to 50, but it rose steadily throughout the operation, which lasted only half an hour. There was a steady blood loss towards the end of the operation.

Two points emerge from these cases. First, it would seem that a patient who once responds satisfactorily to these drugs may be expected to respond in the same way on any future occasion. That being so, the converse is of course true. Secondly, hexamethonium alone may at times suffice for a short operation. If the operation is more prolonged additional hexamethonium may be given, but probably procaine amide will have the more lasting effect.

A man of 70 was being operated on for removal of a meningioma. Thirty-seven minutes after induction with thiopentone, gallamine triethiodide, and pethidine he developed an attack of asthma. Some 10 minutes previously he had been given an injection of hexamethonium, which had reduced his blood pressure to 66. Surprisingly the supervision of bronchospasm failed to cause an appreciable increase in blood pressure and the bleeding remained negligible and the colour good; but movements of the head due to laboured breathing and bulging of the brain during expiration were an annoyance to the surgeon. The condition persisted throughout the operation, clearing up within a few minutes after withdrawal of the endotracheal tube. The patient made a good recovery.

Results

The series consists of 90 cases. I have divided these into two groups, which happen to be equal in number; the first includes all those cases up to the time when procaine amide was first used, the second the remainder. The criteria of success were a negligible amount of bleeding and a good reduction in intracranial tension. Many cases, while not completely fulfilling these criteria, gave unquestionably improved operating conditions, and these I have classified as "partially successful."

In the first group of 45 cases 26 (58%) were successful, 9 (20%) were partially successful, and 10 (22%) were failures. In the second group 38 (85%) were successful, 5 (11%) were partially successful, 2 (4%) were failures.

It will be seen from these figures that procaine amide is a useful adjunct to this form of anaesthesia, as it converts many of the potentially failed and partially failed hexamethonium cases into successful ones.

Three deaths due directly or indirectly to the anaesthetic have occurred. In the light of our experience two at least of these cases are considered to have been unsuitable for this type of anaesthesia.

There was one case of reactionary haemorrhage.

Summary

The advantages of controlled hypotension in neurosurgery are listed.

The dangers of the method are discussed, with special reference to "retractor anaemia."

A method is described of reducing the failure rate of hexamethonium by potentiating with procaine amide.

The results of a series of 90 cases are given.

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The *Hebrew Medical Journal* (Harofé Haivri) recently completed its twenty-fifth year of publication. Although it has been edited and produced in the United States, much of its contents have been published in Hebrew. It is a remarkable achievement on the part of those concerned that they have succeeded in adapting so ancient a language to the needs of modern medicine and have created a medical terminology and literature in Hebrew. The present editor is Dr. Moses Einhorn.

AN OUTBREAK OF DIPHTHERIA: INFLUENCE OF IMMUNIZATION

BY

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During 1951 an outbreak of diphtheria of unusual size for the present time occurred in and around Coseley. Coseley, with a population of 34,414 at the 1951 Census, is an urban district in the Administrative County of Stafford between the county boroughs of Wolverhampton and Dudley and almost surrounded by other industrial districts. Wolverhampton and Dudley were not included in the investigation here considered, but it is understood that Wolverhampton had five cases of diphtheria during the year and that Dudley had 11 (all during the first two quarters). The total population of the seven surrounding districts included in this report was 232,836, and together they had 50 confirmed cases during the year, while Coseley had 58. These 108 cases were 15.5% of the 699 (provisional) corrected notifications for England and Wales in 1951. There has in the past been a steady and at times surprisingly high incidence of diphtheria in the neighbourhood. In Fig. 1, the figures for which were obtained from the annual reports of the medical officers of health of Coseley, the number of notifications and deaths and the population for the years 1908-51 are given.

The incidence of diphtheria in Coseley in recent years compares unfavourably with the national incidence and that of non-county boroughs and urban districts (England only, excluding London), as is shown by Fig. 2, which is based on figures published in the Registrar-General's statistical reviews 1912-49.

Bacteriology

The bacteriology of diphtheria in the Administrative County of Stafford is of interest.

Menton *et al.* (1935) reported the results of 500 swabs from 500 individual patients classified according to the type of diphtheria organism; their figures showed a marked predominance of mitis diphtheria. For 1941-4 the published data of the Stafford Public Health Laboratory showed a change to the gravis and, to a lesser extent, to the intermedius types. Comparable figures for 1946-50 show that the intermedius type exceeded the gravis type, which, however, still almost equalled the mitis type in number. In 1951 the outbreak was due to gravis diphtheria. The data are set out in Table I.

TABLE I.—Relative Incidence of Types of *C. diphtheriae*—Administrative County of Stafford (Based on the Number of Cases Shown in Parentheses)

	Reported in 1935	1941-4	1946-50	1951
Gravis ..	3.8% (19)	56.9% (1,230)	27.0% (98)	98.7% (78)
Mitis ..	68.6% (343)	6.7% (144)	27.5% (100)	1.3% (1)
Intermedius ..	19.8% (99)	36.4% (787)	45.5% (165)	0% (0)
Irregular ..	7.8% (39)	— (—)	— (—)	— (—)

FIG. 1.—Number of cases of and deaths from diphtheria, and population in Coseley for 1908–51.

Logan (1952) considers that the general rapid downward trend in diphtheria cases and deaths in England and Wales may be partly due to the fact that the proportion of mitis strains recovered between 1945 and 1948 almost doubled, whereas the proportions of intermedius and gravis strains substantially declined. Although this change of type occurred in Staffordshire between 1945 and 1948, it was not accompanied by a marked reduction in the incidence of diphtheria, and over the longer period 1935–51 the change in type has been the opposite.

In Coseley, in 1951, swabs from 77 persons (not all confirmed clinical cases of the disease) were positive on culture for the diphtheria organism, and they were all of gravis type with the exception of one of intermedius type. The corresponding figure for the surrounding districts was 28—all gravis. Comprehensive records of swab results obtained in the years 1936–40 are unfortunately not available; therefore the precise period during which the change of type occurred is not known, nor can a hypothetical reason for the change be offered. Fig. 1 shows that the present wave of diphtheria was already well established in 1935, 1936, 1937, and 1938, and that the death rate was as high in 1936 as at any time since.

FIG. 2.—Incidence of diphtheria in England and Wales, in non-county borough and urban districts (England only, excluding London), and in Coseley.

1951 Outbreak

During 1951, 108 confirmed cases of diphtheria occurred in the whole area under review, of which 58 were in the Urban District of Coseley. Table II shows the ratio of notifications to confirmed cases and deaths.

Of the 34 unconfirmed notifications in Coseley, 12 (35.3%) had nasal or throat swabs positive for *C. diphtheriae* at some time and 22 (64.7%) never had a positive swab. Of the 44 unconfirmed notifications in the surrounding districts, 4 (9.1%) had positive swabs and 40 (90.9%) had not. These patients had initial signs and symptoms suspicious enough to prompt the action taken by their doctors, but the signs were transient, as no evidence of clinical diphtheria was found after admission to hospital. Those cases with early positive swabs may have been carriers, but this is not thought likely, as there was no previous history of diphtheria or chronic nasal discharge, nor were any positive swabs obtained subsequently. It is

much more likely that they were, in fact, minimal clinical cases which rapidly overcame the disease after contracting it. They form an appreciable percentage of the unconfirmed notifications.

TABLE II.—Diphtheria Cases and Deaths, 1951

Area	1951 Census Population	Notifications	Confirmed Cases	Deaths
Coseley U.D.	34,414	92	58	1
* Surrounding districts	232,836	94	50	5
Total ..	267,250	186	108	6

* Bilston M.B., Darlaston U.D., Rowley Regis M.B., Sedgley U.D., Wednesbury M.B., Willenhall U.D., Tipton M.B.

Of the surrounding districts the one most affected in the outbreak was Bilston M.B., which borders on Coseley and had a population at the 1951 Census of 33,464. There were 18 cases with 3 deaths. Four cases were in one family and 15 were in schoolchildren. Reference is made below to the action taken in Bilston. In the remainder of the surrounding districts 32 sporadic cases occurred.

Seasonal Incidence.—In Coseley, cases occurred steadily throughout the year, but this was not so in the surrounding districts, where the outbreak did not gather momentum until the late summer, reaching a peak in November.

Age and Sex Incidence.—The age incidence of confirmed cases only is shown in Table III. Children of school age formed 65.5% of the total cases in Coseley and 65.7% of all cases.

The confirmed cases are classified according to age group and sex in Table IV. The sexes were attacked in approximately equal numbers in pre-school- and school-children.

TABLE III.—Age Incidence of Confirmed Cases of Diphtheria, 1951

	0–4 Years		5–14 Years		15 Years and Over		All Ages	
	No. of Cases	Rate*	No. of Cases	Rate*	No. of Cases	Rate*	No. of Cases	Rate†
Coseley U.D.	12 (20.7%)	3.86	38 (65.5%)	6.72	8 (13.8%)	0.32	58 (100%)	1.69
Surrounding districts	9 (18.0%)	0.43	33 (66.0%)	0.91	8 (16.0%)	0.05	50 (100%)	0.21
All cases ..	21 (19.5%)	0.87	71 (65.7%)	1.69	16 (14.8%)	0.08	108 (100%)	0.40

* Attack-rate per 1,000 related population (approximate).

† Attack rate per 1,000 related population on 1951 Census.

TABLE IV.—*Age and Sex of Confirmed Cases of Diphtheria, 1951*

	0-4 Years			5-14 Years			15 Years and Over			All Ages		
	M	F	Total	M	F	Total	M	F	Total	M	F	Total
Coseley U.D.	7	5	12	20	18	38	4	4	8	31	27	58
Surrounding districts ..	4	5	9	17	16	33	—	8	8	21	29	50
All cases ..	11	10	21	37	34	71	4	12	16	52	56	108

Clinical Features

Of the 108 confirmed cases, 61 (56.5%) were classed as mild, 25 (23.1%) as of moderate severity, and 22 (20.4%) as severe, including the 6 fatal cases. In 74 the nose and/or throat swabs were positive for the gravis type of organism, but 34, although diagnosed clinically as diphtheria cases, did not have positive swabs. The exclusive occurrence of the gravis type of diphtheria has not resulted in a generally severe clinical form of the disease. The case fatality of 5.6% compares with 8.1% in the 11,492 gravis cases reviewed by McLeod (1943).

Of the 108 patients, 106 were admitted to hospital, the mean stay being 53 days; the longest stay was 152 days for a boy of 6 whose illness was of moderate severity but whose tonsils were removed for persistently positive swabs.

The complications were those commonly associated with gravis diphtheria. Of the 16 patients who were severely ill but recovered, 15 had paralyses, as did 8 of the 25 moderate cases and 3 of the 61 mild cases. One patient who died showed paralysis; the others did not live long enough to show it. Nine patients, including all the fatal cases, had bull-neck. Only three patients had a laryngeal membrane, and these were all mild cases; 27 had a pharyngeal, palatopharyngeal, or nasopharyngeal membrane, and these included the 6 fatal cases and 13 of the 16 other severe cases.

Of the six patients who died five were children between the ages of 7 and 11 years, all of whom died within seven days of admission to hospital. The other was a male school-teacher, aged 31, who died after 28 days in hospital. The cause of death in each case was myocarditis.

Spread of the Disease

In spite of the majority of cases being in schoolchildren there was little evidence that the infection was spread in school. The occurrence of cases was not affected by the school holidays, nor could a series of cases be found in the same school or class in circumstances suggesting transmission from one child to another by any of the classical and recognized methods, such as the sharing of pencils, contiguous position in class, and so on.

While in most cases there was little or no evidence to show how or from whom the infection was obtained, some of the confirmed cases were concerned in multiple infections in the same household. Nine families in Coseley between them had 23 individuals with positive swabs. Eighteen of these were later confirmed as having clinical diphtheria, this number being 31% of all confirmed cases in Coseley. The occurrence of the first case in each household was as difficult to explain as was the spread within the household easy. These first cases and the 69% of cases arising singly occurred sporadically and irregularly without traceable cause in the great majority of cases.

The location of the cases in Coseley, particularly in relation to the distribution of population, was most interesting. Coseley is not an isolated industrial town with a central business and shopping area, an inner industrial ring, and an outer suburban residential area in the usual way. It is rather a group of a dozen or so villages of varying size spaced throughout the 3,300 acres of the district, the villages being separated by stretches of waste and agricultural land interspersed with factories. During 1951, 59 (76.6%) of the total of 77 individuals found to have positive swabs lived in only five of these relatively sharply defined areas, the

remaining areas either escaping completely or having only the odd scattered case. The cases were bunched in a striking manner. In one of these localities, the worst affected, there were 13 confirmed cases and 11 other persons with positive swabs living within an area of about 12 acres.

In the other four areas those with the infection were similarly clustered, though in smaller numbers. In spite of this, interrogation of contacts, neighbours, friends, etc., failed to show any connexion between the cases. Chronologically the cases in these areas did not link up, as they occurred often at widely spaced intervals of time. Inquiries failed to establish connexions between the cases except in one or two instances. It was unlikely, for example, that pre-school children would be in the habit of playing with children aged 12 years or more living near by. The weight of the evidence suggests that the infection was spread at home rather than at school, yet little specific evidence of home spread in individual cases was elicited except for those in the same family.

While these five areas are well defined, they have services common to other areas in Coseley and the surrounding districts. The same public transport, places of entertainment, main shopping centres, and so on are used by people of the affected and unaffected areas and of the surrounding districts. No explanation can be offered of why the cases should be so sharply confined for so many months to the affected areas.

The experience in previous years of the various areas in Coseley is of some interest. Records show that the incidence has been greatest in different areas at different times. Those suffering heavily ten years before escaped entirely in 1951, and vice versa. The irregular movement of the infection from one year to the next resembles that described by Grant (1951) during the years 1936-46 in Gateshead, and by Newsholme (1898) in his report on the 1888-96 epidemic of diphtheria in London.

The possibility that milk might be the vehicle of infection was investigated, but there was no evidence to support this.

The fact that the incidence was highest in schoolchildren led to a search for carriers in the schools and to an inquiry into the immunization state of the child population.

Search for Carriers in Schools

Between June 11 and 22 nose and throat swabs were taken from every child in eight school departments in Coseley. Five of these departments were those in which the greatest number of cases had occurred, and the other three, having only one case between them, were used as controls. The results are summarized in Table V.

Thus in school departments A to E, where the incidence of notified and confirmed cases of gravis diphtheria was 1.5%, a further 1% of the children were found to be harbouring *C. diphtheriae* gravis in the nose or throat, while in Departments F, G, and H, where the incidence of confirmed cases was 0.16%, no further children were found to be harbouring the organism. It must be emphasized that these figures are small and that they are based upon swabbing carried out on one occasion only.

The 15 children with positive swabs were free of symptoms, but nevertheless the evidence seems in favour of their being subclinical cases of diphtheria rather than carriers; none had any history of diphtheria or chronic nasal discharge, and their infection cleared up rapidly upon isolation in hospital; only five had any history at all of adequate immunization within the previous three years. If this is accepted, the investigation showed no evidence of a higher carrier rate in those schools with a number of cases of diphtheria than in those where none or only one case had occurred. As is mentioned above, there was an association in their home surroundings also between the children who were confirmed cases and those found to be harbouring the organism on swabbing, so that these bacteriological findings do not particularly indicate spread of the infection at school.

TABLE V.—Results of Nose and Throat Swabs of Coseley School-children

	School Departments with Highest Incidence of Diphtheria					All Departments
	A	B	C	D	E	
Confirmed cases of diphtheria January 1–June 11, 1951 ..	9	4	3	3	2	21
No. of children on roll ..	449	371	155	183	242	1,400
No. with positive swab for gravis diphtheria in addition to confirmed cases ..	1	5	3	1	5	15
Incidence of confirmed cases ..	2.0%	1.1%	1.9%	1.6%	0.83%	1.5%
Incidence of additional positive swabs ..	0.24%	1.3%	1.9%	0.55%	2.1%	1.0%

	School Departments (Controls)			All Departments
	F	G	H	
Confirmed cases of diphtheria January 1–June 11, 1951 ..	0	0	1	1
No. of children on roll ..	278	102	228	608
No. with positive swab for gravis diphtheria in addition to confirmed cases ..	0	0	0	0
Incidence of confirmed cases ..	Nil	Nil	0.44%	0.16%
Incidence of additional positive swabs ..	Nil	Nil	Nil	Nil

Immunization State

The percentage of the child population who had completed a course of immunization at any time before December 31, 1950, according to the annual returns, is shown in Table VI. It is seen that 73% of the school population of Coseley were shown in the return for 1950 as having been immunized.

This method of estimating the immunization state of the child population has, however, obvious disadvantages. It takes no account of the recency or otherwise of the immunization, nor, in the case of schoolchildren, whether they have had a reinforcement dose preceded by adequate primary immunization. It was thought that, in estimating whether or not a child could be regarded as probably adequately protected by immunization, stricter criteria were

TABLE VI.—Percentage of Child Population Immunized Before 1951

	Age Group			Age Group	
	0–4	5–14		0–4	5–14
Coseley ..	32	73	Tipton ..	24	96
Bilston ..	33	81	Rowley Regis ..	37	95
Wednesbury ..	47	89	Sedgley ..	51	93
Willenhall ..	42	86	Darlaston ..	26	79

TABLE VII.—Immunization Record of Children Swabbed

Presumably adequately protected:	
With complete primary course within previous 3 years	152
With complete primary course followed by a reinforcement dose, the latter within previous 3 years	388
Total	540
Unprotected or inadequately protected:	
No record of immunization	764
Primary course more than 3 years previously; no reinforcement dose	589
Record of incomplete primary course only	32
Record of "reinforcement" dose only	68
Complete primary course with reinforcement more than 3 years previously	15
Total	1,468
Proportion of 2,008 children investigated whose immunization records showed evidence of adequate protection within previous 3 years	26.9%

needed, and for the purpose of this investigation an admittedly arbitrary standard of complete immunization within the preceding three years was adopted. For all those children swabbed in the schools mentioned in Table V, a detailed survey of the immunization records was made and the result is shown in Table VII.

This result must be qualified by stating that the County Council's immunization records in their present form date only from April, 1949, when they were collated from the previous unstandardized records and a new system of supervision of immunization was introduced. It is probable that the percentage adequately protected, on the rather strict criteria set out above, was appreciably higher than 26.9%; this supposition is strengthened by the results of the inquiry made into the immunization state of those who were confirmed cases of diphtheria, in a number of whom a history of immunization was obtained from relatives or patient, although not entered in the records.

The criticism may also be made that estimation of the antitoxin content of the blood, or even the Schick test, would have been a better method of assessing the probable immunity or susceptibility of these schoolchildren than a scrutiny of the available records of their immunization. Unfortunately it was impracticable to carry out these tests for the 2,008 children.

The total school population of Coseley U.D. in June, 1951, was approximately 4,403, and, although the sample of 2,008 was not entirely unselected (especially as regards age and economic status), the results given above certainly indicated a much lower state of protection against diphtheria of the school population of Coseley than would appear from the official returns or would generally be regarded as necessary to prevent an outbreak of diphtheria.

Reference must here be made to the conclusion of the Tyneside and Dundee investigators (Hartley *et al.*, 1950) that a person inoculated as a child can expect to secure for himself early and adequate protection should he be exposed to infection in later life, because even in the absence of a reinforcing dose the infection itself serves as a secondary stimulus so that antitoxin is rapidly produced, and the disease is mild. Thomson (1951) also concludes, from statistics available to the Ministry of Health, that the prognosis for those who contract the disease, but who at some time have been immunized, is much better than that of those who have never had any such protection.

Nevertheless, the importance of the reinforcing dose of antigen in causing a rise in antitoxin titre, thus protecting the individual against an attack of diphtheria, and the community against an outbreak, remains unchallenged. It is possible that the present standard form of immunization return to the Ministry of Health may give an unduly optimistic impression, especially with regard to schoolchildren, and that further analysis of immunization records of local

TABLE VIII.—Immunization Records of Confirmed Cases

Severity	Age (Years)	Presumably Adequately Protected*	Inadequately Protected†	No Record of Immunization
Mild ..	0–4	1 (3)	— (—)	10 (8)
	5–14	4 (6)	6 (22)	27 (9)
	15+	— (—)	— (6)	13 (7)
Moderate ..	0–4	— (2)	— (1)	7 (4)
	5–14	1 (1)	2 (6)	13 (9)
	15+	— (—)	— (—)	2 (2)
Severe ..	0–4	— (—)	1 (—)	2 (3)
	5–14	1 (1)	1 (5)	16 (12)
	15+	— (—)	— (—)	1 (1)
		7 (13) 6.5% (12%)	10 (40) 9.2% (37.1%)	91 (55) 84.3% (50.9%)

In parentheses is shown the immunization state based upon the history obtained from relatives and (where possible) from the patient.

* Complete primary course within previous 3 years or complete primary course followed by a reinforcement dose—the latter within previous 3 years.

† Primary course more than 3 years previously—no reinforcement dose, record of incomplete primary course only, record of "reinforcement" dose only or complete primary course with reinforcement more than 3 years previously.

health authorities might show a less favourable state of affairs than is believed to exist. The immunization records of the 108 confirmed cases are shown in Table VIII.

Thus, although 49.1% of all the confirmed cases had some history of immunization, only 12% had been protected adequately within the preceding three years. Of the 22 severe cases, however, only 7 (31.8%) had any history of immunization at all, and of the six patients who died five had never been immunized, while the sixth, a girl of 8, had only a doubtful history of immunization in infancy. Two of the children who died had, however, received one dose of antigen—one about 24 days and the other about 11 days before the onset of the illness.

Of the 31 individuals whose swabs were positive (30 for gravis and 1 for intermedius diphtheria), although they were not clinically confirmed cases, 11 appeared never to have been immunized, while not more than seven were adequately protected.

Action Taken

By the end of September, 31 cases had occurred in Coseley schoolchildren, and it was also plain that the level of immunity of the child population was too low. A special letter was distributed through the teachers to the parents of each child attending the Coseley schools, urging the need for immunization and including a form of consent. Immunization was offered in this way for all the children, irrespective of their immunization history, and consent was obtained for 87%. A full primary course was given to each child, A.P.T. being used for all infants (aged 5-7), and T.A.F. for all secondary-school children (aged 11-15); the intermediate group (aged 8-10) were given A.P.T. or T.A.F. at the discretion of the medical officer performing the immunization. About 3,500 children were thus immunized; the operation began on October 22, and the great majority were completed by December 7.

In the meantime seven Bilston schoolchildren contracted the disease during November, and one died. A schoolmaster in a Bilston school who lived in Coseley also had diphtheria (and died later). A similar immunization campaign was therefore undertaken for the Bilston schoolchildren. Here 79% consents were obtained and about 4,000 children were given a primary course between December 10, 1951, and February 28, 1952, out of a school population of approximately 6,089, leaving a further 800 to be completed after that date.

Both at Coseley and at Bilston the proportion of consents obtained from parents was higher in the presence of the outbreak of diphtheria than had been customary. At the same time the ordinary measures to secure the immunization of pre-school children were intensified.

It was not expected that the special campaigns would produce enough immunity in Coseley and Bilston schoolchildren to control the outbreak of diphtheria until two to three months after their conclusion, but in fact the incidence fell markedly in Coseley at the end of 1951, and in Bilston in February, 1952, especially in schoolchildren. Whether the fall was wholly due to the immunization is uncertain.

From January 1 to November 3, 1952, 17 confirmed cases of gravis diphtheria occurred in Coseley, and 11 in the surrounding districts, but six of these were in Bilston in January and February, before the immunization campaign could have been effective.

Of the other 22 patients, 11 were schoolchildren and 6 pre-school children, but only five had ever been immunized. Of these five three were brothers and sisters who became ill within a few days of each other at the end of October, together with three other sibs, two of whom were unimmunized confirmed cases and the other a symptomless carrier or subclinical case.

Summary and Conclusions

A report is made on an outbreak of gravis diphtheria in Coseley and the surrounding districts in which 108 cases with six deaths occurred during 1951 in a popula-

tion of 267,250 and a further 31 persons were found to be harbouring the organism.

In Coseley there had been for some years an incidence of diphtheria unusual in this country since immunization became general, and the change in the prevalent types of *C. diphtheriae* had been opposite to that in England and Wales as a whole—namely, from mitis to gravis and intermedius. The outbreak was provided with a fertile soil by the low level of immunity of the child population, and was not, so far as can be said, the result of the development of a strain of *C. diphtheriae gravis* more than usually capable of overcoming the immunity produced by the ordinary diphtheria antigens.

Long-term carriers appeared to play no part in the spread, and the large number of persons found to be harbouring the organism with slight or no symptoms were probably subclinical cases or transient carriers—that is, the result and not the cause of the outbreak.

The infection was probably spread mainly at home rather than at school, although most of the cases were in schoolchildren. No explanation can be offered of the remarkable grouping of confirmed cases and others found to be harbouring the germ in certain areas in Coseley.

In the two districts most affected the incidence fell immediately after mass immunization of the school population.

The outbreak emphasized the importance of a constant watch upon the proportion of children receiving reinforcement doses of diphtheria antigen, and showed that reliance upon the figures prepared for the annual immunization return may be misleading, especially where schoolchildren are concerned. It occurred in an area in every district of which at least 73% of the school population had completed a course of immunization at some previous time. Nevertheless, the outbreak provided further evidence for the belief that the risk of severe illness or death is reduced for those who have at any time been immunized. It also demonstrated the greater willingness of the public to accept immunization when they are confronted with an outbreak of diphtheria.

We gratefully acknowledge the facilities for the investigation afforded by Dr. G. Ramage, County Medical Officer of Health for Staffordshire. We wish to express our thanks to Dr. B. C. Haller, Medical Officer of Health, Bilston M.B., for information concerning diphtheria in Bilston; to Dr. R. N. Phease, Director of the Stafford Public Health Laboratory, for swabbing 2,008 Coseley schoolchildren and for collating information on the types of diphtheria organism found at the laboratory in the years 1946-50; and to Dr. C. Simpson Smith for kindly supplying clinical details of the hospital patients.

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The British Hospitals Contributory Schemes Association has published Part I of a directory of convalescent homes serving the provinces (England and Wales). All the 42 names included have been recommended by hospital contributory schemes affiliated to the association. The directory, which is in stencilled form, may be obtained from the association, Royal London House, Queen Charlotte Street, Bristol, 1, price 1s. 6d. H.R.H. the Duke of Edinburgh recently consented to bestow his patronage on the association.