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AN EPIDEMIC OF INFLUENZA DUE TO VIRUS B

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A city may not be the ideal place for the conduct of precise epidemiological investigations; both its size and the complexity of its intercommunications make the course of events difficult to trace with accuracy. Nevertheless, the continued study of such epidemics is obviously essential not only because of their magnitude but also for the simple reason that most epidemics occur in cities. A large epidemic of virus B influenza in the city of Glasgow seemed a sufficiently unusual event to make it desirable to study, so far as possible, the natural behaviour of the infection in this large community. The Public Health Department of the city has, over a long period of time, paid considerable attention to the study of respiratory infection, so that it is possible to utilize statistics which might not be generally available.

Indicators of the Occurrence of an Epidemic

Accurate figures regarding the incidence of influenza are not obtainable. That infections due to influenza virus B had appeared in the city was proved by the demonstration of a rising titre of antibody in the paired sera from two cases of pneumonia which were examined on February 25, 1952. The histories obtained from these patients suggested that the earliest date of sickening was February 8, 1952. Subsequently, with the assistance of the Virus Reference Laboratory at Colindale, virus B was isolated from a fatal case of fulminating staphylococcal pneumonia. It is not intended in this report to analyse the results of the serological studies. It is sufficient to state that these, as well as other related epidemiological investigations, show beyond doubt that there was a high prevalence of virus B infection in the city during late February and March, 1952.

Some idea of the course of the epidemic can be obtained from the accumulated statistics of (*a*) the weekly new claims to the Ministry of National Insurance; (*b*) the weekly notifications of pneumonia; and (*c*) the weekly deaths from respiratory disease. These figures are supplied in Table I for the period December 1, 1951, to March 31, 1952.

(*a*) *New Claims to the Ministry of National Insurance.*—Study of these figures shows that the whole period can be divided roughly into three: the last weeks of 1951 and first week in 1952 constitute the first interval, when the figures were low; the 2nd to 8th weeks a second interval, when the figures had increased by about 50%; during the 9th to 13th weeks a further increase was noted, which reached a peak in the 10th and 11th weeks, falling in the 13th week to the pre-existing level. If the figure for the first week of the study period is regarded as 100%, then at the peak the new claims had increased to about 250%. The first interval, of course, includes the Christmas and New Year weeks, when a drop in the reporting of minor illness is a usual occurrence. When this is appreciated, the figures suggest that during the early weeks of 1952 there was a gradual increase in sickness, which culminated in the more accentuated rise in the 8th to 12th weeks.

(*b*) *Notifications of Acute Primary and Influenzal Pneumonia.*—The figures of notifications of pneumonia in Glasgow are more valuable than in many other cities. Since 1925 the practitioners have been encouraged to notify their cases, a large proportion of which are admitted to the infectious diseases hospitals. The notifications showed a rather steady increase from the first week of the study period. In the 7th week of 1952, however, a much more rapid rise began, which reached a peak in the 9th week, to return in the 13th week to a figure similar to that encountered in the earlier interval.

TABLE I.—*(a) New Claims to the Ministry of National Insurance, (b) Notifications of Acute Primary and Influenzal Pneumonia, (c) Deaths Registered from Respiratory Diseases (excluding tuberculosis); December 1, 1951, to March 31, 1952*

Week	(a)	(b)	(c)
49	3,957 (100)*	63 (100)	14 (100)
50	3,840 (97)	85 (135)	23 (164)
51	3,647 (92)	111 (176)	32 (223)
52	2,537 (39)	117 (186)	29 (207)
1	2,991 (50)	99 (157)	21 (150)
2	4,576 (116)	148 (235)	29 (207)
3	5,604 (142)	119 (189)	21 (150)
4	4,809 (122)	158 (251)	45 (321)
5	5,640 (143)	174 (277)	56 (400)
6	6,265 (159)	181 (288)	67 (478)
7	5,525 (140)	220 (350)	43 (307)
8	6,003 (152)	231 (367)	53 (378)
9	7,847 (199)	368 (585)	75 (536)
10	9,772 (247)	336 (534)	84 (600)
11	9,697 (245)	268 (426)	84 (600)
12	6,886 (147)	193 (307)	53 (378)
13	4,974 (126)	117 (186)	40 (286)
Totals ..	94,570	2,988	769

*The figures in parentheses are percentages of the figure for week 49.

The peak of notifications was reached in the week preceding the peak of new claims to the Ministry of National Insurance. At first sight this seems surprising, but it is possible that, as information of the presence of an epidemic becomes publicized, there is a greater tendency for the individual to pay attention to minor illness and to remain off work.

(*c*) *Deaths from Respiratory Diseases, Excluding Tuberculosis.*—Here, after a fairly steady number during the beginning of the period, an initial rise is noted in the 4th week, followed by a moderate increase in the 9th, 10th, and 11th weeks.

These figures combine to indicate that during the latter part of February and the first part of March, 1952,

an epidemic of some magnitude occurred in the city. It was indicated to us by general practitioners that in the majority of the cases seen by them the diagnoses were laryngitis, tracheitis, and bronchitis. The serological studies carried out in the patients admitted to the pneumonia wards showed that antibodies to virus B were present in a high proportion. The increase in the number of notifications of pneumonia and in the deaths from respiratory disease suggested either a high virulence of virus B or an enhanced susceptibility of the population. Comparison of the figures with those for the virus A epidemic of 1951, indeed, showed that the number of notifications of pneumonia was practically the same (see Table VII), although there was, fortunately, a considerable reduction in the number of deaths (see Table VI). This point will be studied in more detail later in the present report.

Pattern of the Epidemic: Contrast between the Behaviour North and South of the River Clyde

(*a*) *Pneumonia Notifications.*—It was generally rumoured that the south side of the city had experienced the effects of the epidemic earlier than the north side. The city is divided for administrative public health convenience into five divisions, of which three are on the north side of the River Clyde and two on the south side. It was therefore possible to allocate the notifications of pneumonia into the different divisions and, since the populations of the divisions were known, to compute "pneumonia rates per million." It was at once apparent that the epidemic had, in fact, appeared earlier on the south side. The figures are given in Table II; in order to complete the picture, the relevant figures for the same period of 1951–2—when virus A was epidemic—are also included.

The data support the view that the two areas of the city behaved differently. Thus, to the south of the Clyde the rise in the notification rate preceded that in the north by about three weeks. Further, whereas in the northern area the "curve" of the epidemic was sharp, with a single peak in the 10th week of the year (the usual appearance for an influenza epidemic), in the southern area the epidemic was more prolonged and there was no defined peak, although, it is true, the rate reached its maximum in the same week as in the north—namely, the 10th.

It is difficult to account for this difference in behaviour. That the River Clyde itself is more than an artificial dividing-line seems unlikely, for the amount of cross-river communication is considerable and large numbers of inhabitants, indeed, live on one side and work on the other. It may be observed from the table that in the virus A epidemic in 1951 no such difference in the behaviour of the epidemic was observed.

Since this analysis was based upon a serious manifestation of influenza—namely, pneumonia—it seemed desirable to examine data which related to less severe illness in order to see if this difference between north and south could be confirmed.

(*b*) *Absenteeism from School.*—Attendance at the 150 primary schools in Glasgow is normally fairly steady throughout the winter, the figure ranging from 87 to 92%. Records of attendances at these schools were obtained for the period December 1, 1951, to March 31, 1952. The ages of the children attending such schools lie between 5 and 12½ years. For each school the week was noted in which the peak of absenteeism occurred. The result of this analysis is shown in Table III. The contrast between the north and the south side of the city is at once apparent. In the schools on the south side of the river the peak period lay between February 22 and 29, whereas in the north the maxima lay in the period February 29 to March 7. Indeed, a spot map (Fig. 1), prepared from the data for the indi-

TABLE II.—*Notifications of Acute Primary and Influenzal Pneumonia by Civic Area and Rates per Million. December, 1950, to March, 1951, and December, 1951, to March, 1952*

Week	North of River Clyde Population: 683,300 (Northern, Central, and Eastern Divisions)				South of River Clyde Population: 385,700 (South-eastern and South-western Divisions)			
	1950–1 Notifications	Rate	1951–2 Notifications	Rate	1950–1 Notifications	Rate	1951–2 Notifications	Rate
49	73	107	43	63	56	145	17	44
50	79	115	59	86	61	158	25	65
51	103	150	82	120	66	171	22	57
52	81	118	79	115	51	132	30	78
1	168	245	66	96	68	176	28	73
2	240	350	92	134	122	316	38	98
3	223	326	73	107	85	220	37	96
4	172	251	94	137	96	249	47	122
5	119	174	104	152	52	135	65	168
6	75	110	122	178	64	166	51	132
7	63	92	120	175	41	106	92	238
8	70	102	133	194	26	67	92	238
9	91	133	155	226	35	91	102	264
10	51	74	225	329	32	83	103	267
11	66	96	174	254	36	93	90	233
12	60	88	126	184	34	88	56	145
13	74	108	82	120	42	109	30	78
Totals	1,808		1,829		967		925	

TABLE III.—*Peak Period of Absenteeism in 150* Primary Schools in the City of Glasgow*

Area	Number of Schools with Peak Absenteeism in Week Ending					Total
	15/2/52	22/2/52	29/2/52	7/3/52	14/3/52	
North	1	8	44	42	1	96
South	9	20	24	0	0	53
Totals ..	10	28	68	42	1	149*

* One school showed no peak.

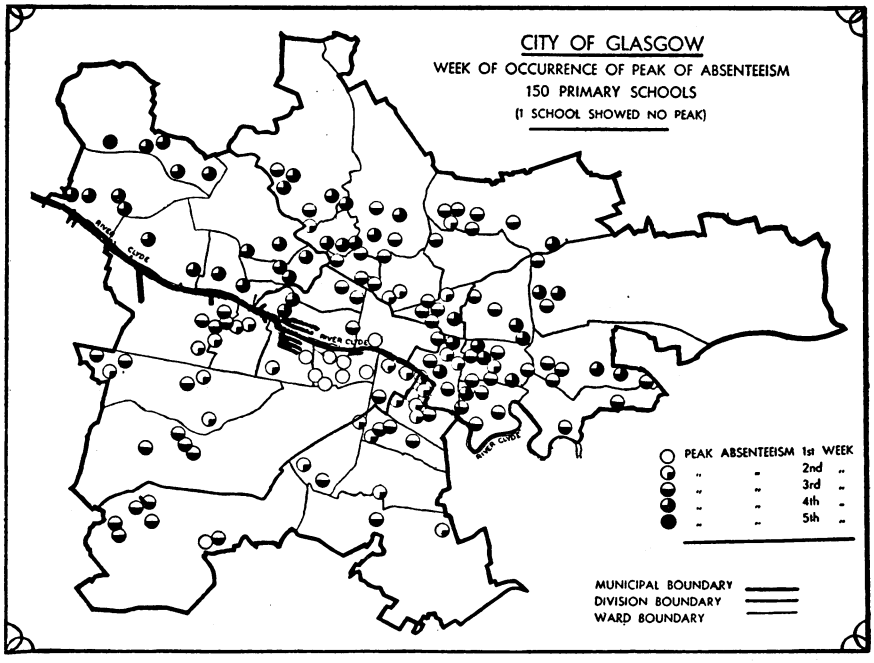

FIG. 1

vidual schools, shows that practically all of the schools in which the peak absentee rate occurred in the first week (week ending February 15, 1952) were in one area lying along the south bank of the River Clyde. This district includes a number of industries as well as an overcrowded, badly housed population, and contains one of the main receiving docks. It is into this dock that the bulk of the coastal and Continental trade is received. The spot map also gives the impression that the epidemic spread from this focal centre, and it will be seen that those schools situated in the extreme north-west of the city were the last to be affected and that all showed their peak of absenteeism at the end of the period. The distribution of the data by administrative Public Health Divisions brings out this point very well. The gradual ascent of the mean week throughout the five divisions suggests that there was a gradual spread of infection through the city from a focal area (Table IV).

TABLE IV.—*Distribution of School Absenteeism by Public Health Division and Week*

Week ending:	15/2/52	22/2/52	29/2/52	7/3/52	14/3/52	Mean Week
South-western ..	7	10	12	0	0	2·17
South-eastern ..	2	10	12	0	0	2·42
Central	0	5	19	11	0	3·17
North-eastern ..	0	3	21	12	0	3·27
North-western ..	1	0	4	19	1	3·76
Totals ..	10	28	68	42	1	

Meteorological Conditions

Scotland in general and Glasgow in particular experienced an unusually severe spell of cold weather in the early part of 1952. It was therefore decided to study the available meteorological information. Some of the data are shown in Fig. 2. For comparison, the information for the same periods of 1950 and 1951 has been extracted and is shown as mean figures. There are three interesting features. First, it will be seen that the relative humidity, after a rather high reading for two weeks, fell to a very low figure during the week in which the epidemic is assumed from the serological studies to have begun; secondly, that the minimum temperature was unusually low in the immediately preceding period; and, thirdly, that the average daily range of temperature was much greater than usual during the early part of the year.

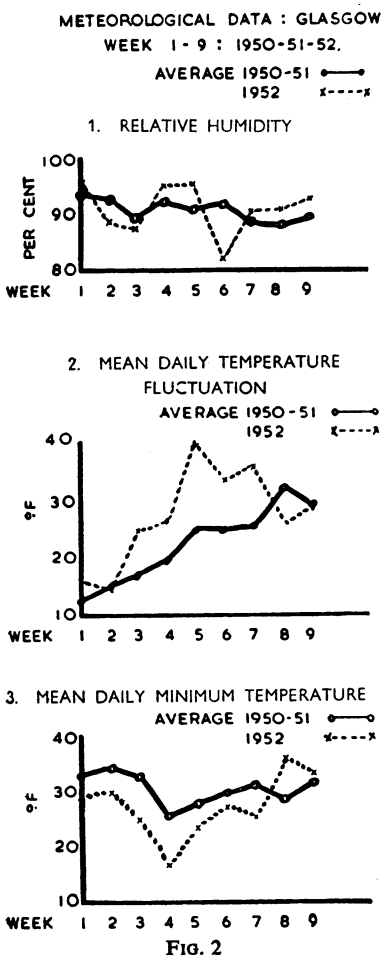

FIG. 2

These conditions, of course, applied to the city as a whole and leave unexplained the curious difference in behaviour between the north and south of the city.

Situation in the Rest of Scotland

There is no doubt that the facility with which the admission of cases of pneumonia to hospital in Glasgow is secured encourages the practitioner to notify his patients. He will naturally tend to notify more readily patients in those age-groups in which the disease may still run a severe course, as well as those living in unsatisfactory housing conditions. Nevertheless, where notification is assiduously practised the figures serve, as has been seen, as a useful indicator of the prevalence of respiratory infection. A perusal of the statistics for four other Scottish cities yields less valuable information. The figures for Edinburgh, Aberdeen, Dundee, and Greenock relating to "pneumonia notifications" and "deaths from respiratory diseases (excluding tuberculosis)" show that on quite a number of occasions the deaths exceed the notifications. In these circumstances less importance can be attached to the notifications, although it may be stated that an examination of them does not suggest that there was any very unusual occurrence during the last four weeks of 1951 and the first ten weeks of 1952. The new claims made to the Ministry of National Insurance have been abstracted and are shown in Table V. It will be observed that in Edinburgh the figures fluctuated between 53% and 123% of the mean for the period; in Dundee a peak of 125% of the mean was encountered in the third week of the year; in Aberdeen the thirteenth week showed a figure 160% of the mean for the period. In Greenock—which lies twenty-six miles to the west of Glasgow on the south side of the River Clyde—the last three weeks of the period produced figures ranging from 125 to 139% of the mean. The intercommunications between Glasgow and Greenock are considerable, so that it would not be surprising if the epidemic in the city had extended out to the surrounding district. Additional evidence, not presented here, from the Ministry of National Insurance new claims in other parts of the West of Scotland supports such a view.

TABLE V.—*New Claims to the Ministry of National Insurance, 1951–2. Figures for Five Scottish Towns*

Week	Edinburgh	Dundee	Aberdeen	Greenock	Glasgow
48	1,326 (85)*	616 (94)	563 (82)	280 (86)	3,971 (73)
49	1,369 (88)	683 (104)	616 (89)	240 (74)	3,957 (72)
50	1,244 (79)	616 (94)	575 (83)	266 (82)	3,840 (70)
51	1,326 (85)	602 (92)	649 (94)	220 (68)	3,647 (67)
52	831 (53)	444 (68)	433 (63)	167 (51)	2,537 (46)
1	992 (63)	477 (73)	509 (74)	213 (65)	2,991 (55)
2	1,616 (104)	757 (85)	657 (95)	299 (92)	4,576 (84)
3	1,831 (117)	816 (125)	822 (119)	378 (116)	5,604 (102)
4	1,633 (104)	763 (117)	720 (104)	348 (107)	4,809 (88)
5	1,779 (114)	721 (110)	721 (105)	371 (114)	5,640 (103)
6	1,931 (123)	797 (122)	797 (116)	428 (131)	6,265 (115)
7	1,638 (105)	686 (105)	707 (103)	400 (123)	5,525 (101)
8	1,488 (95)	629 (96)	694 (101)	329 (101)	6,003 (110)
9	1,463 (93)	562 (86)	651 (94)	319 (98)	7,847 (144)
10	1,348 (86)	503 (77)	629 (91)	317 (97)	9,772 (179)
11	1,364 (87)	595 (91)	714 (104)	408 (125)	9,697 (178)
12	1,298 (83)	679 (104)	840 (122)	424 (130)	6,886 (126)
13	1,332 (85)	706 (108)	1,102 (160)	453 (139)	4,974 (91)
Totals	25,809	11,652	12,399	5,860	98,541
Mean week for period	1,434 (100)	654 (100)	689 (100)	326 (100)	5,476 (100)

* The figures in parentheses are percentages of the mean for the period.

Mortality from the Epidemic

The deaths which occurred from respiratory diseases during the two periods of four months, December–March, 1950–1, and December–March, 1951–2, are shown in Table VI. It has already been explained that in 1950–1, in common with the rest of Great Britain, Glasgow experienced an epidemic of virus A influenza during December–January (Grist *et al.*, 1952). It is therefore of interest to compare that epidemic with the one due to virus B, which ran through

TABLE VI.—*Comparison of Mortality in Two Periods: December–March, 1950–1, and December–March, 1951–2*

Month	1950–1		1951–2	
	Confirmed Pneumonia Notifications*	Total Deaths from Respiratory Diseases	Confirmed Pneumonia Notifications*	Total Deaths from Respiratory Diseases
December ..	567	155	276	55
January ..	1,233	265	500	74
February ..	413	131	818	136
March ..	367	101	926	131
Totals ..	2,580	652	2,520	396

* In this table and Table VII the figures abstracted are those for confirmed notifications, since the age-grouping is more easily available for such cases.

February–March, 1952. The much greater mortality arising during the influenza A epidemic is at once apparent.

This difference between the two epidemics was studied more closely. It seemed, in particular, desirable to demonstrate whether the lower mortality in the present epidemic could be explained by a difference in the age distribution of the persons attacked. Accordingly, the confirmed notifications were obtained for these two four-months periods in 1950–1 and 1951–2 (Table VII). In the two non-epidemic periods (February–March, 1951, and December, 1951–January, 1952) the age distributions were almost identical. In the epidemic period December, 1950–January, 1951, it seems that some excess of cases was encountered in the very young and elderly compared with the epidemic period February–March, 1952. The similarity, however, of all four curves is a striking feature and, if nothing else, might indicate that the general practitioners adopt a fairly uniform standard in notification. The similarity of the two non-epidemic periods has encouraged us to use the figures to estimate the age distribution of the excess of pneumonias which might be regarded as the product of the influenza virus epidemics. It will be seen that the distributions show slight differences, particularly in the excess of young children in the 1950–1 epidemic. Such differences as there are, however, lend no support to the view that the difference in mortality in the two periods could be explained in terms of the age distribution of the notified cases.

TABLE VII.—*Age Distribution of Confirmed Notifications of Pneumonia: December to March, 1950–1, and December to March, 1951–2*

Period	Age Group (Years)							
	0–5	–10	–15	–25	–45	–60	60+	Total
December–March, 1950–1	877	133	65	152	327	413	613	2,580
December–March, 1951–2	719	183	90	185	371	424	548	2,520
December–January, 1950–1 (epidemic period A)	656	82	46	114	218	270	414	1,800
February–March, 1952 (epidemic period B)	491	132	77	122	263	289	370	1,744
February–March, 1951 (non-epidemic period)	221	51	19	38	109	143	199	780
December–January, 1951–2 (non-epidemic period)	228	51	13	63	108	135	178	776
Increment of pneumonia notifications due to epidemic A ..	428	31	33	51	110	135	236	1,024
	*(188)	(61)	(254)	(81)	(102)	(100)	(133)	
Increment of pneumonia notifications due to epidemic B ..	270	81	58	84	154	146	171	964
	*(122)	(159)	(305)	(221)	(141)	(102)	(86)	

* The figures in parentheses represent the percentage increase over the relevant non-epidemic period.

Discussion

It is generally thought that, whereas influenza A infections usually occur in rather short sharp epidemics which may be geographically widespread, outbreaks due to type B virus tend to be smaller, more sporadic, and diffuse both in place and in time. The recent Glasgow experience is therefore interesting in that a large and distinct epidemic, confined within a period of roughly five weeks and not associated with noteworthy outbreaks in geographically related areas, was attributable to the relatively innocuous type B virus.

The similarity between the total numbers of cases of pneumonia encountered in two epidemics—the first due to virus A, the second to virus B—is surprising. The greater virulence of virus A would lead one to expect an increase of cases of pneumonia as well as an increase in the deaths from respiratory diseases. It seems not unlikely that the role of influenza virus in the production of pneumonia may be the carrying out of a "softening-up" process preparatory to bacterial invasion; the more extensive the damage to the respiratory mucosa the greater the risk of successful bacterial assault and, consequently, of secondary pneumonia. These two succeeding episodes in Glasgow, almost equal in magnitude as measured by the resultant pneumonias, suggest that in circumstances favourable to it the type B virus may show characteristics not unlike those of type A. The importance of the virulence of the primary virus infection becomes more obvious when attention is directed to the total mortality produced. The mortality rates—based on confirmed notifications and deaths from respiratory diseases—in succeeding epidemics due to virus A and virus B, were 25% and 16% respectively; and, although these rates must not be regarded as expressing a true mortality from pneumonia, they are nevertheless indices which can be compared. It will be interesting to examine in exact detail the pattern of the bacterial flora of the sputum from the pneumonia patients in the two periods, but a preliminary survey has not indicated any gross dissimilarity. Even allowing for the suggestion that the age distribution of the cases of pneumonia in the more recent (B) epidemic may have been more favourable, it cannot be doubted that the A virus has a greater capacity to induce fatal disease. Although there is nothing new in this statement, the fact that the conclusion is drawn from the experience of the same population with the two viruses in a comparatively short period of time may give it added value.

That the climatic conditions played a part in creating a suitable soil for the production of an epidemic seems worthy of consideration. Fluctuations in relative humidity accompanied by a wide daily temperature range must make considerable demands upon the activity of the mucosa of the respiratory tract. With a virus which has *per se* a high virulence factor, climatic changes would seem to have little importance. On the other hand, with a virus whose virulence is normally low, climatic changes might induce variations in host resistance which would alter the balance in favour of the invader.

Such an argument could have been advanced more persuasively if the whole of Glasgow had behaved in a similar fashion. The difference between the north and south of the city introduces a further surprising feature and, moreover, one which tends to lessen the importance of the climatic changes. As we have already said, we find it hard to believe that the River Clyde constituted a factual dividing-line between two areas. There seems to be no doubt, however, that the south side of the city experienced an earlier and more prolonged epidemic than the north. Without wishing to appear to over-simplify the problem, it is an interesting fact that the epidemic began in that area of the city which adjoins the dock into which much of the Continental traffic is received. Influenza due to virus B was recorded in the bulletins of the World Health Organization in Denmark in mid-November, 1951, in the Netherlands in the last week

of December, 1951, and in Italy in January–February, 1952. The vessels which arrived at this dock from the middle of January until the end of February were as follows:

Date of Arrival in Glasgow	Nationality	Last Port of Call
15/1/52	British	Antwerp-Ghent
18/1/52	Swedish	Rotterdam
23/1/52	British	Antwerp-Ghent
30/1/52	,,	,,
4/2/52	Dutch	Honfleur
6/2/52	British	Antwerp-Ghent
7/2/52	,,	Paris
8/2/52	,,	Lisbon
13/2/52	,,	Antwerp-Ghent
19/2/52	,,	,,
22/2/52	Dutch	Rouen"
26/2/52	British	Antwerp-Ghent
29/2/52	Swedish	Valencia-Malaga

It is a possible speculation that virus B was introduced to the city from one of these ships ; that the weather conditions prevailing increased the chances of spread into the adjoining area of the city ; that a local " build-up " occurred among an overcrowded population, which enhanced the virulence of the virus and encouraged a later spread to the rest of the city and to the surrounding district. We are of course aware of the occurrence of small groups of cases in parts of England during the same period of time, so that it may be unwise to over-emphasize the possibility of the introduction of the virus from overseas.

The analysis of the age distributions of the notified cases of pneumonia seems interesting. Little or no accurate information is available of the actual age-distribution of influenza in a community. One might have expected, however, that the increment of pneumonias resulting from influenza virus infection would have upset the age distribution of the normal run of endemic cases. In fact, the point which emerges is that in two epidemic periods due to different viruses and in two non-epidemic periods the age distributions of the notified cases followed an essentially similar pattern. When the age groups are studied in detail individual differences emerge. It is not perhaps surprising that there should be considerable increases in the age groups under 5 and over 60 years. The interrelationship of influenza and pneumonia at the extremes of life is obscured by the epidemic inexperience of the young and the presence in the elderly of chronic respiratory disease or degeneration—factors which must enhance the possibility of successful bacterial assault. It is interesting to find that the greatest absolute increase in pneumonia notifications in the 1950–1 A epidemic occurred in the 0–5-year age group. When the 1952 B epidemic is compared with the 1950–1 A epidemic the most striking feature is the increase of notifications in the middle age groups (6–45 years). These figures would support a view that the A virus was attacking a population with a relatively high immunity from recent experience, whereas the B virus was operating in a community whose immunity was of a low order. The presence of B virus in Glasgow during the spring of 1950 is known from the observation of an antibody rise in a small proportion of the pneumonia admissions ; but there was no large-scale epidemic at this time. It may be assumed that Glasgow shared in the European experience of A infection in the winter of 1948–9, although there is no supportive laboratory evidence. Our findings may simply reflect the much more widespread impact which the A virus makes on the community, but the possibility of a difference in the degree or persistence of immunity cannot be excluded.

Summary

An epidemic of influenza B in the city of Glasgow during the early months of 1952 is reported.

The figures for new claims to the Ministry of National Insurance, pneumonia notifications, and deaths from pneumonia during the period of the epidemic are compared with those obtained in the epidemic of influenza A which occurred in the city during the winter of 1950–1. From these figures it was found that similar numbers of persons were affected in the two periods, and that the increase in pneumonia notifications was of the same order. The age distribution of the deaths from pneumonia differed in the two epidemics : in the influenza A epidemic the greater number of cases was in the youngest and oldest groups. The A epidemic was associated with the higher mortality.

The possible origin of the recent epidemic in the dock area, and its spread throughout the city, are discussed in association with the figures for school absenteeism in February and March.

The abnormal meteorological conditions which preceded the epidemic are noted.

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STAPHYLOCOCCAL PYOTHORAX IN INFANTS

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Empyema in infants was not uncommon before the days of penicillin. Chaplin (1947) reported 104 cases under 2 years of age admitted to an English hospital in a 10-year period. From America Spence (1920), Brown (1923), Steinke (1935), Hochberg and Kramer (1939), and Forbes (1946) all report large series. Spence (1920) noted the incidence as about one to every nine cases of pneumonia admitted to hospital in his and other series. The role of the staphylococcus in empyema in infants appeared to increase with the advent of sulphonamides (Forbes, 1946 ; Chaplin, 1947). Frazier and Davis (1951) found that all of 14 cases of empyema in children under 12 months old which occurred since 1943 were due to the staphylococcus.

In the past five years empyema has been much less common. Frazier and Davis (1951) found that empyema did not develop in any of their patients with pneumonia who had had adequate penicillin. In spite of this, staphylococcal empyema is still seen in infants' wards, though it receives little or no special mention in most standard textbooks on paediatrics. Early recognition is most important, and the best treatment is not yet established. Two successfully treated cases in infants in the first month of life are here reported.

Case 1

A previously normal 16-day-old male infant was admitted on February 27, 1951, having had difficulty in breathing for 24 hours. He did not seem very ill, but his temperature was 100.2° F. (37.9° C.), his respirations 44, and a definite patch of crepitations was audible over the right chest. Intramuscular penicillin, 50,000 units six-hourly, was begun, and although his temperature settled, his general condition altered little until the fourth day, when he suddenly became cyanosed and very distressed. The right chest was dull to percussion, breath sounds were absent, and an *x*-ray film showed complete opacity of the right lung field with slight mediastinal shift to the left—a shift which could not be