SEQUELAE OF CEREBROSPINAL MENINGITIS

A FOLLOW-UP STUDY OF 986 CASES*

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The present survey was designed primarily to answer a single question, "Is there an appreciable incidence of persistent symptoms following cerebrospinal meningitis, and, if so, what are the nature and the severity of these symptoms?" The term "symptoms" is used advisedly, and refers to the subjective sensations and feelings of the patient as opposed to specific pathological states or conditions. The data here presented are therefore based solely on the statements of the patients themselves. It would obviously be highly desirable to carry out a medical check-up as well, but lack of necessary facilities and of medical personnel unfortunately made such a procedure impossible.

The area chosen for the survey comprised three geographically distinct districts. The chief of these was in south-east Wales and Monmouthshire, the lists of patients being supplied by two large city isolation hospitals (at Cardiff and Newport) and five smaller isolation hospitals in coal-mining towns of southern Glamorganshire (Bridgend, Caerphilly, Gelligaer, Pontypridd, and Rhondda). Two smaller areas were added by way of contrast—the Denbighshire region served by the Wrexham Isolation Hospital, and the largely rural area from

during the calendar years 1940 and 1941, and in some cases during the first three months of 1942. The field survey was made during the period from May 21 to June 25, 1942, inclusive. The interval between hospital discharge and follow-up visit thus varied from 3 to 29 months, but tended to approach the longer extreme. Over one-half of the series were followed up more than 18 months and 84% more than a year after discharge, while only 4% had been out of hospital less than six months.

Technique of the Survey

A similar follow-up survey of cerebrospinal meningitis patients in London had previously been made by the Ministry of Health (Maddock, 1943). In order that the incidence figures for sequelae in urban and rural areas of Wales and Monmouthshire should be comparable to those of the Ministry for metropolitan London, essentially the same field technique was again used, and home visiting was done by the same nurses as in the London study.

Follow-up visits were made by three Public Health nurses of the American Red Cross-Harvard Field Hospital Unit, with no advance warning of them. Each of the addresses furnished by the hospitals was visited, and the patient interviewed if possible. Otherwise, information was obtained from a member of the household or a neighbour who knew the patient; each such instance was subsequently reviewed, and those in which the informant did not appear sufficiently well acquainted with the patient's condition were not included in the survey. As shown in Table I, 61 cases were excluded for this reason, and another 61 because they could not be located, had moved from the area, or had died; this left 986 successful follow-up visits out of the original 1,108 meningitis cases.

The Public Health nurses gained a ready entry to the homes by introducing themselves as representing the hospital, which wished to know how the patients had been doing since their illnesses. Leading questions were scrupulously avoided, the only initial question asked being, "How have you felt since you had meningitis?" When this elicited no complaints of ill-health the query was repeated in somewhat altered form during the course of a few minutes' conversation, and if the reply was still the same the patient was recorded as having no disabilities. In analysing the data collected, sequelae were arbitrarily defined as disabilities persisting for over three months after hospital discharge. Symptoms previously present were excluded unless definitely accentuated immediately after meningitis, as were also subsequent symptoms that did not appear immediately after the illness. On the other hand, complaints that had disappeared before the date of the interview were included provided that they fulfilled the above conditions.

TABLE I

Hospital	Number of Cases on Original Lists	Meningitis Cases Excluded from Series					Number of Cases in Present Series
		Untraced or Unlocated	Left District	Died since Hospital Discharge	Excluded due to Insufficient Information		
Cardiff City Isolation Hospital ..	416	9	17	5	20		365
All-yr-yn Hospital, Newport ..	144	—	2	1	7		134
Tyntylo Isolation Hospital, Rhondda ..	127	1	—	1	2		123
Bridgend Isolation Hospital ..	63	8	4	—	11		40
Gelligaer Isolation Hospital ..	28	—	1	—	—		27
Caerphilly Isolation Hospital ..	29	3	—	—	—		26
Tonteg Isolation Hospital, Pontypridd ..	21	—	—	—	1		20
Wrexham Isolation Hospital ..	156	—	2	—	12		142
Carmarthen County Isolation Hospital ..	124	—	2	5	8		109
Total	1,108	21	28	12	61		986

which patients were sent to the Carmarthen County Isolation Hospital at Carmarthen. The numbers of cases from each of these hospitals are shown in Table I.

Each of the nine co-operating hospitals furnished the names and addresses of all cerebrospinal meningitis patients admitted

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Evaluation of the Survey Method

Before considering the findings, it might be advisable to examine the survey method briefly and to enumerate its chief advantages and disadvantages. These are essentially as follows:

Advantages.—(1) The primary aim of the method employed is to determine the incidence of symptomatic complaints such as personality changes, tendency to become easily fatigued, many headaches, and backaches, etc., for which no supporting evidence would be expected to be found on physical examination. (2) This method will also bring to light those patients not satisfactorily rehabilitated after their illness, whether this be due to organic cause, neurosis, or psychiatric abnormality.

Disadvantages.—(1) Although it would seem reasonable to assume that at least a large proportion of the disabilities reported were a direct result of the preceding meningitis, such an assumption rests on purely circumstantial evidence which, by its very nature, cannot provide proof of any causal relationship. *It cannot be too strongly emphasized that these sequelae are not presented as disabilities caused by the meningitis, but only as symptomatic disabilities, persisting for more than three months, which first appeared or (if previously present) became accentuated immediately after the illness.* (2) Data based on the patients' own statements will unavoidably be subject to some degree of exaggeration, and will also undoubtedly include a number of genuine complaints due to causes other than cerebrospinal meningitis. (3) There would seem to be no conceivable way in which a control series could be studied. Even if a comparable group could be drawn up, any attempt at collecting similar information concerning health would almost surely be received with such suspicion as to render the results valueless.

The Survey Findings

General.—The incidence of the various disabilities according to age group and sex is shown in Table II. It should be noted,

Emotionally Less Stable.—Under this heading were grouped those patients variously described as irritable, excitable, disposition poor or bad, nervous, high-strung, hysterical, or losing temper easily. In 24 of the 109, severe or frequent headaches or other pains were associated, which might easily explain the condition.

Depression.—Of these 15, 8 were described as depressed and 7 as moody or sulky.

Inability to Concentrate.—"Unable to concentrate" was the term used for 5 of these 14 individuals, while "loses self" and "absent-minded" each accounted for two. The other 5 more specific descriptions were "frequent mental lapses," "ignores conversation directed at her," "appears vacant and doesn't understand what is said to him," "doesn't understand directions well," and "unable since illness to cope with rationing while working in shop."

Poor Memory.—No further qualification was given for 8 of this group, while the other 5 were described as "memory for names worse," "doesn't remember things he is told," "can't remember where she puts things," "forgets things when sent to shop," and "notices it in figuring—mind goes blank."

Total Deafness.—The most striking feature of this disability is the extremely low age distribution, 6 of the 27 (22%) being 2 years of age or less, while 21 (78%) were not over 14. These percentages are slightly less than double the corresponding figures for the entire group of 387 with disabilities. Three patients totally deaf at discharge subsequently showed marked improvement, starting at three months, seven months, and eight months respectively. Specific mention of speech was made in 10 instances, 2 of these speaking well and 5 not as well as before the illness, while the remaining 3 were deaf-mutes.

Partial Deafness.—Here the young age distribution of the preceding group is not found. The deafness was described as moderate or severe in 10 of the 28 cases. In one case a persistently discharging ear offers a probable explanation for the

TABLE II.—Incidence of Disabilities Following Meningitis

Age at Time of Meningitis:	Under 1		1 and 2		3 and 4		5-14		15-24		25-44		45-64		65 and Over		Total		
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	Total
Total survey population	30	21	71	46	39	47	152	126	114	77	124	80	28	27	1	3	559	427	986
Number with disabilities	7	3	26	9	18	13	55	46	51	28	64	40	12	13	0	2	233	154	387
Emotionally less stable	4		13	3	7	9	16	15	15	7	11	6	1	2			67	42	109
Depression						1	4	1	4		4	1					12	3	15
Inability to concentrate			1	1			5	2	1	2	1		1				8	6	14
Poor memory							4	1	1		3	1	1	2			9	4	13
Total deafness	1		4	1			10	5	4	1		1					19	8	27
Partial deafness					3		8	2	1	5	2	1	2	4			16	12	28
Visual disabilities		1					5	3	6	2	5	3	3	1			19	10	29
Strabismus		1	1	1	1	1		1	1		1	1					4	5	9
Tinnitus											1	2		1			1	3	4
Excessive lacrimation			1										2	1			3	1	4
Other impairment of special senses			1				1							2			2	3	5
Pain in limbs and "rheumatism"					1			7	2	3	1	6		4	1		5	20	25
Weakness of limbs			2	1				2	2			1	3		1		7	3	10
Lameness and unable to walk	1		1		1	1	1	2		15	40	25	4	5			4	4	8
Headache	1		3	1	6	7	14	19	30	15	40	25	4	5			98	72	170
Easily fatigued				1	3		5	2	7	3	14	7	3	3			32	16	48
Backache			1			1		2	6	5	12	15	2	2			21	25	46
Poor balance		1	2	1		3		4	2	1	1	1		1			8	12	20
Dizziness							1	3	2	1	3	1	1				7	5	13
Gastro-intestinal symptoms			2		2		1	1	2		1	1	1				8	2	9
Neck pain							2		1	1	1	1	1				5	2	7
Nightmares			2								1						5	0	5
Increased susceptibility to colds				1	2	1			2		1			3			3	2	5
"Heavy head"											1	1	3				4	1	5
Retarded development		1	2		1												3	1	4
Sleeps poorly	1										1	1					2	1	3
Other miscellaneous (once or twice only)			3	1	1	2	2	5	2	2	3	1					11	11	22
Total	8	4	39	12	29	26	83	75	91	48	107	77	26	30	0	2	383	274	657

particularly in connexion with the youngest age groups, that the ages given represent age at time of illness, which was up to 29 months before the follow-up interview. A total of 387 individuals showed 657 disabilities; of these, 223 had only a single complaint, while 95 reported two each, 41 three, 21 four, 5 five, and 2 six. As we have said, the classification adopted is purely symptomatic; therefore no attempt has been made at diagnosis. Similarly, it did not seem justifiable to try to decide whether a given symptom was or was not due to meningitis, and all symptoms that satisfy the criteria stated above have been included.

partial deafness, both deafness and discharge clearing simultaneously six months after leaving hospital. Two of this group, both with only slight deafness, had scarlet fever within a few weeks of meningitis, leaving a field for speculation as to which illness the impairment of hearing is to be attributed.

Visual Disabilities.—This tabular classification represents a condensation of the following four headings:

(a) **Impaired Vision.**—Of these 22 cases 17 were reported as "weak eyes," while one each was described as "vision worse," "blurred vision," "near blindness in left eye, poor vision in right," and "eyes weak and red" (iritis and choroiditis on discharge from

the hospital). The remaining patient, a boy of 14, had a retinal haemorrhage in the right eye while in hospital; after discharge he was in bed in a darkened room for six weeks and unable to see properly for five months, but since that time his vision had been normal.

(b) *Visual Disturbances*.—This term is used to designate four cases each presenting a different type of disturbance of visual function. These were double vision, clearing at 18 months and associated with partial deafness and tinnitus; night-blindness sufficiently marked to force the patient to return home before dark, associated with total deafness; spots before eyes frequently; and frequent visual disturbances described rather vaguely by the patient's mother as being in the form of "black spells," associated with severe headaches and strabismus.

(c) *Enucleation of Eye*.—This operation was performed in two instances. One of these patients had choroiditis as a complication while in hospital, and the eye was enucleated three months later. The other was transferred direct from the isolation hospital to a general hospital for the operation, the patient not knowing the reason for this procedure.

(d) *Total Blindness*.—The single case of total blindness was that of a female infant of 8 months who was totally blind for five months after discharge, but subsequently recovered her sight. She was also in bed for six months after leaving the hospital, unable to sit or walk, but at the age of 32 months (the time of the follow-up visit) could walk alone holding on to a wall, though seeming to have no co-ordination or balance and still having to be fed. (In the absence of further clinical data, the latter disability could only be given the admittedly unsatisfactory classification of "poor balance.")

Strabismus.—The age distribution is again very young, five of the nine being 4 years of age or under. The condition was unilateral in five and bilateral in one, while in the remaining three this point was not specified. In two instances this disability was no longer present—one as a result of operation three months after discharge, the other clearing spontaneously twelve months after illness. The latter patient was a 13-months-old male infant who at the time of follow-up (aged 37 months) showed evidence of markedly retarded development, and was observed by the interviewing nurse to be apparently hydrocephalic.

Tinnitus.—These four individuals were all over 24 years of age, and in all of them the tinnitus was associated with deafness—total in one and partial in the other three.

Excessive Lacrimation.—This was associated with impaired vision in two of the four instances.

Other Impairment of Special Senses.—Aphasia was reported twice (both in individuals over 50) and slurred speech twice, while one female aged 75 complained of complete loss of sense of taste for six months after discharge.

Pains in Limbs and "Rheumatism".—Pain in the lower limbs was complained of by 19 of the survey group. Pain, soreness, or aching of the legs was the complaint of 12, in one case accompanied by stiffness. Three had experienced "arthritis" or "neuritis" of the knee, three others had both pain and swelling of the knee, while the symptom of the remaining patient was periodic swelling of knees and ankles. In four instances it was specifically stated that the disability had interfered with work or attendance at school.

Pain in the upper limbs occurred three times, in the form of aching of arm, "arthritis" of arm, and "neuritis" of shoulder. Three further cases classified as "rheumatism" represent generalized joint or other pains that could not be localized to any one anatomical area.

Weakness of Limbs.—Weakness of the lower limbs was reported eight times, the weakness being in the ankles in three, the knees in one, and the leg muscles in four. One of the latter group had weakness of arms as well as legs, and this combination has been classified as two separate disabilities; this case is one of the two described below. There were two cases of weakness of the upper limbs, both presenting points of individual interest. The first was a female aged 65 who lost the use of her right arm completely for six months following meningitis, with subsequent marked improvement, although 24 months after discharge she was still unable to lift heavy objects. The other was a male aged 52 with extreme weakness of arms and legs for six months after his acute illness. There was no pain or stiffness, but he could not use his arms to lift anything and was unable to work. The condition cleared spontaneously after six months, and for

15 months he was asymptomatic. Then, 21 months after discharge, he developed "fibrositis" of arms and legs with pain and stiffness, and at the time of the follow-up had been completely incapacitated for six months. (The pain and stiffness have, of course, not been included in the survey findings, the later development being related here solely as a matter of interest.)

Lameness and Unable to Walk.—Two of the six cases grouped as lame were described as "turns foot out" and "throws foot out when walking." Two others reported marked limping, one case clearing completely at six months and the other being much improved when interviewed 15 months after discharge. A male infant of 9 months at the time of illness was unable to straighten his leg; he did not walk until he was 18 months old, and though by the age of 27 months (when followed up) he ran about and played, he always kept his leg bent at the knee. The remaining child, a girl aged 6, suffered from stunted growth in her left leg, with a severe limp and muscles that at times were tender to touch. On the basis of information available two patients could only be classified as "unable to walk." A girl aged 6, also totally deaf, was in a push-chair for six months after her attack of meningitis, with subsequent complete recovery. A boy aged 3 was unable to walk on return from the isolation hospital, and in two weeks was admitted to another hospital; 13 months later he was said to be still there with a cast from the waist down.

Headache.—This is by far the most common disability of the series, and was reported by 170 of the survey group. There were associated visual disabilities in only 13 of these. Defining "frequent" for purposes of tabulation as weekly or oftener, this symptom was divided into four main subgroups, as follows:

Mild or moderate, occasional	..	..	..	..	61
Mild or moderate, frequent	..	..	..	..	61
Severe, occasional	..	..	..	..	30
Severe, frequent	..	..	..	..	18

Space does not permit a detailed analysis of the headache symptomatology, but the findings in respect of each of the four chief characteristics of this symptom are briefly presented.

(a) *Severity*.—Ten cases were reported as mild, slight, or not severe, and an additional 10 as dull. These and the 93 cases in which severity was not specified (and so presumed to be mild) give a total of 113. Moderate headaches numbered nine, while 48 were described as sharp or severe.

(b) *Frequency*.—In six cases headaches were constant, while in 36 they were termed "frequent" by the patient or informant. More specific frequency was twice a week or oftener in 10, approximately once a week in 27, and less often than weekly in 28. Of this latter group there were only four patients who did not have their headaches at least once a month. Occurrence was described by 40 as occasional or "not frequent," while frequency was not specified in 10 instances. Eight headaches occurred when the patient was hot, tired, or excited, and five were subject to other miscellaneous exciting causes.

(c) *Duration*.—This was the least satisfactorily reported characteristic, 107 not specifying the duration of their attacks. Of the remainder, six were constant, 28 lasted between a day and a week, 18 for 2 to 4 hours (including "several hours"), and 11 for one hour or less.

(d) *Location*.—In 39 instances location was not specified. The headaches were frontal in 79 (46% of the 170), occipital in 22, "top of the head" in three, and temporal in one. The location was described by 16 as various combinations of two of the above, and by 10 as generalized.

Easily Fatigued.—Of these 48 complaints 40 were described as easily fatigued or tiring easily, three as sleepiness during the day, two as listless or languid, two as lack of energy, and one as "tired bouts." A specific statement that time had been lost from work or school as a result of this disability was made by six individuals.

Backache.—Since backache is essentially a rather vague sort of symptom, it was perhaps to be expected that the description of this disability would be similarly vague and relatively unsatisfactory. Frequency was not specified by 11 of the 46, while eight described their backache as constant, eight as frequent, and eight as occasional. Daily, weekly, and monthly occurrence were each reported once; four experienced backache after heavy work, and four if tired. Neither severity nor

duration was well enough described to warrant tabulation. The location (not specified in 18) was interscapular in one, low back in 24, and sacral in three.

Poor Balance.—Aside from the case previously described under "Total Blindness" this did not appear to constitute a serious disability, being variously described as "balance poor," "stumbles easily," "sways when walking," and "tendency to fall." Ten of the 20 cases were associated with deafness—total in five instances and partial in five. The disability had cleared completely in three (six months after discharge in two and 10 months in the third), and was improving in nine of the remaining 17.

Dizziness.—This group of 13 complained of dizziness, giddiness, or feeling "light-headed." Headache was also reported by nine of these individuals. Deafness was associated in only two instances (one total and one partial), and these two were the only ones of the 13 who complained of poor balance.

Miscellaneous Disabilities

This final group of what might be termed symptomatic odds and ends comprises all disabilities (excepting a few that have been grouped above with closely associated complaints) occurring less than 10 times. The greater number of these require no more than mention of their occurrence, but a few seem deserving of some further elaboration.

The nine gastro-intestinal complaints reported consisted of vomiting in five, poor appetite in two, and one each with persistent constipation and with a monthly attack of gastro-intestinal pains and upset. Neck pain, occurring in seven, was described five times primarily as pain and twice primarily as stiffness; headache was associated in four instances and backache in three. Nightmares and increased susceptibility to head colds were each reported five times, while there were three complaints of sleeping poorly.

"Heavy head" was a complaint encountered only in Denbighshire, and no further elucidation of the nature of the disability could be obtained from four of the five presenting this symptom. The fifth patient stated that he felt as if severe pressure were being exerted on the top of his head. This occurred chiefly when he was trying to get to sleep, and as a result he had very little sleep at night and was able to work only three or four days a week.

The four cases of retarded development included one boy of 22 months (3 years old at time of follow-up) described by his family as retarded in physical development, and three cases of mental retardation, all in males. One of these, 3 years old at the time of his meningitis and 5 at the follow-up, had been in a mental institution in London for over a year. The other two were aged 10 and 13 months at the time of acute illness, and were followed up 27 and 26 months later, respectively. Neither had walked or talked or shown any interest in toys, and the younger one was unable even to sit up. This child also presented a history of almost hourly convulsions for the first five or six weeks after discharge. Both patients were seen by the interviewing nurse, and the older was observed to have a disproportionately large head (previously mentioned under "Strabismus").

Of the disabilities occurring one or twice—listed in Table II as "Other Miscellaneous"—only two seem of sufficient individual interest to warrant a brief description. A male aged 39, suffering from facial nerve paralysis, had apparently followed his medical status with close attention, as he described his disability as paralysis of the fifth and seventh nerves, involving masseters and cheek muscles and causing protrusion of the lower lips as well as sensory disturbances of the mouth and tongue. This cleared spontaneously 11 months after discharge, and had not recurred when he was interviewed two months later. The other case was that of a male aged 41, suffering from palpitation which was present "all the time" but worse at night, with associated nightmares and irregularly occurring severe frontal headaches. As a result he slept very little, and had been unable to resume his work as fitter at a local colliery.

Disabilities reported twice were oedema of limbs, oedema about the eyes, fainting attacks, enuresis (in a girl of 6 and a male of 18), nose-bleeding, "not as robust as previously," persistently discharging ear, and restlessness. Those reported

a single time (including the two described in the preceding paragraph) were paralysis of facial nerve, palpitation, convulsions, "lumps on back of head," "numbness at back of knee," and "nervous habit of shaking head."

Accentuation of Disabilities Previously Present.—Although it was decided that disabilities previously present should be included if definitely accentuated immediately after meningitis, only 6 such cases were found. Three of these complaints were of headache, two of impaired vision, and one of partial deafness.

Disabilities No Longer Present or Improved.—At the time of the follow-up 35 disabilities were no longer present. Nine of these had cleared four to six months after discharge, 11 during the second six months, 5 during the second year, and 10 from 25 to 28 months after leaving hospital. This list included headache and partial deafness (5 cases each), pain in the lower limbs (4 cases), "easily fatigued" and "poor balance" (3 each), and "emotionally less stable" and strabismus (2 cases apiece), while 11 other disabilities each numbered one recovery. There were 64 reports of disabilities that were still present but improved. Of these, 21 were cases of headache, 9 of poor balance, and 8 of partial deafness, while no other disability was mentioned more than four times in this connexion.

Health Improved Since Meningitis.—In contrast to the disabilities so far presented, the health of 61 individuals was said to have been better since meningitis. This improvement concerned general health in 58, while the other 5 were personality changes for the better. A boy of 4½ was no longer shy and retiring; a girl of 7 now played happily with other children; a girl of 12 "was grizzly before meningitis but has a happy disposition now"; while a girl of 15 "seems improved in disposition." But the most amazing transformation was that of a 51-year-old chronic alcoholic whose previous condition was described by his wife as "drunk morning, noon, and night." She fervently blessed his illness, for since having meningitis he had become a teetotaler, and for 25 months had not touched a drop of liquor.

Some Further Considerations

The major portion of this report has been devoted to a brief description of the survey itself and presentation of the disabilities found. There remains a large amount of associated data gathered by the interviewers in the field, much of which might prove of interest. However, limitations of space permit the selection of only a small part of this material, and four further points have accordingly been chosen to be touched on briefly. These are the interval between discharge from hospital and return to work or school, the occupations of the survey population, indication of those disabilities considered actually incapacitating, and the incidence of disabilities by occupational groups.

Interval Between Discharge and Resumption of Work or School.—This interval is shown in Table III, including the presence or absence

TABLE III.—Interval between Hospital Discharge and Resumption of Work or School

Time after Discharge when Work or School was Resumed	Patients without Disabilities				Patients with Disabilities			
	Male		Female		Male		Female	
	No.	%	No.	%	No.	%	No.	%
1st month	119	51.5	108	61.0	49	27.7	48	37.8
2nd month	66	28.6	45	25.4	58	32.8	34	26.7
3rd month	28	12.1	17	9.6	20	11.3	17	13.4
4-6 months	13	5.6	6	3.4	33	18.6	18	14.2
7-12 months	3	1.3	0	—	8	4.5	1	0.8
Over 12 months ..	0	—	0	—	1	0.6	2	1.6
Did not resume ..	2	0.9	1	0.6	8	4.5	7	5.5
Total	231	100.0	177	100.0	177	100.0	127	100.0
Pre-school	91		91		52		26	
Interval not stated ..	4		5		4		1	
Grand total	326		273		233		154	

of disabilities and sex incidence. It is obviously impossible to determine accurately the point at which an infant or pre-school child resumes normal activity, and these incidence figures are therefore

based on totals exclusive of pre-school ages and the 14 persons for whom the interval was not stated. Taking three months as the maximum limit of a normal period of convalescence, it will be noted that there is a very definite delay in return to work among the group complaining of disabilities compared with those without complaints. The three intervals over 12 months were 13 months for the one male case and 14 months and 25 months for the two females.

Occupation.—A detailed list of the occupations of the survey population resulted in a table so enormous as to be wholly unwieldy, and the occupations have accordingly been condensed into the groupings given in Table IV. Among the males, as shown in the

TABLE IV.—Incidence of Disabilities by Occupational Groups

Occupational Group	Total No.	All Disabilities		Incapacitating Disabilities	
		No.	Rate per 100	No.	Rate per 100
Male					
Colliery	62	36	58.1	12	19.4
Factories, mills, and plants ..	38	20	52.6	3	7.9
Other heavy labour	41	18	43.9	3	7.3
All other adults	126	51	40.5	9	7.1
School	148	56	37.8	14	9.5
Pre-school	144	52	36.1	9	6.3
Total male	559	233	41.7	50	8.9
Female					
Housework	121	60	49.6	8	6.6
Factories and mills	22	6	27.3	0	—
All other adults	50	19	38.0	5	10.0
School	116	42	36.2	9	7.8
Pre-school	118	27	22.9	3	2.5
Total female .. .	427	154	36.1	25	5.9
Grand total .. .	986	387	39.2	75	7.6

first column of this table, 62 were employed in colliery work, while 38 worked in factories, mills, and plants. The remaining male adults have been divided into "Other Heavy Labour" and "All Other Adults." For the females, housework is the leading occupation with 121, while "Factories and Mills," with 22, is the only other adult classification listed separately. The Services had 17 male representatives—15 Army and 2 Royal Air Force—while there was

that this classification represents my personal opinion, and thus constitutes a solitary exception in a report otherwise devoted entirely to factual analysis and presentation. For this reason it has been included with no little trepidation, and the cases termed incapacitating have been only those concerning which no possible doubt was entertained. It is felt, therefore, that the true incidence of incapacitating disabilities is undoubtedly considerably higher than these figures would indicate.

Incidence of Disabilities by Occupational Groups.—In addition to the occupational distribution of the survey population, Table IV also shows the incidence and rate per 100 of total disabilities and incapacitating disabilities for each of the occupational groups listed. It might be expected that the incidence rate would be higher for the more strenuous occupations, and the findings bear out this expectation to a considerable degree. In the male total disabilities the rate is highest in colliery workers, falling progressively through factory workers, other heavy labourers, "all other adults," school, and pre-school. A similar progression occurs in male incapacitating and female total disabilities with a single exception each (school and factory workers, respectively), but female incapacitating disabilities fail to provide a further parallel. The incidence percentage is higher for males than for females in both categories, but neither of these differences is statistically significant.

Conclusion

As stated in the opening sentence of this report, the survey was designed primarily to answer a single question, "Is there an appreciable incidence of persistent symptoms following cerebrospinal meningitis, and, if so, what are the nature and the severity of these symptoms?" In view of the findings, the first half of the question can be answered by an unqualified affirmative. The nature and the severity of the symptoms reported have been defined above as clearly and completely as space and the collected data would permit. Discussion has been deliberately omitted. The facts must stand on their own metaphorical feet. There are many extraneous factors other than the preceding meningitis affecting symptomatology which are next to impossible to evaluate, and this is especially true when dealing with a survey period which embraces the entire Battle of Britain with all its associated physical and psychic

TABLE V.—Incidence of Disabilities Classified as Incapacitating

Age at Time of Meningitis:		Under 1		1 and 2		3 and 4		5-14		15-24		25-44		45-64		65 and Over		Total		
Sex:		M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	Total
Total deafness		1		4	1			10	5	4	1	8	1	1				19	8	27
Headache								1	1	3	4	1	1					12	6	18
Backache										1	2	3		1				4	3	7
Partial deafness								3	1		1	1						4	2	6
Easily fatigued								1		1	1	2						4	1	5
Pain in lower limbs								1		1	2							0	1	1
Lameness		1						1						1				1	2	3
Retarded development			1	1		1												2	1	3
Impaired vision								2										2	0	2
Enucleation of eye								1		1								2	0	2
Weakness of upper limbs														1		1		1	1	2
Unable to walk						1			1	1		2		3	1			1	4	5
Miscellaneous (once each)			2															6	4	10
Total of disabilities		2	3	5	1	2	0	17	11	11	11	16	2	5	4	0	1	58	33	91
Number of individuals with disabilities		2	2	5	1	2	—	17	9	10	8	11	2	3	2	—	1	50	25	75

not a single member of the Auxiliary Services among the females. Three males and no females were unemployed before contracting meningitis, while occupation was not stated in four instances by males and in one instance by females.

Incapacitating Disabilities.—In considering the complaints made by 387 of the 986 individuals followed up (an incidence of 39.2%) it is obvious that many of these disabilities are of a relatively trivial nature. In an attempt to determine how many were truly incapacitating, the record cards of all patients with disabilities were carefully reviewed. The two criteria employed were obvious interference with the patient's former occupation and marked likelihood of his being seriously handicapped. Total deafness was considered incapacitating *per se*, but with this exception the status of each case was decided on its individual merits. The disabilities classed as incapacitating are shown in Table V, with their age and sex distribution. A total of 91 incapacitating disabilities were present in 75 individuals, giving an incidence of 7.6%. The disabilities listed as "Miscellaneous," each occurring once, were (in ascending order of age) total blindness, poor balance, "rheumatism," inability to concentrate, paralysis of facial nerve, palpitation, dizziness, weakness of lower extremities, "heavy head," and aphasia. It should be noted trauma. In view of this consideration, it seems superfluous to

attempt an interpretation of these symptoms, and any such interpretation is left to the individual reader.

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REFERENCE

Maddock, E. C. E. (1943). *Mon. Bull. Min. Hlth. and E.P.H.L.S.*, vol. 2.

In recognition of his important work upon the various types of Rh factors and on their genetic transmission, the College of Physicians of Philadelphia has awarded the Alvarenga Prize for this year to Alexander S. Wiener. Dr. Wiener will give the Alvarenga Lecture before the College of Physicians of Philadelphia and the Philadelphia County Medical Society on Oct. 3, on "Rh Blood Factors in Clinical Medicine."