

Report of the Medical Officer of Health on the public health and sanitary circumstances of Johannesburg.

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MUNICIPALITY OF JOHANNESBURG

**REPORT of the MEDICAL OFFICER OF
HEALTH on the PUBLIC HEALTH and
SANITARY CIRCUMSTANCES of
JOHANNESBURG during the Period
1st July, 1904—30th June, 1906.**

TO WHICH IS APPENDED

**A REPORT by the MEDICAL ATTENDANT (Dr. P. G. STOCK)
on the HEALTH of the NATIVES and INDIANS employed
by the Council.**

CHARLES PORTER, M.D., D.P.H.

*Barrister-at-Law,
Medical Officer of Health.*

JOHANNESBURG,

31st October, 1906.

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MINISTRY OF HEALTH

REPORT OF THE MEDICAL OFFICER
HEALTH OF THE PORT OF LONDON AND
GAINSBURY CHOUINARD
JOHN WESSING during the year
1st July 1904-30th June 1905

A REPORT BY THE MEDICAL ATTENDANT
ON THE HEALTH OF THE NATIVE AND FOREIGN
BY THE DOCTOR

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SUMMARY OF STATISTICS

FOR THE

MUNICIPALITY OF JOHANNESBURG.

Latitude.—26 degrees 11 minutes 44 seconds South.

Longitude.—1 hour 52 minutes 10 seconds East.

Area.—The area of the Municipality of Johannesburg is 52,330 acres (*vide Government Gazette*, October, 1903).

Altitude.—The population of Johannesburg resides at a mean elevation of 5,850 feet.

Houses.—At the census in April, 1904, there were within this area 20,419 inhabited houses, containing an average of about 7.9 persons to a house.

Between Census Day and 30th June, 1906, the number of houses erected within the Municipality was 4,041.

Annual Rateable Value.—The annual rateable value of property within the Municipality of Johannesburg as assessed in accordance with Ordinance 43 of 1903, and representing "the full and fair price or sum which the same would realise if brought at the time of valuation to voluntary sale," was as follows :

1904	...	...	...	£37,770,974
1905	...	...	...	£43,878,071
1906	...	...	...	£45,022,665

The Town Council can impose a rate not exceeding 3d. in the £. The rate for 1904 was 2d., for 1905 2½d., for 1906 2½d.

Years 1904-5 and 1905-6.

YEAR.	WHITES.	COLOURED S.A.	ASIATICS.	Totals.		
				Males.	Females.	Persons.
1904-5 (Census) ...	83,363	75,566	11,820	130,500	40,249	170,749
1905-6 (Estimated) ...	86,363	68,062	15,054	—	—	169,479
					1904-5.	1905-6.
MARRIAGES (white) ...	...	...	...	...	1,155	1,274
PERSONS MARRIED (white) ..	...	...	...	...	2,310	2,548
MARRIAGE RATE per 1,000 Population (white) ...	...	...	...	...	27.7	29.7
BIRTHS (white) ...	...	...	...	...	2,964	3,227
BIRTH RATE per 1,000 Population (white) ...	...	...	...	...	35.5	37.3
DEATHS.	White.		Col. S.A.	Asiatic.		
1904-5 ...	1,345		2,281	77	3,703	—
1905-6 ...	1,611		2,305	182	—	4,098
DEATH RATES.	Crude.	Corrected for age and sex and visitors.			All Persons.	
In 1904-5 ...	16.1	21.12	29.3	7.3	20.8	
1905-6 ...	18.4	24.3	32.4	11.3	22.9	
1904-6 (2 years) ...	17.4	22.7	30.8	9.7	21.8	

CORRIGENDA.

In **Index**, insert "Cancer 27."

After "Washing Sites" insert figures "61."

Page 6.—In the parenthesis "(7,778, see foot of p.)" insert figure "3" after "p."

Page 15, par. 5, line 1, for "infectious" read "infectious."

Page 20, line 15, for "detention" read "dentition."

Page 21.—Table at foot. Under heading "Bacterial Finding," in case of "F.P. (Basuto)," for "Do." read "No."

Page 26, par. *re* Opsonic Theory, line 5, for "resistance" read "resistance."

CORRIGENDA.

In Index, insert "Cassidy" in line 17.
After "Washington" insert "Hawley" in line 18.
Page 6. In the parenthesis "(1775)" insert "1775" in line 19.
Page 10. Line 1 for "information" and "information".
Page 10. Line 16 for "debenture" and "debenture".
Page 21. Table at foot. Under heading "Hawley" insert "in case of" in line 17.
Page 26. Line 14. Insert "Hawley" in line 14.
Page 26. Line 15. Insert "Hawley" in line 15.

TO HIS WORSHIP THE MAYOR OF JOHANNESBURG (J. W. QUINN, Esq.)

SIR,—I have the honour to submit my report on "THE HEALTH AND SANITARY CIRCUMSTANCES OF JOHANNESBURG" during the two years 1904-5 and 1905-6.

The great DIFFICULTY IN ESTIMATING THE POPULATION in such a community (*vide* pp. 5, 6), and the hope that the Council would be able to take a modified census about January, 1906, led to the original postponement of the Annual Report for 1904-5. Eventually it was thought that a period of two years would afford a more reliable basis for statistical and other purposes, and this is exemplified in the fact that the entire small-pox outbreak between October 1904 and March 1906, is now reviewed.

Valuable details as to AGE and SEX-CONSTITUTION, nationality, etc., of the white population in April, 1904, have been reproduced from Dr. Turner's recently published Final Census volume.

Effort has been made to focus and analyse available data as to the CHARACTERISTICS AND BEHAVIOUR OF THE CHIEF FACTORS OF LOCAL INFANTILE AND ADULT MORTALITY, viz., pneumonia, diarrhoeal disease, enteric fever, cancer, and tuberculosis amongst natives. The RELATION OF METEOROLOGICAL CONDITIONS to pneumonia, enteric fever, etc., has also been noted (v. pp. 15 and 18).

The heavy incidence and fatality of CEREBRO-SPINAL MENINGITIS, especially amongst natives, has received particular consideration (v. pp. 20 to 24).

The features of the outbreak of virulent SMALL-POX in the winter months of 1904-5 are detailed at pp. 28-38, and afford a most striking and REMARKABLE VINDICATION OF THE VALUE OF VACCINATION (see p. 31).

HEART DISEASE is more than duly prevalent, and in this connection the EFFECT OF THE HIGH ALTITUDE of Johannesburg is referred to (p. 26).

The mortality from PUERPERAL SEPTICAEMIA (v. p. 38) is apparently higher than it ought to be, and raises the question of the TRAINING AND SUPERVISION OF MIDWIVES.

The circumstances of an occurrence of PLAGUE in January, 1905, and an account of the general measures for PLAGUE PREVENTION taken during 1904-6 are recorded at p. 39-43.

INSPECTION OF FOOD SUPPLIES—a work of considerable magnitude and difficulty in Johannesburg—is dealt with at pp. 47-52, and the Council's position in regard to the ADULTERATION OF SPIRITS is also explained.

Other important subjects, such as Water Supply, Sewerage, Sewage Disposal, Destructors, Housing of Natives and Asiatics, School Hygiene, Ventilation of Theatres, etc., are discussed in turn.

THE WORK OF THE SCAVENGING DEPARTMENT is alluded to at p. 56-58, but the detailed report thereon is presented separately by the Manager (Mr. F. C. Gavin, M.R.C.V.S.), whose energy and business ability in the organising and conduct of this huge and exceptionally difficult undertaking are well known to you.

The number (915) of PROSECUTIONS (v. p. 65) which it was necessary to institute, entailed much work on the Department, as the cases were entirely prepared in the M.O.H.'s Office.

The SPECIAL LOCAL DIFFICULTIES OF SANITARY INSPECTION, and the WORK OF THE STAFF are recorded at p. 65-66.

A notable REPORT ON THE HEALTH OF THE MUNICIPAL NATIVES by their Medical Attendant, Dr. P. G. Stock, Assistant M.O.H., is appended; and I take this opportunity of stating that Dr. Stock's conscientious, reliable and ungrudging services have been of high value to the Council and the greatest assistance to myself.

I have to thank the Council, and especially you, Sir, Dr. Napier, Messrs. Roy and Chudleigh, for support and help on all occasions. To my colleagues, the other Heads and Sub-Heads of Departments, I am indebted for that friendly and ready co-operation which is one of the pleasantest features of your Service.

I have the honour to be, Sir,

Your obedient servant,

Municipal Offices,
Johannesburg,
31st October, 1906.

CHARLES PORTER,
Medical Officer of Health.

REPORT

OF

MEDICAL OFFICER OF HEALTH.

For Period from 31st July 1904, to 30th June 1906.

VITAL AND MORTAL STATISTICS.

CENSUS POPULATION.—The appended particulars are from the Census Enumeration of 17th April, 1904, and other official sources :—

RACE DISTINCTIONS (*Census, 1904*).

—	Males.	Females.	Persons.	Males.	Females	Persons.
I. Europeans or Whites ...	—	—	—	51,629	31,734	83,363
II. All Coloured Races :—						
1. Aboriginal Natives, including Basutos, Bechuanas, Kaffirs, Zulus, etc. ...	55,765	3,840	59,605			
2 All other Coloured persons, including Hottentots, and other S. African coloured persons; also Malay, Chinese, Indians, and foreigners of coloured race ...	8,899	3,775	12,674	64,664	7,615	72,279
TOTALS ...	—	—	—	116,293	39,349	155,642

The ASIATICS living in Johannesburg on Census Night comprised the following :—

Race.	Males.	Females.	Persons.	Race.	Males.	Females.	Persons.
Afghan ...	12	—	12	Brought forward	4,938	524	5,462
Arab ...	39	1	40	Japanese ...	3	2	5
Chinese ...	770	3	773	Malays ...	355	398	753
Cingalese ...	2	—	2	Persians ...	6	3	9
Goanese ...	9	—	9	Syrians ...	157	151	308
Indian ...	4,106	520	4,626	Turks ...	36	25	61
Carry forward	4,038	524	5,462	TOTAL ...	5,439	1,103	6,598

There were also at KLIPSPRUIT CAMP 1,751 Coloured South African persons, and 1,180 Asiatics, all temporarily transferred from Johannesburg.

NUMBER OF BRITISH AND FOREIGN BORN.

M.O.H. 1904-6

WHITE POPULATION. (CENSUS 1904).

Statistics.

		Males.	Females.	Persons.
British Africa	...	16,241	16,746	32,987
British Europe	...	22,070	9,400	31,470
British Asia	...	204	75	279
British America	...	224	72	296
British Australia	...	2,616	1,297	3,913
British born at Sea	...	21	20	41
All others, probably British	...	377	215	592
Total British	...	41,753	27,825	69,578
Total Foreign	...	9,876	3,909	13,785
GRAND TOTAL		51,629	31,734	83,363

The Census Commissioner (Dr. George Turner) points out that in Johannesburg, South African born women outnumber South African born men, due to the fact that British and others from overseas marry Colonial girls.

PERCENTAGE PROPORTION OF THE POPULATION FORMED BY PERSONS OF THE PRINCIPAL RACES.

CENSUS 1904.

White	65.86	Asiatic	4.80
Aboriginal	24.59	Other Coloured	4.75

COMPARISON BETWEEN THE PERCENTAGE OF PERSONS UNDER AND OVER 15 YEARS OF AGE, OF EACH RACE FOUND IN JOHANNESBURG MUNICIPALITY, AT THE CENSUS OF 1896, AND AT THE CENSUS OF 1904.

RACE.	Under 15 Years of Age.				Over 15 years of Age.			
	Males.		Females.		Males.		Females.	
	1896	1904	1896	1904	1896	1904	1896	1904
European	50.17	50.36	49.83	49.64	68.42	65.32	31.58	34.68
Aboriginal	55.64	61.99	44.35	38.01	97.00	92.98	3.00	7.02
Other Coloured	51.43	51.46	48.57	48.54	74.86	76.59	25.14	23.41
All Races	50.63	52.99	49.37	47.06	82.75	79.79	17.25	20.21

AGES OF THE WHITE POPULATION

(CENSUS 1904).

	Male.	Female.		Male.	Female.
Under 1 year	1,069	1,001	35 years and under 40 years	5,607	2,787
1 year and under 2 years	694	669	40 " " 45 "	4,004	1,784
2 " " 3 "	636	597	45 " " 50 "	2,482	1,149
3 " " 4 "	685	640	50 " " 55 "	1,704	802
4 " " 5 "	720	752	55 " " 60 "	817	479
Total under 5 years	3,804	3,659	60 " " 65 "	488	321
5 years and under 10 years	3,535	3,426	65 " " 70 "	222	161
10 " " 15 "	3,001	3,055	70 " " 75 "	86	97
Total 5 years and under 15 years	6,536	6,481	75 " " 80 "	48	36
15 years and under 20 years	3,038	2,755	80 " " 85 "	13	15
20 " " 25 "	6,152	3,555	85 years and over	5	13
25 " " 30 "	8,755	4,907	Total 35 years and over	15,476	7,644
30 " " 35 "	7,776	3,633	Over 15 years (so returned)	72	—
Total 15 years and under 35 yrs.	25,741	13,950	GRAND TOTAL	51,629	31,734
			TOTAL	83,363	

From pages 264 and 265 of Census Report.

M.O.H. 1904-6 TABLE SHEWING THE NUMBER OF PERSONS, MALES AND FEMALES, PER 1,000 OF THE TOTAL EUROPEAN POPULATION, LIVING AT QUINQUENNIAL AGE PERIODS FROM 0 TO 30 AND AT DECENNIAL AGE PERIODS FROM 30 YEARS AND UPWARDS, IN JOHANNESBURG MUNICIPALITY IN 1896 AND 1904.

AGES.	JOHANNESBURG, 1896.			JOHANNESBURG, 1904.		
	Persons.	Males.	Females.	Persons.	Males.	Females.
0 to 4 years ...	105·900	53·667	52·233	89·524	45·632	43·892
5 to 9 " ...	85·982	43·687	42·295	83·502	42·405	41·097
10 to 14 " ...	79·167	35·555	34·612	72·646	35·999	36·647
15 to 19 " ...	75·884	42·155	33·729	69·731	36·683	33·048
20 to 24 " ...	133·734	88·102	45·632	116·443	73·798	42·645
25 to 29 " ...	158·524	109·003	49·521	153·090	105·023	48·067
30 to 39 " ...	216·964	157·346	59·618	237·552	160·539	77·013
40 to 49 " ...	101·165	73·369	27·796	112·988	77·805	35·183
50 to 59 " ...	38·030	26·067	11·963	45·607	30·241	15·366
60 to 69 " ...	10·274	6·797	4·477	14·298	8·517	5·781
70 to 79 " ...	2·180	1·296	0·884	3·203	1·607	1·596
80 years and over ...	0·196	0·098	0·098	1·416	1·080	0·336
TOTAL ...	1,000·000	637·142	362·858	1,000·000	619·329	380·671

"It is very satisfactory to note that the curves are remarkably similar. The maximum for persons is reached at the same age, 30 to 39 years, though the maximum in 1904 was 2·9 per cent above that of 1896. This increase was principally due to the fact that women at that age had increased by 2·9 per cent., the males being proportionately equal, 157 to 160.

"These curves also show a higher percentage of children in 1896 than in 1904."

DENSITY OF POPULATION, (Census, 1904).

About 21 persons per acre within the area actually used for building purposes, as against 60 in London and 12 in Capetown. It varied from 0·76 in Observatory to 89 and 148 in parts of Marshalls and Ferreiras respectively. (*v. Census* p. LXXVI).

PERCENTAGE PROPORTION OF EUROPEAN PERSONS BELONGING TO EACH RELIGION (Census, 1904).

	Persons.	Males.	Females.
Dutch Churches ...	13·73	11·39	17·54
Anglican Communion ...	30·57	30·21	31·16
Presbyterian ...	10·57	11·40	9·23
Congregationalist ...	1·17	1·07	1·33
Methodist ...	9·18	8·89	9·66
Baptist ...	1·40	1·28	1·59
Salvation Army ...	—	0·29	0·38
Lutheran ...	2·67	2·75	2·55
Roman Catholic ...	8·81	8·92	8·63
Greek Catholic ...	0·64	0·96	0·12
Other Christian ...	4·50	4·74	4·11
Total Christian ...	83·57	81·90	86·30
Hebrew ...	12·95	13·90	11·42
Other Non-Christian ...	0·04	0·04	0·04
Total Non-Christian ...	12·99	13·94	11·46
Indefinite ...	0·52	0·64	0·32
No Religion ...	0·62	0·84	0·25
Object to State ...	1·31	1·48	1·04
Unspecified ...	0·99	1·20	0·63

ESTIMATED POPULATION.

WHITES.—The figures taken for 1904-5 are those of the Census of 17th April, 1904, viz., 83,363, and these are, no doubt, sufficiently accurate.

The difficulty of arriving at a correct estimate for 1905-6 is, however, very great, for in such a community the effects of 'bad times' and of market-depression are believed to be such that a population-figure calculated by the arithmetical methods of more settled countries would be very unreliable.

It has been suggested that the results of the annual revision of the Voters Roll might shed light on the question. The revision has in 1905-6 resulted in an appreciable increase. But this may possibly be due to more efficient canvassing, and to keener interest in politics amongst those entitled to vote.

Even the basis of inhabited houses is hardly trustworthy, as, at the time of the Census, rents were much higher and houses fewer than 12 or even 6 months later, and possibly the number of inmates per house was greater; though against this is the fact that people have been poorer since 1904, and many, to reduce expenses, have become, or have received, lodgers. The fact, however, that since 1st May, 1904, over 4,000 new houses have been erected within the Municipality, while the number of empty houses and shops towards the end of the year 1905-6 (1,152 + 190 = 1,342) was practically the same as on Census Day, 1904 (1,331), points to a substantial increase.

There are other data relating to 1905-6 which suggest a larger population in the latter year. These include (a) more numerous deaths under such headings as 'heart disease,' 'cancer,' and 'old age,' causes not usually associated with insanitary or infective conditions; (b) an increase of 238 in the number of persons married; (c) an increase of 263 in the number of 'births,' and (d) certain railway figures.

Assuming that in 1905-6 the birth-rate per 1,000 was the same in 1904-5, the white population would (by Newsholme's method) be $\frac{3,227 \times 1,000}{35.55} = 90,773$, and, on a similar but perhaps less likely assumption in regard to the marriage rate, 91,951.

In Johannesburg, the effect of immigration and emigration is believed to be very considerable, and it was thought that some indication of the nett result might be gathered from consideration of the number of SINGLE tickets issued to and from Johannesburg, and the stations of Cape Colony, Natal and Delagoa. These figures have been obtained by courtesy of the Chief Traffic Manager, C.S.A.R. (W. W. Hoy, Esq.), and show that in 1905-6, the number of immigrants exceeded that of emigrants by at least 6,610.

Finally, the actual excess of births over deaths in 1905-6 was 1,616.

In view of the foregoing facts, it appears, on the whole, reasonable and likely that a moderate estimate of the white population in 1905-6 may be arrived at by adding 3,000 to the Census figures $83,363 = 86,363$.

The difficulty of estimating the population has been felt to be so great that the Council has now acquired statutory powers to take, as often as may be deemed necessary, a Census which would at any rate include particulars as to the number and sex of (a) Whites, (b) Coloured South Africans, (c) Asiatics.

ASIATICS.—The figures for 1904-5 and 1905-6 are obtained by adding to the Census Return of Asiatics in Johannesburg and Klipspruit (7,778, see foot of p.), the monthly average of Chinese employed on Mines within the Municipality, as supplied to the Council's Statistician by the Government Mining Engineer. For 1905-6 this average is based on 12 month's figures (see below), but for 1904-5 only 7 months' returns are available, as the Chinese did not commence work till December, 1904. Therefore, in calculating 'rates' for 1904-5, only seven-twelfths of the monthly average of Chinese are added to the Asiatic Census Returns. The estimate for 1904-5 is, accordingly, $7,778 + 4,042 = 11,820$, or, for the purpose of calculating 'death rates,' $7,778 + 7/12$ ths of $4,042 = 10,136$.

The estimate for 1905-6 is $7,778 + 7,276 = 15,054$.

Monthly Return of Chinese.

1904-5.			1905 6.		
December	...	1,007	July	...	6,189
January	...	3,028	August	...	6,573
February	...	3,837	September	...	6,560
March	...	3,831	October	...	7,126
April	...	4,689	November	...	7,383
May	...	57,12	December	...	7,324
June	...	6,189	January	...	7,282
			February	...	7,858
			March	...	7,837
			April	...	7,479
			May	...	7,638
			June	...	8,072

SOUTH AFRICAN COLOURED.—In each case the estimate is arrived at by (a) Subtracting from the Census Returns of the 'Coloured Races' in Johannesburg and at Klipspruit (74,030), the number of Asiatics (see preceding paragraph); and (b) Adding the increase in the average monthly number of 'mine natives' within the Municipality, as compared with the return (27,247) of 'mine natives' in Census month (April, 1904), which latter has kindly been supplied by the Chamber of Mines and checked against the Native Affairs Department's figures.

For 1904-5, the figures are :—

$$(74,030 - 10,136) + (38,919 - 27,247) = 75,566.$$

For 1905-6, the figures are :—

$$(74,030 - 15,054) + (36,333 - 27,247) = 68,062.$$

Monthly Return of Mine Natives.

1904-5			1905-6		
July	...	59,250	January	...	35,415
August	...	37,230	February	...	38,628
September	...	36,476	March	...	42,013
October	...	36,375	April	...	42,426
November	...	35,969	May	...	41,002
December	...	33,428	June	...	39,522

MARRIAGES.

From 1st July, 1904, to 30th June, 1906, the number of white marriages registered was 2,429, equal to a marriage rate of 28·6 per 1,000. The rate per 1,000 in "London" was 17·0 in 1904, and 16·9 in 1905.*

During the same period 284 coloured marriages were registered.

BIRTHS.

From 1st July, 1904, to 30th June, 1906, the number of white births registered was 6,191.

The birth-rate was high, being equal to 36·5 per 1,000. For "The 76 Great Towns" of England and Wales, in 1905, the birth-rate was 28·2.†

During the same period 1,145 coloured births were registered, but as coloured females number only 7,615 against 64,664 males, it would merely mislead to strike a birth-rate.

Illegitimate Births.—In 1904-5 these numbered 111, and in 1905-6 they were 103, being for the 2 years in the proportion of 34·5 per 1,000 births, as against 40 per 1,000 births in England and Wales in 1904, and 37 per 1,000 in London in 1905. Whether this is the result of a higher morality or of other causes is a matter for speculation.

A word may be said as to the influence of birth-rate upon death-rate. In large towns, high death-rates go with high birth-rates. High death-rates, however, are not the result of high birth-rates—they are more generally caused by bad sanitary conditions. Populations having a continuously high birth-rate should (sanitary conditions being equal) have lower death-rates than populations having low birth-rates; for if, year by year, the births exceed the deaths amongst a population, not only are additional children under 5 years of age, whose mortality is high, added to the population, but a still larger increase of those between 10 and 40, whose mortality is low, takes place, and counterbalances the other; whilst the proportion of old people over 55 to the total population is diminished. Conversely, a continuously low birth-rate means a small proportion of young adults, and a large proportion of old people, and is therefore unfavourable to a low death-rate.

DEATHS.

The deaths herein referred to are those of persons who died within the extended Municipal Area as defined by Proclamations 13 of 1902 and 46 of 1903.

Race.	Deaths.		Death-Rate per 1,000.		
	Total.	Of Non-Residents.	Gross Recorded.	Excluding Non-Residents.	Corrected for age and sex distribution and non-residents.
1904 to 1905.					
Whites ...	1,345	78	16·1	15·2	21·14
S. A. Coloured ...	2,281	63	31·5	29·3	—
Asiatics ...	77	3	7·5	7·3	—
All Persons ...	3,703	144	21·1	20·8	—
1905 to 1906.					
Whites ...	1,611	99	18·4	17·5	24·3
S. A. Coloured ...	2,305	97	33·8	32·4	—
Asiatics ...	182	11	12·0	11·3	—
All Persons ...	4,098	207	24·1	22·9	—

In order to neutralize the errors in comparison of death-rates arising from variations in sex and age constitution of the population of different towns, the Registrar-General of England and Wales has calculated a series of 'factors' by which the recorded death-rates of the "Great Towns" can be multiplied, so as to make them correctly comparable. Dr. George Turner, Census Commissioner, has very kindly worked out similar 'factors for correction' for the white population of Johannesburg. They are as follows: For Males, 1·4742489; Females, 1·2334079; Persons, 1·3912409, calculated on the average English death-rates for 1881-91.

INFANTILE MORTALITY (*i.e.* deaths of infants under 1 year per each 1,000 births registered:—

In 1904-5: For Whites, 153; Coloured, including Asiatics, 385.
 „ 1905-6: „ „ 177; „ „ „ 451.

* *Vide Registrar General's Annual Summary, 1905, p. X.*

† *Vide Registrar General's Annual Summary, 1905, p. V.*

TABLE F.

RETURN OF DEATHS AMONG THE ASIATIC POPULATION FOR THE YEAR ENDING 30TH JUNE, 1906.

No.	CAUSES OF DEATH.	All Ages.	Under 1 year.	1—5 years.	5—15 years.	15—25 years.	25—65 years.	65 and upw'ds.	Number of District.															Hospi- tal.	Non- R'd'nt.	Un- known.	Total.
									I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.	XI.	XII.	XIII.						
1	Small-pox - - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
2	Measles - - -	1	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	Scarlet Fever - - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	Epidemic Influenza - - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	Whooping Cough - - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	Diphtheria - - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	Membranous Croup - - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	Enteric Fever - - -	7	-	-	-	4	3	-	-	1	-	1	2	-	-	-	-	2	-	-	-	-	-	1	-	-	7
9	Cholera - - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	Plague - - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	Diarrhoea and Dysentery - - -	18	3	2	-	4	9	-	-	-	1	1	6	-	-	-	-	5	1	3	-	-	-	1	-	-	18
12	Epidemic Zymotic Enteritis - - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13	Esteritis - - -	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1
14	Other continued fevers - - -	1	-	-	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
15	Erysipelas - - -	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1
16	Puerperal Fever - - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17	Other Septic Diseases - - -	2	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	2
18	Acute Rheumatism or Fever - - -	1	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
19	Intermittent Fever - - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20	Malarial Cachexia - - -	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1
21	Tuberculosis of Meninges - - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
22	Tuberculosis of Lungs - - -	19	-	-	-	6	13	-	1	2	3	1	3	-	-	-	-	3	-	3	2	-	-	1	-	-	19
23	Other forms of Tuberculosis - - -	2	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	2
24	Alcoholism - - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
25	Cancer - - -	3	-	-	-	-	3	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	3
26	Premature Birth - - -	1	1	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
27	Developmental Diseases - - -	3	3	-	-	-	-	-	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
28	Old Age - - -	1	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
29	Meningitis - - -	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1
30	Other Diseases of Nervous System - - -	3	-	1	-	-	2	-	1	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	3
31	Organic Diseases of Heart - - -	11	-	-	-	1	9	1	-	-	2	-	2	-	-	-	-	-	1	4	-	-	-	1	1	-	11
32	Acute Bronchitis - - -	5	3	1	-	-	1	-	1	-	-	1	2	-	-	-	-	-	-	-	1	-	-	-	-	-	5
33	Chronic Bronchitis - - -	2	-	-	-	1	1	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	2
34	Pneumonia, Lobar or Croupous - - -	15	-	1	-	2	12	-	2	-	1	-	3	-	-	-	2	1	4	1	-	-	-	-	-	-	15
35	Pneumonia, Broncho or Catarrhal - - -	2	1	-	-	-	1	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	2
36	Rockdrill ditto, or Miners' Phthisis - - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
37	Disease of Stomach - - -	1	-	-	-	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
38	Obstruction of Intestines - - -	3	-	-	1	-	2	-	1	-	-	-	1	-	-	-	-	-	-	1	-	-	-	-	-	-	3
39	Cirrhosis of Liver - - -	3	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
40	Nephritis or Bright's Disease - - -	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1
41	Scurvy - - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
42	Syphilis - - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
43	Tumours, etc., Affections of Female Genital Organs - - -	1	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
44	Diseases of Parturition - - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
45	Accident or Negligence - - -	38	-	-	-	16	22	-	-	-	-	-	-	1	-	-	-	9	12	15	1	-	-	-	-	-	38
46	Suicide or Murder - - -	23	-	-	-	6	17	-	-	-	-	-	-	-	-	-	-	6	2	11	1	-	-	3	-	-	23
47	All other causes - - -	11	-	-	-	3	8	-	-	1	1	-	-	-	-	-	1	1	1	4	-	-	-	2	-	-	11
TOTALS - - -		182	12	5	2	45	117	1	8	5	12	8	25	1	-	1	-	34	20	50	6	-	-	11	1	-	182

DISTRICT No. 1 includes that portion of Johannesburg (farm Randjeslaagte), south of the Railway and north of Commissioner Street.

DISTRICT No. 2 includes Braamfontein, Hospital Hill and Hillbrow.

DISTRICT No. 3 includes Marshall's Town and City and Suburban.

DISTRICT No. 4 includes Ferreira's, Fordsburg and Mayfair.

DISTRICT No. 5 includes The Brickfields, Vrededorp, the Cemetery and the Locations.

DISTRICT No. 6 includes Jeppe's, Jeppe's Extension, Belgravia, etc.

DISTRICT No. 7 includes Doornfontein, New Doornfontein, Bertrams, Lorentville, Judith's Paarl, Troyeville, Kensington Estate, Bezuidenhout Valley Township and Morriston.

DISTRICT No. 8 includes Berea, Yeoville, Bellevue, Bellevue East and North-Eastern suburban portion.

DISTRICT No. 9 includes Auckland Park, Richmond, Melville, Newlands, Claremont and North-western suburban portion.

DISTRICT No. 10 includes Pearls Hoop and Mines from Robinson westwards to boundary.

DISTRICT No. 11 includes Central Mines (from Ferreira to City and Suburban).

DISTRICT No. 12 includes Prospect Town, Denver and the Mines from Meyer and Charlton to Eastern boundary.

DISTRICT No. 13 includes Ophirton, Booyens, Turfontein, Rosettenville, etc. (southern suburban portion).

YEAR ENDING 30th APRIL 1908

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THE ACCOUNTS OF THE YEAR ENDING 30th APRIL 1908
 HAVE BEEN EXAMINED AND FOUND CORRECT
 BY THE AUDITORS
 J. H. B. & CO. AUDITORS
 10, ABchurch Lane, LONDON, E.C. 4

TABLE E.

RETURN OF DEATHS AMONG THE S.A. COLOURED POPULATION FOR THE YEAR ENDING 30TH JUNE, 1906.

No.	CAUSES OF DEATH.	All Ages.	Under 1 year.	1—5 years.	5—15 years.	15—25 years.	25—65 years.	65 and upw'ds.	Number of District.															Hospi- tal.	Non- Resi- dent.	Un- known.	Total.
									I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.	XI.	XII.	XIII.						
1	Small-pox...	9				2	7					1	5						1	1	1					9	
2	Measles ...	13	1	7	1	3	1					2	1	4					3	1	1					13	
3	Scarlet Fever ...																										
4	Epidemic Influenza ...	13				5	7	1				1							10	1	1					13	
5	Whooping Cough ...																										
6	Diphtheria ...																										
7	Membranous Croup ...	2		1	1							1	1													2	
8	Enteric Fever ...	99			1	55	43		1	2	1	3	14		1	1	1	40	23	5	4			3		99	
9	Cholera ...																										
10	Plague ...																										
11	Diarrhoea and Dysentery ...	259	85	21	4	81	68		4	4	10	5	50		5	3	5	107	20	11	30			5		259	
12	Epidemic Zymotic Enteritis ...																										
13	Euteritis ...	26	7		1	9	9			1		1	5				2	7	2	3	5					26	
14	Other continued fevers...																										
15	Erysipelas...	4				1	3																	1		4	
16	Puerperal Fever ...	3				1	2							1				2	1				1	1		3	
17	Other Septic Diseases ...	5	2				3				2									1	1			1		5	
18	Acute Rheumatism or Fever ...	21			1	5	15					2						13	3	4				1		21	
19	Intermittent Fever ...																										
20	Malarial Cachexia ...	27					11	16			1							7	8	11						27	
21	Tuberculosis of Meninges ...																										
22	Tuberculosis of Lungs ...	346	2	2	4	151	187		4	4	1	8	17		4	1	1	138	42	47	59	1	17	2		346	
23	Other forms of Tuberculosis ...	13				5	8											5	2	1	4					13	
24	Alcoholism ...	2					2					1						1								2	
25	Cancer ...	9	1			3	4	1	1		1		1						2	1	1			2		9	
26	Premature Birth ...	22	22						1	1	1	1	4		1	2		3	2	1	4			1		22	
27	Developmental Diseases ...	49	42	7					2	1	5	2	16	1	2	3	3	3	2	6			3			49	
28	Old Age ...	9																									
29	Meningitis ...	135	2	1		80	52	8			2	4	3					47	15	14	48			2		135	
30	Other Diseases of Nervous System...	31	1	2	4	16	8				1	1	3			1	1	5	14		2			2		31	
31	Organic Diseases of Heart ...	77	2		2	29	44		3	2	4	7	7			1		20	8	11	7	1	6			77	
32	Acute Bronchitis ...	45	26	11		2	6		1	1	1	2	20		1	1		1	5	1	2	6		3		45	
33	Chronic Bronchitis ...	37				12	24	1					3					1	17		12	4				37	
34	Pneumonia, Lobar or Croupous ...	576	23	7	8	247	288	3	10	11	7	7	40	3		3	5	228	109	56	66	6	14	6		576	
35	Pneumonia, Broncho or Catarrhal ...	24	12	9		1	2		2			1	11			3		1	2	2						24	
36	Rockdrill ditto, or Miners' Phthisis...	15				4	11						1					5	5		4					15	
37	Disease of Stomach ...	1				1												1								1	
38	Obstruction of Intestines ...	17	9			5	3		1	1		2	8						1	2	1			1		17	
39	Cirrhosis of Liver ...	22				11	11				1	1	1				1	4		2	8					22	
40	Nephritis or Bright's Disease ...	15			1	4	10				2	1					1	6	1	1				1		15	
41	Scurvy ...	61			1	18	42					1	3	1			1	33	10	6	3			3		61	
42	Syphilis ...	27	5	1	1	3	15	2		1		2	2				1		2	2	1			16		27	
43	Tumours, etc., Affections of Female Genital Organs ...	2				1	1																			2	
44	Diseases of Parturition ...																										
45	Accident or Negligence ...	164	2	5	6	62	89		1	1	1	2	12				7	55	38	30	7			7	1	164	
46	Suicide or Murder ...	27	1			4	22		2				4					8	4	4	2			1	1	27	
47	All other causes ...	98	1	2	4	37	54		3	2	1	1	6					48	15	12	7			2		98	
	TOTALS ...	2305	246	76	40	869	1058	16	36	40	45	52	245	7	32	13	31	824	333	246	283	8	97	13		2305	

DISTRICT No. 1 includes that portion of Johannesburg (farm Randjeslaagte), south of the Railway and north of Commissioner Street.

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DISTRICT No. 9 includes Auckland Park, Richmond, Melville, Newlands, Claremont and North-Western suburban portion.

DISTRICT No. 10 includes Pauris Hoop and Mines from Robinson westward to boundary.

DISTRICT No. 11 includes Central Mines (from Ferreira to City and Suburban).

DISTRICT No. 12 includes Prospect Town, Denver and the Mines from Meyer and Charlton to Eastern boundary.

DISTRICT No. 13 includes Ophirton, Booyens, Turfontein, Rosettenville, etc. (Southern suburban portion).

YEAR ENDING 30th JUNE 1961

Year	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	2101	2102	2103	2104	2105	2106	2107	2108	2109	2110	2111	2112	2113	2114	2115	2116	2117	2118	2119	2120	2121	2122	2123	2124	2125	2126	2127	2128	2129	2130	2131	2132	2133	2134	2135	2136	2137	2138	2139	2140	2141	2142	2143	2144	2145	2146	2147	2148	2149	2150	2151	2152	2153	2154	2155	2156	2157	2158	2159	2160	2161	2162	2163	2164	2165	2166	2167	2168	2169	2170	2171	2172	2173	2174	2175	2176	2177	2178	2179	2180	2181	2182	2183	2184	2185	2186	2187	2188	2189	2190	2191	2192	2193	2194	2195	2196	2197	2198	2199	2200	2201	2202	2203	2204	2205	2206	2207	2208	2209	2210	2211	2212	2213	2214	2215	2216	2217	2218	2219	2220	2221	2222	2223	2224	2225	2226	2227	2228	2229	2230	2231	2232	2233	2234	2235	2236	2237	2238	2239	2240	2241	2242	2243	2244	2245	2246	2247	2248	2249	2250	2251	2252	2253	2254	2255	2256	2257	2258	2259	2260	2261	2262	2263	2264	2265	2266	2267	2268	2269	2270	2271	2272	2273	2274	2275	2276	2277	2278	2279	2280	2281	2282	2283	2284	2285	2286	2287	2288	2289	2290	2291	2292	2293	2294	2295	2296	2297	2298	2299	2300	2301	2302	2303	2304	2305	2306	2307	2308	2309	2310	2311	2312	2313	2314	2315	2316	2317	2318	2319	2320	2321	2322	2323	2324	2325	2326	2327	2328	2329	2330	2331	2332	2333	2334	2335	2336	2337	2338	2339	2340	2341	2342	2343	2344	2345	2346	2347	2348	2349	2350	2351	2352	2353	2354	2355	2356	2357	2358	2359	2360	2361	2362	2363	2364	2365	2366	2367	2368	2369	2370	2371	2372	2373	2374	2375	2376	2377	2378	2379	2380	2381	2382	2383	2384	2385	2386	2387	2388	2389	2390	2391	2392	2393	2394	2395	2396	2397	2398	2399	2400	2401	2402	2403	2404	2405	2406	2407	2408	2409	2410	2411	2412	2413	2414	2415	2416	2417	2418	2419	2420	2421	2422	2423	2424	2425	2426	2427	2428	2429	2430	2431	2432	2433	2434	2435	2436	2437	2438	2439	2440	2441	2442	2443	2444	2445	2446	2447	2448	2449	2450	2451	2452	2453	2454	2455	2456	2457	2458	2459	2460	2461	2462	2463	2464	2465	2466	2467	2468	2469	2470	2471	2472	2473	2474	2475	2476	2477	2478	2479	2480	2481	2482	2483	2484	2485	2486	2487	2488	2489	2490	2491	2492	2493	2494	2495	2496	2497	2498	2499	2500	2501	2502	2503	2504	2505	2506	2507	2508	2509	2510	2511	2512	2513	2514	2515	2516	2517	2518	2519	2520	2521	2522	2523	2524	2525	2526	2527	2528	2529	2530	2531	2532	2533	2534	2535	2536	2537	2538	2539	2540	2541	2542	2543	2544	2545	2546	2547	2548	2549	2550	2551	2552	2553	2554	2555	2556	2557	2558	2559	2560	2561	2562	2563	2564	2565	2566	2567	2568	2569	2570	2571	2572	2573	2574	2575	2576	2577	2578	2579	2580	2581	2582	2583	2584	2585	2586	2587	2588	2589	2590	2591	2592	2593	2594	2595	2596	2597	2598	2599	2600	2601	2602	2603	2604	2605	2606	2607	2608	2609	2610	2611	2612	2613	2614	2615	2616	2617	2618	2619	2620	2621	2622	2623	2624	2625	2626	2627	2628	2629	2630	2631	2632	2633	2634	2635	2636	2637	2638	2639	2640	2641	2642	2643	2644	2645	2646	2647	2648	2649	2650	2651	2652	2653	2654	2655	2656	2657	2658	2659	2660	2661	2662	2663	2664	2665	2666	2667	2668	2669	2670	2671	2672	2673	2674	2675	2676	2677	2678	2679	2680	2681	2682	2683	2684	2685	2686	2687	2688	2689	2690	2691	2692	2693	2694	2695	2696	2697	2698	2699	2700	2701	2702	2703	2704	2705	2706	2707	2708	2709	2710	2711	2712	2713	2714	2715	2716	2717	2718	2719	2720	2721	2722	2723	2724	2725	2726	2727	2728	2729	2730	2731	2732	2733	2734	2735	2736	2737	2738	2739	2740	2741	2742	2743	2744	2745	2746	2747	2748	2749	2750	2751	2752	2753	2754	2755	2756	2757	2758	2759	2760	2761	2762	2763	2764	2765	2766	2767	2768	2769	2770	2771	2772	2773	2774	2775	2776	2777	2778	2779	2780	2781	2782	2783	2784	2785	2786	2787	2788	2789	2790	2791	2792	2793	2794	2795	2796	2797	2798	2799	2800	2801	2802	2803	2804	2805	2806	2807	2808	2809	2810	2811	2812	2813	2814	2815	2816	2817	2818	2819	2820	2821	2822	2823	2824	2825	2826	2827	2828	2829	2830	2831	2832	2833	2834	2835	2836	2837	2838	2839	2840	2841	2842	2843	2844	2845	2846	2847	2848	2849	2850	2851	2852	2853	2854	2855	2856	2857	2858	2859	2860	2861	2862	2863	2864	2865	2866	2867	2868	2869	2870	2871	2872	2873	2874	2875	2876	2877	2878	2879	2880	2881	2882	2883	2884	2885	2886	2887	2888	2889	2890	2891	2892	2893	2894	2895	2896	2897	2898	2899	2900	2901	2902	2903	2904	2905	2906	2907	2908	2909	2910	2911	2912	2913	2914	2915	2916	2917	2918	2919	2920	2921	2922	2923	2924	2925	2926	2927	2928	2929	2930	2931	2932	2933	2934	2935	2936	2937	2938	2939	2940	2941	2942	2943	2944	2945	2946	2947	2948	2949	2950	2951	2952	2953	2954	2955	2956	2957	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TABLE D.

RETURN OF DEATHS AMONG THE WHITE POPULATION FOR THE YEAR ENDING 30TH JUNE, 1906.

No.	Causes of Death.	All Ages.	Under 1 year.	1—5 years.	5—15 years.	15—25 years.	25—65 years.	65 and upw'ds.	Number of District.													Hospi- tal.	Non- R'sdn't.	Un- known.	Total.
									I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.	XI.	XII.	XIII.				
1	Small-pox - - -	22		2		2	18		3	2	7	3			1				2	2					22
2	Measles - - -	24	8	9	6		1		3	2	5	2	6	1				2	2		1				24
3	Scarlet Fever - -	6	1	4	1					1			1	1								3			6
4	Epidemic Influenza -	9	1	3			4	1		1		1			1		1	1	2				2		9
5	Whooping Cough - -	14	5	5	4					2		4	2	3	3										14
6	Diphtheria - - -	10		8	2				1	1	2	1			3		1				1				10
7	Membranous Croup -	7	1	4	2				2	1	1				2										7
8	Enteric Fever - - -	84		2	6	26	49	1	16	2	5	9	2	4	1	3	2	7	1	11	3		18		84
9	Cholera - - -																								
10	Plague - - -																								
11	Diarrhoea and Dysentery -	277	221	35	2	3	15	1	17	30	15	31	36	26	35	14	12	14	6	5	27		9		277
12	Epidemic Zymotic Enteritis -	3	3							1	1														3
13	Enteritis - - -	10	3	1		1	3	2		1	1	4	1		2			1							10
14	Other continued fevers -																								
15	Erysipelas - - -	9	2				6	1	2		2	1		1	1		1						1		9
16	Puerperal Fever - -	7				3	4			1	1	2				1		1			1		1		7
17	Other Septic Diseases -	2	1					1	1													1			2
18	Acute Rheumatism or Fever -	15	1	1	6		6	1		3	2	2	1	2	1	1	1	2							15
19	Intermittent Fever - -																								
20	Malarial Cachexia - -	8			1	1	6		1		1	1	1	1	1	2									8
21	Tuberculosis of Meninges -	1		1																					1
22	Tuberculosis of Lungs -	79	2		3	17	57		17	7	6	3	2	8	6	4		7	1	1	3	1	12	1	79
23	Other forms of Tuberculosis -	7	2				5					1	1	1	1				1		1				7
24	Alcoholism - - -	13					13		2	1	3	1		4											13
25	Cancer - - -	51		1	1	2	43	4	11	5	6	4	1	4	4	4		2		5		5			51
26	Premature Birth - -	84	84						9	5	6	11	8	9	11	6	5	1		2	6	1	3	1	84
27	Developmental Diseases -	157	142	15					9	12	14	25	15	18	27	7	6	7	2	12	1	2			157
28	Old Age - - -	32					1	31	4	7	2	2	2	5					2	3					32
29	Meningitis - - -	32	12	7	5	1	7		3	5	4	2	1	2	5		1	4	1	1	2				32
30	Other Diseases of Nervous System -	41	6	5	2	2	23	3	7	4	4	2	2	3	6	2	2	2	3	2					41
31	Organic Diseases of Heart -	108	2	5	3	12	69	17	17	14	16	10	8	9	5	2	5	3	1	3	1				30
32	Acute Bronchitis - -	30	22	7			1		1	3	1	8	10	2	2		1	1		1	2				22
33	Chronic Bronchitis - -	22	1	1			11	9	3		3	4	1	5	3										22
34	Pneumonia, Lobar or Croupous -	104	13	13		5	66	7	21		9	3	12	10	10	8	4	3	1	7	8	3	5		104
35	Pneumonia, Broncho or Catarrhal -	46	24	16	1		4	1	2	4		4	6	4	3	7		5	2	1	3	4	1		46
36	Rockdrill ditto, or Miners' Phthisis -	39					38				2	13			3		1	6	3	5	3				39
37	Diseases of Stomach - -	8	2			2	4							1	1										8
38	Obstruction of Intestines -	19	5			2	11	1	5	1	2	1		7					1	1	1				19
39	Cirrhosis of Liver - -	15				1	14		3	1	2	1			1			1	1		2			1	15
40	Nephritis or Bright's Disease -	37	2	1	2	6	26		4	2	7	4		4	6		2	2		1			4	1	37
41	Scurvy - - -	1																							1
42	Syphilis - - -	4					2	2			1	1	1								1				4
43	Tumours, etc., Affections of Female Genital Organs -	14					3	11	2	2			2	1	3	1	1								14
44	Diseases of Parturition - -	14					12		1	2	2	2		2		2		1	1						14
45	Accident or Negligence - -	67	3	5	8	11	40		6	6	7	5	7	1	4	2		5	2	14		2	3		67
46	Suicide or Murder - -	30				2	28		10	2	4	1		1	1	1	1	5			2		1	1	30
47	All other cases - - -	49	3	3	4	3	35	1	5	6	1	5	1	3	4	6	2				3	2	10	1	49
	TOTALS - - -	1,611	572	155	58	110	633	82	190	137	149	176	128	142	163	65	61	81	33	59	108	13	99	7	1,611

DISTRICT No. 1 includes that portion of Johannesburg (farm Randjeslaagte), south of the Railway and north of Commissioner Street.

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DISTRICT No. 6 includes Jeppe, Jeppe Extension, Belgravia, etc.

DISTRICT No. 7 includes Doornfontein, New Doornfontein, Bertrams, Lorentville, Judith's Paarl, Troyeville, Kensington Estate, Bernidenhout Valley Township and Morriston.

DISTRICT No. 8 includes Boreas, Yeoville, Bellevue, Bellevue East and North-Eastern suburban portion.

DISTRICT No. 9 includes Auckland Park, Richmond, Melville, Newlands, Claremont and North-western suburban portion.

DISTRICT No. 10 includes Paarl's Hoop and Mines from Robinson westwards to boundary.

DISTRICT No. 11 includes Central Mines (from Ferreira to City and Suburban).

DISTRICT No. 12 includes Prospect Town, Denver and the Mines from Meyer and Charlton to Eastern boundary.

DISTRICT No. 13 includes Ophirton, Booyens, Turfontein, Rosetown, etc. (southern suburban portion).

TABLE C.

RETURN OF DEATHS AMONG THE ASIATIC POPULATION FOR THE YEAR ENDING 30TH JUNE, 1905.

No.	CAUSES OF DEATH.	All Ages.	Under 1 Year.	1-5 Years.	5-15 Years.	15-25 Years.	25-65 Years.	65 and up w'ds.	Number of District.													Hospi- tal.	Non- Res'd't.	Un- known.	Total.
									I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.	XI.	XII.	XIII.				
1	Smallpox	-	-	-	-	-	-	-																	
2	Measles	-	-	-	-	-	-	-																	
3	Scarlet Fever	-	-	-	-	-	-	-																	
4	Epidemic Influenza	-	-	-	-	-	-	-																	
5	Whooping Cough	-	-	-	-	-	-	-																	
6	Diphtheria	-	-	-	-	-	-	-																	
7	Membranous Croup	-	-	-	-	-	-	-																	
8	Euteric Fever	-	-	-	-	-	-	-										1							1
9	Cholera	-	-	-	-	-	-	-																	
10	Plague	-	-	-	-	-	-	-					1												1
11	Diarrhoea and Dysentery	-	-	-	-	-	-	-					1					3							4
12	Epidemic Zymotic Enteritis	-	-	-	-	-	-	-																	
13	Enteritis	-	-	-	-	-	-	-																	
14	Other continued Fevers	-	-	-	-	-	-	-												1					2
15	Erysipelas	-	-	-	-	-	-	-					1												1
16	Puerperal Fever	-	-	-	-	-	-	-					1												
17	Other Septic Diseases	-	-	-	-	-	-	-																	
18	Acute Rheumatism or Fever	-	-	-	-	-	-	-																	
19	Intermittent Fever	-	-	-	-	-	-	-																	
20	Malarial Cachexia	-	-	-	-	-	-	-					1					1				1			4
21	Tuberculosis of Meninges	-	-	-	-	-	-	-																	
22	Tuberculosis of Lungs	-	-	-	-	-	-	-				1		5				2		4					12
23	Other forms of Tuberculosis	-	-	-	-	-	-	-																	
24	Alcoholism	-	-	-	-	-	-	-																	
25	Cancer	-	-	-	-	-	-	-					1												2
26	Premature Birth	-	-	-	-	-	-	-																	
27	Developmental Diseases	-	-	-	-	-	-	-					1												2
28	Old Age	-	-	-	-	-	-	-													1				1
29	Meningitis	-	-	-	-	-	-	-					1												1
30	Other Diseases of Nervous System	-	-	-	-	-	-	-				2													2
31	Organic Diseases of Heart	-	-	-	-	-	-	-					2					1	1	5					9
32	Acute Bronchitis	-	-	-	-	-	-	-				1													2
33	Chronic Bronchitis	-	-	-	-	-	-	-												2	1				7
34	Pneumonia, Lobar or Croupous	-	-	-	-	-	-	-				1		3											
35	Pneumonia, Broncho or Catarrhal	-	-	-	-	-	-	-																	
36	Rockdrill ditto, or Miners' Phthisis	-	-	-	-	-	-	-																	
37	Diseases of Stomach	-	-	-	-	-	-	-																	
38	Obstruction of Intestines	-	-	-	-	-	-	-																	
39	Cirrhosis of Liver	-	-	-	-	-	-	-																	
40	Nephritis or Bright's Disease	-	-	-	-	-	-	-					2							1			1		4
41	Scurvy	-	-	-	-	-	-	-					1												1
42	Syphilis	-	-	-	-	-	-	-																	
43	Tumours, etc., Affections of Female Genital Organs	-	-	-	-	-	-	-																	
44	Diseases of Parturition	-	-	-	-	-	-	-																	
45	Accident or Negligence	-	-	-	-	-	-	-				2					2	3	1	6			1		16
46	Suicide or Murder	-	-	-	-	-	-	-										2		1					1
47	All other Causes	-	-	-	-	-	-	-				2													4
TOTALS		77	4	3	1	21	47	1	4		8		22				2	13	2	21	2		3		77

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DISTRICT No. 13 includes Ophirton, Booyens, Turfontein, Rosettenville, etc. (Southern suburban portion).

TABLE B.

RETURN OF DEATHS AMONG THE S.A. COLOURED POPULATION FOR THE YEAR ENDING 30TH JUNE, 1905.

No.	CAUSES OF DEATH.	All Ages.	Under 1 year.	1-5 years.	5-15 years.	15-25 years.	25-65 years.	65 and upwds.	Number of District.													Hospi- tal.	Non- R's'd'nt.	Un- known.	Total.
									I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.	XI.	XII.	XIII.				
1	Smallpox -	5			1		4					1	3					1							5
2	Measles -	16	1		1	10	4						1					10	5						16
3	Scarlet Fever -																								
4	Epidemic Influenza -	31			1	14	16						2					4	7	18					31
5	Whooping Cough -																								
6	Diphtheria -	2					1	1										1						1	2
7	Membranous Croup -	2	1	1					1	1															2
8	Enteric Fever -	125			3	80	42		4	2	2	3	2			2		29	36	13	2	1	5		125
9	Cholera -																								
10	Plague -																								
11	Diarrhoea and Dysentery -	247	49	5	6	104	83		1	2	2	5	31			4	1	1	90	29	37	41		1	247
12	Epidemic Zymotic Enteritis -																								
13	Enteritis -	43	1	2	4	20	16		1				4					21		11	4		2		43
14	Other continued fevers -																								
15	Erysipelas -	4					1	3					1					1	1	1					4
16	Puerperal Fever -	3					3									2		1							3
17	Other Septic Diseases -	2					2											1		1					2
18	Acute Rheumatism or Fever -	16				6	10				1	1	1	1				4	1	7					16
19	Intermittent Fever -																								
20	Malarial Cachexia -	58			2	24	32						1			1		13	5	13	25				58
21	Tuberculosis of Meninges -	2	1				1						1					1							2
22	Tuberculosis of Lungs -	219	1	1	8	92	116	1	2	2	3	7	9			1	1	78	18	34	28		1	3	219
23	Other forms of Tuberculosis -	12	1		1	4	6					1	1					4		4	1				12
24	Alcoholism -	4					1	3									1								4
25	Cancer -	14				5	9					3	3			1	1	1	1	2					14
26	Premature Birth -	36	36								3	1	21					2	2	4	1		1	1	36
27	Developmental Diseases -	62	56	5	1			10	1	1	6	2	29	1	5	2	1	3	1	4	2	1	3		62
28	Old Age -	15					5						3					1	2	3	1				15
29	Meningitis -	144	2		4	90	48		1	1		1	3				1	63	36	22	15				144
30	Other Diseases of Nervous System -	33		1	2	6	23	1	1	2			6					6	4	3	7	1	2		33
31	Organic Diseases of Heart -	62		1	3	16	39	3	1	1	1		9					21	5	13	7	1	3		62
32	Acute Bronchitis -	44	33	3		2	4	2	1			4	2			2		5		4	6				44
33	Chronic Bronchitis -	73	1		3	30	38	1			2		4					37		5	25				73
34	Pneumonia, Lobar or Croupous -	518	14	1	8	251	242	2	8	5	3	9	46			5	4	195	90	68	83	1	10	6	518
35	Pneumonia, Broncho or Catarrhal -	52	12	5	1	22	12		2	2	2	2	6			1	1	10	13		12				52
36	Rockdrill ditto, or Miners' Phthisis -	6			1	2	3						2					2		3					6
37	Diseases of Stomach -	9	1	1		2	5						2							1	1				9
38	Obstruction of Intestines -	5	1			4	6		1				1												5
39	Cirrhosis of Liver -	10				10	9	1			2		6	1			1	4		5	1				10
40	Nephritis or Bright's Disease -	20											7	5				13	12	4	3		3	5	20
41	Scurvy -	52			1	25	26																		52
42	Syphilis -	23	2			4	17		1			1	5					2	5	2	1		6		23
43	Tumours, etc., Affections of Female Genital Organs -	4				1	3						2	2				1			1				4
44	Diseases of Parturition -	2				1	1																		2
45	Accident or Negligence -	189	1	8	2	89	87	2	4	1	1	3	9	5	2	3	2	62	30	56	5		5	1	189
46	Suicide or Murder -	8					7		1			1						3		1	1				8
47	All other causes -	109	4	1	4	51	49			5	3	2	8			2		31	20	24	6		1	5	108
TOTALS		2281	219	35	57	972	975	23	31	29	32	50	293	10	28	8	18	705	335	367	281	5	63	26	2281

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 DISTRICT No. 10 includes Paarl's Hoop and Mines from Robinson westwards to boundary.
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 DISTRICT No. 12 includes Prospect Town, Denver and the Mines from Meyer and Charlton to Eastern boundary.
 DISTRICT No. 13 includes Ophirton, Booyens, Turfontein, Rosettenville, etc. (southern suburban portion).

TABLE A.

RETURN OF DEATHS AMONG THE WHITE POPULATION FOR THE YEAR ENDING 30TH JUNE, 1905.

No.	CAUSES OF DEATH.	All Ages.	Under 1 year.	1—5 years.	5—15 years.	15—25 years.	25—65 years.	65 and upw'ds.	Number of Districts.															Hospi- tal.	Non- R'd'nt.	Un- known.	Total.
									I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.	XI.	XII.	XIII.						
1	Small-pox - - -	1					1											1								1	
2	Measles - - -	12	2	6	3	1						1	3	1	1		5		1							12	
3	Scarlet Fever - -	1					1					1						1								1	
4	Epidemic Influenza -	17	1				11	4	4	4			2	2	2	1					1			1		17	
5	Whooping Cough - -	1	1												1											1	
6	Diphtheria - - -	5	1	3			1		2	2		1														5	
7	Membranous Croup -	5	1	3	1								2	1		1	1									5	
8	Enteric Fever - - -	46	1	2	4	5	34		10	2	2	6	2	6		1	1	2			1	2		10	1	46	
9	Cholera - - -																										
10	Plague - - -																										
11	Diarrhoea and Dysentery -	170	125	18	1	3	22	1	13	26	12	22	16	4	18	4	13	3	3	6	15			3	2	170	
12	Epidemic Zymotic Enteritis -	1	1													1										1	
13	Enteritis - - -	37	25	8			3	1		2	5	10	7		1	1	1	4	1	2	3					37	
14	Other continued fevers -																										
15	Erysipelas - - -	8	2				1	5		1	1	2	1	1					1	1						8	
16	Puerperal Fever - -	7					1	6			1	2			1		1				1			1		7	
17	Other Septic Diseases -	8					3	5	2				1	2			1				1			1		8	
18	Acute Rheumatism or Fever -	16		1	3	5	7		3	4	1	1	1	1	2				1	1	1					16	
19	Intermittent Fever - -																										
20	Malarial Cachexia - -	4		1			3				2				1						1					4	
21	Tuberculosis of Meninges -	6	1	2	2		1		2	1		1		1			1									6	
22	Tuberculosis of Lungs -	85	2		2	10	70	1	17	7	8	9	3	4	7	3	5	3	1	3	4	1	9	1	1	85	
23	Other forms of Tuberculosis -	7	4		1		2		1		1	3		1												7	
24	Alcoholism - - -	16					1	14	1	5	2	3	2	1	1											16	
25	Cancer - - -	44			1	1	37	5	8	1	2	1	3	4	8	5	2		1	4						44	
26	Premature Birth - - -	66	66						4	8	4	14	9	6	9	1	3	3		3						66	
27	Developmental Diseases -	143	139	4					9	21	14	23	22	11	13	2	8	3	2	1	11	1	2			143	
28	Old Age - - -	11					1	10				2	4		1		1									11	
29	Meningitis - - -	26	11	7	1	3	4		2	3		3	3	5	7				2		1					26	
30	Other Diseases of Nervous System -	29	4		1		19	5		4	2	1	2	3	4	2	2	2	1		2					29	
31	Organic Diseases of Heart -	82	1	3	6	7	59	6	10	12	12	7	7	8	3		2	6			6					82	
32	Acute Bronchitis - - -	26	16	6	1	1	1		1	2	6	5	2	5	4	1										26	
33	Chronic Bronchitis - -	14					10	4	2	2	1	2	1		2	2										14	
34	Pneumonia, Lobar, or Croupous -	83	7	5	1	10	59	1	1	2	12	10	9	8	7	1	4	8	1	4	8	1	6			83	
35	Pneumonia, Broncho, or Catarrhal -	46	31	6	1	1	5	2	6	7	1	7	13		4		3	1	1							46	
36	Rockdrill ditto, or Miners' Phthisis -	44					44		5		1	9	2	4				10		3	2		7	1		44	
37	Diseases of Stomach - -	8		1			7		1	1		1	1	1	1		1		1							8	
38	Obstruction of Intestines -	17	6	1	1	2	3	4	1	4	2	3	1	2	1	1	1				1					17	
39	Cirrhosis of Liver - -	16					4	12	4	2	3	1		1	2		1				1	1				16	
40	Nephritis or Brights' Disease -	42	1	1	2	4	31	3	7	7	3	3	3	4	4		1	3	1	1	2		3			42	
41	Scurvy - - -																										
42	Syphilis - - -	5	3				2							2		1										5	
43	Tumours, etc., Affections of Female Genital Organs - - -	24					4	19	1	4	1	3	3	3	4	2								1		24	
44	Diseases of Parturition - -	11					2	9	2	1		1	1	2					3		1					11	
45	Accident or Negligence - -	82		1	12	16	51	2	7	6	2	7	7	6	5		10	4	12	2				10	4	82	
46	Suicide or Murder - - -	20					1	18	1	3	1	4	2		2	1		2		1	1					20	
47	All other causes - - -	53	2	3	5	4	36	3	4	7	7	5	3	5	5	3	3	2	1	2	3		3			53	
TOTALS - - -		1345	454	82	49	91	613	56	141	149	115	169	137	106	116	36	54	75	25	42	77	3	78	22		1345	

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DEATH-RATE IN BRITISH, COLONIAL AND FOREIGN CITIES.—Appended, for purposes M.O.H. 1904-6 of comparison, are particulars as to the "Death-rate per 1,000 from All Causes" in large cities in Statistics. other parts of the world :—

	1904.	1905.		1904.	1905.
Greater London (i.e., Metropolitan and City Police Districts) ...	16.6	15.6	Paris	17.4	17.4
"76 Great Towns" of England and Wales ...	17.2	15.7	Berlin	16.9	17.2
Edinburgh	16.6	16.2	Trieste	25.8	28.1
Glasgow	19.2	17.9	Vienna	18.3	19.3
Dublin	23.4	21.3	Rome	18.7	20.6
Calcutta (including plague deaths)	30.0	34.4	St. Petersburg ...	23.7	25.0
Bombay (including plague deaths)	55.0	48.6	Moscow	27.6	27.9
Madras	37.9	58.7	Cairo	—	35.1
Sidney	11.2	11.0	Alexandria	—	31.5
Brisbane	11.5	—	Durban	11.5	10.9
			Cape Town	—	21.5
			New York	22.6	18.5
			New Orleans	21.5	22.0
			Buenos Ayres ...	14.9	16.0

Except in regard to Durban and Cape Town, these figures are taken from the Annual Summary of the Registrar General for England and Wales, 1904 (p.p. iii, vii., xviii., lxxxv.) and 1905 (p.p. v., xxii., xxiv., xiv.).

CAUSES OF DEATH.

The causes of, and ages at death, and the local distribution appear separately for 1904-5 and 1905-6, in the inset Tables A to F for "Whites," "Coloured South Africans" and "Asiatics" respectively.

The extent to which each of the principal causes of death contributed to the death-roll of the years 1903-4, 1904-5, and 1905-6, may be readily seen from the following table :—

DISEASE.]	WHITES.			S.A. COLOURED.			ASIATICS.		
	1903-4.	1904-5.	1905-6.	1903-4.	1904-5.	1905-6.	1903-4.	1904-5.	1905-6.
Smallpox	—	1	22	—	5	9	—	—	—
Measles	9	12	24	6	16	13	—	—	1
Scarlet Fever	4	1	6	1	—	—	—	—	—
Epidemic Influenza ...	17	17	9	9	31	13	2	—	—
Whooping Cough	6	1	14	—	—	—	—	—	—
Diphtheritic Diseases	15	10	17	5	4	2	—	—	—
Enteric Fever	126	46	84	99	125	99	5	1	7
Diarrhoeal Diseases ...	319	208	290	333	290	285	7	4	19
Tuberculosis of Lung	82	85	79	195	219	346	11	12	19
All other Tuberculosis	10	13	8	8	14	13	—	—	2
Cancer	35	44	51	10	14	9	2	2	3
Premature Birth	44	66	84	28	36	22	—	—	1
Developm'tal Diseases	107	143	157	59	62	49	—	2	3
Old Age	12	11	32	6	15	9	1	1	1
Meningitis	29	35	47	100	162	154	2	2	2
Organic Diseases of Heart...	79	82	108	48	62	77	6	9	11
Pneumonia	171	129	150	707	570	600	55	7	17
Miners' Phthisis	36	44	39	3	6	15	—	—	—
Accident or Negligence	61	82	67	230	189	164	6	16	38
Suicide or Murder	41	20	30	8	8	27	—	1	23

M.O.H. 1904-6

Mortality.

The following observations are suggested by inspection of this Table :—

1. That in 1904-5 the White mortality from infectious diseases (Nos. 1-7), diarrhoeal diseases and pneumonia was considerably lower than in the preceding and following 12-monthly periods, the small number (46) of enteric deaths being very noteworthy.
2. That in 1905-6 the White mortality from smallpox, measles, scarlet fever, whooping cough, diphtheria and meningitis was markedly higher than in either of the two other periods under review, but as regards enteric and pneumonia, 1905-6 occupied an intermediate position.
3. That in 1905-6 the number of White deaths ascribed to 'cancer,' 'premature birth,' 'developmental diseases'—especially 'old age' and 'organic diseases of the heart'—was appreciably greater than in 1902-3 or 1904-5. Neither 'infection' nor 'sanitary conditions' in the narrower and usual meaning of the term, is commonly thought of in connection with these causes of death, and it is not easy to explain or interpret their prominence, but to some extent, as already pointed out, it seems to favour the possibility that, in spite of bad times, the population in 1905-6 had increased.
4. With regard to "S.A. Coloured" persons, the mortality from enteric was highest and that from pneumonia lowest in 1904-5, as compared with the preceding and following official years, but one of the most important and least welcome indications afforded is the progressive increase of "Tuberculosis of the Lungs," which is very marked in 1905-6, and will be referred to elsewhere.
5. In considering the figures for Asiatics, it is to be remembered that Chinese mine coolies were not employed within the Municipal Area till December, 1904, and that their monthly number from December, 1904—June, 1905, averaged 4042, and was 7276 in 1905-6. With these facts in mind, the mortality in 1904-5 (especially if fatal accidents be excluded) is very low, and that of 1905-6 shows no undue increase. Under the heading "Suicide" are included 13 deaths of mine coolies from opium poisoning.

INFANTILE MORTALITY.

By the statistical term "Infantile Mortality" is meant the number of deaths of infants under one year of age per each 1,000 births during a given period, and, in the words of the Registrar-General for England and Wales, Infantile Mortality "has always been regarded as a valuable test for the health of communities." In Table A the rates for Johannesburg are compared with the rates for various English communities, and for the other large towns in South Africa.

TABLE A.

MORTALITY OF INFANTS UNDER 1 YEAR PER 1,000 BIRTHS.

	1899-1903.	1902.	1903.	1904.	1905.	1906.
England and Wales	146	133	132	145	128	...
Urban Counties of England and Wales	159	143	143	158	...	...
Rural Counties do.	120	118	107	117	113	...
" 76 Great Towns " do.	...	145	144	160	140	...
" 141 Smaller Towns " do.	...	135	135	154	132	...
Capetown ... ..	...	168	114	...	118	...
Kimberley ... ..	...	...	145	154	125	...
Durban ... ..	...	154	100	...	...	...
Pretoria ... ..	...	...	94	...	...	...
JOHANNESBURG . . . . .	...	262	185	153	...	177

In Table B are compared the rates in Johannesburg and in various English communities of Infantile Mortality, expressed as percentages of (a) the total number of births, and (b) the total number of infant deaths,

COMPARISON OF CAUSES OF INFANT MORTALITY IN JOHANNESBURG AND IN ENGLAND, EXPRESSED AS PERCENTAGES OF BIRTHS (B),
AND OF ALL INFANT DEATHS (D).

PLACE.	Premature Birth and Congenital Malformation.		Debility, Low Vitality, Inanition, Asthenia, Atrophy, Marasmus.		Diarrhoea and other Gastro-Intestinal Diseases.		Convulsions.		Teething.		Respiratory Disease.		Tubercular Disease.		Infectious Disease.		All other Diseases.	
	B.	D.	B.	D.	B.	D.	B.	D.	B.	D.	B.	D.	B.	D.	B.	D.	B.	D.
Johannesburg ($\frac{4}{5}$ yrs, 1st January, 1902 to 30th June, 1906) ...	2.6	13.9	3.4	17.9	7.3	38.7	1.0	5.5	0.3	2.0	2.3	11.2	0.7	3.8	0.5	2.8	0.6	3.6
(a) Hertfordshire, Wiltshire, Dorsetshire, 1889-91 ...	1.6	...	1.7	...	0.8	...	1.3	...	...	...	2.1	..	0.4	..	0.6	...	...	...
(b) Rural Counties of England and Wales, 1897-1901 ...	...	...	4.5	...	2.0	...	1.8	...	...	...	2.0	...	0.5	...	0.8	...	...	...
(b) Urban Counties of England and Wales, 1897-1901 ...	...	...	4.5	...	4.1	...	2.1	..	...	...	2.7	...	0.8	...	1.0	...	..	...
(c) Preston, Leicester, Blackburn, 1889-1891 ...	2.6	...	2.7	...	4.7	..	3.7	..	0.4	...	3.7	...	1.2	...	1.4	...	...	...
North English Manufacturing Town, 1890-1899 (population, 96,000) ...	1.6	7.3	4.7	21.8	4.9	22.8	2.1	10.0	0.6	2.9	4.1	10.1	1.2	5.7	1.2	5.6	0.9	4.3

10,083 Births.
1,910 Deaths.

(a) Calculated from Tables B.C.D.F., pp. xl-xv, R.G.'s Report 1601.
 (b) " " " L. R.G.'s Report, 1962 p. lxviii.

L. K.G.'s Report, 1902 p. LXVIII.

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In Table C is shown the monthly incidence of white infant deaths in Johannesburg for the 4 calendar years 1902-3-4-5, December, November, January and October stand out as specially fatal in the order named.

TABLE C.

January	...	171	July	...	109
February	...	116	August	...	81
March	...	93	September	...	90
April	...	83	October	...	152
May	...	79	November	...	275
June	...	108	December	...	300

Examination has now been made of the causes of 1,910 infant deaths between 1st January, 1902, and 30th June, 1905, in the hope that this analysis (*vide* Table D) may afford some indication of the best means of removing such causes or limiting their operation. For purposes of comparison with the factors of infant mortality in communities in England, the classification used in Table D is identical with that adopted in a similar inquiry early in 1900 as regards 5,101 infant deaths in the 10 years 1890-99, in Stockport, a town of 96,000 inhabitants; and it will be observed that the deaths are separately tabulated for (a) each day of the week (b) each week of the 1st month and (c) each month of the year, according to the method followed by the English Registrar General in the section of Infantile Mortality in his Report for 1891.

TABLE D.

Analysis of the causes of White Infant Mortality in Johannesburg for the 4½ years—1st January, 1902, to 30th June, 1906.

CAUSES.	1st day.	2nd day.	3rd day.	4th day.	5th day.	6th day.	7th day.	1st week.	2nd week.	3rd week.	4th week.	Under 1 month.	1 mth. and under 2 mths.	2 mths. and under 3 mths.	3 mths. and under 4 mths.	4 mths. and under 5 mths.	5 mths. and under 6 mths.	6 mths. and under 7 mths.	7 mths. and under 8 mths.	8 mths. and under 9 mths.	9 mths. and under 10 mths.	10 mths. and under 11 mths.	11 mths. and under 12 mths.	TOTAL.
Premature Birth. Congenital Malformation ...	130	21	10	9	2	8	2	182	25	20	9	236	14	8	3	2	2	...	...	1	...	...	...	257
Debility Low Vitality. Inanition, Asthenia, Marasmus, Atrophy...	41	11	8	9	1	6	2	78	21	25	16	140	44	31	31	28	11	17	16	8	6	7	4	343
Diarrhoea and other Gastro-intestinal Maladies	1	1	...	1	2	1	1	7	10	13	5	39	28	13	104	86	78	87	59	61	47	32	47	741
Convulsions ...	8	6	4	2	2	3	3	28	2	8	...	43	13	11	8	2	7	5	2	6	5	1	3	106
Teething ...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	4	3	7	4	4	9	7	39
Respiratory Diseases (excluding Pthistis)	...	1	...	1	...	...	2	4	13	15	8	40	30	15	20	17	13	11	15	8	14	13	19	215
Tubercular Diseases Pthistis	...	...	...	...	...	...	...	...	...	...	...	...	2	2	1	2	1	3	...	3	2	...	2	16
Tabes Mesenterica and Tubercular Peritonitis	...	...	...	...	...	...	...	...	...	...	...	...	3	1	1	...	...	...	...	...	1	...	...	9
Tubercular Meningitis ...	...	...	...	...	...	...	...	...	2	...	1	3	2	5	9	4	5	4	4	3	4	3	3	49
Zymotic Diseases—																								
Whooping Cough ...	...	...	...	...	...	...	...	...	...	1	...	1	2	1	2	1	1	1	...	1	2	4	3	19
Diphtheria, Membranous Croup	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...	1	...	...	2	2	...	2	7
Enteric Fever ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	4
Scarlet Fever ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3
Measles ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	12
Erysipelas ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	9
Chickenpox ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
Suffocation ...	3	1	...	...	...	...	...	4	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	6
Injury ...	...	1	...	...	...	...	...	1	...	...	...	5	...	...	...	...	...	...	...	...	...	...	...	8
Other Causes...	5	2	2	...	2	2	2	15	5	2	...	22	13	2	...	4	5	2	1	...	2	1	3	56
	188	44	24	22	9	20	12	319	79	85	49	532	155	150	183	149	132	137	107	97	92	76	100	1,910

The Number of White Births registered between 1st Jan., 1902 and 30th June, 1906, was 10,083.

Before undertaking the consideration of Table D, it should be stated that the Schedule of Causes of Death issued by the Society of Medical Officers of Health in 1901 has been followed in its preparation. M.O.H. 1904-6
Infant Mortality.

The heading "Congenital Malformation" includes malformation of heart, spina bifida, hydrocephalus, imperforate anus, cleft palate, harelip, icterus neonatorum.

The heading "Diarrhoea or other Gastro Intestinal Maladies" includes diarrhoea either alone or coupled with some ill-defined causes (such as marasmus, thrush, convulsions), epidemic or summer diarrhoea, epidemic or zymotic enteritis, intestinal or enteric catarrh, gastro-intestinal catarrh, dysentery, dysenteric diarrhoea, cholera nostras, cholera infantum, choleraic diarrhoea, and any other gastro-intestinal malady.

Examination of Table D shows:—

1. That the number of deaths on the *first day* of life (188) is four times as great as on any succeeding day (against $2\frac{1}{2}$ times in Stockport), and is 43 per cent. more than the combined total of deaths during days of the first week. On the *second day* mortality falls to less than one-fourth of its previous height, and, with the exception of a marked rise on the 6th day continues to decline rapidly.

2. The total number of deaths during the *first week* (319) constitute about 60 per cent. of the deaths of the first month of life. The rate of infantile mortality during the first week is, in fact, so high, that were it maintained uninterruptedly, every infant born would die before completing its sixth week of life. In the second week, however, mortality falls to about one-fourth of its previous height. In the third week there is a slight rise under the headings of 'Debility, Low Vitality, Marasmus, etc.,' a tendency which is also noticeable in English statistics; in the fourth week a fresh decline occurs.

3. The Infant Mortality (532) of the *first month* is more than double that of any other month, and approaches one-fourth of all such deaths (1910). In the second month it falls to 155, or less than one-third of its previous height, and in the third month to 150. In the fourth month, however, it rises to 183, due to a notable increase in the deaths from "diarrhoea and other gastro-intestinal maladies." In the 5th-12th months, there is an irregular decline from 149 to as low as 76. It will be interesting to note whether these variations are maintained over a longer series of years, or whether, as in England, monthly lessening of mortality is regularly maintained.

Passing to the consideration of the causes to which these infant deaths are assigned, it will be seen, as regards the first months, that while comparatively few deaths appear under the headings of definite diseases, 419 out of a total of 532 are ascribed to either (1) premature birth and congenital malformation, (2) debility, inanition, marasmus, etc., or (3) convulsions. In other words, the great destruction of child life during the first month is largely the result of a rapid weeding-out of infants prematurely born or imperfectly developed, and of weaklings who come into the world in a scarcely viable condition. How far, if at all, this process may be favoured and accelerated by want of knowledge on the part of untrained women undertaking the duties of the lying-in chamber, is a point on which no data are available. Five deaths were due to suffocation, presumably by overlying. In the second month mortality under the foregoing headings is very much less, and more definite ailments begin to manifest themselves as causes of death. Diarrhoea and other gastro-intestinal maladies are responsible for many deaths in each of the 12 months, but appear to be specially fatal in the fourth, seventh, fifth and sixth, and kill 7.3 per cent. of all infants, against 4.7 in "Preston, Leicester and Blackburn," 4.1 in the "urban counties," and 2.0 in the "rural counties." Putting it another way, the infant deaths in Johannesburg from this cause form 38.7 per cent. of all infant mortality, the very worst English figure being 22.8. The incidence of fatal infantile respiratory disease in Johannesburg suffers little by comparison with even the "rural counties," and is very much below the figure for English towns. It may be noted, however, that here it is most serious in the first and second months, and very much less thereafter, whereas in England it assumes prominence in the second month, and maintains it throughout the remaining ten.

Tubercular Disease destroys 0.7 of the infants born in Johannesburg, as against 0.5 in rural and 0.8 in English urban counties, and 1.2 in manufacturing towns.

With regard to Infectious Disease, infants in Johannesburg appear to enjoy considerable immunity, the deaths from this class of malady representing 0.5 of the infants born, as against 0.8 in English rural counties, and 1.4 in manufacturing towns. This is chiefly due to freedom from epidemics of Whooping Cough and Measles.

Whooping Cough (19) is much the most fatal infantile infectious disease, and is returned as a cause of death as early as the third week. Measles (12) and Erysipelas (9) come next, followed by Diphtheric disease (7) and Enteric (4), viz., 1 in the seventh, 2 in the ninth, and 1 in the twelfth months. Scarlet Fever caused 1 death in the fourth, 1 in the fifth, and 1 in the twelfth months.

The percentages of Johannesburg children who die from convulsions is 1.0, and from teething 0.3, which compare favourably with all the English rates. Whether this is due to more careful death certification, or to other causes, it is difficult to say. The percentage (3.6) of "deaths from all other causes" (including suffocation and injury) is rather lower than the Stockport figure. "Inherited Syphilis" was returned as a cause of death in 6 cases, but it is probable that this does not reflect the actual state of affairs, for, inasmuch as congenital syphilis as a cause of death debars from insurance benefits, it is conceivable that death may in some cases be assigned to co-existing secondary disease.

Summarising the foregoing, the chief causes of infantile mortality in order of intensity, are the following:—

1. Diarrhoeal Disorders, and the effects of Malnutrition.—Under this heading may be included "Diarrhoea and other gastro-intestinal maladies," Debility, low vitality, inanition, asthenia, marasmus, atrophy, and probably most cases of "convulsions." These causes are together responsible for 62 per cent. of all deaths of infants under 1 year of age.

2. Prematurity at Birth, and Congenital Malformation.—Assigned to this cause are 13.9 per cent. of all infant deaths, equal to 2.6 per cent. of all births, as against 2.6 per cent. of births for "Preston, Leicester and Blackburn, 1889-91," and 1.8 for "Hertfordshire, Wiltshire and Dorsetshire, 1889-91," and 1.6 for Stockport, 1890-99. The rate for Johannesburg—having regard to the suburban nature of a large portion of the Municipality—is therefore apparently rather high, but it is not easy to suggest either explanation or remedy.

3. Respiratory Disease.—This is a comparatively minor cause, which kills 2.3 per cent. of children under 1 year, as compared with 3.7 in "Preston, Leicester and Blackburn," 2.7 in the Urban Counties of England, and 2.0 in rural counties.

"Diarrhoeal Diseases and the effects of Malnutrition," which, as already said, account for 62 per cent. of infant deaths, merit therefore special consideration, and it is suggested that the predisposing causes are twofold, viz.:—

1. Early weaning and unsuitable hand feeding.
2. Insanitary conditions, such as (a) soil and air pollution by slops, leakage and emanations from slop receptacles, privies, etc., all giving rise to food contamination.

Insanitary conditions of residence are capable of being largely, though gradually, corrected, and in course of time much improvement may be looked for in this respect, especially when the sewerage system is in operation. The question of early weaning and unsuitable hand-feeding is, however, probably more difficult to combat.

It is submitted that the measures most likely to make for improvement in this respect are:—

1. The spread of knowledge of Infant Hygiene amongst mothers and those who, in the natural course of events, will become mothers.
2. The breast-feeding of infants, if possible, up to the age of seven months.
3. The protection of milk supplies and the provision of clean milk.

The spread of knowledge of Infant Hygiene can be assisted in two ways, viz.:—

- (1) By the wide circulation in handbill form of Suggestions as to the Feeding and Care of Infants; and
- (2) By imparting such instruction to the elder pupils in girls' schools.

In 1899, in Stockport, where the Infant Mortality was very excessive, and maternal ignorance amongst the poorer classes even greater, both these measures were adopted by the Health Committee, who were the first public body in England to initiate the teaching of Infant Hygiene in schools. Draft "Suggestions as to the Feeding and Care of Infants" were kindly revised by the Stockport Medical Society, Professor Delépine of Owen's College, and Dr. Dawson Williams, and widely distributed in handbill form. The substance of this handbill, slightly modified and printed in pamphlet form with explanatory notes, was sent in quantities as required to each school, and the teaching was imparted during reading lessons and as material for composition. A supply of feeding bottles of suitable pattern was also furnished, and 7s. 6d. for prizes was granted to each school willing to take the matter up. This system is still in operation.

In April, 1905, many of the foregoing facts were brought to the notice of the Transvaal Medical Society, and in the following July the M.O.H. addressed the Transvaal Teachers' Association on the Teaching of Hygiene (including Infant Hygiene), in Elementary Schools. A small joint committee of members of the Health Committee and of Teachers was formed to go into the matter, but for various reasons the proposal has not yet taken practical shape, though it has not been lost sight of.

It may here be recorded that some medical men of high standing and much experience in the treatment of children, are of opinion that fresh cow's milk, suitably diluted, is not always or even generally the best food for hand-fed infants in Johannesburg. Perhaps some explanation of this observation may lie in the fact that in Johannesburg milk is very often not delivered clean; and even when it is clean on delivery, it is not subsequently protected sufficiently from contamination. Indeed, Dr. Newsholme, of Brighton, believes, as the result of careful examination of this question in several successive years, that the infection of diarrhoea as conveyed by both condensed milk and fresh cow's milk, has chiefly a domestic origin, and is chiefly due to domestic dirt, and he finds that condensed milk is more dangerous in this respect than fresh milk, as a tin may continue in use for three days after it is opened, and therefore undergoes longer exposure to contamination by dust and flies than fresh milk. (Brighton Report for 1905, p.p. 27 and 48.)

M.O.H. 1904-6
Infant
Mortality.
Pneumonia.

The provisions of your Dairy and Cowshed Bye-Laws are fairly complete, and provide for cleanliness of premises, animals, milkers, and receptacles. But the enforcement of these Bye-Laws over the immense area which supplies Johannesburg, and in a land where water is at a premium, is a matter of great difficulty. Even with an army of inspectors, the community would still have to depend largely on the willing co-operation and cleanliness of the milk producer.

One or more of the dairy experts here might, with advantage, be approached on the question of instituting by private enterprise a system whereby properly cooled, clean milk may be obtainable at a reasonable price, as is done at Fécamp in Normandy, St. Helens, Liverpool and Battersea. Judging from the price of ordinary milk here, this undertaking ought to be the golden opportunity of philanthropy and 6 or 7 per cent., and it is to be hoped that before long it may take practical shape.

It may be mentioned that a preparation known as Galak or Dried Milk, made by rapidly drying thin layers of milk on steam-heated cylinders, has recently been placed on the market, and has been widely spoken of as an infant food in America; but it has been pointed out that the constitution of the milk has been altered by the heat of the drying process and the fat globules have undergone change, possibly only of the nature of aggregation but sufficient to cause a considerable departure from those in normal milk, as regards their physical properties. This dried milk can, however, be kept in a closed tin, like sugar or tea, and ought not to be nearly so liable to contamination by dust and flies as either condensed or fresh milk.

No attempt has been made to analyse infantile mortality amongst coloured people, because there are no reliable statistics available for Johannesburg. It is, however, probably very great, if the figures for Capetown in 1903-4, viz., 271, and for Kimberley in 1903, viz., 537, can be taken as any indication.

Serious as are our infantile mortality figures, it is open to question whether they afford an adequate index of the loss and damage to the community from this cause. As the late Lord Playfair said, "The record of deaths only registers, as it were, the wrecks which strew the shore, but it gives no account of the vessels which are tossed on the billows of sickness, 'stranded and maimed as they often are by the effects of the recurrent storms.' The sickly children that survive the battle of a neglected infancy are apt to grow into puny and physically deficient adults, and excessive infantile mortality thus becomes a great social and national blemish, against which it behoves us all to strive.

PNEUMONIA.

The following are the figures as to 'reported cases' and deaths for the period under review :—

YEAR.	WHITES.		S. A. COLOURED.		ASIATICS.	
	Cases Reported.	Deaths.	Cases Reported.	Deaths.	Cases Reported.	Deaths.
1903-4	—	171	—	707	—	55
1904-5	246	129	1,235	570	8	7
1905-6	414	150	1,280	600	31	17

Notification of pneumonia commenced in March, 1904, at the time of the Plague outbreak, and has been nominally continued since, but there is reason to believe that this notification is far from complete and the above figures do not afford a reliable basis for the calculation of case-mortality. The chief reason for the continuance of notification is the desirability of getting timely warning of any unusual incidence of the disease, in view of the possibility of pneumonic plague occurring. Any unduly large number of cases in any quarters or compound is at once made the subject of inquiry, and in several mining compounds extensive measures of disinfection have thereupon been carried out, with the approval of the medical officer of the mine, and with very satisfactory results.

M.O.H. 1904-6

Pneumonia.

The deathrates per 1,000 from this disease are as follows:—

	WHITES.	S. A. COLOURED.	ASIATICS.	LONDON.
1903-4	2.0	10.1	0.9	1.2 (1903)
1904-5	1.5	7.5	0.7	1.4 (1904)
1905-6	1.7	8.8	1.1	1.4 (1905)

From the above figures it would at first sight seem that as regards Whites, the risk of death from pneumonia in Johannesburg is not, after all, much greater than in London. But pneumonia is specially fatal to the aged; "taken off by it," says Professor Osler, "in an acute, short, not often painful illness, the old man escapes those 'cold gradations of decay,' so 'distressing to himself and to his friends.'" Now, in Johannesburg as compared with London, proportion of the population over 60 years of age is very small, the bulk of the inhabitants being probably between 10 and 45. A true comparison is therefore difficult.

Seasonal Influence—

The number of deaths registered during each week of the two years 1904-5 and 1905-6, as well as the mean weekly temperatures, are shewn on the accompanying chart, but, it is rather surprising that neither for whites nor coloured do the curves show any very constant or clearly-defined relationship of low-temperature to pneumonia-deaths. Amongst whites the mortality is greater in the winter and early spring (July to October), which is also the dry season and the time of most dust. South African Coloured persons suffer least during February, March, April and the early part of May; at the end of May or beginning of June, the curve commences to rise, and though it exhibits considerable weekly oscillations, it maintains a high general level till the following January, and in some weeks of our summer months it reaches as high a point as in the coldest weather. There is no doubt that, as pointed out by Drs. Macaulay and Irvine who have made a careful study of this question, that the bulk of pneumonia mortality of natives is amongst those recent arrivals—especially from British Central Africa and similar tropical districts—who have been less than three months in the Transvaal.

The comparative immunity of Asiatics from fatal pneumonia during the two years under notice is very remarkable; in 1904-5 in a population of 10,136 including 4,042 mine-coolies, there were only 7 deaths, and in 1905-6 with a population of 15,054 including 7,276 mine-coolies only 17 of which 7 were miners.

With regard to the predisposing and proximate causes of pneumonia and the precautions against it which it is desirable to observe, the Medical Officer of Health is unable to add anything to his remarks in his Annual Report, 1902-3, as follows:—

"It is, however, generally agreed that pneumonia is an infectious disease, usually caused by the pneumococcus and that it is predisposed to by devitalizing influences of any kind, such as irregularities and excesses of life (especially alcoholism), insanitary environment, over-crowding and air-pollution, as well as by inferior and insufficient food, and neglect of precaution against the great and sudden diurnal changes of temperature characteristic of the South African climate. Furthermore, there can be little doubt that the very great amount of dust with which Johannesburg is liable to be afflicted in the dry season has had a very considerable share in the production of the disease, and this view is confirmed by the fact that dust taken in May in Market Street and Fox Street has been shown to be as sharp, angular, and irritating as that taken from mines stopes. Finally, as the 'spit' of pneumonia patients swarms with the germ of the disease, there is little doubt that the disgusting habit of spitting inside dwellings, bars and public vehicles, is an appreciable factor in spreading the disease.

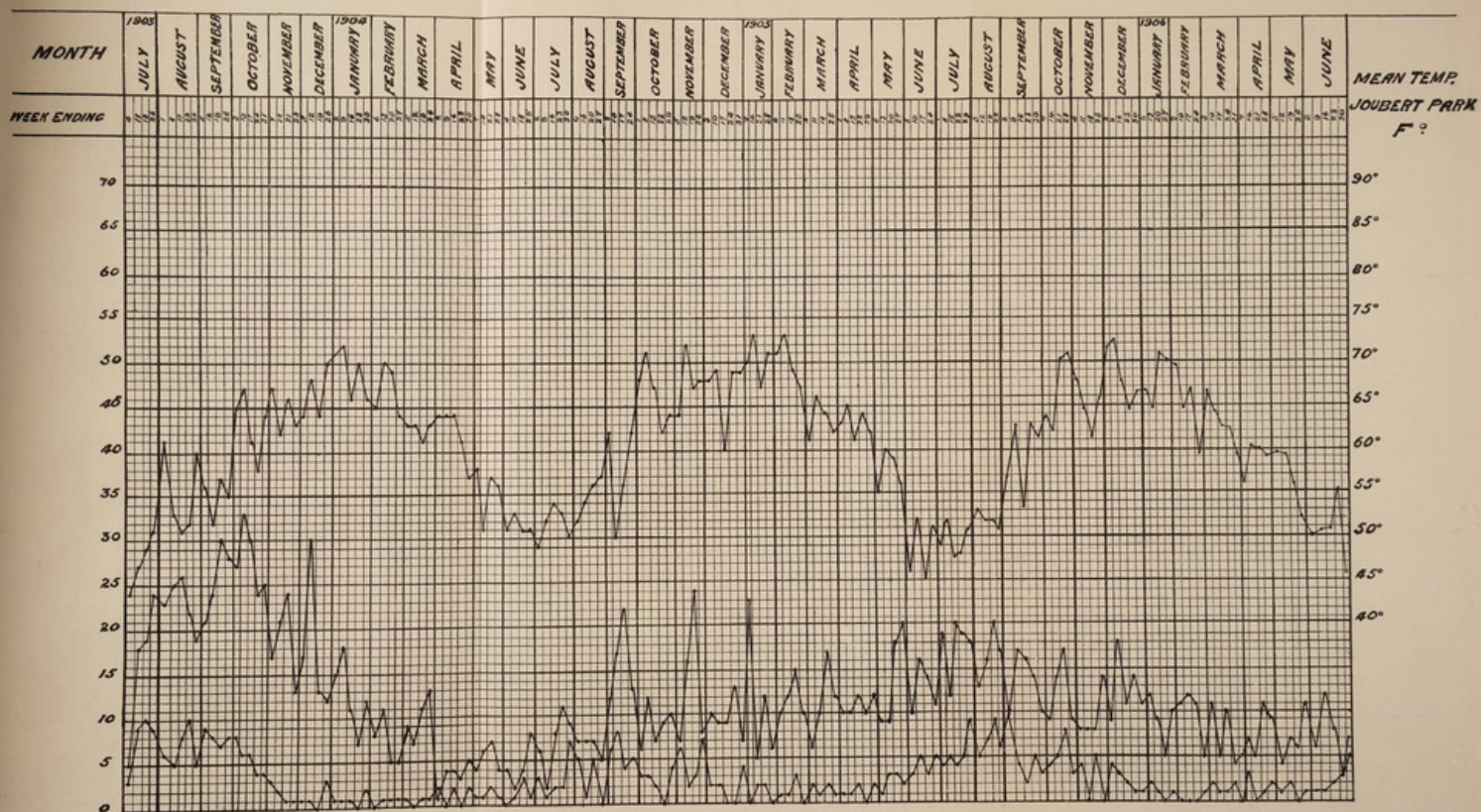
"The above-mentioned causes of pneumonia obviously suggest such remedies as in the present state of knowledge, may be considered of use. The general improvement of the sanitary conditions under which we live, the making of roads and the consequent abatement of dust, combatting the practice of spitting in dwellings and public vehicles, the avoidance of excesses, and the ingestion of a sufficiency of good food, are amongst the most important points to bear in mind. And it is also to be noted that prompt medical advice and attention when an attack appears to threaten is of the utmost importance, and further, that the number of those attendant on a person suffering from pneumonia should be limited to that sufficient for the comfort and welfare of the patient."

Touching the effects of overcrowding and air pollution, the M.O.H. begs to quote the following observation of Dr. Henry Ashby, Lecturer on Children's Diseases at the Manchester University in a recent paper on "Pneumococcal Infections" (*vide B.M. Journal 13/10/06*):—

PNEUMONIA CHART

DEATHS

July 1st 1903 - June 30th 1906

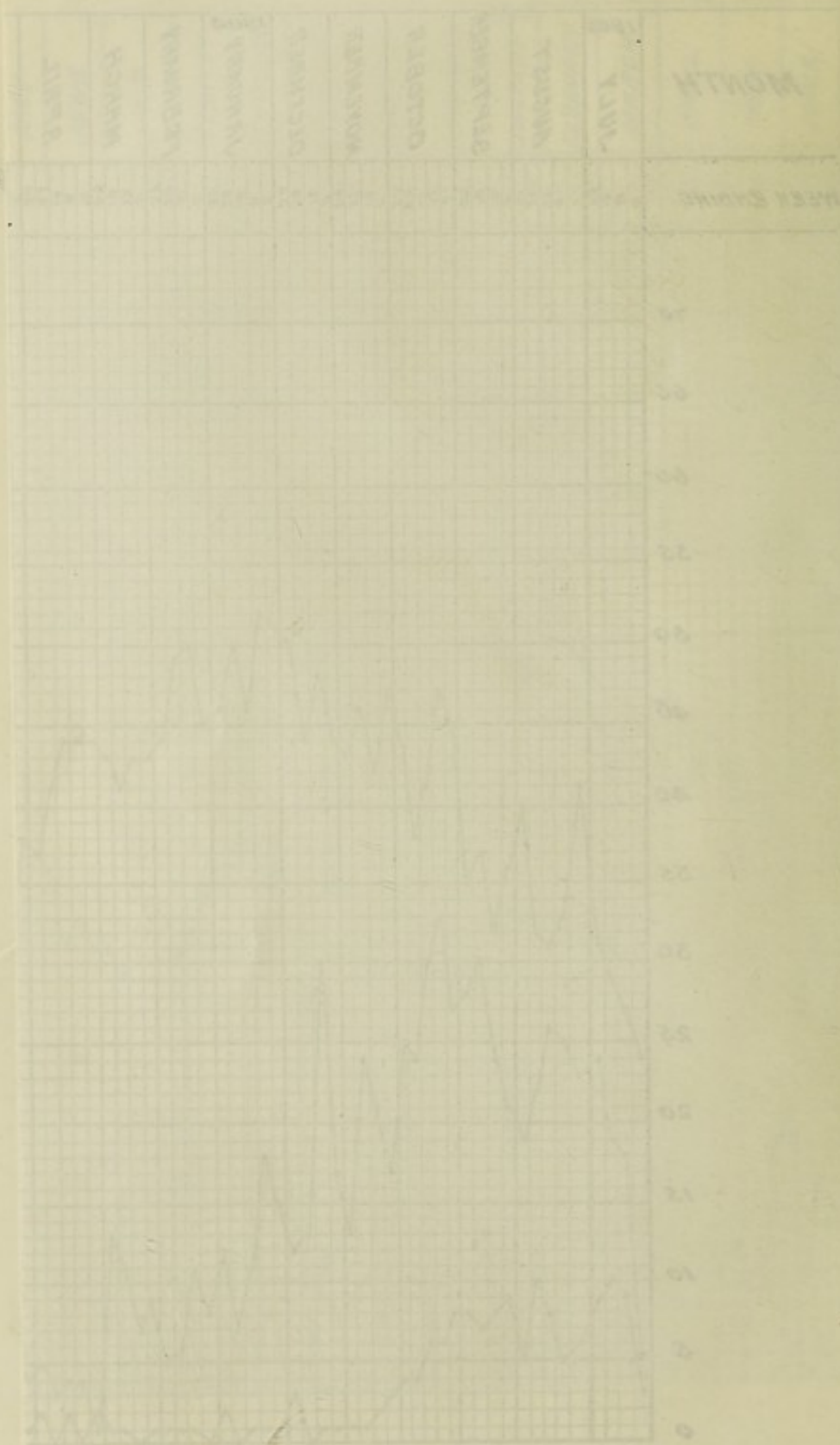


——— Upper Curve — Mean temperature Joubert Park. ———
 ——— Middle " — S. A. Coloured. ———
 ——— Lower " — Whites. ———

PHYSIOLOGICAL CHART

DEATHS

From 30th 1904



"The discovery of the Pneumococcus, if it has not yet led to very practical results as regards serum treatment, has taught us the great danger of overcrowding hospitals and dwelling-houses, and the great value to the individual patient of fresh air. The public are long in learning the lesson of the open window in the treatment of pneumonia and the poisoned atmosphere of an overheated and stuffy room will, for another generation at least, claim its victims."

M.O.H. 1904-6
Pneumonia,
Enteric.

ENTERIC OR TYPHOID.

Appended are the statistical particulars for the years under notice.

YEAR.	WHITES.			S.A. COLOURED.		ASIATICS.	
	Cases.	Deaths.	Deaths per cent.	Cases.	Deaths.	Cases.	Deaths.
1903-4	1009	126	12.4	—	99	—	5
1904-5	454	46	10.1	266	125	8	1
1905-6	617	84	13.6	232	99	29	7

A large number of imported cases, *i.e.* of persons developing or suffering from enteric, came from outside districts into the hospitals and nursing homes of Johannesburg. Excluding deaths amongst this class (see Tables A, B, C), the mortality rates from enteric per 1,000 of the population, were as follows :—

	1903-4.	1904-5.	1905-6.
Whites	1.3	0.4	0.7
S.A. Coloured	1.4	1.6	1.4
Asiatics	0.6	0.09	0.8
In the "76 Great Towns" of England	0.12 (1903)	0.10 (1904)	0.08 (1905)

The above rates, so far as they go, suggest at first sight, that the risk to Whites of death from Typhoid fever in Johannesburg is from 4 to 10 times as great as it is in the large towns in England, but here again (as in Pneumonia) the comparatively youthful 'age-constitution' of the population of Johannesburg must be remembered in view of the fact that typhoid is a disease of youth and early adult life. It is therefore reasonable to suppose that if the 'age-constitution' of Johannesburg were similar to that of the average large English town, the typhoid rate here would be less than the above figures indicate.

The typhoid death rates for "S.A. Coloured" are higher than those for "Whites." It is thought that this signifies a greater case-mortality amongst those attacked, rather than a greater liability to contract the disease.

Asiatics are less susceptible than either "Whites" or "S.A. Coloured." There were 3 deaths amongst the mine-coolies in the period 1st January, 1904, to 30th June, 1906.

THE INFLUENCE OF SOIL, OF FABRICS AND OF FLIES IN THE DISSEMINATION OF ENTERIC.

—As having a most important bearing on enteric fever prevalence in South Africa, it is desirable to record certain notable conclusions based by Firth and Horrocks on the results of the following experiments at the R.A.M.C. School at Netley :—

1. With soils moistened with varying amounts of dilute raw and sterile sewage and rain.
2. With fine dry soil and with sand placed in a closed cupboard from 3 to 4 feet from open dishes containing sterile broth, and then vigorously blown about by a bellows passed through side of cupboard so as to reproduce the conditions of a duststorm.
3. With soils exposed to continuous or bright sunshine.
4. With fabrics.
5. With flies, which, after settling on typhoid infected matter, crawled over sterile nutrient media in flat dishes.

Firths and Horrock's conclusions are as follows :—

1. That there is no evidence to show that the enteric bacillus, when placed in soil, displays any disposition or ability to either increase in numbers or grow upwards, downwards or laterally.

M.O.H. 1904-5

Enteric.

2. That the enteric bacillus can be washed through at least eighteen inches of soil by means of water, even when the soil is closely packed down and no fissures or cracks allowed to exist.
3. That the presence or absence of organic nutritive material in the soil appears to be a largely negligible factor.
4. That an excess, or great deficiency, of moisture in soils appears to be the dominant factor affecting the chances of survival of the enteric bacillus in, or at least the possibility of recovering it from soil.
5. That from fine sand, kept moist with either rain or dilute sewage, the enteric bacillus cannot be recovered later than the twelfth day after fouling; this inability to recover the organism is due probably not so much to its death as to its being washed down into the deeper sand layers by liquids added.
6. That in peat, the enteric bacillus appears to rapidly die out, as the microbe cannot be recovered from it after the thirteenth day; but this soil is so porous that it is quite possible that the micro-organism was washed down into the deeper parts, and consequently not recoverable from the place of inoculation.
7. That from ordinary soil kept damp by occasional additions of rainwater, of dilute raw sewage and of dilute sterile sewage respectively, the enteric bacillus can be recovered to and on the 67th, 53rd and 74th days respectively.
8. That in a similar soil, after heavy rainfall, the enteric bacillus at once disappears from the surface layers.
9. That from a similar soil, allowed after inoculation to become so dry as to be readily blown about as dust, the enteric bacillus can be recovered up to and on the twenty-fifth day; and that enteric infective matter can be readily translated from dried soil and sand by means of winds and air currents.
10. That in a sewage polluted soil recovered from beneath a broken drain, the enteric bacillus is able to survive up to the sixty-fifth day.
11. That from pieces of khaki-drill, khaki-serge and blue serge, each inoculated with an emulsion of the enteric bacillus and then allowed to become quite dry, the micro-organism is recoverable up to and on the 74th, 87th and 78th days respectively.
12. That from pieces of khaki-drill respectively fouled by liquid and by solid or semi-solid enteric faeces and then allowed to dry, the micro-organism is recoverable on the seventeenth day.
13. That the enteric bacillus is able to survive in surface soil an exposure to 122 hours of direct sunshine, extending over a period of twenty-one consecutive days. That from a piece of infected serge the enteric bacillus is recoverable after the fabric has been exposed to fifty hours of direct sunshine spread over a period of ten days.
14. That ordinary house flies (*Musca domestica*) can convey enteric infective matter from specific excreta or other polluted material to objects on which they may walk, rest or feed. That such infected matter appears to be attached not only to their heads (mandibles probably) but also to their legs, wings and bodies. It has not been proved that the enteric bacillus passes through the digestive tract of the fly.

The above conclusions as to the viability of the enteric bacillus in soil have since been confirmed by Pfuhl of Berlin.

Firth and Horrocks add:—

"Our experiments have shown us that the bacillus typhosus is able to assume a vegetative existence for considerable periods outside the body; we are therefore compelled to face the position that outbreaks of enteric fever are not exclusively water-borne, and that infective material carried by winds and flies may play a large part in the development of disease. We have shown that the enteric bacillus can survive in ordinary earth for over two months, no matter whether the soil be virgin, or polluted with sewage, or be frozen hard.

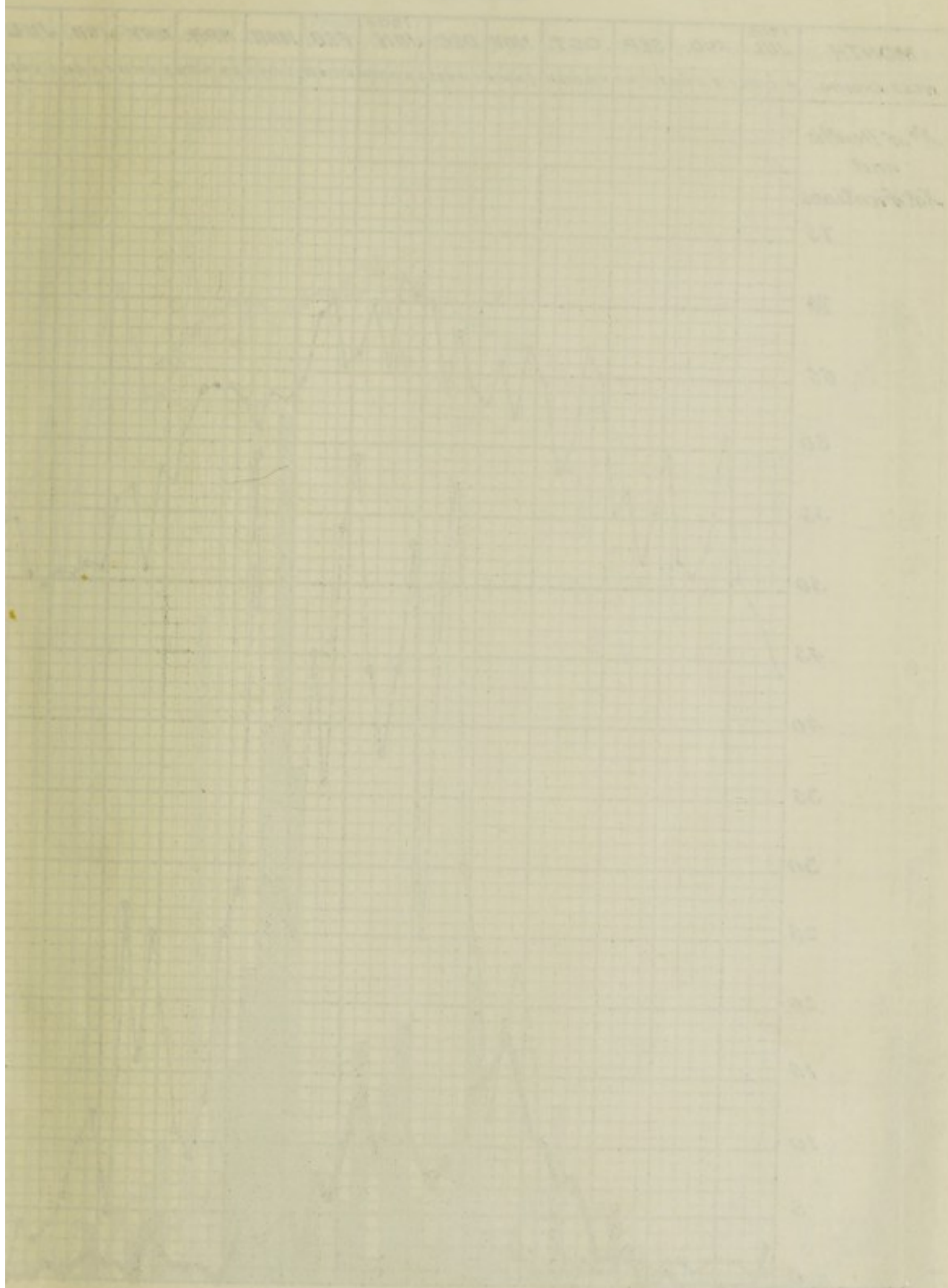
"This being the case, it is not difficult to understand how certain areas, steadily fouled by surface pollution, may become endemic foci for the development of enteric fever. We think that the amount of specific pollution which a soil may receive from the dejecta of enteric fever cases has been greatly underestimated. Observations have shown that enteric stools may contain from 3 to 5 enteric bacilli in 0.006 milligramme of dejecta, and when we consider the number and volume of the evacuations from a single patient it is obvious that the specific pollution of the soil under certain conditions must be enormous. It must further be remembered that the urine of enteric patients may add materially to the specific contamination.

"In the face of these considerations it is manifest that, for a proper exercise of preventive measures, our attention must be concentrated on the dejecta at the moment they leave the human body. It is true we can do much to protect ourselves against infection if the specific micro-organisms become disseminated in Nature, but our task then becomes stupendous, as our efforts have been directed to guard so many paths of infection. A full measure of success can only be expected or obtained when we commence our work before the enteric or specific bacillus has had an opportunity of assuming a vegetative existence. In other words we have to consider how we can dispose of dejecta with the minimum of danger to health. This is no new problem, and it is one replete with difficulties; moreover, it must be considered in respect of conditions existing in both civil and military life at home and abroad.

"In the light of our experiments we cannot help regarding the dry-earth or pail-closet system, as ordinarily carried out, to be replete with danger. The possibilities of local dissemination of infective matter either as dust or by flies are great, and, unless the dejecta

THERMO-BIOLOGICAL CHART

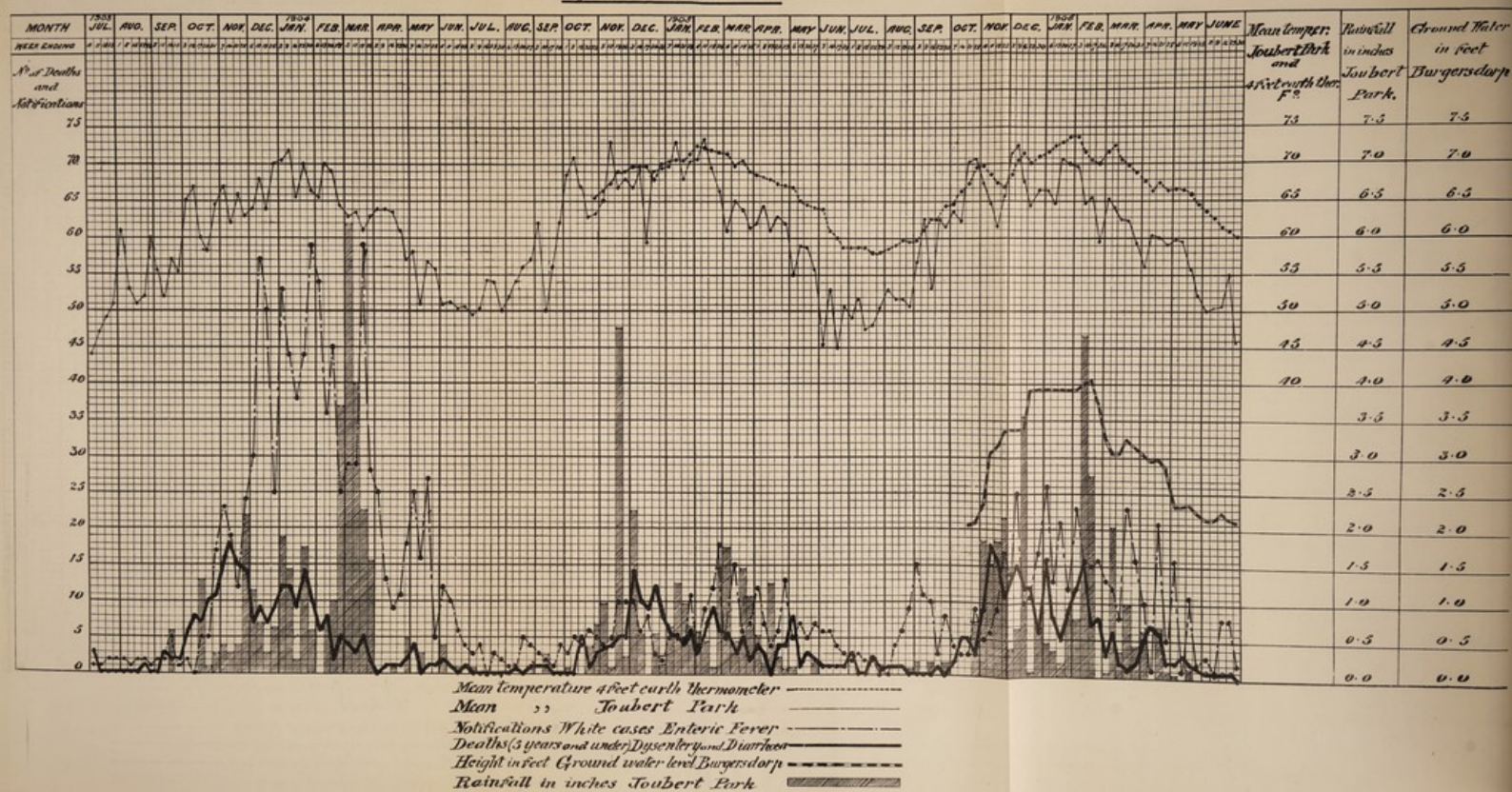
July 1st 1903 - June 30th 1904



with dry bulb thermometer
 with wet bulb thermometer
 and with anemometer
 and with barometer
 and with psychrometer

ENTERIC FEVER AND METEOROLOGICAL CHART.

July 1st 1905 - June 30th 1906.



"are at once removed, burnt or deeply buried, they constitute a standing menace to the public health. We hold, therefore, that any installation of pail closets or dry-earth system of conservancy in towns or large communities is absolutely reprehensible." M.O.H. 1904-5
Enteric.

The conclusions of these observers afford strong support to the views as to prevalences of enteric in Johannesburg expressed in each of the Medical Officer of Health's previous annual reports, viz., that "the chief causes are pollution of soil and air by the present bucket system, extensive soil pollution by slops and by natives promiscuously defaecating in outlying districts and unobserved spots, as well as contamination of food and drinks by infected dust or fly-borne impurities."

The evidence of numerous post-mortems has shown that the native frequently suffers from enteric of so mild a type that he is able to continue his usual employment. Such cases, by polluting the veld and thus, in some instances, sources of water supply, distribute air borne and water borne infection far and wide.

The use of canvas water-bags for cooling drinking water after it has been boiled has been suggested as a possible cause of enteric, as these bags are usually hung up in exposed windy places, and may get contaminated by wind-borne dust. It is, at any rate, a point for inquiry.

RELATION OF TEMPERATURE, RAINFALL AND LEVEL OF SUBSOIL WATER TO ENTERIC FEVER.

In England enteric fever is most prevalent and causes the largest number of deaths in the late autumn, and it has not been found that there is any very close connection between the temperature of the air and the enteric curve, beyond the fact that a hot dry summer often tends to aggravate the intensity of the autumnal rise.

With regard to the temperature of the earth at a depth of 4 feet, the relationship which Drs. Ballard and Tomkins' researches established between the temperature of polluted subsoils and the occurrence of summer diarrhoea, as well as the similarity of the seasonal prevalence of the latter disease with that of enteric, led the writer, when Medical Officer of Health for Stockport, to carefully compare for seven years, 1893-9, the curves of diarrhoeal mortality, typhoid mortality, and mean weekly reading of the 4 feet earth thermometer. In each of these years, these curves revealed a marked general similarity, both typhoid and diarrhoea commencing to rise when the 4 feet earth temperature attained 56° F. (Ballards' "critical temperature.")

With reference to variations of "subsoil," or "ground" water, Pettenkoffer's observations at Munich tend to show that outbreaks of enteric occurred after a rapid fall of ground-water succeeding an unusual high level; whilst Fodor says that "at Buda-Pesth the rise of enteric fever mortality accompanies the rising ground water, and the two fall together." In England no constant relation has been noted, but the records of observations on the point are scanty. In October, 1905, a subsoil water-gauge was constructed in Johannesburg to a specification kindly supplied by Dr. W. Watkins-Pitchford, of Maritzburg. It consists, like Pettenkoffer's, of a float suspended by a cord passing over a pulley, the other end of the cord supporting an indicator, which marks the height on a fixed scale (see also page 66.)

On the accompanying chart, comparison is now made of the typhoid-case-curve in Johannesburg with those of rainfall and temperature of the air since July, 1903, with that of the temperature of the earth at a depth of 4 feet since October, 1904, and with that of subsoil-water level since October, 1905. The results so far, except perhaps as regards rainfall, are not very definite. Air-temperature and ground-temperature show the highest readings in October to February inclusive. The rise and fall of the subsoil water curve took place (in 1905-6) between the months of October and April, the period of maximum level being from the middle of December to the middle of February. In other words, air-temperature, ground-temperature and level of subsoil water were highest during the summer months, which are also the wet months. In 1903-4 and in 1905-6 the typhoid curve was also very high during these months, and shot up again during the cooler month of March; but this description does not apply at all to the course of the curve in 1904-5. In all three years the weekly oscillations of the typhoid curve were much greater than those of temperature and subsoil water, and, on the other hand, marked rises of temperature were not always followed by a typhoid increase.

Whilst, therefore, there is a general seasonal similarity between the air and earth temperature curves and the typhoid curve, Johannesburg observations do not so far justify any closer conclusion, and the same remark applies to the 1905-6 subsoil water-curve.

RELATION OF RAINFALL TO ENTERIC.—It was pointed out in the Report for 1903-4 (p. 11.) that after the October rains the proportion of enteric cases in houses supplied with well-water, as compared with houses having the public water service, rose from 14.2 per cent. to 25 per cent., and following the heavy rains of the first week of March, to 33 per cent.

In 1904-5 no similar rise was observed, and during the wet season (third week of September to end of May) the percentage of cases in "well-water houses" was actually less than in the dry months, viz., only 13.3 per cent. against 16.9 per cent. In 1905-6, however, this state of affairs was reversed, the wet season percentage being 21.0 against 15.6.

M.O.H. 1904-6

Para-typhoid.

Diarrhoea, &c.

While there can be no doubt that flood-water carrying surface pollution into wells must increase the dissemination of enteric infection, further and much closer observation is necessary before a definite statement can be made as to the extent to which this occurs in Johannesburg. Such inquiry has been initiated, and in future reports it is hoped to compare the rainfall curve with that of carefully sifted "well-water" cases occurring in the third and fourth weeks after each heavy rain.

It may be added that careful examination of the relation of enteric fever to meteorological conditions in Natal is being carried out by Dr. W. Watkins-Pitchford, of Maritzburg, whose observations cover the past 3 years.

PARA-TYPHOID FEVER.

This name has been given to a febrile disease which, in its course and symptoms, is very like typhoid fever. Many of the cases so described are due to organisms intermediate in type between the *Bacillus coli communis* and the Typhoid bacillus, including the forms known as "paratyphoid bacillus A," "paratyphoid bacillus B," "paracolon bacillus," as well as certain bacilli (often associated with meat-poisoning) of which the *Bacillus enteritidis* is an example. The symptoms of invasion and of the established disease are practically the same as typhoid, but for the most part the cases seem to be very mild, ending in recovery, and probably include much that has hitherto been called "simple continued fever." The essential distinction between typhoid and paratyphoid fevers lies not so much in their symptoms as in the different characteristics of the organisms by which each is caused, including their behaviour to the Widal test, the reaction to which is of great confirmatory value in the diagnosis of typhoid.

"Widal's reaction" is the loss of motility by, and the aggregation into "clumps" of, the organisms in an active culture of typhoid bacilli after the addition to it of the blood-serum of persons suffering from typhoid fever or of animals immunized to the typhoid bacillus.

If, however, the blood-serum of a person suffering para-typhoid fever is added to a culture of typhoid bacilli, clumping (if it results at all) is slow and very imperfect: on the other hand, characteristic "clumping" usually follows the addition of the blood of a paratyphoid patient to a culture of paratyphoid organisms.

The practical lesson of these somewhat technical facts is that, both for considerations of treatment and prevention, it is not safe to accept a negative Widal reaction as sufficient proof that any given case is not of a typhoid nature, and it is necessary to further test the serum of the patient against cultures of typical typhoid bacilli, typical *Bacillus coli* and the intermediate bacilli.

DIARRHOEAL DISEASES.

The following are the mortality figures for the period under notice:—

	WHITES.			S. AFRICAN COLOURED.			ASIATICS.		
	1903-4.	1904-5.	1905-6.	1903-4.	1904-5.	1905-6.	1903-4.	1904-5.	1905-6.
Diarrhoea and Dysentery... }	313	170	277	312	247	259	4	4	18
Epidemic Zymotic Enteritis ...	3	1	3	9	—	—	—	—	—
Enteritis ...	3	37	10	12	43	2	3		1
	319	208	290	333	290	285	7	4	19
	817			908			30		

DEATH RATE PER 1,000 OF POPULATION LIVING.

	WHITES.	S.A. COLOURED.	ASIATICS.	76 GREAT TOWNS IN ENGLAND.
1903-4]	3.82	4.77	0.89	0.83 in 1903.
1904-5.	2.49	3.83	0.39	0.83 in 1904.
1905-6.	3.34	4.18	1.26	0.83 in 1905.

The proportion of the foregoing deaths which took place amongst children under 5 years of age was:—For Whites, 85 per cent.; S.A. Coloured, 31 per cent.; Asiatics, 20 per cent. As regards both Coloured and Asiatics in Johannesburg, it must, however, be remembered that both comparatively and absolutely there are very few children.

M.O.H. 1904-6

Diarrhoea.

Meningitis.

The remarks on page 16 as regards the relative severity of incidence of typhoid fever on Whites, S.A. Coloured and Asiatics respectively, appear to apply equally to diarrhoeal diseases. The rôle of "diarrhoeal" diseases as a factor of infantile mortality has been discussed at page 12.

On the chart opposite page 18, a curve of the weekly mortality amongst white infants under 5 years of age has been traced for comparison with meteorological curves, and with that of enteric occurrences.

Dr. W. H. Rogers, of Johannesburg, who has devoted some attention to the subject of infantile diarrhoea, asserts that the greatest incidence of the malady is in the intervals of hot weather between the rains in November, December and January, whilst it is low during the rains themselves; and that except under conditions explained by its infective nature, it almost always develops during detention. He thinks that in summer the infection is due to the streptococcus pyogenes, and in winter to the pneumococcus, whilst on occasion the bacillus enteritidis appears to have been responsible. These bacterial conclusions have, however, been questioned.

MENINGITIS.

This is a disease characterised by inflammation of the membranes (meninges) of the brain or spinal cord, or both, and by clinical symptoms of great irregularity. The disease may be primary, or it may be secondary to other maladies or injuries (*e.g.*, tuberculosis, pneumonia, typhoid, disease of middle ear, etc.). In this report, meningitis has been tabulated as the cause of death only when it was the primary disease.

Two types of Primary Meningitis are recognised, namely:—

(1) CEREBRO-SPINAL FEVER, which may occur either in non-epidemic (also called "sporadic") or in epidemic form, both being due to an organism known as the meningococcus, or Diplococcus intracellularis, and

(2) PNEUMOCOCCIC MENINGITIS, with or without a general pneumonic infection, and due to the organism of pneumonia. It is believed that Drs. Brodie, Rogers and Hamilton, of Johannesburg, in a striking communication to the Transvaal Medical Society in 1894, and to *The Lancet* of October 22nd, 1898, on "Pneumococcal Infections," were the first to recognise and describe this variety of the disease. At least 100 cases amongst mine Kaffirs came under their notice, and as the result of 15 complete bacterial examinations, they conclude "that the pneumococcus is the specific factor in the causation of the disease," and that it first affects the mucous membrane of the nose, the brain and spinal symptoms being due to extension of infection along various anatomical channels.

The possibility of a "mixed" infection, that is of a cerebro-spinal meningitis in which both the meningococcus and pneumococcus are present, has been suggested by Mr. W. H. Power, C.B., F.R.S., of the English Local Government Board, as subject for inquiry. Councilman, in a report to the Massachusetts State Board of Health in 1898, says (p. 76) in discussing the meningococcus, "Mixed" infections with other organisms were not uncommon. The pneumococcus was found seven times, once in connection with Friedlander's bacillus." He adds "Terminal infections with streptococci and staphylococci were occasionally found." The joint presence of the meningococcus and pneumococcus has not, however, been observed in Johannesburg. In addition to the 15 cases examined by Drs. Brodie, Hamilton and Rogers, bacterial findings are available in regard to 43 examinations. The results are as follow:—The meningococcus alone was found in 26 cases; the pneumococcus alone in 8 cases; neither organism was demonstrated in 9 instances; and in no case were both found to be present.

Having regard to the comparatively small number of the above examinations, it is not suggested that the results indicate the true relative frequency of the pneumococcal and meningococcal forms of the disease. It is clear, however, that the pneumococcus can cause cerebro-spinal fever with or without pneumonia, and it is also true that the meningococcus can produce pneumonia as a complication of meningitis, 8 such cases having been noted by Councilman.

In the Medical Annual 1906 (p. 321), are recorded the results of 40 cases of cerebro-meningitis of other than tubercular origin. Of these, 35 were due to the meningococcus, and 1 each to the pneumococcus, staphylococcus and streptococcus.

During the years 1904-5 and 1905-6 there was an appreciable mortality amongst whites from "meningitis" and "cerebro-spinal meningitis," and a very serious death roll amongst certain mine natives, as will be seen from the following figures:—

M.O.H. 1904-6

DEATHS—1904-1906.

Meningitis.

Registered Cause.			All Ages.	-1	-5	-15	-25	-65	+65
Meningitis	Whites ...	...	38	16	9	5	2	6	...
	Natives ...	...	175	4	...	3	114	54	...
	Asiatics ...	...	2	...	...	...	2	...	...
Spinal Meningitis	Whites ...	...	1	...	...	...	1	...	...
	Natives ...	...	2	...	...	2	...	...	...
	Asiatics ...	...	...	...	...	...	...	...	...
Cerebral Meningitis	Whites ...	...	5	3	1	...	1	...	...
	Natives ...	...	3	...	1	...	2	...	...
	Asiatics ...	...	...	...	...	...	...	...	...
Cerebro-spinal Meningitis	Whites ...	...	13	4	3	1	2	3	...
	Natives ...	...	99	...	...	1	54	44	...
	Asiatics ...	...	...	...	...	...	...	...	...
Totals	Whites ...	...	57	23	13	6	6	9	...
	Natives ...	...	279	4	1	6	170	98	...
	Asiatics ...	...	2	...	...	...	2	...	...
			338	27	14	12	178	107	...

Amongst Whites.—Of the 57 deaths, 43 were amongst persons under 15 years, 37 being very young children. As regards the 14 adult cases, inquiries have been addressed to the certifying practitioners, and 13 replies received. In only three cases was bacterial examination made. In one of these the meningococcus was found; in another the pneumococcus, whilst in the third "the organism isolated in pure culture was a non-pathogenic water organism." The latter case was under the care of Dr. E. T. E. Hamilton, who states that it was one of considerable clinical difficulty—"very acute, and probably what the Germans describe as 'kopf,' or hydrophobic tetanus. A complete *post mortem* was made and no meningitis found." In 11 out of the 13 cases investigated, the clinical symptoms presented little difficulty. This is interesting, as in England the disease has frequently been mistaken for sunstroke, typhoid fever, typhus, tetanus and malignant measles. Dr. L. G. Irvine, Medical Officer Crown Deep, etc., Mines, states that in quite a number of cases amongst natives, the indications are latent, and death occurs without obvious symptoms, with the exception, perhaps, of a single convulsion, the cause of death being only revealed *post mortem*. This is borne out by the fact that during the two years under notice, *post mortem* examination at the Public Mortuary showed that 75 coloured and 4 white persons had died from this disease, which in no single case had been diagnosed during life. These figures are available through the courtesy of Mr. Pinching, the Mortuary Superintendent.

At the end of June and the beginning of July, the following notable group of cases (5 white, 1 coloured), came under treatment at the Johannesburg Hospital:—

Initials.	Address and Description.	Admitted.	Result.		Bacterial Finding.
			Died.	Left Cured.	
A.L.P.	Farmer or Market Gardener at Newlands	28th June.	9th July.		Meningococcus.
H.D.	Mechanic, Eloff Street	29th June.	6th July.		Do.
S.G.	Rheumatic patient since 11th June in ward to which A.L.P. admitted	1st July.		26th July.	Do.
E.V.	Lancaster West Gold Mine, Krugersdorp	2nd July.	8th July.		Do.
F.P. (Basuto)	Found unconscious on veldt at Booyens	2nd July.	14th July.		Do.
S.F.	Bronchitic patient since 1st June in ward to which A.L.P. admitted	6th July.	9th July.		Meningococcus.

The remarkable features of this group are that (a) four of them (A.L.P., H.D., E.V., V.P.) occurred about the same time at widely different places, and without any traceable community of circumstances; and (b) that two cases of apparently direct infection (viz., S.G. and S.F.) followed (in three and eleven days respectively) the admission of A.L.P., into the ward of Johannesburg Hospital in which S.G. and S.F. were patients. M.O.H. 1904-6
Meningitis.

In addition to the foregoing, F.G.B. was admitted on 14th June from Juta Street, Braamfontein, suffering from acute pneumonia (pneumococcus present) with marked cerebral symptoms. He was discharged cured on 18th July, but readmitted on the 15th August, again for pneumonia with cerebro-spinal symptoms, and died on the 18th August. A second bacterial examination was not made, but it seems probable that the disease was pneumococcal.

Dr. George A. Turner also records 3 second admissions in an outbreak of 68 cases, which occurred in the Native Labour Association's Compound. It would be interesting to know the bacterial nature of these cases.

Dr. Walker, then Acting Medical Officer of Health, Transvaal, kindly notified the occurrence at this time of a case of non-tubercular cerebro-spinal meningitis at Wolmaranstad, Transvaal, which ended fatally on 23rd June, the sufferer being a schoolboy.

The cases at the Johannesburg Hospital were promptly and thoroughly isolated by Dr. Mudd (Acting Superintendent). The M.O.H. is indebted to the courtesy of that practitioner and Dr. R. P. Mackenzie (Superintendent) for the foregoing particulars.

In consequence of these occurrences, cerebro-spinal meningitis was, by resolution of the Council dated the 9th July, added to the list of notifiable diseases for a period of 6 months from 1st July, 1906.

Amongst Natives.—It will be noted that of 279 deaths, 168 were referred to 'meningitis,' and only 98 to 'cerebro-spinal meningitis,' but as the disease was clearly present in epidemic form, there is little doubt that deaths from primary meningitis amongst mine natives over the age of 15 years were really 'cerebro-spinal meningitis.' Such deaths include 268 of a total of 279, the age incidence of mortality being just the reverse of that amongst the white population, owing to the great number of young adult natives engaged on the mines. Taking the deaths from cerebro-spinal meningitis as 268, it is found that 10 occurred in the locations and District IV. (Ferreiras, Fordsburg and Mayfair). The remaining 258 were in the Native Labour Association's Receiving Hospital, and in the compounds of the various mines within the Municipality as shown below:—

July, 1904—June, 1906.

W.N.L.A. Hospital	... 63	Village Deep	... 6
Langlaagte Deep	... 30	New Heriot	... 6
Crown Deep ..	... 19	Wemmer	... 5
Robinson	... 17	Jubilee	... 4
Village Main Reef	... 14	Meyer and Charlton	... 4
Robinson Deep	... 13	Wolhuter	... 4
Ferreira Deep	... 11	Nourse Deep	... 4
Crown Reef	... 10	Langlaagte Consolidated	... 3
Langlaagte Estate	... 9	Ferreira	... 3
Jumpers	... 8	Treasury	... 2
Bonanza	... 7	Salisbury	... 1
City and Suburban	... 7	Henry Nourse	... 1
New Goch	... 7		
			258
	215		

It is a remarkable fact that the various Municipal compounds, some of which are no better than the least recent mine compounds, and which house from 4,000-5,000 boys, chiefly Basutos, Pondos and Bacas, remained entirely free from the disease.

Inquiries were addressed to the medical officer of each of the above mines with a view of ascertaining the total number of cases, the percentage fatality, and whether beneficial result followed any particular form of treatment. Eleven replies were received, covering 178 cases, of which only 21 recovered. With regard to treatment, antipyrin is regarded as some use by Drs. G. A. Turner, L. G. Irvine and Gilchrist, but others attach little value to it. It may be stated in this connection that Kollé and Wasserman have recorded certain experiments undertaken during the last 12 months by the Berlin Institute of Infectious Disease, to produce an antimeningococcus serum, and the results so far are encouraging as to its protective and curative value. It is said to be harmless, and is issued by the Berlin Institute in 10 c.c. doses. Such a serum is prepared by Flexner, of New York, and one is also obtainable from Messrs. Burroughs & Wellcome at 3s. per phial. It is thought that anti-pneumococcus serum for cases due to pneumococcal infection may also prove of value, and will no doubt receive a trial on the Rand.

M.O.H. 1904-6

Meningitis.

Particulars as to the Seasonal Prevalence of Meningitis amongst the Coloured Population in 1904-5 and 1905-6 are set out below for what they are worth :—

July	...	2 + 11 = 13	January	...	11 + 14 = 25
August	...	4 + 10 = 14	February	...	13 + 23 = 36
September	...	4 + 5 = 9	March	...	18 + 20 = 38
October	...	16 + 6 = 22	April	...	14 + 7 = 21
November	...	14 + 9 = 23	May	...	20 + 10 = 30
December	...	13 + 3 = 16	June	...	15 + 17 = 32
		53 + 44 = 97			91 + 91 = 182

These figures suggest no clear deduction, but Councilman states that nearly all epidemics of this disease have appeared in the winter and spring. He adds: "The weather in itself has probably little to do with the disease, because the number of cases has frequently increased with the approach of warm spring and an increase in the temperature." Lowy says cold and heat and rain and sunshine have nothing to do with the appearance and extension of epidemics.

Comparison has been made of the curves representing monthly occurrences in Johannesburg of pneumonia and meningitis respectively, but without suggestive result.

The "Place of Origin" of the 279 natives who died from meningitis during the period under notice is shown as follows :—

Portuguese East Africa	...	202	Rhodesia	...	6
Transvaal	...	19	Natal	...	4
British Central Africa	...	13	Orangia	...	1
Cape Colony	...	10	German East Africa	...	1
Basutoland	...	7	Unknown	...	6

Although the East Coast mine boys have furnished the largest number of victims, namely 202, out of a total of 268 deaths of mine natives, it does not necessarily follow that their susceptibility is very much greater, for their number is large, and includes from 70-75 per cent. of underground workers and probably 50 per cent of surface boys.

On arrival in Johannesburg each batch of recruits is sent direct for medical observation to the W.N.L.A. Compound. Between 7th June, 1905, and 24th May, 1906, some 69 cases (with 46 deaths) occurred amongst recruits thus reviewed, and the following figures show the number of days which elapsed between their arrival and admission to hospital.

Days	...	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	23	36	47
Cases	...	1	2	1	3	1	3	3	4	6	5	8	5	3	5	5	1	3	1	1	5	1	1	1

The date of incubation is not known, but it will be seen that four-fifths of these cases developed within 14 days of arrival.

In consequence of the prevalence of this disease, the Compound was repeatedly (February 5th, April 9th, May 5th, June 18th) and rigorously disinfected by the Public Health Department, and at other times under the direction of the Medical Officer (Dr. G. A. Turner, D.P.H.), but cases and groups of cases continued to crop up at irregular and sometimes long intervals (*e.g.*, 11, 23, 10, 5, 41, 34, 7, 22 days) from entirely different parts of South Africa. This experience has led Dr. G. A. Turner to suggest with all reserve that possibly vermin, *e.g.*, the body louse or the bug, may be the means of carrying the disease from person to person, and he points out that if this is so, disinfection of premises and washing of contacts will avail little, unless the latter are also freed from vermin. In the course of preliminary bacterial investigation, Dr. Turner has observed undoubted cocci in leucocytes obtained from lice from such patients, but is not prepared to say that they are meningococci.

Drs. Hamilton, Rogers, G. A. Turner and other practitioners who have seen many cases of this disease in Johannesburg do not doubt its infectivity from person to person, and the two cases S.G. and S.F. which followed the admission of A.L.P. into a ward of Johannesburg Hospital, point to the same conclusion. The meningococcus has been found in the mucus of the nose and mouth, and in the secretion of the eye, and therefore special care is essential in the disposal of such discharges. Isolation of patients with thorough disinfection of the room and contents at the termination of the case is also clearly necessary.

In a circular issued by the Health Department of New York City during the great epidemic of 1904-5, it is stated that the meningococcus "is occasionally present in the noses and throats of healthy persons who have come in close contact with the sick, or used towels

"or handkerchiefs soiled by them. Such persons, while not contracting the disease themselves, ^{M.O.H. 1904-6} may transmit it to others, so that the disease greatly resembles diphtheria in its mode of spread, &c." ^{Meningitis.}

A circular has recently (20th October, 1906) been addressed to the medical men of Johannesburg calling attention to the possibility, as first suggested by Dr. G. A. Turner, of transmission of infection by body-vermin, and also the desirability, in all cases, of a bacterial verdict. ^{Tuberculosis.}

TUBERCULOSIS.

Appended are the statistics for 3 years :—

DEATHS 1903-4-5

TUBERCULOSIS	WHITE.			S.A. COLOURED.			ASIATICS.		
	1903-4.	1904-5.	1905-6.	1903-4.	1904-5.	1905-6.	1903-4.	1904-5.	1905-6.
Of Meninges ...	3	6	1	4	2	—	—	—	—
Of Lungs ...	82	85	79	195	219	346	11	12	19
Other forms ...	7	7	7	4	12	13	—	—	2
	92	98	87	203	233	359	11	12	21
	277			795			44		

DEATH RATE PER 1,000 PERSONS LIVING.

	WHITES.	S.A. COLOURED.	ASIATICS.	ENGLAND AND WALES.
1903-4 ..	1.10	2.91	1.41	1.74 in 1903
1904-5 ...	1.17	3.08	1.18	1.77 in 1904
1905-6 ...	1.04	5.27	1.38	—

The number of deaths from tuberculosis other than tuberculosis of the lungs is so small as not to require separate consideration.

Tuberculosis amongst Whites.—Of the 277 white persons whose deaths are reported 170 were born in the United Kingdom, 50 in other European countries, and 57 in South Africa; 211 being males and 66 females. The age at death was briefly as follows; 15 were under 5; 10 between 5 and 15; 39 between 15 and 25, and 213 over 25.

The duration of illness was unknown in 30 cases, and in the remainder as follows :—In 58 cases less than 1 month; in 18, under 3 months; in 31, under 6 months; in 25, under 12 months; in 13 under 18 months; in 17, under 2 years; in 85, over 2 years.

It has, unfortunately, not been possible to form any idea as to what proportion of the foregoing deaths were those of consumptives who came to South Africa suffering from the disease. An alteration in the death-certificate-form has therefore been asked for.

The occupations of the deceased persons were as follows :—Miners, 45; storekeepers, clerks and salesmen, 35; housewives, 25; tailors, domestic servants and carpenters, 11 each; fitters and agents, 10 each; bricklayers, 9; painters, 4; plumbers, 4; various, 36; unspecified, 66.

Amongst South African Coloured.—Of the 795 deaths registered 443 were those of persons from the East Coast (chiefly Portuguese 'boys'); 40 from British Central Africa; 81 from Transvaal; 14 from Orange River Colony; 30 from Natal; 79 from Cape Colony; 29 from Rhodesia, and 22 Basutoland; whilst 57 were classed as 'unknown.'

740 of the deceased persons were males, and 55 females. The great majority were mine boys (660) and labourers (56), including house and stable boys. Practically all of these were between the ages of 15 and 40 years.

The duration of illness was as follows :—204 died in less than 1 month; 200 under 3 months; 114 under 6 months; 60 under 12 months; 24 under 18 months; 18 under 2 years; 30 after illness of more than 2 years, whilst in 145 the period is not specified.

The yearly increase of tuberculosis amongst natives is very noticeable, the 195 deaths of 1903-4 being followed by 219 and 396 respectively in the two subsequent years.

M.O.H. 1904-6

Tuberculosis.

Amongst Asiatics.—Of the 44 deaths recorded 20 were those of Indian 'hawkers' and 14 of Chinese employed on the Mines. 43 were deaths of persons over 15 and mostly under 40.

Eight deaths followed illness of less than 1 month; 6 occurred within 3 months; 12 within 6 months; 5 within 12 months; 8 after a longer period, whilst in 5 cases no period was specified.

A Special Committee was appointed by the South African Medical Congress held at Pietermaritzburg, in 1905, to report upon the means to be adopted to prevent the spread of tuberculosis in South Africa. This Committee included representatives of each Colony and of Portuguese East Africa, and presented the following Report at the South African Medical Congress, Bloemfontein, 1906:—

As a preliminary to the formulation of any special preventive measures, the Committee has deemed it advisable to endeavour to ascertain the salient facts of the prevalence of tuberculosis in South Africa; whether the disease is actually increasing and, if so, the probable causes of such increase; whether the disease shows any special class of race incidence, etc.

The subject of the causal relations of bovine to human tuberculosis has received so much attention at Home during the past few years that some inquiries have been made as to the distribution and extent of the disease among the cattle of South Africa; it may with safety be asserted that bovine tuberculosis is not an important factor in the prevalence of the disease among the inhabitants of this country.

Whilst considering the subject of special preventive measures against tuberculosis, the Committee has been forcibly impressed with the great advantage which would accrue from a uniform Public Health Act for the whole of South Africa.

Prevalence of Tuberculosis.—The Committee is of opinion that tuberculosis is unduly prevalent in South Africa, and that it is increasing among certain sections of the community. Accurate returns as to the prevalence of the disease throughout the whole country do not appear to be available owing to the rudimentary condition of the vital statistics of many parts, and more especially those relating to the coloured races.

Special Incidence of the Disease.—Phthisis is especially ripe amongst poor half-castes and those of the natives who obtain their living in the towns. In Natal the disease has its heaviest incidence upon the town-dwelling Indians.

Causes of Special Incidence.—The unanimous opinion of the Committee is that the inordinate prevalence of the disease amongst the coloured people of the towns is due to the unhealthy manner in which they live; to the unrestrained association of the infected with the healthy and to the complete ignorance of such people as to the communicability of the disease. The predisposing influence of overcrowding, poorness of diet, and want of ventilation and sunlight are too often to be found in the town locations, compounds, and barracks in which these people congregate.

It seems probable that the heaviest part of a campaign against tuberculosis in South Africa would be found to lie in the direction of the sanitary supervision of Natives and Asiatics. The important and more elaborate task would remain, however, of controlling the continued introduction of the disease by phthisical immigrants from Europe.

South Africa is a country which, from the nature of its climate, should be free from tuberculosis and an instructive parallel to its present position in this matter is to be found in Southern California. In the latter country tuberculosis has of late years shown such an alarming tendency to increase that an anti-tuberculosis league has been formed to cope with the disease. The general opinion of this association is that the prevalence of phthisis in Southern California is almost entirely due to the continuous immigration of sufferers from the Eastern States.

Recommendations.—The Committee present the following recommendations for consideration and confirmation:—

1. That Tuberculosis be made a compulsory notifiable disease throughout South Africa, and, in addition, that all persons suffering from such disease should be obliged to notify any change of address to the Medical Officer of Health for the district, and in the event of any such patient changing his residence from one Colony to another, the Medical Officer of Health of the first Colony shall notify the Medical Officer of Health of the second. The term "tuberculosis" shall mean and include phthisis and any other form of tuberculosis accompanied by a discharge of tuberculous pus.

2. That the enactment and enforcement of public health legislation throughout South Africa would prove more effective in decreasing tuberculosis at the present time than any other method.

3. That the elements of hygiene and especially the principles which govern the communication of tuberculosis should be taught in elementary schools and be made the subject of compulsory examination.

4. That a standing Committee of Congress consisting of representatives from each Colony and Protectorate be appointed to act as an advisory body on the subject of tuberculosis, and that an anti-tuberculosis Society composed of both medical and lay members be appointed in each of the Colonies of South Africa except where such are already existent, and that the Transvaal, Pretoria and Orange River Colony Medical Societies be requested to take the initiative in the formation of these associations.

5. That all prospective laws applicable to tuberculosis and its prevention should be uniform throughout South Africa, and that any forward movement in the desired direction should, if possible, be made simultaneously by all the countries.

6. The following restrictions should be applied to consumptives arriving in South Africa:—

(a) Consumptive immigrants without means of support excluded altogether, the Shipping Companies being made responsible for their return conveyance.

(b) Consumptive immigrants with means of support to the satisfaction of the Governments concerned should be allowed to land on the condition that they carry out reasonable precautions to the satisfaction of the Medical Officer of Health of the district to which they are proceeding and that suitable regulations be promulgated by the respective Governments dealing with such persons with regard to failure to carry out these precautions and insisting on notification of any change of address.

7. That attention be directed to the necessity for

(a) Obliging the Master of a passenger ship, which has conveyed a consumptive, to have the cabin which has been used by the patient efficiently cleansed and disinfected, and

- (b) Prohibiting any cabin from being used in common as a sleeping place by a consumptive and healthy people. M.O.H. 1904-6

8. That the several Governments of British South Africa represent to the Imperial Government the necessity of British and Foreign Nations attending to the provisions of paragraphs 6 and 7. Tuberculosis.

9. That sanatoria of the simplest possible construction compatible with efficiency for European patients and similar institutions for coloured patients should be established in the different colonies under the control of public bodies; the expense of the maintenance of such institutions would be decreased by the suitable employment of inmates, and also by the provision in connection therewith of outdoor employments (as, for example, market gardening, viticulture, tobacco growing, silk worm industry, basket weaving, and straw plaiting, etc.) which would allow of patients remaining in such establishments until the disease was sufficiently arrested to permit of their returning to their usual vocations. Opsonic theory.

10. That the expenditure entailed by the measures taken by the coastal Governments in respect of dealing with phthisical immigrants shall be provided in equitable proportion by the several Governments of South Africa. Heart Disease.

11. That a copy of these recommendations be sent to the High Commissioner and the Governments of the several Colonies.

THE OPSONIC THEORY.*—As this question has attracted much recent attention in connection with Tuberculosis, a brief explanation is appended:—

When the human system is invaded by disease germs, certain cells in the blood known as white cells or 'leucocytes,' so to speak attempt to repel this invasion by absorbing and digesting the germs, this process being known as 'phagocytosis.' If the resistance of these phagocytes is successful, the disease does not develop or aborts; but if the germs are too numerous or resistant to be so destroyed, the malady progresses in the usual way. Now Drs. Wright and Douglas believe in the existence in the 'plasma' or liquid part of the blood of certain substances which combine chemically with the invading germs, and they assert that not until this combination takes place are the defending white cells or phagocytes capable of enveloping and destroying the germs. These substances are known as 'opsonins,' from *opsonō*, I cater for, I prepare victuals for. The quantity of opsonins present in the blood varies in respect to the different germs which have to be repelled, and the amount for any particular infection—say tuberculosis—indicates the power of resistance against that disease of the individual from whom the blood is drawn.

The 'opsonic index' is arrived at as follows:—A number of (say) tuberculosis germs are added to a drop of the blood of a normally healthy person, and this blood is then examined microscopically. It is found, for example, that 40 leucocytes have ingested 160 germs. Clearly, therefore, the normal 'phagocytic index' is $\frac{160}{40} = 4$. The blood of the patient is then similarly examined, and 40 leucocytes are found to have absorbed only 80 germs. His 'phagocytic' index is therefore only $\frac{80}{40} = 2$, or half the normal index. Now, as 'phagocytosis' depends on the quality of 'opsonins' present, it follows that the 'phagocytic index' is also the 'opsonic index.'

The practical importance of this theory is that upon it Professor Wright has based an exceedingly valuable system of treatment which has been attended by most remarkable results. Briefly it is this:—He identifies the germ which is causing the disease, and then raises the patient's opsonic index by inoculating him with an appropriate dose of the dead germs in solution.

With regard to the significance of the 'opsonic' index of patients suffering from tuberculosis of the lungs, the following statements have been made:—

1. Early cases, or more advanced cases that have had complete rest in bed for a time, and also sanatorium 'cures,' show a low or a lowered opsonic index.
2. The more advanced cases show either a high or a fluctuating opsonic index.

ORGANIC DISEASES OF HEART AND ACUTE RHEUMATISM.

These include pericarditis, endocarditis, valvular disease and hypertrophy, and both amongst 'Whites' and 'S.A. Coloured' the mortality under this head has shown a notable progressive increase, the deaths recorded during the three years, July 1st, 1903—June 30th, 1906, being 79, 82 and 108 for whites, and 48, 62 and 77 for South African Coloured. Of the 'White' deaths, 192 were those of males and 77 those of females, indicating a proportionately greater incidence on males. Thirty-three persons died under 15 years of age, and 236 at later periods. As regards occupation, the highest figure (45) is under the heading of 'housewife.'

As heart disease is a frequent sequel of Acute Rheumatism, it is noteworthy that the death rate per 1,000 for the last 3 years, from the latter malady, is 0.15 for Whites, 0.2 for S.A. Coloured, and 0.09 for Asiatics, as against 0.05 in England and Wales in 1904. These rates, however, seem so extraordinary in a climate like Johannesburg that further observation is necessary before their significance, as they now stand, can be accepted.

In connection with the prevalence of heart disease in Johannesburg, it is of interest to note that Dr. E. P. Baumann states that of 269 Johannesburg boys and girls between 10 and 17 years of age examined by him, only 34 per cent. possessed hearts which conformed to the standard regarded as normal in Europe. In the remainder, whilst there was in most cases no definite and well-marked organic disease, the heart nevertheless presented some degree of derangement in the direction of enlargement. He points out that the danger in these cases is not so much for the present as in 20 years time, when adult life has been reached and maturity approaches; for experience elsewhere has shown that this early enlargement persists through

*Vide *British Medical Journal*, July 7th, 1906. "Opsonic Theory," by G. W. Ross, M.A., M.B.

M.O.H. 1904-6

Heart Disease.

Cancer.

Miner's
Phtthisis.

Syphilis.

life, and that persons so affected use up prematurely, so to speak, a portion at least of the cardiac reserve upon which the healthy adult falls back in circumstances of severe heart-strain such as pneumonia. Systematic inspection of school children would throw more light on this question.

INFLUENCE ON HEALTH OF HIGH ALTITUDES.

It is often somewhat loosely asserted, both by medical men and others, that the altitude of Johannesburg (say 6,000 feet above sea-level) is responsible for various evils, and it is of course a generally noted clinical fact that cases of heart disease do not do well at high elevations, though Sir Hermann Weber, M.D., as the result of observations in the Swiss Alps, believes that if proper rules are observed, heart disease is no contrary indication against elevations up to 3,000 feet.

At a height of about 6,000 feet, the sea-level reading of the barometer (30 inches) is reduced to about 25·4 inches, and the available oxygen in a given cubic volume of air is reduced by rather less than one-fifth, or from say 21 to 16·8 per cent. It is supposed that this is compensated for by an increase in the number of respirations, but it has been found in experiments on animals that so long as the percentage of oxygen in the air does not sink below 14, as much oxygen is absorbed into the blood as when the oxygen is present in normal proportion in the air. It is, therefore, probable that the increase in respiratory work and consequent heart-effort is much less than the ratio of diminution of oxygen in a given volume of air at Johannesburg, as compared with air at sea-level.

On the other hand, neuralgia, gout, rheumatism and tuberculosis are all benefited by high altitudes.

MALIGNANT DISEASE OR CANCER.

Whites—

The deaths from cancer show a progressive increase, being 35, 44 and 51 respectively for the three years 1903-4, 1904-5, and 1905-6. Of the total (130), 58 were males and 72 females, and 124 occurred at ages over 25. Stated in terms of the census population, the mortality was 0·3 per 1,000 for males, and 0·7 per 1,000 for females, as against 0·74 and 1·0 in England and Wales in 1904.

The English Registrar-General points out, however, that cancer-rates are most correctly estimated by comparing the total deaths at ages above 35 years with the number then living, and this method will in future be followed.

In 45 cases the seat of the disease was not stated; in 19 the stomach was affected; in 18 the womb, etc.; in 13 the liver; in 7 the breast, in 6 the rectum; in 5 the intestines; in 3 the bones; in 3 the glands of the neck; in 2 each the spleen, pancreas and face or jaw; in 1 each the axillary glands, larynx, peritoneum and prostate.

South African Coloured—

33 deaths were recorded, 11 being at ages under 25, and 22 at later periods. The parts affected are recorded as follows:—Liver 10, womb 3, rectum 3, bowels 2, stomach 2, throat 1, bone 1, not stated 11.

The death-rate per 1,000 living was 0·15, but it should be remembered that this population consists in Johannesburg mainly of young male adults who remain here a comparatively short time.

Asiatics—

7 deaths occurred, of which 6 were at ages above 25. The part affected is stated in 2 cases only, viz., breast and bladder.

MINER'S PHTHISIS, ROCKDRILL PNEUMONIA OR SILICOSIS.

The deaths from this disease are recorded in Tables A to F, and at p. 8, and present no unusual statistical feature.

SYPHILIS.

Four infant and 7 adult Europeans and 10 infant and 54 adult Natives are registered as having died from this disease between July 1st, 1903 and June 30th, 1906.

Appended is a return kindly supplied by Dr. Mehliss, of the Johannesburg cases of Syphilis and other Venereal diseases treated at the Lazaretto during the years 1900-6 inclusive:—

YEAR.	WHITE.	COLOURED.	YEAR.	WHITE.	COLOURED.
1900	6	52	1904	168	126
1901	20	43	1905	256	204
1902	86	46	1906	131	166
1903	108	63		to 30th June.	to 12th October.

As it is believed that Syphilis and other Venereal diseases are widely prevalent amongst Natives in the Transvaal, a Commission has been recently appointed, comprising Sir Godfrey Lagden, Dr. Turner (Medical Officer of Health, Transvaal), and the Medical Officer of Health, Johannesburg, to inquire and advise the Government as to the preventive measures considered desirable and practicable. M.O.H. 1904-6
Syphilis.
Smallpox.

PREVENTION OF SYPHILIS.

In May, 1906, Professor Elie Metchnikoff delivered an exceedingly important lecture before the Royal Institute of Public Health on the "Hygiene of Syphilis," and quoted a series of experiments by German observers on chimpanzees and baboons, the results of which indicated that the use of salves made up with non-irritating mercury salts might certainly be a useful prophylactic against syphilis in cases where suspicious contact had taken place. A medical man at the Pasteur Institute was therefore inoculated, at his own request, with virus from the chancres of two syphilitic men. An hour after the parts inoculated were rubbed for five minutes with an ointment which contained in 3 parts one part of calomel. The medical man, though certainly free from any former syphilitic taint, developed no primary lesion. Four monkeys were treated with the same virus with which he was inoculated. Two of them used as control animals, showed primary lesions 17 days later. A third monkey was rubbed with the calomel ointment an hour after inoculation of the virus and remained free from any syphilitic lesion, like the young man. The fourth monkey was rubbed with the ointment 20 hours after inoculation and showed a primary lesion after 39 days. That experiment, therefore, showed that man could with advantage employ mercurial ointments after every suspicious contact in order to preserve himself from syphilis. The study of that prophylactic method was not yet finished. Perhaps even a less prolonged inunction with ointments containing a lower percentage of mercurial salts might successfully prevent the development of the virus.—vide *Lancet*, 7th July, 1906.

SMALLPOX.

A rather severe outbreak of smallpox occurred on the Witwatersrand between 14th May and 1st October, 1905, and 3 straggling cases subsequently, viz., one in November, 1905, one in February, and one in March, 1906. Including the latter, 212 cases in all were recognised, including one detected at Pretoria, and one at Durban. They were thus distributed:—

	White.	Coloured.
Johannesburg	112	59
Germiston	17	3
Boksburg	20	—
Roodepoort	—	1
	149	63
	212	

The "Type of the Disease" is indicated below:—

	WHITE.		COLOURED.		ALL PERSONS.	
	Cases.	Percentage.	Cases.	Percentage.	Cases.	Percentage.
Purpuric	7	4.6	0	0	7	3.3
Hæmorrhagic	15	10.0	11	17.4	26	12.2
Confluent	23	15.4	32	50.7	55	25.9
Discrete	104	69.7	20	31.7	124	58.9
	149		63		212	

The mortality from 'purpuric' and 'hæmorrhagic' forms was 22 in 22, or 100 per cent.; for 'confluent' it was 1 in 23 or 4.3 per cent. for 'whites,' and 3 in 32 or 9.3 per cent. for 'coloured.' From 'discrete,' or 'modified,' no death occurred.

THE PERCENTAGE CASE-MORTALITY AMONGST VACCINATED AND UNVACCINATED.

CLASS.	WHITE.	COLOURED.	ALL PERSONS.
Revaccinated *	0.0	0.0	0.0
Vaccinated Infancy	7.1 (8 in 112)	0.0 (0 in 16)	6.2 (8 in 128)
Unvaccinated	40.5 (15 in 37)	29.7 (14 in 47)	34.5 (29 in 84)
All Cases	15.4 (23 in 149)	22.2 (14 in 63)	17.4 (57 in 212)

* 7 cases only; all whites, and all slight discrete attacks. No visible signs of revaccination in two of these.

Witwatersrand, May, 1905—March, 1906.

WHITES.

TABLE "A."—SMALLPOX.

TYPE.	Sex.		Age.						Country of Birth.			Condition as to		Result.	
	M.	F.	—1	—5	—15—25	—35—45	+45	United Kingdom.	S. African.	Australian.	All Others.	Infant Vaccination.	Re-vaccination.	Death.	Recovery.
Purpuric	7	5	2	...	2	4	1	5	1	1	...	1 had 3 marks 30 yrs old 1 had 4 marks 30 yrs old 1 had 1 mark 41 yrs old 4 were never vaccinated	None	7	None
Hæmorrhagic...	15	10	5	1	2	3	9	12	2	1	-	1 had 1 mark 30 yrs old 1 had 3 marks 46 yrs old 1 had 2 marks 48 yrs old 1 had 3 marks 51 yrs old 10 never vaccinated	None	15	None
Confluent	23	19	4	2	3	11	5	19	3	...	1	Non-Fatal Cases:— 1 had 4 marks 5 had 3 marks 3 had 2 marks 3 had 1 mark 10 not vaccinated Fatal Case:— Not vaccinated	None	1	22
Discrete	104	86	18	5	4	12	58	76	6	13	9	5 had 1 mark 17 had 2 marks 63 had 3 marks 6 had 4 marks 1 had 6 marks 12 not vaccinated during infancy, but 7 of these vaccinated after exposure to infection.	3 had 1 mark 1 had 2 marks 2 (?)	..	104
Total	149	120	29	8	7	18	75	112	12	15	10		4	23	126

Witwatersrand, May, 1905—March, 1906.

COLOURED.

TABLE "B."—SMALLPOX.

TYPE.	Total.	Sex.		Age.		Race.				Conditions as to Infant Vaccination.	Re-Vaccination.	Result.	
		M.	F.	—15	+15	Natives.	Cape.	Somalis.	Malays.	Indians.		Death.	Recovery.
Purpuric	...	...	...	...	...	...	...	...	...	...	...	...	...
Haemorrhagic	11	8	3	1	10	5	...	4	2	...	In no case	11	...
Confluent	32	24	8	10	22	13	7	3	4	5	Unvaccinated 27 cases— 1 Mark in 1 case 2 Marks in 2 cases 4 Marks in 2 cases	3	29
Discrete	20	12	8	8	12	10	70	...	2	1	In no case	...	20
Total	63	44	19	19	44	28	14	7	8	6	None.	14	49

NATIVES.—28 Cases, viz., 17 unvaccinated of whom 6 (or 35·2 per cent.) died, and 11 vaccinated of whom none died. None had been re-vaccinated.

CAPE.—14 Cases, viz., 10 unvaccinated of whom 1 died, and 4 vaccinated of whom none died. None had been re-vaccinated.

SOMALIS.—7 Cases, all unvaccinated, with 4 deaths from haemorrhagic smallpox, and 3 severe but non-fatal confluent attacks.

MALAYS.—8 Unvaccinated attacks, with 2 deaths.

INDIANS.—5 Unvaccinated, 1 vaccinated (1 mark). No deaths.

2 Cases were persons vaccinated during incubation, but not previously.

7 Cases were persons vaccinated during incubation, but not previously.

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White Cases (see Table).—Of the 149 sufferers, 120 were males and 29 females. Their nationality was as follows:—English, 113; Australian, 14; New Zealand, 1; S. African, 12; American, 1; German, 2; Russian, 1; Norwegian, 1; Dane, 1; Swiss, 1; Greek, 1; Swede, 1.

Their condition as to vaccination was as follows:—

112 had been vaccinated in infancy, and of these 10 showed 1 mark; 22 had 2 marks; 71 had 3 marks; 8 had 4 marks; and 1 (a German) 6 marks. 3 mild discrete cases had each 1 small re-vaccination mark, respectively 7, 8 and 9 years old; and 1 similar case had two small marks 8 years old. In 2 other mild cases, re-vaccination was alleged, but no sign of it remained. Not one re-vaccinated person was attacked by any severe form of small-pox.

Mortality.—The total case mortality was 23 in 149 or 15.4 per cent. of attacks; amongst the vaccinated, it was 8 in 112 or 7.1 per cent., and amongst unvaccinated 15 in 37, or 40.5 per cent. (See also Table.)

Coloured Cases.—Of the 63 coloured sufferers, 44 were males and 19 females.

Their *nationality* was as follows:—Native, 28; Cape, 14; Somalis, 7; Malays, 8; Indians, 6.

Condition as to Vaccination.—Sixteen had been vaccinated at some period or other, and, of these, 2 showed 4 marks; 6, 3 marks; 4, 2 marks; and 4, 1 mark. One adult native, bearing 2 very small marks; 2 years old, contracted a slight attack. None had been re-vaccinated. No vaccinated coloured person died from small pox.

Mortality.—The total case mortality was 14 in 63 or 22.2 per cent. For vaccinated 0 in 16; for unvaccinated, 14 in 47 or 29.7 per cent.

THE FOLLOWING ARE REMARKABLE FEATURES OF THE OUTBREAK:—

1. The proportion of fearfully severe 'purpuric' (7) and 'haemorrhagic' cases (26).

All the 'purpuric' attacks occurred amongst whites. The appearance of the sufferers was most alarming and extraordinary, the conjunctivæ (whites of the eyes) rapidly becoming purplish-black and remaining so till death. Haematuria occurred in several cases, and in one instance in which the real condition was unrecognized gave rise to a diagnosis of threatened miscarriage. In every case death occurred within 48 hours and there was no papular nor pustular eruption.

The 'haemorrhagic' cases (15 whites and 11 coloured) commenced as the 'confluent' type, with subsequent bleeding into the pocks. Every case was fatal, though not so rapidly as the purpuric variety.

Of these 33 purpuric and haemorrhagic cases 27 had never been vaccinated, and, of the remainder (6), none had been vaccinated for over 30 years (see Tables).

2. The degree of success which attended the vigorous measures (see p. 37) taken to protect the population by vaccination.

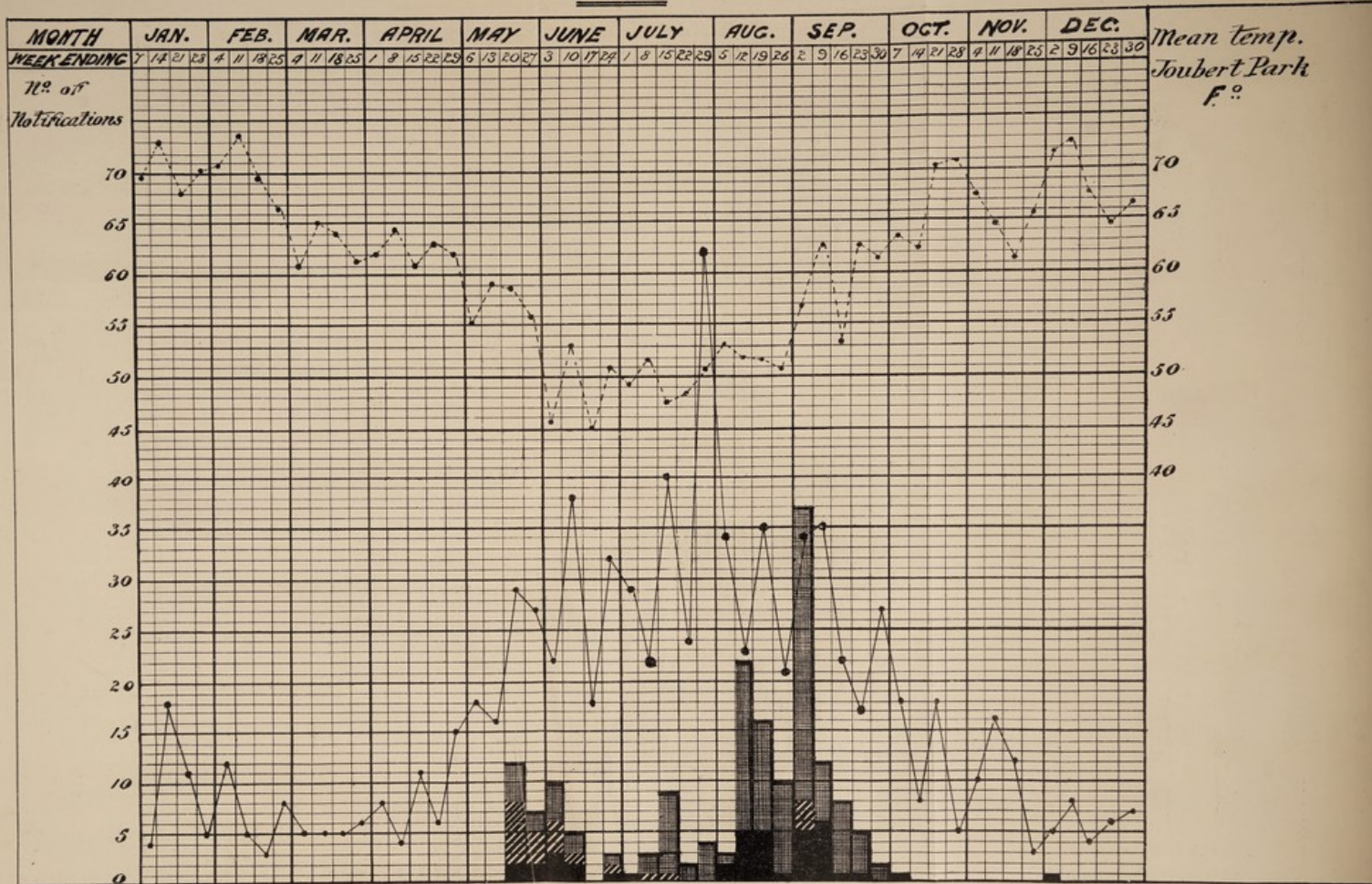
No less than 59,162 persons (37,501 whites and 21,661 coloured) were vaccinated between 14th May and 30th Oct, 1906, in Johannesburg alone, at the expense of the Council; and, in addition, 34,309 natives were vaccinated at the Pass Office by the Native Affairs Department. The Medical Officer of Health steadfastly regarded wholesale vaccination as the essential preventive measure, and spared no trouble nor importunity to secure it. The fact that there were altogether only 212 cases in an outbreak of most virulent type in an originally large unprotected population is, in his opinion, very materially due to the vaccinations effected; and it should be remembered that the last time smallpox became epidemic on the Rand (1897-8) some 3,000 cases occurred before it was mastered.

3. The fact that while there were 149 cases amongst a white population not exceeding 95,000, there were only 63 in a coloured community of 203,000, including 43,000 Chinese miners. Also, that of these 63, 47 had never been vaccinated.

This is a further remarkable tribute to the value of vaccination, which is compulsory under the Pass Laws for adult male natives. Their immunity was strikingly shown at the

SMALLPOX and CHICKENPOX CHART.

January 1st - December 30th
1905



Mean Temperature Joubert Park.

Notifications Chickenpox.

Notifications Smallpox. Sub-divided as follows:—

S.A. Coloured
Asiatics
Whites

Village Main Reef Mine. Here 10 cases occurred amongst the imperfectly vaccinated white miners, but not one amongst the hundreds of well-vaccinated natives who worked with them. M.O.H. 1904-6
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4. The absence of aerial diffusion or other spread of infection to the well-vaccinated community at Rietfontein Lazaretto. In ill-vaccinated England it has been found that in the neighbourhood of aggregations of acute cases of small-pox in hospitals, an undue incidence of the disease has been observed.

During the outbreak under notice, all small-pox cases (with two exceptions) were removed to Rietfontein Lazaretto, an institution eight miles north-east of centre of Johannesburg. In addition to the small-pox wards, there are within a radius of 200 yards wards for white and coloured venereals, and for coloured scurvy and pneumonia patients. There is also the Municipal Isolation Ward, and at a distance of one-third of a mile on the opposite side of the valley is the Chronic Sick Home. Excluding small-pox patients, there were rarely less than 500 persons at Rietfontein, and the total number who passed through during the continuance of the outbreak was very much greater.

At the commencement, Dr. Mehrliss (the Medical Superintendent) vaccinated or re-vaccinated everyone in the place, and all subsequent admissions on arrival.

Not a single case of small-pox infection occurred, though no very stringent restrictions were placed on the movements of convalescent patients, and though at one time the type of disease was extraordinarily severe. This is interesting, but not surprising, in view of Dr. Bruce Low's report to the Local Government Board that in Germany, owing to the well-vaccinated condition of the population, the few cases of small-pox which arise are nursed with impunity in an annexe to the ordinary general hospital.

Relation to Season of Year.—The epidemic occurred during the winter and early spring months (end of May to end of September). Small-pox is more prevalent during the colder months—possibly because there is more crowding in houses—but the season affects its incidence only to a slight degree. In England small-pox tends to be above the mean in the first half of the year, and below it in the latter half.

Relation to Chicken-pox.—Chicken-pox is always present amongst the natives on the Witwatersrand, who are very susceptible to the disease and not infrequently die from it; but, as will be seen from the accompanying chart, there had been a marked increase in the number of cases some three weeks before the small-pox outbreak started.

The chicken-pox epidemic reached its height in the week ending July 29th, when 62 cases were notified, gradually declining to the normal between August and November.

AMAAS.—In South Africa some practitioners recognise amongst natives a disease called 'Amaas.' Personally, however, your medical officers do not accept this view, and are in accord with both Dr. Turner (Medical Officer of Health, Transvaal,) and Dr. Mehrliss who has the advantage of a long and very vast experience. Cases notified as 'Amaas' are either modified small-pox or chickenpox, and this term is only included in the notifiable list in order that such cases shall not be missed.

THE OUTBREAK WITHIN THE MUNICIPAL AREA.

The condition as regards vaccination of the white population in May, 1905, was particularly favourable to a severe outbreak. Vaccination was not compulsory, and though the Public Health Committee had in February, 1903, appointed 5 medical practitioners to vaccinate anyone at the expense of the Council, and had advertised the fact by placard and handbill, and in July, 1904, had appointed 3 more vaccinators for outlying districts, not half-a-dozen persons had availed themselves of these facilities.

Owing to the prevalence of smallpox in the Orange River Colony and Natal early in 1904, the Medical Officer of Health, Johannesburg, recommended, on 22nd June, 1904, that the Medical Officer of Health, Transvaal, be communicated with, in regard to the putting in force of Section 30 of Police Law No. 12 of 1895, which provides:—"That everyone living or residing in the State shall be bound, unless prevented by illness, to have himself vaccinated or re-vaccinated in time of danger." The decision as to when such time of danger exists rests with the Lieutenant-Governor in Executive Council.

The foregoing recommendation was adopted by the Town Council on July 6th, 1904. It was, however, apparently considered better to take action under Ordinance 58 of 1903, Section 58, as amended by Ordinance 41 of 1904, Section 28, and on October 12th, 1904, the Colonial Secretary stated that on the receipt of a formal resolution from the Town Council to the effect that

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Smallpox.

compulsory vaccination was necessary in Johannesburg, he was prepared to have regulations proclaimed accordingly. The Public Health Committee thereupon recommended that the enforcement of compulsory vaccination was necessary, but this was strongly opposed in Council by certain members and sent back for re-consideration. On 24th October the Public Health Committee reported that in view of the advice and arguments of the Medical Officer of Health, they again desired to submit their previous recommendation. After much discussion the following amendment was carried :—

“That regulations with regard to smallpox made under Section 58 of the Municipal Corporation's Ordinance, 1903, shall be made applicable to Johannesburg, provided that such regulations shall not, without further reference to the Council, provide for the compulsory vaccination or re-vaccination of any person other than persons of colour or persons who have been in contact with smallpox patients, and the members of the families of such persons.”

The Government was, however, unable to accept these restrictions, and vaccination was not made compulsory in Johannesburg.

It is not necessary to recapitulate here the arguments which were advanced in favour of vaccination, but the concluding paragraph of the report submitted by the Medical Officer of Health is not without significance in the light of after events :—“Much more evidence in the same direction could be adduced, but it is thought that enough has been said to convince the Committee of the efficacy of vaccination, and of the necessity for its compulsory enforcement as a preventive measure, if this community is to be spared the tale of suffering and expense which sooner or later falls to the lot of unvaccinated countries.”

While the above negotiations were proceeding, three cases (imported from Natal) caused some anxiety. Prompt and vigorous measures of isolation and disinfection with supervision and vaccination of contacts were adopted, and there was no extension. The first of these occurred on 2nd August, 1904, when a man G.J., who had arrived a few days previously from Newcastle, Natal (where smallpox was prevalent), presented himself at the Health Office with a copious and characteristic papular eruption. He had not been vaccinated since infancy some 37 years previously, but eventually recovered after a sharp attack.

On 8th October, 1904, a Mr. T. was removed to the Lazaretto from Boksburg suffering from smallpox. He had passed through Johannesburg on his way from Natal to Boksburg and lodged at 22 Wanderers Chambers, Loveday Street.

On 22nd October, 1904, Dr. Tucker reported a case in the person of an unvaccinated native working on the Langlaagte Estate G.M. Co. The source of infection was not clearly traced, but was again thought to be Natal. The whole of the native compound was disinfected, all the other natives (some 1,400) were inspected by Dr. Tucker and the Medical Officer of Health, and re-vaccinated, and 68 contacts dealt with.

Whilst the early notification of the above cases enabled successful measures to be taken it only needed the introduction of infection by an unrecognised case, or a delay in notification, to start a serious epidemic amongst a population so unvaccinated as was that of Johannesburg in the early part of 1905.

This happened in May, 1905, when infection was introduced by Indian pilgrims who, in returning from Mecca, had travelled by a steamer on which smallpox broke out prior to their disembarkation at Durban. At 2 p.m. on Sunday, May 14th, Dr. Tucker reported Case No. 1, in the person of a Malay woman living at the corner of 17th and Kaffir Streets, Malay Location. She was promptly removed to the Lazaretto together with her husband and son, the premises closed and disinfected. A thorough house-to-house inspection of the whole Malay Location was at once made by the Council's medical officers and staff of inspectors, but no other sufferers were then detected.

A second case notified the same evening at Fountain Road, Fordsburg, followed next morning by a notification of a white girl at 17th Street, just east of the Malay Location, whose family had been dealing at the store of Case No. 1, dispelled any hopes of the first notification being an isolated case.

The same day (the 15th) the fourth case was notified from Fordsburg near the pumping station, and it was ascertained that the white girl and two of the Malay Location contacts had been working at one of the steam laundries at Auckland Park.

It now appeared probable that the infection was widely spread, and in order to deal more effectively with what threatened to be a serious epidemic, the Public Health Committee, on the advice of the Medical Officer of Health, recommended that the Colonial Secretary be requested under Section 58 of the Municipal Corporations Ordinance to proclaim regulations framed under

the above Ordinance to be in force within the Municipality. The Council adopted this recommendation at a special meeting on May 17th, and Vaccination Regulations for Johannesburg were published in the *Gazette* of June 16th (Govt. Notice 538 of 1905). Further regulations were gazetted on August 25th, 1905 (see Govt. Notice 763). M.O.H. 1904-5
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The epidemic which commenced on May 14th, 1905, as just related, may be said to have terminated on 1st October, 1905, though an isolated case occurred on 30th November. In all 171 cases came to light, including three recognized elsewhere, in which the infection was contracted in Johannesburg, viz., a corporal of S.A.C. at Pretoria; a native at Mr. Zoccola's vineyard at Lombardy (2½ miles N.E. of Municipal boundary), and a Zulu who was found to be ill on his arrival at Durban.

TABLE I.—WEEKLY OCCURRENCES.

Week ending.	Number of cases notified.				Week ending.	Number of cases notified.			
	Whites.	S.A.C.*	Asiatics.	Total.		Whites.	S.A.C.	Asiatics.	Total.
May 20 ...	3	2	6	11	Aug. 12 ...	17	5	Nil.	22
„ 27 ...	2	2	3	7	„ 19 ...	11	5	Nil.	16
June 3 ...	4	3	3	10	„ 26 ...	9	1	Nil.	10
„ 10 ...	1	2	1	4	Sept. 2 ...	29	5	3	37
„ 17 ...	Nil.	Nil.	Nil.	Nil.	„ 9 ...	6	6	Nil.	12
„ 24 ...	1	1	1	3	„ 16 ...	7	1	Nil.	8
July 1 ...	Nil.	2	Nil.	2	„ 23 ...	4	1	Nil.	5
„ 8 ...	2	Nil.	1	3	„ 30 ...	2	Nil.	Nil.	2
„ 15 ...	7	Nil.	1	8	Oct. 7 ...	Nil.	1	Nil.	1
„ 22 ...	2	Nil.	Nil.	2	„ 14 ...	Nil.	Nil.	Nil.	Nil.
„ 29 ...	4	Nil.	Nil.	4	„ 21 ...	Nil.	Nil.	Nil.	Nil.
Aug. 5 ...	1	2	Nil.	3	„ 28 ...	Nil.	Nil.	Nil.	Nil.
					Dec. 2 ...	Nil.	1	Nil.	1
					Total ...	112	40	19	171

*(South African Coloured includes Somalis.)

The Race and Sex Distribution is shown in Table II.

TABLE II.

Race.	Males.	Females	Total.	Remarks.
Whites ...	86	28	115	Includes Somalis.
S.A. Coloured ...	28	10	39	
Asiatics ...	8	11	19	
Total ...	122	49	173	

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TABLE III shows the incidence in the various districts, the greatest number being furnished by the white population of Marshall's Town, and of City and Suburban. These adjoining districts are by no means the most unsatisfactory from a sanitary point of view, but the white population were found to be almost wholly unprotected by vaccination.

DISTRICT.	Whites.	S.A. Col.	Asiatics.	Total.
1. Johannesburg, south of Railway and north of Commissioner Street	12	3	1	16
2. Braamfontein, Hospital Hill, Hillbrow	8	1	1	10
3. Marshall's Town and City and Suburban	39	12	—	51
4. Ferreira's, Fordsburg, Mayfair	20	1	1	22
5. Newtown, Vrededorp, and Locations	2	14	14	30
6. Jeppes, Jeppes Extension and Belgravia	3	1	—	4
7. Doornfontein, Troyeville, Bezuidehout Valley, etc.	8	2	—	10
8. Berea, Yeoville, Bellevue, Norwood, etc.	—	—	—	—
9. Auckland, Richmond, Melville, Newlands, etc.	2	—	—	2
10. Paarlshoop and Western Mines	1	—	—	1
11. Central Mines	17	2	—	19
12. Prospect, Denver and Eastern Mines	2	1	—	3
13. Ophirton, Booyens, Turffontein, Rosettenville, Forest Hill	1	—	2	3

Early in the outbreak, the disease appeared on the East Rand, a man (P) being attacked at New Modderfontein on 16th May. Dr. G. A. Turner, who investigated this case, ascertained that he had been living up to the 8th or 9th May at Crown Road, Fordsburg. Cases also occurred in Germiston, and on July 22nd an unrecognized and remarkable case of Black or Purpuric Smallpox was sent in by rail from Geduld Mine, Springs, to a Maternity Home in Johannesburg, the bleeding being attributed to impending miscarriage.

On the outbreak of the disease in the Malay Location in May, three Vaccination Stations were established there under the charge of Drs. Frazer, Farmer and Tucker, while Dr. Slater vaccinated in the Kaffir Location. Although vaccination did not become compulsory until July 1st, some 5,000 persons were induced, largely by the efforts of Location Superintendent Lloyd and his staff, to avail themselves of this protection, with the satisfactory result that no case occurred in the Locations after the first week in July, with the exception of certain Somalis who were taken there by their friends after the disease had developed.

Leaving the Location, the disease gradually worked down to Marshall's Town and City and Suburban, where the majority of white cases occurred, a large proportion being mild attacks in whites only vaccinated in infancy.

On 16th August, 1905, one of the sorters from the General Post Office was sent walking through the streets to the M.O.H.'s office by the Post Office Medical Officer, with a note to say that he thought the man was suffering from small-pox, an assumption which was obviously correct. The sorting room was disinfected, and, so far as possible, all letters handled by the sorter in question (which included the contents of some 2,200 private letter boxes) were removed and disinfected in presence of the Post Office officials, between 10 p.m. and 2 a.m., with a minimum of disturbance to the postal service. The official numbers of the boxes were published in the newspapers, and the owners advised to seek vaccination. On 11th September a sorter in the Railway Travelling Post Office was attacked, and somewhat similar steps were taken.

Most emphatic and repeated representations were made to the Postal Authorities, the M.O.H. Transvaal, and to the Colonial Secretary as to the urgent necessity for systematic re-vaccination of every Post Office employee, a matter about which much difficulty was raised, and eventually (September 18th) the Government required all the Postal Staff to be re-vaccinated or to leave the service. No further trouble occurred.

The most difficult people to deal with were the Asiatics and Somalis. The former greatly resent any intrusion on their privacy, object both to isolation of their sick and to disinfection, and, with a view to concealment, placed patients in the closet when premises were being searched. The prosecution and fining one of their prominent members for failing to notify a case in his unvaccinated child and for giving false information to the Inspector when he visited the house, had a most salutary effect, and coupled with the efforts of Mr. Lloyd, the Location Superintendent, resulted in fairly prompt notification being thereafter obtained.

The Somalis, perhaps, gave the greatest trouble. Exempt from the provisions of the Pass Law, and consequently mostly unvaccinated, they were difficult to trace and showed the greatest cunning in hiding their sick, sometimes carrying them a considerable distance to an empty house into which food was smuggled, until the cases were discovered by an Inspector. M.O.H. 1904-5
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On one occasion (August 21st) the dead body of a Somali, covered with the rash of confluent smallpox, was found at 6 a.m., covered with sacking, in Eloff Street Extension. A letter, evidently referring to this occurrence, subsequently fell into the hands of the Asiatic Authorities at Germiston, but the closest investigations both by the police and the Health Department, failed to discover where the body had come from.

When it became evident that the unvaccinated and susceptible Somalis were largely instrumental in the spread of infection, those living in the town were carefully traced out and vaccinated on the spot. Their dwellings in the Malay Location were also marked down, and visited one night by a staff of medical men, inspectors and police, under the direction of the Medical Officer of Health. Upwards of 150 Somalis, etc., were vaccinated on this occasion, and not a single further case occurred amongst them.

The epidemic reached its height in the week ending September 2nd, when 37 cases were discovered. By that time, however, people had become alarmed, and apart from pressure exercised by employers and others, at the personal and written request of the Medical Officer of Health, were in large numbers voluntarily seeking the protection afforded by vaccination. By 1st October it was practically over.

The origin of many of the early attacks was readily ascertained, but later on when sufferers were sent in rickshas, or walked to the Municipal Offices or Hospital, it was often impossible to do so.

MEASURES TAKEN TO DEAL WITH THE OUTBREAK.

These have to some extent been indicated, but may be summarised as follows:—

I. Detection of the Disease.—This was secured through notification by medical men, house-to-house inspection of the locations daily (and often nightly) for several weeks, and the employment of special inspectors to keep a watch on the quarters occupied by certain low-class Indians. Handbills and placards, describing the symptoms, were printed in English, Dutch, two Indian and two native dialects, and widely distributed, and an Indian who concealed and denied the existence of the disease in his house, was prosecuted and fined £10. When the City and Suburban district became the centre of the disease, house-to-house visitations by medical men (who also performed free vaccination) was carried out.

Notification by medical men was usually prompt and careful, but in several cases there was disastrous delay. At times difficulties in diagnosis naturally arose, and while both Dr. Stock and the writer were, in the absence of other consultants, always ready to share the responsibility of diagnosis with the notifying doctor, a disposition was displayed by one or two practitioners to shift all responsibility on to your medical officers, and at times to call upon them without any reasonable justification.

Dr. Mehliß at Reitfontein rendered invaluable and ever-ready help in this as in all other respects, at times putting himself to the inconvenience of coming into Johannesburg for consultations with your medical officers. Mistakes were made, but they were few and were on the side of caution, a pustular syphilide with influenza being numbered amongst them.

II. Isolation of Sufferers.—Two very severe cases—both pregnant women—were unfit to be removed to the hospital. One of these was the purpuric case referred to elsewhere as having been mistaken for one of threatened miscarriage, and sent in by train from Springs to the Maternity Hospital. The other case was a Dutch woman in the Municipal Tenements, Fordsburg, and gave rise to the greatest anxiety. Three secondary cases resulted, all persons who absolutely refused re-vaccination, and, not being contacts, could not be forced.

All other cases were removed for isolation, usually within an hour of notification. Owing, however, to the immense amount of transport required for patients, it became impossible to despatch each case at once to Rietfontein, and a Receiving Hospital was opened in some suitable, if dilapidated, cottages in Newtown. These cottages, which were some distance from other houses, were enclosed with an iron fence, divided into white and coloured wards, equipped with the necessary hospital furniture, and put into telephonic communication with the office. A trained R.A.M.C. orderly was placed in charge to whom rations were taken each morning by one of the disinfectors. Patients were rarely kept there for a night, but owing to the wretched condition of the road to Rietfontein, the last ambulance was always despatched to reach the Lazaretto, if possible, before night fell.

At Rietfontein the Government provided for the care of sufferers.

III. Disinfection of Premises and Treatment of Contacts.—As soon as the patient had been removed, the disinfectors entered the house and started work, the usual routine being followed, and if necessary the whole house dealt with. All soft goods were removed to the Disinfecting Station to be passed through the "Equifex," or (if leather, fur, etc.) through the Formalin chamber. The staff engaged on this work were, of course, vaccinated, and wore canvas 'overalls.'

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Meanwhile, contacts were being traced, and 1872 primary contacts in all were dealt with. Of these, 1,294 were bathed at the Disinfecting Station, and the remainder (with the exception of 45 who could not be located or who had left the town and were dealt with elsewhere), were allowed to bathe at home. All clothing was, of course, disinfected by steam. Where necessary, every contact was vaccinated, and although a few at first objected, their scruples were overcome. All contacts were kept under observation for 16 days; at one time no less than 575 were being visited daily.

The work of the staff was very onerous, and it was necessary to engage an extra male and extra female assistant at the Disinfecting Station, besides extra disinfectors and native drivers. Two trained inspectors were specially detailed to live at the Disinfecting Station.

Everything worked smoothly, and not a single well-founded complaint was made. On one occasion the workers at a very large steam laundry were found to include several contacts. In 5 hours the laundry and all its contents had been disinfected, upwards of 70 women and girls had been taken in ambulances to the Disinfecting Station, and there disinfected and vaccinated, and 60 natives were vaccinated and made to bathe on the premises. The enterprising American proprietor then advertised that the laundry and staff were under the special supervision of the M.O.H., an advantage enjoyed by none of his competitors.

IV Facilities for Vaccination and Re-vaccination.—In February, 1903, the Municipality appointed five public vaccinators to vaccinate at its expense, and in July, 1904, this number was increased to eight to provide for the rapidly growing outside suburbs. These facilities were not availed of by half-a-dozen persons.

At the commencement of the outbreak in May, 1905, nine additional vaccinators were appointed, and all were paid 5s. for each white and 2s. 6d. for each coloured case. On 16th August this scale was reduced to 5s. per case for the first hundred whites in each month, 3s. per case for the second hundred, and 2s. per case for all others, the corresponding scale for coloured persons being 2s. 6d., 1s. 6d. and 1s. each. On 1st October this arrangement terminated, and £30 was paid to each 12 practitioners as public vaccinators for October. By the 1st November the outbreak was over.

Two medical men were also employed for two or three weeks at £2 2s. per day in making house-to-house visitations through the infected City & Suburban districts, and vaccinating as many as possible.

As the result of urgent representation by the Medical Officer of Health to the Native Affairs Department and Colonial Secretary, owing to the small but evident leakage of un-vaccinated natives through the Pass Offices, four extra vaccinators were appointed by the Government for this work in September, 1905.

Handbills and placards were posted and distributed broadcast, advertising the foregoing facilities.

Explicit instructions as to the observance of cleanliness and efficiency in vaccinating were issued by the Medical Officer of Health to the vaccinators appointed by the Municipality.

A carefully organized night visitation by medical men, inspectors, and police was made to the quarters occupied by Somalis, with strikingly successful results.

The Railway Administration, Post Office, Chief of Police, Commandant of Volunteers, mine managers, merchants, and other employers of white labour, were circularized, and in most cases called on by the M.O.H., to enlist their assistance in obtaining the vaccination of their people, and two Dutch Clergymen in Fordsburg gave very willing and effective help amongst their flocks. The Leaders of the Indian community were also approached.

Results.—59,162 persons (37,501 whites and 21,661 coloured) were vaccinated at the expense of the Municipality, and a further 34,309 natives were vaccinated by Government at the Pass Offices.

132,575 tubes of vaccine were supplied to medical men during the outbreak.

In only one case out of 93,000 vaccinations were any serious after-effects alleged, and even in that it was not clear that it was a case of *propter hoc*, rather than *post hoc*.

A bricklayer, at 20, well-developed, regular in his habits, and with no adverse family history, presented himself to the M.O.H. complaining of loss of power in his left arm, following vaccination. He was very carefully examined for the Council by Dr. E. T. E. Hamilton, M.D., Lond., F.R.C.S., and by Dr. Baumann, M.D. Edin., M.R.C.P. Lond. On his left arm were four old and three large recent vaccination marks. There was much wasting, with loss of power and of sensibility, nystagmus, right ankle-clonus, and exaggerated knee-jerks, which together suggested a diagnosis of disseminated multiple sclerosis, a nervous malady which often follows acute febrile diseases, *e.g.*, measles or small-pox. Drs. Hamilton and Baumann did not, however, consider that the disease was caused by vaccination, though vaccination may have played some accidental part in precipitating its onset.

COST OF THE OUTBREAK.

M.O.H. 1904-6

This amounted to £6,515 7s. 6d., made up as follows :—

Cost of Vaccinations	...	...	...	£5,694	7	6
Wages of extra inspectors, orderlies, and disinfectors ; rent and equipment of receiving hospital, extra transport, printing, etc.	...	...	...	821	0	0
				£6,515	7	6

Smallpox.

Puerperal
Septicaemia.

Scarlet Fever.

In concluding this section, the Medical Officer of Health desires to record his appreciation of the excellent and ungrudging work of every member of the staff, and especially of Dr. Stock (Assistant Medical Officer of Health), Mr. Lloyd (Superintendent of Locations), and Inspectors Christie, Murphy, and Watson. Acknowledgment has already been made of Dr. Mehliß's invaluable assistance. Drs. Slater and Michie did specially good and reliable work as vaccinators and house-to-house visitants. In the Council, Messrs. Roy and Quinn and Dr. F. H. Napier defended the value of vaccination most ably, and the results must be most gratifying to them.

PUERPERAL SEPTICAEMIA, Etc.

	1904-5.		1905-6.	
	Cases.	Deaths.	Cases.	Deaths.
WHITE	5	7 (including 1 outside)	11	7
COLOURED SOUTH AFRICAN	4	3	—	3 (including 1 outside)
ASIATIC	1	1	—	—

It is clear from the above figures that the notification of pyaemic and septicaemic states associated with the puerperal period has been very incomplete. This is probably in part due to the absence in many cases of a definite understanding on the subject. It may, therefore, be well to place it on record that in November, 1898, the Royal College of Physicians resolved that notifiable puerperal conditions should be taken to include "septicaemia, pyaemia, septic peritonitis, septic metritis, and other acute septic inflammations in the pelvis, occurring as the direct result of childbirth." The Obstetrical Society of London gave a similar ruling in reply to enquiry by the Society of Medical Officers of Health.

The Royal College of Physicians have now removed the term 'puerperal fever' from their nomenclature, and substituted such terms as 'puerperal pyaemia' or "puerperal septicaemia." In certifying the 21 deaths which have occurred in Johannesburg in 1904-6, the inexact term "puerperal fever" has only been used three times.

Of the 21 cases inquired into, 17 were Whites, 2 Cape Coloured, 1 Native, and 1 Asiatic. All received medical attendance: 14 were attended by midwives, and 7 by friends. There is no evidence that any practitioner or midwife conveyed the infection from one patient to another. In all notified cases, the hands of midwives or other female attendants were as far as possible disinfected in the presence of the inspector, by cutting and cleaning the nails; soaking the hands in ether after a preliminary wash; then scrubbing vigorously with yellow soap and very hot water for 5 to 10 minutes, and finally soaking in 1 to 200 of Izal or Cyllin for 5 minutes. Clothing and other possibly contaminated articles were also disinfected, and the persons in question required to bathe.

The deathrate from puerperal febrile conditions per 1,000 white persons living was 0.049 in England and Wales in 1904. In Johannesburg in 1904-6, it was 0.082. The explanation is not clear, though the fact that the birthrate in Johannesburg was 37.3 against 27.9 in England and Wales in 1904 should obviously be borne in mind. It is hoped to return to this point in next year's report in connection with the training and supervision of midwives, a measure which is very desirable, and, in urban districts, quite practicable.

SCARLET FEVER.

	1904-5.		1905-6.	
	Cases.	Deaths.	Cases.	Deaths.
WHITES	103	1	205	6
COLOURED SOUTH AFRICAN	2	—	2	1
ASIATIC	—	—	—	—

M.O.H. 1904-6

Diphtheria.

Erysipelas.

Measles.

Plague.

Scarlet fever is usually an exceedingly mild disease in the Transvaal. The mortality was only 0.04 per 1,000 persons living, against 0.11 in England. 20 cases were removed to the Isolation Ward, Rietfontein, one of the latter being the child of a tailor who followed his calling in his own house. This man occasioned much trouble, as he refused to obey any regulations, and the child was finally removed by the Council's officials, under a 'Special Order.'

DIPHThERITIC DISEASE INCLUDING MEMBRANOUS CROUP.

					1904-5.		1905-6.	
					Cases.	Deaths.	Cases.	Deaths.
WHITES	..	...	...	...	26	10	36	17
COLOURED SOUTH AFRICAN			...	...	2	4	5	—
ASIATIC	...	...	...	...	—	—	—	—

The mortality per 1,000 living was 0.15 for the two years, against 0.16 in the 76 great towns of England and Wales in 1905.

Careful inquiry in each case revealed no community of school attendance, milk supply nor other special circumstance, except in one instance in which three attacks occurred in one house, and at the same time there was an epidemic of 'roup' which killed about a dozen fowls on the premises. Bacterial examination of exudate from the fowls threw no light on the subject. In another case, while a lady was 'doctoring' a fowl suffering from 'roup,' some discharge from its mouth was blown into her face and three days later she developed diphtheria.

The diagnosis of diphtheria was bacterially confirmed in 11 cases, two reports being negative.

ERYSIPELAS.

					1904-5.		1905-6.	
					Cases.	Deaths.	Cases.	Deaths.
WHITES	..	...	...	...	100	8	107	9
COLOURED SOUTH AFRICAN			...	..	36	4	29	4
ASIATICS	...	...	...	...	6	2	29	1

It is a well recognised fact that erysipelas amongst whites is much more prevalent and very much more fatal than in England, and the above figures represent a mortality of 0.1 per 1,000 against 0.036 in England and Wales in 1904. The great majority of the cases were facial, and not usually associated with a visible wound, though there were some very severe traumatic cases. The dusty condition of the atmosphere in Johannesburg is a point which suggests itself as having a possible bearing on the frequency of erysipelas. Of the 207 white cases notified, 135 were males (of whom 128 were adults) and 72 females. Apart from the known numerical excess of males, slight cuts in shaving may have increased the opportunity for infection.

In numerous instances request was made for admission of erysipelas cases to the Municipal Isolation Ward, but wherever it was possible for sufferers to be treated elsewhere admission was refused.

MEASLES.

In 1904-5 and 1905-6 the mortality was as follows: Whites, 36; S.A. Coloured, 29; Asiatics, 1. For both 'Whites' and 'S.A. Coloured' the death-rate per 1,000 persons living was 0.2, as against 12.3 per 1,000 in England and Wales in 1904. Measles are therefore comparatively negligible as a cause of mortality, and there have been no sudden outbursts among schoolchildren, such as occur in England.

BUBONIC PLAGUE.

Only one case of Plague occurred, viz., on 15th January, 1905.

At 10 a.m. Dr. Daly telephoned that there was a suspicious case in a row of rooms on Stands 479 and 468, Jubilee Street, facing the Kazerne Railway Goods Yard. The sufferer was found to be a coolie lad aged 14, who was extremely ill with a bubo on the upper part of the front of the left thigh, and a temperature of 105°. He was removed to the Lazaretto, where he died a few hours later. On enquiry, it was found that on Friday, 13th, he had been brought by his father to the house of a general storekeeper at the south-east corner of Sauer and Kerk Streets, and there is some reason to think that he was ill when he arrived. This

house adjoined a forage store and bakery. He was seen by Dr. Daly on Saturday, 14th, but there was nothing to suggest plague till Sunday morning, 15th inst., when the bubonic swelling was noted. On that morning he was removed from the store at corner of Sauer and Kerk Streets to the room in Jubilee Street, from whence he was taken to the Lazaretto. It was stated that the lad had been in Johannesburg for some 18 months. Both father and son were clothes hawkers in the coloured market, south of the Gas Works.

Sputum and bubo juice were sent the same day to the Government Laboratories, and reported to be microscopically suspicious. On 26th January it was announced that by cultivation and inoculation experiments definitely positive results as to the presence of *B. Pestis* had been obtained from the bubo juice, but not from the sputum nor lung-juice.

Measures taken—

1. The room in Jubilee Street and the house in Sauer and Kerk Streets were at once emptied, disinfected, locked up, and contents removed to Disinfecting Station.
2. All contacts with one exception were at once located, disinfected and kept under daily observation. The exception referred to was identified on 17th January in Pretoria and lodged in the Lazaretto.
3. The row of rooms on Stands 479 and 468, Jubilee Street, were emptied and closed within 24 hours, surrounded with a galvanised ratproof fence five feet high, floors, ceilings and roofs removed and sites disinfected. The premises were dilapidated and insanitary, and in them 179 rats were found, of which 166 were dead.

The house, forage store, and bakery in Sauer Street were similarly dealt with, and 68 dead rats, of which 54 were mummified, and nine mice, of which eight were dead, were found, mostly in the stables at the rear of the forage store and bakery. One mouse was reported from the Laboratory as microscopically suspicious, but eight rats which were examined were quite free from any indication of plague.

The contents of the forage store, consisting of some 240 bales of hay and lucerne, and about 400 bags of mealies, oats, etc., were thoroughly gone over, well sprayed with formalin, and, as there was no sign of their having been interfered with by rats or mice, were then liberated.

The cost of these operations was £61 10s.

The Jubilee Street property was subsequently pulled down by the owners and replaced by a row of well-built shops.

4. A circular was subsequently drawn up in simple language to reassure the Indians, indicate the precautions they should adopt, and the steps to be taken if plague occurred amongst them. This was translated by Mr. M. Gandhi into several Indian dialects and distributed broadcast.

ROUTINE PLAGUE PREVENTIVE MEASURES.

These included:—

1. Bacterial examination of sputa of pneumonia patients.—In 1904-5, 1,727 specimens were examined, of which 7 were suspicious and 1,720 negative. In 1905-6 there were only 2 suspicious results in 859 examinations.
2. Closure and drastic disinfection of premises which, in the opinion of the M.O.H., were infected or likely to become infected with plague.

The district inspectors were required to prepare lists of all such premises. The M.O.H. then went through the districts, inspected the listed premises and many others which appeared insanitary, and reported them for 'disinfection' to the Public Health Committee and Plague Committee. Most of these properties were situated in Ferreirstown, the site of the original mining camp of Johannesburg, and of a number of cases of plague during the 1904 outbreak. The majority were dilapidated shanties, but unfortunately there was no legal power to demolish them. The course adopted was therefore that which has been followed at certain places in India. The dwellings were emptied within 48 hours to 7 days, and 'disinfected' as follows:—The whole of the inside was sprayed, the floors, skirtings and ceilings removed, the sites soaked with acid solution perchloride of mercury (1 in 500), the windows taken out, and the roofs removed to let in sun and air. It was thought that the owners would then elect to replace the remains by decent buildings, but there was found to be a desire in many instances to patch them up and re-let them to coloured people. Resolved that this should not be done, the M.O.H. at this juncture sought the able advice of Mr. Harold Strange, then President of the Chamber of Mines, and at his excellent suggestion, these premises were viewed on 17th November, 1904, by members of the Town Council, with deputations from the Chambers of Commerce and Trade, Medical Society, Architects' Association, and Association of Property Agents. An emphatic demand for the prompt clearance of this dangerous insanitary area immediately followed. Though this could not be done, the owners were informed that if they attempted to rebuild and permit re-occupation, the premises would again be closed and disinfected. The battle was won, and within a comparatively short time this very dangerous area was cleared without penalising the community for the benefit of slum property owners. In many instances good class new buildings were erected upon it.

M.O.H. 1904-6

Plague.

The following is a list of the premises dealt with by the M.O.H. as above described :—

Marshall Street, Stands 41, 92, 97/8, 100/1, 135, 142, 170/2/8, 210/1/2/4, 231, 277/8; Main Street, Stands 45/6, 162, 166, 193/4/5/9, 205/6/7, 227; Alexander Street, 197, 221/3/4/5/6/8/9, 208/9, 230; Fox Street, 149, 153, 187/8/9, 222; Bezuidehouth Street, 150/2, 161/3; Wolluter Street, 179, 192, 203/4, 213; Jubilee Street, 469, 478, 618, 1417; Anderson Street, 53/5; Becker Street, 79, 88; Market Street, Stand 59; Berea Street, City and Suburban, Stand 647; President Street, Stand 480; Siverwright Avenue, Doornfontein, Stands 773/4.

These premises comprised 293 single room dwellings, 30 cottages, 1 mosque, 7 shops and 4 stables.

WORK OF RAT DESTRUCTION AND EXAMINATION.

The manner in which rats spread plague is not definitely known, although there is now little doubt about the fact. Some species are apparently more liable to the disease than others, and in an article to the *British Medical Journal* (May 6th, 1905) Col. Bruce Skinner suggests that the immune Norway rat (*Mus decumanus*) may stay the spread of plague by destroying the long-tailed species, which is highly susceptible. Many different species are found in the Transvaal, the commoner varieties in Johannesburg being the *Mus decumanus*—commonly known as the Norway rat, the *Mus Alexandrina* or Egyptian rat, and the *Mus Rattus* or long-tailed rat.

The rat catchers state that the long-tailed species is least common, but further data are being collected on these points.

On the 1st July, 1904, there were two separate staffs of rat-catchers at work, one under the direction of the Public Health Department, the other of the Rand Plague Committee. The Municipal rat catchers were distributed throughout the town, and a certain proportion of the "catch" were sent each day to the Government Laboratories for examination—a careful record being kept of the source of each. If an animal were reported as being infected with plague, any further action in regard to the premises was undertaken by the staff of the Rand Plague Committee. The block of premises on which the infected rodent was found was surrounded by a rat-proof fence and gone through systematically from the circumference to the centre by the Plague Committee's staff, which included 2 carpenters. Floors, ceilings, wainscoting, etc., were lifted, the superficial layer of earth beneath the floors taken to the Destructors, and the subjacent ground thoroughly disinfected with a strong solution of acid perchloride of mercury (1-300 to 1-500), which is looked upon as specially effective. The woodwork removed was usually burned, and the premises, after being made rat-proof, were permitted to be again occupied.

At the end of July, 1904, the Municipality took over the whole of this work. The town was divided into districts and a rat catcher allocated to each. The staff consisted of ten rat catchers with a native apiece, and worked almost entirely with traps and dogs, poison being practically prohibited. A carpenter was engaged from time to time as required.

Warning circulars were sent to forage stores, etc., and the following notice was published :—

DESTRUCTION OF RATS.

"The Public are again urged to co-operate with the Public Health Committee in the extermination of rats and mice."

"These vermin should, as far as possible, be destroyed by means of traps, poison, cats and dogs; runs should be stopped with iron netting, holes filled in with cement, and forage and grain constantly moved to prevent nesting."

"The services of a Municipal Ratcatcher are available free of charge by notifying the Medical Officer of Health, P.O. Box 1049, Room 41, Municipal Offices, De Villiers Street."

.....
Medical Officer of Health.

During the two years, July 1st, 1904—June 30th, 1906, only 337 persons availed themselves of this offer.

An arrangement was made with the Government Laboratory by which 50 rats a day were examined. Each ratcatcher carries a supply of paper bags. Each rat is at once placed in one of these, the stand number, etc., being noted down on the margin. This prevents confusion of identity, a point of great importance should any prove to be infected with plague.

In May, 1904, the Medical Officer of Health drew the Plague Committee's attention to the Odessa results with Danysz virus, and hopes were entertained that this method might be of use. An unfavourable report from the Government Laboratory in November 1904, ended the matter for the time being.

Difficulties were experienced in prosecuting a vigorous campaign, not the least being the opposition of some householders who, fearing that their premises would be interfered with, removed not only the rats from the traps, but even the traps themselves. A large number of traps were also stolen. Power to penalize such interference is desirable.

Certain persons pretending to be ratcatchers levied 'black-mail' in the poorer portions of the town. No offender was brought to book, but as all ratcatchers are provided with a written authority, the practice was quickly checked.

Payment for rats was soon discontinued, as it opened the door to petty fraud, and elsewhere rats have been bred for the capitation fee. M.O.H. 1904-6
Plague.

In no less than 6 out of 12 cases in which rats were returned as 'plague-infected' and in 23 out of 34 in which the verdict was 'suspicious,' the rats were caught in stables or forage stores. Four 'suspect' rats were caught in the Kazerne Goods Station—one in June, 1905, actually in a forage truck. It is clear, therefore, that the importation of forage constitutes an almost open channel through which rat-infection may enter the town, and, short of completely disorganizing the trade, it is impossible to effectively guard it.

The following table shews the number of rats accounted for each month, the number sent to the Government Laboratory for examination, and the result of the examination :—

TABLE showing the number of Rats caught and examined during the period July 1st, 1904—June 30th, 1906.

Month.	Total No. Destroyed.	Total No. sent to Laboratory.	No. free from Plague.	No. infected with Plague.	No. suspicious Plague.	Remarks.
1904 July ...	2,590	1,037	1,030	7	Nil.	
August ...	2,340	912	908	2	2	
September	3,054	994	993	Nil.	1	
October ...	2,580	892	889	do.	3	
November	4,427	858	844	do.	1	13 not examined
December.	2,890	1,051	1,047	do.	4	
1905 January...	3,506	1,200	1,187	1	12	
February..	3,533	1,144	1,143	Nil.	1	
March ...	3,643	1,236	1,207	do.	Nil.	29 not examined
April ...	3,192	1,082	1,078	2	2	
May ...	3,248	1,209	1,208	Nil.	1	
June ...	3,618	1,074	1,068	1	5	
July ...	2,021	506	505	Nil.	1	
August ...	2,219	518	518	do.	Nil.	
September	2,001	497	477	do.	do.	20 not examined
October ...	2,015	456	422	do.	1	33 not examined
November	1,689	391	391	do.	Nil.	
December.	1,735	276	276	do.	do.	
1906 January...	2,320	327	327	do.	do.	
February..	2,733	288	287	do.	1	
March ...	3,214	326	326	do.	Nil.	
April ...	2,581	271	271	do.	do.	
May ..	1,564	312	312	do.	do.	
June ...	1,700	300	300	do.	do.	
TOTAL ...	64,413	17,157	17,014	13	35	

It will be seen that no less than 64,413 rats were destroyed, but large as this number is, it can scarcely have touched the fringe of the rat-population. No doubt certain blocks have been freed of these vermin, but the ratcatchers have chiefly been of use as an Intelligence Department.

During the evacuation and disinfection of certain premises in Ferreiras Town, large numbers of mummified rats were found in a 'crouching' posture, suggestive of death from plague. None were, however, in a fit condition to allow of a bacteriological examination being made.

Since August, 1904, when the epizootic may be said to have died out, only four out of some 15,000 rats examined were found infected with plague, and these at long intervals apart. It is therefore evident that there has been no marked recrudescence, the plague-stricken rats being probably freshly imported.

M.O.H. 1904-6

Plague.

Malaria.

In July, 1905, the number of ratcatchers was reduced to five, three of them being dispensed with in the following November. The work of the remaining two is devoted chiefly to the Kazerne, to old districts where plague existed, and to visiting forage stores, houses on request, etc.

Some 12 rats from different parts of the town are now daily examined at the Government Laboratories, and by these measures, and the co-operation of the inspectors, early information should be received of any unusual rat mortality.

MALARIA.

Appended are the statistics of this disease:—

					1904-5.		1905-6.	
					Cases.	Deaths.	Cases.	Deaths.
WHITES	...	...	...	...	97	4	158	8
COLOURED SOUTH AFRICAN	...	...	...	...	138	58	126	27
ASIATICS	...	...	...	...	34	4	24	1

All except 2 of the above cases were those of persons who had contracted the disease elsewhere. Of the two exceptions, one was eventually found to be tuberculosis and not malaria, and in the other, examination of the blood gave a negative result.

From 75 to 85 per cent. of the coloured cases were natives from Mozambique territory.

Whilst admitting that notification of Malaria is, as regards the whole Colony, very desirable in order that its local incidence may be ascertained, it is not quite clear that any immediate direct advantage accrues to Johannesburg therefrom. However, the cost is not very great, and notification would reveal any local occurrences which took place, as at Durban in 1905.

PREVENTION OF MOSQUITOS.

The type or genus of mosquito by which Malaria is communicated to human beings is known as the *Anopheles* or dappled-winged mosquito, and, so far as the writer is aware, has not yet been recognised in Johannesburg. It has, however, been asserted that the larvæ have been seen.

Perhaps the most striking difference between the ordinary mosquito (*Culex*) and the *Anopheles* is the attitude adopted by the respective insects when seated on the wall. Popularly, the *Anopheles* may be said to stand on its head with the point of its tail projecting outwards; while the tail of *Culex* points downwards or often a little towards the wall. In *Anopheles* the head and thorax or chest are comparatively small. The proboscis looks like a long thick beak, and the insect has a peculiar fusiform shape. *Culex*, on the other hand, has a thick ungainly thorax and a thin proboscis. The wings of *Anopheles* are generally spotted along the anterior edge, while those of *Culex* are generally plain. The larvæ of *Anopheles* float flat on the surface like sticks, while those of *Culex* when at rest hang suspended head downwards by the attachment of their breathing tube to the surface of the water. Lastly, *Culex* larvæ live most in artificial collections of water, while *Anopheles* larvæ prefer natural collections.

The most vulnerable period in the history of mosquitos is when they are larvæ. They can then be destroyed wholesale. In the case of larvæ it is sufficient to pour out the water on the ground, but it is more difficult to deal with larvæ in pools, drains, cisterns, wells, ponds and streams. Even here, however, very simple measures may often suffice. Small puddles can be brushed out with a broom, the larvæ dying on desiccation by the sun. Other pools can often be drained or filled up with earth, and where these simple measures are impracticable, recourse may be had to procuring culicicides. The most popular of these is kerosene oil (paraffin), and in the report of the West African Malaria Expedition of the Liverpool School of Tropical Medicine, it is stated that this can be most easily applied by painting the water by means of a rag fixed on a stick, enough oil being used to make a fairly permanent film. Dr. Strachan, of Lagos, recommends olive oil mixed with a very small proportion of turpentine, especially for cisterns of drinking water. The use of tar has been suggested as a cheap culicide which will have the effect of rendering pools permanently uninhabitable for larvæ. When placed in water, tar constantly gives off a film like that produced by kerosene oil, but more permanent, and it is said by some observers to destroy larvæ in a more efficient manner than oil does.

The exclusion of mosquitos from dwellings by means of wire-mesh screens fixed to doors and windows is obviously advisable.

Open septic tanks and the filter-beds usually associated therewith have been observed to give rise to large numbers of mosquitos. The application of wire-mesh to such an installation has in one particular case within the writer's knowledge, proved most useful.

TABLE H.

Estimated population of the United States, 1900-1910

Year	1900	1910	1920	1930	1940	1950	1960	1970	1980	1990	2000	2010	2020
United States	76,000,000	92,000,000	106,000,000	123,000,000	132,000,000	150,000,000	165,000,000	180,000,000	195,000,000	205,000,000	215,000,000	225,000,000	235,000,000
White	60,000,000	70,000,000	80,000,000	90,000,000	98,000,000	110,000,000	120,000,000	130,000,000	140,000,000	148,000,000	155,000,000	162,000,000	170,000,000
Black	10,000,000	12,000,000	14,000,000	16,000,000	18,000,000	20,000,000	22,000,000	24,000,000	26,000,000	28,000,000	30,000,000	32,000,000	34,000,000
Hispanic	5,000,000	8,000,000	12,000,000	18,000,000	25,000,000	35,000,000	45,000,000	55,000,000	65,000,000	75,000,000	85,000,000	95,000,000	105,000,000
Asian	1,000,000	2,000,000	3,000,000	4,000,000	5,000,000	6,000,000	7,000,000	8,000,000	9,000,000	10,000,000	11,000,000	12,000,000	13,000,000
Native American	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000
Other	1,000,000	2,000,000	3,000,000	4,000,000	5,000,000	6,000,000	7,000,000	8,000,000	9,000,000	10,000,000	11,000,000	12,000,000	13,000,000

Source: U.S. Census Bureau, Historical Statistics of the United States, 1900-1990.

TABLE H.

Monthly Return of Infectious Disease notified in Johannesburg from 1st July, 1905, to 30th June, 1906.

DISEASE.	RACE.	Totals.	July, 1905.	Aug. 1905.	Sept., 1905.	Oct., 1905.	Nov., 1905.	Dec., 1905.	Jan., 1906.	Feb., 1906.	Mar., 1906.	April, 1906.	May, 1906.	June, 1906.	Number of District.													Hos- pital.	Non- Re- admit.	Un- known.	TOTALS.	
															I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.	XI.	XII.	XIII.				E.	C.
Smallpox -	E.	67	7	36	24	1		1			1				5	6	18	12	2	2	3		4	1	9	2	3				67	17
	C.	17		8	6										3		5															
	A.	193	21	27	42	26	17	15	1	5	6	11	7	15	5	20	5	8	10	32	22	27	6	43	5	3	7				193	382
Chickenpox -	E.	382	131	106	29	32	23	10	14	6	8	7	5	11	4	4	5	2	5	3	3	2		85	204	39	26					
	C.	3	1	1	1																											
	A.	1																														
Amoebic -	E.	617	11	36	34	29	33	75	108	91	78	54	44	24	73	48	35	90	22	36	45	23	29	44	45	37	24		72	3	617	232
	C.	232	5	9	7	5	16	26	26	23	31	25	27	32	2	9	1	9	24	1	6	3	5	66	47	38	5					
	A.	39	3	3		3	2	2	1	5	6		1	3																		
Typhoid or Enteric Fever -	E.	1		1																												
	C.	1																														
	A.	1																														
Gastric or Typho-Malarial Fever -	E.	128	5	5	9	2	3	3	15	24	26	15	41	10	28	23	10	13	2	14	18		6	2	3	6	10		17	6	158	126
	C.	126	2	6	4	4	3	15	9	24	16	13	13	17	3	1	1	2	2					16	86	5	9					
	A.	24	2					2		1																						
Malaria -	E.	205	5	20	15	21	19	3	9	13	18	24	24	34	15	39	7	11	8	13	18	12	3	13	12	13	50				205	2
	C.	2	1																													
	A.	1																														
Scarlet Fever or Scarlatina -	E.	11	2	1	1	1			1			1	2	2		2		1	4	1				2			1					
	C.	1																														
	A.	1																														
Puerperal Fever and Puerperal Septicemia -	E.	315	10	10	5	35	84	45	41	33	20	17	10	5	39	19	21	55	18	6	32	3	4	9	2	2	60	1	43	1	315	282
	C.	282	16	15	7	13	19	23	27	36	42	45	24	15	1	7	3	6	25	1	2		5	67	66	42	50					
	A.	68	5	4	2	9	10	5	3	4	3	6	5	12																		
Dysentery -	E.	34	3	10	1	3		4	3	3	1	2	2	2	6	4	2	1		3	10	3		1			4					
	C.	4		1				2																								
	A.	1																														
Diphtheria -	E.	2			1				1					1	1							1					1					
	C.	1																														
	A.	1																														
Membranous Croup -	E.	107	18	22	13	13	10	8	3	4	3	2	4	7	26	18	8	8	19	11	2	2	2	3	2	2	4				107	29
	C.	29	4	5	5	5	5	1				1	1	2	2	3	3	2	2				5	3	2							
	A.	29	6	9	5	2	2					1	1	1		3																
Erysipelas -	E.	8									1			1	1							5	1				1					
	C.	4																														
	A.	4																														
Leprosy -	E.	3						1	1		3						1				2											
	C.																															
	A.	3																														
Intermittent or Relapsing Fever -	E.	3																														
	C.																															
	A.	3																														
Ankylostomiasis -	E.	414	59	78	61	60	22	39	10	5	18	5	18	49	58	31	44	52	29	35	39	28	6	10	6	15	28		33		414	1280
	C.	1280	100	171	125	90	106	113	98	79	93	63	95	87	7	16	9	21	37	13	20	4	17	360	314	263	184					
	A.	31	7	7	2	2	1	1	4	3				4		1		5							2	22						
Pneumonia -	E.	2135	141	246	206	190	188	182	192	181	171	131	158	149	237	292	151	251	114	153	191	104	52	128	84	80	191	1	166	10	2135	31
	C.	2363	319	321	185	159	172	191	177	168	192	154	167	167	22	40	27	43	100	18	36	9	33	601	724	393	279					
	A.	184	24	24	10	16	15	10	10	15	9	7	7	39		4	2	1	10					20	28	165	1					
Total of all Diseases -	E.	2135	141	246	206	190	188	182	192	181	171	131	158	149	237	292	151	251	114	153	191	104	52	128	84	80	191	1	166	10	2135	31
	C.	2363	319	321	185	159	172	191	177	168	192	154	167	167	22	40	27	43	100	18	36	9	33	601	724	393	279					
	A.	184	24	24	10	16	15	10	10	15	9	7	7	39		4	2	1	10					20	28	165	1					
TOTALS -		4682	484	591	401	356	375	383	379	362	372	292	332	355	279	246	180	295	224	171	227	113	85	749	836	578	471	2	210	16	4682	

DISTRICT No. 1 includes that portion of Johannesburg (farm Randjohagte), south of the Railway and north of Commissioner Street.

DISTRICT No. 2 includes Braamfontein, Hospital Hill and Hillbrow.

DISTRICT No. 3 includes Marshall's Town and City and Suburban.

DISTRICT No. 4 includes Ferreira's, Ferndale and Mayfair.

DISTRICT No. 5 includes The Brickfields, Vrededorp, the Cemetery and the Locations.

DISTRICT No. 6 includes Jeppe, Jeppe Extension, Belgravia, etc.

DISTRICT No. 7 includes Doornfontein, New Doornfontein, Bertrams, Laventureville, Jodith's Park, Troyeville, Kensington Estate, Brandeburg Valley Township and Morriston.

DISTRICT No. 8 includes Bera, Yeoville, Bellevue, Bellevue East and North-Eastern suburban portion.

DISTRICT No. 9 includes Auckland Park, Richmond, Melville, Newlands, Claremont and North-Western suburban portion.

DISTRICT No. 10 includes Park Hill and Mines from Edinson westward to boundary.

DISTRICT No. 11 includes Central Mines (from Ferreira to City and Suburban).

DISTRICT No. 12 includes Prospect Town, Denver and the Mines from Meyer and Charlton to Eastern boundary.

DISTRICT No. 13 includes Ophirton, Boopse, Turfontein, Rosettenville, etc. (Southern suburban portion).

TABLE G.

Monthly Return of Infectious Disease notified in Johannesburg from 1st July, 1904, to 30th June, 1905.

DISEASE.	Race.	Totals.	NUMBER OF DISTRICT.															Un- known.	Non- Resident.	Hos- pital.	TOTALS.											
			July, 1904	Aug., 1904	Sept., 1904	Oct., 1904	Nov., 1904	Dec., 1904	Jan., 1905	Feb., 1905	Mar., 1905	April, 1905	May, 1905	June, 1905	I.	II.	III.				IV.	V.	VI.	VII.	VIII.	IX.	X.	XI.	XII.	XIII.	E.	C.
Smallpox	E.	8		1		1							3	3	1	1		3	2	1				1				8	4			
	C.	4				1							2	1					2	1									6			
	A.	6											5	1					6													
Chickenspox	E.	121	6	32	23	19	3	2	1	2	5	2	15	11	6	17	6	12	8	10	26	8	7		1	19		121	459			
	C.	459	33	16	19	18	47	14	37	18	15	41	89	112	1	19	10	6	16	4	11	5		187	115	38	47					
	A.	8																														
Amoebic Dysentery	E.	11							8	1	2													11					11			
	C.																															
	A.																															
Typhoid or Enteric Fever	E.	454	13	16	29	33	40	48	56	57	64	42	40	25	55	50	26	47	26	41	24	12	4	7	31	7	15	454	266			
	C.	266	12	5	8	31	18	21	43	29	35	32	25	7	2	10	2	12	40	1	3	2		40	103	40	5		8			
	A.	8							1	2	3		1	1																		
Gastric and Typho-Malarial Fever	E.	1							1								1											1				
	C.																															
	A.																															
Continued Fever	E.	1							1												1							1	1			
	C.	1																														
	A.																															
Malaria	E.	97	15	14	7	5	9	5	6	8	5	11	2	10	12	15	13	9	2	9	4	3	3	1	2	9	2	5	97	138		
	C.	138	15	17	6	10	12	8	32	13	12	9	4	2					1					10	19	65	39	1		34		
	A.	34							3	1	1	14	2	12																		
Scarlet Fever and Scarlatina	E.	103	6	12	24	13	11	9	4	5	11	4	1	3	7	29	3	7	4	14	14	5	3	3	4	1	9		103	2		
	C.	2			1										1																	
	A.																															
Puerperal Fever and Puerperal Septicemia	E.	5			1	1			1		1							2										5	4			
	C.	4	1			1				1		1						1											1			
	A.	1																														
Dysentery	E.	217	7	7	4	7	33	36	23	31	22	31	9	7	17	39	15	23	13	16	21	6	5	7	16	10	8	217	349			
	C.	349	1	4	14	7	42	55	20	36	58	41	27	44	2	22	3	2	23	3	1	1		96	96	25	70	1		11		
	A.	11																														
Diphtheria	E.	22	2	2	2	3	1		1	1	4	4	2		1	8		1					1					22	2			
	C.	2	1						1																							
	A.																															
Membranous Croup	E.	4	2		1			1							1														4			
	C.																															
	A.																															
Erysipelas	E.	100	7	11	14	21	12	6	4	3	3	9	3	7	15	15	10	13	5	15	12	1	2	1	5	1	1		100	36		
	C.	36		1	4	2	2	1		5	4	9	4	4	1	7	1	3	3											6		
	A.	6																														
Leprosy	E.	13			2				1		6	4																		13		
	C.																															
	A.																															
Plague	E.	246	30	35	29	21	14	12	11	9	12	6	21	46	33	17	33	21	14	22	22	4	6	15	11	9	12	7	246	1,235		
	C.	1,235	39	61	94	104	83	44	92	108	157	138	142	173	11	29	11	35	34	4	10	4	4	414	319	187	150	5		8		
	A.	8	2		1	1			1				2	2																		
Pneumonia	E.	1,379	88	130	125	124	124	119	108	117	127	109	96	112	148	191	107	138	74	134	127	41	31	35	71	37	68	17	1,379			
	C.	2,520	102	104	148	174	204	143	234	212	289	275	289	346	20	88	28	59	119	15	27	12	4	769	658	365	321	7				
	A.	74	2		2	1			4	6	8	16	16	19	2				11	1				7		46						
Total all Diseases	E.	1,379	88	130	125	124	124	119	108	117	127	109	96	112	148	191	107	138	74	134	127	41	31	35	71	37	68	17	1,379			
	C.	2,520	102	104	148	174	204	143	234	212	289	275	289	346	20	88	28	59	119	15	27	12	4	769	658	365	321	7				
	A.	74	2		2	1			4	6	8	16	16	19	2				11	1				7		46						
TOTALS		3,973	192	234	275	299	328	262	346	335	424	400	401	477	170	279	135	197	204	150	154	53	35	811	729	448	389	25	189	5	3,973	

DISTRICT No. 1 includes that portion of Johannesburg (farm Randjesburg), south of the Railway and north of Commissioner Street.

DISTRICT No. 2 includes Braamfontein, Hospital Hill and Hillbrow.

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DISTRICT No. 4 includes Ferreira's, Fordsburg and Mayfair.

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DISTRICT No. 6 includes Jeppe, Jeppe Extension, Belgravia, etc.

DISTRICT No. 7 includes Doornfontein, New Doornfontein, Bertrams, Leeuwarden, Jubb's Park, Troyville, Kensington Estate, Bonville, Valley Township and Morriston.

DISTRICT No. 8 includes Berea, Yeoville, Bellevue, Bellevue East and North-Eastern suburban portion.

DISTRICT No. 9 includes Auckland Park, Richmond, Melville, Newlands, Claremont and North-western suburban portion.

DISTRICT No. 10 includes Park Road and Mines from Robinson westwards to boundary.

DISTRICT No. 11 includes Central Mines (from Ferreira to City and Suburban).

DISTRICT No. 12 includes Prospect Town, Denver and the Mines from Meyer and Charlton to Eastern boundary.

DISTRICT No. 13 includes Ophir, Rooyens, Turfloop, Rosettenville, etc. (southern suburban portion).

ANKYLOSTOMIASIS.

M.O.H. 1904-6

This is a disease which specially affects miners, tunnel-piercers, and sometimes brickmakers and others. It is caused (usually) by the swallowing of the ova of a parasite known as the *anchylostomum duodenale*, which 'hatch out' in the upper part of the bowel, forming worms from 6 to 10 millimetres long, which fix themselves in the mucous membrane and withdraw blood by suction, the symptoms resulting from this slow depletion. Pronounced anaemia may develop gradually or very acutely, and end in death. The eggs are abundant in the stools of sufferers.

Ankylos-
tomiasis.
Leprosy.
Notifiable
Disease.

This disease was made notifiable on 5th August, 1904, by Proclamation 43 of 1904. Since that date, 3 cases have been reported, viz., 1 at Ferreira Deep, and 2 at the Robinson. Two deaths occurred, viz., one in January and one in March, 1906.

The provision and systematic supervision of adequate latrines, with careful boiling of all drinking water, and the exclusion from the mine of persons known to be infected, are, shortly, the chief preventive measure. (*In this connection, see Mines Sanitation, p. 58.*)

In Porto Rico most remarkable curative results have followed the use of thymol and beta-naphthol, but unfortunately beta naphthol, which is much cheaper, is somewhat disappointing unless the patient is prepared for 24 hours beforehand by taking a strict milk diet. Thymol is therefore far better in regard to wholesale treatment. Five dosings of 1 drachm each were generally sufficient to practically cure a patient, i.e., "to turn him from a sick man to a well man" and to reduce by nineteen-twentieths his power to infect the soil afresh." With 10 doses, 94 per cent. of sufferers were thus relieved. (*Journal of Hygiene, October, 1906.*)

LEPROSY.

13 coloured cases were notified in 1904-5; 8 white and 4 coloured in 1905-6. All were removed to the Leper Asylum, Pretoria.

Of the 17 Coloured cases, 10 were recent arrivals from Portuguese East Africa, 2 came from Standerton, 2 from the O.R.C., and the remaining 3 were for some years resident in Johannesburg or neighbourhood.

The 4 White cases included 3 females, viz., 1 Boer, 1 Hollander and 1 Cape Colonial; and 1 male, a Cape Colonial Carpenter who thinks he contracted the disease during the war. Nothing definite as to source of infection was, however, ascertained in any instance. (See also Tables G, H.)

NOTIFIABLE INFECTIOUS DISEASES.

These include smallpox, chicken pox, amias, plague, typhus, enteric, gastric or typho-malarial, malaria, scarlet fever, puerperal fever, dysentery, diphtheria, erysipelas, leprosy, pneumonia, cerebro-spinal meningitis, and ankylostomiasis. During the two years under notice, 8,655 cases were notified, viz., 3,514 amongst Whites, 4,883 amongst S.A. Coloured, 258 amongst Asiatics. These occurrences are fully discussed elsewhere in this Report. (*See also Tables G, H.*)

GENERAL PROCEDURE IN REGARD TO NOTIFIED INFECTIOUS DISEASE.

When a notification is received, it is registered, initialled by the Medical Officer of Health and passed to the Infectious Diseases Inspector, who visits the infected house as soon as possible, and enters on a form supplied by the Medical Officer of Health particulars as to the date of onset, probable source of infection, names and addresses of "contacts" and sanitary condition of premises. He also leaves (a) a supply of disinfectant (chlorinated lime) with directions for use (b) a handbill setting forth the precautions to be adopted in such cases, and the provisions of the Municipal By-laws in regard thereto, (c) a post card to be signed by the medical attendant, directed to the Health Department, asking for disinfection of the premises, etc., when the period of isolation has expired and the case has terminated. When the sufferer has been attending a school, office, factory or store, an intimation of the nature of his illness is to be sent to the head of the establishment in question. In cases of enteric fever and dysentery, a special nightsoil pail is left at the sufferer's house. Stringent directions for its prompt provision and special supervision are issued and enforced. Each special pail is provided with a lid, and when being left on service about a pound of chlorinated lime is placed in it. It is replaced each day, but before removal fresh chlorinated lime is added. The contents are then emptied into the night cart, and the pail is again freely sprinkled with the disinfectant, 'nested' with other empty pails, and removed to the Depositing Site, where it is well washed, and immersed in boiling creasote.

DISINFECTION.

Houses in which infectious disease occur are dealt with by the Disinfecting Inspector, whose duty it is to remove all infected textile articles for disinfection by steam. Books, leather and furs are disinfected by formalin vapour in a suitable chamber. Rooms are disinfected by washing with a one per cent. solution of chlorinated lime, or by formaldehyde solution (strength 4ozs. to the gallon). 1,443 houses and 21 mine compounds were disinfected during the 2 years, excluding those dealt with by the Rand Plague Committee. (See page 41.)

M.O.H. 1904-6

Disinfection.

Hospitals.

Ambulances.

SPRAYS FOR DISINFECTING ROOMS.—An adequate supply of Mackenzie's and Robertson's well-known sprays.

EQUIFEX STEAM DISINFECTORS.—These have worked satisfactorily. Messrs. Defries have supplied a new form of their patent air-exhaust gauge, which works excellently and has been fitted to each disinfecter.

It is considered that the Council's Disinfecting Station is second in equipment and efficiency to none anywhere, certainly second to none in the United Kingdom.

86,755 articles of clothing, bedding, etc., were disinfected during the 2 years.

ISOLATION HOSPITAL.

Particulars are appended as to the number, nature, cost and average length of isolation of the cases of infectious disease treated by Dr. Mehliss (1904-6) in the Isolation Ward at Rietfontein, which has been lent by the Government :—

	Oph- thalmia.	Pneu- monia.	Chicken Pox.	Erysi- pelas.	Measles.	Scarlet Fever.	Enteric Fever.	Acute Rh'ism.	Skin Disease.
Admissions ...	1	1	26	68	15	20	2	2	10
Recovered ...	1	—	25	66	15	20	2	2	9
Died ...	—	1	1	2	—	—	—	—	1

Total Cases ... 145

Total Deaths ... 5

Total cost of Isolation Ward, £2,834 13s. 6d.

PAYMENT BY PATIENTS :—

Recovered ... £997 5s. 0d.

Outstanding ... 219 18s. 0d.

Average cost per head per day, 15s. 7-7d.

Average length of isolation per case, 23-1 days.

This ward was equipped in 1902 by the Municipality, and the admission of cases thereto is only sanctioned (a) when satisfactory prepayment is made, or a reliable guarantee is forthcoming for the repayment of all costs incurred by the Council; (b) without such guarantee in the case of domestic servants (in the discretion of the Council's M.O.H.); or (c) when the M.O.H. is personally satisfied that the patient or his friends are quite unable to pay, and that the public health is seriously endangered by allowing the sick person to remain where he is. Personal considerations such as the poverty of the patient, want of proper attention, inconvenience to other persons, are not allowed to enter into the question as to whether a non-paying patient shall be admitted: the decision rests solely and strictly on considerations of danger to the public health; and, in this connection, weight is given to the fact that European experience has shown that isolation of scarlet fever entails an expense which, in the opinion of many, has hitherto been out of proportion to the preventive results obtained. In the case of police, miners and railway employees there is usually no difficulty in obtaining satisfactory guarantees from their Administration or their Sick Fund Societies.

This Isolation Ward is about to be taken over by the Rand Provisional Joint Committee (established June 1st, 1906), which now administers the Rietfontein Lazaretto.

RECEIVING HOSPITAL.

This has been referred to already under the heading of "Smallpox," and consists of several old cottages in an isolated part of Newtown. These have been fenced in, and equipped in such a way that coloured and—if necessary—white patients can be decently accommodated till they can be dispatched to the Lazaretto at Rietfontein. The distance (8½ miles) to Rietfontein often renders it impracticable to send out each patient separately.

AMBULANCE EQUIPMENT.

There is one well-fitted modern two-horse ambulance (by Pickett) for whites, and a second is on order. A suitable covered four-wheel vehicle with stretcher is provided for natives. There are also seven light-running four-wheeled canvas-covered American vans for removing clothing, contacts, sitting-up patients, etc. These vehicles are served by 2 horses and 11 mules.

BACTERIOLOGICAL DIAGNOSIS.

M.O.H. 1904-6

The following are particulars of the specimens examined under this heading for the Town Council, at the Government Laboratory, Hospital Hill, during the two years under review :—

Disease Product.	Positive.	Negative.	Doubtful.
Typhoid	84	9	
Tuberculosis	287	51	
Diphtheria	11	2	
Silicosis	1	—	
Plague	4	2,667	
—	387	2,729	—

Bacterial
diagnosis.
Nursing
Homes.
Slaughter-
poles.
Bakehouses.

These figures do not include rats and disease products examined for suspected plague. —(v. p. 40.)

CURATIVE SERA.

The Public Health Committee on September 15th, 1902, sanctioned an arrangement by which the supply of therapeutic sera is obtained from Messrs. Burroughs, Welcome & Co., of London, and issued at cost price to medical practitioners, or gratuitously in necessitous cases. The amount of each serum obtained and distributed between 1st July, 1904, and 30th June, 1906, is as follows :—

Antitoxin.	Phials Obtained.	Phials Distributed.
Anti-diphtheritic	87	308
Anti-streptococcal	925	830
Anti-staphylococcal	—	41
Anti-dysenteric	225	37
Anti-pneumonia, No. 1	6	4
do. No. 2	6	—

NURSING HOMES.

There are 18 registered nursing homes in Johannesburg. These places are inspected and licensed by the Public Health Department, and the Council can withdraw the licence if nuisance arise.

In January, 1904, the Transvaal Medical Society recommended "that the space requirements for Nursing Homes should be as follows :—(a) for all infectious and all serious operation cases not less than 1,200 c. feet of free air-space, and 100 sq. feet floor space; (b) for all other cases not less than 800 c. feet of free air space and 75 sq. feet of floor space."

SLAUGHTER POLES AND PUBLIC ABATTOIR.

There are within the Municipal area 16 slaughter houses (or slaughter poles as they are locally called), and, with the exception of one at Jumpers and one at Prospect Township, these are situated in Brixton Township, west of the Municipal Compound at Vrededorp, scattered over a considerable area. A special inspector is charged with the duty of looking after these places and inspecting the meat killed therein.

During the year he examined 39,532 carcasses of beef, 161,179 sheep, 11,488 pigs, and 557 calves. Eighteen carcasses, 6 sides and 11 forequarters of beef, 37 carcasses of mutton, 217 pigs, 1 goat, 4 buck, 4 cases, 12 barrels and 500 lbs. of fish, 300 lbs. bacon, 34 sheep's livers, 8 ox livers, and 96 boxes of peaches were condemned.

The provision of a public abattoir is very desirable, and a sum of £40,000 has been set aside recently by the Council for the purpose. Plans have been prepared on the lines of those adopted for the Admiralty Slaughter House, Chatham; the only difficulty is one of site, and it is expected that this will shortly be overcome.

In addition to the usual reasons elsewhere for providing public abattoirs, the necessity here is very pressing, as the Director of Agriculture will not permit cattle from other colonies or from proclaimed districts to be brought in, except upon the express condition that they are off-loaded from the railway trucks run by means of a siding into the lairages of an abattoir, so that they do not cross any ground liable to be traversed by other animals, and only come out as dead meat.

BAKEHOUSES.

There are at present within the Municipal area some 109 licensed bakehouses, which are periodically inspected, and, on the whole, fairly well kept, some being very good indeed.

M.O.H. 1904-6

DAIRIES AND MILKSHOPS.

Dairies.

380 Dairies and 37 milkshops are licensed and kept under supervision.

Aerated
Waters.Food
Inspection.

The Dairy Farmers' Association are most ready to co-operate in every way with the Public Health Department, which is indebted to them for various useful suggestions. The Association asked during 1905-6 that delivery of milk by 'tapping' it out from cans into smaller measures outside consumers' doors should be prohibited, but the M.O.H. was unable to advise that this be done.

The cleanliness of dairies and of methods leaves much to be desired, though considerable improvement has been effected. The most serious difficulty at outlying dairies is that of getting a sufficient and reliable supply of clean water, and it is not easy to see how it is to be overcome.

770 samples of milk were taken for analysis. Prosecutions for adulteration followed in 250 instances; fines aggregated £266.

AERATED WATER AND ICE FACTORIES.

A code of Bye-laws for the regulation of these trades was gazetted on 6th April, 1906. All these places are now registered and frequently inspected. All bottles used for containing aerated waters are required to be first soaked for 10 minutes in 0.5 per cent. solution of sulphuric acid.

LEAD-POISONING FROM SODA-WATER.

In March, 1906, Dr. J. P. Cullen notified a case of lead-poisoning suspiciously associated with the consumption of soda-water from a modern and well-conducted local factory. Some of the suspected water was found to yield a marked reaction for lead. A thorough examination of the plant, processes and materials used was made by your medical officers with Dr. J. McCrae, Acting Government Analyst, and subsequently Dr. George Turner (Medical Officer of Health, Transvaal). Dr. McCrae also chemically examined 24 samples of materials, bottles and bottle-rings, but only in some of the bottle-glass and rings was any even slight trace of lead found. The source of the lead in the soda-water could not be satisfactorily traced.

MICROBES IN AERATED WATERS.

The idea is widely prevalent that after water has been charged for some time with carbonic acid gas under pressure, it becomes practically free from microbes. There is, however, some doubt about this. Slater (*Journal of Bacteriology*, 1893) says that "aeration increases the safety of water," and that it "affords a practically absolute safeguard against cholera," though it affords less complete security against enteric fever. Pfuhr (*Zeitschrift für Hygiene*, 1902) found living typhoid germs in seltzer water "after at least 27 days exposure." Hankin found that samples of Indian soda water, examined more than a week after bottling, were sterile, and believes that "any risk of infection from bad soda water can be avoided if it is kept a week or more before use." Hankin, however, points out that in India, owing to the high temperature, soda water has to be bottled at a much higher pressure than in England (180 lbs. as against 30 or 40 lbs. per sq. inch), and believes that the gas at a relatively low pressure, acts less powerfully as a germicide.

The Medical Officer of Health is reliably informed that the average pressure used in Johannesburg is about 120 lbs. to the square inch, with an additional 10 lbs. in hot weather, because cold water absorbs the gas more freely than does water at a higher temperature. It therefore seems probable that the aeration of local 'mineral' waters (so called), exercises an appreciable germicidal action.

INSPECTION OF FOODSTUFFS.

The following goods were condemned by the Food and Drugs Inspector:—

	Cases.	Tins.	lbs.	Bags.	Barrels & Baskets.	Whole.
Condensed Milk	108	804				
Fish	2,277	130	48,944		67	
Vegetables				1		
Fruit	13		6,200			
Groceries	31	75				
Cheese	3					36
Meat	776½	289	885			
Hams and Bacon	1					171
Eggs	37					
Poultry	9					533
Margarine	80					
Pigs						51

A special inspector examines frozen foodstuffs arriving at the Kazerne. He passed ^{M.O.H. 1904-6} 76,945,759 lbs. meat, 5,347,468 lbs. fish, 517,852 lbs. poultry, 29,457 lbs. game. He condemned 9,876 lbs. meat, 470 sheep, 38 pigs, 5 buck, 1,925 lbs. and 8 cases poultry, 140 soles, 1 doz. crayfish, 15 sides bacon, 311 cases and 2,100 tins canned meat, 18 cases and 5,600 lbs. eggs, 151 cases and 178 tins milk, 3 doz. cheeses, 67 cases groceries, 231 cases and 2,490 lbs. fruit, 171 bags and 4,080 lbs. vegetables, 550 lbs. peas, 56,796 lbs. fish, 1,010 lbs. game, 50 doz. oysters, 40 cases macaroni, and 25 live pigs. ^{Food Inspection}

Macaroni.—The 40 cases mentioned in the foregoing list were condemned because they were musty, ill-smelling, and covered with fungi (*penicillium glaucum* and *aspergillus glaucus*).

Cheese.—In April, 1905, three cases of frozen Dutch cheese had to be dealt with. Even when only partially thawed, it was abnormally soft, breaking down under the hand, of excessively offensive smell, and pervaded within and without with distinctly recognisable mould vegetations. The condemnation of cheese is a difficult matter, but the foregoing characteristics are considered by Professors Lehmann and Crookes sufficient justification, and this lot was destroyed. In doubtful cases, the detection of tyrotoxicon would decide the matter.

Margarine.—It has been found that the spirit of a bye-law which provides that margarine shall be sold by retail in a wrapper bearing only the word "Margarine" in half-inch block capital letters, was being cleverly evaded by a Cold Storage Company, who enclosed the margarine in an inner wrapper on which are printed the words "Butter, Flower Brand," and an outer wrapper bearing only the word "Margarine" in half-inch letters. This margarine was sold to retailers, some of whom remove the outer wrapper, and sell the mixture in the inner wrapper as butter. A bye-law has been drafted to prevent this practice.

Meat and Fish.—A considerable quantity of frozen meat and fish was condemned on arrival by train, largely owing to imperfect refrigerating arrangements. J. Herzfelder, the then manager of the Standard Cold Storage, gave much trouble by persistently disposing of unsound food for human consumption. In his managerial capacity this man was prosecuted five times, and convicted thrice for such offences between February 1905 and April 1906, the two acquittals being on legal technicalities. On the last occasion, Herzfelder obtained an adjournment for two months to bring a witness from Damaraland. In the meantime he went to England, and failed to appear on the date to which the prosecution was adjourned. On his return he was arrested, convicted and fined £75, with an additional £10 for contempt of court, and the Court ordered that no license as a butcher be issued to him for two years.

Measly Pork.—This is a very common condition in South Africa, and gave rise to several prosecutions. An auctioneer was prosecuted in July, 1906, and fined for giving false information to the slaughterhouse inspector in order to obtain the release of three condemned measly pigs. All live pigs exposed for sale on the market are examined for this disease.

Measly Mutton and Beef.—Several cases of hydatids (*echinococcus*) occurring in what are known locally as 'water-bladders' on ox and sheep livers, came under notice. Curious as it may seem, the local butchers (including your 3 experienced meat inspectors), were unaware of the significance of these 'water-bladders,' which are as large as a pigeon's egg, and a circular has accordingly been issued to all meat vendors.

Consignment of Unsound Animals to Johannesburg for Human Food.—On 22nd September, 1905, five out of a consignment of 37 live pigs consigned from Richmond, Transvaal, to local dealers were found to be riddled with measles, all the tongues, and, in two cases, the eyes, showing cysts that were plainly visible during life. These pigs had been passed as "free from disease" two days before by a Government Inspector at Volksrust, and though it was explained subsequently that his certificate should have read "free from proclaimed disease," it was thought to be a most undesirable occurrence, and the attention of the Director of Agriculture was directed thereto.

On 29th July, 1905, 12 carcasses of fresh pork were consigned by 'H. J. Klibbe' from Queenstown to a Johannesburg firm, and, on arrival, two of these were found to be literally riddled with measles. To one of the condemned carcasses was attached a document signed by a person styling himself 'Veterinary Surgeon,' certifying that he had "examined the carcasses of 12 pigs, the property of Mr. H. J. Klibbe, of Imvani, Cape Colony. They are perfectly sound, free from measles and fit for human food." The Medical Officer of Health at once communicated with Dr. A. J. Gregory, Medical Officer of Health, Cape Colony, who promptly inquired into the matter, and found that the author of the certificate was not a qualified Veterinary Surgeon. Unfortunately, there was no way of bringing him to book, and the same inability existed in regard to Klibbe as his offence was committed outside the Transvaal. On the day, however, that these carcasses arrived in Johannesburg, this same Klibbe exposed on the King William's Town market sausages made from measly pork, and as a result was prosecuted and fined £5.

The Government Health Officers for Transvaal and Natal were also notified of this occurrence, and the writer suggested that some inter-colonial arrangement should be come to by the Governments concerned on the lines of Clause 19 of the Manchester Corporation Bill, 1906, which provides that the vendor or consignor of any unsound meat which is liable to be seized, shall be brought to trial in the City, and be liable to a penalty of £50.

M.O.H. 1904-5

Food
Inspection.

This recommendation will shortly be considered at a Conference of Government Health Officers for South African Colonies at Capetown.

Characteristics and Labelling of Frozen Meat.—In November, 1905, the Chamber of Trade asked the Town Council to frame a By-law requiring that all frozen meat be labelled as such, on lines similar to the labelling of Margarine. The Medical Officer of Health, however, advised that such a By-law would be very difficult to enforce, because one could not, in some cases, positively swear that frozen meat which had thawed and perhaps been kept, was originally frozen meat. Moreover, no such system of labelling was known to exist elsewhere, and if it could be proved that frozen meat had been sold as fresh meat, the vender could be punished under the existing Food By-laws for having supplied an article not of the nature or not of the substance or not of the quality demanded.

As the Chamber of Trade pressed the matter, inquiries were addressed to London and Manchester, and as the replies are of interest they are briefly noted below :

Dr. Collingridge, Medical Officer of Health, City of London, wrote : "There are no By laws in the City with regard to the labelling of frozen meat, and up to the present I see no reason for advising that such should be adopted, although from time to time there has been an agitation in favour of such a move."

Professor H. R. Kenwood, M.B., University College, London, said : "You are quite correct in your opinion that there is no By-law which requires butchers to label frozen meat as such. I am of opinion that your views with reference to the difficulty of distinguishing frozen meat (which has thawed out) from fresh meat are amply warranted, and I question whether in every case it is possible to make a distinction."

Professor Kenwood adds : "I think the microscopic test is of distinct value. It consists in expressing a drop of the meat-juice on to a glass-slide and mounting. In the serum of frozen meat the corpuscles will be observed to have lost their pigment and to be floating in a high-coloured serum : you will find very few typical corpuscles (as to shape). The juice of fresh meat, however, shows a majority of corpuscles of normal shape and colour floating in an almost colourless serum."

Mr. Alfred Holburn, M.R.C.V.S., City Abattoirs, Manchester, wrote that he knew of no such law or by-law as that proposed ; that in most cases a distinction could be recognised, at any rate up to the point of decomposition. Amongst these he emphasized differences not easily defined in the colour and consistency of the fat and flesh, the abundant escape of meat-juices from the thawing cut surface, and the fact, alluded to by Professor Kenwood, that the serum is more blood-stained owing to dissolution of hæmoglobin.

No action has been taken as regards the proposed by-law.

Conveyance of Meat by cart and train.—The Council's by-laws provide a penalty for the conveyance of food in an unwholesome, uncleanly or offensive manner. Owing to complaints as to dirty carts being used and Kaffirs sitting on uncovered meat, a special warning was issued to all meat vendors. The Cold Storage Companies and the Railway Administration have also been written to several times about the conveyance of uncovered meat through the Municipal area in uncovered trucks.

Butchers' Shops and Carts.—Owing to the amount of wind-borne dust in Johannesburg, it is very advisable that meat should be kept in a cool, well-ventilated chamber away from the public street and not be hung in open shops, and that butchers' carts should be built with covered chambers like bread vans. A circular to this effect has been issued to meat vendors, but having regard to existing financial depression, the Council has not been asked to enforce these recommendations.

CANNED FOODS.

Enormous quantities of Army canned food remained over at the close of the war in June, 1902, and an immense amount is imported from England, America and Germany. Much of the Army surplus was sold cheap by auction, apparently without guarantee as to quality, and fell into the hands of persons who disposed of it at a low price to coloured people. Accordingly, in 1905 the M.O.H. prepared for the staff a careful summary of present knowledge in regard to tinned or canned foods, illustrated by numerous specimens the various conditions described, and directed that special attention be paid to such foods by the inspectors. A vast quantity of tinned fish, meat, and meat extracts, and a lesser amount of vegetables and fruits, have since been condemned.

Some of the "seizures" presented features of great difficulty in forming a defensible opinion as to their condition, and this was particularly the case in regard to tinned milks. The amount of 'tinned milk' sold in Johannesburg is very great ; and often the tins are very much 'blown.' On the other hand, the inside of the tin is bright and uncorroded ; the milk may or may not be slightly darker in colour than usual, but is quite normal to smell and taste. In one instance tyrotoxin was found by Major Buist, R.A.M.C., but in a number of others careful chemical and bacterial examination at the Army and Government Laboratories has failed to furnish any evidence whatever of decomposition ; in fact, in more than one case, the milk was sterile. It is, therefore, perfectly clear that mere 'blowing' is not sufficient grounds for the

condemnation of condensed milk; there must also be obvious decomposition-change, or chemical or bacterial evidence of unsoundness. This opinion is recorded here because the Department has been blamed for not seizing all 'blown' canned milk. M.O.H. 1904-6
Food
Inspection.

The sale by the Army people of 15,000 tins of Oxo to a Johannesburg dealer also gave rise to difficulty. Practically all of the tins were 'blown' and corroded, and some were leaking; but in about 75 per cent. there was little, if any, obvious change in the contents, owing presumably to the amount of salt used in preparation. Five per cent. (750) of the tins were picked out, and the contents of 30 of these were examined at the Government Laboratory. Tin equal to 0.33 per cent. of contents (or about 1.9 grains of oxide of tin to the oz.) was found in all, and a variable amount of copper in 16 of these. Another 100 tins were emptied, the contents thoroughly mixed, and a fair sample taken therefrom was found to contain 0.22 per cent. of tin. Although there is some question as to the noxiousness of copper and tin in small quantities, it was felt that the public should get the benefit of any possible doubt, and that, under all the circumstances of the case, it would not be right to pass this consignment, which was accordingly condemned, with the knowledge and approval of the military medical authorities. Spirits.

On 12th May, 1906, the M.O.H. observed some 200 'blown' and dilapidated tins on the stall of a dealer in the Market Place. The contents were found to be putrid and horrible beyond exaggeration, and caused illness amongst those who examined them. This man was fined £40.

During this seizure, information was given that at one of the leading grocery stores and its branches, large quantities of unsound canned food were stocked. The M.O.H., Assistant M.O.H., and Food Inspectors at once visited the premises in question. Some 90 unsound tins—chiefly sardines and Armour's sliced ham—were found behind the counters at the main store, and a considerable number at each of the branches, the disquieting feature being that a head of the firm honestly contended that such blown goods were not bad. Prosecutions and a fine of £25 followed, the Council's Medical Officers receiving the able support of Major J. M. Buist, R.A.M.C., Army Bacteriologist, and of Dr. J. McCrae, Acting Government Analyst.

It is satisfactory to record that very thorough and almost simultaneous inspection of the canned stocks of the various other large provision dealers revealed nothing to which reasonable exception could be taken. A number of seizures were, however, made on the premises of smaller fry, with prosecution and penalties in all cases. One of these related to the sale of absolutely rotten canned fish, known as "Chinese delicacies," and labelled in Chinese characters. For the defence it was alleged that the Chinese preferred it so, but at this point the M.O.H. caused two tins to be opened in Court, with the result that Magistrate, lawyers and witnesses were so forcibly impressed that the case quickly ended in conviction, and the Court emptied.

Dating of Canned Foods.—With much unpleasant experience of such goods, the M.O.H. is impressed by the great necessity of having the date of packing clearly and reliably stamped on the containing vessel of all tinned foods. Some of the filthy stuff which has had to be dealt with in Johannesburg recently was probably 6 to 7 years old.

In August 1906, four Meat Inspection Stamps of the U.S. Department of Agriculture, were removed from tins of very bad canned beef, and sent to the Secretary (Mr. James Wilson) of the Department at Washington. Mr. Wilson has kindly replied that the stamps in question were affixed on January 10th, 1903, to a shipment from Chicago to New York.

Disposal of Condemned Canned Foods.—Some difficulty was experienced in connection with this matter. One 'lot' comprised 14,000 large tins; if these were thrown into the destructors, the working of the latter would probably be interfered with. If the tins were buried, coloured people would certainly dig them up. In the end, a pick-axe was driven through each individual tin, and they were then buried in the nightsoil trenches at the depositing site.

ADULTERATION OF SPIRITS.

Much inferior fiery spirit is doubtless sold to coloured and other persons on the Rand. It is, however, an extremely difficult traffic to check. As ignorant and untrue suggestions have been made that the Council is willingly ignoring this state of things, the reasons of these difficulties may as well be recorded, and the fact recalled that the findings of the Royal Commission of 1891 appointed to inquire into the question of the blending of grain and malt spirits, and of the application of the Sale of Food and Drugs Act to spirits, were entirely negative on these points, and attempted no definition of whisky or other spirit. This attitude was apparently due to (1) the difficulty of defining whisky, (2) the fact that there was consequently no method of applying the Sale of Food and Drugs Act to spirits, except as regards percentage of alcoholic strength, and (3) the non-production of any spirit actually containing well known poisonous by-products.

In consequence, however, of the fact that the medicinal properties of genuine brandy are not shared by the imitations or 'foreign' spirits with which the market was flooded owing to the ravages of the phylloxera in France between 1876 and 1897, the proprietors of *The Lancet* instituted in 1901 an inquiry into the production and composition of genuine brandy. Their Commissioner, in a report published on 29th November, 1902, points out that whereas genuine cognac brandy is a grape product, the cheap imitations were mostly fabricated from grain or beet spirit, flavoured with a dash of the genuine article. He found, however,

M.O.H. 1904-6 that genuine brandy is clearly distinguishable by the quantity and relation to each other of the "impuretés" or volatile "secondary products" of distillation which it contains, and from which it derives its characteristic bouquet or flavour. In 100,000 parts of alcohol in brandy the "secondary products" vary from 380 to 251 parts, and include the following :—

			Parts per 100,000 of Alcohol.
Acids (acetic acid) ...	...	...	85.38 to 64.37
Aldehydes ...	...	...	14.35 to 9.93
Furfural ...	...	...	2.63 to 1.60
Ethers (ethyl acetate) ...	...	...	135.36 to 84.69
Higher alcohols ...	...	...	164.08 to 80.28

The ethers and higher alcohols are nearly always present in equal proportions. Furfural is probably the most objectionable constituent of brandy, but is gradually eliminated by increasing age. On the other hand the remaining 'secondary products' increase with age.

Grain-spirit, Beet-spirit and Gin, contain hardly any secondary products.

Rum is characterised by a high degree of acidity, a notable amount of furfural, and a high proportion of 'ethers' to 'higher alcohols.'

Whisky contains 'secondary products' similar in nature, but differing in proportion to those in brandy, *e.g.*, in whisky, the amount of 'furfural' is excessive, the 'higher alcohols' are in relatively large amount, and the 'ethers' are low. Whisky was originally manufactured solely from barley-malt in pot-stills. Nowadays at least two-thirds of the spirit vended as whisky is a cheap 'silent' or 'patent' spirit, produced from maize, or molasses, or potatoes in a 'patent' still, and usually flavoured with a small percentage of malt whisky. In 100,000 parts of alcohol in barley-malt potstill whisky there are at least 380 parts of 'secondary products,' while in 100,000 parts of alcohol in patent-still spirit there are only 89 to 204 parts, with an average of 240.

On the strength of this distinction, two prosecutions were instituted in November, 1905, by the Islington Borough Council, before Mr. Fordham, at the N. London Police Court, for having sold as 'Old Irish' and 'Old Scotch' whisky respectively, patent-still spirits respectively 6 and 12 months old, to which had been added less than 10 per cent. of real Irish and Scotch whisky. After exhaustive hearings, each defendant was, on February 27th, 1906, convicted and fined £1 and £100 costs, the magistrates holding that this misrepresentation had become very usual, and that it was time that a fraud on the unsuspecting public for the benefit of distillers, dealers, and retailers were stopped.

An appeal was made to Quarter Sessions, but the magistrates were equally divided, and no decision was given. The costs have amounted to thousands of pounds on each side.

Till Mr. Fordham's judgment has been confirmed by a higher Court, it would be merely throwing away money to institute similar proceedings in Johannesburg, especially as a recent attempt to do so at Capetown was dismissed by the Resident Magistrate. A further prosecution has, however, been undertaken at Islington, and is still proceeding.

Forty samples of whisky, one of gin and one of brandy were taken in Johannesburg during 1904-6, and tested as to alcoholic strength. Three only of these were found to be under the legal standard, to extents varying from 2.9 to 2.1 degrees.

ANALYSIS OF FOODS, 1904-6.

In addition to 858 water examinations (see p. 55), some 934 articles of food were examined during 1904-6 at the Government Laboratory. Details are appended :—

Number and Description.			Genuine or Pure.	Adulterated or Impure.	Doubtful.	M.O.H. 1904-6. Food Analysis.
770	milk	... ..	520	250	—	
58	butter	... ..	43	14	1	
40	whisky	(for alcoholic strength)	37	3	—	
1	gin		1	—	—	
1	brandy		1	—	—	
12	beer (for arsenic and lead)	...	11	Minute trace arsenic in 1		—
13	liqueur chocolates (for alcohol)		Contained 0.06-1.6 oz. per lb. chocolate.			
13	aerated waters (for lead)	...	7	Traces in 6	—	
13	coffee (for chicory)	...	11	2	—	
2	bread (for sand)	...	1	1	—	
2	flour (for sand)	...	1	1	—	
1	ice (if pure water)	...	1	—	—	
1	pork (for cysticercus)	...	1	—	—	
1	vinegar (whether malt?)	...	—	—	1	
1	wheat (for weevils)	...	—	1	—	
1	mollasine meal...	...	1	—	—	
1	tea	... ..	1	—	—	

The following articles (not foods) were also analysed:—Sewage 1, fly powder (arsenicated) 1, mortar 1, perfume 1.

For some time previous to March, 1906, the Council's analytical work was not, in the opinion of the M.O.H., dealt with in a satisfactory manner at the Government Laboratory. There was upon occasion considerable delay, possibly due to shortness of staff, but certain occurrences in regard to analysis of milk, and the return as "genuine butter" in April, 1905, of a mixture containing at least 85 per cent. of margarine, raised very serious question as to reliability of results; and this doubt was not lessened by comparison of the analytical verdicts on a large number of butters examined previous to 31st March, 1905, with those submitted after that date.

In March, 1906, the direction of the Laboratory was undertaken by Dr. J. McCrae, Ph.D., whilst Dr. P. G. Stock, Assistant Medical Officer of Health, Johannesburg, has generally superintended the bacteriological work. No cause for complaint has arisen.

Further legal powers desirable.—The question of Food Inspection is obviously a most important one in Johannesburg, and in order that it may be more effectually carried out, powers should be obtained:

- (a) To suspend the licence for a period not exceeding two years of any premises, such as a butchery, cold storage, or dairy, when the occupier had been twice within the previous 12 months convicted of selling unsound food, or having the same in his possession for sale.
- (b) To inflict imprisonment with hard labour without the option of a fine on persons convicted of such offences, as is the case under the English, London, and Scotch Public Health Acts.
- (c) To order that a notice of the facts of the conviction be affixed, in such form and manner and for such period not exceeding 21 days, as the Court may decide, to the trade premises occupied by the convicted person, and at his cost, as under Section 47 (4) of the Public Health (London) Act 1891.

WATER SUPPLY.

Water.

On 1st April, 1905, the Rand Water Board took over the management of the different undertakings which they had acquired from the Johannesburg Waterworks Co., the Braamfontein Estate Co., and the Vierfontein Syndicate.

The Braamfontein Pumping Station supplies Parktown, and derives about 94,000 gallons per day from two wells sunk in weathered slates through a tract of alluvium, the latter being traversed by a bed of a spruit (the water in which is often much polluted), which courses from Parktown gates westward between Milner Park and the Ripple-marked Quartzite Kopjess. No. 1 well is 75 feet deep, with two tunnels at the lower end, respectively 23 and 30 feet long. No. 2 well is some 200 yards south of No. 1, and is apparently a superficial spring, which flows into the bottom of a rectangular basin some 16 feet square by 15 feet deep, with cemented sides. It is enclosed in a corrugated iron shed. For raising the water from the wells to the main pumps, a chain pump and three Worthington pumps are fitted. To pump the water from the engine house to the reservoirs, two Riedler pumps, driven by compound engines, are provided; each of these is capable of delivering about 8,000 gallons per hour. There were two 5 inch rising mains (one of which has been taken up) from the engine house to the two reservoirs; the latter were handed over to the Town Council, the Board retaining only the pumping station and rising mains.

The work taken over from the Johannesburg Waterworks Co. included:—

- (1) Six deep wells in the dolomite at Zuurbekom, some 18 miles west of Johannesburg.
- (2) Two boreholes in hard shale (96 feet deep), with two 'galleries,' N. and W., respectively 120 and 50 feet long, in New Doornfontein, near Natal Spruit.
- (3) Two boreholes in the lower Witwatersrand beds, near the old reservoirs in New Doornfontein.

The machinery at the two latter sources was in poor repair, and in April, 1905, the Company's supplies were practically all derived from Zuurbekom. This water is pumped in the first instance to Paarlshoop, and from Paarlshoop to the high and low level reservoirs at Yeoville and Berea.

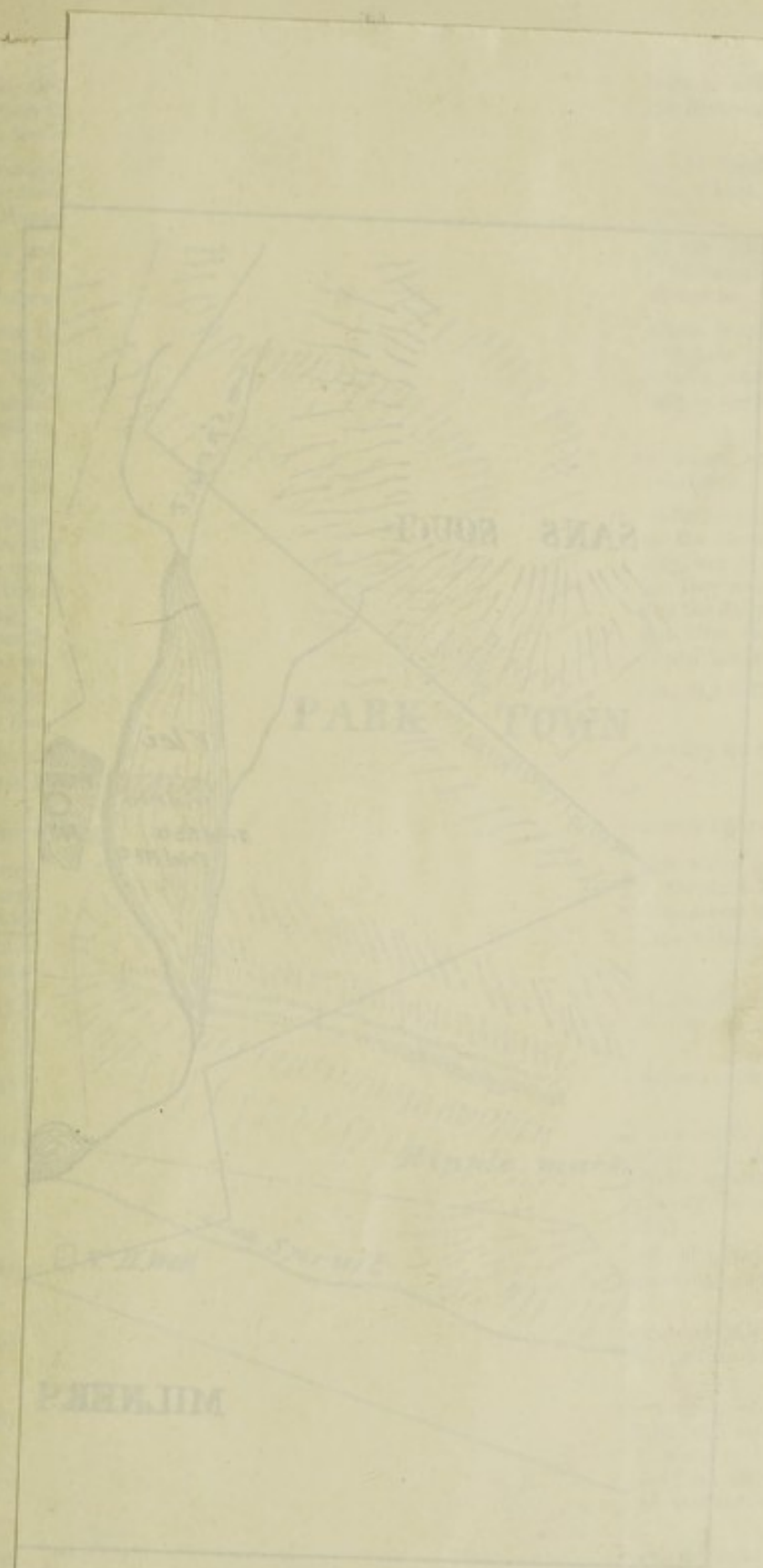
The reservoirs and distribution system were handed over to the Town Council, the Board retaining control of the pumping stations at Zuurbekom and Paarlshoop, and the rising main from Zuurbekom to Yeoville.

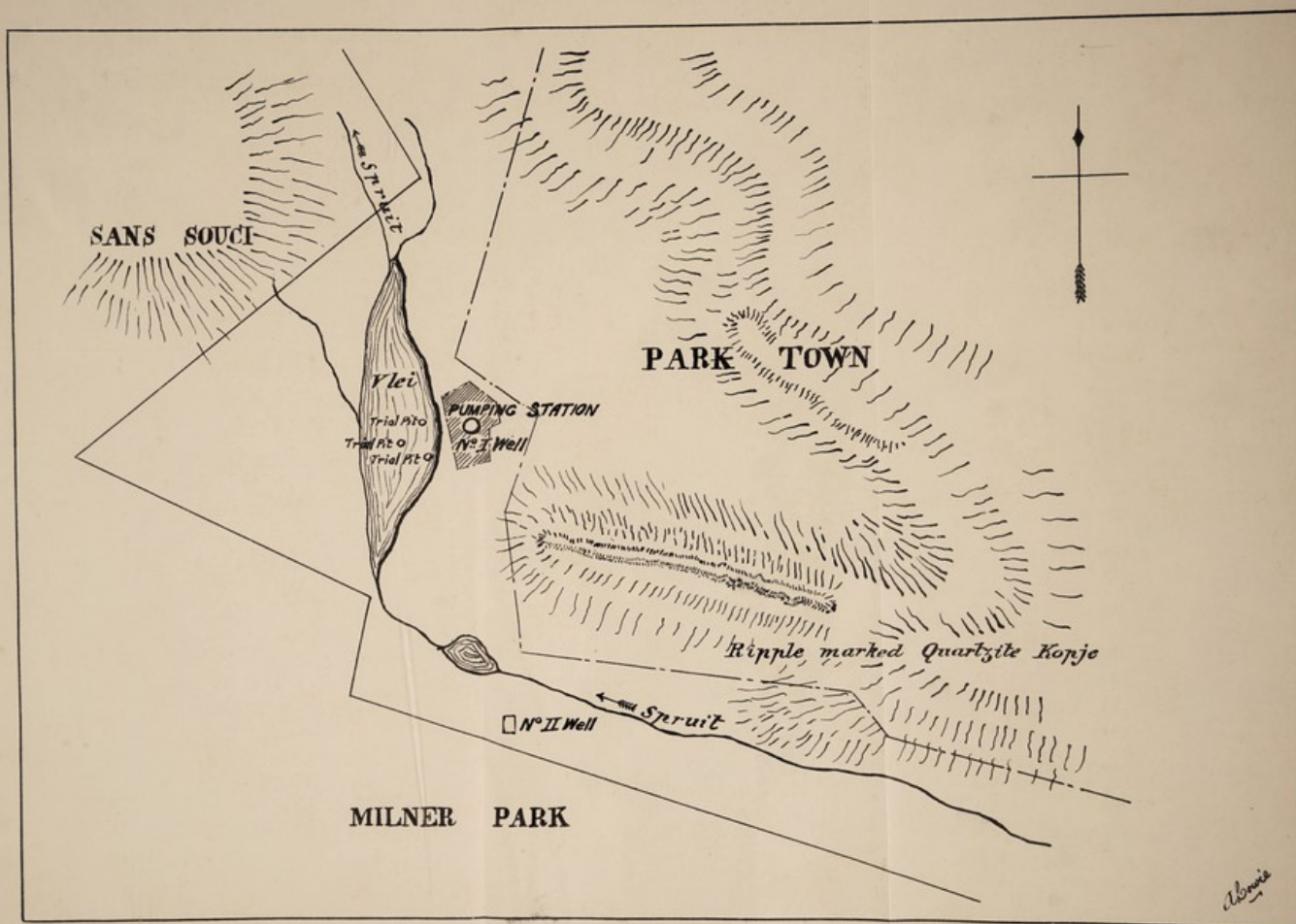
At Zuurbekom the main pumping station had been established about 600 yards from the point at which the bulk of the water supply was obtained; this considerably increased the cost of attendance. The Waterworks Company had sunk six shafts, but of these, two were practically useless; another in the main pumping station yielded only about 280,000 gallons daily; the remaining three were situated in the same locality within a circle 190 feet in diameter, but over one of them only, pumping plant was installed. Of the three wells, that which is now pumped from did not yield a considerable supply until the water found in one of the other wells, about 129 feet distant, was tapped by means of a borehole; this was done by the Water Company immediately before the Board took possession. The third well had never yielded more than about 480,000 gallons daily. Two well pumps were installed by the Waterworks Company, each with a normal delivery of one million gallons daily, against about 100 feet head. These pumps drew the water from the wells and delivered it at the balancing tanks at the main station, about 600 yards distant. Here there are three pumping engines, each with a normal delivery of one million gallons daily. These engines send the water up to Paarlshoop through a rivetted steel rising main, 16 inches in diameter. At the well pumps the buildings are of wood and iron, both flimsy and inflammable, but at the main pumping station they are of masonry and of a substantial kind. Lancashire boilers are installed both at the main pumping engine house and at the well engines; six at the former, and two at the latter place. There is 100 per cent. stand-by for both boilers and engines at the well pumps, and at the main pumping station 50 per cent. stand-by for pumping plant, and 100 per cent. for boilers. At the time of taking over the plant it was found to be, generally speaking, in good order, but no spare parts were provided for the well pumps, the main pumping engines had not been opened out or overhauled for about two years, and three of the boiler flues were found to have their crowns slightly bulged, a defect which has since been remedied.

The pumping plant at the intermediate station at Paarlshoop consists of five Babcock and Wilcox boilers, and four sets of triple expansion Worthington pumps, each with a normal delivery of about one million gallons daily. There is also here a balancing tank, capable of holding 775,000 gallons, but which is leaky in the upper part, so that its capacity, for practical purposes, does not exceed 300,000 gallons. There was also a Venturi meter, but so fixed as to be almost useless for its intended purpose.

The rising main between Zuurbekom and Yeoville is 18 inches in diameter, of steel plates $\frac{1}{2}$ inch and $\frac{3}{16}$ ths inch thick, with Kimberly collar joints.

All the foregoing works are still in use. The machinery at the well and boreholes at New Doornfontein has been overhauled, and these sources have been utilised to a considerable extent during the past year. Besides this, the Riedler Pumping Engine installed by the Vierfontein Syndicate at Olifantsvlei was overhauled, and another Riedler pumping engine, which was taken over from the Syndicate, was also installed there. These two engines can pump to Johannesburg a total quantity of 600,000 gallons daily, but the shaft at Olifantsvlei has not been found capable of yielding more than half of this for any considerable period. The main from Olifantsvlei, when put down, was only intended to deliver the water to Booysens Dam; to pump it into the town mains involves exposing it to a much higher pressure than that for which it was intended. The main has, consequently, given a good deal of trouble.





Two 12-inch boreholes have been put down, one in a shaft at Natal Spruit to a depth of 210 feet from the surface, and the other on a site belonging to the Board near Bertrams Road. The latter has been sunk to a depth of 170 feet from the surface.

Arrangements have been made for removing the existing plant at the old boreholes in New Doornfontein, and putting down borehole pumps driven by electric motors, taking current from the Municipal electric lines. These pumps will deliver to the Berea Reservoir.

The main sources of the Board consist of shafts and boreholes sunk into the dolomite in the valley of the Klip River. Of these sources, the shafts at Zuurbekom and Olifantsvlei, sunk by the Waterworks Company and Vierfontein Syndicate, have already been referred to.

From the farm Misgund, about 9 miles east of Zuurbekom, to the southern boundary of the farm Zwaartkopjes, which is the property of the Board, a distance of about 13 miles measured along the valley, the Board either own the land in freehold, or have obtained a control over sufficient water rights to enable them to draw as much of the underground supply as the Government permit them to take from this district.

At Rooikop, in the valley of the Natal Spruit, they also own certain claims which are situated on the dolomite formation, and from which, no doubt, water could be obtained.

It is perhaps unnecessary to say anything as to the capacity of these different properties, which were all obtained before the war by the Vierfontein Syndicate, since the Government limits the quantity of water to be drawn from them to ten million gallons daily, but it may be said that there is every reason to believe that this quantity is well within what they are capable of yielding. It is considered probable that, after leaving two million gallons as the daily contribution from Zuurbekom, the Board will be able to obtain the other eight million from their properties and water rights between Misgund and Zwaartkopjes without drawing upon Rooikop.

The foregoing description has been kindly supplied by Mr. D. C. Leitch, M.I.C.E., Chief Engineer, Rand Water Board.

The daily supplies to Johannesburg averaged two million gallons per day for the year ending 31st March, 1906.

SUSPECTED POLLUTION OF THE SUPPLY FROM THE BRAAMFONTEIN PUMPING STATION.

During the early months of 1906, the bacterial findings in regard to this water gave rise to some anxiety. Careful investigation followed, and Dr. P. G. Stock, the Assistant M.O.H., demonstrated by means of fluorescin, the possibility of surface-pollution gaining access to these wells from a neighbouring vlei. The facts of the case are shortly set out in the following summary from a report by the M.O.H., dated 24th April, 1906:—

- (1) That prior to December, 1905, the *Bacillus coli* had, on occasion, been found in the water from the wells at the Braamfontein Pumping Station, but that its presence was considered to be more or less accidental.
- (2) That since February, 1906, this organism has been persistently present in these well waters, notably in that from No. 1 Well.
- (3) That No. 1 Well has no proper lining, that the shale in which it is sunk presents 'weeping' and obvious fissures, and that, by means of fluorescin, the Assistant Medical Officer of Health has clearly demonstrated its contamination by water from a vlei which, during the rains, is flooded by storm-water, including the overflow from a spruit which is at times highly polluted. (*See sketch plan.*)
- (4) That the yield of No. 2 Well probably consists, to a large extent, of surface water, and that it is even conceivable that in times of flood, storm-water may gain direct access to the well.
- (5) That since the 7th April, pumping from No. 1 Well has ceased, and will not be resumed till a borehole of sufficient depth has been sunk into the undisturbed rock, and the existing well filled in with sand.
- (6) That the water of No. 2 Well is still being used; that its safety is questionable, and that so soon as a sufficient supply to Parktown is otherwise available, this well should be dealt with either in the manner proposed in regard to No. 1 Well, or by some system of filtration. In the meantime, cattle should be excluded from the vicinity of the well, and precautions adopted against the possibility of entrance of flood water.
- (7) That the *B. Coli* was also found in the water, side-scrappings and sediment in the Water Towers, and in water from consumers' taps; and that the Water Towers have been cleaned out, scraped and lime-washed.
- (8) That the recognition of the *B. Coli* in the public water supplies of Johannesburg has repeatedly served as a danger signal of pollution, the existence of which has been subsequently demonstrated, and that therefore the presence of this organism cannot be disregarded even when—as in Parktown—there has been no recognised water-borne disease for a long period.

M.O.H. 1904-6

Water.

Use of
Fluorescin.

M.O.H. 1904-6

CHEMICAL AND BACTERIAL EXAMINATION.

Water.

Sewerage, &c.

Samples are taken from the various sources of the Board's supply and at various points on the system of distribution, in accordance with a carefully arranged schedule, which is revised from time to time. Financial provision has been made for 200 chemical and 400 bacterial examinations yearly. The Water Board receives a copy of all results direct from the Government Analyst, and defrays half the cost involved in collection and examination.

858 samples of water were taken during 1904-6 for examination, viz., 606 chemical and 252 bacterial during the two years.

SEWERAGE.

The following facts as to the progress of the Sewerage Scheme to June 30th, 1906, have been very kindly furnished by the Town Engineer:—

Owing to the diversity in the contour levels of Johannesburg, and the ridges that occur in various portions of the inner sections of the Municipal Area, the town has to be treated in sections for drainage purposes. These sections are designated by their positions, and are as follows:—

S.W. District.

The disposal of the stormwater and sewage of this district, which is the most thickly populated in the Municipal Area, has received the greatest attention.

The outfall of this system is on the Council's Farm at Klipspruit, and the leading work has been let in four contracts.

The first section, in tunnel, from the Main Reef Road to Earp Street, Ophirton, is nearly completed.

The second section from Earp Street to the Spruit at the Concordia Washing Site is well in hand, and presents no difficulties.

The third section consists of a heading over 19,000 feet long, from Concordia Spruit to the spruit at Diepkloof with 14 shafts, three of these latter are over 200 feet deep, and six of the remainder are over 100 feet deep. It is anticipated that this section will be completed in August, 1907, provided no unforeseen quantity of water is encountered.

The fourth section is from the end of the Diepkloof Tunnel to the Eastern boundary of Klipspruit Farm, and has just been let. The work on this section is light.

At Klipspruit the sewage will be liquefied in septic tanks, and will then be treated on the land. The layout of the sewage farm, which includes the construction of detritus pits, septic tanks, and distribution carriers, is being carried out, and its completion should synchronise with the completion of the main sewer.

The greater portion of the reticulation of the S.W. district, that is to say, the urban portions comprising Ferreirastown, a portion of Marshalls Town, Johannesburg, Braamfontein, portions of Mayfair and Fordsburg and Newtown, as to both stormwater drains and sewers will, with the letting of a contract for the drainage of Braamfontein, now in course of preparation, be well in hand, and the sewers in the whole of the abovenamed localities can be brought into use as soon as the outfall sewer is completed.

South Eastern District.

At present the work done in this district comprises the main outfall stormwater channels and main sewer down Natal Spruit as far as Durban Road, and the portions of the stormwater drainage and sewerage in New Doornfontein and between the Railway and Market Street.

So soon as the question of sewage disposal for this district is settled, further work will be actively prosecuted.

Special provision, consisting of six large sized gulleys with kerb inlets, has been made for stormwater in Commissioner Street at Natal Spruit, which will do away with the flooding of the street at this point, hitherto occurring with every thunderstorm.

Eastern District.

In this district, works of stormwater drainage and of sewerage have been undertaken in such sections as will give the speediest relief from the damage caused by rain storms, the order of progress as regards sewers being a secondary consideration until the question of sewage disposal be settled for the Eastern and South Eastern districts.

SEWAGE DISPOSAL.

In April, 1905, Mr. D. C. Greig, who was then a member of the Council, and who had just returned after inspecting the Sewage Purification Works at Manchester and Birmingham, urged the Council to substitute artificial bacterial purification of Johannesburg sewage for land treatment by surface irrigation. Both the Town Engineer and the M.O.H. pointed out that the conditions were entirely different here—plenty of suitable land is available, water is badly required for irrigation purposes, evaporation (more than 60 inches per annum) is enormously greater than in

England, and the pecuniary aspect of the two schemes was altogether in favour of land treatment. The Council, however, in order to be on the safe side in such an important matter, appointed a Commission, consisting of the Town Engineers of Durban and Capetown, with Mr. Prentice, A.M.I.C.E., of Johannesburg, to inquire into the matter. The cost of the inquiry was about £1,000, and the Commission's report endorsed in every respect the recommendations of the Town Engineer and the M.O.H.

M.O.H. 1904-6

Disposal of
Refuse.

PRIVATE SEWAGE PURIFICATION INSTALLATIONS.

Fifty-two of these have been constructed in connection with mines and large private residences, the usual system being a sedimentation tank with primary and secondary contact beds, though in some cases there are percolating filters with sprinklers, and in two instances Stoddart's distributor is used. Occasional complaints of smell nuisance have been received, and also that these installations give rise to mosquitos. The largest installation, which is said to deal with some 60,000 gallons of sewage per day from several large blocks of offices, clubs, etc., is erected on the Robinson Mynpacht. There are 3 furnace-slag beds of the percolating type, with automatic revolving sprinklers. Very fair effluents have been produced, and the Medical Officer of Health has received no complaint of nuisance.

PLANS OF HOUSE DRAINAGE.

The routine observed as regards the passing of drainage plans, and of certain building plans, is, that after examination by the Town Engineer, they shall be passed to the Medical Officer of Health for objection or signature. Any grounds of dissent by the Medical Officer of Health are notified to the Town Engineer, who communicates them to, and discusses them with the depositor. In some cases—but only at the suggestion of the Town Engineer or his representative—the depositor discusses with the Medical Officer of Health the point in dispute. After the plans have been passed by the Medical Officer of Health, neither he nor any of his staff has any further concern therewith, though upon occasion the Medical Officer of Health has, by request of the Town Engineer, supported prosecutions by him for failure to comply with the Building By-laws.

143 plans were carefully examined by Mr. Cuthbert Crothall of the Medical Officer of Health's Department between August 25th, 1905 and 30th June, 1906, and signed by the Medical Officer of Health, to whom all points of difficulty were referred.

DISPOSAL OF REFUSE.

This matter is fully dealt with in the report of the Manager of the Scavenging Department. The M.O.H. has a general responsibility as to the measures adopted and results obtained, and, as a matter of principle, calls for explanation in all cases of neglect reported to him. By the terms of his acceptance of office, he is not responsible for details relating to staff, plant, and animals, nor, with the present very competent Manager (Mr. F. C. Gavin) at the wheel, is there any occasion for him to be so. The M.O.H. must, however, point out that far too much of his time and that of the Assistant M.O.H. is occupied in dealing with complaints as to individual shortcomings of the Scavenging Services. The M.O.H. appears to be held personally responsible by many ratepayers for such matters, as well as for defective conditions of roads giving rise to lodgments of rain water. During the summer of 1905-6, the number of complaints *re* scavenging addressed personally to the M.O.H. by letter and telephone, both to the office and to his private house, was very great, and was specially mentioned to the Health Committee, and rightly explained as largely attributable to shortage of plant and animals. The work of dealing with each of these complaints naturally interfered with other important duties. While certain cases called for intervention by the M.O.H., the majority were purely matters for the Manager of the Scavenging Department, and the complainants were so informed. The M.O.H. would, in this connection, recommend that the residence of the Manager of the Scavenging Department be provided with a telephone, for it is not the M.O.H.'s duty to deal in detail and at all hours with individual failings of the Scavenging Service. This provision would also place the M.S.D. in closer touch with the work and conduce to increased efficiency.

The M.S.D. confers from time to time with the M.O.H. on alterations and extensions of service, and on matters relating to staff, but as the M.S.D. is exceptionally fitted for his difficult duties, the M.O.H. does not interfere with him in their discharge.

It should be added here that the M.S.D. has a staff of overseers for each of his cleansing services. These men are neither qualified nor paid as sanitary inspectors, but both the sanitary inspector and overseers of each district are expressly enjoined to co-operate, and, as a rule, do so cordially. The sanitary inspector notifies the overseer of any neglect on the part of his 'boys,' and the overseer in turn reports to the inspector insufficiency and defects of receptacles, etc., which the inspector then has to get rectified. The M.O.H. entirely approves of this system.

STREET-SWEEPING.

This is done in the night time, except during the wet season, when it is postponed to the early morning, so as to get the mud off the streets just before the day's traffic commences. Some 13,600 mule loads are removed by 57 Scotch carts each month. The expenditure under this head for 1905-6 was £16,717 5s. 6d.

M.O.H. 1904-6

Disposal of
Refuse.

HOUSE-REFUSE AND CARCASS-REMOVAL.

Close upon 700 Scotch cart loads per day are collected, and most of it is burned at the destructors. There has been a considerable extension of this service in the suburban districts. The calorific value of this refuse is very low.

Carcass removal:—1,125 horses, mules, etc., 162 pigs, 69 sheep, and 1,694 dogs were removed and buried at the Depositing Sites.

The cost of removal of house refuse and carcasses was £55,674 in 1905-6.

DESTRUCTORS.

In January and April, 1904, two four-celled top-fed Meldrum destructors were completed, viz., one at Burghersdorp and one at Natal Spruit, and each, as guaranteed, efficiently destroys 60 tons of refuse per day without effluvia or dust nuisance.

Between November, 1904, and May, 1905, the Burghersdorp installation was duplicated, and in the new portion, charging holes were made circular, instead of oval, as experience had proved the circular form to be much stronger and more durable.

The Town Engineer informs the writer that the "principal structural defect of these installations is that there is no by-pass flue provided for the furnace gases, and these cannot be diverted from the boilers. In the event of a boiler becoming suddenly emptied by the failure of a tube, it would be impossible to prevent the boiler from being injured by the heated bricks."

At both of these destructors the dust-carts drive on to a platform, and shoot their contents on to that side of it on which are the furnaces. Apart from the fact that these platforms are too small, this arrangement (for which Messrs. Meldrum are not responsible) is not a good one, as the cartway quickly becomes obstructed by rubbish. The cart-track should be raised well above the refuse reception areas, and should also be a 'throughway,' in order to obviate the necessity for carts having to turn round and return, thus delaying entering carts. Stoppages have occurred from time to time for repairs, cleaning flues, etc.

Since May, 1906, the Burghersdorp destructor has been used for generating power for the new electric tram service, and for this purpose it has been found necessary to burn a considerable quantity of coal.

A weighbridge for recording the weight of rubbish in each cart before passing on to the platform has been installed since 1st July, 1906, at each destructor.

A destructor for the service of the northern and north-eastern districts is badly required, and a site for the purpose has just been secured. Eventually one will be necessary in both the southern and the north-western suburbs.

Largely for local reasons, the cost of burning refuse in Johannesburg is a heavy one.

REMOVAL OF NIGHTSOIL AND DISINFECTION OF PAILS.

In June, 1906, the average number of pails removed per night was 18,308. Every pail before being again sent out is washed, tested for leakage, dipped in boiling creasote heated in steam jacketed-pans, and after the surplus creasote has dripped off in such a way that it is collected and available for use again, is 'nested' with other pails and placed in the carts for distribution. The apparatus for this purpose has been devised by Mr. F. C. Gavin, M.R.C.V.S., manager of the Scavenging Department, is most effective and economical in its working, and is shown in the accompanying illustration.

The Medical Officer of Health has personal knowledge of every system of pail-cleansing in use in England, and has seen nothing to approach this for efficiency. The boiling creasote acts not merely as a thermal and chemical disinfectant, but forms a coating on the buckets which covers and imprisons infected material remaining there after washing, and is also apparently obnoxious to flies, which is a most important point. The inclusive cost of washing and creasoting is 3s. 8½d. per 100 buckets.

The night soil is buried in shallow trenches at three depositing sites, situated respectively at the north-west, south-west, and south-east outskirts of the Municipality. Complaint has arisen in regard to the north-west depositing-site, and its use is being minimized. Urgent need exists for a northern site, but the objections not unnaturally raised by any one who has land in the vicinity of any suggested site are well-nigh insuperable.

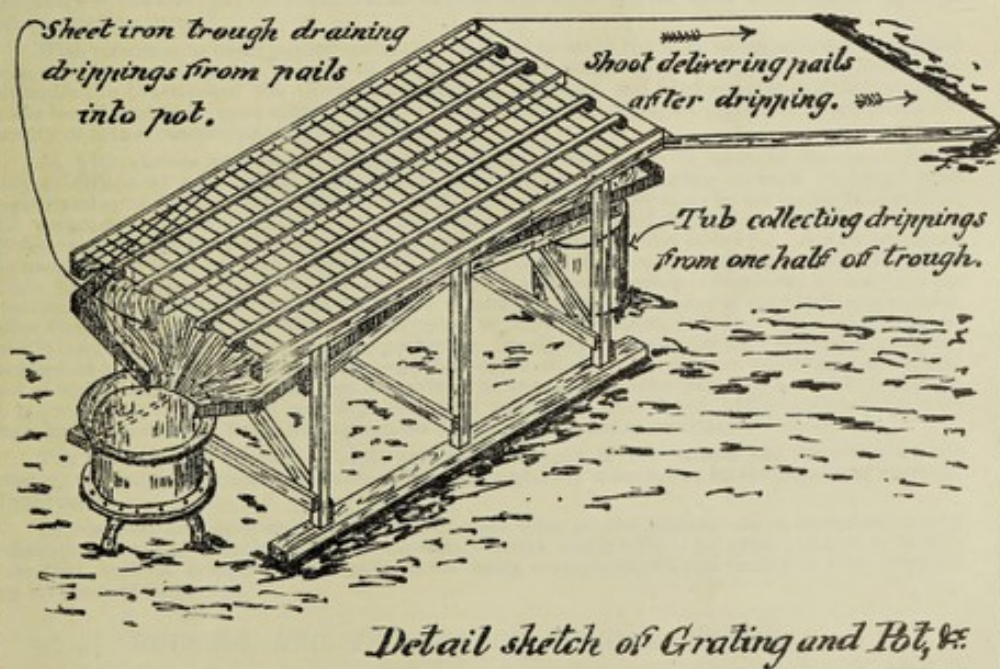
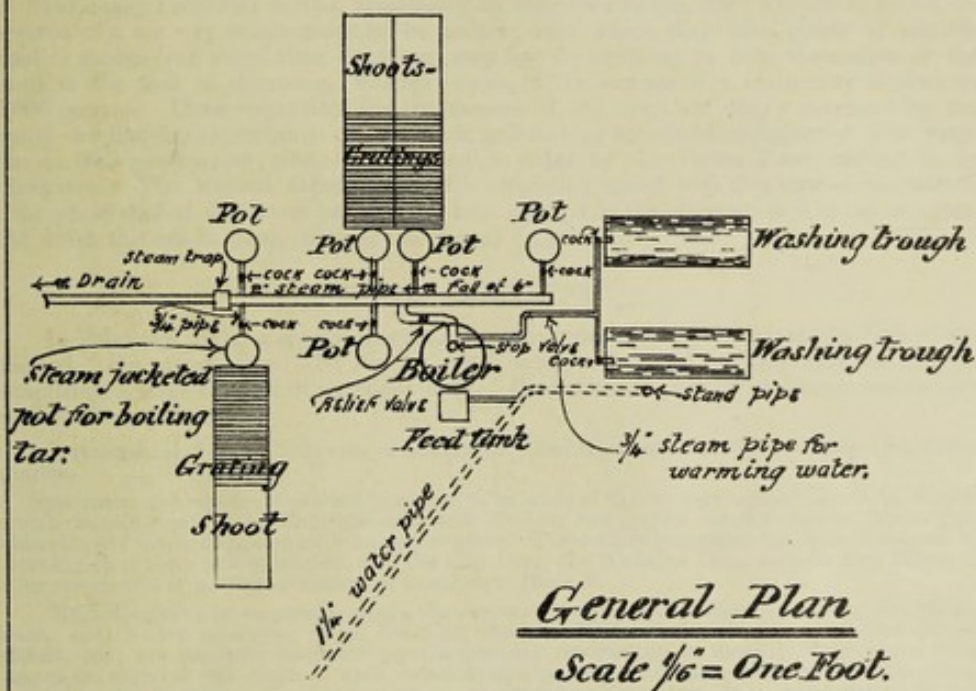
It is hoped that at an early date it may be possible to utilise the outfall sewer to Klipspruit for the reception of contents of pail-closets. Here again the difficulty of a site for an inlet has to be met, and the cost of water necessary for dilution will also be very heavy.

The cost of this service in 1905-6 was £97,818.

REMOVAL OF WASTE WATER.

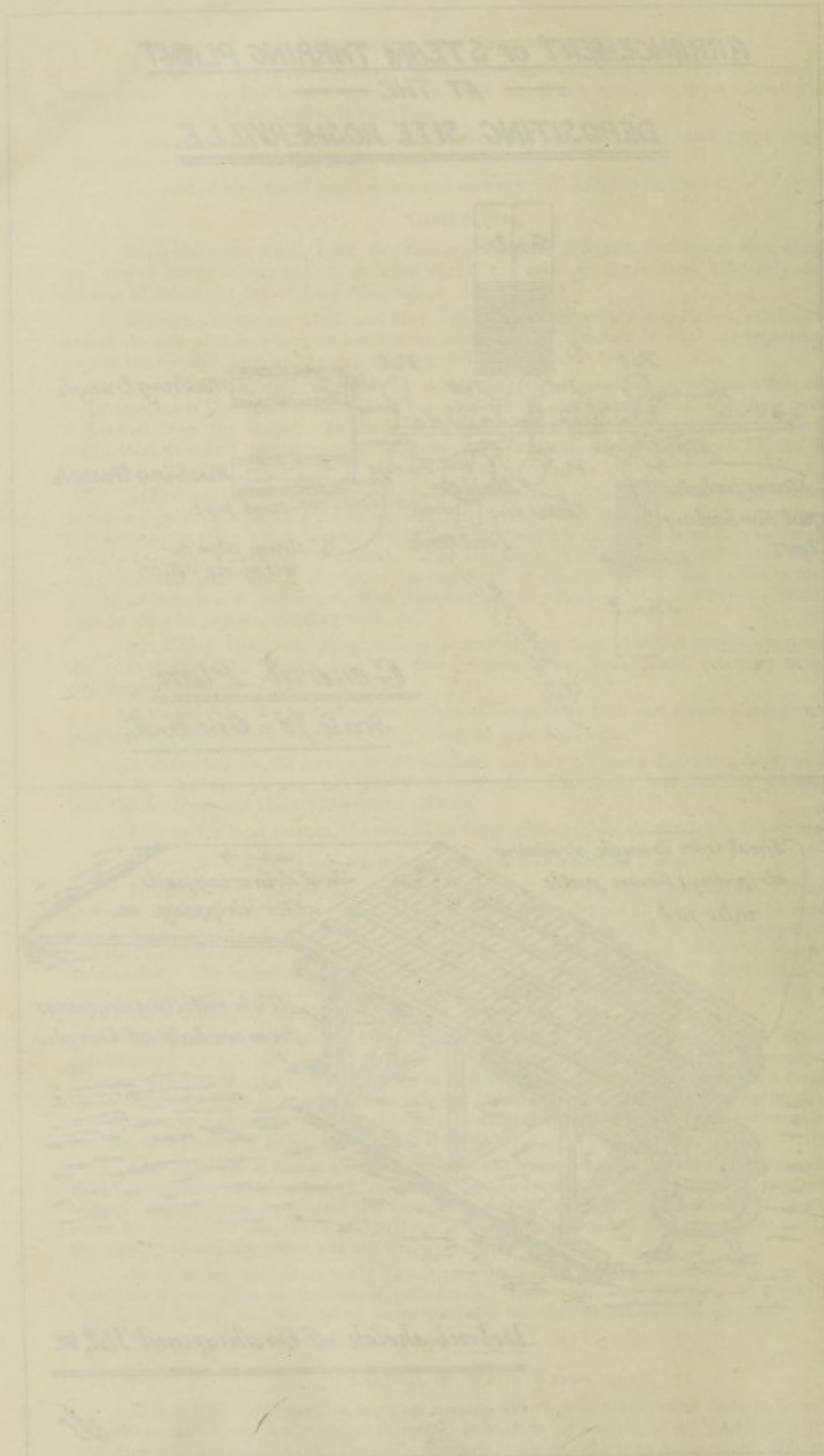
Owing to the absence of a sewerage system, the slops and bathwater have to be collected in tanks at each house, and removed therefrom in buckets by natives, or by gravitation through hosepipes where possible, to the Council's slopearts, each of which contains about 400 gallons, and is drawn by four mules and attended by three natives. In the month of June, 1906, 160

ARRANGEMENT OF STEAM TARRING PLANT
AT THE
DEPOSITING SITE ROSHERVILLE.



Albani

ARRANGEMENT OF STEEL TRUSS BRIDGE AT THE DEPOSITING SITE ROSEVILLE



tanks were employed during the day removing 16,788 loads, or 6,715,000 gallons, and 66 tanks working at night took 7,549 loads or 3,019,600 gallons. M.O.H. 1904-6

The cost to the town of this service is enormous—between £80,000 and £90,000 per annum, or about 15s. per 1,000 gallons removed—while from its very nature and the fact that it has to be carried on by Kaffirs, under the supervision of a limited number of white overseers, it is a never-ceasing source of complaint and worry. Undoubtedly, there is, and inevitably must be from the very nature of the system, frequent oversight and unavoidable neglect; but on the other hand, many householders who, presumably by their own choice, have elected to live in an unsewered city, are very unreasonable in the matter; even where they have plenty of suitable grassed or garden land round their dwellings, very few do anything to help themselves or the Council in the task of disposing, without sewers, of the sewage of a community of close on 200,000 persons. Those responsible for the finances of the town are deeply impressed by the necessity for limiting expenditure on this work, and making householders dispose of their waste waters on their gardens, etc., wherever it is possible, either by the Vivian Poore method, or by sub-irrigation. The Medical Officer of Health altogether agrees with this view of the matter, and the whole staff of inspectors has recently been engaged in the preparation of a list of premises at which this can be done, in order that it may be enforced.

Disposal of
Refuse.
Mines
Sanitation.

MINES SANITATION.

In February, 1904, a special inspector for mines sanitation (Mr. Alexander Cowie) was appointed. His report, dated 31st August, 1906, is appended, and he has quietly and steadily accomplished a large amount of excellent work. He has received every assistance and facility from the mine managers:—

As instructed, I have the honour to submit the following report dealing generally with Mines Sanitation.

Systematic and regular inspection continues to be made of the sanitary arrangements in connection with the mines within the Municipal area, and, since my last general report to you on this subject, considerable and marked improvement has taken place. The work of inspection has been increased by the opening up of three new properties, viz., the City Deep, the Wolluter Deep, and the Turf Mines, as also the resumption of mining operations at Langlaagte Block B.

Regarding the surface arrangements, the numerous details of sanitation concerning the White, Chinese, and Native quarters, Mine Boarding Houses, Kaffir Eating Houses, Butchers' Shops, Hospitals, &c., are carefully inspected periodically and reported on in detail. The various Mine Managers are supplied with copies of such detailed reports, and, when necessary, served with official notices calling for the abatement of any nuisance discovered on inspection. It is gratifying to be able to state that these reports and notices are almost invariably found on re-inspection to have been complied with in accordance with the Public Health By-Laws. The almost general provision of comfortable housing accommodation for all employees, of all necessary sanitary conveniences, of new and modernly equipped hospitals, and of systematic and approved scavenging arrangements, testifies unmistakably to the fact that the requirements of good sanitation are far from being looked upon as secondary considerations.

With reference to underground sanitation, in order to make the work of inspection uniform and cause as little inconvenience as possible to the work of the mines, you arranged that I should put myself under the directions of the Government Mining Engineer, and I beg to state that this arrangement has been found to be most satisfactory to all concerned, mine managers especially appreciating the uniformity of action concerning sanitary matters.

As with surface sanitation, systematic and regular inspection is made of the underground sanitary conditions at each mine. Strict attention is paid towards securing on each working level a sufficient number of sanitary conveniences, so arranged and maintained as to be conveniently accessible for all workmen, kept in a cleanly state, and sufficiently ventilated, lighted and disinfected. The maintenance of careful general scavenging throughout the workings is also called for. A detailed report on the underground sanitary conditions of each mine is furnished, after due inspection, to the Inspector of Mines for the Johannesburg district, and a copy of each such report is forwarded by him for your information. Copies of these reports, in which sanitary defects, if any, are particularly emphasised, are also furnished through the Mines Department to Mine Managers, and here again re-inspections reveal a steady improvement at the various properties. Sanitary conveniences have been, and are being, constructed on sound sanitary lines; well organised staffs of native or Chinese scavengers under the control of white men, backed up by strict supervision on the part of mine overseers and shift bosses, do much to render the underground workings free from nuisance. In addition, native police doing duty underground are instructed to report any natives or Chinamen found committing nuisances.

The removal and disposal of night soil when brought to the surface and the cleansing and disinfecting of sanitary buckets are matters which are regularly attended to by the Municipal Scavenging Department.

By constant and systematic inspection of each mine in the manner above described, a very considerable measure of attention is paid to sanitary matters, and it affords me great pleasure to be able to state that, without exception, managers extend every encouragement and facility to your inspector during his visits of inspection.

HOUSING AND FEEDING OF CHINESE MINERS.

In reply to official inquiry by his Worship the Mayor (J. W. Quinn, Esq.) the Medical Officer of Health submitted the following report on 30th January, 1906:—

- (1) That I have at various times and without notice to the Managers, officially visited each one of the Chinese Compound within the Municipal Area, viz., at the following mines:—Jupiter, Jumpers Deep, New Heriot, South Nourse, Nourse Deep, Henry Nourse, Village Deep and Langlaagte Consolidated.

M.O.H. 1904-5

Mines
Sanitation.
Schools,

- (2) That the conditions under which the Chinese are living in these Compounds are as follow :—

- (a) They are housed in substantial buildings constructed as regards lighting, heating, ventilation, flooring and air space in strict accordance with the recommendations of the Transvaal Medical Society; the rooms are clean, comfortable, and in some cases, notably at the Jumpers Deep, quite gay in appearance. The atmosphere of the rooms, even with the full complement of boys present, is, in my experience, invariably free from the 'muggy' smell so generally noticeable in lodging-houses and barrack-rooms in England. An ample sufficiency of baths (with hot and cold water laid on), and of latrine accommodation is provided. In addition, there is at the Jumpers Deep, South Nourse, Nourse Deep and Village Deep a very fine dining-room, with a corresponding greater cleanliness in the living rooms. At every compound there is a large kitchen fitted with steam-heated cooking pots.
- (b) The Chinese receive an ample, not to say generous, diet of good food which I have repeatedly tasted, and which is prepared by Chinese cooks. I append the daily 'contract' diet, to which each coolie is entitled, but the diet actually given is still more liberal, as is seen from the Village Deep scale :—

"Contract" Diet.	Village Deep Scale.
2½ lbs. rice	Rice <i>ad lib.</i>
6oz. of fresh meat or of fish	8oz. fresh meat
3oz. vegetables	12oz. vegetables
½ oz. tea	Tea <i>ad lib.</i>
2oz. nut oil	8oz. white bread instead
Salt	Salt <i>ad lib.</i>

- (c) The coolies receive competent medical attendance in well-equipped special hospitals. At the Jumpers Deep there is a resident qualified Chinese doctor, in addition to the English visiting staff.
- (3) Having had over ten years' intimate official experience of the housing of the labouring classes in England, I beg to state, in conclusion, that, in my judgment, the conditions under which the Chinese live in the compounds within the Municipality of Johannesburg are, without any manner of doubt, very much superior as regards housing, food and payment, to those which the unskilled labourer can command in either the manufacturing or rural districts of England, and also to those which are often considered good enough for our own soldiers.

Appended are some details of the Recommendations of the 1905 Commission by which the Housing of the Chinese was considered: *Air-space*.—200 c. ft. for each labourer occupying the premises when full complement present—not more than 12 ft. average height from floor to count where only one tier of bunks, and not more than 14 ft. when 2 tiers. *Ventilation*.— $\frac{1}{4}$ sq. ft. inlet and $\frac{1}{4}$ sq. ft. outlet per occupant (in addition to doors and windows) by hutch-like lantern louvres in roof, louvres over door, and four openings (each 1 ft. sq.) in opposite walls, 2 to 4 inches from the ground. *Heating* by stove with canopy, which also facilitates ventilation. *Windows* in opposite walls, glazed and opening, equal to 1/10th floor space. *Floors*.—Impervious.

GOVERNMENT SCHOOLS.

In the middle of December, 1905, the M.O.H. personally inspected and reported on all the Government Schools (19 in number) within the Municipality, in consequence of statements as to their overcrowded and insanitary condition. In two instances—City and Suburban and Spes Bona—serious overcrowding did exist, and, with a few notable exceptions, the latrine etc., accommodation left much to be desired.

These matters were brought to the notice of the Director of Education (J. E. Adamson, Esq.), and steps were at once taken to place matters on a better footing. The overcrowding was quickly checked by refusing fresh applicants for admission, and in several instances fine, well-constructed, well-planned modern school buildings have since replaced the temporary premises to which objection had been raised.

The M.O.H. has been frequently consulted by the Director of Education as to matters of school-ventilation, space allowance, latrine accommodation etc., and has received from him and his Johannesburg representatives every facility and assistance in connection with health matters relating to schools.

LICENSED PLACES.

M.O.H. 1904-6

From 1st July, 1904, to 30th June, 1906, 4,758 applications for licences of various kinds have been dealt with, the premises in question being in all cases carefully examined as to sanitary requirements.

	Granted.	Refused.	Total.
1. Tea Shops, Eating Houses, Restaurants, etc.	1,751	61	1,812
2. Dairies	786	20	806
3. Butchers' Shops...	807	11	818
4. Bakers	215	4	219
5. Kaffir Eating Houses	190	171	361
6. Slaughter Houses	30	1	31
7. Laundries	244	6	250
8. Ice Creameries	377	15	392
9. Noxious or Offensive Trades ...	64	5	69
Totals	4,464	294	4,758

Licensed
Places.
Ventilation of
Theatres.

HOTELS, BARS, ETC.

In consequence of a communication from the Licensing Board, a careful personal inspection was made by the Council's Medical Officers of the sanitary circumstances of every hotel and bar in the Municipal area, upwards of 75 in number. In many instances the conditions were disgusting, and evidenced a regrettable laxity of supervision which was suitably dealt with. A number of prosecutions followed, and vigorous steps were taken to remedy the state of things complained of. A marked improvement was rapidly and readily effected, and has since been maintained.

THEATRES AND PLACES OF PUBLIC ENTERTAINMENT.

During each of the two years, some 48 such places, including 5 theatres, were inspected as regards ventilation and sanitary accommodation previous to licensing.

Ventilation of Theatres.

In December, 1904, the M.O.H. made a careful examination of "The Standard" and "His Majesty's" Theatres in regard to ventilation, and on the 16th December, samples of air were kindly taken by Mr. A. Heymann (M.A., Mast. Chem. and Phil.), the well known analyst, from each theatre at 10.30 p.m. during a performance. The results of the inspection and analysis were as follow:—

The *Standard Theatre* accommodates 610 persons; the 'inlet' area provided was 109 sq. ft. against 152 sq. ft. required; the 'outlet' area was 152 sq. ft., and was regarded as sufficient; the carbon dioxide in the air of the stalls was 14.1 per 10,000 vols. and 13.8 in the gallery, the permissible limit being taken as 12.5. The sub-stage and certain dressing rooms were very ill-ventilated.

"*His Majesty's*" is a fine new theatre, seated for 952. Much complaint had, however been made about the ventilation, and it was found that the existing inlet-area was only 22 sq. ft. against 258 sq. ft. required. On the other hand, the outlet-area was, if anything, excessive, being 265 sq. ft. against 238 sq. ft. required. The carbon dioxide in the air of the stalls at 10.30 p.m. was 15.6, in the circle 14.4, and in the gallery 15.6 per 10,000 vols.

The Medical Officer of Health accordingly opposed the renewal of these licenses, except on condition that undertaking were given to improve the ventilation. The Committee granted the licences conditionally. Shortly afterwards the *Standard Theatre* was thoroughly reconstructed, and a system of artificial ventilation by the propulsion of warmed or cooled air was, with considerable benefit, installed at *His Majesty's*. Owing, however, to the fact that there are no 'risers' in the floor of this theatre, the inlet under each seat had to be fixed horizontally; and this, together with the fact that the inlets are filled with very fine wire gauze, render them liable to occlusion by deposited dust.

Recently a very fine new music hall ('*The Empire*'), designed by Mr. J. A. Moffat to seat 1,200, has been erected, and is splendidly ventilated on a system similar to that at *His Majesty's*, with the important practical difference that the floors, being 'stepped,' the air-inlet under each seat is fixed vertically in the 'riser,' and is not closed with gauze. On summer nights, with a crowded house and much smoking, the coolness and purity of the atmosphere are very remarkable, and much in advance of anything the writer has experienced or heard of elsewhere; a notable result upon which Mr. Moffat is to be greatly congratulated.

Locations.

Washing Sites.

The Medical Officer of Health does not usually interfere actively in the work of the Locations, except where his advice is sought by the Superintendent (Mr. W. W. Lloyd), who is a very energetic and competent official, with an intimate knowledge of the coloured population. From time to time, however, the Medical Officer of Health is called on for reports on special matters.

THE KAFFIR LOCATION.—For many years the Kaffirs were located on a site near the Municipal main compound, wedged in between Vrededorp and Brixton, which are White districts. The ground they occupied was of very considerable value, their white neighbours objected to their proximity, and after much consideration the Council resolved to set aside a new Kaffir Location on their farm at Klipspruit, about nine miles west of Johannesburg. Messrs. J. W. Quinn, John Roy and W. K. Tucker in particular spared themselves no pains in originating this scheme and carrying it through, and its success doubtless affords them some return for the anxiety and risk the selection of Klipspruit involved, owing to its distance from town. The nucleus of a location was provided by about 100 large semi-cylindrical galvanised iron huts which had been hurriedly erected at Klipspruit during the 1904 plague outbreak, and which were now furnished with suitable doors and windows. A morning and evening train service, water supply, scavenging, supply-stores and other essentials were arranged for.

When matters were sufficiently advanced, just and liberal compensation was paid to the owners of dwellings—even for those of the biscuit-tin type—in the old Vrededorp Location, and the settlement of many hundreds of claims placed an enormous amount of work on the Town Clerk and his staff.

Ample previous notice having been given, the occupants of the old location were required on 1st April, 1906, to remove to Klipspruit. This migration was very quickly effected, the natives being temporarily housed, free of cost, in the above-mentioned iron huts until they could erect their own dwellings. Every facility was given for transport and cheap purchase of both new and second-hand material. A considerable provision of comfortable and separate married and single quarters was made, and sites set apart for schools, chapels, etc. Plans were also prepared for “public washing sites,” to replace the disgusting conditions described under this heading in the last Annual Report.

The Committee then instructed the Medical Officer of Health to ‘shepherd’ to Klipspruit all natives in town who were not living on the premises of their employers, or under white supervision elsewhere. At first some alarm was felt by the commercial community, but this subsided when matters were explained and it became known that any employer providing suitable housing for natives required for the purposes of his business to reside in town, would receive a permit, hundreds of which have since been issued by the Medical Officer of Health.

The rents payable by natives at Klipspruit include ample water supply and pail-closet service, and are calculated to the lowest figure that will meet outlay. For a stand 50ft. x 30ft. on which the occupants erect their own dwellings, 8s. per month is charged for a family of 2 persons over 10 years, with 3 children under that age, and for every additional person 1s. 6d. per month if over, and 9d. per month if under 10 years. Every lodger in the Council-lodging houses or in the iron huts, is charged respectively 4s. 6d. and 3s. per month, with a certain reduction in the case of families. The rail fares to Johannesburg are 8s. 6d. for a monthly ticket, or 2s. 6d. weekly, or 6d. for an ordinary return ticket.

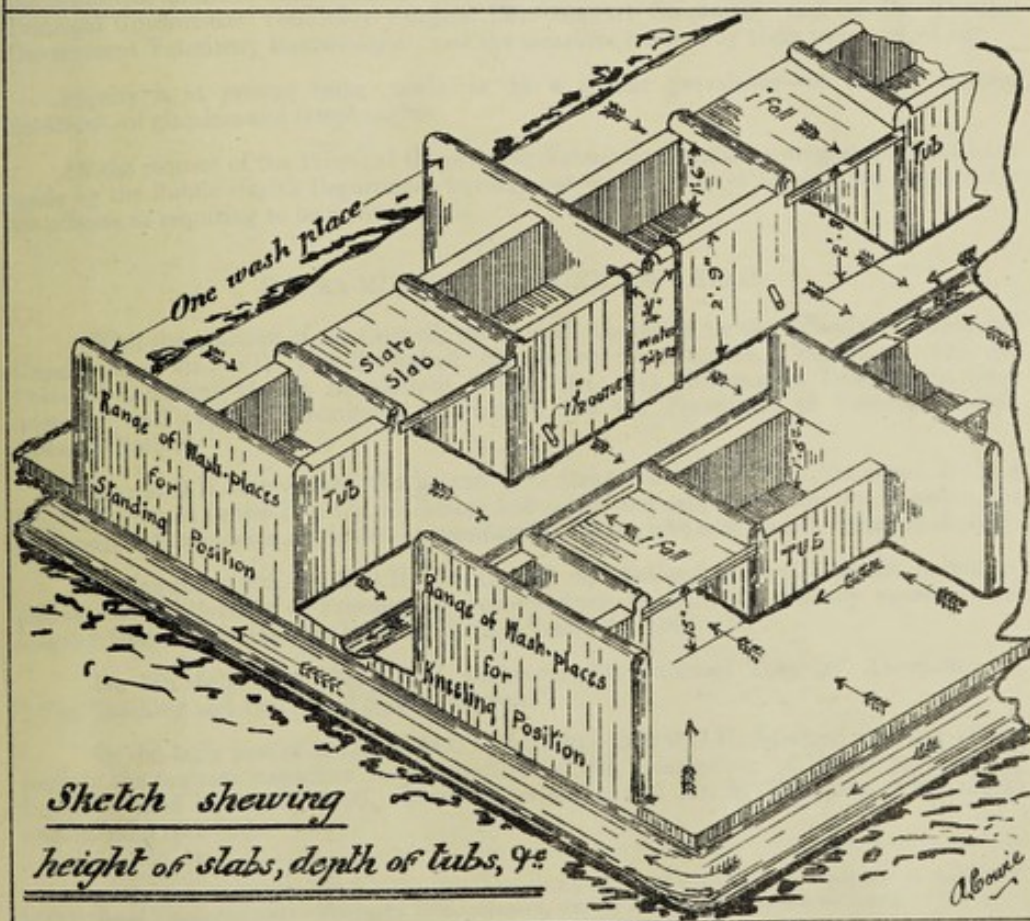
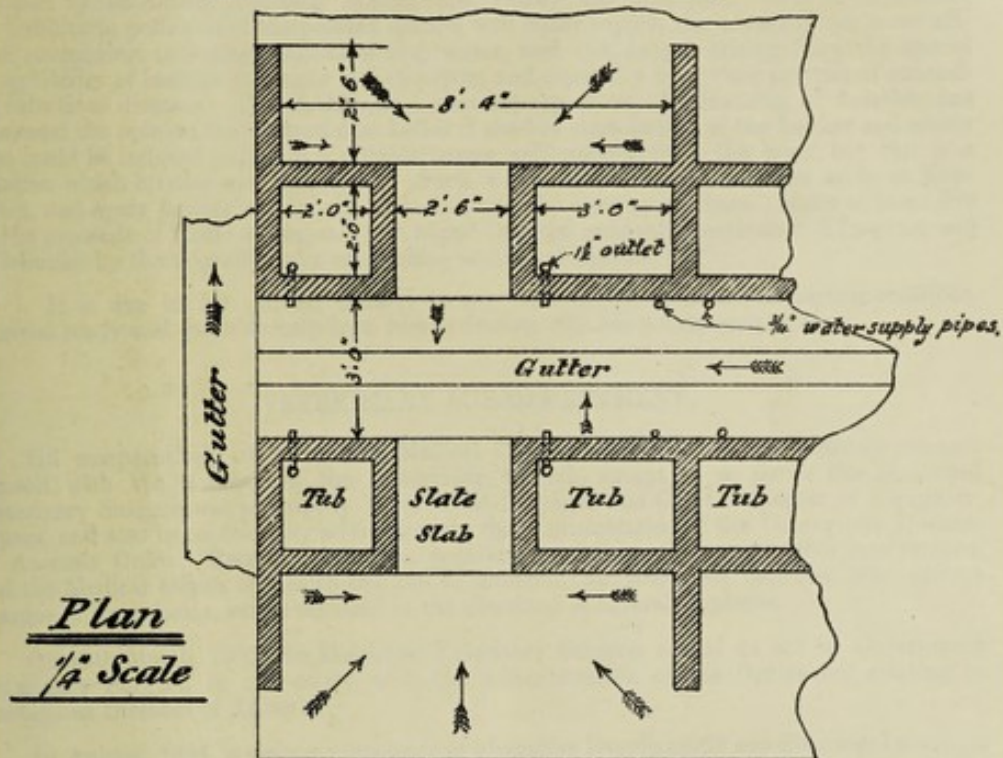
So far the Committee's well-considered undertaking has been conspicuously successful, and has obviously been an object of great interest to members and officials. It has already had the effect of clearing out of Johannesburg many undesirable and unsupervised ‘loafers,’ and, on the other hand, the system of permits for natives remaining in town, has brought about a very notable improvement in the conditions of their housing. There has been no trouble up to the present at the New Location.

The number of natives at Klipspruit is now about 1,500. This figure will be largely increased when the completion of the public washing sites renders it possible to require the washboys to live there.

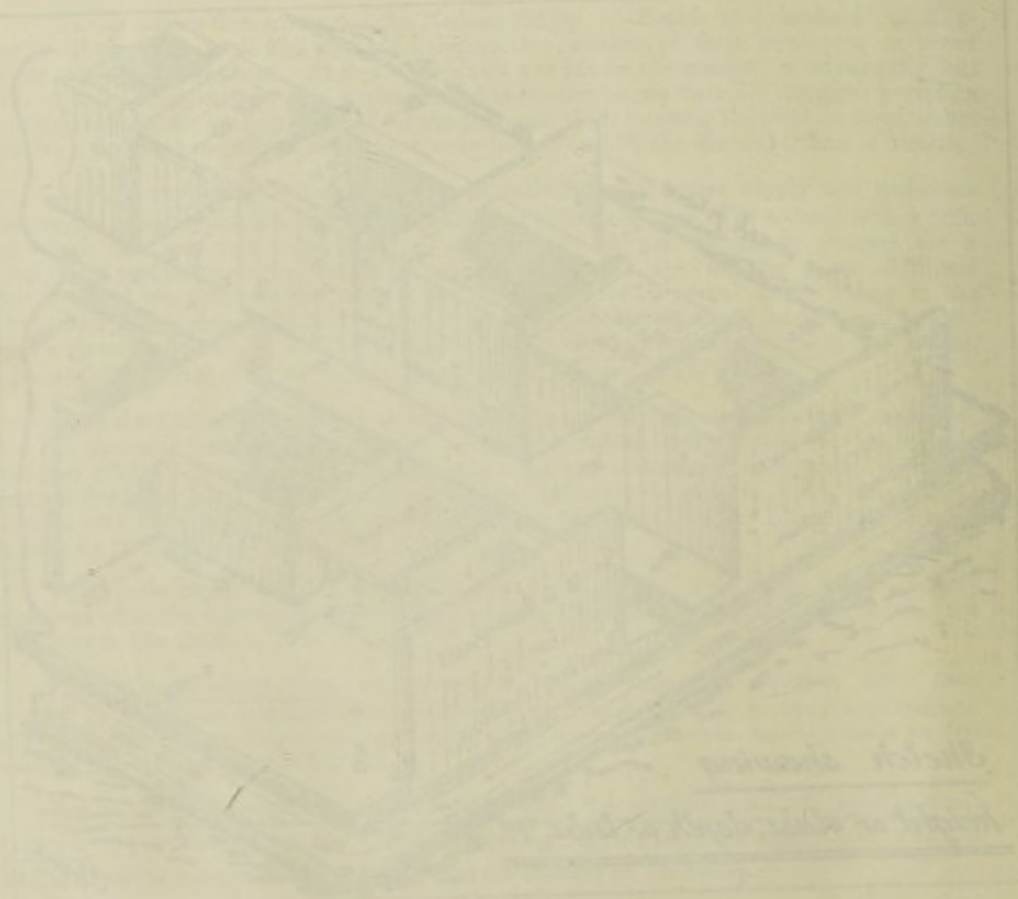
The Public Washing Sites are figured in the accompanying diagram, have been devised by the Town Engineer after questioning the ‘wash-boys’ as to their requirements, and appear to be exceedingly well adapted for their purpose. Provision has been made for 100 washers, at a contract price of £2,075.

The Council's expenditure in connection with the establishment of the Klipspruit Location to 30th June, 1906, was £52,654, including £22,081 for water supply, and a sum of £13,768 paid as compensation for huts in the old location at Vrededorp.

ARRANGEMENT OF WASH-PLACES FOR NATIVES AT THE
KLIPSPRUIT LOCATION



ARRANGEMENT OF SEAT-PLACES FOR NATIVES AT THE ALLIANCE LOCATION



INDIAN OR MALAY LOCATION.—In November, 1905, the population, as estimated by the Location Superintendent, was about 4,200, including Indians 1,600, South African-born Malays 970, Chinese and Japanese 70, Egyptians, Somalis, Malagasies 100, Natives 40, Cape Coloured 1,300, Europeans 120. On 12th January, 1906, a detailed report on this location, prepared by the Acting Assistant M.O.H. (Dr. Coke)* was presented. In it he emphasized the liability to pollution of the present shallow well water supply, the necessity for more efficient scavenging, including removal of slop water, and the danger arising from the special susceptibility of Indians to plague and smallpox, and especially from their practice of concealing infectious diseases. The M.O.H., in a previous report on the Housing of Asiatics, has expressed the opinion that it would be better if the low class Indian of the hawker and waiter type could be induced to live in a suitable bazaar well removed from the town, but this is a question which bristles with difficulties. Such a site has, however, been set aside at Klipspruit, and every facility will be offered to Indians who elect to go there. Many of them live by the proceeds of Kafir stores, and it is hoped that the removal of natives to Klipspruit will be followed by the migration of a substantial number of Indians.

It is due to Mr. M. K. Gandhi to say that the M.O.H. has, on various occasions, received ready and valuable help from him in dealing with his poorer countrymen.

VETERINARY SUB-DEPARTMENT.

Till comparatively recently, the Medical Officer of Health did not actively concern himself with the working of the Veterinary Branch, except in so far as the Municipal Veterinary Surgeon was practically Chief Meat Inspector and Chief Inspector of Slaughterhouses, and also in occasionally advising as to the administration of the Contagious Diseases of Animals Order. Recently, however, occasion has arisen for more active intervention, and the Medical Officer of Health has had to conduct two prolonged inquiries into various charges of irregularity, which resulted in the dismissal of several employes.

On 13th March, 1905, the Municipal Veterinary Surgeon ceased to act as Government Veterinary Surgeon in connection with the administration of the Ordinances relating to Contagious Diseases of Animals.

In August, 1904, a serious prevalence of ulcerative lymphangitis was discovered amongst the Municipal animals. The Medical Officer of Health thereupon secured the advice of the Principal Government Veterinary Surgeon (Mr. Stewart Stockman), and of Dr. Theiler, Government Veterinary Bacteriologist, and the measures advised by them were carried out.

Inquiry is at present being made as to a similar prevalence—of several months duration—of glanders and lymphangitis.

At the request of the Principal Government Veterinary Surgeon arrangements have been made by the Public Health Department to carry out disinfection of stables etc. notified by his officers as requiring to be so dealt with.

EXTRA-MUNICIPAL WORK OF M.O.H.

With the sanction of the Council, the M.O.H. has served on the following Government Commissions, viz.:—(1) The Springkell Sanatorium Investigation Committee; (2) the Coloured Labourers' Health Regulations Commission; (3) Government Laboratories Commission; and (4) the Commission to Inquire into the Prevention of Venereal Disease amongst Natives.

The M.O.H. also drafted the Report of a Sub-Committee of the Transvaal Medical Society in regard to the Housing of Chinese Labourers, and supported this report before the Government Commission appointed to consider the matter, who accepted its recommendations.

In January, 1905, the M.O.H. investigated, reported and advised as to the Accommodation for and Feeding of Prisoners in Johannesburg Prison, and critically examined the lengthy Draft Public Health Ordinance for the Transvaal, 1905.

On 5th July, 1905, the M.O.H. addressed the Transvaal Teachers' Association on "The Teaching and Practice of School Hygiene."

In the early part of 1905, the M.O.H. and Assistant M.O.H. delivered a course of lectures to the sanitary inspectors in preparation for the examination of the Royal Sanitary Institute, held in March, 1905. Thirteen inspectors and Mr. F. Thompson (Chief Clerk) obtained the certificate.

*Dr. G. H. Coke (M.B., B.Sc., Edin., Barrister-at-Law), acted with much acceptance as Assistant M.O.H. from November 1905—February 1906 inclusive, during Dr. Stock's absence on leave.

M.O.H. 1904-6

EXPENDITURE OF PUBLIC HEALTH DEPARTMENT.

Expenditure.

(This does not include Scavenging Expenditure.)

Prosecutions.

	1904-5.	1905 6.
Salaries	£13,100 14 6	£14,347 19 11
Native Wages, Food and Passes	520 13 10	562 13 0
Locomotion	864 2 11	834 1 0
Charges	2,748 11 0	9,095 4 9
Purchase and Maintenance of Live Stock	393 15 0	481 15 10
Do. Plant	24 10 0	149 1 9
Isolation Hospital	1,523 6 0	1,932 19 11
Disinfecting Station	207 18 7	383 10 1
Plague Expenditure	1,984 14 3	796 0 6
†Unforeseen Expenditure ... ..	...	1,914 4 3†
	£21,368 6 1	£30,497 11 0

* This £9,059 included £5,197 for special vaccination expenses in connection with smallpox outbreak; also £1,021 for scavenging and upkeep of public latrines, not previously charged.

† This £1,914 included £514 special smallpox expenditure, £268 for telephone connection to Klipspruit Location, erection of sample huts, etc., and £945 for Sewage Inquiry Commission.

PROSECUTIONS.

915 persons were prosecuted for various breaches of the Sanitary Regulations: 889 were convicted, and fines aggregating £1,701 7s 6d were imposed. Particulars are appended:—

BY-LAWS INFRINGED.	Race of Accused.			Totals.
	Whites.	S. A. Coloured.	Asiatics.	
Prevention of Nuisances	456	67	117	643
Sale of Food and Drugs	155	—	11	166
Dairies and Milkshops	64	—	—	64
Bakehouses	7	—	—	7
Eating-houses	3	—	—	3
Slaughter-houses, etc.	11	—	—	11
Kaffir Eating-houses	14	—	—	14
Native Location	7	—	—	7
TOTALS	720	67	128	915
RESULTS—				
Convicted and Fined... ..	644	66	93	803
Convicted and Cautioned	52	—	34	86
Dismissed	23	1	1	25
Charge Withdrawn	1	—	—	1
AMOUNT OF FINES	£1,471 7 6	£42	£188	£1,701 7 6

This work was closely supervised by the M.O.H., under whose personal direction the proofs of evidence, summonses, subpoenas, indictments and charge-sheets are prepared and handed to the Assistant Public Prosecutor in the Magistrate's Court. Upon occasion, however, the latter position, which is poorly paid, has been filled by persons who, being apparently without any sort of legal training, quickly succumbed to the average defending attorney, and at one period repeated representations were addressed to the Chief Magistrate, in regard to the mismanagement of serious cases. Arrangements were, therefore, made, with very satisfactory results, for the Council's solicitors to prosecute in important matters. Since that time, the conduct of ordinary prosecutions has also been more efficient, and all charges have been heard before Mr. Graham Cross, A.R.M., whose familiarity with the Council's somewhat formidable code of Public Health By-laws, has been of the greatest assistance to the Department.

STAFF OF PUBLIC HEALTH DEPARTMENT.

M.O.H. 1904-6

A.—INSPECTORS. The following statement shows the number of Sanitary Inspectors employed during the year under notice as compared with the number before the war:—

	Before War.	1904-6.
Chief Inspector ...	1	1
District Inspectors ...	16	17
Native Constables with District Inspectors ...	16	3
Special Service Inspector ...	1	—
Mines Sanitation Inspector ...	—	1
Infectious Disease Inspector ...	—	2
Disinfecting Inspector ...	—	1
Licensing Inspector ...	1	1
Food Inspectors ...	2	1
Frozen Meat Inspector at Kazerne ...	—	1
Slaughterhouse Inspector ...	1	1

Of the 26 white inspectors, 20 possess the certificate of the Royal Sanitary Institute.

It is further to be noted that since the British Occupation 21,214 plans of new houses were approved to 30th June, 1906, and that the area of supervision during 1904-6 included Berea, Yeoville, Bellevue, Bellevue East, Lorentzville, Judith's Paarl, and Jeppestown Extension districts, besides the numerous Townships and Mines included within the Municipality as the result of the Extension Scheme sanctioned by Ordinance 13 of 1902, and 36 of 1903.

Special Difficulties of Sanitary Inspection in Johannesburg.

In connection with the duties of the District Sanitary Inspectors, the M.O.H. would point out that the absence of any sewerage system and the state of general disrepair of street gutters, throw upon these officials an amount of work and frequently of odium that is quite unknown in English towns. Practically every house in the urbanized portion of Johannesburg has a drain in the yard which leads direct to the gutter and is put there specially for that purpose. Each Inspector has to look after hundreds of houses, and yet is necessarily held responsible by the Council, the Public, and the M.O.H., when any householder or his servant follows his natural impulse and throws dirty water, or allows yard-flushings to flow, into the drain which is placed so conveniently under his hand, and which discharges into the gutter, where, in many cases, the waste liquid stagnates, festers and stinks. Further, in many cases the Sanitary Inspector and the M.O.H. too, are roundly denounced as personally responsible for the not infrequent individual failures of the scavenging services, the result—not of neglect by the M.O.H. or the Inspector—but of shortness of removal plant or the oversights of scavenging 'overseers' or their 'natives.' These facts are mentioned as some of the quite exceptional difficulties that have to be faced in Johannesburg: it is not, however, even suggested that these troubles can be removed or materially mitigated till the much-needed sewerage system is in operation.

The M.O.H. is also impressed by the frequency of unreasonable or greatly exaggerated complaints, and of the attempts that are made, for private reasons, to enlist the interference of the M.O.H. or the Inspectors.

During the period (1904 to 1906) under notice, no less than 7,106 written notices were served by the inspectors in the course of their work.

The duties of Chief Inspector have been efficiently carried out by Mr. Thomas Manion, who has not spared himself, and, with one or two exceptions, the District Inspectors have worked reliably and well. Mr. Alex. Cowie, who has had an engineering training, and whose excellent work as Mines Sanitation Inspector is elsewhere referred to, has also been of frequent service in advising as to the domestic disposal of sewage by the Vivian Poore and other methods, of which he has large experience on the mines. He has also prepared all the diagrams and charts which appear in this report. Mr. Cuthbert Crothall has been responsible for the examination of all drainage and special building plans, and has done this work thoroughly well.

B.—CLERICAL STAFF. This consists of a chief clerk (Mr. F. Thompson) with 2 assistant clerks and typists, and an office boy. Apart from the usual statistical records of such an office (which in Johannesburg are laboriously increased by the necessity of differentiating between Whites, S.A. Coloured and Asiatics), and attending to the complaints of a very sensitive public, no less than 8,109 letters—not including circulars and formal acknowledgments—were written during 1905, and the number for 1906 shows an increase. In addition, the whole of the clerical work required in connection with the 915 prosecutions undertaken by the Department has been dealt with. The Office Staff has worked thoroughly well, and Mr. Thompson, in particular, has cheerfully given much overtime to keep matters straight, and has helped greatly in the collation of statistical and other material for this report.

M.O.H. 1904-6

Meteorology,

METEOROLOGICAL OBSERVATIONS.

METEOROLOGICAL OBSERVATIONS.

Taken at 8 a.m. Daily by Town Engineer's Department.

	Barometer cor- rect to 32deg. F. Approximate height, 5,850 feet.	Thermometers in Screen.										Rainfall.		No. of days on which rain fell at Joubert Park.	4 foot Earth Thermome- ter at M.O.H.'s Office.					
		Dry Bulb.	Wet Bulb.	Self-registering Approximate Height, 5,761 feet.				Joubert Park.	Bellevue.											
				Mean		Absolute Max.	Absolute Min.													
				Max.	Min.															
1904-5	1905-6	1904-5	1905-6	1904-5	1905-6	1904-5	1905-6	1904-5	1905-6	1904-5	1905-6	1904-5	1905-6	1904-5	1905-6					
July ...	24-331	24-577	48-09	41-3	62-8	62-9	41-7	37-0	70-0	70-8	33-0	32-0	Nil.	Nil.	Nil.	...				
August ...	24-501	24-469	50-9	43-7	67-6	64-5	43-8	40-9	79-0	74-4	32-0	34-0	-0-5	-1	-0-1	-0-6	1	3	...	...
September ...	24-503	24-413	51-9	53-8	69-9	72-2	44-9	47-4	81-0	83-2	27-0	29-0	-2-8	-3-6	-3-3	-2-6	3	4	...	59-14
October ...	24-386	24-426	57-8	61-8	75-7	80-3	50-6	53-5	85-0	88-9	39-0	37-7	-0-6	-7-8	-0-8-5	-0-8	5	3	...	62-87
November ...	24-420	24-415	63-7	60-0	79-3	75-4	55-5	54-0-5	92-0	88-2	47-0	43-8	6-51	7-47	5-60-5	5-79	12	14	...	65-54
December ...	24-388	24-384	60-0	63-7	75-9	79-0	52-4	57-5	87-0	91-0	40-0	47-7	4-0	5-04	4-20-5	4-6	11	16	...	68-01
January ...	24-389	24-399	62-2	65-6	79-1	81-9	56-5	59-7	86-5	89-0	52-0	53-5	3-61	1-92	3-90-5	3-77	15	10	...	69-93
February ...	24-399	24-396	61-1	60-5	76-1	75-5	55-4	55-9	84-9	81-7	46-1	47-4	3-85	8-10	3-50-5	8-22	16	14	...	68-25
March ...	24-445	24-423	57-5	57-1	72-1	71-8	57-0	52-8	82-6	83-2	42-0	45-2	3-82	3-83	3-430	3-45	12	14	...	66-67
April ...	24-485	24-439	58-3	54-1	73-3	69-9	47-2	48-2	77-9	77-7	42-6	38-2	1-67	1-35	1-76	-7-6	8	8	...	63-23
May ...	24-445	24-485	51-2	50-8	67-8	67-7	47-4	43-4	75-6	74-0	29-8	34-5	-2-6	-1-3	-2-7	-0-8	2	2	...	62-57
June ...	24-404	24-493	43-6	42-6	60-4	61-1	37-4	38-1	68-3	66-8	30-0	28-3	Nil.	Nil.	Nil.	Nil.	Nil.	Nil.	...	60-30
Total for Year ...										25-01	29-08	24-245	27-68	85						

Sub soil Water
Gauge.
P.T.O.

SUB-SOIL WATER GAUGE.—In October, 1905, a gauge similar to that devised and used by Dr. W. Watkins-Pitchford at Maritzburg, was constructed, and weekly readings have since been taken, for correlation of the resulting curve with that of enteric. M.O.H. 1904-6
Sub-soil Water Gauge.

The following description of the gauge was kindly supplied by Dr. Pitchford, and is inserted here in the hope that it may lead to similar observations being made elsewhere in South Africa:—

Dr. Watkins-Pitchford points out that it is advisable to select a spot for the sub-soil water gauge in a neighbourhood in which the ground water is not likely to be 'tapped' by the sinking of shafts, deep foundations, drainage etc., and he recommends that the well-pipe should be put in at least one year before the remainder of the apparatus is constructed, measurements being taken during this period, by means of stiff wire, of the depth of the ground water from the surface, so that the necessary data may be obtained for the length of the index board.

The WELL should be sunk about 3 feet in diameter, to the depth at which sub-soil water becomes apparent at the end of the dry season.

The WELL-PIPE consists of a stout galvanised iron pipe about twenty feet long and three inches in (internal) diameter. The upper four feet of the pipe project from the surface of the ground. The interior of the pipe is quite smooth. At every six inches along the pipe an inch hole is drilled right through; the upper four feet are, however, not so drilled. The foot of the well pipe should rest upon two pieces of rock; it should be fixed vertically plumb and the trench round it should be filled in with broken stone.

The FLOAT consists of an empty corked bottle about 13 inches long by 2½ inches.

The INDEX is attached to the float by a piece of stout copper wire 16 feet long. To the upper end of the float-wire, just above the index, is attached a fine copper wire which passes over a pulley at the top of the apparatus and suspends a counterpoise. The index moves inside barometer-tubing which is fixed along the whole length of the middle line of the front board of the apparatus. The barometer-tubing is fixed in lengths, which simply rest upon one another, by sheet-copper straps over the junctions. The lowest piece of the tubing is received into a little brass box attached to the bottom of the front board, and having a hole through the centre of its floor to permit the passage of the stout copper wire from the float. The index itself consists of a glass tube about two inches long and of a diameter which enables it to fit loosely inside the barometer-tubing. The stout wire from the float passes right through the index and its projecting upper end is flattened and drilled so as to enable the fine wire suspending the counterpoise to be securely attached. The ends of the little index tube are narrowed in the lamp flame and the interior of the tube is filled with pitch to secure the wire and render the index more obvious. The reading of the gauge is always taken as the position of the upper end of the index, which is always clearly visible through the barometer-tubing.

The COUNTERPOISE is of lead, and its weight is such that when the float is in the water the index at once returns to its position when the wire is either pulled up or drawn down. The counterpoise serves to keep the index in the axis of the barometer-tube and also to keep the whole wire taut.

The INDEX BOARD is graduated, from above downwards, in feet and inches, and in this way the position of the index gives at once the distance of the ground water from the surface of the soil.

CHARLES PORTER, M.D., M.R.C.S., D.P.H., *Barrister-at-Law*

Medical Officer of Health.

31st October, 1906.

REPORT

ON THE

HEALTH OF THE NATIVES AND INDIANS EMPLOYED BY THE COUNCIL

for the Year, July 1st, 1905—June 30th, 1906.

The average number of Natives employed by the Council during the year, as computed from the returns received from the various Departments was 4,526. Whilst the total number of natives who were employed was 14,968.

The subjoined table shows the total number of natives and Indians employed by each Department, with the average number usually engaged.

Department.	Natives.		Indians.	
	Total No. employed during the year.	Average No. employed each month.	Total No. employed during the year.	Average No. employed each month.
Sanitary	9,158	2,518	...	...
Town Engineer	4,450	1,457	...	...
Gas, Electric and Tramways ...	492	303	...	...
Water	800	220	...	...
Parks and Estates	68	28	190	123
Total	14,968	4,526	190	123

Total coloured employees 15,150
Average number employed 4,648

The total number of admissions to Hospital was 511 and the total deaths 41 as compared with 430 and 48 respectively during the previous year.

The admissions represent an annual ratio of 112.6 per 1,000 of the average number employed, but of only 34.1 per 1,000 of the total number. The corresponding figures for last year were 81.5 and 35.5.

The annual death rate per 1,000 was 9.0 on the average number and 2.7 on the total number employed.

The death-rate is slightly (0.4 per 1,000) higher than last year, but the mortality figures then arrived at did not include the deaths amongst a batch of British Central Africa natives who were shewn in a separate group. Had these deaths been included, the rate for 1904-5 would have been 9.6 per 1,000, thus showing an improvement for this year.

The annual death-rate amongst the coloured labourers of the mines of the Transvaal with an average monthly population of 112,255, as calculated from the quarterly mortality return published in the *Government Gazette*, during the same period was 42.3 per 1,000. Unfortunately the figures for Johannesburg alone are not given.

From my experience I should say the lower mortality of the Municipal as compared with the mine native was largely due to the superior physique of the former, who are mostly Basutos or Bacas, and are of better physique than the Portuguese native, who form the large bulk of mine labourers.

Injuries and Pneumonia are responsible for the greatest number of admissions, and Pneumonia and Enteric for the greatest proportion of deaths; Pneumonia causing nearly 50 per cent. of the total mortality.

CASES ADMITTED INTO THE NATIVE HOSPITAL.

July 1st, 1905—June 30th, 1906.

M.O.H. 1904-6

Health of
Coloured
Employes.

DISEASE.	COMPOUNDS.										RESULT.					Total.				
	Main.	Van Beek.	Reber- ville.	Concor- dia.	New- hamp- shire.	Shaw- Gard.	Brit- ton.	San- tita Street.	San- tal Spruth.	Water Depth.	Trans- way.	Light & Power.	Per- trans.	Cen- tery.	Cured or re- ceived.		Still ill.	Trans- ferred to other Hospitals.	Discharged unit or to convalesce at Home.	Di- et.
Smallpox ...	1	-	1	3	4	1	2	1	1	1	2	14	...	2
Chickenpox...
Measles
Influenza ...	3	1	1	3	2	...	13	...	2	1	...	4	...	...	30	...	2	...	2
Mumps ...	...	...	...	...	...	...	3	...	...	...	...	...	...	...	...	...	...	...	...
S. C. P. ...	2	...	...	1	2	...	1	...	...	...	...	1	...	...	6	...	5	...	30
Enteric ...	6	...	2	7	5	...	4	...	...	...	...	...	...	...	13	3	...	...	6
Diarrhoea ...	...	...	...	...	...	...	2	...	...	...	...	...	...	...	...	...	...	...	25
Dysentery ...	2	1	1	1	2	...	2	...	...	...	...	3	...	...	9	...	...	...	3
Malaria ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	12
Erysipelas ...	1	...	...	1	1	...	1	...	1	...	...	...	...	...	...	...	3	...	1
Leprosy ...	...	...	...	1	2	...	9	4	...	...	...	1	...	...	2	...	24	...	4
Venereal ...	10	...	1	...	...	...	1	2	...	...	...	...	...	...	...	...	...	...	26
Diseases due to Animal Parasites	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Scurvy ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Rheumatism ...	4	1	1	1	1	1	15	1	...	1	...	...	...	...	3	...	...	...	4
Debility ...	3	...	...	2	...	...	4	...	...	...	...	1	...	...	7	...	...	...	25
Dis. of Nervous System	1	2	...	...	...	...	2	...	1	...	...	1	...	...	3	...	...	...	1
Do. Eye ...	1	1	...	...	...	...	4	...	...	...	...	...	...	...	...	...	...	...	8
Do. Ear ...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	5
Do. Heart and Blood Vessels	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2
Bronchitis ...	1	...	...	...	...	...	6	1	...	...	...	1	...	...	1	...	...	...	3
Pneumonia ...	17	2	2	9	4	2	20	5	3	7	1	1	...	...	29	1	...	...	31
Tubercle of Lungs	4	1	...	3	1	1	1	...	...	...	...	...	...	...	39	...	...	...	64
Other Tubercular Diseases	...	...	...	...	...	...	2	...	...	...	...	...	...	...	...	...	...	...	3
Pleurisy ...	3	1	...	...	...	1	...	...	...	...	...	...	...	...	...	...	3	...	4
Suppurative Parotitis	...	1	1	...	...	1	...	...	...	...	...	...	...	...	3	...	...	...	2
Tonsillitis ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Gastritis ...	1	1	1	...	1	1	5	...	...	1	...	1	...	...	8	...	1	...	...
Jaundice ...	...	...	...	...	2	...	...	...	...	...	...	...	...	...	2	...	...	...	...
Nephritis ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Diseases of Bones	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Inf. Con. Tissues	3	...	...	...	1	...	7	5	...	...	...	...	...	...	8	...	2	...	1
Abscesses ...	...	...	...	...	...	...	2	...	1	...	...	...	...	...	1	...	...	...	...
Diseases of the Skin	1	...	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Injuries ...	25	11	5	3	16	5	37	5	2	6	2	...	...	...	86	3	23	1	3
Ill defined ...	11	2	1	2	7	2	10	...	...	...	...	2	...	...	40	...	...	...	4
All other Causes	1	...	...	...	2	2	5	...	...	...	...	...	...	...	6	2	...	...	...
TOTALS	105	27	20	34	53	21	164	23	11	3	23	7	18	1	340	9	88	33	41	511

M.O.H. 1904-6

Health of
Coloured
Employees.

The highest number of admissions (164) came from the Town Engineer's Camp at Brixton, followed by 105 from the Main Compound. With regard to the former, injuries are responsible for 37. In view, however, of the constant changing both of natives and compounds, no useful comparison can be made between the various Compounds except that there is undoubtedly a higher sick-rate amongst natives accommodated in tents as compared with those in huts.

The condition of the Compounds leaves much to be desired, and in view of the Coloured Labourers Health Regulations recently gazetted, a full report and recommendations have been submitted to the Committee.

The system for the supply of drugs to the Compound Hospital inaugurated last year, by which any quantity can be obtained at the tendered price, has been quite satisfactory. No large stock is now kept, the medicines being obtained fresh as required.

Certain instruments which were badly wanted have been purchased, but a small store-room at the Compound Hospital is needed, so as to avoid petty pilfering or loss.

A Diet Sheet has been introduced which is hoped will check any waste of extra food or medical comforts ordered for the patients.

I believe, and in this I am supported by the opinion of Mr. Abrams, the Compound Manager at the Main Compound, that the average native improves physically during the period of his contact with the Council. It was intended to take measurements as to chest-girth, weight, etc., of average batches of recruits when starting and finishing their contracts, but, unfortunately, pressure of other work prevented this being done. It is hoped, however, that an opportunity will offer during the current year.

This question is intimately connected with recruiting, and has received my special attention, for natives occasionally present themselves for treatment who should never have been engaged. When recruiting is easy, a higher physical standard may be demanded than when labour is scarce, and it is therefore inadvisable to lay down any fixed limits. For this and other reasons a detailed medical examination of recruits seems unnecessary, as in case of doubt, the native can be referred to the Medical Officer. At times it is surprising the value a native sets on himself, a boy of 15 asking the wages of a grown man.

Malingering on the whole is uncommon.

In the attached table are shewn the cases admitted into Hospital and their disposal.

I. GENERAL DISEASES.

I. ERUPTIVE FEVERS caused 73 admissions, with 6 deaths.

The admissions comprised 2 cases of Smallpox, 14 cases of Chickenpox, 2 cases of measles, 30 of Influenza and 25 of Enteric, with 6 deaths.

Smallpox.—During the epidemic, 2 unvaccinated natives were removed from Smal Street to the Lazaretto suffering from Smallpox.

On the average number employed, this is equal to an admission ratio of 0.44 per 1,000, as compared with a ratio of 0.57 per 1,000 amongst the South African Coloured and 1.33 per 1,000 amongst the white population of the whole town.

Immediately on the outbreak of the epidemic, steps were taken to ensure all Municipal natives being properly vaccinated. At first this was done by special vaccinators, but later the Pass Office, recognising its responsibility, undertook this work.

That only two cases should have occurred is, I think, a matter for congratulation. The Municipal native, and more especially those in the Sanitary Service, have to daily cover large districts in the town, and while the two isolated cases are eloquent testimony as to the value of vaccination, had it been otherwise, infection might have been widely disseminated.

Enteric Fever.—There were 25 admissions and 6 deaths as compared with 49 and 21 respectively last year.

The highest number of admissions (7) came from the Compound at Concordia, where the water supply is most unsatisfactory.

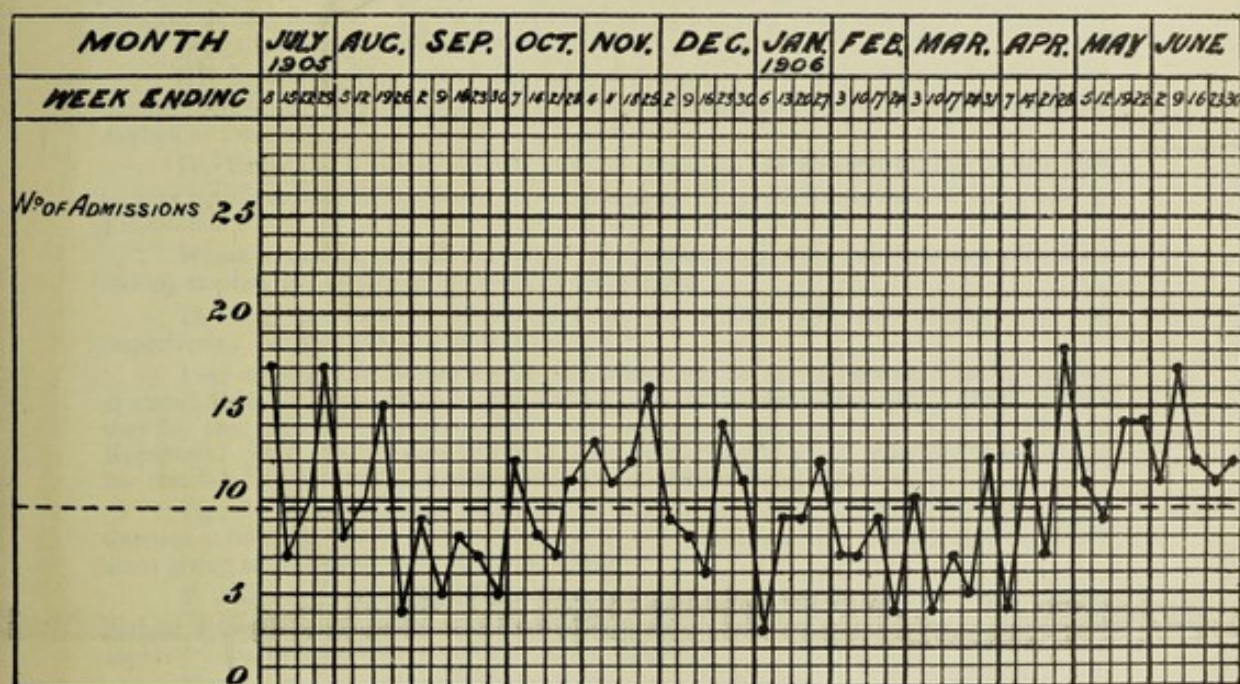
Considering, however, the nature of the work done by the natives in the sanitary service, it is a matter of surprise that the disease is not more prevalent. Possibly this is due to a natural immunity resulting in freedom from the disease or in mild ambulating cases.

The case mortality, 24 per cent., is still too high, but it must be remembered that many cases only come into Hospital when the disease is far advanced, that highly skilled nursing—so desirable in Enteric Fever—is not available, and that the native superstition is aroused by the mere withdrawal of the small amount of blood necessary for the performance of the "Grüber-Widal" reaction, the belief and dread being that the blood is turned into "Medicine."

In the sixteen cases in which it was possible to try the reaction, the results were as follows:—3 were negative, 5 reacted with ordinary Typhoid Bacilli and 8 with Para-typhoid organisms. Of the latter, 7 reactions were obtained with the strain of Brion and Kayser, and one reacted with both Schöttmüller A and B.

*CHART showing weekly Admissions
into the Native Hospital.*

July 1st 1905 = June 30th 1906.



*511 Cases (with 41 deaths) were admitted; these
figures including 5 Cases still ill on June 30th 1905.*

AVERAGE WEEKLY ADMISSIONS SHOWN THUS-----

CHART showing results of observations

made at the Hotel Hospital

July 1st to June 30, 1900

Month	Year	Observations
Jan	1900	1
Feb	1900	2
Mar	1900	3
Apr	1900	4
May	1900	5
Jun	1900	6
Jul	1900	7
Aug	1900	8
Sep	1900	9
Oct	1900	10
Nov	1900	11
Dec	1900	12
Jan	1901	13
Feb	1901	14
Mar	1901	15
Apr	1901	16
May	1901	17
Jun	1901	18
Jul	1901	19
Aug	1901	20
Sep	1901	21
Oct	1901	22
Nov	1901	23
Dec	1901	24
Jan	1902	25
Feb	1902	26
Mar	1902	27
Apr	1902	28
May	1902	29
Jun	1902	30
Jul	1902	31
Aug	1902	32
Sep	1902	33
Oct	1902	34
Nov	1902	35
Dec	1902	36
Jan	1903	37
Feb	1903	38
Mar	1903	39
Apr	1903	40
May	1903	41
Jun	1903	42
Jul	1903	43
Aug	1903	44
Sep	1903	45
Oct	1903	46
Nov	1903	47
Dec	1903	48
Jan	1904	49
Feb	1904	50
Mar	1904	51
Apr	1904	52
May	1904	53
Jun	1904	54
Jul	1904	55
Aug	1904	56
Sep	1904	57
Oct	1904	58
Nov	1904	59
Dec	1904	60
Jan	1905	61
Feb	1905	62
Mar	1905	63
Apr	1905	64
May	1905	65
Jun	1905	66
Jul	1905	67
Aug	1905	68
Sep	1905	69
Oct	1905	70
Nov	1905	71
Dec	1905	72
Jan	1906	73
Feb	1906	74
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Jul	1906	79
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Nov	1906	83
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Jan	1907	85
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Aug	1907	92
Sep	1907	93
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Sep	1910	129
Oct	1910	130
Nov	1910	131
Dec	1910	132
Jan	1911	133
Feb	1911	134
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Jul	1924	295
Aug	1924	296
Sep	1924	297
Oct	1924	298
Nov	1924	299
Dec	1924	300

At first (Jan 1st) not observed; then

observed (Jan 1st) and continued to 1900

Observed again in 1900

Too much weight cannot, of course, be attached to deductions from so small a number, but it is still extraordinary that no less than 50 per cent of these cases should have been paratyphoid infections. M.O.H. 1904-6
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Two deaths occurred, and it is regretted that a thorough post-mortem examination could not be made.

The first case, however, died shortly after admission, before the result of the "Widal" was known, and the second case, though presenting the clinical appearance of Enteric, had persistently given a negative reaction during life. A culture taken from the spleen after death, however proved to be a pure growth of an organism indistinguishable from Schöttmüller A. If post-mortem examinations were performed as a matter of routine, an abundance of valuable information would be obtained, which under existing conditions, is entirely lost.

Paratyphoid Fever is usually regarded as a milder disease than true Enteric, and if the above figures are any indication of its prevalence amongst the natives, they again suggest the part the native plays as a carrier of infection. Usually the native does not seek medical advice until, for physical reasons, he is obliged, and meantime may have been spreading infection far and wide; in this respect it would be of interest to know the proportion of paratyphoid infections amongst the white population. Certainly the disease is not rare, and mixed infections have been noted. It is hoped that further opportunities will be afforded for investigating this disease, the diagnosis of which depends so much on the serum reaction and bacteriological examinations.

II. TUBERCULAR DISEASE.—There were 8 admissions with 2 deaths; 3 admissions being due to tubercle of the lung, the remainder to tubercle of other parts of the body. Both deaths were due to lung disease. This is an improvement on last year when there were 7 admissions with 3 deaths for Pulmonary Tuberculosis.

III. LEPROSY.—The case of Leprosy was discovered in a native who had been in the Council's employ for only 10 days. He was at once isolated and afterwards sent to the Leper Asylum at Pretoria.

IV. VENEREAL DISEASE.—There were 26 admissions for venereal disease, 2 only with tertiary manifestations being treated in the Compound Hospital, the remainder being sent to Rietfontein.

Whether this represents the whole of those affected, I am unable to say, only those seeking medical advice coming under direct observation.

The ratio per 1,000 is 5.7 and 1.7 for the average and total number employed respectively; last year the figures were 1.6 and 0.7.

I am not sure how far any useful comparison can be drawn between these figures, for as stated above, it by no means follows that all cases come under observation. Granting that they do, one explanation presents itself and that is, the removal of the Kafir Location to Klipspruit. With lessened possibilities of intercourse, recourse would naturally be had to the few remaining sources with increased likelihood of infection being spread.

Figures for comparative purposes are difficult to obtain, but in 1903 amongst the Garrison stationed in South Africa, there were 202 admissions for primary syphilis, these alone giving an admission ratio of 7.3 per 1,000.

V. PARASITIC DISEASES.—There were only two admissions for diseases depending on Animal Parasites, both being due to the Bilharzia Haematobia. This, however, is not the slightest indication as to the number of natives affected.

Worm diseases are usually treated from the Dispensary, and I am of opinion that almost every native acts as a host to some kind of Parasite, Taenia being apparently the commonest. My experience entirely supports the observation of Dr. George A. Turner, jun., and others, that should a native suffering from an acute illness vomit a round worm, the termination is invariably fatal.

VI. SCURVY.—There were 4 admissions for this disease, or a ratio of 0.8 per 1,000. It is uncommon amongst Municipal natives, no doubt largely due to the amount of fresh food procured in the town.

VII. RHEUMATIC AFFECTIONS.—There were 25 admissions and no deaths. 22 recovered entirely and 3 were sent to convalesce at home. The type has not been so severe as is met with elsewhere, but I do not think this is the general experience.

VIII. OTHER GENERAL DISEASES causing admissions call for no special comment.

(2) LOCAL DISEASES.

I. DISEASES OF THE RESPIRATORY SYSTEM.—There were 101 admissions and 22 deaths, giving ratio of 22.3 and 4.8 per 1,000.

The admissions include Bronchitis 31, Pneumonia 64, and Pleurisy 6.

The deaths were due to Bronchitis 2, and Pneumonia 20.

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Pneumonia which, after injuries, accounts for the largest number of admissions, has greatly increased. The admissions per 1,000 averagely employed has risen from 8.08 last year to 14.1 this year. The case mortality being 31.2 per cent. as compared with 30 per cent. in the previous 12 months. Some cases of *Pneumonia* are acutely infectious, and disinfection should, where possible, be carried out in every case.

An opportunity has been afforded for treating a few cases with anti-pneumococcus serum, and while the number is too small to draw any reliable conclusions, the results were most promising. The expense of the serum is at present a great drawback to this form of treatment, but in time will be lessened with improved methods of preparation.

II. SUPPURATIVE PAROTITIS.—The above nomenclature is adopted in two cases of secondary Parotitis in which the primary disease was not very apparent. After suppuration and a tedious convalescence both ended in complete recovery.

Case I. was admitted from Van Beek Street on February 28th with a temperature of 101° and mild Tonsillitis, the mouth being somewhat dirty. Under the usual remedies the local condition improved, the temperature falling to normal; on March 7th, however, there was an evening rise to 102° followed by swelling of both Parotids. A quantity of pus was evacuated from both glands on the 14th, the patient leaving hospital completely cured on April 19th. An examination of the pus revealed the presence of staphylococci only.

Case II., from Rosherville, was admitted on April 12th, with a temperature of 102°, dry cracked tongue, sordes on the lips, and generally in a typhoidal condition. On the 15th the temperature fell to normal and remained so until the 18th, when the evening reading was 104°, and a slight swelling was noticed over the left parotid. Intense pain was then complained of in the region of both glands, the left suppurating and requiring free incision, after which recovery, though slow, was complete. The blood in this case repeatedly gave a negative widal with both typhoid and para-typhoid strains.

Of the various theories advanced for this comparatively rare affection, the Embolic, Heat Degeneration, Toxin Excretion and Sympathetic of Paget may now be discarded, the true explanation probably being that of Hanau and Pilliet, viz., infection by Stenson's Duct.

In cases examined by these observers, the ducts were found choked with debris containing micro-organisms and the inflammatory process was commencing around the ducts and only later spreading to the perilobular tissue and vessels.

Claisse & Duplay have shown that in animals the condition is only produced when the vitality is lowered, the salivary secretion impaired and organisms are excessive in amount or virulence, and Bond has demonstrated the presence of ascending currents in ducts capable of carrying micro-organisms from the orifice to the gland acini.

In short, the evidence shows that the process of duct infection which is responsible for secondary Parotitis is due to one or other of the following causes:—

- (1) The presence of specific micro-organisms, e.g., typhoid, or pneumonia in the buccal cavity.
- (2) An increase in number or virulence of the normal mouth organisms (more especially staphylococci).
- (3) Anything interfering with the saliva protectively draining down the duct.

In both these cases the dry and septic condition of the mouth was no doubt the predisposing factor, and, considering the chances of facial paralysis following when suppuration has occurred, they may be considered fortunate to have escaped so well.

(3) INJURIES.

There were 118 admissions and four deaths, the commonest cause being accidents connected with transport and violence. Surgical cases amongst natives usually do well.

The other admissions call for no special comment, their disposal being shown in the accompanying table.

(4) MINOR AILMENTS.

There were the usual large number of minor ailments treated at the Dispensary, none of which call for remark.

The chart attached shows the weekly admissions into Hospital—the dotted line representing the mean.

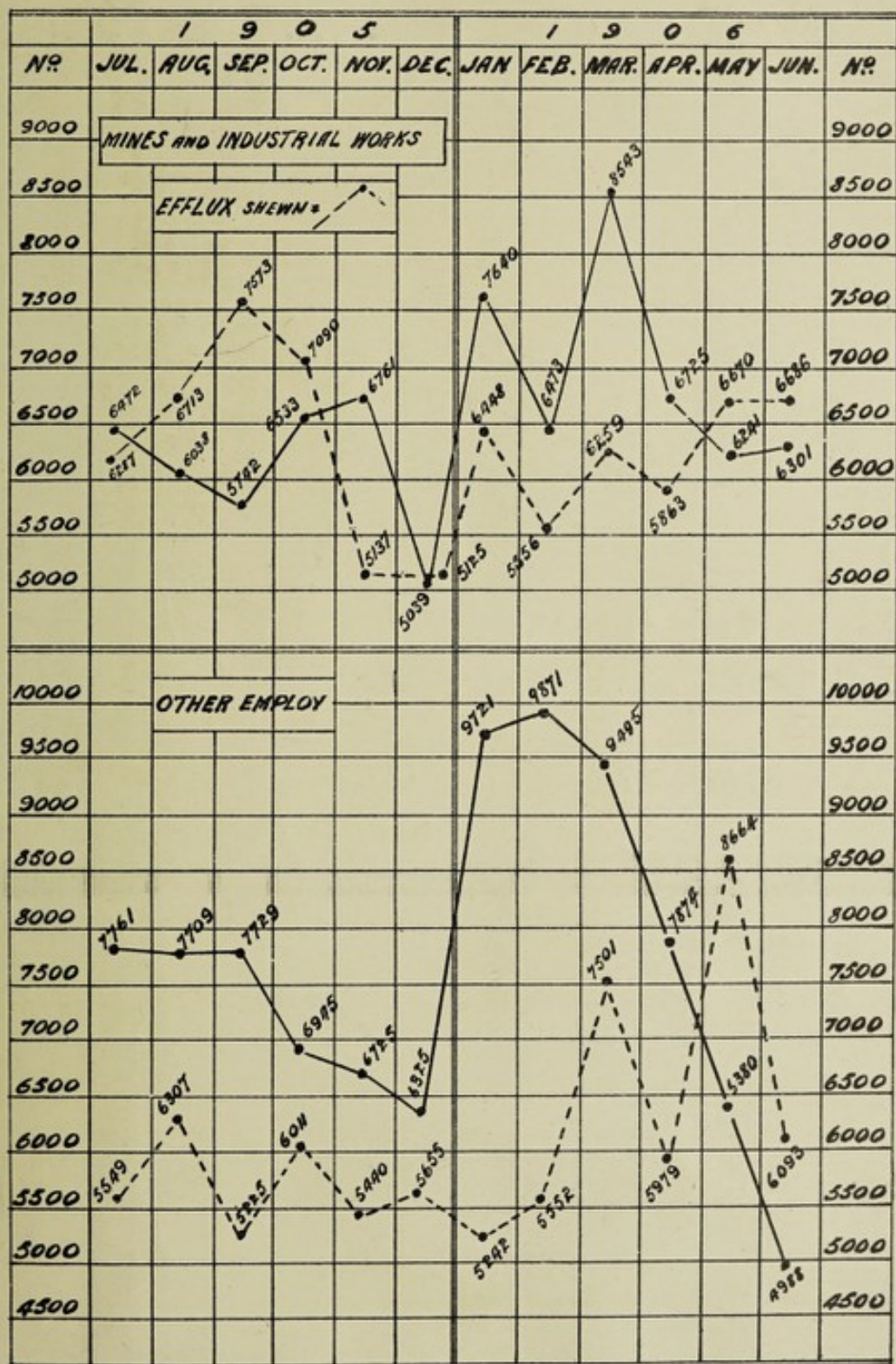
To the M.S.D. I am again indebted for the information that recruiting throughout the year has been on the whole satisfactory, and appended, for future reference, is a chart supplied by the courtesy of the Secretary for Native Affairs, showing the influx and efflux of natives into and out of the proclaimed labour districts of the Transvaal. Figures for Johannesburg alone not being available.

PART II.—INDIANS.

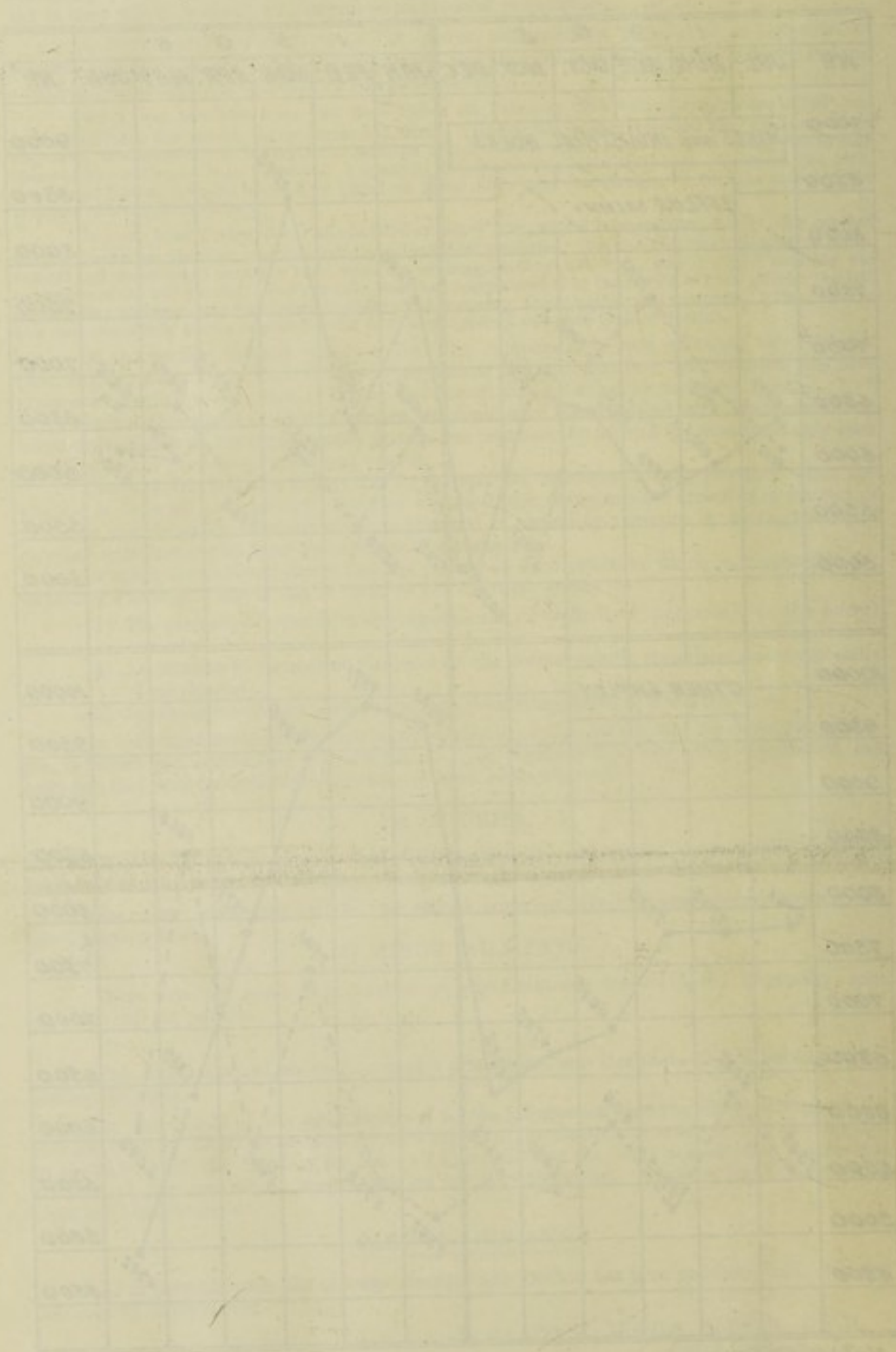
As in previous years the sickness amongst the Indians has been practically nil, only one case coming to my notice.

P. G. STOCK, M.R.C.S., L.R.C.P., D.P.H.,
Medical Attendant.

Chart shewing comparative variation of Influx and Efflux of Natives into and out of Proclaimed Labour Districts of the Transvaal.



The following table shows the results of the
 analysis of the water and soil of the
 station.



Value



