	4,383	0.19
1926-30	8,971	0.40	3,080	0.14
1931-5	6,322	0.29	2,354	0.11
1936	1,056	0.26	363	0.09
1937	1,014	0.25	351	0.09
1938	982	0.24	347	0.09
1939	805	0.21	302 (d)	0.08
1940	653	0.20 (c)	318 (d)	0.10
1941	675	0.27 (c)	343 (d)	0.15

(a) Excluding posthumous cases. (b) Not checked for duplicates. (c) Based on the civil population only—i.e., civil notifications per 1,000 civilians. (d) Excluding non-civilians from Sept. 3, 1939.

The age distribution of the new cases which have occurred since the beginning of the war is shown in Table VI, from which it is clear that the comparatively small rise in the notification rate for the population as a whole conceals very large

increases in the rates for the younger age groups. These increases are much in excess of any variations attributable to margins of error in the estimation of basic populations.

TABLE VI.—*New Cases of Non-pulmonary Tuberculosis in London (A.C.), 1938-41*

Age Group	1938		1939		1940 (a)		1941 (a)		Increase in Rate for 1941 compared with 1938 %
	No.	Rate per 1,000	No.	Rate per 1,000	No.	Rate per 1,000	No.	Rate per 1,000	
0-2	87	0.55	71	0.58	52	0.76	84	2.21	302
3-4	55	0.61	41	0.59	44	0.98	45	1.77	190
5-14	253	0.47	200	0.48	146	0.78	148	1.30	177
15-24	272		217		162		172		
25-64	346		302		249		211		
65+	40	0.20	26	0.17	24	0.16	40	0.20	—
Not known	—		2		4		4		
Total	1,053	0.26	859	0.23	681	0.22	704	0.30	15

(a) Excluding non-civilians.

The death rates (per 1,000) from non-pulmonary tuberculosis in the same four years among children under 15 years of age were: 0.19, 0.17, 0.35, and 0.87 respectively—a progression which is in substantial agreement with the trend of new cases.

The distribution of new cases according to the site of the tuberculous lesion is shown in Table VII for both children and adults. The variations in the rates for the different sites are in the case of adults relatively small when normal yearly fluctuations are taken into account, except possibly in the case of meningitis. In respect of children, however, the changes in the rates are substantial. When all bones and joints are combined, the percentage increases in the rates for each site over the period 1938-41 are: all bones and joints, 184; abdomen, 141; peripheral glands, 215; meninges, 250; other sites, 269. Having regard to chance fluctuations, the difference between these percentages does not appear to be statistically significant, except in the case of tuberculosis of the abdomen, in which the increase seems to be significantly lower than for other sites.

As an indication that 1938 is a satisfactory base year for the purpose of Table VII, the average site distribution of deaths from non-pulmonary tuberculosis during the immediate pre-war years is given below.

Percentage Distribution of Deaths from Non-pulmonary Tuberculosis in London (A.C.), 1931-8

Year	Bones and Joints	Intestines and Peritoneum	Central Nervous System	Other	Total
1931-8	15	10	41	34	100
1938	12	9	42	37	100

TABLE VII.—*New Cases (a) of Non-pulmonary Tuberculosis in London (A.C.), 1938-41: Distribution according to Site. Rates per 1,000 Living are shown in Parenthesis against the Numbers of Cases*

Age Group	Year	Site of Tuberculous Lesion								Total
		Spine	Hip	Knee	Other Bones and Joints	Abdomen	Peripheral Glands	Meninges	Other Sites (b)	
1. Under 15 years of age	1938	23 (0.029)	28 (0.035)	19 (0.024)	29 (0.037)	43 (0.054)	123 (0.156)	89 (0.113)	41 (0.052)	395 (0.501)
	1939	26 (0.043)	22 (0.036)	20 (0.033)	27 (0.044)	23 (0.038)	113 (0.186)	55 (0.091)	26 (0.043)	312 (0.514)
	1940	12 (0.040)	23 (0.077)	9 (0.030)	19 (0.064)	11 (0.037)	91 (0.304)	62 (0.207)	15 (0.050)	242 (0.809)
	1941	11 (0.062)	19 (0.107)	11 (0.062)	22 (0.124)	23 (0.130)	87 (0.491)	70 (0.396)	34 (0.192)	277 (1.564)
Increase in rate 1938-41 (%)		114	206	158	235	141	215	250	269	212
2. Over 15 years of age	1938	91 (0.028)	28 (0.009)	27 (0.008)	44 (0.013)	84 (0.026)	141 (0.043)	45 (0.014)	198 (0.060)	658 (0.201)
	1939	63 (0.020)	34 (0.011)	22 (0.007)	56 (0.017)	52 (0.016)	136 (0.043)	40 (0.013)	144 (0.045)	547 (0.172)
	(c) 1940	50 (0.018)	35 (0.013)	21 (0.008)	45 (0.016)	37 (0.013)	88 (0.032)	39 (0.014)	124 (0.044)	439 (0.158)
	(c) 1941	44 (0.020)	23 (0.011)	14 (0.007)	46 (0.021)	63 (0.029)	85 (0.040)	40 (0.019)	112 (0.052)	427 (0.199)
Increase in rate 1938-41 (%)		-29	22	-13	62	12	-7	36	-13	-1

(a) Primary notifications, including posthumous cases. (b) Includes military and genito-urinary. (c) Excluding non-civilians.

TABLE VIII.—*New Cases of Non-pulmonary Tuberculosis in London (A.C.), 1938-41 (including Non-civilians)*

Year	0-14			15-24			25-64			65+			Age Group Total (a)		
	M	F	M/F	M	F	M/F	M	F	M/F	M	F	M/F	M	F	M/F
1938	223	172	1.30	144	128	1.13	154	192	0.80	12	28	0.43	533	520	1.03
1939	165	147	1.12	107	110	0.97	142	160	0.89	14	12	1.17	428	431	0.99
1940	117	125	0.94	80	94	0.85	142	120	1.18	10	14	0.71	353	353	1.00
1941	141	136	1.04	87	111	0.78	116	113	1.03	14	26	0.54	360	388	0.93

(a) Including cases in which the age is not known.

The sex distribution of new cases is shown in Table VIII, in which non-civilians have been included for reasons that have already been stated. The trend of the sex ratios indicates that at ages below 25, and particularly in the 15-24 age group, females have been more affected than males by the increased incidence. At the older ages it appears that males have been more affected than females.

Discussion

The experience of London, judged by the foregoing statistics, has been less favourable than in the country as a whole. Brief, and in some cases necessarily approximate, figures for England and Wales are given in Table IX.

TABLE IX.—*Tuberculosis Notification and Mortality Rates per 1,000 in England and Wales*

Year	Formal Notifications per 1,000		Deaths per 1,000 (b)	
	Pulmonary	Non-pulmonary	Pulmonary	Non-pulmonary
1938	0.92	0.31	0.53	0.10
1939	0.84	0.27	0.54	0.10
1940	0.87 (a)	0.25 (a)	0.59	0.11
1941	0.95 (a)	0.28 (a)	0.60	0.13
Increase 1938-41 (%)	3	-10	13	30

(a) Approximately, based on mid-1939 total population. (b) Excluding non-civilian deaths after Sept. 3, 1939.

Possible causes of this divergence are easier to suggest than to measure. Evacuation has probably had a selective effect upon the population. Some children who were ailing may have been kept back by their parents, and those who subsequent to evacuation showed signs of deterioration in health would probably have returned very soon. Among children actually attending school it has to be admitted that there is little evidence to support this suggestion in the clinical results of routine medical examinations carried out by school medical officers; the increased incidence of tuberculosis, particularly of the non-pulmonary form, was, however, greater in children of pre-school age, and many of the new cases among older children would not have attended school for some time prior to notification and would have missed routine examination. A probable effect of evacuation has been to increase the proportion of tuberculous persons in the population remaining. It would be expected that as they were ill they did not desire to leave home, and for the same reason (in many cases, also, their economic status would be low) it would be more difficult for them to find homes in reception areas. Inquiries made of representative boroughs reveal that at Dec. 31, 1940, the following proportions of persons on the Dispensary Register were actually living within their respective boroughs: Finsbury, 94.5%; Islington, approximately 90%; Stepney, about 75%; Greenwich, 92%; Paddington, 73%. The balance are those who had evacuated themselves temporarily. There is reason to believe that these proportions are higher than that which the total population at that date bore to the pre-war population.

The statistics must also reflect to some extent the progressive recruitment of fit persons to the Forces. This selection also has the effect of increasing the proportion "unfit" in the residual population. On the other hand, recruiting boards have discovered some cases of active tuberculosis which otherwise would not have been diagnosed until the disease became more advanced.

Account must be taken of the aerial bombardment of 1940-1, with its concomitant physical and psychological strain and temporary overcrowding. It would be interesting to compare

the experience of London with that of other much-bombed towns, but the necessary statistics are not available to us.

Part of the increases in the numbers of notifications of and deaths from tuberculosis can be attributed to reduced resistance to the disease and increased numbers of new cases diagnosed among Londoners who are patients in mental hospitals. The increase in the rate of occurrence of new cases among mental patients between 1938 and 1941 amounted to 0.12 per 1,000 of the total population of the County of London, and therefore, out of the rise of 43% in incidence, 9% is attributable to increased notifications in respect of mental patients. The increase, as such, has, however, been exaggerated by the fact that during 1941 more extensive measures of diagnosis were instituted in the mental hospitals and that therefore some of the notifications in 1941 related to patients who had been tuberculous for some time. With regard to mortality there is evidence that the proportion of all deaths of mental patients which are associated with active tubercle appears to have risen. An investigation is being made to ascertain the extent of increased incidence of tuberculosis in mental hospitals.

Finally there is the important factor of increased employment. Since Dunkirk there has been no respite from the heavy demands of war industry. Hours of work have been long. Travelling conditions have often been bad. Moreover, in wartime many less healthy persons obtain employment who would not in peacetime successfully compete in the labour market. Many have taken up heavier types of employment; this, in the case of infected persons, might make all the difference between the quiescence and development of the disease. Generally, in considering the balance between input and output of energy of the human body it is possible that the prominence given to measures for improving nutrition has distracted attention from the output side of the equation.

The statistics of non-pulmonary tuberculosis throw light on the type of infection and on the efficacy of the sterilization or pasteurization of milk as a means of reducing the risk of infection. Most of the milk consumed in the Metropolis is pasteurized, and therefore the fact that abdominal infections have not increased in proportion to infections at other sites is of special significance. The disproportionate rise in non-abdominal infections indicates that while pasteurization has held back the spread of bovine infections the principal infecting source is human. In this respect the experience of Glasgow (*British Medical Journal*, 1941, 2, 436) is similar.

The experience of London differs from that of Glasgow in two important respects: (1) The increase in the incidence of tuberculosis is greater in respect of children than in respect of adults; and (2) new cases of pulmonary tuberculosis increased more in adults than new cases of non-pulmonary disease. This fact, coupled with the evidence of site distribution for non-pulmonary forms of disease in children, suggests that contact and droplet infection has been an important feature in London. It is difficult to assess the relative importance of decreased resistance to new or old-standing infections.

Summary

The effect of the conditions of war upon the trend of tuberculosis incidence in a densely populated and much-bombed urban area has been examined. The principal findings are:

1. As compared with 1938, there was in 1941 an increase of 43% in the rate of occurrence of new cases of pulmonary tuberculosis and of 15% in new cases of non-pulmonary tuberculosis. The pulmonary tuberculosis death rate increased over the same period by 72% and the non-pulmonary rate by 67%. These increases are much greater than for England and Wales as a whole.

2. The increase in the incidence of tuberculosis affected children much more than adults, particularly in the non-

pulmonary type, in which the increase was practically confined to the "under-fifteens" (except the increase of tuberculous meningitis, which extended to adult ages).

3. At ages over 25 males have been more affected than females. Below 25 it appears that, with the non-pulmonary type, females have been more affected than males, but with pulmonary tuberculosis at these younger ages there is no conclusive evidence that one sex has been more affected than the other.

4. The increase in non-pulmonary tuberculosis has occurred almost equally in all the principal sites, except in abdominal tuberculosis, in which the increase was significantly lower.

5. New cases of pulmonary tuberculosis increased more in adults than new cases of the non-pulmonary disease. This fact, coupled with the evidence of site distribution for non-pulmonary forms in children, suggests that contact and droplet infection has been an important feature in London.

6. There is evidence both that pasteurization of milk has held back the spread of bovine infections and that the principal infecting source is human.

7. Factors influencing the incidence of tuberculosis include changes in the age and sex distribution of the population as a result of evacuation and of recruitment to the Forces, the strain and overcrowding resulting from bombing, fatigue and lack of rest, restriction of diet, and, on the other hand, increased employment and financial resources for those formerly on the verge of poverty. In mental hospitals the increased incidence is greater than in the population as a whole.

WARTIME DERMATOLOGY WITH A PLEA FOR ECONOMY

BY

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The treatment of diseases of the skin in peacetime is considered of little importance and of no urgency, as the sufferers are said never to be cured nor yet to die. In recent years, however, treatment has advanced considerably and so have teaching and hospital facilities. Only when the whole of the available working power of the country is mobilized is the crippling effect of diseases of the skin fully realized, and their treatment assumes added importance in wartime medicine (Vickers, 1940).

In the Services it was soon found that many man-hours could be lost through trivial skin complaints. At sea about 50% of the daily attendances at the sick bay are for skin complaints. This takes up time and space and medical stores, of which only a limited stock can be carried. Scabies has become rife in the large centres of population, and as a result its prevalence has increased in the Navy. Recent experience of dermatology in the Naval Medical Service has brought several facts forcibly to my attention, and these are expressed in the following notes.

Material

The survey covers a period of two and a half years, which began one month before the opening of hostilities. This period falls naturally into three parts—namely, six months at sea, eighteen months ashore, and a second period of six months at sea.

The first part is the experience of six months afloat in cold or extremely cold conditions with a personnel of approximately 500 men. During this time there was little contact with centres of population, and the food was good, with a reasonable amount of fresh fruit and vegetables. The accommodation was crowded and the hours of darkness long, but the general health remained good. The second part is the experience of the skin department of a large naval hospital at home. Here there was accommodation for 28 in-patients, and out-patients were seen by consultation. The cases were drawn from all three Services in the area and the ships based on the port. A small number of foreign invalids were received. The third part is the experience of six months afloat in tropical conditions with a personnel of approximately 1,600 men. Little contact was made with centres of population, and fresh food was inter-

mittently available. The accommodation was satisfactory and the period of daylight 12 hours. The general health was also satisfactory.

Circumstances peculiar to the Service are found to be on both the credit and the debit side. The discipline enables the medical officer to obtain greater control over treatment, but the exigencies of the Service may interfere with it. The population is entirely male afloat, and largely so ashore, while children are not included. The standard of physical fitness is above the average of the general population. The nursing facilities are limited. The number of attendants is small, and their training is short judged by civil nursing standards. Accommodation is limited, and isolation difficult except in the hospitals. At sea, facilities for dispensing are often poor and replacement of medical stores is difficult; rapid changes in climatic conditions are encountered, and the laundry is often overtaxed. Ashore, the personnel are apt to move from one area to another without warning.

Restrictions imposed by War Conditions.—Economy in all things is of paramount importance in wartime. Loss of man-hours is a matter for grave concern, and those affected with skin lesions must continue their normal work wherever possible. If it is necessary to take a patient off work his sick period must be kept to a minimum. Economy in various drugs is an essential part of the national economy, and where an alternative exists the inferior drug may have to be employed in the national interest. Where alternative treatments are possible, that which combines effectiveness with economy should be chosen without regard for the personal experience or preference of the medical officer or patient. The nursing staff is relatively reduced in number and the training period for probationers is shortened. The standard of physical fitness is lower than in peacetime. The necessity for black-out, with impaired ventilation and the wearing of gas masks, must have a deleterious effect on skin conditions.

The Cases

First Part.—During this period few skin cases were encountered. These consisted of a number of cases of impetigo and scabies and several cases of dermatitis of the hands, apparently due to change from civil to Service occupation.

Second Part.—During this period 1,149 cases were seen—652 as in-patients and 497 in consultation. There were a large variety of conditions, but only the more common ones are shown in Table I.

TABLE I

Disease	In-patient	Out-patient	Total
Dermatitis from all causes ..	31.6%	30.7%	31%
Seborrhoeic dermatitis ..	8.5%	8%	8%
Occupational dermatitis ..	4%	7.6%	5.8%
Dermatitis medicamentosa ..	3.7%	1.5%	3%
Scabies ..	27%	9%	18%
Impetigo ..	16%	4%	10%
Mycosis*	8%	9%	8.4%

* Including tinea pedis, tinea cruris, and tinea circinata.

Third Part.—During this period 349 cases were treated. As these cases were seen afloat, they were kept under observation up till the time of writing—i.e., two months after the end of the period. Only those conditions with an incidence of over 5% are shown. They were: mycosis, 56%; scabies, 15%; miliaria rubra, 13.5%; and impetigo, 8%.

Treatment

Four conditions make up 67.4% of the cases in Part 2, and four conditions make up 92.5% in Part 3. Three conditions are common to both—namely, scabies, impetigo, and mycosis—the remaining two being dermatitis from all causes and miliaria rubra. Briefly, the treatment used in those five conditions was as follows:

Scabies.—During Part 2 an emulsion of benzyl benzoate was employed. The formula and procedure for this emulsion were described in a previous paper (Carslaw and Swenarton, 1941). In Part 3 this emulsion was unobtainable, in the early months sulphur ointment (B.P.) being used, and later the benzyl benzoate mixture with soft soap and spirit. A course of treatment in each case consisted of three applications in three days, with a hot bath before treatment. Disinfestation of all clothing