

ON SOME CHARACTERS ASSOCIATED

with

CASES OF HEART DISEASE

in the

PUBLIC ELEMENTARY SCHOOLS OF LONDON.

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ON SOME CHARACTERS ASSOCIATED WITH CASES OF HEART
DISEASES IN THE PUBLIC ELEMENTARY SCHOOLS OF LONDON.

Heart disease is one of the most important of the crippling defects which affect children in that the very continuance of life, as well as of economic efficiency, is at stake, while the symptoms may be so slight that for a long period no advice is sought. Clinical and administrative problems connected with heart disease in children constantly present themselves to all members of the school medical service. At one time it is necessary to decide whether a child may remain in an ordinary school or whether it would be better for him to be transferred to an invalid school to secure additional care in school hours, ~~the~~ advantages being an easier curriculum, light handwork during half the school day, opportunities for prolonged rest, if desired, in the recumbent position, and taking to and from home in an ambulance thus minimising the risk of exposure. These advantages, however, are largely thrown away if, on its return home, the child is allowed to go out to play without regard to the state of the weather or is given unsuitable domestic work to perform. At another time it is a case of advising

the parent as to the suitability of a child for certain work and, if the child is in an invalid school, of certifying to the managers when the child applies for exemption whether the work proposed is or is not suitable. Again, questions may arise as to the length of time a child should be away from school after suffering from one or other of the various forms of rheumatism. Finally, there is the general interest in the aetiology and prevention of heart disease. By some it has been thought that heart disease was more common among children of (the) school age than was formerly the case and that this increase was associated with an increase in chorea, itself, in turn, the direct result of school pressure. It seemed, therefore, that a summary of the conditions revealed by medical inspection under the varied conditions of a large city would prove of interest, even if it failed to establish the predominant influence of any one set of factors susceptible of immediate removal by medical or economic measures.

The aim has been to determine the extent to which heart disease prevails among the population of school age and to note some of the associated factors of heredity and environment, so far as could be done in the brief period allowed for a medical inspection. The materials available are of three kinds, corresponding, in the main, with three grades of severity of heart affection. The records of the routine inspection in the ordinary schools give information as to the frequency of the milder cases; those which had given rise to no

notable symptoms and so which had remained undetected, or those in which ^{cardiac} compensation was adequate and there was no reason for the exclusion of the child on the grounds of health.

The records of the routine inspection contain, as a rule, only one or two entries with regard to each child, and in cases in which the parent did not attend at the medical inspection the information with regard to the previous history is very incomplete.

The notes were taken directly from the inspection cards of the minority of cases in which individual attention had been possible, and from the summary cards used for each department in the cases in which the data obtained by the different school doctors has been utilised en masse. As some 301,000 children in some 1,640 departments of the ordinary elementary schools were inspected by the medical staff, it is clear that if a picture of the conditions in the whole county area is to be presented use must be made of the observations of all.

Far smaller in numbers, but more valuable owing to the more detailed information contained, are the records of the children suffering from heart disease and allied conditions who attended the invalid schools (P.D. schools) established under the Elementary Education (Defective and Epileptic Children) Act 1899. Children in these schools are seen

by the school doctor at least once in every nine months and oftener if any necessity arises; the parents almost invariably attend at the admission examinations, and in any case the school nurse visits the home regularly, when fetching or returning the child in the ambulance. As a consequence the notes on the medical condition ^{of the patient} and the hygienic and social conditions of the home are proportionately more complete. A third line of evidence is the certificates furnished with regard to children who are absent from school. This gives some information with regard to the more serious cases but has the disadvantage of being incomplete, since the methods by which attendance officers record certificates and the extent to which they are demanded vary somewhat from one area to another. The difference in procedure though insufficient to affect the general scheme of school attendance prevents accurate comparisons of the frequency of special ailments. The data from this source may be summarised ⁱⁿ (to) a statement that heart disease, or recurrent rheumatism with some suspicion of cardiac involvement, is given as an explanation of some 10% of the cases of absence from school for periods extending beyond 2 months. The maximum frequency would appear to be in the areas of Southwark, Chelsea, and Wandsworth.

In the case of the ordinary schools it has only been possible to indicate the distribution of cases as a percen-

tage frequency of the total number examined. These percentages have been shown in map form for comparison with similar maps of other factors. In the case of (the) children in the invalid schools the smaller numbers made it possible to ascertain the address of each child at the time it was thought to have acquired the illness and so to make a spot map of actual cases for comparison with various social and physical data. The distribution is not regular but in groups, and it may be well to explain at once that this is not due to any peculiarity in the distribution of the 33 special schools. There are from two to five ambulances or omnibuses in connection with each invalid school, and many take two or three rounds morning and afternoon, so that the whole county area receives adequate provision.

The observations may be divided into two main categories, clinical and demographic.

Clinical Notes.

In the detailed medical examinations during the year 1911, 4679 children out of a total number of 204,113 or 2.29% presented physical signs pointing to cardiac affection. Of these, 19,250 children including 598 with evidence of heart disease had been presented to the school doctors as special cases on account of suspected ill-health and not because they were of the age groups inspected as a matter of routine. These cases could not be included in a random

sample. The remainder constituted a sample, made up of the children coming to school for the first time, of those aged 8-9 and 12-13 and presented evidence of cardiac affection in 2.2% of their number. The summary cards distinguished between evident valvular lesions and other cardiac defects but did not allow of an enumeration of the individual valves affected, for which reference would have to be made to the original cards scattered throughout all the schools. The distribution in age groups was as follows;-

Group.	Valvular No.	Lesions %	Other No.	Lesions %	Total No. examined.
Infant entrants	387	.9	377	.9	40880.
Boys. 8-9	381	1.0	322	.9	36499.
" 12-13.	483	1.3	332	.9	36954.
Girls. 8-9	423	1.2	376	1.1	34964.
" 12-13	572	1.6	439	1.2	35565.

This shews a greater frequency at the higher age and among girls than boys, which corresponds with the data available with regard to rheumatism and chorea. More detailed data have only been obtained from the areas where the original cards were abstracted.

	Total No.	Heart Cases.	Rheumatism.	Chorea.
Boys	3718	40	97	23
Girls	4368	54	108	41

The proportional distribution of rheumatic manifes-

tations between the sexes varies somewhat from that found by hospital observers e.g, Dr. Poynton.

	Rheumatism.		Chorea.	
	School.	Hospital.	School.	Hospital.
	%	%	%	%
Boys.	47.3	36.2	36	28.9
Girls.	52.7	63.8	64	71.1

The difference between the two sets of figures is perhaps to be explained by the school cases being of a milder degree, the children and their parents scarcely regarding themselves as ill, while it may well be that a greater degree of discomfort is needed to urge a boy to go, or to lead to his being taken, to hospital. In the cases of heart disease the previous history was as follows;-

	Boys.	Girls.
	%	%
No history of rheumatism or chorea.	35.0	48.2
History of rheumatism	20.0	16.8
History of rheumatism and chorea	-	3.7
History of chorea only.	2.5	2.0
Uncertain history	42.5	29.3

The number of cases in which only a vague history of previous rheumatic manifestations could be obtained is largely due to the number of cases in which the parents did not attend the medical examination and to those in whose case a far longer period than is usually available is required if any in-

formation of real interest is to be extracted.

In some 3,000 children an attempt was made to estimate the frequency of different types of rheumatic affection.

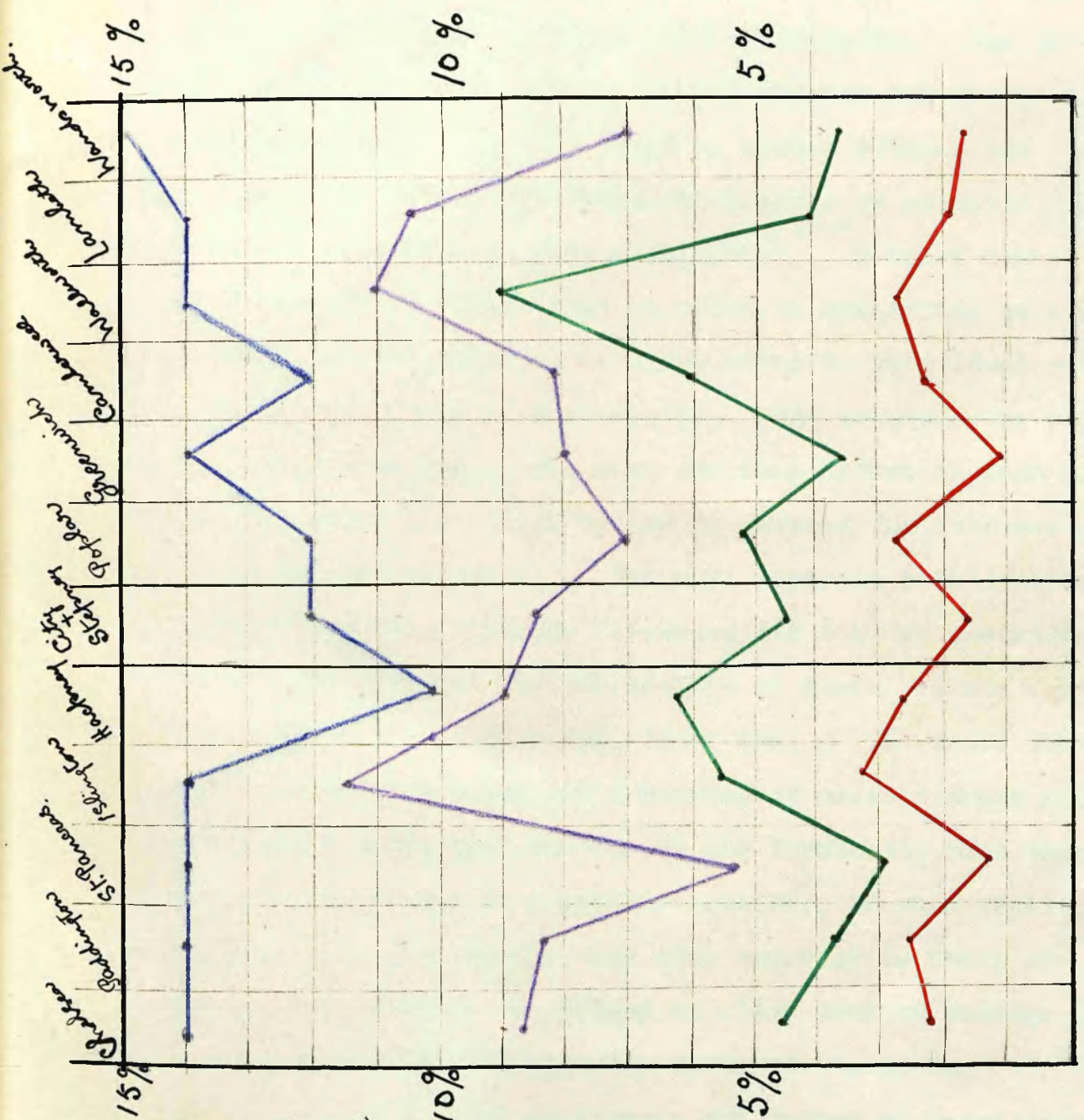
Type.	%.	% of rheumatic cases only.
Rheumatic fever.	1.6	31.6
Chorea	.7	13.5
Tonsillitis.	1.2	24.1
Growing pains	1.4	26.3
Valvular heart disease	4.9	55.7
Other heart signs.	1.6	30.8

In this connection the fact that the cases noted with heart disease had previously, in most cases, had some other manifestation of rheumatism must not be overlooked.

The evidence as to family history was of interest.

No rheumatic history in	36.9%
Rheumatism of the mother in	29.4%
" " " father "	13.6%
" " " brothers or sisters in	19.6%

In studying the associated conditions reliance has to be placed on comparisons of defects district by district, since the number of heart cases in which individual information was available was too small to utilise. The summary cards enabled the relative frequency of various groups of defect to be determined for each sex and age period. The series actually chosen comprised the state as to cleanliness,



Percentage of Defects Boys aged 12-13.

Teeth
Tonsils
Adenoids
Heart Defects

clothing and nutrition, the state of the teeth, the presence of enlarged tonsils and the presence of adenoids. The observation of individual cases of heart disease had led to the conclusion that the relation would be closer between the frequencies of disease and unhealthy tonsils or adenoids than between disease and mere enlargement. ^{of tonsils} A brief experience of the cards shewed that it would be impossible to extract this information with accuracy owing to individual variations in the manner of description. The accompanying diagrams shew the frequency per cent for each defect in each of the twelve areas into which London is divided for purposes of educational administration. The most apparent relationship is between the heart disease frequency and that of adenoids, the least that between the frequencies of heart disease and of bad teeth. It will be seen later that on the whole there is a relationship between the frequency of heart disease and poor economic conditions whereas it has frequently been shown that the teeth of the very poorest children, to whom sweets and sugar are a rare luxury, are much superior to those of children whose parents can afford to allow them to indulge in sweets and other soft fermentable carbohydrate foods.

Another method of estimating the degree of relationship between the various features is to arrange the districts in order of rank for each feature and determine the co-efficient of association by Spearman's method. This is a rough pro-

Percentages
of Boys
aged 12-13.

defective
regarding

Clothing

Cleanliness 10%

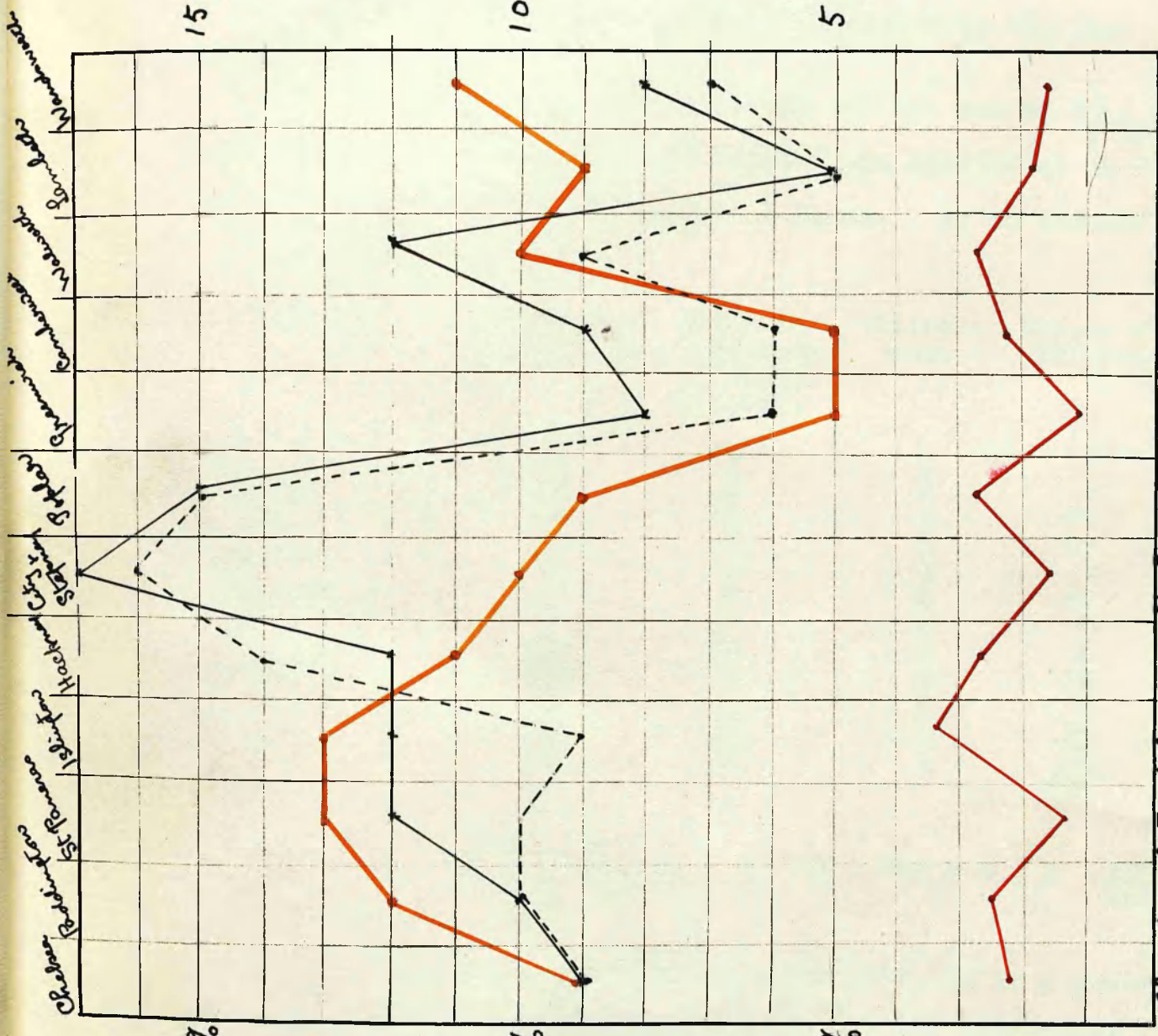
Nutrition

Heart
defects

15%

10%

5%



Chi. Red. St. P. Isl. Hoc. City St. Pop. Green. Camb. Wal. Land. Wand.

cedure but serves to indicate the probable value of further research.

The co-efficient of association is obtained by the formula $p = \frac{1}{N} \sqrt{\frac{S(n'_1 - n''_1)^2}{N^2 - 1}}$ where S stands for the sum of $\frac{(n'_1 - n''_1)^2}{1 - 2}$ the squares of the differences in rank of the individual in two categories n'_1 & n''_1 N. for the number of ranks. As an example the following may be taken;-

District.	Order in cleanliness.	Order in frequency of heart disease.	Difference.	Square of difference.
Chelsea.	8	7	1	1
Paddington.	4	6	2	4
St. Pancras.	5	11	6	36
Islington.	7	1	6	36
Hackney.	3	4	1	1
City & Stepney.	1	9	8	64
Poplar.	2	2	-	-
Greenwich	11	12	1	1
Camberwell	10	5	5	25
Walworth	6	3	3	9
Lambeth	12	8	4	16
Wandsworth	9	10	1	1
				<u>195</u>

$$N = 12 ; N^2 - 1 = 143 \therefore \frac{N \cdot N^2 - 1}{6} = 2 \cdot 143 = 286 \therefore P = 1 - \frac{195}{286} = 1 - .68 = .32.$$

This indicates an association value of †. 32 in a scale which ranges from † 1 through zero to - 1. The importance of a correlation depends in some measure on the value considerably exceeding that of its probable error.

$$\text{The P.E. of } \rho = .6745 \times \frac{1 - \rho^2}{\sqrt{N}} \cdot (1 + .086\rho^2 + .013\rho^4)$$

Value of co-efficient of association

Between frequency of heart disease &	Boys.		Girls.	
	8-9	12-13	8-9	12-13.
Condition of clothing	.19 \pm .18	.36 \pm .16	.59 \pm .13	.43 \pm .16
Cleanliness	.19 \pm .18	.32 \pm .18	.20 \pm .18	.20 \pm .18
Nutrition	.04 \pm .19	.23 \pm .18	.42 \pm .16	.64 \pm .09
Bad teeth	.37 \pm .17	.25 \pm .18	.30 \pm .18	.16 \pm .19
Adenoids.	.76 \pm .08	.73 \pm .09	.63 \pm .12	.56 \pm .13
Enlarged tonsils	.37 \pm .17	.53 \pm .14	.43 \pm .16	.47 \pm .15

This shows a definite and significant relationship between heart disease and the presence of enlarged tonsils or adenoids in either sex and between heart disease and the state of nutrition and perhaps the condition of the clothing in the case of the girls. Whereas the condition of the heart and of the teeth in older children or of cleanliness are nearly independent variables.

It might be suggested that the frequency of various defects may depend in part on the personal equation of the medical officer conducting the examination. This must be nearly excluded in this case since in each administrative area the children in the schools were examined by at least three and sometimes more doctors.

Some of the childrens' habits such as staying out

late at night in all weathers and sitting about or going to bed in damp clothes when they do go home, are probably associated with the prevalence of heart disease and constitute the chief features in which a very poor district differs from one of a slightly better social status. In the poor areas the children have only the streets to play in, whereas, when slightly better off they may be kept at home and too much indoors, and develop into weaklings in the opposite direction. With less direct exposure to damp they often get sore throats, enlarged glands, and unhealthy tonsils and adenoids.

The cases in the Special Schools are far fewer in number, but richer in interest owing to the greater facilities for examination and re-examination, the history being continuous for considerable periods. The visits of the nurse to the home allows of a further appraisal of the surroundings in relation to both aetiology and treatment. Details have been collected with regard to 1172 children who had attended invalid (P.D.) schools within the past three years having been admitted with a provisional diagnosis of heart disease. The subsequent diagnosis was as follows.

No evidence of cardiac lesion but evidence
of one or more attacks of chorea. : : 157

Carried forward 157

	Brought forward	157
Lesions regarded as cardiac but non-valvular.		152
Congenital Heart Disease		118
Acquired valvular lesions		744
comprising		
Mitral Stenosis	26	
Mitral Incompetence	536	
Double Mitral	108	
Aortic and Mitral	41	
Aortic Incompetence	28	
Aortic Stenosis	4	
		<u>1171</u>

The dominant cardiac lesion is thus seen to be mitral incompetence though experience with some of the scholars who pass on to Trade Schools, and with some who have presented indefinite signs after suspicious febrile attacks as pupil teachers but later as training college students have presented definite signs, points to many cases of mitral stenosis becoming manifest only after an interval.

Children suffering from heart disease are only deemed suitable for the special schools if compensation has been but recently established or if there is a risk of recurrent attacks of illness leading to further damage. Fully compensated cases with no recent rheumatic history and in a condition to continue their ordinary occupations are not admitted. Such children are fairly comparable with many who attend the out-patient departments.

Since children are comparatively rarely admitted to

the Special Schools after the age of twelve, the comparison with the Childrens Hospitals should be even closer. In 500 cases Dr. Poynton obtained the following percentages,

Aortic Stenosis	.5	as contrasted with .5 in the school cases
Aortic Incompetence	4.4	3.8
Mitral Stenosis	10.0	3.5
Mitral Incompetence	-	72.2
Double Mitral	-	14.6
Mitral & Aortic	-	5.5

In 150 fatal cases Dr. Poynton gives the distribution of valvular affection ; Mitral alone 98.

Mitral & Tricuspid	32.
Mitral and Aortic	15.
All valves	4.

There is a considerable degree of resemblance between the two sets of numbers and the minor differences may be due to cases which are from time to time taken to hospital, but are too ill to be on the roll of a school.

The previous history was noted with special care, and the parent seen on more than one occasion by the doctor or nurse, and in many instances the history could be confirmed by the illnesses of the child while in attendance, on which occasions the nurse from time to time visits the home to see if the child is progressing, and The

family is also as a rule helped and supervised by the Invalid Children's Aid Association.

In the cases in which heart lesions were suspected which were not demonstrably of a valvular nature there was

A history of rheumatism in	43
" " of rheumatism and chorea in	10
" " of recurrent chorea in	48
" " sore throat but no other rheumatic manifestation in	20
No history of rheumatism in	<u>33</u>
	154.

The antecedent history given of the 743 cases of acquired valvular disease was:-

B O Y S.

Antecedent History	Nature of valvular lesion					Total
	Mitral Stenosis	Double Mitral	Mitral Incompetence.	Mitral & Aortic	Aortic	
Rheumatism	4	19	97	19	14	153
Rheumatism & Chorea	-	2	10	2	2	16
Rheumatism & Scarlet Fever	-	1	4	1	1	7
Chorea	-	4	17	-	1	22
Scarlet Fever	-	1	5	-	-	6
Diphtheria.	-	-	2	-	-	2
Weasles	1	-	-	-	-	1
Pneumonia	-	2	1	-	-	3
Sore throats, but not necessarily at onset	-	7	20	2	1	30
No history of illness at onset and none of Rheumatism or chorea	<u>2</u>	<u>6</u>	<u>36</u>	<u>4</u>	<u>2</u>	<u>50</u>
	<u>7</u>	<u>42</u>	<u>192</u>	<u>28</u>	<u>21</u>	<u>290</u>

G I R L S.

Antecedent History	Nature of valvular lesion.					Total
	Mitral Stenosis	Double Mitral	Mitral Incompetence	Mitral & Aortic	Aortic	
Rheumatism	6	29	159	9	5	205
Rheumatism & Chorea.	-	6	29	-	-	35
Rheumatism & Scarlet Fever	1	2	9	1	-	13
Chorea	7	8	43	1	-	59
Scarlet Fever	-	1	7	-	3	11
Diphtheria	-	1	-	-	-	1
Pneumonia	-	-	2	-	-	3
History of Sore throats not necessarily at onset	-	6	41	-	-	47
No history of illness at onset and none of rheumatism or chorea.	5	12	54	2	3	76
	<u>19</u>	<u>66</u>	<u>344</u>	<u>13</u>	<u>11</u>	<u>453</u>

The proportion shewing previous rheumatic manifestations is substantially the same in either sex, boys 68.3% girls 69.5% and the distribution of the lesions is similar, save in the case of affections of the aortic valves which are nearly twice as frequent in the boys, a sexual difference which is exaggerated as age increases and the chief causes of atheroma come into action.

A comparison of the immediate antecedents in these 874 school cases with those in 600 hospital cases recorded by Dr. Poynton reveals a general agreement as regards the main features.

<u>Hospital</u>	<u>School</u>
Active rheumatism	55.1
Active chorea	15.5
Erythema nodosum	.5
Rheumatism	34.4
Sore throats	11.1
Rheumatism & Chorea	7.0
Chorea	10.4
Rheumatism & Scarlet Fever	2.3
Scarlet Fever	1.9

Diphtheria.	.8	Diphtheria	.4
Measles	.8	Measles	.1
Pneumonia	.3	Pneumonia	.7
Influenza	.8		
Epilepsy	.3		
Nephritis	.3		
Congenital Syphilis.	.2		
Congenital Malformation of disease	11.3	Congenital Malformation or disease.	13.5
Cause uncertain	6.3	Cause undetermined	18.2

In several of the cases there was a family history of rheumatism, but the point was not noted in the earlier stages so that statistics would be misleading. The period between the initial symptoms of rheumatism and definite evidence that the child suffered from heart disease in no case exceeded four years and was on an average just under eighteen months. In a considerable percentage of cases the cardiac affection would seem to have been the first rheumatic manifestation. It is, however, very difficult to be sure on such a point, since many febrile ailments with vague pains and malaise may be called relaxed throat, cold, influenza etc., and in the case of the children of the poorer elementary school-attending class often pass without attention medical or otherwise.

Of the 118 cases of congenital heart disease the most probable diagnoses gave the following distribution:-

Pulmonary stenosis	43	36.5%
Patent auricular or ventricular septa	27	22.9%
Basal systolic murmurs, Patency of septa suspected	31	26.37%

Persistent ductus arteriosus	3	2.5%
Aortic stenosis	14	11.9%

Definite cyanosis was present in 57.6%. In 5.9% there was extreme pallor and in 2.5% there was a florid complexion. Marked clubbing of the fingers occurred in 22.9% and slight clubbing in 26.3%. The correlation between cyanosis and clubbing of the fingers is indicated in the accompanying table

C Y A N O S I S.

<u>CLUBBING</u>	<u>SEVERE</u>	<u>MODERATE</u>	<u>SLIGHT</u>	<u>ABSENT</u>
Marked	19	6	2	-
Slight	18	4	4	5
Absent	6	7	2	45

The proportions differ from those of the cases collected by Peacock, which have formed the basis of the descriptions given in most text books until very recently, in which 86% are stated to have been cases of pulmonary stenosis and 90% to have had very marked cyanosis.

The experience of the children in the invalid schools is that for the ^{major} ~~more~~ part they improve definitely in health and strength, and that the graduated exercise they receive forms a suitable preparation either for work or for other forms of school life. Advice is always given to the parents of children who are leaving on attaining the limiting age of 16 or before, if they

persist in seeking exemption. In most cases the advice is accepted for the time being at any rate; in one or two instances in which it has been ignored, death or serious illness has followed rapidly.

The following table gives the latest information with regard to the children in the invalid schools in the last three years.

NATURE OF CARDIAC LESION.

Result & date of last note.	Organic nature of lesion uncertain history of chorea.	Con- genital	Acquired non val- vular.	Acquired valvular.				Aortic
				Mitral sten- osis.	Double mitral	Mitral Incom- petence	Mitral and Aortic	
Still in invalid school.	47	58	76	8	36	232	16	19
Trans-ferred to other types of school.	44	10	30	4	1	44	1	1
At work.	33	6	25	5	17	91	8	5
Left at 16 unfit for much work.	5	7	-	-	17	27	3	2
Invalided or ailing.	8	18	10	2	17	52	3	1
Died.	3	16	2	1	15	49	5	2

TABLE CONTINUED.

Acquired valvular.

Result & date of last note.	Organic nature of lesion uncertain history of chorea.	Con- genital	Acquired non val- vular.	Mitral sten- osis.	Double mitral	Mitral incom- petence	Mitral and Aortic	Aortic.
Lost sight of but in fair con- dition at last note	5	-	6	5	2	21	3	1
Left London.	2	3	5	1	3	20	2	-

The prognosis over a short period seems to have varied directly with the extent of the lesion. It is probable that a number of those who were invalided or ailing on the occasion of the last note have died. There has thus been a fatality rate of from 8 - 15%, but on the other hand some 30% have been able to return to the ordinary schools or to proceed to productive employment.

DEMOGRAPHICAL DATA.

A map of the percentage frequency of cases of heart disease noted in the course of routine medical inspection shews some irregularities in distribution. The maximum occurs in East Finsbury, closely followed however by the Isle of Dogs, while at variable distances follow Bermondsey, West Southwark, Central Finsbury, Norwood, and Chelsea. If London be regarded as divided into quadrants; by the Thames and a line passing between Islington and St. Pancras, Finsbury and Holborn, Southwark, Camberwell and Lambeth; then the N.W. quadrant presents a higher incidence on the boundary than centrally. In the N.E. there is a high incidence on the river boundary, a low incidence in the crowded districts of the nearer East but is again high in Finsbury and South Islington. In the S.E. there is an inverse type of distribution, the high incidence being central and the low incidence peripheral. The S.W. area presents a low incidence, except in Norwood and Battersea. These do not at first sight seem to agree with any easily recognisable social or physical factors which might explain the differences observed. It might be suggested that a part may be due to personal equation on the part of the school doctors, since for this map which deals with all the schools of London the data of every one had to be employed, it being impossible for one individual to visit some thousand schools. It should however be noted

in the first place that during the year nearly every area was visited by two, if not more, doctors, and secondly, that in most areas the percentage of heart cases found in a routine inspection agreed fairly well with the death rates between the ages of 10 - 15 as given in the last decennial supplement of the Registrar General. The chief exceptions are the City and Strand which have but small resident populations but large hospitals the mortality in which has not been corrected by transfer. Omitting these, the coefficient of rank association between percentage frequency of heart cases and the death rate from circulatory diseases at the age 10 - 15 is $p = .4\ddagger .16$. The most obvious differences as between Hoxton and Finsbury, Bermondsey and Stepney are confirmed. Detailed comparison is difficult owing to the changes in distribution which have occurred since the last decennial return.

In the case of children in the invalid schools the addresses have been extracted from the medical record cards and a spot map shewing their actual distribution constructed. Whenever possible that address has been chosen at which the symptoms of illness first manifested themselves, but if this was not recorded then the address at which the child resided when it first came under medical observation and was found to be defective has been utilised. An inspection of the spot maps shews that the cases are not at all evenly distributed,

as might have been expected were no definite factors influencing the distribution, but are definitely concentrated in certain areas, while in others they are conspicuously absent. Part of this irregularity is due to the presence of large open spaces as the public parks, docks etc. In the richer districts a smaller fraction of the child population would attend public elementary schools and so be liable to attend the invalid schools, so that fewer dots would be expected in these parts of the maps. This argument would not affect the maps of death rates or those which shew the percentage of cases of heart disease among the children of certain ages attending public elementary schools. The children of the better-to-do classes, undoubtedly in most cases, receive closer attention and, illness being noted earlier, the chances of rheumatism proceeding to cardiac affection ^{are} diminished. There are thus few cases in large parts of Hampstead, Marylebone, South Kensington, Mayfair, Belgravia, Highbury, Stoke Newington, and Upper Clapton on the north, and in the outskirts of Wandsworth, Lewisham, and Woolwich on the south. The irregularities do not seem in any way explicable by any feature in the distribution of the invalid schools 33 in number (apart from open air and tuberculosis schools) since the one to five ambulances attached to each school make two or three rounds morning and afternoon to convey the children, and between them cover the whole county area.

The maps may be compared with others indicating such features as social status and economics, density of population, overcrowding, surface contour, geology, and racial traits, as represented by the proportion of aliens, or by the distribution among school children of stature, weight, and colour of hair and eyes. A brief survey of each feature will be made first for London as a whole, and then for registration area by registration area.

Social Conditions.

The data for the maps on this feature are derived from Charles Booth's "Life and Labour in London", and similar works; from the observation of the invalid school nurses who, taking the children to their homes daily, can form a good estimate of the conditions prevailing; ~~and~~ from the notes on environment of each school; and from the data obtained in several enquiries into insanitary areas or for improvement schemes; all coupled with visits to schools or other institutions in all the areas concerned. In the maps the districts occupied by those of wealth are coloured yellow; of the well-to-do servant-keeping class, red; of the comparatively comfortably-off clerical or artisan classes, with perhaps one servant in the house but often only a visiting help, green; and of the poorer classes, purple or blue. The map will be seen to be somewhat of a patchwork pattern with the wealthy classes concentrated in the nearer

County of London.

SKETCH MAP--EDUCATIONAL ADMINISTRATIVE AREAS.

Social Status



London County Council,
 Local Government & Statistical Dept.,
 July, 1907.

W. and in the N.W., the well-to-do on the outskirts, and the poorer classes along the river and its tributaries the Lea, Ravensbourne, Fleet, Bridge Creek, and Wandle. In the wealthier areas the average is not always quite so good as in districts just lower in the social scale, since the mews attached to the larger houses in which are the families of the coachmen etc. can only be described as comfortable, and often are let out to others of a lower social grade. In some parts this has been accentuated of late years. Comparing the map of social status with that of percentage frequency of heart cases it will be noted that in Hammersmith, North Kensington, Finsbury, South Hackney, Poplar, Rotherhithe, Bermondsey, Southwark, and Battersea, poverty is associated with a prevalence of heart disease, whereas in Whitechapel, Stepney, Limehouse, and St. Georges, an equal degree of poverty is not associated with this prevalence. Deptford, Greenwich, Woolwich, and Lambeth shew a good deal of poverty with a low heart rate, but if the same areas be studied in the spot map it will be seen that poverty and heart cases largely coincide. In other areas the spot map shews a close relationship between poor surroundings and poor health. The figures for Bethnal Green, Whitechapel, Stepney, Holborn, parts of Marylebone and St. Pancras are surprisingly low. It will be noted in the map of racial distribution that these districts have a high proportion of aliens, and experience has shewn that there are

fewer cases in the schools attended by aliens and particularly by Jews.

The spot map indicates at once the poor areas along the Wandle, in Hammersmith, Notting Dale, North Paddington, Kilbarn and Kentish Town; but it also picks out better class areas in Kensal Green, Fulham, Streatham, Norwood, Peckham and Catford.







Density of Population and Overcrowding.

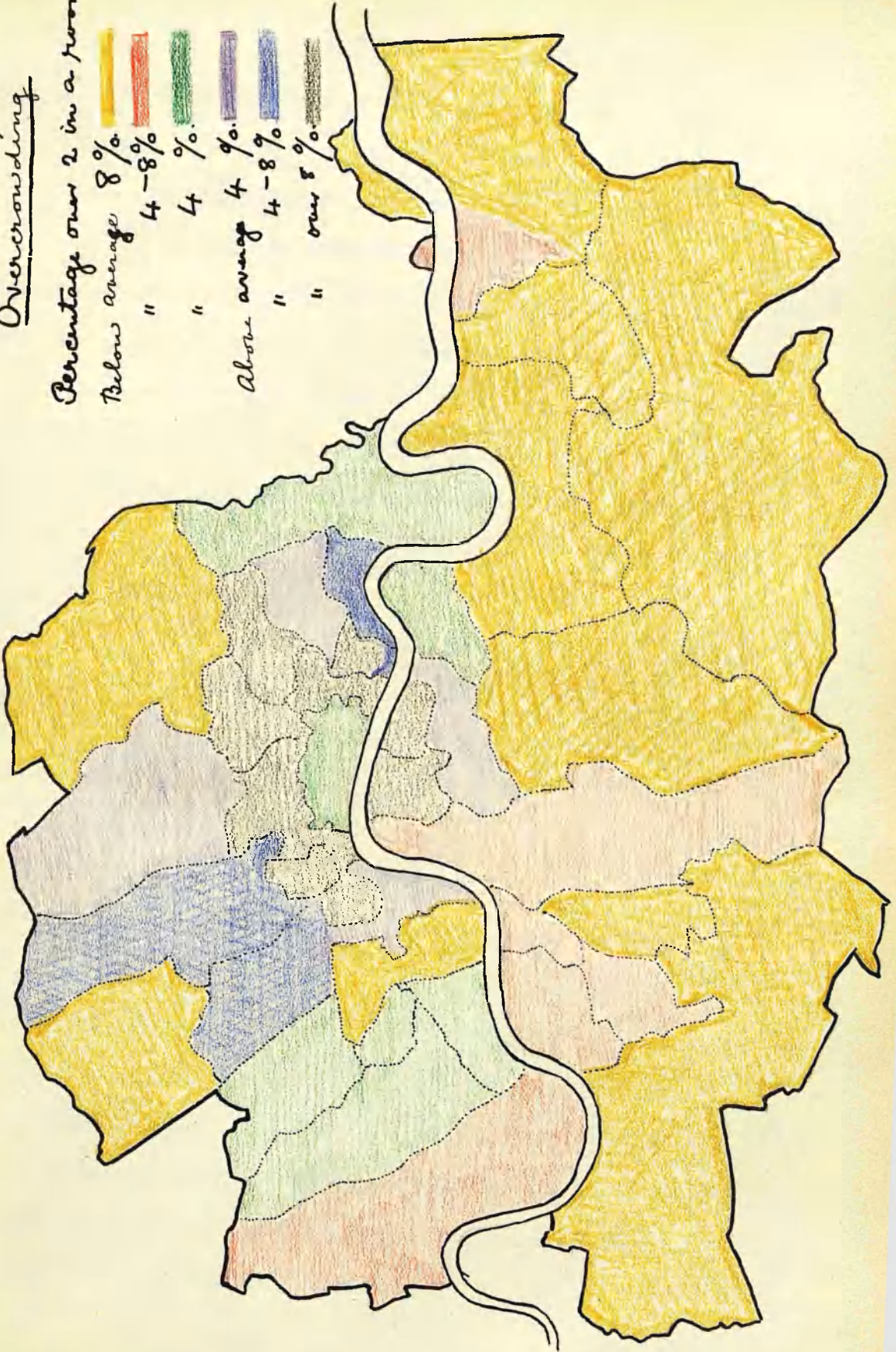
The data for these have been taken from the decennial supplements of the Registrar General and from the various census volumes. The greatest density is to be found in the central and east-end districts, Whitechapel, St. Georges in the East, Shoreditch, Bethnal Green, and Finsbury, the minimum in Woolwich, Wandsworth, and Lewisham.

If overcrowding be tested by the number living in tenements with more than two occupants to a room, a very similar result obtains. A dense belt surrounds the city comprising the Boroughs of Holborn, Finsbury, Shoreditch, Bethnal Green, Stepney, and Southwark. There is marked congestion in the outlying districts of Marylebone and St. Pancras and least in Hampstead, Hackney, Wandsworth, Camberwell, Lewisham, Greenwich, and Woolwich. The comparison of these features with the distribution of heart disease shews similar divergencies to those noted under social status, and indeed the relationship is less

Overcrowding

Percentage over 2 in a room.

- Below average 8% 
- " 4-8% 
- " 4% 
- Above average 4% 
- " 4-8% 
- " over 8% 



close. The coefficient of rank association between density of population and the percentage frequency of heart cases in the two age groups in the elementary schools is $p = .20 \pm .18$, or almost absolute independence. Even if it be allowed that it is unfair to reckon districts with small resident populations but large hospitals, the figure is only raised to $p = .34 \pm .17$ which is of no real significance. The relation between the density of the population and the death rate for circulatory diseases both at all ages and for the age period 10 - 15 has been tested in the same way with the following results:

Decennial period.	Value of Coefficient of Association.
<u>All Ages.</u>	
1891 - 1900	.104 \pm .11
1881 - 1890	.22 \pm .12
1871 - 1880	.14 \pm .12
<u>Age 10 - 15 only.</u>	
1891 - 1900	.12 \pm .12
1881 - 1890	.17 \pm .12
1871 - 1880	.52 \pm .08
1861 - 1870	.24 \pm .12
1851 - 1860	.41 \pm .10

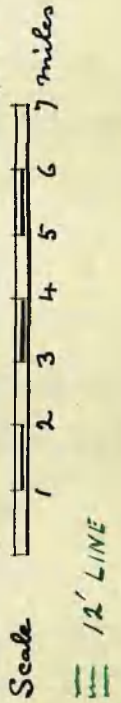
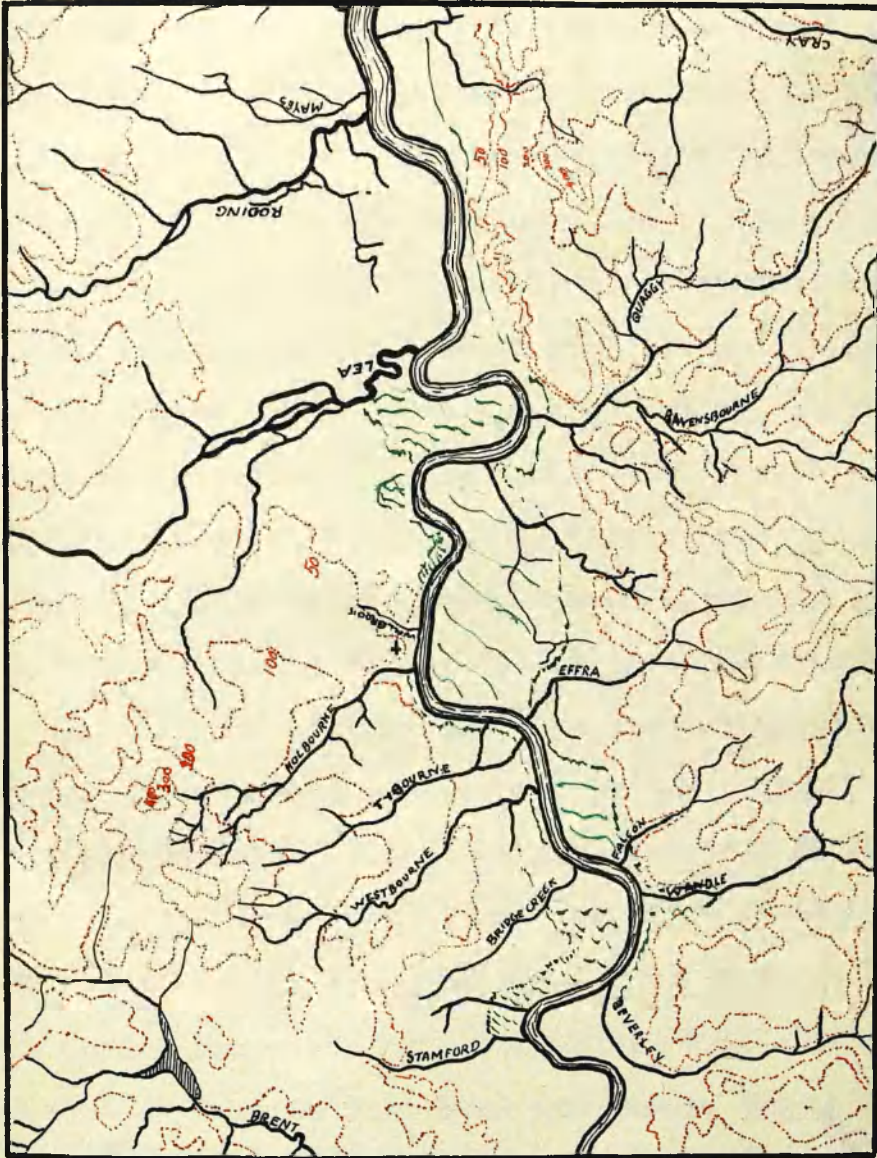
The relationship in the first group is unproven, in the second it seems definite in the decennia ending 60 and 80, while in the others death rate and population densities

have little relation.

Orographical features.

London was built on an angle of solid ground where the roads from the south crossed the river. Below London Bridge on either bank was tidal marsh and alluvial flats, the river being deflected in one place to the south to cut into the Blackheath Hills as a result of the delta, now the Isle of Dogs, deposited by the Lea. Along the margins of a tidal lake which extended from Deptford to Fulham were reedy swamps through which twisted numerous small rivers. To the north of the Thames the eastern boundary was, and is, the wide valley of the Lea which came in from the hills of Hertfordshire. Even now much of the valley nearer the river consists of damp alluvial flats which have been drained with numerous cuts, but in which any excavation rapidly fills with water. The greater part is occupied by factories and warehouses, only here and there ^{scattered} groups of houses and those of the poorer kind. Hackney Brook used to rise from springs on Stamford Hill and wind in a narrow valley between Dalston and Homerton to join the Lea a little below the old ford (Oldford). It now enters the sewers, but probably in some measure flows outside these although underground and contributes to the dampness of the district, and its course can sometimes be detected in the autumn by the lie of the fog in the neighbourhood, though this test has been complicated by

Streams in the London district.



the construction of the Regent's Canal which contributes its quota to the general dampness. It will be observed that a considerable number of the heart cases recorded in the district come from the vicinity of these two waters. The Wall brook used to flow from Finsbury fields to Dowgate. It has long since been closed in, but serves to remind one of the existence of the "Great Fenne or More, which watereth the walls on the north side". This was a mixture of marsh and moor which extended up through what is now St. Lukes, Clerkenwell, and part of Hoxton, and included the lower-lying part of South Islington. This was not built on until comparatively late, although when this occurred the houses were soon crowded. Part of the ground from Moorfields to Smithfield was from time to time used for plague pits and other burial places, and even now excavations for foundations of new buildings tend to come on masses of bones. These points are of some interest in that the high mortality of Finsbury is one of the features inexplicable on social grounds alone.

The Hole Bourne or Fleet rises from three sources in Highgate ponds, Hampstead ponds, and Flask walk which join near the junction of Kentish Town Road and Camden Road. The eastern brook has flowed by what is now Holmes Road, Grafton Road, and Victoria Road, the middle brook across Mansfield Road along the site of Carlton Street and Weedington Road, the western down Fleet Road and part of Malden Road. From their junction the stream passed between Kings' Road and College Street

south of Pancras Road to Battle Bridge. Here it was joined by a small brook which had come down the vale between the York and Caledonian Roads, thence to the east of Grays Inn Road to the rather deep little valley below the bridge of Rosebery Avenue, along the bottom of Field Lane and Saffron Hill to Farringdon Road and thence to the river. A reference to the spot map shews that an undue proportion of cardiac cases come from the Fleet Valley.

The next tributary stream the Ty Bourne, rises on the slopes of Hampstead near Belsize Park in two brooklets which unite near the middle of Avenue Road just under Barrow Hill, thence passing through the ornamental water in Regent's Park, along Park Road by Gloucester Place, Marylebone Lane, and Brook Street to the water in Buckingham Palace grounds. Thence crossing Vauxhall Bridge Road to the Thames. Like the others it is now diverted into the London main drainage system. The course of this stream is characterised by an absence of cardiac cases on the spot map, but it runs throughout almost its entire course in a series of fashionable districts so that the children would not be likely to attend elementary schools. Complaints of rheumatism from residents in Avenue Road, Belsize Park and Park Road are not uncommon.

The West Bourne rises by a series of springs a little further west than the foregoing on the slopes of Childs Hill and Hampstead. One division flows by Belsize Road, the

other by Maygrove Road and Netherwood Road to the east of the High Road Kilburn which they cross at Cambridge Road in the midst of which they are joined by streamlets from the direction of Willesden Land and the Paddington cemetery. The stream passes between Portsdown Road and Shirland Road, crosses the canal at Formosa Street and passes down Porchester Terrace and Craven Terrace to the Serpentine. Thence it goes by Wilton Street, Eaton Place, Westbourne Street and Chelsea Bridge Road to the river. In places it is still open in the backs of the gardens of some houses, and in the market garden area which survives behind Elgin Avenue, it is a favourite resort for the purpose of attempting to catch "tiddlers". The upper part of its course in Brondesbury, Kilburn Park, and Kensal Green is marked on the spot map by several cases of heart disease.

Bridge Creek flows from Kensal Rise through the old town along the lower levels of Notting Dale, under the slopes of Holland Hill to enter the Thames near Battersea Bridge. Several cases occur in the valley of this stream in Notting Dale, as also around a small brook to the east of the Wandsworth Bridge Road.

Still more to the west a brook flows across the Old Oak Farm estate, is joined near Ellerslie Road by a

branch which traverses the exhibition grounds, and proved an obstacle to the first efforts to erect the Wiggle-Woggle. Here it joins a stream which comes down Scrubs Lane from Willesden. The two flow across Shepherd's Bush Green which was formerly a marsh and osier bed, frequented by duck, thence along Shepherd's Bush Road to Brook Green in the middle of which it passed Westward to traverse Margravine Road, and so to the river by the Soap Works below Hammersmith Bridge.

Another small brook rose from springs near the Becklow Road, flowed to the pond on Starch Green, and thence across a tract of marsh, now the ornamental water in Ravenscourt Park, and down Mall Road to the river. There were springs in a tract of marshy common land which is now Dalling Road and the western end of Glenthorne Road, and possibly an intermittent connection with the last mentioned brook existed. This area has always been noted for its dampness. The boundary stream Stamford Brook rises near East Acton and flows along the county boundary between Hartwood Road, Stamford Gardens and the branch line of railway from Acton, thence just to the west of the Goldhawk Road to Youngs Corner and the Thames. A side branch joins the preceding and enters the Thames at the creek.

On the south side of the Thames the Beverley Brook is practically outside the county boundary in most of its course, though where it touches there is a scanty population

and no recorded heart cases.

The valley of the Wandle which enters London from Mitcham is damp and low-lying throughout and presents a large number of heart cases in Southfields, Summerson, Earlsfield, and Wandsworth Town.

The frequency of heart cases in the neighbourhood of the Graveney, a tributary of the Wandle which flows through Lower Tooting, drew attention to the relationship which seems to exist in some parts between the past and present courses of streams and the distribution of rheumatism and heart disease.

The Falcon Brook rises in a series of springs in Tooting Bec and Upper Tooting ^{and} passes through the rather narrow valley at Northcote Road and St. John's Road to the river above Battersea Church. Throughout, the course of this stream can be noted on the spot map.

The Effra rises in Brockwell Park and on the slopes of Tulse Hill winds along between the Brixton & Clapham Roads to the confines of Kennington ^{along South Lambeth Road,} and then turns sharply to the west ^{other than quite small brooks} to enter the Thames near Nine Elms. There are no tributary streams ^{on the south side in the} great central London reach of the river, but at Deptford creek an important stream, the Ravensbourne, enters. A little way in from the river the stream divides and is crossed by the river road to Kent at the deep ford, now

a bridge (Deptford). The main stream rises on the high ground near Caesar's Camp at Keston, enters London near Bellingham, and passes up through Catford and Lewisham, and, having breached the hills between Blackheath and Brockley, enters the Thames at Deptford Creek. Pool river and Quaggy river are side streams entering in the Catford district whose very names serve to indicate the nature of the surrounding ground. A certain number of cases will be found in this district in the spot map, but perhaps more than might have arisen by chance.

According to C. H. Heydemann (London in the Making) a northern tributary of the Ravensbourne came down in several brooks from the higher ground of Denmark Hill, Forest Hill and Nunhead ^{with} ~~traverses~~ the flat clayey area, formerly marsh land and alluvial flats of Walworth and Bermondsey, its lower course approximating to that of the Surrey Canal. In all parts of the course this branch runs through an area in which rheumatism and heart disease are common. According to the account by Whittaker in the Memoir of the Geological Survey, this stream did not join the Ravensbourne but entered the Thames direct.

The main Valley of the Thames, until the completion of numerous embankments in the last half century, consisted of large areas of alluvial flats and more or less water-logged gravels. In the neighbourhood of the river in Fulham, Battersea, Bermondsey, Deptford, the Isle of Dogs, Greenwich, and Woolwich, numerous cases will be noted

on the spot map. Two situations seem especially favoured; the bases of escarpments as in Battersea and Woolwich, and flats near the river where dwelling houses are but newly erected as, for example, Bishop's Park to Craven Cottage, Fulham and the flats leading to the Blackwell Tunnel on the south side, or those around Plumstead Station.

Throughout London the higher ground is singularly free from cases of heart disease attending elementary schools. In part this may be due to the fact that, except in Woolwich, the so-called working classes can scarcely be said to have made the hills their own. Each side valley or old water course of any size seems to have yielded a case, where the social status of the occupants was such as to allow of opportunities for their discovery.

If the course of the various canals of London be followed on either spot map it will be noted that many cases of heart disease are recorded from the houses of streets immediately adjoining, and especially from those that back on to the canal bank. This is a mixed indication not necessarily proving a direct association between canals and cases of rheumatism and heart disease, since almost always the streets and houses bordering on the canals are occupied by those of the lower social and

Comparing the map on Page 28, with the Spot Map it will be seen that, a very large proportion of the Heart Cases come from districts which are not more than 12 feet above Ordinance datum.

economic ranks. Special instances of the association of heart cases with canals may be seen in Kensal Town, Haggerston, Victoria Park, Stepney, Limehouse, and along the Surrey Canal and its basins in Walworth and Peckham.

Rheumatism and heart disease are reported to be unusually prevalent in the Isle of Dogs which is surrounded by the river and occupied by docks, but the prevalence is not so marked in the areas of Limehouse which also border on large masses of water. *See opposite page.*

Haviland was of opinion that heart disease was associated with sheltered conditions and deep valleys, "Stuffy Valleys" was the term he employed; and that part exposed to a thorough flush of air, such as coastal districts and wide valleys, showed very low rates of mortality from diseases of the circulatory system. London is perhaps not a good area to test his theories. Compared with many parts of the country the mortality from heart disease is low, and the configuration is such that there are no deep stagnant valleys. The greater mortality in the central area of London might be held to conform to his views, as also the cases in a few side valleys, as of the Falcon. But the prevalence in the wind-swept western edge of London and in the exposed Isle of Dogs is contrary to his suggestions. On the whole the orographical association would seem to be with low-lying damp situations.

This would agree with the usual conclusions for chronic rheumatism, ^{but} acute rheumatism has been often thought to favour somewhat opposite conditions, and to be more prevalent after warm dry weather when the ground water is low.

GEOLOGICAL FEATURES.

The under-lying deposit of the greater part of the area under consideration is the impervious London clay, though in the south-eastern districts the earlier Woolwich and Blackheath sands and pebbles cover some of the higher ground, and there is a thin border of chalk below the escarpment from Woolwich to Greenwich. The heights of Hampstead and Highgate are crowned with a layer of dry permeable ~~Lower~~ Bagshot sand constituting a very healthy area the bulk of which is public park land. Over-lying the clay in the greater part of the most densely populated districts of London is a variable thickness, not, however, exceeding 20 feet, of high and low level gravels. This constitutes for the more part a permeable stratum but in places, especially low-lying river flats and beneath escarpments, it is apt to become water-logged. The maps of the surface geology of London indicate in several areas considerable tracts of brick-earth, but in all suburban areas, if not, indeed, generally, this expresses a past rather than a present phase; for brick fields preceded

the builder, and the brick earth and any valuable gravel were replaced by made soil. As made soil, which is not recorded by the Geological survey, occurs at intervals in other parts, it is open to question whether a comparison of case incidence on brick-earth has any real meaning.

Along the Thames and its tributaries the Lea, Ravensbourne, and Wandle are strips of alluvial mud and clay deposits largely covered by warehouses and wharves though in parts the site of human habitations.

Of the cases whose dwelling-places could be determined as being fairly certainly on one or other formation the distribution is as follows.

Chalk	5
Thanet sands on chalk	24
Woolwich beds	12
London Clay	136
Bagshot Sands	1
Gravels	439
Brick-earth	77
Alluvium	104

In the absence of exact data as to the extent to which the school-going population is resident on each formation, it is difficult to express an opinion as to their relative order, but from a consideration of the occupied area it would seem that the alluvium held the first place. The

distribution of the beds is such that a comparison of the mortality one area with another by the use of the decennial supplements is impracticable. Haviland regarded the geological factor as of importance only so far as it controlled the nature of the ground relief. Anything leading to deep valleys, particularly if these were across the direction of the prevalent winds and ~~so~~ ^{therefore} ill ventilated, tending ^{ed} to encourage heart disease, while such formations as lead to wide valleys and good flushing irrespective of dampness or other features ^{in detail} lead to a low mortality rate from circulatory system diseases.

A study of the mortality rates on different formations, so far as they can be estimated from the predominant formation in each registration area, does not entirely confirm this, and shews wide variations so that other factors must play the leading rôle. (See St. Bartholomew's Hospital Reports Vol. XXXIX p. 126.)

Formation.	Death rate per 1,000.
<u>Archæan</u> (pure)	1.75
" (mixed)	1.59
<u>Cambrian</u>	1.56
<u>Ordovician</u> (Wales)	1.45
" (Lakes)	1.71
<u>Silurian</u>	1.56
<u>Devonian</u>	2.00
<u>Carboniferous</u>	
Mountain Limestone	2.02
Millstone Grit (Pennine)	1.85
" " (Devon)	1.86
Coal Measures	1.43

Formation.	Death rate per 1,000
<u>Permian</u>	
New red sandstone	1.91
Magnesian limestone	
under boulder clay	1.10
<u>Triassic</u>	1.64
<u>Jurassic</u>	1.76
<u>Wealden</u>	
Hastings sands	1.67
Weald clay	1.64
<u>Cretaceous</u>	
Gault clay	1.86
Chalk	
† Boulder clay	1.95
- Boulder clay	2.10
<u>Eocene</u>	
London clay	1.57
Bagshot sands	1.71
<u>Pliocene</u>	
Norwich crag	1.57
<u>Recent</u>	
Alluvium	1.69
Fen-land	1.60

Even combined, the orographical and geological features do not seem to dominate the scene as explanations of the distribution of mortality or, so far as could be judged from London, of case incidence.

Racial factors

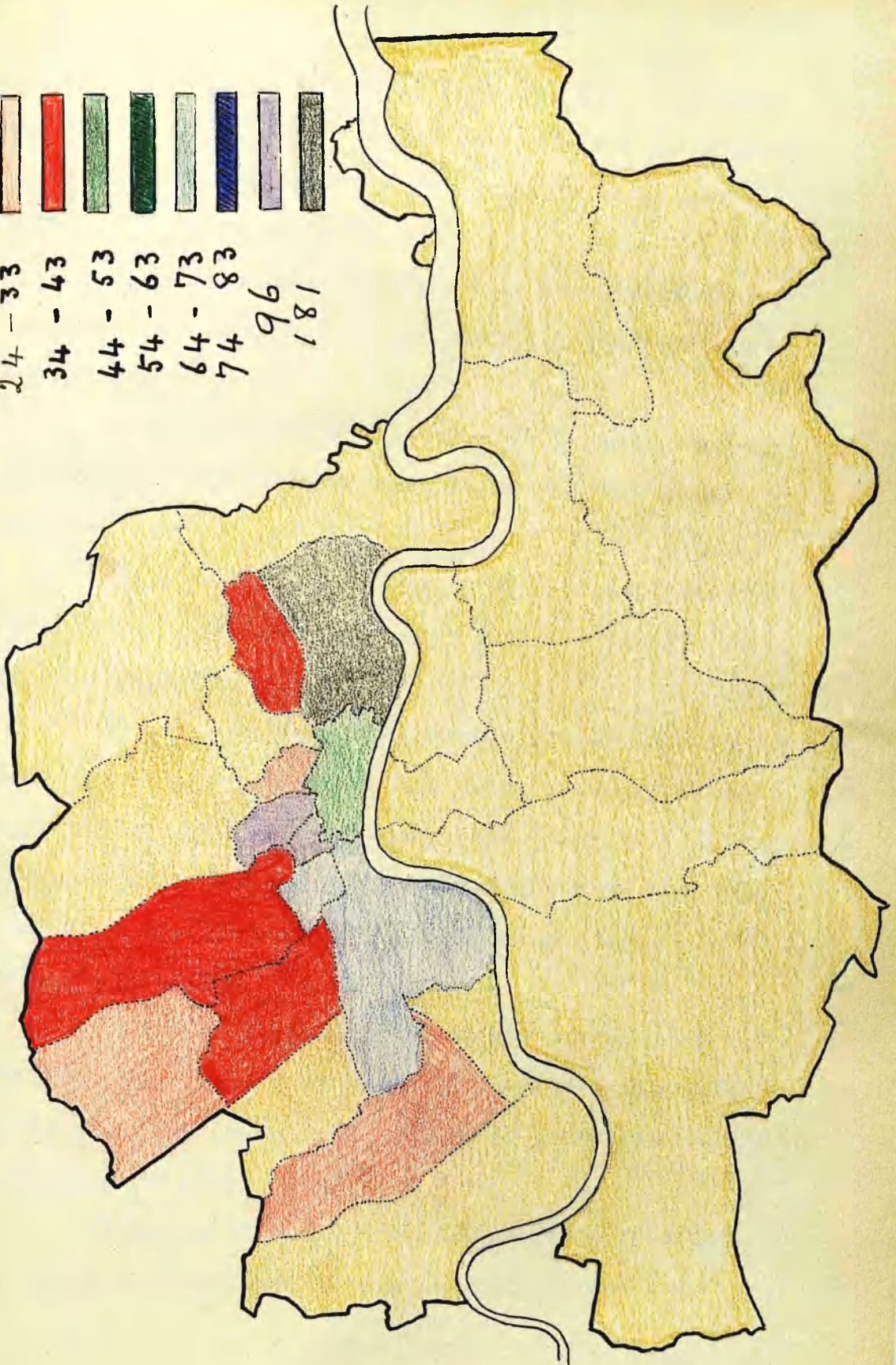
(a) Alien immigration.

For many years the foreign population of London has tended to spread abroad generally, ^{over the county area} but it still concentrates in certain areas in a remarkable way. The maximum intensity is in the Borough of Stepney, followed at some little distance by Holborn, Westminster, the City, Marylebone, Bethnal Green, and St. Pancras.

Distribution of Ahiens per 1000.



Under 24
24 - 33
34 - 43
44 - 53
54 - 63
64 - 73
74 - 83
96
181



The nationalities which favour the different quarters vary. Russians and Poles collect in Stepney and Bethnal Green, thence overflowing into Hackney and latterly into Hammersmith.

The more successful Jews pass on to Paddington, Hampstead, and finally the aristocratic quarters of Westminster.

Germans formerly collected in Stepney, Hackney, and Holborn, but latterly more in Marylebone and St. Pancras.

The French shew a preference for Westminster, St. Pancras, and Marylebone; the Italians for Finsbury, Holborn, and Westminster.

Of the less numerous nationalities, Austrians, & Hungarians favour Stepney, the Swiss, Westminster and St. Pancras, the Dutch, Stepney, the Swedes and Norwegians, Poplar, Limehouse, and Rotherhithe, with a more settled colony in Marylebone. The Asiatics are mostly in Limehouse and Poplar.

This distribution helps to explain some of the difficulties which were noted in regard to the relation between social status and density of population and frequency of heart cases.

Comparing schools attended entirely or almost entirely by Jews, and as far as possible the same

neighbourhood attended by the ordinary east-end Londoner, it has been noted that the former present many fewer cases of heart signs and symptoms than do the latter. It was in the area in which foreign Jewish children were very common that the diminution in the percentage of heart cases was evident in the percentage map, and also, though marked by the poverty and density of population, in the spot map. The difference may be due in part to a genuine heritable immunity to rheumatism, but is more probably ascribable to the better feeding, clothing, and general care bestowed on the Jewish children, who are also less likely to remain in the streets to all hours regardless of the weather, or to sit about at home in wet things all the evening and night; ^{do things} In other words, while the poorer Jews have some degree of home life and comfort, the poorer true Londoner seems to make no efforts in that direction.

The bulk of the alien elements in the East End of London are brunets ^{te} and many observers have suggested that brunets ^{te} are relatively free from rheumatism and heart disease.

Sir William Church has pointed out the prevalence of rheumatism in the Isle of Man and on parts

of the western coastal area, which contain the fairest, almost the tallest populations of England and certainly those with the purest Norwegian ancestry. The contrast between the mortality rates of Northumberland, Cumberland, and Westmoreland with those of Wales, even when areas of similar geological formation are chosen, is most definite. The death rate per 1,000 in Welsh Ibero-Celtic Carnarvon is 1.33, in Anglian Bakewell 1.70, and in Norwegian Cocker-mouth 1.65. Boucherou (L'Anthropologie 1900) found the proportions of hair and eyes among the conscripts suffering from acute rheumatism in Auvergne to be

Hair	Dark	21,	Light	37
Eyes	Dark	27,	Light	61.

Baxter, in the Medical statistics of the Provost-Marshal-General's Bureau, asserts that the brunette type as a whole offers greater resistance to disease, there being a larger number of fair than dark recruits rejected. Dealing with particular systems of diseases, he notes that the excess of blonds was most marked for diseases of the circulatory and urinary systems.

Beddoe in his classic monograph on "The Races of Britain" says "In my experience as a physician, it has appeared that on the whole, dark complexioned children showed more tenacity of life than fair ones, under some of the unfavourable conditions connected with town life."

Dr. Shruballs in the B.M.J. Dec. 1904 gives curves showing the percentage frequency of each hair and eye colour among patients suffering from specified disorders.

He states, "The first feature to attract attention is that amongst hospital patients the frequency of red and black hair is much the same as among the general population, but that there are more individuals with fair and fewer with light and dark brown hair."

Considering individual groups of diseases, the peculiar frequency with which fair but especially red hair and light eyes are met in patients suffering from acute rheumatism, heart disease, or tonsillitis is most striking.

If this racial relation to disease exists, the presence of a dark alien population might be the factor to explain the surprisingly low figures for heart cases noted in perhaps the poorest and most over-crowded area of the East End.

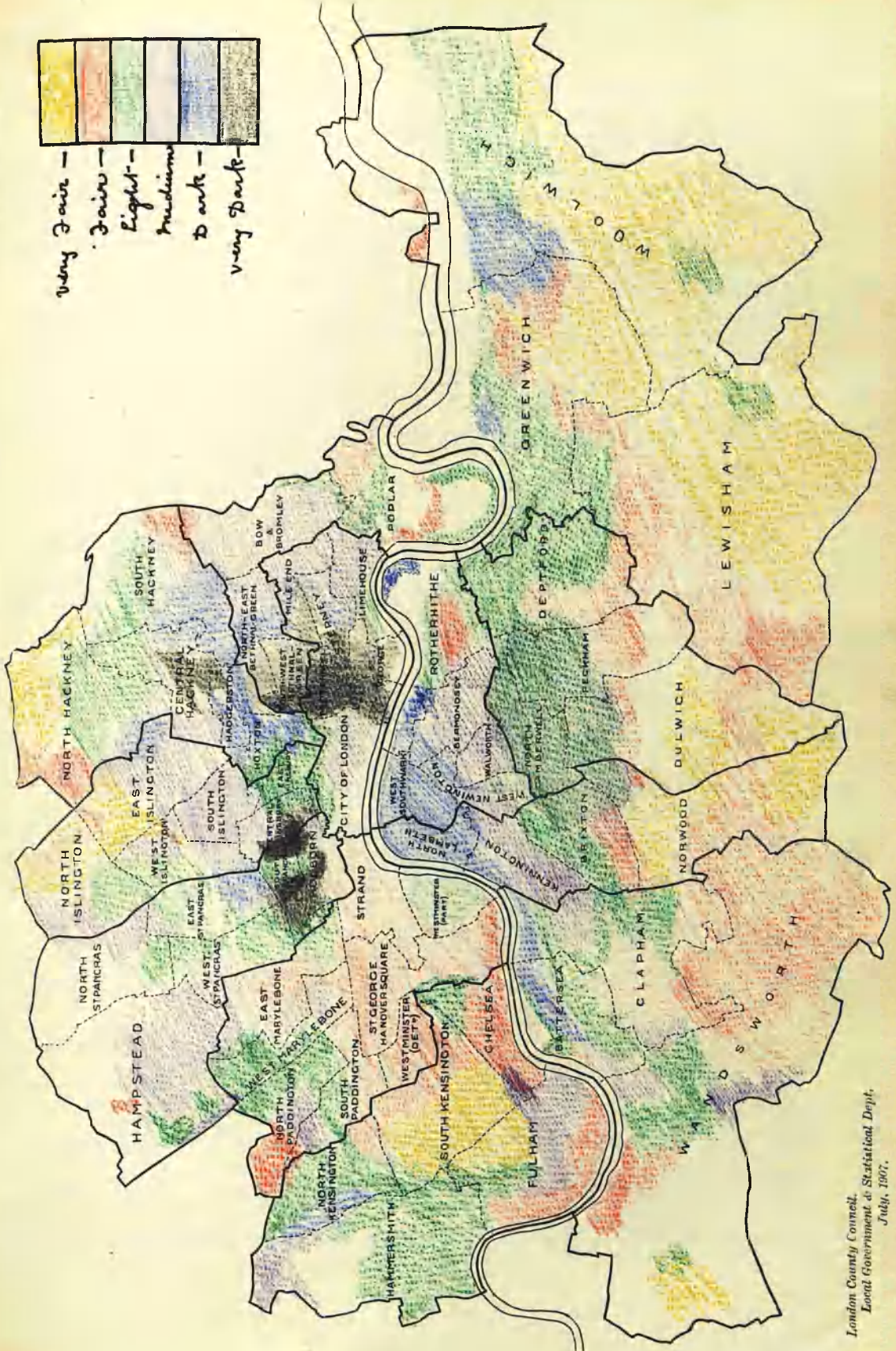
(b) Physical Traits.

Statistics as to stature and weight of the children in the respective age groups selected for routine medical examination are of course available. In addition, some efforts have been made to ascertain the distribution of colour traits in London. Beddoe gave records some thirty years ago for the central London area Smithfield, Clerkenwell, and St. Lukes. In the paper from the B.M.J.

County of London.

SKETCH MAP--EDUCATIONAL ADMINISTRATIVE AREAS.

Colour Type in 25,000 Cases



London County Council.
Local Government & Statistical Dept.
July, 1907.

quoted above the colour type, so far as the hair is concerned, is given for some fifteen districts of London in comparison with the frequency noted among hospital patients, for town and country cases alike.

Since the medical inspection of (the) schools has been in progress, a certain number of additional observations have been made by various doctors, so that in all there are data for some 25,000 children from 8-12 years of age. From these the accompanying map has been constructed. It must be looked on as tentative in character, since in some districts the data are rather scanty and the exact boundaries of each set of observations were sometimes difficult to determine.

It does not shew a direct relation between fairness and presence of heart cases, but in some areas where more cases might have been expected it will be noted the dominant colour type is dark.

The data for recording the stature and weight of the children are returned by each school doctor and are recorded on summary sheets.

When these averages of stature and weight are arranged in groups and plotted out on a map, it becomes clear that they follow closely the result that might have been anticipated from the predominant occupation

Weights of boys aged 8

London 1910.

Kilograms



20 - 21

22 - 23

24 - 25



Heights of Boys aged 8.
London 1910.

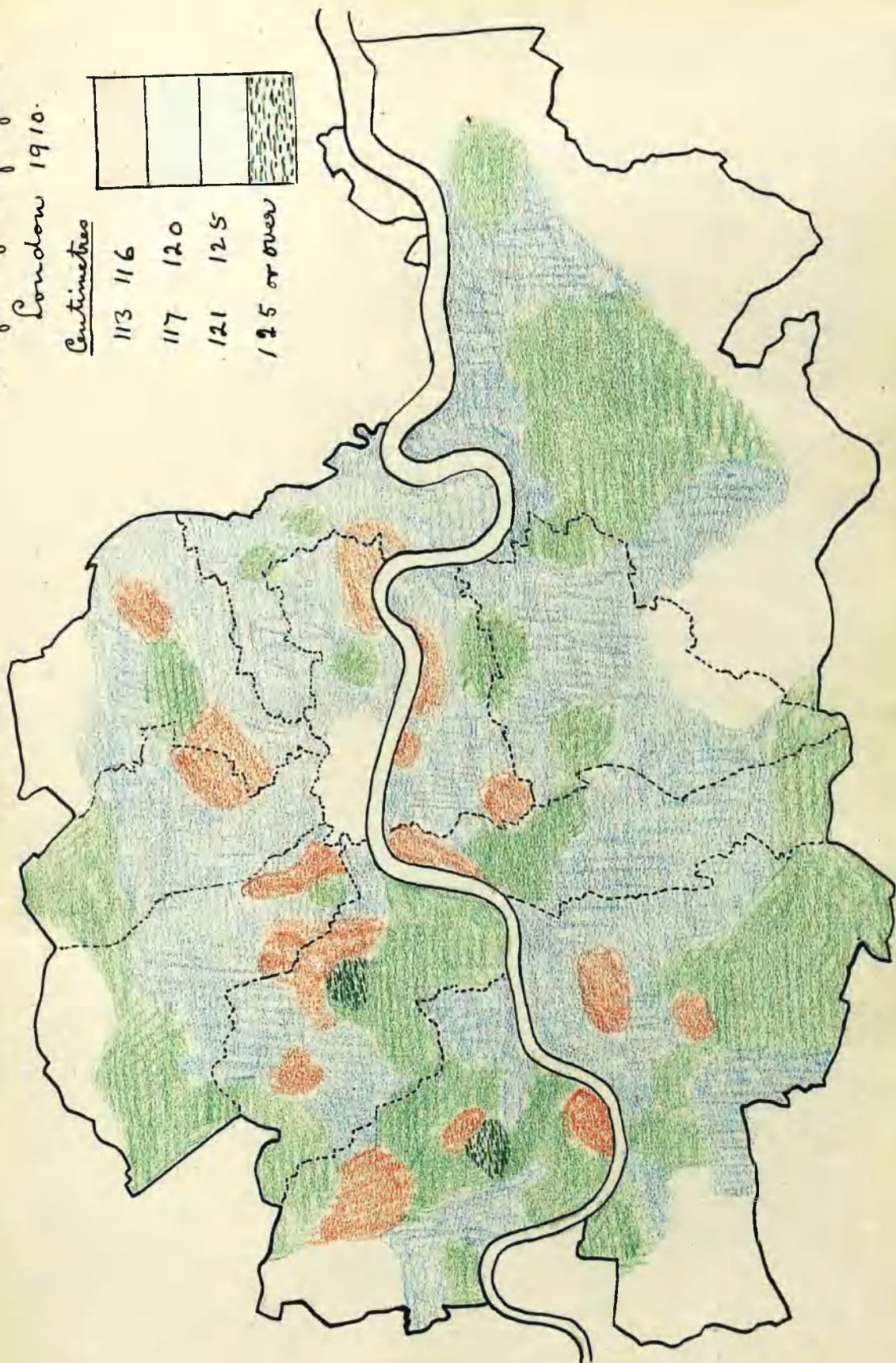
Centimetres

113 116

117 120

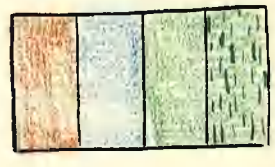
121 125

125 or over

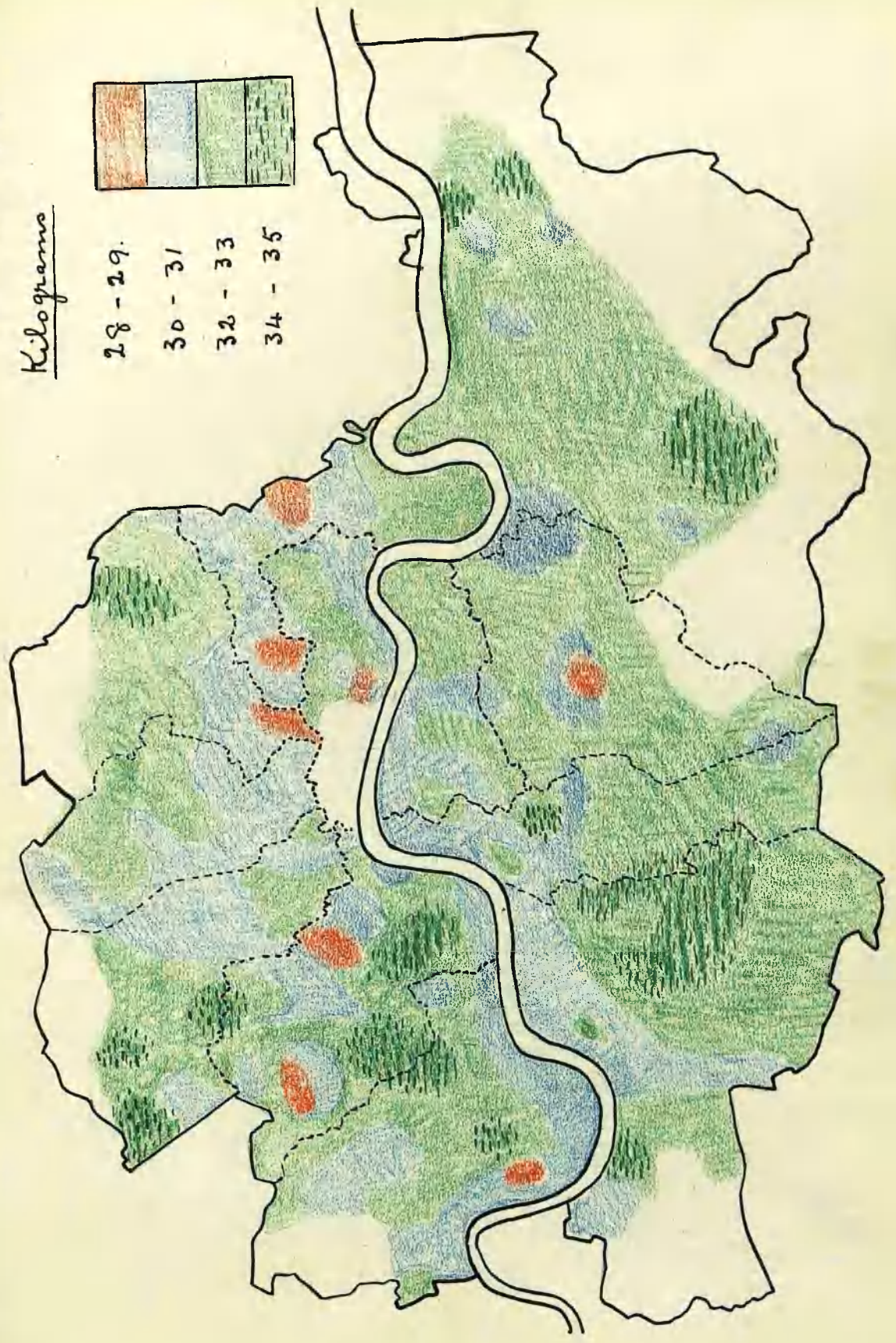


Weights of Boys aged 12.
London 1910.

Kilograms



- 28 - 29.
- 30 - 31
- 32 - 33
- 34 - 35



Sights of Boy aged 12
London 1910

Centimetres

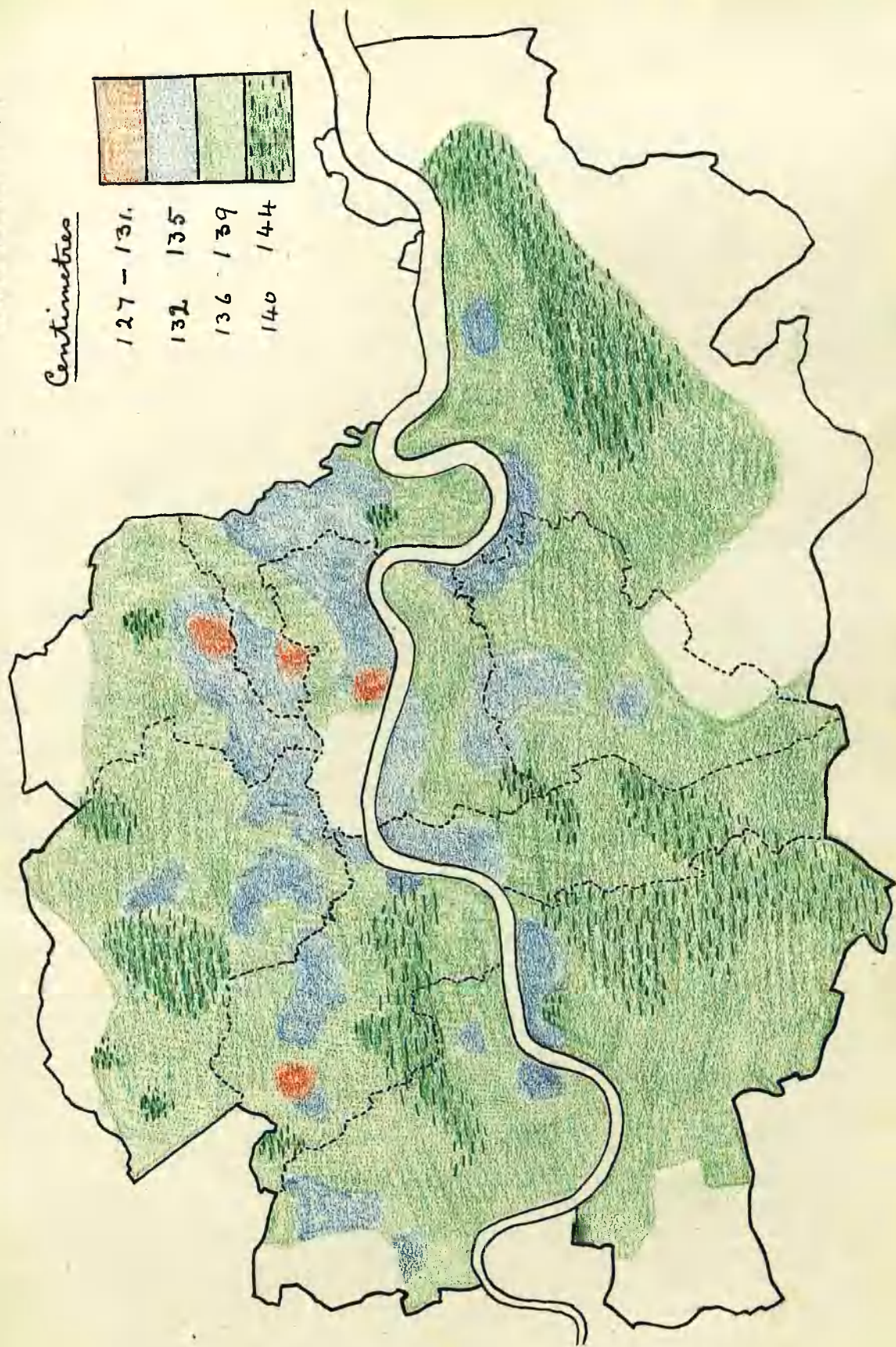


127 - 131

132 135

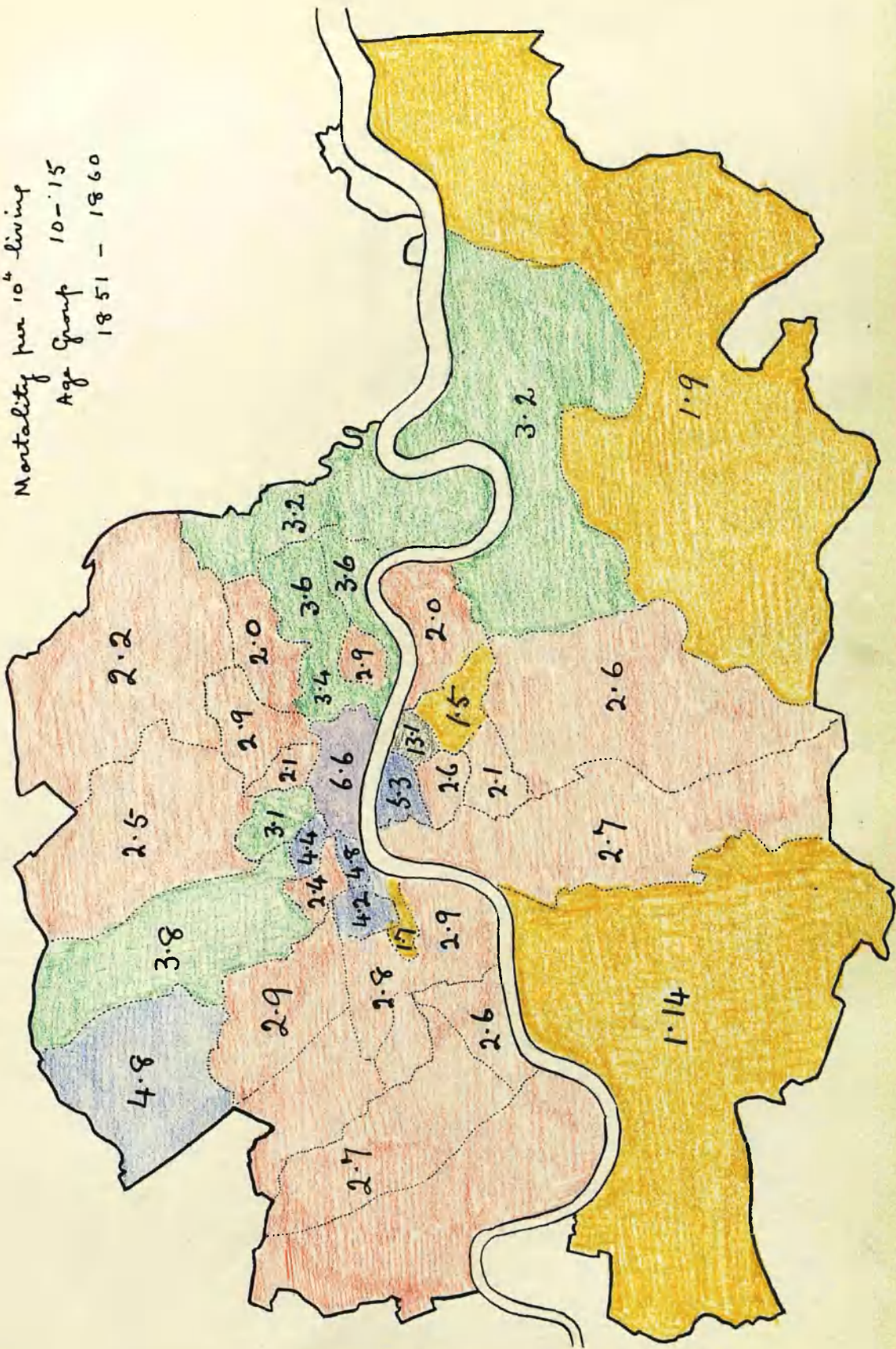
136 139

140 144

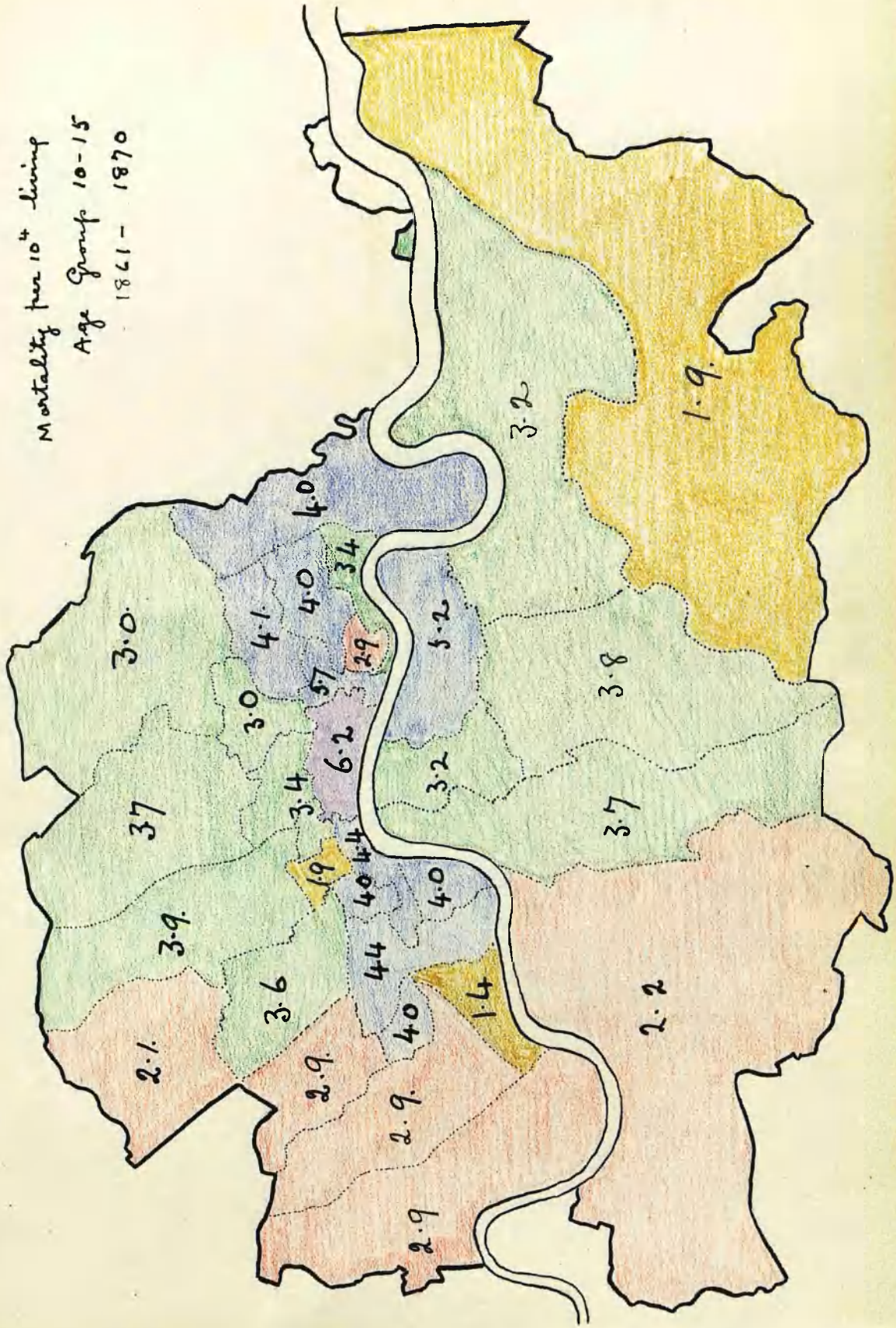


of the parents in each district, if the British Association figures had been used as a basis of calculation. The lower averages are found in the riverside districts, in North Kensington and in a central band extending from the Strand to Bow and Bromley. The result in Fulham is unexpected, as here the children come from comfortable homes of the artisan or commercial classes. On the whole the poverty areas are clearly indicated. The relation between physique and social conditions would seem at a glance to be closer than the relation thereto of heart disease. The relation of overcrowding to poor physique is only clear in extreme cases, and in every instance other factors come into play. Overcrowding is associated with small incomes, insufficient food, deficient sleep, and often ill-health. On the other hand the teeth are better, owing perhaps to an inability to obtain sweets; there is usually less tendency to lymphatic enlargements, perhaps because the children are so much more in the open; and the general musculature is less flabby. It is probable that the children of the very poor have undergone so stern a natural selection before the school age that the survivors are of sturdier build which falsifies comparisons between class and class. The child who would have exhibited rheumatism and heart disease has perhaps succumbed to some earlier infection.

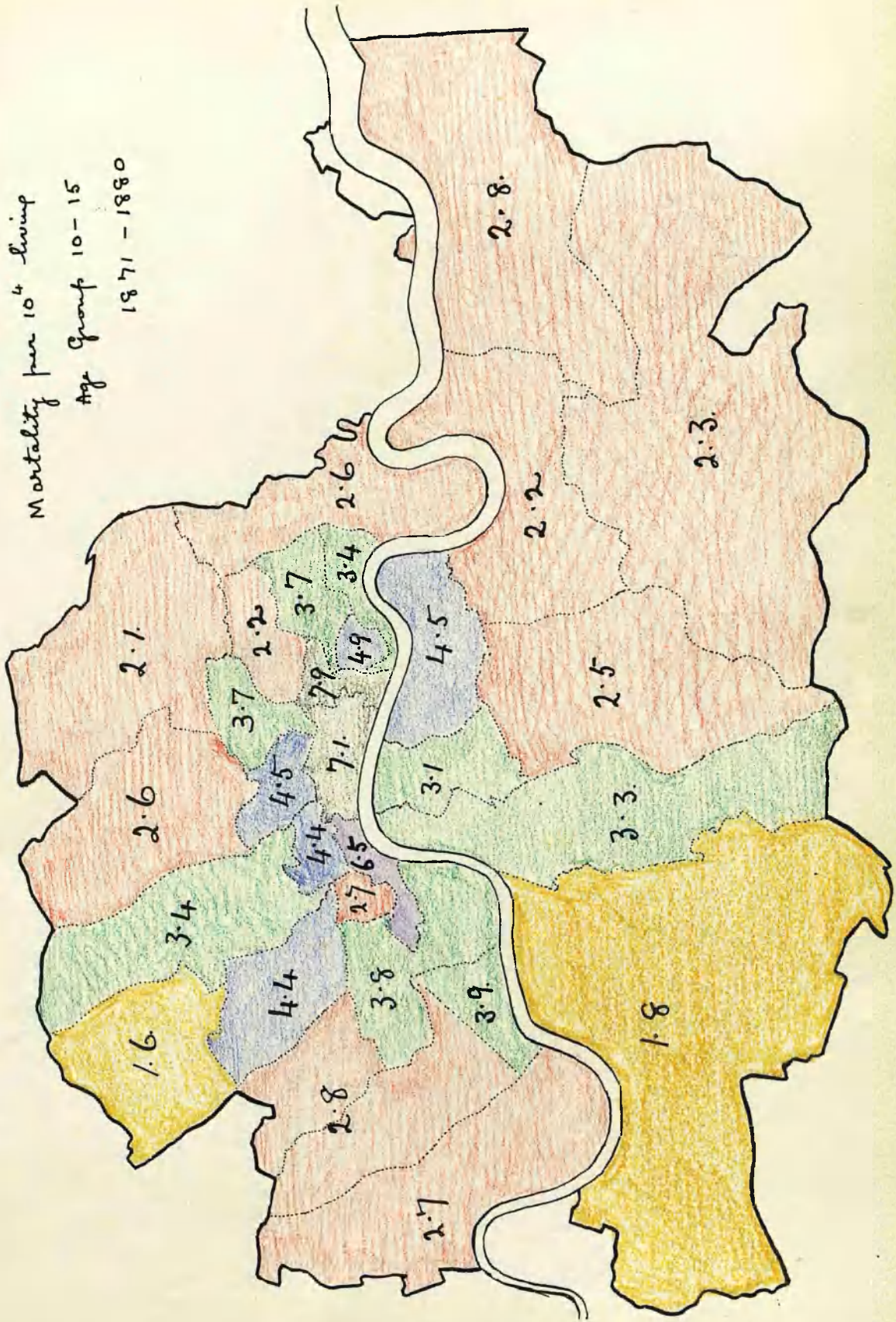
Mortality per 10⁴ living
 Age Group 10-15
 1851 - 1860



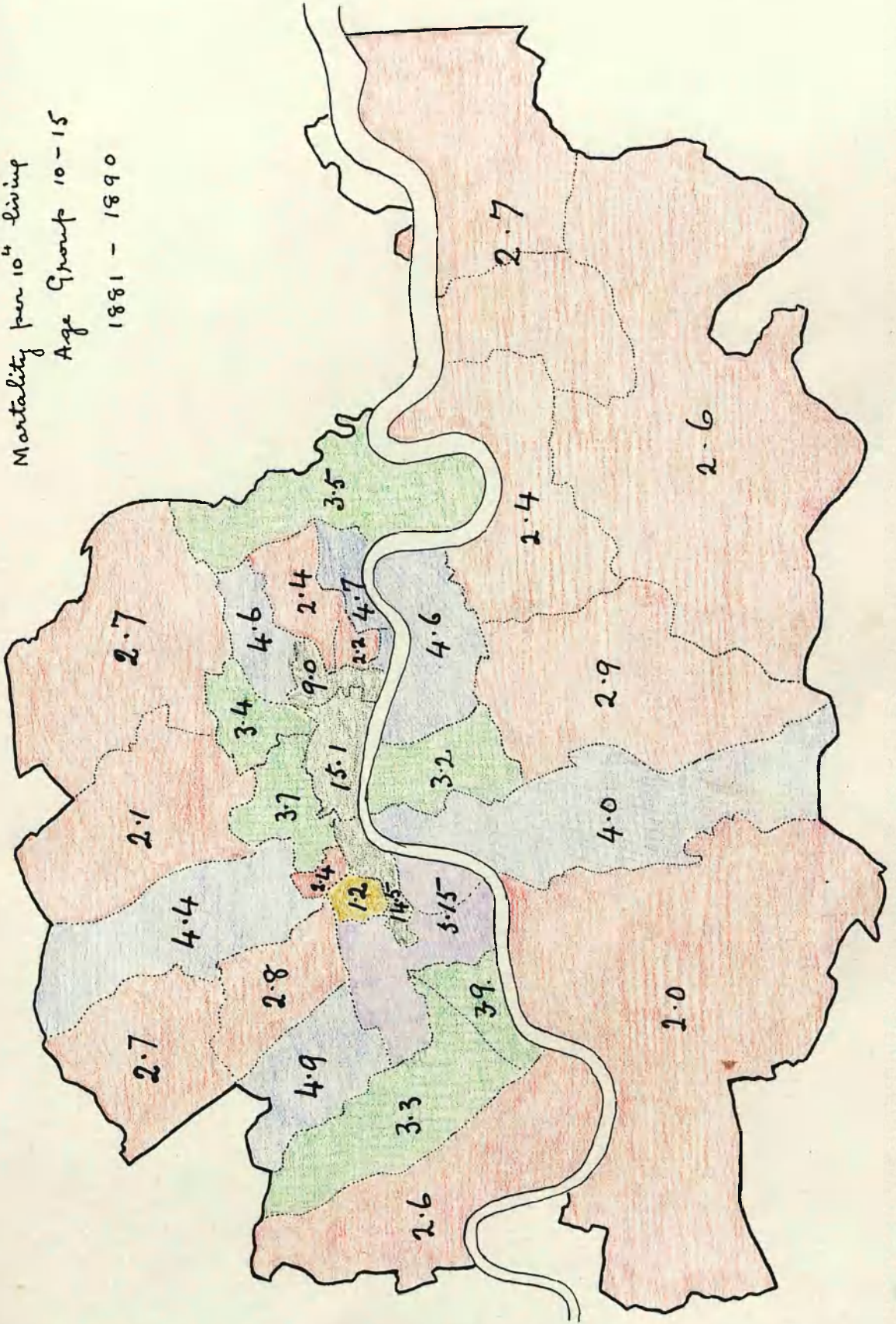
Mortality per 10⁴ living
 Age Group 10-15
 1861 - 1870



Mortality per 10⁴ living
Age Group 10-15
1871 - 1880



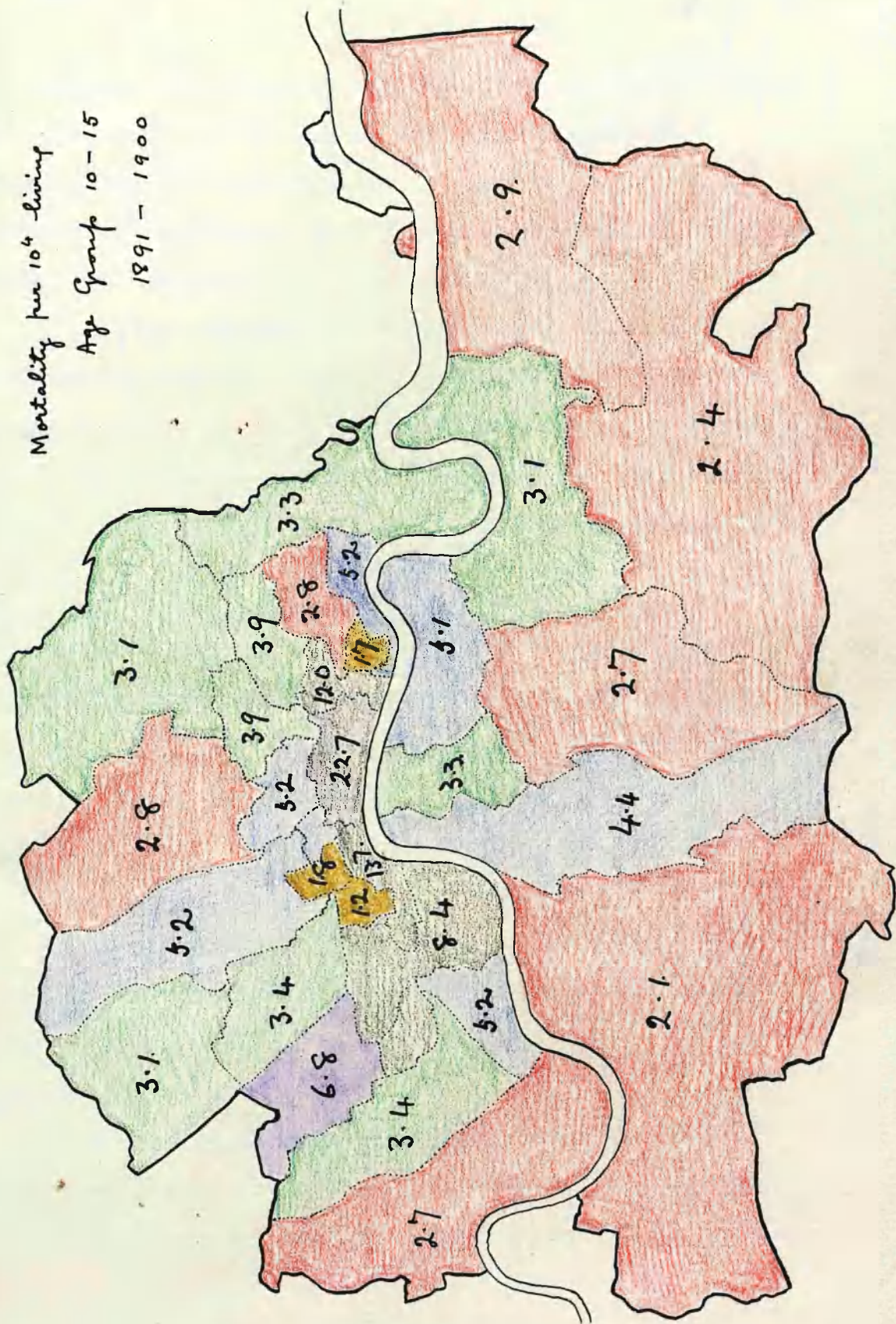
Mortality per 10⁴ living
 Age Group 10-15
 1881 - 1890



Mortality per 10⁴ living

Age Group 10-15

1891-1900



In Finsbury, St. Pancras, Notting Dale, the Wandle Valley, Battersea, and the Greenwich flats there seems an association of heart disease and poor physique. In other areas, as Kensal Town, a better physique accompanies rheumatic traits.

To some extent the factors which are associated with the prevalence of heart disease might be expected to be revealed by an enquiry into the mortality rates for a considerable period of time, during which some of the features of the environment might have changed while others had not.

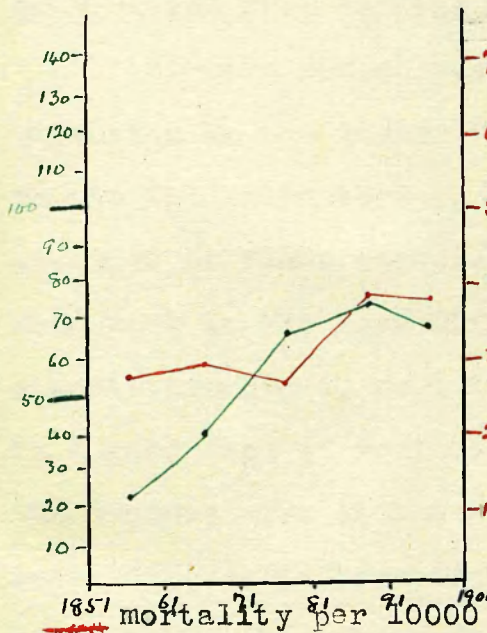
Comparison of Registration Areas.

The previous data with regard to the present distribution can be compared with these area by area. For this purpose the mortality rates in the registration areas of the London district for the ages 10 - 15, which correspond most closely to the school ages, have been calculated and contrasted in the light of the changes in the density of the population, of the type of population, the permanent features of the ground, housing etc. in each area.

Kensington.

In the early days of registration this district comprised nearly the whole of the western edge of London, but as time passed and the number of inhabitants increased,

first Fulham and then Paddington separated off. Except in Notting Dale, the greater part of the area lies between the 50 and the 100 foot level and is of a gently undulating character crossed by broad valleys. The present shopping area of Westbourne Grove was in early Victorian times a ridge of corn-fields through which a field path wound to the toll-gate at Notting Hill Village, and beyond this from



— persons per acre

the slopes of Campden Hill the prospect was entirely rural. At that time there was a ring of high class residences near the park, and spreading out, along some of the main roads between the various isolated hamlets, many of which can still be recognised. The coming of the Regent's Canal and the extension of the Great Western Railway caused much disturbance

in some of these; notably in Kensal Old and New Towns, which were little red brick villages standing just off the main road. The rows then put up were soon crowded, and the district between the railway and the canal was known locally as soap-suds island, from

the favourite occupation of the women, the real wage earners. Into it gradually poured all the riff-raff from the Praed Street area displaced when Paddington station was constructed. A great increase in the population of the whole Kensington area took place between the 50's and the 70's at first chiefly of the well-to-do. From the 80's onward the out-lying poor areas in Kensal Town and Notting Dale rapidly increased, largely through immigration from central London via the Lisson Grove area.

Of more recent years there has been a buoyant expansion in the Queens Park and Kensal Rise district on the Willesden border, chiefly of two storey houses arranged as flats occupied by the artisan classes, many of whom work in the Post Office or on the railway. The streets are broad, well drained, quiet at night, and there is a good deal of refined home life, except perhaps in the laundry area at the N.W. corner. Yet none the less heart disease is prevalent and has been since the first, as probably, has the undue frequency of sore throats, enlarged tonsils, and like conditions revealed by medical inspection in the schools. Kensal Town has been entirely ruined, and has become a slum characterised by the drink-absorbing capacity of its residents who however differ from those further south in Notting Dale in that, as yet they are a fairly fixed population, and children may be

found attending the schools which formerly catered for their parents. Notting Dale has become a place for tramps. There is a small block of rough dwellings near the Marylebone Infirmary, some old village poverty associated with the workers in the now exhausted brick-fields, and in the area known locally as "the potteries". In the Sirdar Road and Bangor Street district the poverty is of the wastrel or vicious type. Latimer Road was formerly a great laundry area, but the laundry business is moving further out and is being replaced by no special occupation. The social conditions under which the children of North Kensington live vary considerably. At Oxford Gardens the type approaches that of the secondary school, while at Edinburgh Road, only a few streets away, many are dirty ill-fed and neglected. Yet the amount of disease is not great, the troubles are chiefly minor ailments, the general impression left being that the material is fairly good, but that the conditions of life are at fault. The necessity for buying cheap food results in the purchase of food-stuffs deficient in nutritive qualities. The main articles of diet are bread and butter, the fag ends of coarse meat, the outside leaves of green vegetables, tea, and an occasional pennyworth of fried fish and potatoes. Dirt is everywhere, and is a potent factor in the production of mal-nutrition;

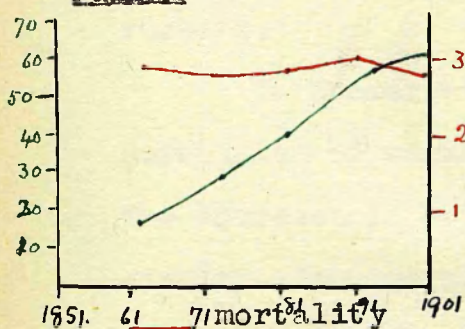
large numbers of children are verminous and shew evidence of the infested state of the bedding. Infants are drowsy and inclined to sleep all day, having had no opportunity of quiet sleep at night. Approximately one-third of the children in this neighbourhood are supported by female labour. With the mother at work the children rapidly become neglected, the boys get out of control, learn to play truant, and become known to the police while still in the junior school. The home is looked after by an elder girl; perhaps not more than 10 years of age. The mother's earnings provide bread and tea, and pay the rent, but leave nothing over for boots or clothing. Many of the boys obtain odd jobs out of school hours for which they receive food or small sums, and in consequence they appear better nourished than the girls who work beyond their strength at domestic work, step cleaning, baby minding, carrying heavy laundry bundles or running errands. For all this they receive no remuneration, it is done for the family. This is a marked contrast to some other poor quarters, such as Bethnal Green, where the girls are in better condition than the boys.

It will be no surprise to find that under such conditions heart disease cases are not uncommon. Taking Kensington as a whole there has been a steady increase in the population with much less change in

the death rate. In the Paddington area the death rate shewed a rapid rise in the last decennium, with the increase in the Kensal Green population.

The surface of the area is about equally gravel and ^{earth} London clay with a patch of brick at the foot of Notting Hill. The bulk of the known cardiac cases are on the clay, and a considerable proportion ^{is} adjacent either to the canal or to one or other of the branches of the West Bourne.

Fulham



1 The registration area of Fulham, comprising the boroughs of Fulham and Hammersmith, is low-lying except at its extreme north, where Wormwood Scrubs rises above the 50 foot line, but

—persons per acre save for two or three recent streets

at the side of Scrubs Lane this part only contains the prison. The Scrubs is on the clay, but the greater part of the area is or was on brick earth with a fringe of gravel and a thicker area dividing the earth near the Hammersmith road. The gravels by the river were all water-logged at the time of the construction of the houses along the banks from Bishops Park to Craven Cottage. In earlier days the district was a mixture of moor and marsh intersected by lazy streams of no great size.

Formerly there were a few good houses and some

scattered poverty of the village type. Then a certain number of well-to-do ^{persons} settled in the Ravenscourt Park quarter, which is only now ceasing to be a comfortable residential district. In the 80's and 90's the district contained many of the commercial and clerical classes going up to town by train.

The Shepherd's Bush area has deteriorated gradually and now largely consists of the lodger type of commercial workers.

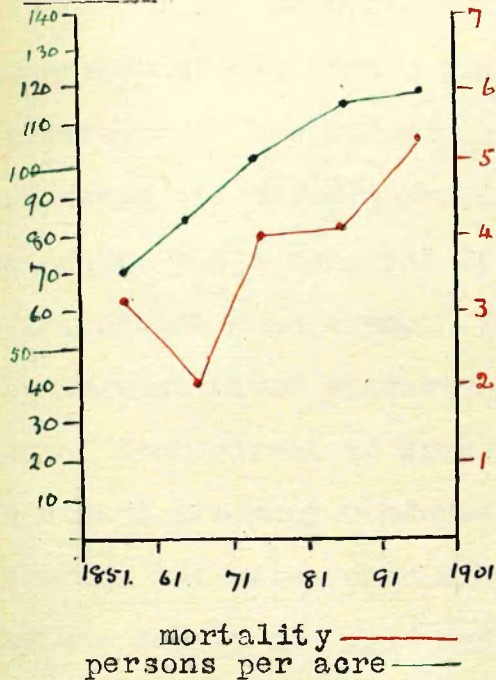
In Hammersmith there is some poverty among the older population of market gardeners and riverside workers. The increase in houses has, on the whole, brought in a working-class population, especially as for many years the means of communication with London proper were very bad. The fringe of market gardens and orchards was well marked until the last ten years and even now has not entirely disappeared. Fulham used to be a separate and distant village. There is a clan of Irish labourers in the Field Road district, while near Lillie Road and North End Road were the dwellings of horsekeepers, car and cab cleaners and exhibition workers, and some of the wastrel and vicious poverty that is commonly associated with the hangers-on to exhibitions. The streets off the Fulham Road in the neighbourhood of Bagleys Lane

received many refugees from the destruction of Drury Lane. The Sands End district is poor and ill built, the occupants of the houses being largely gas workers or general labourers. The better parts of Fulham are peopled by clerks and other city workers. The districts in the South corner by the river are flagrant examples of the work of the speculative and hasty builder. There is, however, little real overcrowding even in the worst parts.

It will be observed that the death rate has remained remarkably constant while the population has increased. The heart cases are to be found in the damper parts, in the houses by the river in new buildings, in the Glenthorne Road district in very old houses. The social status of the affected families is poor in the Hammersmith area and to the east of the Wandsworth Bridge Road, but very comfortable in the roads between the Fulham Palace Road and the river. In this district there was a good deal of diphtheria, though at sufficient intervals not to attract much attention, in the new rows of houses and also in the Ellerslie Road district and the bottom of Willow Vale along the line of an old stream. The climate of Fulham is somewhat relaxing.

The great change in the borough is from a few large houses surrounded by market gardens and orchards to innumerable rows of small houses.

Chelsea.

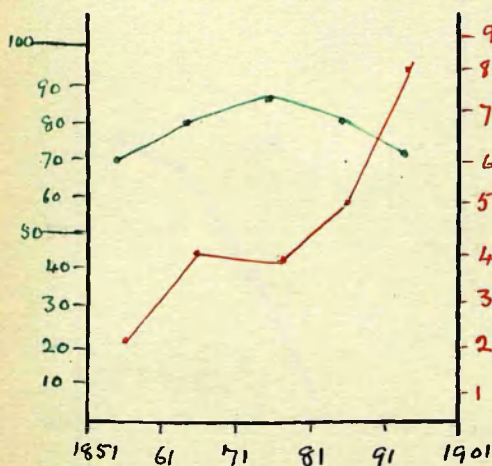


This is a low-lying gravel flat, for the most part below the 25 foot line. The old village for a long time remained apart from the rest, and the old families could be traced in the schools within the last three years. There was a certain amount of poverty of an old standing but vicious type associated with the presence of the Cremorne Gardens, and after these had gone to

this area came many dispossessed from more central areas, so that the lower borders of Bridge Creek have been slums for 60 years or more. There is little reason to suspect this part of unusual dampness, though the houses are old and doubtless have no damp courses. Place names might be deceptive, for one road leading up from the Thames is called Flood Street, ~~but for~~ this is not on account of recurrent inundations but in memory of a certain resident, a Mr. Flood. In the earlier registration days the conditions in Chelsea were bad, but they improved in the sixties and early seventies until the district was flooded by migrants from central London and Westminster when the big improvement schemes were in full swing. Chelsea formed a stage

in the migration outwards and for a time presented a marked contrast of wealth and poverty close together. With the clearance of the Cadogan estate the poorer and more shifty elements are being moved on to Battersea, Wandsworth, and Mitcham, but a roughish Irish element still remains in Marlborough Road area. The western end of the borough is of a somewhat mixed character, and a wastrel element is constantly moved from street to street by the police. Yet in this same district are many comfortably-off families who might have a servant but often only a help. The houses formerly occupied by one family now hold perhaps four. Well drained with broad roads this is not a district in which rheumatism is so much noticed as in the newer houses nearer the river. Around the electric power works there is a high rheumatism rate and a number of heart cases.

St. Georges, Hanover Square.



mortality ———

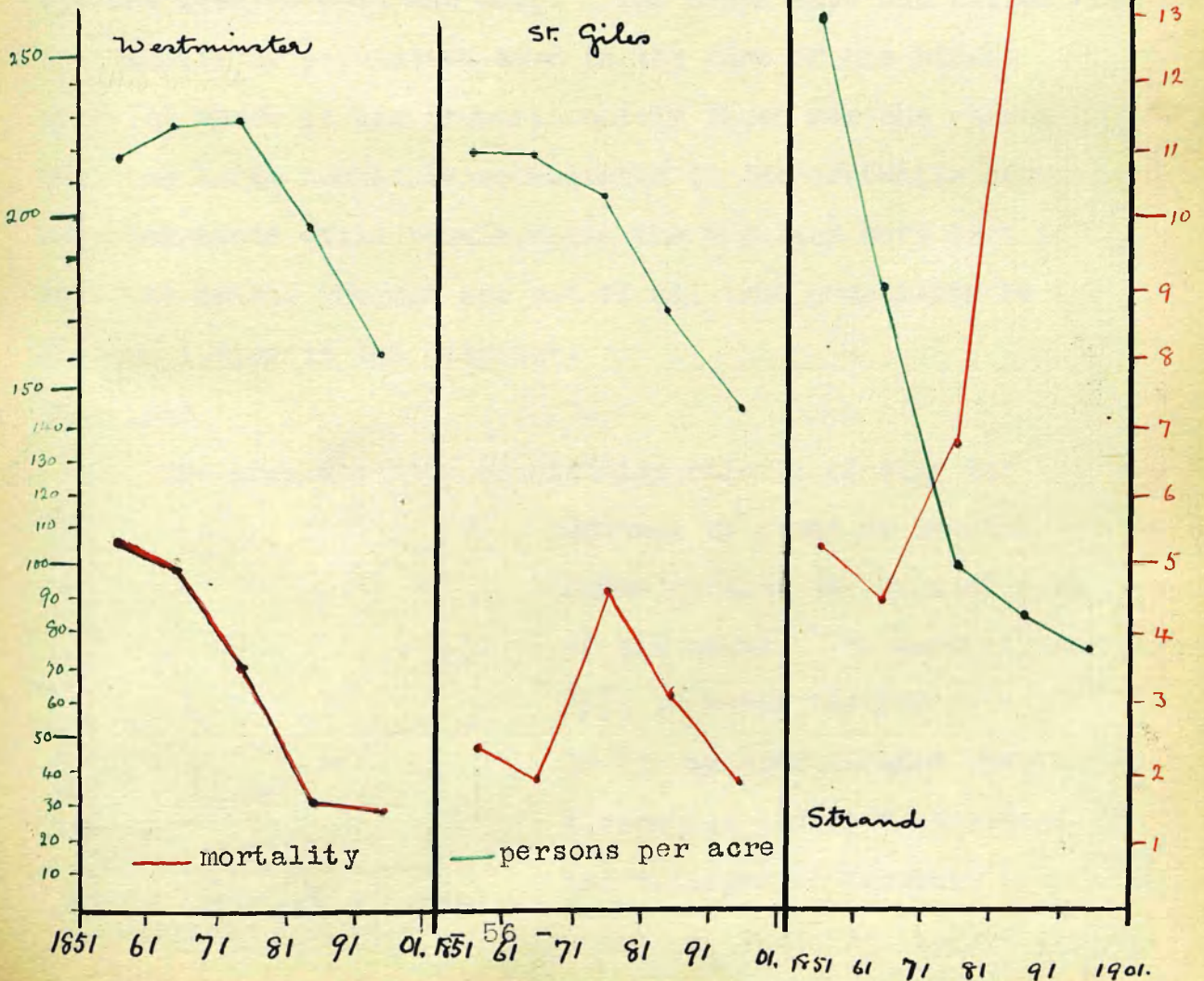
persons per acre ———

This is a lowlying registration district which has changed but little in density of population. Large parts are occupied by parks. Knightsbridge, Mayfair, and Belgravia have always been fashionable quarters during the registration period. Behind the mansions are sets of mews in which the coachmen, grooms, and their families have lived in

comparative comfort. Sometimes these have been let to a poorer class of car cleaners etc. so that from comfort one might pass to moderate poverty. This condition has somewhat accentuated of late years. The rise in the death rate has been steady.

Westminster, St. Giles, Strand.

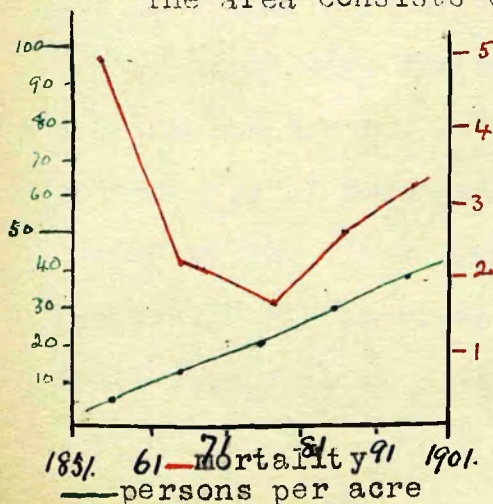
In these districts may be traced the disappearance of the poverty-stricken crowded courts and alleys described by Dickens. The clearances for the Law Courts, Shaftesbury Avenue,



Charing Cross Road, and Kingsway have removed almost the whole of the most populous part of early Victorian London. The displaced occupants for a time still further crowded the neighbouring courts and then moved to Lisson Grove and Chelsea and thence further out. They were unfortunately not regenerated by the change, but set up fresh slums amidst almost rural surroundings in Battersea and Wandsworth. Many of the remaining occupants are in dwellings and reconstructed houses, keep rather better hours than their predecessors, and are exposed less to cold and damp. The death rate has fallen with the density of population, save in the case of the Strand district where it has proportionately risen for the reason that the large hospitals established in the erstwhile crowded neighbourhoods still remain, while the populace have left, so that the deaths therein are out of all true proportion to the numbers living in the district.

Hampstead.

The area consists of hillside chiefly of clay but



crowned by a cap of Bagshot sands forming the greater part of the heath. No part of the area is below the 100 foot line. In the earlier decades the registration district consisted of the villages of Kilburn, Brondesbury West End, and Hampstead, separated

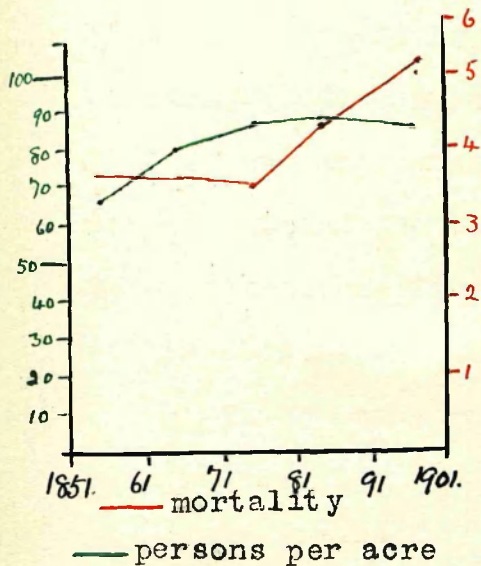
among

by fields ~~or~~ heath scattered in which were a few country residences. There was some poverty, congestion, and lack of sanitation of the old-fashioned village type. Soon houses sprung up along the roads, and many of the older cottages were destroyed and replaced by others of a better type for the town dweller who wished to live at the edge of the country. With this change there was a fall in the mortality. The greater part of the district is still occupied by the wealthy and the well-to-do, but in the last two decades there has been a growth of small houses, with some degree of poverty and congestion, in the lower parts of Brondesbury. The condition commenced with the need for dwellings for the workmen when the Metropolitan Railway extension to Harrow was constructed, and once started the district served to house some of those displaced from Lisson Grove. The lower slopes of west Hampstead are now occupied by small houses of the clerical class which were run up rather hastily in ill-drained fields but which are now probably dry, the building craze having passed just outside the country to Golders Green and Childs Hill. A poorer type of house and resident has also spread up the valley of the Fleet from the neighbouring borough of St. Pancras. The increase of population has been steady, the death rate from an original rather high level fell suddenly

and has since slightly risen. The fall may have been due in part to the improvement of the village property or simply to the introduction in considerable numbers of a better type of resident.

Pancras.

This area also consists of a series of slopes, the



central line of which is made by the valley of the Hole Bourne. The summit of Highgate is capped by Bagshot sands, there are pockets of brick earth in Kentish Town and Camden Town, while the lower levels south of the Euston Road are, or were, of gravel. The slopes of Highgate have always attracted a certain

number of the well-to-do, as has the Haverstock Hill district, but for the rest the history is one of the replacement of fields and market gardens by rows of monotonous houses. From the first, Somers Town has been a place of mean streets, the entrance of the great railways and the clearances required for Euston, St. Pancras, and King's Cross removed over a third of the area in successive periods. The displaced inhabitants crowded up in the same district as far as possible and gradually increased its boundaries to the north displacing an older population who had lived in

moderate comfort in Kentish Town and the lower slopes of Highgate. The demands of the railway have led to large quarters being devoted to guards, signalmen, platelayers, porters, and casual workers on the line who have taken over the greater part of the Fleet Valley in Kentish Town and the streets between Chalk Farm Road and Camden Road. The great goods yards have also encouraged the settlement of coalies, goodsworkers, porters, and costers off Camden High Street and between the Hampstead Road and Albany Street around the basin of the Regent's Canal. A large colony displaced from Somers Town has formed fresh slums at the side of the cemetery in Highgate New Town.

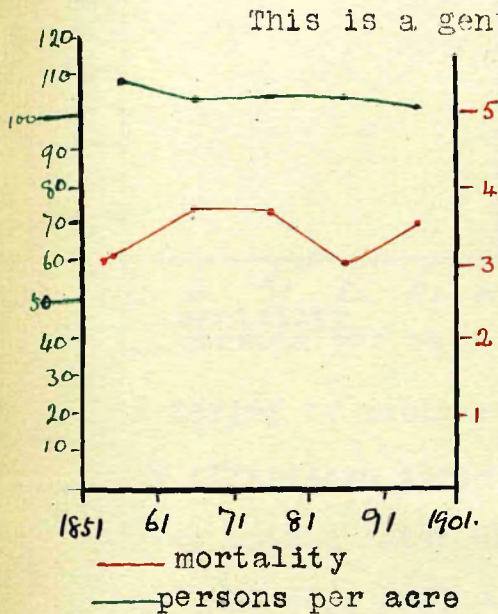
In the southern part of the area there is still much wastrel and vicious poverty, though less than there was a decade ago.

The increase in the density of population has been checked by the huge clearances for railway and goods yards and the actual figures give a somewhat false impression in consequence.

The mortality has risen in the last two or three decades, which corresponds with the close occupation of the upper valley of the Fleet. It will be noted that most of the heart cases attending the special schools occur in this valley. Here are several factors, poverty, damp, clay soil, bad housing, perhaps even stuffiness co-existing.

It is difficult to conclude which is dominant, but for the individual the former seems to be ^{the} most effective as in its absence the others could be avoided.

Marvlebone.



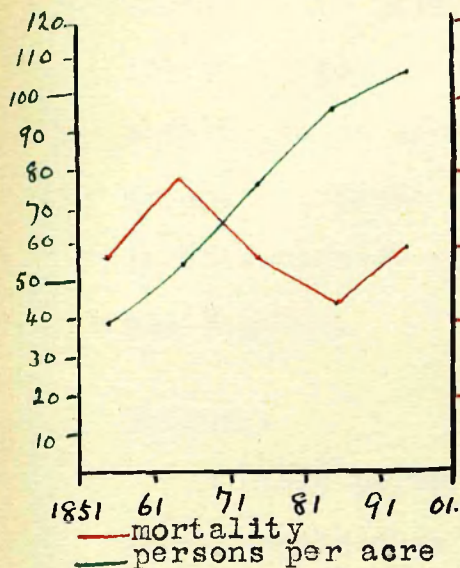
This is a gently sloping clay district consisting

for the more part of good class houses in the squares, around the park, and spreading up the Avenue and Finchley Roads to Hampstead. The poorer areas are between the Grove Road and the Edgware Road. Formerly the Lisson Grove area was one of the worst in London, but the construction of the Great Central Railway and the erection

of several blocks of "models" has changed matters for the better. In the whole period there has been a fairly stationary population and death rate. The district from the evidence of the school children would seem fairly free from heart disease. It is certainly a very dry district throughout its poorer quarters, though some of the houses in Avenue Road and St. Johns Wood Park are somewhat damp perhaps as a result of the former streams now nominally in culverts.

Islington.

This is a large undulating registration area crossed



by several ridges. The surface formation in the north is clay in the south and west gravel, and in the east brick earth. Parts of Highbury and Canonbury are still occupied by very well-to-do, if not wealthy, city men, but for the most part the borough has fallen away with the course of time. Islington was in earlier days

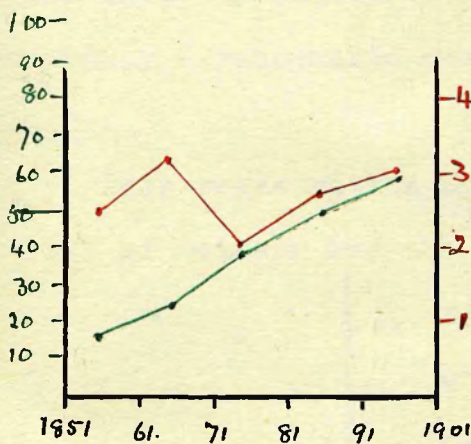
a series of isolated villages, which were gradually joined by straggling streets. Then a wealthy residential quarter grew up, and later the wealthy inhabitants moved further out and were replaced by the well-to-do, these in turn in most districts by those of comfortable means. Comfort became less common, and finally in the lower lying western area poverty and squalor of a wastrel type of helplessness reign supreme.

The inhabitants of the streets west of the Caledonian Road are mainly dependant on the railway, guards, porters, shunters, carmen and the like, but recently there has been introduced a wastrel populace from the south of the Euston Road displaced by the improvements in that district. Most heart cases are found in the poorer streets in the old river valley and near the canals, but there are a few in better class neighbourhoods. On the whole the

mortality in Islington has fallen with a rising density of population. For some time all building operations have taken place not on open fields but on previously occupied ground; so that there has been a marked contrast in this respect with the neighbouring districts Pancras and Hackney.

Hackney.

This borders on the Lea Valley and so has a considerable area of alluvial land little better than



— mortality
— persons per acre

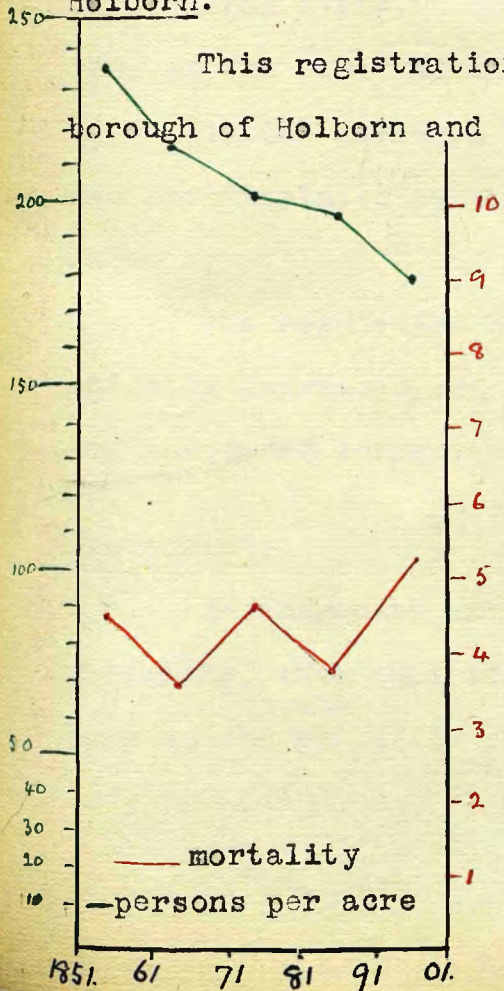
marsh. The growth of London is now leading to building upon this practically reclaimed land but a part is still utilised for factories etc.

The northern part of the area, Clapton and Stoke Newington, was formerly wealthy and is still well-to-do, on the whole, though there are

patches of poverty, perhaps the relics of older village centres. The general history is that of other suburbs; growth as wealthy or well-to-do areas, comfort later replacing wealth and poverty comfort under the centrifugal pressure along all lines of easy communication to central London. Hackney Wick has an isolated population which

has kept itself very much to itself until recent years. There has been a steady growth of population and a rise in the death rate ^{during} the last two decennial periods after a marked fall in the 70's. The heart cases noted in the present enquiry are mostly from the alluvial or brick earth flats of the Lea Valley where the houses have been recently built on land formerly liable to flooding and with a high level of ground water, as shewn by the filling of the foundation trenches on many occasions during their erection. The homes of their children presented apparently a reasonable degree of comfort.

Holborn.



This registration area comprises part of the present borough of Holborn and the borough of Finsbury. It is on the site of the lower valley of the Fleet and of the Moorfields and marshes which extended from the city gates to the Islington hills. Many place names, Goswell (Ted'swell), Clerkenwell, Anwell, Chiswell etc, suggest watercourses while Stow refers to it as a place of many springs. There has been a steady decline in the crowded condition of this area especially on the western side, and many big improvements have been made. The growth of the Italian colony

in Saffron Hill and the construction of many model dwellings along the Clerkenwell and Farringdon Roads have done much to remove the squalor formerly existing around the Field Lane refuge. Yet, the skilled silversmiths and watchmakers, who established the name of Clerkenwell, have gone, and machine workers and unskilled labourers have taken the place of the artisan, so that it is doubtful if the general average of the district has changed.

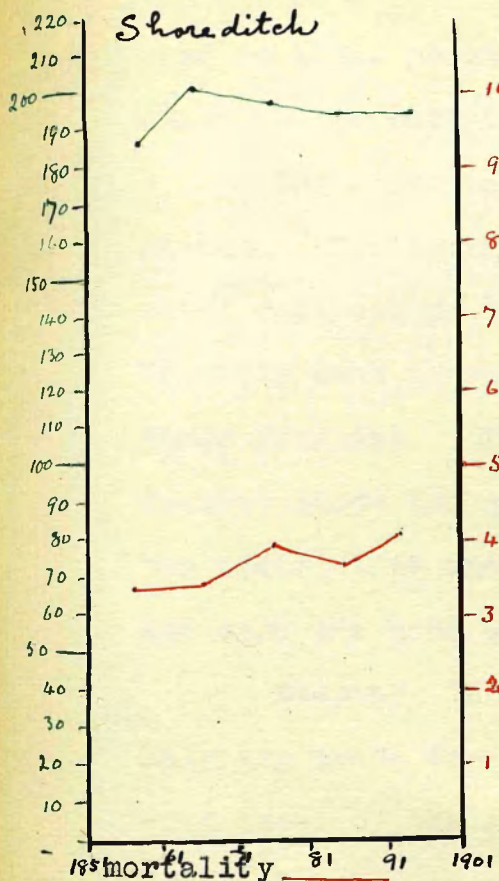
In St. Luke's the worst alleys have been pulled down and replaced by blocks of dwellings sheltering a tidier and more disciplined class. Yet in a few streets are still to be found some of the worst slums of London.

In the northern part the independent small householder has been replaced by the dweller in flat, tenement, or single room.

The population has steadily declined, the death rate slightly increased, and the few heart cases in the special schools are scattered irregularly about the district.

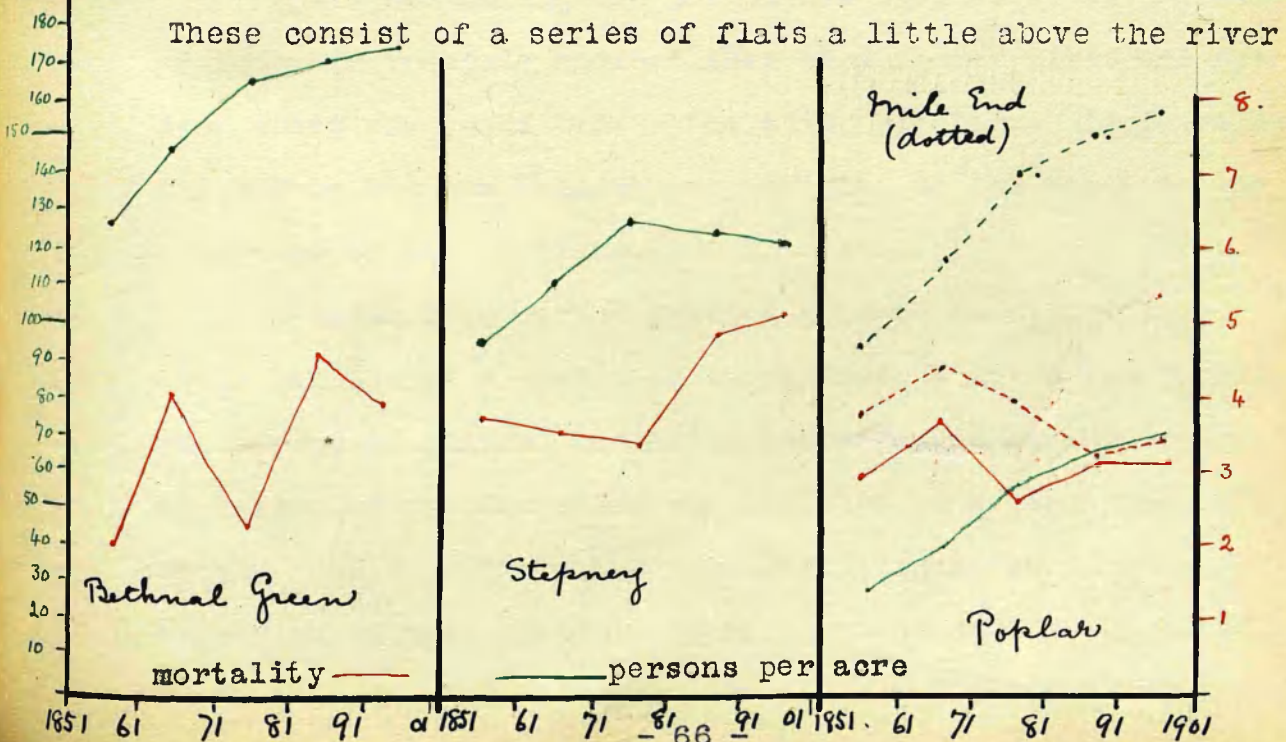
Shoreditch.

In character and history this area much resembles the foregoing, save that there have been few extensive improvements schemes and ^{the} so little change in the density of the population.



The chief change has been in the type of occupant. The skilled worker has given place to casual and unskilled labour. Factories have replaced the home workshop, and from doing a complete piece of work the man has fallen to doing some one small section, and if that section went out of fashion he would be hard put to earn a living. In the Curtain Road area cabinet-making is still a leading trade, and furniture factories have increased in number. In the north of the area near the canal such streets as Wilmer Gardens are full of mendicancy persons per acre — and vicious poverty.

Bethnal Green, Mile End, Stepney & Poplar.



save in a few points the soil is gravel with alluvial clays in the neighbourhood of the river.

The story has been one of gradual reduction of status. The individual homemaker, weaver, or cabinet maker ^{has been} replaced by the factory hand, The large rooms formerly used as workshops becoming bed-sitting rooms for large families. The N.W. Bethnal Green, like its neighbour Hackney, shows the gradual change from comfort to poverty. The district is steadily, with each decade becoming more and more the home of foreign Jews overflowing from Whitechapel.

Stepney, in the past, was largely dependent on the shipping trade for its prosperity, and its fortunes failed with those of the Port of London, after the great strike of 1889, though even at a somewhat earlier date traffic had been less brisk at the upper docks.

Mile End during the period has seen first an increase of those in moderate comfort, then of a poorer class, and now some areas are quite bad. The alien has begun his invasion, and before him the English poor retire, on the whole to the advantage of the district.

Poplar from market gardens growing on alluvial flats has become a medley of warehouses, wharves, and docks. The period of highest mortality corresponded to the construction of the docks and the building of a large number of the houses. There has been little room for further expansion without preliminary destruction during the last

fifteen years.

There is much old-established poverty in Bethnal Green, but there, as at Haggerston and Wapping, it is of a sturdy character, whereas in Whitechapel and Spitalfields there is much of a wastrel type. The increase in the population has not been accompanied by proportionate changes in the death rate from circulatory diseases. In Poplar, off the High Street, there is a large poor Irish colony, and there is another which was formerly known as the "Fenian Barracks" at the side of the Limehouse Cut. In Devons Road and Devas Street are bad areas, with casual labourers at canal side gas-works and docks.

In Carr Street and the White Horse Lane district, are many Irish, the descendants of those who came over at the time of the great potatoe famine. North of the Bow Road in Old Ford the poverty is of long standing, due rather to poor pay than to irregularity of work. Throughout the further East of London the poverty is steadily increasing by the displacement of the occupants of Whitechapel, Shoreditch, and St. Georges in the East by the growing streams of Jewish aliens. The chief occupations in Poplar are dock and railway work, and general waterside labour. South Bromley contains many bus and tram men and canal side labourers. The chief industries of North Bromley and Bow, are box making, match factory work, chemical factories, and paper bag works. In Limehouse

zinc works and biscuit works predominate, while in Mile End breweries, distilleries, gas works and for the women at home the manufacture of cheap clothing.

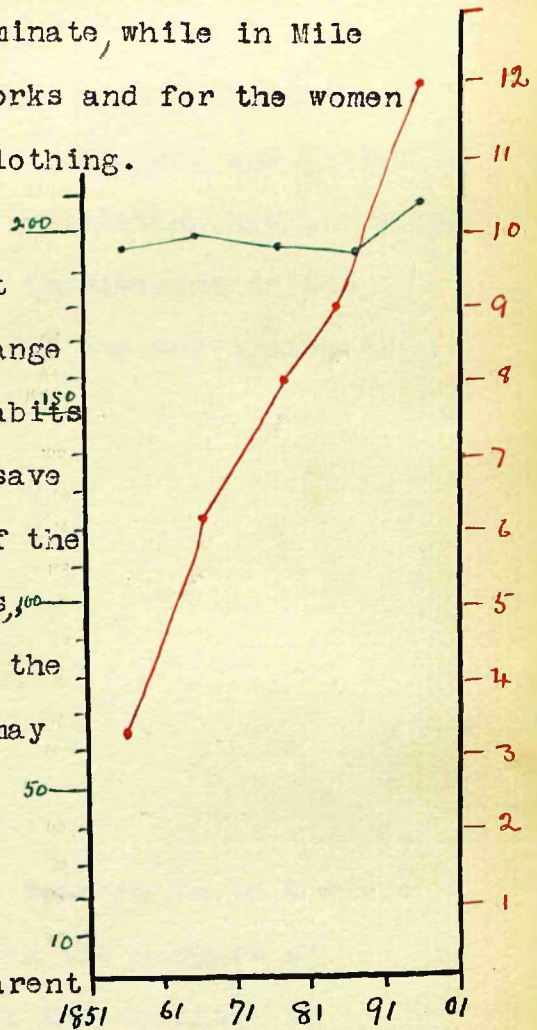
Whitechapel

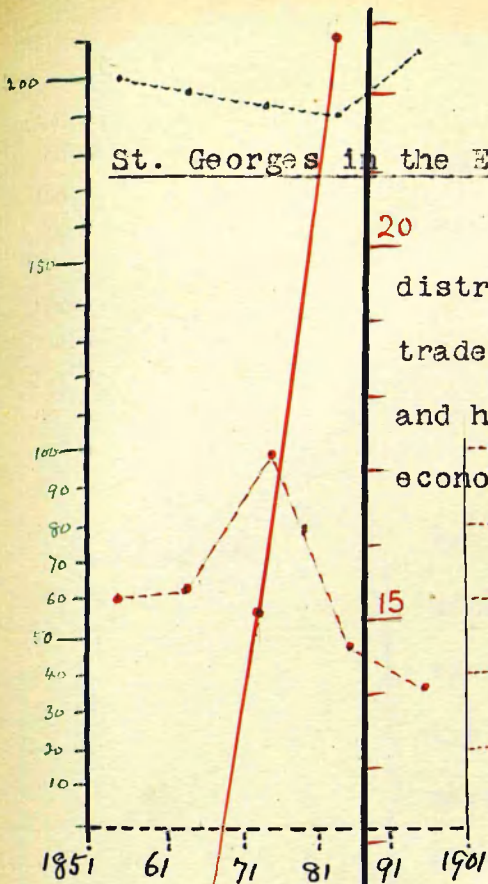
This district has shewn little change in the density or habits of its population, save the disappearance of the Spitalfields weavers, but a great rise in the death rate. This may be due to deaths in institutions but generally it seems

mortality — persons per acre

contrary to the apparent

evidence of school inspection as to the relative immunity of Jewish children from heart ailments. The proportion of aliens has risen at each decade. Perhaps the worst batch of aliens, the new arrivals, populate Whitechapel and leave as soon as they can earn a little.



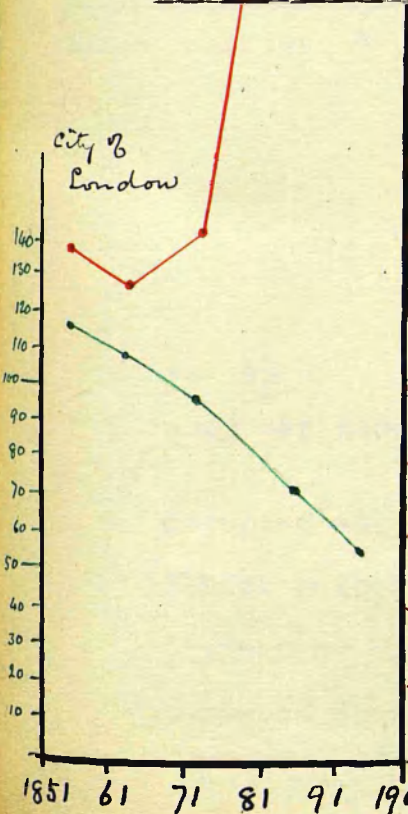


St. Georges in the East. (dotted)

This has always been a crowded district dependant on shipping and allied trades. The alien population has increased, and has led to some improvement in the economic conditions of the worst streets.

— mortality persons per acre

The City of London.



city of London

London is fast ceasing to be a place of residence, whereas the numbers of patients taken in at the hospital of St. Bartholomew keep up if they do not increase, so that, with a constant supply of deaths from circulatory disorders and a dwindling populace without, a false impression of rapid increase is obtained.

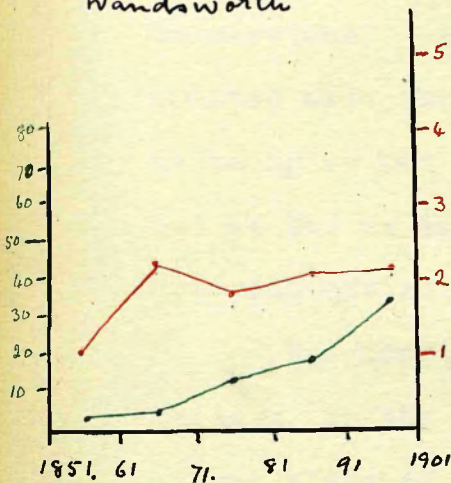
Wandsworth.

This large registration district consists of undulating country, quite wild on Richmond Park, across which it reaches

to the Beverley Brook, and Putney Heath; semi-urban with fields and market gardens in large parts of the Wandle Valley; urban for the rest. Clay and gravel are the chief formations.

In the earlier registration decades the district consisted of a series of

Wandsworth



5 separate villages. Between these, on the roads radiating out from London grew up the semi-country houses of well-to-do city merchants and business men. For a time after the reclaiming of the marsh to make a Park, Battersea was a fashionable quarter, but the railway construction and the needs of the large sheds and goods yards led to the provision of house the labourers and accommodation for their families, and the brief period of exclusiveness soon ended.

mortality ———
persons per acre ———

The railway workers and those of allied trades spread over from the market gardens by the railway into the old town and

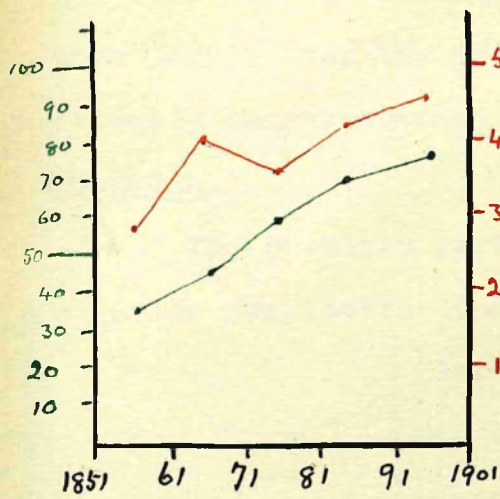
occupied all the low ground from Nine Elms to the Wandle. Junior members of city firms had villas on the road from Clapham or Brixton to Balham and Tooting. Later, with improved communication came the clerks, and still smaller

houses. From the mid 90's the displaced population of central London poured out through Chelsea as far as the Wandle Valley, from Wandsworth Old Town to Tooting Graveney. In spite of the fact that much of the ground was damp, low lying, and liable to occasional flooding, it was rapidly acquired for building purposes and fairly close to the river on either bank as far up as Southfields and Summerstown. A new typical central London slum has been created amid rural surroundings which was described in 1901 as being as bad as anything in Westminster though perhaps not as bad as Westminster had been in the past. The district has not improved in the last few years.

The heart cases are found in the Wandle and Graveney valleys, in the newer streets just opening on the damp clayey sides of Furzedown, along the track of the Falcon Brook, and at the base of the escarpment by the railway through Battersea. Here, water from the river and the hills join to keep up the water level in the gravels, on which the houses are built. The district is also poor, and contains besides railwaymen in the better houses, candlemakers, gas-workers, scavengers, coalies, wood-choppers, costers and a few caravaners who claim gipsy descent.

Lambeth.

This area extends in a long narrow strip from the river to the hills at Norwood. The chief formations are

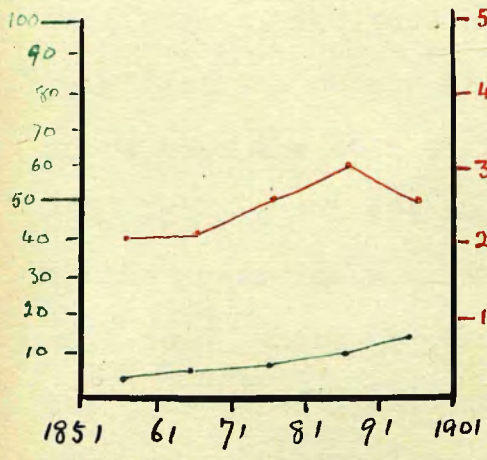


— mortality
— persons per acre

gravel near the river, and clay on the higher ground. The upper part of Norwood was found in the routine school inspections to yield most heart cases. The area contains all conditions from the very poor near the pottery works at Vauxhall to the well-to-do at Upper Norwood. The proportions have varied somewhat, and with time the poverty zone has crept further south, while fresh patches of inferior social status have appeared in parts of Brixton and along the line of the Effra. The mortality rate has always been relatively high.

Lewisham.

This area consists broadly speaking of Forest Hill, and the ridge of which it forms part,



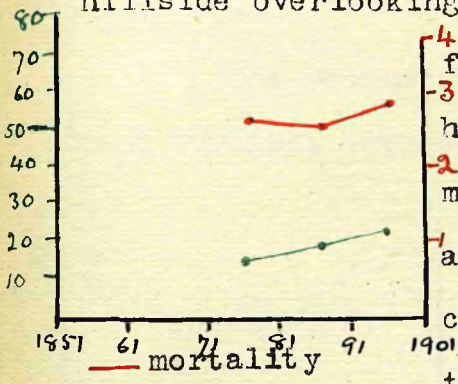
— mortality
— persons per acre

Sundridge Hill and the intervening valley of the Ravensbourne. To the south and west clays predominate, and near Lewisham Junction are gravels, pebble beds, and traces of chalk. Save in its N.W. corner this has been throughout a group of isolated villages which have gradually become connected by straggling roads and

streets, in which even now there are considerable gaps, and intervals for fields and playing grounds. The heart cases come mostly from the river valley and from a few new roads recently constructed on the none too dry clay.

Woolwich.

The populous part of this district is a strip of the hillside overlooking the river, and part of the alluvial



flat immediately adjacent. Woolwich, has always presented a mixture of a manufacturing town, and garrison town, and a rural district. The manufacturing area comprises the dockyard and arsenal, also the commercial works on the north of the

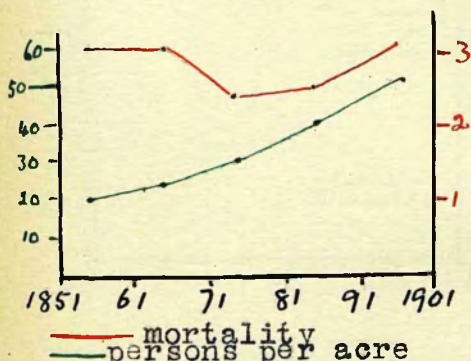
river in North Woolwich and Silvertown; when these are busy the town is prosperous. The garrison town is largely on the hills in the centre, and presents the usual good and bad features. The rural district is gradually being encroached on from Plumstead and from the newer urban centres at Eltham, Pope Street, and Well Hall, this change ~~is~~ however, too recent to effect the decennial mortality returns. The spot map shews that the bulk of the cases are on the slope of the hill between the arsenal station and Plumstead, several being on the newer roads on the low alluvial ground north of the main road, where the drainage of the subsoil is very difficult, the houses badly built, and the occupants of a poor class. The same applies all along the road through Charlton to Greenwich. Between the arsenal and the dockyard is a slum area equal to any in London, known locally as the dust hole but its limits

have been somewhat diminished of late years as special efforts have been made at demolition. The result has been that bad characters have tended to collect to the east of the common. Here the factors of damp and distress have in the main coexisted, but the number of heart cases from the newer houses is striking.

Greenwich.

The Greenwich registration area still includes Deptford and formerly embraced part of Woolwich. It contains high

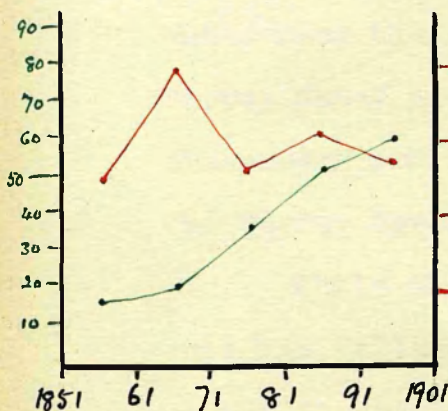
ground at Blackheath, but for the ^{major} ~~more~~ part consists of alluvial flats bordering on the Thames. Greenwich proper and Blackheath are on chalk. Blackheath, formerly a well-to-do, if not a wealthy, suburb is slowly deteriorating, and the



lower slopes from Royal Hill to Charlton are now in the occupation of the artisan classes. Life in old Deptford is rather rough, the principal occupations being connected with the abattoirs and the victualling yard. Some poor, displaced by improvements in Poplar, have crossed the tunnel and set up afresh the conditions for which they were displaced. A small poor area partly in Lewisham is Loampit vale. In Hatcham railway work is the chief occupation; on the river edge towards Woolwich labouring in the electric light and power works. It will be noted, that in the Deptford borough and on the Lewisham borders, the population has followed the line of the valleys, and that near Brockley there is still some high ground un-

occupied. The death rate from circulatory system diseases has on the whole increased with the density of population and from the spot map it will be noted that the bulk of the cases noted come from the vicinity of the Ravensbourne or as it is called near its mouth, Deptford Creek.

Camberwell.



This area extends from the low ground at Walworth to the summit of the ridge at the Crystal Palace. Most of the area consists of clay or gravel, but in the valley below the Denmark Hill - Champion Hill ridge there is a strip of the pebbles and loams of the Woolwich beds.

— mortality
— persons per acre

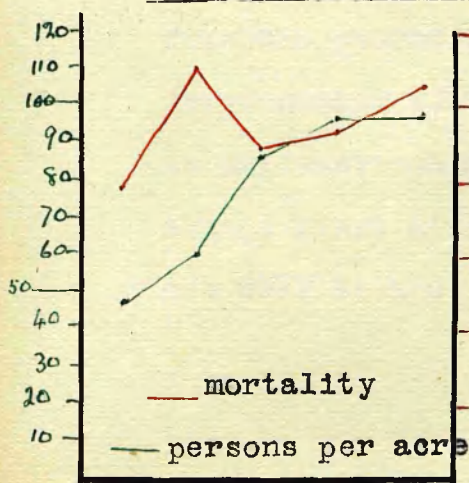
In the 50's and 60's North Camberwell was the home of the city worker, while the houses of the richer merchants were on the slopes of Denmark Hill, beyond which there were a series of isolated villages and hamlets. Slowly the pressure of the crowded poverty-stricken areas to the north made itself felt, and those of moderate means moved from Newington into Walworth and so on to Camberwell, the occupants of which moved to Lewisham and some later out of the country. The southern part of the area now contains many small villas of the comfortably off; city

clerks, school teachers, and the like, while the remaining large houses are let at reduced rents. Off the High Street, Peckham are numbers of Irish gas-workers, while a colony of grave-diggers and labourers accounts for a poverty zone near Nunhead cemetery to the east of Peckham Rye.

In East Dulwich there are mainly city clerks, while from the north of the Peckham Road to the Grand Surrey Canal are railwaymen carriers, wharfingers, fishcurers, and the like; the latter especially towards the Surrey docks.

While the population has increased, the mortality rate has fallen, notwithstanding the depreciation of the district and the opening up of new roads. The spot map shows the majority of the heart cases are on the lower ground around the canal or the end streams of the western limb of the Ravensbourne.

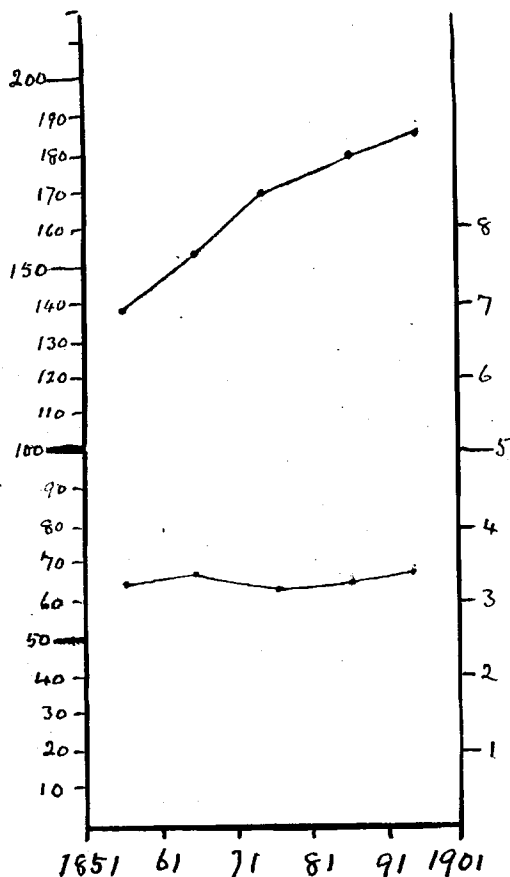
St. Olaves, Southwark.



6 The parish of St. Olave and the
 5 adjacent area of Bermondsey have
 4 been occupied throughout the period
 under review by the very poor. To
 3 some extent warehouses and factories
 2 have replaced courts and alleys and
 1 several big demolition schemes have

been carried out, but not in time to affect the mortality rates quoted. Still in Dockhead and in the Tabard Street area, scheduled for destruction and in part undergoing the process, it is still possible to estimate the conditions of life forty years ago. Bermondsey was the centre of the leather industry, and its fortunes to some extent rose and fell with that commodity being at their ebb some ten years back. Rotherhithe was comparatively rural until the development of the Surrey Docks, and now their presence and that of Southwark Park ensures a certain measure of breathing space. While the population has increased considerably the death rate has only risen a little in the fifty years. The great rise coincided with the extension of traffic and the enlargement of the docks. Relatively few heart cases are in the special schools and those mostly from the poorer quarters, such as Dockhead. A large number of the medical certificates submitted as explanations for absence in this neighbourhood allege heart disease as a cause. The children are well looked after by various missions.

St. Saviours.



mortality —————
 persons per acre ————

The district on the south side of Blackfriars bridge is undergoing the same process. Warehouses replace courts near the river, council and other dwellings replace the alleys further in. The comfortable class who used to live in Newington, to serve whom the big shopping centre grew up around the Elephant and Castle, have gone, moving farther out to the suburbs, and the shops have collapsed into bankruptcy and decay. The largest after being empty for years is now doing duty as a cocoa warehouse.

In the fifty years there has been some increase in population and a stationary death rate.

The net result would seem to be that no one factor is absolutely dominant. Social status has clearly a considerable influence, but the data from the east end from Kennington, North Lambeth, and Westminster shew exceptions ^{to} exist. Cases are recorded from most of the damp river valleys, but not always in numbers that would correspond to their density of population. Low-lying ground presents more cases than the highlands, new streets proportionately more than old. Probably the basal factor is exposure, whether this leads to infection directly or indirectly by lowering resistance. In the case of the better-to-do the surroundings such as the vicinity of water, damp foundations etc. may be the precipitant causes, in the poorer classes, exposure by stopping out regardless of weather and by remaining cold and in unchanged wet clothing at home; where the two evils, poverty and damp, coincide the cases should be most frequent, and evidence to this effect is afforded in Battersea, the Wandle Valley and the Fleet valley in Kentish Town. The unexpected prevalence of heart disease in the streets bordering on canals is probably due to the double factor. Around the canals, docks, and in the river valleys the damp in the ground and air as revealed by the fogs of autumn

and winter has to be reckoned with, as much as the damp in the walls or floors of the home. Though there is some reason to suspect that fair children may be more liable to rheumatism, this susceptibility is not sufficiently definite to utilise in any administrative action. The most closely related and most readily treated condition is the presence of tonsils and adenoid growths, particularly if in an unhealthy condition.

It should be noted that the majority of the children with heart disease benefit by school attendance and can proceed thence to work, the least profit ~~is~~ ^{being} derived by the cases of congenital disease with cyanosed faces and clubbed fingers. These, hospital experience teaches, in large measure fail to pass the period of adolescence, and for them if the prospects of life are scanty the great need is a home rather than a school.

Jane R. F. Gilmore