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COMMUNICATIONS

A STATISTICAL ANALYSIS OF 3,219 PERSONS*

Certified Blind at the Regional Clinic for Certification
of the Blind, Glasgow and South-West Scotland,
During the Period 1929-1935

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I.—INTRODUCTION.

THE Regional Clinic for the certification of Blind Persons in Glasgow and South-West Scotland was established in August, 1929, following the report by Freeland Fergus and Halliday (1921) of a special survey of the adult blind population. The following year a descriptive note of the functions and administration of the clinic was published by Halliday (1930), and in 1932 a report on the causation of blindness in 1,460 cases was drawn up by Marshall and Smith (1932). The clinic has now been in operation for more

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than ten years, and a detailed review of the experience gained and the information collected may be of value.

For this purpose the records of all applicants for admission to the Register of the Blind from August, 1929, to the end of the year 1935 have been selected. During this period, extending to more than five years, a total of 5,140 persons were examined by ophthalmologists attached to the Clinic, and 3,219, or 62.6 per cent., were certified blind within the meaning of the Blind Persons Act. The cause of blindness and other particulars regarding the latter group of 3,219 blind persons have been taken out and analysed, and the results of the analysis form the basis of the present report.

The function and administration of the Regional Clinic and the method of collection and tabulation of data regarding each case examined have been fully recorded in the papers mentioned above, but for convenience a brief summary may be given, together with a consideration of other matters of a general nature germane to the present report.

Medical Certification.

Admission to the Register of the Blind in Glasgow and South-West Scotland prior to 1918 was not controlled by medical examination. During that year, however, the practice was adopted of requiring every applicant to obtain a certificate of blindness from a duly qualified medical practitioner. The necessary certificate was completed in most cases by a medical man without specialist experience in eye diseases, and an attempt was, therefore, made in 1924 to secure a more accurate assessment of blindness by holding special clinics where applicants were examined by ophthalmologists. It should be remembered that at this time the standard of blindness was largely a personal one and furthermore many were still admitted to the register by other channels. The report by Dr. Freeland Fergus (*vide supra*) contained a strong recommendation that all persons seeking to be enrolled on the Register of the Blind should be examined by a board of specialists in eye diseases. The Regional Certifying Clinic was established on these lines in August, 1929, and has been in constant operation from that date. Generally speaking, therefore, since September, 1929, all applicants in the area of Glasgow and South-West Scotland have been accepted as blind only after examination by ophthalmologists attached to the Clinic. All the cases included in the present report were dealt with in this manner.

The examiners, four in number, work in pairs at the Regional Clinic, each pair constituting a board, and they conjointly sign the medical certificate. Usually two sessions of the Clinic are

held per week at each of which about twelve cases are seen. Applicants unable to attend the Clinic through illness or for other reasons are examined at their homes by one or other of the ophthalmologists. Only a comparatively small number fall into this category.

The form of medical certificate used to record the findings at examination is one which has since been recommended by the Department of Health for Scotland and has now been adopted by all Local Authorities in Scotland. The English medical sheet which was modelled on the Scottish form is similar in all essentials.

Method of Analysis and Tabulation of Data.

When the clinic was inaugurated it was realised that within the course of a few years information regarding some thousands of cases would have collected and that a suitable opportunity was presented for the future analysis of data bearing on the causation of blindness. A system of rapid analysis and tabulation was essential, and advantage was taken of the Hollerith mechanical method which had been used for several years by the Glasgow Public Health Department for routine purposes. A necessary feature of the system is the reduction of all data to numerical codes, and the medical case sheet has been drawn up in such a manner that the findings at the examination can be readily coded and transcribed by a clerk to a Hollerith card which is completed for every case examined. Experience has shown, however, that a strict supervision is required to ensure uniformity in coding by different examiners.

Standard of Blindness adopted at the Clinic

The standard of blindness adopted at the clinic follows the lines laid down in the Report of the Royal Society of Medicine (July, 1915), as amended by the Joint Memorandum of the Department of Health for Scotland and Department of Education (October, 1931). The recommendations contained in this latter memorandum may be briefly summarised.

Visual acuity serves as the basis of certification, and three categories are distinguished.

Group I.—Persons with a visual acuity of less than 3/60 Snellen. Applicants falling into this category are regarded as blind.

Group II.—Persons with a visual acuity of 6/60 Snellen or better. Generally speaking, individuals in this group are not regarded as blind unless the field of vision is contracted to 10 degrees or less throughout the greater part of its extent and particularly in the lower part of the field.

Group III.—Persons with intermediate degrees of visual acuity,

that is to say, of 3/60 Snellen but less than 6/60 Snellen. Applicants in this group are regarded as blind (a) when the visual defect is associated with a restricted field of vision although it exceeds the limit of 10 degrees laid down in Group II, or (b) if aphakic.

At the Glasgow Clinic applicants of all ages, including school children, are examined in accordance with these standards. The unfortunate consequences which may arise from the use of two standards are in this way eliminated.

A further category recognised at the Clinic but not included in the Memorandum may be mentioned. This includes persons who, while not blind at the time of examination, are in the opinion of the examiners likely to become blind within five years. These are certified suitable for technical training in the Royal Blind Asylum.

All the cases dealt with in this report, however, fall into one or other of the three main groups referred to in the Joint Memorandum, and no case certified "likely to become blind in five years" is included. The proportion in each group is set out in the following statement (Table I).

TABLE I

	GROUP I Visual Acuity below 3/60 Snellen	GROUP II Visual Acuity of 3/60 Snellen but below 6/60 Snellen	GROUP III Visual Acuity of 6/60 Snellen or better	Total
No. of Cases	3,011	171	37	3,219
Percentage	93.53	5.31	1.16	

The great majority of the cases are included in Group I, only some six per cent. falling into the remaining two categories.

II.—DESCRIPTION OF CASES ANALYSED.

Source of Candidates.

The Regional Certifying Clinic in Glasgow is under the administration of a Special Joint Committee for the administration of the Blind Persons Acts, composed of representatives from the city of Glasgow and from seven adjoining counties in the South-West Scotland, together with the larger burghs in these counties. There are altogether 23 separate local authorities served by the Clinic, with a combined population of 2,578,709 persons. The cases under consideration were distributed in the various districts as follows:

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Local Authority.	No. of Cases.	Population (Census, 1931).
Glasgow	1,783	1,088,461
Airdrie	37	25,954
Coatbridge	87	43,056
Hamilton	42	37,862
Motherwell and Wishaw	64	64,710
Rutherglen	25	25,157
Other Lanark County	353	300,847
Greenock	130	78,949
Paisley	75	86,445
Port Glasgow	18	19,581
Other Renfrew County	51	103,611
Dumbarton	29	21,546
Clydebank	50	46,952
Other Dumbarton County	112	79,246
Falkirk	36	36,566
Stirling	11	22,593
Other Stirling County	47	107,288
Ayr	35	36,783
Kilmarnock	26	38,100
Other Ayr County	113	210,334
Argyll County	43	63,050
Bute County	12	18,823
Dumfries Burgh	40	22,795
All Local Authorities	3,219	2,578,709

Reasons for Examination.

Most were examined in connection with applications for Blind Pensions, but a substantial number attended for increased Public Assistance, while others were examined in connection with technical training, free travelling facilities, etc. The percentage falling into these several categories is shown below.

	Percentage of Total
Applicants for Blind Pensions	44.7
Applicants for Increased Public Assistance	27.0
Applicants for Technical Training	12.0
Applicants for Free Travelling Facilities	8.5
Wireless Licences	1.9
Unclassified	5.9

Birthplace.

The distribution of the cases according to place of birth, together with the proportion of the population in Glasgow and South-West Scotland in different nationalities, is shown in Table II.

The great majority of the cases, as would be expected, were born in Scotland, but it is of interest to note that a much higher proportion of Irish-born are included in the present sample than would have been expected from the distribution of this nationality in the population in the area.

TABLE II

Birthplace	No. of Cases	Percentage of Cases	Population in Glasgow and South West Scotland	Percentage of the Population
Scotland...	2,672	83'01	2,363,512	91'65
Ireland ...	340	10'56	103,314	4'01
England and Wales	126	3'92	82,158	3'19
Others ...	20	0'62	29,725	1'15
Not Stated	61	1'89	—	—
Total ...	3,219	100'00	2,578,709	100'00

Occupations.

The occupations prior to blindness of 2,750 of the total cases dealt with in this report are set out in Table A of the Appendix. The classification adopted is that used by the Registrar General in census returns. The remaining 469 cases include 288 individuals who had not been engaged in any employment before loss of sight, and 181 regarding whom no details of occupation are available.

Age and Sex Distribution.

Table III shows the age and sex distribution of the 3,219 cases at the time of examination at the Regional Certifying Clinic.

It will be observed that the great majority of the cases were over 10 years of age at the time of examination, only 951, or 29·5 per cent., being under that age. Males were in excess of females, the proportion in the two sexes being 56·9 per cent. and 43·1 per cent. respectively.

TABLE III

Age Groups.	0-1	1-4	5-15	16-29	30-39	40-49	50-59	60-69	70+	Total
Males ...	—	8	53	128	145	229	416	442	313	1,734
Females ...	1	11	40	103	100	133	305	443	349	1,485
Total ...	1	19	93	231	245	362	721	885	662	3,219
Percentage	0'03	0'59	2'89	7'17	7'61	11'24	23'39	27'49	20'57	

The distribution of the cases according to age at onset of blindness and age at onset of the condition resulting in loss of vision is given in Table IV.

TABLE IV

Age Group	Onset of Condition Resulting in Blindness			Onset of Blindness		
	No. of Cases	Percent- age	Estimated Average Cases for Year	No. of Cases	Percent- age	Estimated Average Cases for Year
0-1	318	9'94	318	156	4'87	156
1-4	185	5'78	46	104	3'25	26
5-15	670	20'94	61	205	6'46	19
16-29	291	9'09	21	264	8'25	19
30-39	263	8'22	26	296	9'25	30
40-49	334	10'44	33	435	13'59	44
50-59	435	13'59	44	621	19'40	62
60-69	446	14'57	45	732	22'86	73
70 and over	237	7'41	—	388	12'12	—
Not Stated	20	—	—	18	—	—
All Ages...	3,219			3,219		

The mean ages of blindness and of onset of the condition producing blindness were 46·6 years and 34·5 years respectively. The table shows, however, that blindness in more than half of the patients occurred after 50 years, while in almost two-thirds the condition causing blindness had arisen before that age. It should be pointed out that the age grouping adopted on the medical record cards did not lend itself readily to statistical analysis. The average number of cases at each year of life within the age groups has been estimated, however, and the results as shown in the table bring out the great importance of the first year of life, not only in the onset of the diseases causing blindness but in the actual occurrence of blindness itself.

Defects of Material Analysed.

The 3,219 persons included in this report can be regarded as a sufficiently representative sample of the blind cases examined at the Regional Certifying Clinic. It is necessary to consider, however, the extent to which the facts revealed by the analysis

of these cases can be applied to the total blind population in Glasgow and South-West Scotland.

The Blind Persons Act, 1920 was designed primarily to provide preferential treatment as regards education, financial assistance and general welfare for the blind. It might be expected, therefore, that persons attending for assessment at the Regional Clinic would be drawn largely from that section of the community in need of special assistance. That this is so would appear to be demonstrated in a number of different ways. Thus, as has been previously mentioned, more than 70 per cent. of the persons examined were applicants for blind pensions or additional Public Assistance. Again, the age distribution at examination shows a sharp rise in the age-group 50-59, the time at which blind pensions become available.* Actually only 29.5 per cent. of the applicants were under 50 years, while, as has been shown, in 45.6 per cent. blindness had occurred before that age. There was, therefore, a considerable lag between the occurrence and certification of blindness, indicating that the financial aid afforded at the age of 50 was an important inducement to many presenting themselves for examination. A further argument which may be advanced in favour

TABLE V

	Social Categories				
	1	2	3	4	5
Percentage of Cases analysed in Various Categories ...	—	8'06	34'59	38'82	18'52
Percentage of Population of Glasgow and South-West Scotland... ..	1'54	18'05	50'17	15'91	14'33
Percentage of Population of Scotland... ..	1'70	17'50	49'9	18'2	12'7
Percentage of Population of England and Wales ...	2'33	20'35	43'47	20'45	13'40

of this view is forthcoming when a comparison is made of the social grouping of the population of the area with that of 1,749 of the 3,219 cases examined at the clinic (Table V). The remaining 1,470 cases were housewives whose social class was not stated.

The classification adopted follows that used by the Registrar General for England and Wales in the decennial report for 1921.

* The Blind Persons Act, 1938, now allows pension at 40 years.

Occupation forms the basis of classification, and five large categories are distinguished. Class 1 includes the upper and middle classes, Class 3 skilled workers, and Class 5 unskilled workers, while Classes 2 and 4 are intermediate between Classes 1 and 3 and 3 and 4, respectively. It will be observed that a higher proportion of the cases included in this report were recruited from the lower social groups as compared with the proportion in the population of Glasgow and South-West Scotland. Thus 57 per cent. fall into Categories 4 and 5, while only 30 per cent. of the population of the area are included in these groups.

In addition, but closely associated with this social selection, is the tendency for the group of blind persons attending for certification to be weighted for age and sex. Thus, a married woman with a husband to support her is likely to be a late applicant, while males being breadwinners will attend at an earlier age. Further, the special provision of education and training for the blind tends to increase the proportion of blind in the younger age-groups.

In view of these considerations, it must be concluded that the sample of blind persons dealt with in the present report cannot be accepted as completely representative of the total blind population in Glasgow and South-West Scotland, and the results of the present analysis, therefore, cannot be properly applied to blindness in the area unless the facts mentioned are borne in mind.

III.—CAUSES OF BLINDNESS.

Method of Classification.

The classification of causes of blindness used in this report is that recommended by the Department of Health for Scotland and now in general use throughout the country. This classification has been drawn up on the basis of prevention, and five large categories are introduced.

The first group, congenital and undetermined causes, includes conditions which, according to present knowledge, are not preventable in the strict sense of the term. Myopia, cataract, glaucoma, and congenital anomalies account for the great mass of cases in this group. The second category contains cases of blindness due to infectious and toxic conditions. So-called "chronic septicaemia," in which is grouped a number of recognised or unrecognised cases of focal septicaemia, and syphilis are the most important causes in this group. This group is further sub-divided into exogenous and endogenous infections. The next group, traumatic and chemical causes, includes industrial and non-industrial injury and cases arising from sympathetic ophthalmia.

This and the preceding group are those which are regarded as including preventable causes of blindness. A further large category embraces blindness associated with general diseases of the body such as diabetes, degenerative vascular conditions, and disease of the central nervous system. The last category, "not classified," is reserved for cases where the cause of blindness could not be definitely ascertained.

It has been customary in aetiological studies of blindness to accept as a basis of classification the cause of loss of vision in the second eye only and to disregard conditions giving rise to blindness in the first eye. Such a classification is sufficient when the causal condition is the same in both eyes, but it may fail to give a true picture of the position from the point of view of prevention of blindness or the restoration of vision when different causes have acted on each eye separately. It is naturally the last acting cause which determines complete loss of vision, but if this end cause only is considered, conditions arising late in life may receive undue weight while those occurring in earlier years may be underestimated.

Having regard to these considerations an attempt has been made to ascertain to what extent different methods of analysis will affect the number of cases apportioned to the various individual causes of blindness. For this purpose the distribution of the cases dealt with in this report has been taken out in four different ways.

(a) According to the cause of blindness as affecting the second blind eyes. This is the method of classification usually adopted and, of course, deals with those causes actually determining loss of vision.

(b) Taking into account the cause of blindness in the first blind eyes only. This method gives undue weight to causes acting monocularly and arising early in life.

(c) Considering the various causes in relation to eyes as distinct from individuals. This, of course, gives a simple mean of the first two methods.

(d) Taking into account only those cases in which the same cause acted on both eyes. The part played by conditions acting on one eye only is obviously not revealed by this method.

The number and percentage of cases attributed to the various individual causes have been set out under these four headings in Table B in the Appendix; but for convenience the results in regard to the several large cause groups are reproduced at this point.

The four methods of analysis reveal differences of numerical importance in only two of the groups, namely, congenital and undetermined conditions and traumatic and chemico-toxic conditions. Thus, while the congenital and undetermined group gave rise to blindness in the second eyes in 50 per cent. of the total

TABLE VI

Cause of Blindness	Second Eye		First Eye		Both Eyes Together		Both Eyes Same Cause	
	Number	Percentage of Total	Number	Percentage of Total	Number	Percentage of Total	Number	Percentage of Total
Congenital and Undetermined Conditions	1,619	50·30	1,494	46·41	3,113	48·35	1,413	50·14
Infectious and Toxic Conditions—								
(a) Exogenous	209	6·49	218	6·77	427	6·63	193	6·84
(b) Endogenous	918	28·52	920	28·58	1,838	28·55	871	30·91
Traumatic and Chemico-Toxic Conditions	214	6·65	333	10·35	547	8·50	107	3·80
General Diseases	236	7·33	220	6·83	456	7·08	214	7·59
Unclassified	23	0·71	34	1·06	57	0·89	20	0·71
Total	3,219	100·00	3,219	100·00	6,438	100·00	2,818	

cases, they accounted for only 46 per cent. of the loss of vision in the first eyes. On the other hand, in the case of traumatic and chemico-toxic conditions the proportion between the two eyes is reversed, this group causing loss of vision in 6·7 per cent. of second eyes as compared with 10·35 per cent. of first eyes. When the various individual causes of blindness are considered, it will be noted from Table B in the Appendix that about three-quarters of the total cases owed their loss of vision to myopia, cataract, glaucoma, chronic septicaemia, venereal disease and injury. If the figures relating to these six conditions only are considered, the percentages, using the four methods of classification, are as shown in Table VII.

It will be observed that by all four methods of classification the combined percentage of these six conditions is substantially the same, and that only in respect of myopia, cataract and injury are striking differences in the proportion of cases revealed. Myopia and cataract are more prominent when the second blind eyes are used as the basis of classification, and injury when the first blind eyes are considered. The first two conditions are essentially ones which affect both eyes and give rise to blindness in the later years of life. Injury, on the other hand, is met with in earlier years and is commonly a monocularly acting cause. This latter fact is brought into relief in the above table by the fact that 41·36 per cent. of the eyes in the 401 cases in which different causes acted on each eye separately were blinded by injury.

TABLE VII

	Classification according to—				
	2nd Blind Eye only	1st Blind Eye only	Both Eyes Together	Both Eyes Blind from Same Cause	Monocular Cases
Cataract	16'77	14'69	15'73	15'51	17'37
Myopia	16'34	14'73	15'53	16'29	10'02
Venereal Disease ...	13'95	13'95	13'95	15'61	6'75
Chronic Septicaemia	10'72	10'44	10'73	11'07	7'14
Glaucoma	8'69	8'39	8'54	9'08	4'70
Injury	6'42	10'13	7'74	3'59*	41'36
Total	72'90	72'33	72'22	71'15	87'32

* This figure does not include cases of sympathetic ophthalmia which are dealt with in a separate category. If, however, this condition is allowed for, as it obviously should be, the figure for injury becomes 5'85 per cent.

This analysis, therefore, appears to indicate that a classification based on the causes of blindness in the second eyes, or on the causes of blindness in those cases in which the same condition acted on both eyes, tends to emphasise conditions such as myopia and cataract at the expense of injury. On the other hand, a classification based on the first eyes will give a greater prominence to the influence of traumatic conditions. As will be demonstrated later, however, in most cases where injury affected the first eye the determining cause of blindness was either myopia or cataract, conditions which would almost certainly have caused loss of vision by themselves. It might be argued, therefore, that the differentiation of the causes in the two eyes separately serves no useful purpose. On the other hand, it should be remembered that it is not easy to assess the predisposing influence exerted by trauma in the production or acceleration of the second aetiological factor. Furthermore, there can be no doubt that injury to one eye may have an important bearing on the question of prognosis from the point of view of the reduction in the number of blind by operative procedures. An individual with one eye who suffers from cataract, for instance, has less chance of restoration of vision than one in possession of both eyes. The psychological factor is introduced, and the patient is less willing to risk his little remaining vision.

Having regard to these circumstances, therefore, it must be concluded that while the usual method of analysing the causes

of blindness, viz., on the basis of the cause of loss of vision in the second blind eye, is sufficient for general purposes it cannot be regarded as revealing the correct relationship of certain conditions to the causation of blindness. As has been mentioned, when both eyes are blinded from the same cause no difficulty arises, but if a combination of causes has been in operation, analysis either in regard to the first blind eyes or the second blind eyes does not give an accurate picture. This is particularly true as regards traumatic conditions. If in the present series the first eye is taken as the basis of classification more than ten per cent. of the total cases fall into this category, while if the second eyes alone are considered the figure is only 6.4 per cent. Actually, neither proportion is correct and it is necessary to estimate the number of cases where injury was responsible for blindness in both eyes. This figure was 5.8 per cent., and therefore lower than when the eyes are discussed separately. It would appear, therefore, that injury is actually a factor of less importance in the production of complete blindness than is suggested by the usual method of analysis.

Distribution of Cases according to Causes.

It has been pointed out above that a classification according to the cause of blindness in the second eye, while not giving a correct picture in all respects, may be regarded as sufficient for general purposes; in the further consideration of the present series of cases this method of classification has, therefore, been adopted.

The actual number and percentage of cases assigned to the different causes of blindness are given in Table B in the Appendix; but, before the more important individual conditions are discussed in detail, certain general considerations associated with the causes of blindness as a whole deserve attention.

It will be observed from Table B that 2,746 cases, or more than 85 per cent. of the total, fall into the two large cause groups, Congenital and Undetermined Conditions and Infectious and Toxic Conditions. As regards individual causes, cataract (540 cases or 16.77 per cent.) and myopia (526 cases or 16.34 per cent.) are by far the most important. Venereal disease (including ophthalmia neonatorum, gonorrhoea, congenital and acquired syphilis) was responsible, however, for a total of 449 cases, or 13.9 per cent. Actually, these three conditions, cataract, myopia and venereal diseases, accounted for 47.05 per cent., or almost one-half of all cases. Other important individual causes were so-called chronic septicaemia (345 cases or 10.72 per cent.) and glaucoma (280 cases or 8.7 per cent.), while congenital anomalies and abiotrophy are together responsible for 240 cases or 7.45 per cent., and all injuries for 207 cases or 6.4 per cent. These more important individual

conditions are for convenience grouped together in the following statement :

TABLE VIII

Principal Causes of Blindness (By 2nd Eye Classification)	No. of Cases	Percentage of all Cases
Cataract	540	16'77
Myopia	526	16'34
Venereal Diseases	449	13'94
Chronic Septicaemia	345	10'72
Glaucoma	280	8'70
Congenital Anomalies and Abiotrophy	240	7'45
Injury	207	6'42
Total	2,587	80'34

Causes Standardised for Age and Sex.

It has been shown in an earlier section of this report that the individuals examined at the Regional Clinic cannot be regarded as a random sample of the blind population in Glasgow and South-West Scotland, factors such as age, sex, economic and social position all having a selective influence in determining attendance for examination. This fact is of importance because it makes comparison with the results of the analysis of blindness in other districts a matter of considerable difficulty. The difficulty is increased when it is remembered that other differences may exist between districts according to the efficiency or otherwise of the organisation for the welfare of the blind; the efficiency of the examination and the standards of blindness employed; the prosperity, the age and sex constitution of the population at risk and the nature of the trades and industries in the districts concerned. Compulsory registration of the blind on a uniform standard and by equally competent examiners would, of course, remove some of these difficulties; but, as this is not obtainable at the present time, it is felt that any published survey of the causes of blindness should include information regarding age and sex distribution and, if possible, the social and occupational distribution of the blind analysed and of the population from which they are recruited.

Information is given in other parts of this report regarding social and occupational distribution, but at this stage consideration may be directed to the effect on the distribution in causes of the

3,219 cases analysed by correction for age and sex. This is shown in Table C in the Appendix, where the figures have been standardised on the basis of the sex and age distribution of the population for the whole of Scotland. It will be observed that this correction has the effect of increasing the relative proportion of cases falling into causes which produce blindness late in life, *e.g.*, cataract and glaucoma; while it reduces, although to a less extent, those producing blindness at earlier years. Generally speaking, however, standardisation makes no material change in the order of importance of the individual causes.

Causes in Relation to Duration of Blindness.

So far the cases analysed have been shown as a percentage distribution in relation to cause of blindness, but in this way the disabling effects of the various conditions and their economic importance is not sufficiently brought into relief. Accordingly, the "patient years" of blindness for each cause and cause group have been calculated and shown in Appendix Table C as a percentage of the total number of "patient years" of blindness produced by all causes. The method by which these calculations have been made may be illustrated by the following example. Congenital anomalies were the cause of blindness in 153 cases,

TABLE IX

Cause of Blindness	No. of Cases	Percentage Distribution		"Patient Years" of Blindness as Percentage of Total
		Crude	Standardised	
Cataract	540	16·8	18·2	5·6
Myopia	526	16·3	16·2	10·3
Chronic Septicaemia ...	345	10·7	10·8	12·0
Syphilis Congenital ...	152	4·7	4·4	7·1
Syphilis Acquired ...	196	6·1	5·8	3·8
Glaucoma	280	8·7	9·3	3·7
Injury—All Forms ...	207	6·4	6·2	11·3
Congenital Anomalies ...	153	4·8	4·5	11·4
Ophthalmia Neonatorum ..	99	3·1	2·9	10·1
Abiotrophy	87	2·7	2·5	2·3
Phlyctenular Disease ...	84	2·6	2·5	4·4
Local Infections	81	2·5	2·6	3·2
Others	469	4·6	4·1	14·8
All Causes	3,219	100·0	100·0	100·0

the mean age of onset of blindness being 14.4 years, while the average age at examination was 35.1 years. These 153 cases were, therefore, on an average blind for 20.7 years and were responsible for 3,167.1 patient years of blindness. This latter figure represents 11.39 per cent. of the 28,169.4 patient years, which is the total for all cases analysed. When the various causes are examined in this way interesting differences will be observed in their relative order of importance. Thus cataract and myopia, which head the list in order of frequency when considered according to percentage of cases, fall to seventh and fourth places respectively in relation to patient years of blindness. That is to say, while these conditions cause the greatest number of cases of blindness they are not responsible for such a long period of loss of sight as other conditions. The figures for all causes, as has been mentioned, are given in Appendix Table C, but for convenience those relating to the more important causes are shown below (Table IX):

Chronic septicaemia, congenital anomalies and injury show the highest proportion of "patient years" of blindness, in that order, with myopia at fourth place and ophthalmia neonatorum fifth. Actually, these five conditions with syphilis are responsible for 66 per cent. of the total "patient years" of blindness, although accounting for only 52 per cent. of all cases.

Age Distribution in Relation to Causes of Blindness.

The age distribution in regard to each of the more important conditions producing loss of vision is discussed at a later stage in this report. Consideration may be given at this point, however, to the general relationship of the various causes to blindness at different age periods.

Table D of the Appendix shows in detail the mean ages of onset and of blindness for all the individual causes, and it will be observed that, as regards blindness, they vary from 9 years in the case of ophthalmia neonatorum to 65 years for cataract, while those of onset extend from 1 year for ophthalmia neonatorum and congenital anomalies to 61 years for vascular diseases. The table brings out, however, the very considerable variability or scatter around the mean age in most instances as revealed by the standard deviation. Moreover, it must be pointed out that the difficulty in determining accurately the onset of conditions of an insidious nature, such as myopia and abiotrophy, renders the mean ages in certain cases open to criticism. No important deductions can be drawn, therefore, from these figures, and they can only be regarded as indicating the relative importance of individual causes at different periods of life.

Table X has been included to illustrate the average duration from onset to actual blindness of the more important causes.

TABLE X

Cause of Blindness	Mean Age Onset	Mean Age Blindness	Average Duration in Years
Myopia (526)	16'2	52'4	36'2
Trachoma (26)	24'4	49'9	25'5
Phlyctenular Disease (84) ...	10'0	35'0	25'0
Abiotrophy (87)	20'8	39'5	18'7
Congenital Anomalies (153) ...	1'0	14'4	13'4
Chronic Septicaemia (345) ...	33'9	46'3	12'4
Congenital Syphilis (152) ...	14'1	24'7	10'6
Local Infections (81)	41'1	50'6	9'5
Ophthalmia Neonatorum (99)	1'0	9'0	8'0
Measles (28)	5'8	12'2	6'4
Cataract (540)	60'5	65'6	5'1
Diabetes (43)	56'5	61'1	4'6
Non-Industrial Injury (28) ...	31'6	35'5	3'9
Glaucoma (280)	58'9	61'9	2'9
Industrial Injury (81)	37'9	40'7	2'8
Sympathetic Ophthalmia (71)...	32'2	34'9	2'7
Meningitis (39)	10'3	12'9	2'6
Vascular Disease (100)	60'8	63'3	2'5
Acquired Syphilis (196)	42'2	43'9	1'7
Diseases of Central Nervous System (37)	30'8	32'4	1'6
Intra-Ocular Tumour (36) ...	34'5	36'1	1'6
All Cases	34'5	46'6	12'1

The criticisms referred to above also affect these figures and they can be considered only of relative value. They bring into relief, however, the long duration before actual loss of vision occurs in certain diseases, *e.g.*, myopia, trachoma, abiotrophy and phlyctenular disease, and emphasise the considerable period available for therapeutic measures in some of these conditions.

The age in relation to cause of blindness has been considered so far strictly from the standpoint of the average age of onset and of loss of vision. It is difficult to obtain, however, in this way a comprehensive picture of the importance of the various pathological conditions at different stages of life because, apart from other considerations, no account is taken of the distribution around the mean age. An attempt has been made to overcome this difficulty in Appendix Tables E, F and G, by calculating the proportion of cases blind from various causes in certain age

groups. The six periods used, broadly described as pre-school, school, adolescent, working, pension and senescent periods, are considered in relation to (a) the large groups of causes and (b) the individual causes of blindness.

Pre-School Period (0-4 years).—The incidence of blindness during this period is relatively high in comparison with that of other periods. It has been mentioned previously that blindness in the first year exceeds that of any other year of life. The most important causes of blindness fall into the two large groups, congenital and undetermined conditions and exogenous infections. The individual causes chiefly responsible are congenital anomalies (98) and ophthalmia neonatorum (79), together accounting for 68.1 per cent. of all cases becoming blind during the pre-school period. Various intracranial conditions are responsible for 25 per cent. of the cases, the precise causes being birth injury (3), brain tumour (3), other diseases of the central nervous system (11), and meningitis (16). It is probable that a greater number of these conditions should be ascribed to cerebral trauma at birth or to defect of cerebral development. Another important, although not numerically large, cause is the infectious fevers.

School Period (5-15 years).—The incidence of blindness is at its lowest during this period. Endogenous infections and injuries between them make up 70.68 per cent. of the cases. The largest single cause is congenital syphilis, which is responsible for about one quarter of blindness in the school period. Casual injury with sympathetic ophthalmia is next in importance. Myopia makes its first appearance at this early age, affecting 8 or 3.9 per cent. of the total cases.

Adolescent Period (16-29 years).—Endogenous infections and congenital and undetermined conditions are the most common causes during this period. Syphilis is again the most important individual cause, but it now includes acquired syphilis, the proportion of acquired to congenital syphilis being one to four. Traumatic conditions of various kinds caused blindness in 17.28 per cent., as follows:

	No. of Cases	Percentage
Industrial Injury	18	6.82
Sympathetic Ophthalmia	13	4.92
War Injury	7	2.65
Non-Industrial Injury	6	2.27
Others	2	0.62
All Injuries	46	17.28

Chronic septicaemia, a heterogeneous group of conditions probably more accurately described as abiotrophic or degenerative, accounts for 43 or 16.28 per cent. of all cases. Myopia (13.26 per cent.)

and abiotrophy (9.47 per cent.), homochrone inherited defects, are together responsible for more than one-fifth of blindness during this period.

Working Period (30-49 years).—Endogenous and congenital and undetermined conditions give rise to the great mass of blindness during the working period. Syphilis, the most important individual cause, accounts for one-fifth of the total cases, the proportion of congenital to acquired syphilis being one to three. Myopia (17.92 per cent.) comes next in importance, and with abiotrophy (4.5 per cent.) is responsible for more than 20 per cent. of all cases of blindness. Chronic septicaemia accounts for 15.3 per cent. and injury for 10.43 per cent. The proportions of the various traumatic conditions were :—

	No. of Cases	Percentage
Industrial Injury	46	6.30
Non-industrial Injury	5	0.68
Sympathetic Ophthalmia	18	2.50
War Injury	1	0.13
Others	6	0.82
	<hr/> 76	<hr/> 10.43

Cataract (5.1 per cent.) and glaucoma (4.4 per cent.) make their first appearance as measurable causes of blindness.

Pension Period (50-69 years).—Endogenous causes in this period no longer occupy the leading position and are displaced by congenital and undetermined conditions which gave rise to blindness in about two-thirds of the total cases. The characteristic feature of the pension period is the high incidence of diseases of a degenerative type, such as myopia (22.62 per cent.), cataract (22.10 per cent.), glaucoma (12.71 per cent.), and vascular disease (4.95 per cent.), together responsible for more than 60 per cent. of all cases. Focal sepsis is the cause of a further 10.05 per cent. Syphilis (5.83 per cent.) and injury (4 per cent.) are not so important as causes of blindness as in previous periods of life.

Senescent Period (70 years and over).—More than three-quarters of blindness during this period is due to congenital and undetermined conditions. The most important individual causes are cataract (51.8 per cent.) and glaucoma (16.24 per cent.), blindness in the remaining cases being mainly due to chronic septicaemia, myopia and vascular disease.

Sex Distribution, in Relation to Causes of Blindness.

The percentage distribution in sexes of the 3,219 cases as a whole and in relation to the individual causes of blindness is set out in Appendix Table H. The significance of the sex differences

observed in these crude percentages has been assessed by applying the ordinary *p.q.* standard error test to the differences between the proportion of males in each cause and the proportion of this sex in the population at risk. As the percentage of males in the population of Glasgow and South-West Scotland was 48.67 per cent. at the Census, 1931, any cause of blindness affecting males in this proportion or varying from it by no more than can be attributed to chance may be considered to act equally in both sexes; on the other hand, differences of $\pm$ twice or more times the standard error will indicate that males are either more or less liable to blindness from that condition than females. The standard errors have been calculated for each cause of blindness except where the number of cases falls below 25 and the results are stated in Column 2 of the Table. No allowance, however, has been made in this way for age variations in the two sexes. This is of importance particularly in regard to conditions most prevalent in later life because, owing to the preponderance of females in the older age groups, any excess among males may be understated or even hidden. Accordingly, in Column 3 the crude percentages have been standardised for age, using the population of Scotland as the standard.

The incidence of males is significantly higher in all the large groups with the single exception of exogenous infections. As regards individual causes, an excess of males is found in abiotrophy, glaucoma, other primary defects, acquired syphilis, non-industrial and industrial injuries and sympathetic ophthalmia, vascular disease and disease of the central nervous system other than tumour. Females, on the other hand, are significantly in excess only in respect of diabetes, but meningitis as a cause of blindness falls little short of significance in this sex.

It is of interest to note that only in the case of the endogenous group of causes is a hidden male preponderance revealed by standardisation for age, but in most instances and particularly in regard to acquired syphilis and industrial injuries this correction accentuates the sex differences.

Occupation in Relation to Causes of Blindness.

The distribution as regards occupation of the 3,219 persons the subject of the present report is set out in the following statement :

	Males	Females	Total
Gainfully Occupied	1,461	288	1,749
Housewives	—	1,001	1,001
School	71	57	128
Blind Asylum (not previously occupied)	108	52	160
Not stated	91	90	181
Total	1,731	1,488	3,219

STATISTICAL ANALYSIS OF 3,219 PERSONS CERTIFIED BLIND 357

The actual occupation in which the 1,749 persons were engaged prior to blindness is given in extended form in Table A of the Appendix. The classification adopted follows, that used by the Registrar-General in Census reports and it will be observed that only two of the 31 occupational orders, namely, Workers in Precious Metals, and Makers of Watches, etc., are unrepresented. The population at risk in these two occupations in Glasgow and South-West Scotland is small. Many of the groups given in Table A include very few blind persons, and consideration of the relationship of occupation to blindness has been confined, therefore, to those occupational orders containing 50 or more persons. The crude rates of blindness in these latter occupations are shown in the following table, together with the rates when corrected for age and sex using the population gainfully occupied in the whole of Scotland as the basis of standardisation.

TABLE XI

Code No.	Occupational Order	Population in Glasgow and South-West Scotland Census 1931	No. of Blind	Crude Rate per 10,000 of Population Gainfully Employed	Corrected Rate per 10,000 of Population Gainfully Employed
III	Agricultural Occupations	41,999	53	12'62	10'72
	Mining and Quarrying				
	Occupations	72,124	209	28'98	39'03
VII	Metal Workers	145,397	299	20'56	17'04
XII	Textile Workers	43,304	76	17'55	22'53
XIII	Makers of Textile Goods	36,797	74	20'11	17'67
XV	Workers in Wood and Furniture	35,549	61	17'16	22'91
XXII	Workers in Transport and Communication	108,904	166	15'24	18'05
XXIII	Commercial Occupations (excl. Clerks)	139,050	127	9'13	9'98
XXV	Professional Occupations (excl. Clerks)	46,754	56	11'98	11'66
XXVII	Personal Service Occupations	112,095	107	9'55	7'34
XXXI	Other and Undefined Workers	129,723	231	17'81	15'13
	All Other Occupations	260,688	290	11'12	12'95
	Total Gainfully Occupied	1,172,384	1,749	14'92	14'88

Miners show a much higher incidence of blindness than does any other occupational order. The corrected rate of blindness in this group is 39.03 per 10,000 of the population at risk, almost three times that for all persons gainfully occupied in Glasgow and South-West Scotland. Workers in Wood and Furniture (22.91 per 10,000) and Textile Workers (22.53 per 10,000) also show rates considerably in excess of the mean. On the other hand, lower than average rates are found among the Professional, Agricultural, Commercial and Personal Service groups. Metal Workers show an unexpectedly low rate when compared with Miners and Workers in Wood and Furniture.

The more important causes of blindness in relation to the several occupational orders are given in Table J in the Appendix as a rate per 10,000 of the population gainfully employed and as a percentage distribution.

A study of the tables gives no satisfactory explanation of the divergences in the rate of blindness shown by the different occupational orders. Calculation of the standard errors of the difference between the percentage of each cause and its mean shows that none of these differences are statistically significant.

Nationality in Relation to Causes of Blindness.

It has already been mentioned (p. 341) that a larger number of Irish born are included among the 3,219 blind persons analysed than would be expected from the proportion of that nationality in the population of Glasgow and South-West Scotland. This excess of Irish born is again in evidence when, as in Appendix Table K, the individual causes of blindness are considered in relation to place of birth. The X^2 test, comparing the actual number of cases in each nationality with the number to be expected in terms of the total population, has been applied to each cause and cause group in Table K, and Table XII shows those which exhibit statistically significant divergences from expectation.

It should be pointed out that these comparisons do not make any allowance for age and sex differences in the compositions of the population in the several nationalities. The Scottish born show no rate above expectation, but significantly lower than average rates are found in respect of all causes as a whole, the large cause group Congenital and Undetermined Causes, and cataract. Those of English and Welsh nationality are significantly in excess as regards all causes as a whole, the large group, Endogenous Infections, and the individual causes, glaucoma, congenital syphilis, and chronic septicaemia. Those born outside the United Kingdom and Ireland do not differ from expectation except in the cases of all causes as a whole and the group Congenital and Undetermined Conditions, in which the rates are significantly

TABLE XII

Cause of Blindness	Place of Birth			Others
	Scotland	England and Wales	Ireland	
Abiotrophy	O	O	+	O
Myopia	O	O	+	O
Glaucoma	O	+	+	O
Cataract	—	O	+	O
All Congenital and Undetermined Causes	—	O	+	—
Trachoma	O	O	+	O
Local Infections	O	O	+	O
All Exogenous Infections ...	O	O	+	O
Congenital Syphilis... ..	O	+	O	O
Acquired Syphilis	O	O	+	O
Chronic Septicaemia	O	+	+	O
All Endogenous Infections...	O	+	+	O
Non-Industrial Injury	O	O	+	O
Industrial Injury	O	O	+	O
All Traumatic and Chemo-Toxic Conditions... ..	O	O	+	O
Vascular Disease	O	O	+	O
All General Diseases	O	O	+	O
All Causes	—	+	++	O

(+ = Significant Excess; — = Significant Deficiency;
O = Insignificant Divergence.)

lower. The most striking divergences are shown, however, by those of Irish nationality, among whom the rates in all causes and cause groups are significantly above the average, with the single exception of congenital syphilis. It is probable that the higher rates among the Irish born are to be explained by a number of different factors, among which the following are the more important.

1.—Age and Sex Distribution of the Population.

The influence of age and sex in causing the higher rates among the Irish born is brought into relief when it is recollected that at the Census of 1931 47·5 per cent. of persons of this nationality in Scotland were over 50 years of age, as compared with 21·7 per cent. for the population as a whole; while as regards sex, the proportions of males were 55·3 per cent. and 48·7 per cent. respectively.

It has not been found possible to make allowance in the rates shown in Table K for variations in age and sex because of the lack of adequate data; but their probable importance is emphasised when the crude rates for all causes as a whole according to nationality are standardised for these factors (Table XIII).

TABLE XIII

Place of Birth	Number of Cases	Crude Rate per 10,000 of Population of Glasgow and S.W. Glasgow	Rate per 10,000 Corrected for Age and Sex on Total Scottish Population
Scotland	2,672	11'31	12'93
England and Wales	126	15'34	12'47
Ireland	340	32'91	18'23—± 2'09
Others	20	6'73	5'81—± 5'23
			These are S.E.'s of the percentages
Not Stated ...	61	—	—
All Nationalities ...	3,219	12'48	13'49

Standard Error of Difference between Ireland and All = 2'17
Standard Error of Difference between Others and All = 5'3

While all the crude rates are affected to some degree by standardisation, the most striking difference is shown in the case of the Irish born, and it must be concluded that the high general and individual rates of blindness shown by those of this nationality are due in a large measure to the higher proportion of older persons and to the greater percentage of those of the male sex. It will be observed, however, that despite correction for age and sex, the general rate of blindness among the Irish community is significantly in excess of that for all nationalities as a whole.

2.—Occupation and Social Status.

The blind in the various nationality groups arranged according to the social groups considered earlier in the report (*vide* p. 344) are given in Table XIV.

TABLE XIV

Social Category	Place of Birth						Others	All Cases		Standard Error of Difference Group 4 plus 1 st Group 5
	Ireland		England and Wales		Scotland					
	No.	%	No.	%	No.	%	No.	No.	%	
1	—	—	—	—	—	—	—	—	—	Scotland— Ireland ±3'65 Ireland— All Cases ±3'64
2	2	0'95	19	21'35	120	8'35	—	141	8'06	
3	56	26'67	18	20'23	525	36'53	6	605	34'59	
4	76	36'19	32	30'95	566	39'39	5	679	38'82	
5	76	36'19	20	22'47	226	15'72	2	324	18'52	
Not Stated	130		37		1235		7	1470		
All Categories	340		126		2672		20	3219		Scotland— All Cases ±3'09

The proportion of Irish born in the two lower social categories is 72·38 per cent. (as compared with 55·11 per cent. for those of Scottish nationality) and 57·34 per cent. for all nationalities. The standard error of the observed differences has been calculated in the table and shows that the excess of Irish born in both instances is statistically significant.

Here it would seem that the factor of need for financial aid must enter into the problem since the proportion in Classes 4 and 5 is high. The Irish would not readily find the means of returning to their own country and becoming a charge on their relatives as do the Scottish and English, hence their attendance at the clinic might be more urgent than for the natives, and the proportion of Irish be high quite independently of excessive blindness.

3.—Treatment.

With the object of ascertaining whether the high rate of blindness among the Irish born is related to lack of adequate previous treatment, the proportion of cases in each nationality which had received no special ophthalmic treatment has been calculated (Table XIV A).

TABLE XIVA

Place of Birth	Percentage with no Special Ophthalmic Treatment	Difference
Scotland	15.08 ± 0.69	Scotland—England and Wales = 3.79 ± 3.25
England and Wales	11.29 ± 2.82	Scotland—Ireland = 5.89 ± 2.10
Ireland	20.97 ± 2.21	England and Wales —Ireland = 9.69 ± 4.03
Others	Nil	Ireland—All Cases = 5.35 ± 2.08
All Cases	15.61 ± 0.64	

The Irish percentage with no specialist treatment is therefore significantly higher than that of any other nationality and for all cases together. The differences are probably closely related to the social groupings mentioned above. It should be pointed out, however, that the proportion of cases in which further treatment was considered necessary, or in which treatment was regarded as likely to improve vision, was not significantly higher among the Irish than among those of other nationalities. It would appear, therefore, that the lack of previous treatment cannot be regarded as contributing to a substantial extent to the higher incidence of blindness in persons of Irish nationality.

Having regard to all the circumstances, therefore, it must be concluded that the high incidence of blindness among the Irish community is in the main due to the age and sex constitution of the Irish population in Scotland, but that occupation and social status play a part of some importance.

Family History in Relation to Causes of Blindness.

When the medical case record used at the Regional Clinic was drawn up, it was anticipated that it would be possible to obtain from the analysis of a large series of cases valuable information concerning the genetic influences operating in the various causes of blindness. For this purpose, therefore, the ophthalmologists were asked to obtain for each case examined the answer to the question, "Is there a similar defect in parents or relatives?" It was hoped that by interrogation on these lines the relationship of heredity would be brought into relief, while data would be forthcoming regarding the familial incidence of communicable causes of blindness such as syphilis and trachoma. Unfortunately, for a number of different reasons, the information which has been

obtained by this method can be regarded as only of very limited value. In the first place, the history given has been found in many instances to be unreliable or misleading. Experience at the clinic has revealed the extraordinary lack of knowledge shown by many patients and relatives not only of the physical condition but of the actual existence of other members of the family, while in some instances there was a reluctance to admit a familial defect. Again, it was possible in only comparatively few cases to confirm the existence of the defect in relatives by ophthalmological examination. This may be of only minor importance in conditions such as Leber's atrophy or retinitis pigmentosa where the history is as a rule characteristic, but in many instances great difficulty was experienced in deciding whether the condition said to exist in relatives was in fact similar in nature to that found on examination of the patient. Finally, in assessing the value of the family history, variations in size of family must be borne in mind, a negative history from a small sibship being obviously of less importance than a similar reply from a large sibship. It has not been found possible to make allowance for this factor.

TABLE XV

Cause of Blindness	No. of Cases	No. with Family History	Percentage
<i>(a) Possibly Hereditary :</i>			
Abiotrophy	81	42	51'85
Congenital Anomalies ...	144	49	34'02
Myopia	435	132	30'34
Cataract	415	50	12'05
Total	1,075	273	25'4
<i>(b) Infectious, Contagious, and Environmental Influence :</i>			
Trachoma	26	5	19'30
Syphilis, Congenital ...	139	20	14'39
Syphilis, Acquired ...	177	16	9'03
Local Infections	61	5	8'19
Tuberculosis	19	1	5'26
Phlyctenular Disease ...	80	4	5'00
Total	502	51	10'16
<i>(c) All other Causes ...</i>	1,101	71	6'44
All Causes	2,678	395	14'74

Having regard, therefore, to these various circumstances, it is considered that no conclusions are justified from the analysis of data obtained in this manner. As a matter of interest, however, Table XV has been prepared to show the proportion of cases who gave a positive family history among those cases of blindness generally regarded as having a hereditary, infectious or environmental relationship.

Results of Present Analysis Compared with those of Other Surveys.

It has already been mentioned that comparison of the cases falling under the various causes of blindness in different countries or districts is a matter of considerable difficulty owing to the existence of variables in the sample of the blind analysed. This is particularly so with regard to statistics relating to countries outside the United Kingdom, because of the different standards of blindness and conditions of certification in use. Within recent years, however, two surveys of blindness in this country have been published—one by Evans (1938) regarding the causation of blindness in 1,000 cases in Birmingham and the other, by the Prevention of Blindness Committee (1938), giving the results of the analysis of 5,290 cases of blindness. It may be of interest, therefore, to compare the results of these two investigations with that of the present analysis. The figures in relation to causes of blindness for the three reports are shown in the following Table (XVI), the cases from the present series being limited to those in which the same

TABLE XVI

Cause of Blindness	Glasgow & South-West Scotland (2,885 cases)	England and Wales (5,290 cases)	Birmingham 1,000
	Per cent.	Per cent.	Per cent.
Myopia	15'90	10'24	4'4
Cataract	15'15	24'97	18'8
Syphilis, Congenital ...	5'20	5'12	11'1
Syphilis, Acquired ...	6'55	2'83	3'7
Chronic Septicaemia ...	10'81	1'59	—
Glaucoma	8'87	11'85	6'9
Congenital Anomalies and Developmental Conditions	8'07	10'96	9'0
Injury—Industrial ...	2'95	1'30	1'9
Injury—Others	2'88	2'16	—
Local Infections	2'29	5'97	4'30
Ophthalmia Neonatorum	3'43	4'91	8'60
Other Causes	17'90	18'07	31'3

cause acted in both eyes, in conformity with those of the other two analyses.

A study of the Birmingham figures, which show a high proportion among causes producing blindness in young children, would appear to indicate that the age distribution of the cases at the time of examination was different from both the Glasgow figures and those of England and Wales. As a result, satisfactory comparison is not possible. As regards the Glasgow figures and those for England and Wales, however, almost two-thirds of the cases were over fifty years of age at examination and the divergencies in the proportion due to different causes deserve further attention. Cataract, glaucoma, congenital anomalies and developmental conditions, local infections and ophthalmia neonatorum in the English series are all in excess of the Glasgow figures, while the reverse is the case in regard to myopia, acquired syphilis, industrial trauma and chronic septicaemia, the difference in certain causes being of considerable magnitude. Some of the divergencies shown are more or less capable of explanation. Thus the higher proportion of industrial injuries in the present series is due in all probability to the highly industrialised nature of the population in Glasgow and South-West Scotland, while that of acquired syphilis may be due to the fact that the Kahn reaction, which was taken as a routine measure, was used as a criterion of diagnosis. Again, the differences in myopia and cataract are probably largely due to the fact that in a proportion of cases becoming blind from these conditions more than one cause existed and the proper classification presented difficulties. For example, cataract was a complication in 136 of the 525 cases classified in the present series as blind from myopia, and in 26 of those blind from corneal ulceration. It was necessary in these cases for the examiner to decide whether they should be coded as due to cataract or to myopia or corneal ulceration as the case may be. If these 162 cases are added to those classified as blind from cataract the proportion of cases due to this condition rises to 21.4 per cent., while that of myopia falls to 11.8 per cent. These figures approximate more closely to those for England and Wales and it is probable that this difference in classification is the main cause of the divergence shown in the table. Chronic septicaemia, however, is in a somewhat different category. The Glasgow figure for this condition is 10.9 per cent., as compared with 1.6 per cent. for England and Wales. Here again the method of classification may account partly for the difference. The two groups in the England and Wales report, namely macular choroiditis and optic nerve atrophy, for which no cause was assigned, account for 5.5 per cent. of the total cases and are not represented as such in the present report. It is probable, therefore, that these conditions in the Glasgow report have

been distributed partly under chronic septicaemia and partly under syphilis and vascular diseases. Even if allowance is made for these differences in classification, however, the Glasgow percentage for chronic septicaemia still remains considerably in excess of that for England and Wales. It should be pointed out in this connection that the defect in about two-thirds of the cases in the present series coded as blind from chronic septicaemia was irido-cyclitis. It would appear, therefore, that a real and striking difference in the incidence of chronic septicaemia was present in the two areas.

Data Relating to Individual Causes of Blindness.

The causes of blindness of the 3,219 cases under analysis have so far been dealt with as a whole. It may be useful at this point, therefore, to consider somewhat more fully certain of the more important causes and at the same time summarise the facts which have been dealt with in a more general manner in the previous pages.

Congenital Anomalies.

Congenital anomalies were recorded as the cause of blindness in 153 cases (4.75 per cent.), and in 147 cases both eyes were similarly affected. There was no significant difference between the sexes and the mean age of blindness was 14.4 years. The particular defects found were:

Cataract	79 cases
Buphthalmos	12 cases
Microphthalmos	12 cases
Anophthalmos	5 cases
Aniridia and Sequelae	9 cases
Amblyopia	2 cases
Amblyopia with Nystagmus	7 cases
Amblyopia with Albinism	7 cases
Amblyopia with Dislocated Lens	5 cases
Optic Nerve Atrophy	5 cases
Ptosis	1 case
Unspecified	9 cases

It is worthy of note that a certain number of the 79 cases of congenital cataract may have been cataract associated with spasmophilia, while some of the cases of amblyopia, nystagmus and optic nerve atrophy may have been caused by birth injury.

A high proportion are recorded as having received no previous treatment, but, as has been mentioned before, this would appear to be due to an erroneous history. Further treatment was expected to improve vision in 21 cases, the majority of whom were affected by cataract.

Abiotrophy.

Abiotrophy was the cause of blindness in 87 cases (2.7 per cent.), both eyes being similarly affected in all except one case.

As would be expected, having regard to the known fact that in a considerable proportion of the cases the transmission is of the nature of a sex-linked recessive, there was a significant excess of males, the standardised percentage being 76.2 per cent. The average age of onset of the condition was 20.8 years and that of blindness 39.5 years.

The defects found were pigmentary degeneration of retina 66 cases, Leber's atrophy 18 cases, corneal conditions 2 cases, the remaining case being one of familial macular degeneration. The two cases with corneal conditions were affected one with familial nodular degeneration of the cornea and the other with conical cornea.

Myopia.

Myopia was the second most important cause of blindness in the present series, and accounted for 526 cases or 16.34 per cent. of the total cases analysed. This condition was the cause of blindness in both eyes in 459 cases, and it is interesting to note that in only 40 cases, or 7.6 per cent. of all cases blind from myopia, was there an association with injury. The percentage of all monocular injuries was 7.9, and it would appear, therefore, that there was not a greater prevalence of injuries in myopes as might have been expected. The sexes were more or less equally represented and the mean age of blindness was 52.4 years. It was considered that further treatment would improve vision in 87 cases, most of which were myopia associated with cataract.

Complications were noted in all cases with one exception, and in certain instances more than one complication was present. The chief complications, however, were as follows:

Choroido-retinal Degeneration	288 cases
Cataract	136 cases
Detachment of the Retina	66 cases
Corneal Opacities	14 cases
Optic Nerve Atrophy	9 cases
Occlusio-Seclusio Pupillae	4 cases
Enucleated Eye	5 cases
Glaucoma	1 case
Unspecified	2 cases

Detachment of the retina was a complicating factor in 66 cases, and it is interesting to note that fully 70 per cent. of these were of the male sex, a fact which suggests an association with occupational activity. This is in substantial agreement with the results of other studies. Stallard and Boucet, for example, quoted by J. Ringland Anderson in his monograph "Detachment of the Retina," found that 62 per cent. of their cases of detachment of the retina occurred in males, while Sattler (1905) found the proportion 66 per cent. As regards age of onset, detachment of the

retina was most commonly found in the earlier ages, 70.8 per cent. of the cases with this complication becoming blind before reaching fifty years of age, the majority falling into the age group 20-50 years; the period of maximum occupational activity. This fact when considered with the sex ratio of this complication would appear to support the close association of injury or strain as an aetiological factor. The cases complicated by choroido-retinal degeneration, on the other hand, became blind in most cases in the age group 50-60 years, 57 per cent. of the cases falling into this category; while cases complicated by cataract were mostly of more advanced ages, blindness in 52.6 per cent. of the patients occurring after the age of 60 years. The percentage age distribution of these three more important complications of myopia is set out in Table XVII:

TABLE XVII

Complication	Age Group					
	-30	-40	-50	-60	-70	+70
Detachment of Retina ...	17.2	28.3	25.3	20.2	7.1	2.0
Choroido-retinal Degeneration	13.2	5.7	25.5	32.1	22.6	0.9
Cataract	1.1	3.4	8.4	34.6	42.5	10.1

Summarising the facts revealed by this study, blindness occurring among myopes below the age of 40 years was most commonly due to detachment of the retina; during middle life to the advent of choroido-retinal degeneration; while those cases spared these complications became blind at later ages as a result of the onset of degenerative changes in the lens.

Degree of Myopia.—Information regarding the degree of myopia present is available for 142 of the total cases blind from this condition, and its relation to the more important complications is shown in Table XVIII.

A high degree of myopia was present in the great proportion of those blind from myopia with choroido-retinal disease, only three cases (6.1 per cent.) having a refraction below 10 dioptries. The number of cases of detachment of the retina is small, but approximately one-third gave a refraction of below 10 dioptries. This is in accordance with the general findings that although

TABLE XVIII
Degree of Myopia in Dioptres

Complication	Below 5 dioptres		5 and under 10 dioptres		10 and under 15 dioptres		15 and under 20 dioptres		20 dioptres and over		Total Cases
	No. of Cases	Per cent.	No. of Cases	Per cent.	No. of Cases	Per cent.	No. of Cases	Per cent.	No. of Cases	Per cent.	
Choroido- Retinal Disease...	1	2'0	2	4'1	12	24'5	17	34'7	17	34'7	49
Cataract ...	2	4'8	7	16'7	11	26'2	8	19'0	14	33'3	42
Detachment of Retina	—	—	9	34'6	7	26'9	8	30'8	2	7'7	26
Others ...	3	12'0	8	32'0	3	12'0	8	32'0	3	12'0	25
Total ...	6	4'23	26	18.31	33	23'24	41	28'87	36	25'35	142

The average of the two meridians was taken in cases of myopic astigmatism and the average was also taken where inequal refraction in both eyes was found.

retinal detachment occurs more frequently in high myopes it may also occur in cases with a lower degree.

Glaucoma.

It should be pointed out that in this analysis no attempt has been made to distinguish between blindness occurring from the acute and from the chronic forms of glaucoma. The following types of this disease may, however, be dealt with separately: Primary glaucoma, secondary glaucoma and congenital glaucoma or buphthalmos.

Primary Glaucoma.—In this category are included 280 cases, or 8·7 per cent. of the total cases analysed, the majority (256 cases) being affected in both eyes by this condition. Males were significantly in excess, the proportion of this sex being 59·5 per cent. The average age of onset was 59 years and of blindness, 62 years. The relative infrequency of primary glaucoma in the earlier years is brought out by the fact that the onset of the disease occurred before the age of 40 years in only 16 cases. The Kahn test was positive in 8·6 per cent. of the cases, a figure significantly greater than that for all cases excluding syphilis. As will be explained later, this higher proportion of positive Kahn tests may be due

to difficulties in diagnosis or to the fact that the presence of syphilis increases the operative risk. As regards previous treatment, it is interesting to note that almost three-quarters of the cases had received some form of surgical treatment. The complications noted were as follows:

Optic Nerve Atrophy	145
Cataract	96
Occlusio Pupillae	15
Phthisis Bulbi, etc.	12
Corneal Opacity	10
Choroido-Retinal Disease	2

Secondary Glaucoma.—In addition to the cases dealt with above, glaucoma occurred as an end result in 55 instances following the undermentioned diseases:

Irido-cyclitis	35 cases
Corneal Ulceration	7 cases
Cataract (following Operation)	4 cases
Thrombosis of Retinal Vein	4 cases
Wounds of the Eyeball	2 cases
Intra-ocular Tumour	2 cases
Myopia	1 case

Buphthalmos.—Blindness in 12 cases in the present series was due to congenital glaucoma or buphthalmos, and these are included under the heading congenital anomalies.

Cataract.

Cataract was the most important cause of blindness in the present analysis, accounting for 540 cases or one-sixth of the total. Both eyes were blind from this condition in 437 cases (80.9 per cent.). The sexes were equally affected. The average age of onset was 60.5 years and that of blindness 65.6 years. The Kahn test was positive in 7.8 per cent. of the cases examined, which is significantly in excess of the average for all the cases in this series where the cause of blindness was not diagnosed as due to syphilis. This fact probably explains some of the operative failures included in this category.

Cataract was uncomplicated in 324 instances, the complications or end results in the remaining cases being as follows:

Choroido-Retinal Disease	66 cases
Optic Nerve Atrophy	26 cases
Corneal Opacities	25 cases
Occlusio-Seclusio	23 cases
Detachment of Retina	12 cases
Anophthalmos	11 cases
Glaucoma	4 cases
Others, including Conjunctivitis	49 cases

Cataract is of particular interest because of all causes of blindness it offers the greatest prospect of restoration of vision by

operation. Thus it has been estimated by the Prevention of Blindness Committee (1937) that 61·8 per cent. of a total of 1,321 cases of cataract analysed were operable and that if this was successful a useful degree of vision might well be restored in 14 per cent. of the total blind in their series. Analysis of the cataract cases included in this report shows that there was a possibility of the restoration of useful vision by operative measures in 306 cases (56·7 per cent.) representing a proportion of 9·5 per cent. for all cases surveyed. The figures are somewhat lower than those found by the Prevention of Blindness Committee, but, as will be shown at a later stage in this report, when cases of secondary cataract are included the percentage in which restoration of vision was considered possible rises to 12·2 of all the cases analysed. It is worthy of mention, however, that 229 cases had previously received operative treatment and that among these it failed to restore vision in 133 instances, while in the remaining 96 cases the treatment was incomplete.

Ophthalmia Neonatorum.

Ophthalmia neonatorum was the cause of blindness in 99 instances (3·07 per cent.), in all of which both eyes were similarly affected. Blindness in the great majority occurred in the first year of life, but in 20 cases complete loss of sight was delayed and in some instances for a considerable period of years. Blindness in this latter group was due in most cases to an association of cataract with corneal opacity, and the examiner formed the opinion that the degree of defect from ophthalmia neonatorum was so extensive that it was doubtful whether benefit would result from operative measures. These cases of delayed loss of vision are responsible for the unexpectedly high mean age of blindness (9 years) which was found for this group. Restoration of vision by further treatment was regarded as likely in only three cases, but it appears that little consideration was given to the possibility of improvement by corneal grafting.

Trachoma.

Trachoma gave rise to loss of sight in 26 instances (0·81 per cent.) in all of which both eyes were affected. The disease in all cases was in a late cicatricial stage. The insidious and prolonged nature of this condition is shown by the fact that the average age of onset was 24·4 years, while that of blindness was 49·9 years. All the cases blind from trachoma had received previous treatment, but it was the opinion of the ophthalmologists that in ten instances further treatment held but the possibility of improvement in vision.

Local Septic Infections of Coats of the Eye.

In this category are included blindness arising from exogenous ulceration of the cornea not due to injury, trachoma or ophthalmia neonatorum, 75 cases; inflammation of the conjunctiva, 2 cases; and inflammation of the lids and lacrymal sac, 4 cases. It will be noted, therefore, that this is not a homogeneous group; and this is brought out when the age distribution of the onset of the disease is examined. Thus in 21 instances the onset was before 15 years of age, in 14 between 16 years and 39 years, the remaining cases commencing at later ages. There is a possibility that the cases in this group occurring in the earlier years were associated with the infectious fevers, although no definite history of this was elicited. Those commencing in later years belong mostly to the well recognised condition, serpiginous ulcer.

Syphilis.

There were 348 cases (10.81 per cent.) diagnosed as blind from syphilis and of these 152 were due to congenital syphilis; the remainder were either caused by the acquired form or could not be definitely recognised as due to congenital syphilis.

Congenital syphilis.—In all cases, with two exceptions, the lesions of this condition caused blindness in both eyes. The sexes were equally affected. The mean age of onset of the disease was 14.1 years and of blindness 25.3 years, but the age distribution shows that blindness in a considerable number was delayed till later years. The clinical diagnosis was confirmed in 54.6 per cent. by the Kahn test. A family history of blindness was obtained in 14.2 per cent. of the cases. The ocular defects produced were as follows:

Interstitial Keratitis	81 cases
Choroiditis	26 cases
Iridocyclitis	23 cases
Optic Nerve Atrophy	13 cases
Choroido-retinitis	8 cases
Indeterminate	1 case

Acquired syphilis and cases not definitely congenital.—Both eyes were similarly affected in 189 of the 196 cases included in this category. As would be expected, there was a significant excess of males, 78.4 per cent. being of this sex. The mean age of onset of the ocular condition was 42.2 years and of blindness 46.6 years. It is interesting to note that in two-thirds of the cases the onset of the disease was between the ages of 30 and 50 years. The Kahn test was positive in 64.5 per cent. of the cases examined. The defects attributed to acquired syphilis were:

Optic Nerve Atrophy	131 cases
Choroido-retinitis	38 cases
Iridocyclitis	22 cases
Interstitial Keratitis	5 cases

Association of syphilis and blindness.—It has already been shown that, of the total cases analysed, loss of vision in 348 or 10.81 per cent. was regarded as due either to acquired or congenital syphilis. This figure, however, includes only those cases which showed clinical manifestations of syphilis, the diagnosis in doubtful cases being confirmed by the Wassermann reaction. It is generally recognised that the clinical diagnosis of syphilis, an admittedly polymorphic disease, is not always an easy matter. Further, the presence of this infection while not actually determining blindness may have an important influence on the course or treatment of other ocular conditions. Thus, for example, it is a matter of clinical observation that the presence of untreated syphilis increases the risk of operative interference. It is probable, therefore, that syphilis made a more important contribution to blindness in the present series than the figures given above would indicate. That this is in fact the case is suggested by a consideration of (a) the results of the Kahn test, and (b) the history of previous anti-syphilitic treatment in the cases in this series.

(a) *Kahn Test.*—The Kahn test has been used at the Regional Clinic because of the comparative ease with which it can be carried out. It should be pointed out, however, that all cases showing a positive response to this test are submitted to the Wassermann reaction for confirmatory diagnosis. An endeavour is made to have the blood of all persons attending at the clinic examined in this way, the only exceptions being the very old, the very young, or those whose condition makes it inadvisable to insist on the performance of the test. There fall to be added to the exceptions, however, patients examined in their homes and those objecting to the test. Actually, the Kahn test was carried out in 2,010 or 62.4 per cent. of the total cases included in this report and was found positive in 252 cases or 12.54 per cent.

(b) *History of previous anti-syphilitic treatment.*—In 95 cases included in the present series blindness was not diagnosed as due to syphilis but the patients gave a history of having received previous anti-syphilitic treatment. The Kahn test was performed in 82 of these and was positive in only 27. There were, therefore, in addition to the groups considered above with either a clinical or serological diagnosis of syphilis, 68 cases or 3.3 per cent. of the total cases analysed in which there was presumptive evidence of a treated syphilitic infection.

Having regard to the foregoing considerations, an attempt may be made to arrive at an estimate of the incidence of syphilis among the blind, by combining the three factors, clinical and serological diagnosis and history of anti-syphilitic treatment. This may be set out in the following manner :

No. of cases with positive Kahn test	= 252
Estimated positive cases among those in which no Kahn test performed (5.07% of 1,136)	= 58
No. of cases diagnosed as blind from syphilis:	
(a) No Kahn test taken	= 75
(b) Negative Kahn test	= 109
No. of cases with history of anti-syphilitic treat- ment, excluding those diagnosed as syphilis:	
(a) No Kahn test taken	= 13
(b) Negative Kahn test	= 55
Total	= 562 or 17.46%

It will be shown later that the percentage of positive Kahn tests in the various groups of causes differs slightly and that these tests were not taken at random. If, however, it is assumed that selection did not operate, another method of assessing the incidence of syphilis among the blind is to weight the observed percentage of positive cases in each cause group by the total number of cases in each group in the following manner:

Cause of Blindness	No. of Cases	Kahn Test: Percentage Positive in Cases tested	Estimated No. of Positive Kahns in Total Cases
Congenital and Undetermined	1,619	6.38	103
Exogenous Infections	209	4.20	9
Endogenous Infections (less Syphilis)	570	1.63	9
Traumatic and Chemical	214	5.92	12
General Disease	236	4.42	10
Not Classified	23	6.67	2
Total	2,871		145

The incidence of syphilis in the present series may, therefore, be calculated in the following manner:

Estimated No. of Positives	= 145
Cases Diagnosed as Syphilis	= 348
Cases with a History of Injection Treatment (No Kahn)	= 13
Cases with a History of Injection Treatment (Kahn Negative)	= 55
All Cases	= 561 or 17.43%

This estimate is very similar to that given previously. It is important to remember, however, that the figure of 17.4 per cent. represents the incidence of syphilis in the blind population examined at the Regional Clinic and not the proportion of cases of blindness caused by syphilis. The latter proportion lies in all probability somewhere between the figure of 17.4 per cent. and

that of 10.81 per cent. representing the group actually diagnosed as blind from syphilis.

It may be of interest at this point to compare the incidence of positive serological tests for syphilis among the blind with that found in other samples of the population. The Kahn test has been performed as a routine measure since 1927 at the various ante-natal clinics in Glasgow and also among cases of gonorrhoea attending the venereal diseases dispensaries. The results in these two groups and among the blind attending the Regional Clinic may be given for comparison—

Source	Total Number of Cases examined by Kahn Test		Kahn Positive	
	1927-1937	Number	Percentage	
Patients attending Ante-Natal Clinics in Glasgow	33,669	861	2.6	
Patients suffering from Gonorrhoea	11,205	492	4.4	
Patients examined at Regional Blind Clinic	3,988	371	9.3	
Total	48,862	1,724	3.5	

Syphilis in relation to Cause of Blindness.—It has been previously mentioned that the Kahn diagnostic test was applied to only a proportion of the cases dealt with in the present analysis. It is, therefore, important to consider whether the group examined in this way can be regarded as a representative sample of the total

TABLE XIX

	Total Cases in Group	Number sub- mitted to Kahn Test	Per- centage Exam- ined	Stand- ard Error	Difference from Average	Difference Standard Error	Average Age at Examina- tion
Congenital and Undeter- mined	1,413	830	58.74	1.31	-0.52	-0.40	59
Exogenous Infections ...	193	111	57.51	3.54	-1.75	-0.49	49
Endogenous, excl. Syphilis	532	343	64.47	2.13	+5.21	+2.45	49
Traumatic and Chemo- toxic	107	73	68.22	4.75	+8.96	+1.89	32
General and Unallocated	234	112	47.86	3.21	-11.40	-3.55	56
Total	2,479	1,469	59.26				

cases. For this purpose the various causes of blindness among those cases in which loss of vision in both eyes was attributed to the same condition have been analysed in relationship to the application of the Kahn test. Table XIX shows the proportion of cases among the five large cause groups submitted to the Kahn test. Cases of blindness definitely diagnosed as due to syphilis have been excluded both from the endogenous infections and from the total.

Higher proportions were examined in the endogenous infections (excluding syphilis) and in the traumatic and chemotoxic groups, while the proportion is lower than the average in those cases assigned to the general diseases and unallocated category. Two of these differences are almost certainly and one possibly significant from the statistical standpoint. It is clear, therefore, that the cases tested cannot be regarded as a random sample. This fact is confirmed when the X^2 test is applied. The value of X^2 is 23.5, indicating that the differences observed in the percentages are such as would occur in random samples much less than once in one hundred times. It would appear from the table that age at examination was the important selective factor in so far as the general diseases and unallocated and traumatic and chemico-toxic categories are concerned, the higher proportion in the latter group being due to the relatively low average age and that of the former to the higher average age at examination. The explanation of the fact that no significant difference is observed in the congenital and undetermined causes is probably to be accounted for by the

TABLE XX

	Number sub- mitted to Kahn Test	Number of Kahn Tests Positive	Per- centage Positive	Stand- ard Error	Difference from Average	Difference Standard Error
Congenital and Undeter- mined	830	52	6.27	1.18	-7.19	-6.12
Exogenous Infections ...	111	5	4.50	3.21	-8.71	-2.71
Endogenous Infections plus Syphilis	607	163	26.85	1.37	+13.64	+9.92
Traumatic and Toxic ...	73	4	5.48	3.96	-7.73	-1.95
General Disease... ..	112	5	4.46	3.20	-8.75	-2.73
Total	1,733	229	13.21			

greater variation in ages among those in this group, while the high percentage in the endogenous (excluding syphilis) category indicates that the Kahn test was used as an aid to diagnosis. This influence of the use of the Kahn test as an aid to diagnosis is again brought out when the positive results are examined.

TABLE XXI

	Number sub- mitted to Kahn Test	Number of Kahn Tests Positive	Per- centage Positive	Stand- ard Error	Difference from Average	Difference Standard Error
Congenital and Unde- termined	830	52	6.27	0.74	1.19	1.60
Exogenous Infections	111	5	4.50	2.04	-0.33	-0.16
Endogenous Infections excl. Syphilis ...	343	5	1.46	1.16	-3.38	-2.91
Traumatic and Toxic	73	4	5.48	2.51	0.65	0.26
General Diseases ...	112	5	4.46	2.03	-0.37	-0.18
Total	1,469	71	4.83			

TABLE XXII

	Number sub- mitted to Kahn Test	Number of Kahn Tests Positive	Per- centage Positive	Stand- ard Error	Difference from Average	Difference Standard Error
Congenital and Unde- termined	830	52	6.02	0.81	0.16	0.20
Exogenous Infections	111	5	4.50	2.23	-1.36	-0.61
Traumatic and Toxic	73	4	5.48	2.75	0.38	-0.14
General Diseases ...	112	5	4.46	2.22	1.40	-0.63
Total	1,126	66	5.86			

Table XX reveals the fact that, as would be expected, a much higher percentage of positive results was obtained for the endogenous group of infections as compared with those found in the other categories. When the cases diagnosed as due to syphilis are excluded from this group, however, as in Table 21, the

proportion of positive results is significantly lower than the average for all cases. Moreover, exclusion of the group of endogenous infections, as in Table XXII, leaves the proportion of positive results in the remaining cause groups substantially alike. These facts, of course, clearly show that the Kahn test has been used for diagnostic purposes. This use of the serological test as a criterion of diagnosis is perhaps justifiable in so far as the group of endogenous infections is concerned, particularly when it is remembered that the end-results of non-syphilitic inflammatory conditions may not differ materially from those produced by syphilis. On the other hand, it might be argued that a negative result should have been used to exclude from that category cases diagnosed clinically as syphilis. It is considered, however, that having regard to the appearances in the eye found on ophthalmological examination the diagnosis of syphilis in the great majority of cases was justified. In this connection it will be remembered that the Kahn test in a certain proportion of cases of syphilis may in fact be negative.

Table XXIII summarises the results of the analysis of the results of the Kahn test in relation to the more important individual causes of blindness.

TABLE XXIII

	Number sub- mitted to Kahn Test	Number of Kahn Tests Positive	Per- centage Positive	Stand- ard Error	Difference from Average	Difference Standard Error
Congenital	91	—	0'00	2'25	-4'83	-2'15
Abiotrophy	71	1	1'41	2'54	-3'42	-1'35
Myopia	317	24	7'57	1'21	+2'74	2'27
Glaucoma	152	13	8'55	1'74	+3'72	2'14
Cataract	180	14	7'78	1'60	+2'95	1'84
Ophthalmia Neona- torum	61	2	3'28	2'75	-1'55	-0'57
Phlyctenular	53	3	5'66	3'11	+0'83	0'27
Chronic Sepsis	206	1	0'49	1'49	-4'34	-2'91
Industrial	52	1	1'92	2'97	-2'91	-0'98
Total Injury	68	2	2'94	2'60	-1'89	-0'73
Vascular	40	—	0'00	10'72	-4'83	-0'45
All Cases, excluding Syphilis	1,469	71	4'83			

The above considerations reveal the fact that deductions cannot properly be made from the material submitted to the Kahn test, as obviously selection has taken place. The Kahn test is undoubtedly

of value as an aid to diagnosis, and for this reason alone its performance as a routine measure in the course of the examination of blind persons is justified.

Specific Fevers.

The specific fevers were a comparatively unimportant cause of blindness, only 39 cases (1·02 per cent.) being regarded as resulting from infectious disease. Measles was responsible for by far the greatest number, accounting for 28 cases; smallpox accounted for 6 cases, scarlet fever for 4 cases, while the cause in the remaining case was unspecified. As would be expected, the onset of the ocular condition occurred before the age of 15 in all but two instances. Corneal opacity was responsible for blindness in 28 cases, uveitis (9 cases) being the only other defect of importance.

Meningitis.

Thirty-nine cases were regarded as blind from meningitis. The onset of blindness in more than two-thirds of these occurred before the age of 15 years. It is of interest to observe that only 34·2 per cent. $\pm 7\cdot6$ were males, a figure which while not statistically significant suggests a higher incidence of this condition in the female sex. The defects found were—

Optic Nerve Atrophy	32 cases
Endophthalmitis	3 cases
Iridocyclitis	2 cases
Cortical Blindness	2 cases

Phlyctenular Disease and Tuberculosis.

There were 84 cases (2·61 per cent.) blind as a result of phlyctenular disease, in 82 of which both eyes were similarly affected. The onset of the diseases in the vast majority took place under 30 years, the average age of onset being 10 years. The occurrence of blindness, on the other hand, was insidious, the mean age, however, being 35 years. The defect in all cases was corneal ulceration.

It is now considered that phlyctenular disease is tuberculo-allergic in nature, but it is improbable that all the cases included under this heading were of this category. It is worthy of mention that 20 cases (0·6 per cent.) in this analysis have been placed in a separate group as due to tuberculosis.

(To be continued)

ANNOTATION

On Holiday Duty

Our heading has in this instance no ecclesiastical or scholastic significance. Every one is entitled to an annual holiday if he can get it and we most of us manage to do so and to ensure that our