Summary of Table.

	Strength.	Ratios per 1000.		
		Incidence of attack.	Incidence of pulmonary complications.	Deaths.
Inoculated ...	15,624	14.1	1.6	0.12
Non-inoculated ...	43,520	47.3	13.3	2.25

degree of bronchial or pulmonary involvement which should be taken as a complication.

The returns, all of which lie within the period between November, 1918, and April, 1919, comprise all those relating to this period which conformed to the following requirements:—

1. That the vaccine used was that prepared at the Royal Army Medical College, according to the original formula.

2. That influenza should have been present in the unit during the period under review. In many stations where inoculation has been largely carried out there was a rapid cessation of the epidemic. Such returns would have swelled the total of the inoculations without throwing any light on their protective effects.

3. That only such returns are included as showed that at least one-tenth of the average strength had been inoculated, whether with one dose or two.

Information was asked for as to the interval occurring between inoculation and a subsequent attack of influenza, but the figures in response to this are too few to be worth analysing; it need only be said that they furnish little or no evidence of any increased susceptibility in the days immediately following inoculation, and that they throw no light of any value on the duration of the immunity conferred by the inoculations. The figures bearing on the latter point would, in any case, have been exposed to the fallacy that the epidemic was rapidly declining throughout the country, and that the inoculated population was drifting, with increasing rapidity, out of our control into civil life.

No bad effects were reported from the inoculations, and the reactions, in the overwhelming majority, were trivial or non-existent.

It will be noted from the table that nearly one-half of the inoculated had received only the first dose of the vaccine—i.e., one-third of the amount which we considered essential to effective protection. It is reasonable to assume that, had all received the full dosage, the protective results would have been still more evident. No statistical evidence bearing upon this point is, however, available.

The table had best be left to speak for itself, but it will, I think, be admitted that in general the results are encouraging and that they tend to confirm, and even strengthen, our original anticipations, which were, briefly, that at least a moderate degree of protection against infection might be expected, while more decidedly beneficial effects might be hoped for in a diminution of both the frequency and the gravity of the pulmonary complications.

Periodic returns have continued to be received since the period dealt with in the table, but these have been either negative altogether, as regards incidence of the disease, or show so few cases of influenza in either group as to be valueless from a statistical standpoint.

BRISTOL HOSPITAL SUNDAY FUND.—The Lord Mayor of Bristol has expressed his delight at the satisfactory progress of his Sunday Fund, which bids fair to show a substantial increase on last year's record total of over £5000. Collections to hand so far are bigger by 25 per cent. than the corresponding figures of last year. It is interesting to note that the movement towards co-operation between the hospitals receives such tangible support from the Bristol public, who, by means of this fund and the collections made by the various firms, show a certain approval of the principle of hospital union which has for some time past been under discussion in Bristol.

COMPLEMENT-FIXATION EXPERIMENTS IN INFLUENZA.

BY H. J. B. FRY, M.D. OXON.,

CAPTAIN, R.A.M.C. (T.),

AND

C. LUNDIE, M.D. GLASG.,

CAPTAIN, R.A.M.C. (T.C.)

In the first part of a previous note¹ by one of us (H. J. B. F.) an organism isolated from cases of influenza was described and its morphological and cultural characters given. It was there stated that the serum of a patient from whose blood the organism had been isolated had shown definite complement-fixation with an antigen prepared from the organism. This result encouraged us to try a similar experiment with sera obtained from other cases of influenza, which had been investigated (H. J. B. F.) during the two previous waves of the epidemic. The sera from these cases were old at the time of this experiment. Although preserved in sealed glass capsules, and, as far as possible, kept on ice, some deterioration was to be expected. Owing to the decline of the influenza epidemic cases of recent influenza have been infrequent, but the sera from a few definite cases of a mild type have been examined together with other sera as controls. One of us (C. L.), as the pathologist in charge of the serological work of No. — General Hospital (Venereal), had very favourable opportunities for examining sera from syphilitic and other patients as controls. The complement-fixation experiments described below were carried out by him, and in order to render the test more rigid he was ignorant of the nature of the cases from which the sera were derived.

Experiments.

The experiments group themselves under the following headings:—

1. Old sera obtained from cases of influenza at the height of the epidemic 1918–19.

2. Fresh sera and cerebro-spinal fluids from recent cases of influenza.

3. Control sera (a) from normal individuals; (b) from syphilitic patients who have never had influenza; (c) from patients with no recent history of influenza; and (d) sera from patients suffering from other pyrexial diseases, typhoid fever, malaria, tuberculosis, &c.

The total number of influenza sera examined is 15, which includes: Influenza old sera, 5; influenza fresh sera, 8; and influenza cerebro-spinal fluids, 2.

Control Cases (32).

(a) Normal	{ Sera 3	with no history of influenza..	4
	{ Cerebro-spinal fluid 1		
(b) Syphilitic sera with no history of influenza			10
(c) Syphilitic sera with histories of influenza not later than one year			6
	{ Typhoid 1		
(d) Sera from specific diseases	{ Malaria 5		
	{ Tuberculosis 3		
(e) Sera from non-specific diseases			3

Serological Technique (C.L.).

(a) *Hæmolytic system*.—Sheep's corpuscles were used in a 5 per cent. suspension after washing six times with saline. The corpuscular suspension was sensitised with 5 M.H.D. of rabbit anti-sheep serum (Burroughs and Wellcome) titre 1 in 2000–3000. Complement was guinea-pig's serum used fresh on the same day, and

¹ FRY: THE LANCET, 1919, ii, p. 51.

was titrated in the usual manner prior to each set of experiments.

(b) *Sera*.—The test sera were inactivated at 55° C. for 10 minutes, and diluted 1 in 5 after inactivation immediately before use. It was found important that the sera should be kept sterile to prevent anomalous reactions.

(c) *Antigen (H. J. B. F.)*.—The source of the antigen is the strain of the bacillus obtained by blood culture from the patient whose serum, as stated previously, gave a positive complement-fixation reaction. The 24-hour growth on an agar slope (+ 10) is emulsified in 2 c.cm. sterile normal saline. The emulsion is allowed to undergo extraction in the incubator at 37° C. for 12–18 hours. It is then centrifuged at high speed for 15 minutes. The supernatant opalescent fluid is pipetted off and stored in sterile glass capsules after heating to 60° C. for one hour.

(d) *The test*.—The antigen-serum-complement mixture is shaken and allowed to stand half an hour at room temperature, and then incubated for half an hour at 37° C. The fully sensitised red cells are added, and the whole re-incubated for half an hour at 37° C. The readings are then taken. In general the test was performed with an antigen control, a test serum control with 1 and 2 M.H.D. of complement, and the test sera were put up with unit volumes of complement containing 1, 2, 3, and 4 M.H.D. respectively.

Experimental Results: (a) Antigen Titration.

Four different antigens were originally prepared for testing their power of absorbing complement.

Antigen (1): Saline emulsion of a 24-hour agar growth heated to 60° C. for one hour.

Antigen (2): Centrifuged extract of a 24-hour agar growth unheated.

Antigen (3): Centrifuged extract of a 24-hour agar growth heated to 56° C. for half an hour.

Antigen (4): Centrifuged extract of a 24-hour agar growth heated to 60° C. for one hour.

Antigen (3) was the one used in the preliminary experiment already reported (*loc. cit.*). The titre of the complement-absorbing power of each antigen was determined on the same day as the tests on the influenza sera to be reported below. Each antigen was titrated in five dilutions (1 in 5, 1 in 7½, 1 in 10, 1 in 15, and 1 in 20 respectively), and each dilution was put up with two strengths of complement, 1 and 2 M.H.D. respectively. Each set of dilutions of antigen had one control using saline instead of antigen for each strength of complement.

Antigen 1.—All controls completely hæmolyzed (1 and 2 M.H.D.). Antigen dilutions with 1 M.H.D. complement 1 in 20 dilution nearly hæmolyzed. Antigen dilutions with 2 M.H.D. complement, 1 in 5 dilution, nearly hæmolyzed. Antigen dilutions with 2 M.H.D. complement, 1 in 7½ dilution, completely hæmolyzed. Antigen (1) was therefore used in a dilution of 1 in 7½.

Antigen 2.—All controls completely hæmolyzed (1 and 2 M.H.D.). Antigen dilutions with 1 M.H.D., none hæmolyzed. Antigen dilutions with 2 M.H.D., none completely hæmolyzed. Antigen dilutions with 2 M.H.D., 1 in 20 dilution, nearly hæmolyzed. Antigen (2) was therefore used in a dilution of 1 in 30.

Antigen 3.—All controls completely hæmolyzed (1 and 2 M.H.D.). Antigen dilutions with 1 M.H.D., none completely hæmolyzed. Antigen dilutions with 2 M.H.D., 1 in 20 dilution, completely hæmolyzed. Antigen (3) was therefore used in a dilution of 1 in 20.

Antigen 4.—All controls completely hæmolyzed (1 and 2 M.H.D.). Antigen dilutions with 1 M.H.D., 1 in 15 dilution, completely hæmolyzed. Antigen dilutions with 2 M.H.D., 1 in 10 dilution, completely hæmolyzed. Antigen (4) was therefore used in a dilution of 1 in 15.

(b) Complement-Fixation Tests.

Five old sera from influenza cases were then tested with each of the four antigens, the latter being put up in the dilutions stated above.

Antigen (1) 1 in 7½, Antigen (2) 1 in 30, Antigen (3) 1 in 20, Antigen (4) 1 in 15. For each serum there were three serum controls and three reaction tubes, the former having 1, 2, and 3 M.H.D.'s of complement respectively, but containing saline instead of antigen. The reaction tubes had each one volume of the required dilution of antigen and one volume of complement dilution, the latter being so arranged as to give 1, 2, and 3 M.H.D.'s of complement respectively in the three reaction tubes. (Complement titration gave one volume of a dilution of 1 in 35 as containing 1 M.H.D.)

Results.

The results are shown in the Series I., in which—
+ means complete fixation of complement (no hæmolysis).

— means no fixation of complement (complete hæmolysis).

± means more than half of complement fixed (less than half hæmolysis).

⊖ means less than half of complement fixed (more than half hæmolysis).

tr. means almost complete hæmolysis.

SERIES I.—Influenza, Old Sera, 5 Cases.

No.	Name.	Onset of disease.	Blood taken days after onset.	Antigen.	Serum control.			Test.			Result.
					M	H	D	M	H	D	
1	S	29/1/19	21	i.	1	2	3	1	2	3	Positive.
				ii.	+	±	—	+	+	+	
				iii.	+	±	—	+	±	+	
				iv.	+	tr.	?	+	+	+	
2	M	10/11/18	10	i.	+	—	—	±	—	—	Weak, positive.
				ii.	+	—	—	+	tr.	—	
				iii.	+	—	—	+	—	—	
				iv.	+	—	—	+	tr.	tr.	
3	C	29/10/18	21	ii.	+	—	—	+	±	tr.	Positive.
				iii.	+	—	—	+	±	tr.	
4	B	20/12/18	7	i.	+	+	—	+	+	tr.	"
				ii.	+	+	tr.	+	+	tr.	
				iii.	+	+	—	+	+	tr.	
				iv.	+	+	—	+	+	tr.	
5	T	27/10/18	22	i.	±	—	—	+	+	tr.	"
				ii.	±	—	—	+	±	tr.	
				iii.	±	—	—	+	±	tr.	
				iv.	±	—	—	+	±	tr.	

Remarks on Cases in Above Table.

1. Original case from which organism was derived in blood culture. Temp. 104° at b.c. Recovery. Serum taken in convalescence.

2. Temp. 102°–104°. Recovery. Blood taken during pyrexia.

3. Blood taken during convalescence 10 days after fall of temperature to normal.

4. Severe case. Both lungs involved. Blood taken during pyrexia.

5. Severe case, Temp. 104°. Blood taken 5 days after fall of temperature to normal.

The age of the sera in Series I. may account for a certain amount of fixation of complement in the serum control tubes. In each case, however, there is a greater degree of fixation of complement in the reaction tubes than in those of the controls, in some cases considerably greater. All the sera were derived from severe typical cases of influenza during the second wave of the epidemic, November, 1918, to January, 1919. Antigen 4 proved to be the most satisfactory antigen in the above series, and was at the same time the least anticomplementary.

The above results suggested further experiments with sera from more recent cases of influenza using Antigen 4, which was the one employed in all subsequent experiments. The results are given in the table (Series II.).

SERIES II.—Influenza, Fresh Sera, 8 Cases; Cerebro-spinal Fluid, 2 Cases; Total, 10 Cases.

No.	Name.	Onset of disease.	Blood taken days after onset.	Serum control.			Test.				Result.
				M	H	D	M	H	D		
1	Cpl. J.	25/6/19	2	1	2	3	1	2	3	4	Negative. Strong positive.
			22	—	—	—	±	+	+	+	
2	Pte. P.	5/7/19	1	—	—	—	±	—	—	—	Negative. Strong positive.
			12	—	—	—	+	+	+	+	
3	Pte. S.	2/7/19	3	—	—	—	tr.	—	—	—	Negative.
4	Pte. K.	21/7/19	3	—	—	—	+	+	—	—	Weak positive. Negative. Positive.
			16	—	—	—	—	—	—	—	
			25	—	—	—	+	+	+	+	
5	Pte. H.	16/7/19	7	—	—	—	+	+	+	+	Strong positive Negative.
			21	—	—	—	—	—	—	—	
			30	—	—	—	—	—	—	—	
6	L/Cpl. L.	3/8/19	6	±	—	—	+	—	—	—	"
			12	—	—	—	—	—	—	—	
7	Pte. —.	3/8/19	4-5 months	—	—	—	+	+	+	—	Positive.
8	Pte. —.	3/8/19	11 months	—	—	—	+	?	±	±	Weak positive.
Cerebro-spinals.											
A	Capt. H.	...	...	±	±	±	+	+	—	—	Controls not satisfactory.
B	Coolie X.	...	...	—	—	—	+	+	—	—	Weak positive for all dilutions.*

Dilutions of C.-S.F. used—1 in 1, 2 in 5, 1 in 5, and 1 in 10.
* See notes below.

Remarks on Cases in Above Table.

- 1. See notes below. Agglutination 1/50 with bacillary emulsion.
- 2. See notes below.
- 3. Rejected. Serum contaminated.
- 4. See notes below.
- 6. Doubtful case of influenza clinically.
- 7. Influenza in February, 1919, under observation for syphilis.
- 8. Influenza in July, 1918, under observation for syphilis.

Clinical Notes. (H. J. B. F.)

The results in certain of the experiments in Series II. are so definite that short clinical notes of the cases from which the sera were obtained are given below.

1. Cpl. J., age 29, admitted 27/6/19. History: Sudden onset with headache, fever, and weakness 25/6/19. No marked pains in body, no cough. No previous attacks of influenza. Temperature on admission 103° F. Tongue furred, face flushed, slight diminutions of breath sounds at both bases, together with fine crackling crepitations; a few rhonchi at right apex. Blood culture 27/6/19 proved sterile. 2/7/19: Temperature fell by crisis below normal, followed by rise to 102° at night; fine rhonchi, and crepitations at both bases behind, with diminished vocal fremitus. 9/7/19: Rise of temperature after being normal three days. Small patch of bronchial breathing at left base, with increased vocal resonance and crackling crepitations. 13/7/19: Percussion note impaired at both bases behind. Breath sounds absent. Vocal resonance diminished. Profuse blood-stained expectoration, continuing 3-4 days. 17/7/19: Temperature normal, lung signs diminishing, and condition good.

2. Pte. S., age 28, admitted 4/7/19. Sudden onset 2/7/19, with pain in chest and cough and blood-stained sputum. Face dusky and cyanosed. Diminution of breath sounds at both bases. No adventitious sounds. Viscid, mucinous, blood-stained expectoration. Pulse regular, but feeble. No previous attacks of influenza. 5/7/19: Blood culture and cerebro-spinal fluid both proved sterile. 6/7/19: Temperature fell from 105° to normal. No physical signs in lungs. Pulse much improved in volume and tension. Expectoration

remained blood-stained for a time. 9/7/19: Rapid general improvement. No further physical signs in heart or lungs.

3. Drvr. P., age 28, admitted 5/7/19. Sudden onset 5/7/19, with fever, headache, and pains in body. T. 102·6°. Influenza two years previously. Dry cough, slight pain in right side of chest. Blood culture 6/7/19 proved sterile. 7/7/19: Temperature down to 99°. No physical signs.

4. Pte. K., age 19, admitted 23/7/19. Sudden onset 21/7/19 with pain in body, headache, and weakness in legs. Slight cough and expectoration. No previous attacks of influenza. Face dusky, eyes injected, herpes on upper lip; heart, first sound rather short and of poor quality. No physical signs in lungs. T. 101°-103·8°. 24/7/19: Blood culture proved sterile. 27/7/19: Temperature gradually falling; slight epistaxis; slight diminution of breath sounds at right base and diminished vocal fremitus. 29/7/19: Again slight epistaxis. 1/8/19: Temperature normal.

4. Pte. H., age 24, admitted 21/7/19. Malaise from 16/7/19. Worse on 20/7/19 with headache and pains in chest and weakness. Not much cough. T. 101°-102°. No physical signs. No previous history of influenza. 23/7/19: Blood culture proved sterile. 24/7/19: Temperature fell by crisis and remained normal.

6. L/Cpl. L., age 28, admitted 7/8/19. Onset with headache and pains in right side of chest. T. 103°. No previous attack of influenza. 9/8/19: Respiration difficult; pallid, sweating. Heart not enlarged; first sound rather weak, pulse fairly regular and of good volume. Percussion note resonant all over chest, vocal fremitus diminished at the bases. No adventitious sounds. Breath sounds vesicular. Sputum muco-purulent, viscid, and, slightly blood-stained. 10/8/19: A few fine crackling crepitations at left base and fine rhonchi. 12/8/19: Pale and slightly cyanosed, but better. Fine rhonchi and crepitations all over both sides of chest. Bronchial breathing over small patch below angle of right scapula. Heart slightly dilated. 12/8/19: Expectoration profuse and blood-stained. Temperature normal. 14/8/19: Much improved, very few rhonchi in lungs, a few fine crepitations in both lungs, slight diminution of vocal resonance at right base, no dullness on percussion. 16/8/19: Lungs clear of adventitious sounds. Condition good.

Cerebro-spinal Fluids.

B. Coolie X.—Onset with symptoms of influenza, T. 103° F., and signs of broncho-pneumonia in both lungs, especially left. Developed cerebral symptoms with marked rigidity of muscles of neck, with a positive Kernig's sign, and extensor plantar response. Lumbar puncture 20 c.cm. fluid removed under fair pressure, turbid, and slightly blood-stained. Films from fluid showed a few polymorphonuclears and lymphocytes. No intra- or extra-cellular cocci seen, but a few Gram-negative bacilli. Culture was obtained on Matthew's medium, but the organism was subsequently grown in pure culture on agar, and was used as a control antigen (see below). Patient died, but no post-mortem examination was permitted.

Control Experiments.

Controls were carried out on sera from normal individuals who were free from any history of influenza, on sera from patients under investigation for syphilis, and on sera from patients suffering from ascertained diseases. Two serum controls were put up with saline instead of antigen containing 1 and 2 M.H.D. of complement respectively, and four reaction tubes containing 1, 2, 3, and 4 M.H.D. complement.

1. Normal sera.—Three sera, with negative serum controls, from individuals who had never had influenza, were all completely negative (1, 2, 3, and 4 M.H.D.). Cerebro-spinal fluids: One normal cerebro-spinal fluid similarly gave a negative reaction (1, 2, 3, and 4 M.H.D.).

2. *Syphilitic sera*.—(a) With history of influenza: Of sera from 16 cases, 6 had influenza at varying dates from August, 1917, to June, 1918, of these 1 only (influenza, June, 1918) gave a partial reaction ($\mp - -$). The remainder were negative in all four dilutions. (b) With no history of influenza: The remaining 10 sera were from syphilitic cases free from any history of influenza. The reactions were negative in all four dilutions.

3. *Sera from specific diseases*.—(a) Typhoid: In one case of typhoid (*B. typhosus* recovered by blood culture and from faeces) the serum taken during convalescence was negative in all four dilutions. (b) Malaria: Of five cases of malaria (parasites in blood films) three had a history of influenza. One with a history of influenza in July, 1916, gave an incomplete negative reaction ($\pm \pm - -$), the second with a history of influenza in September, 1918, gave a doubtful reaction ($\pm ? - -$). The third, with a history of two attacks in 1912 and 1916, gave a strong positive reaction ($++ + +$). The remaining two cases (Austrian prisoners) stated that they had no history of influenza. The sera gave incomplete negative reactions ($+\mp - -$) and ($+\pm \mp -$). The blood specimens were taken a few hours after the rigor, during pyrexia. (c) Tuberculosis: Three cases with tubercle bacilli in sputum were investigated. One was complicated by an acute gonorrhoeal infection with fever and epididymitis. The reaction was completely negative in this case, and there was no history of influenza. Of the sera from the two remaining cases one with no influenzal history gave a complete negative reaction, the other gave a positive reaction ($++ + -$), but had a history of a severe fever of unknown nature in October, 1918, at the time of the influenza epidemic.

Sera from pyrexias of unknown origin (3).—One case of a simple catarrhal jaundice with pyrexia (blood culture sterile) gave a completely negative reaction, and the patient had never had an attack of influenza. Two other cases of pyrexia of undetermined origin, with sterile blood cultures and agglutinations negative for typhoid-paratyphoid group, gave negative reactions. There was no recent history of influenza in these cases.

Control experiments with an indifferent antigen.—An endeavour was made to control the specificity of the antigen described above by means of an antigen prepared in exactly the same manner from a lactose-fermenting coliform organism found as a contamination in the cerebro-spinal fluid of a case of influenza (v.S.). Eight sera were tested against this organism as antigen. Three of these sera from cases of influenza had given a quadruple positive reaction with the "influenza antigen," but gave a quadruple negative with the coliform organism as antigen. Five sera from cases of influenza which had given partial reactions with the "influenza antigen" gave quadruple negatives with the antigen from the coliform organism. The coliform organism did not, therefore, exhibit any of the antigenic properties shown by the organism under investigation.

Discussion of Results.

Owing to the decline in the incidence and virulence of the influenza epidemic and to difficulties connected with demobilisation, the results given above are somewhat scanty and incomplete, but are recorded under present circumstances in the hope that they may serve as a basis for criticism and further investigation. It seems legitimate to assert that the antigen prepared from the organism investigated shows definite fixation of complement with sera from cases of influenza. The results obtained in the case of the old sera are open to criticism owing to the fixation of a certain amount of complement by the sera themselves though the difference in the amount of complement fixed by the serum controls and the test sera is well marked in all the cases with Antigen 4. The old sera were all derived from severe cases, but the recent cases of influenza investigated have all been of a

relatively mild type, which may perhaps account for some anomalous reactions. In Case 4 of Series II. a negative result was obtained with the serum in the third week after onset, after a weak positive reaction had been obtained with the serum in the first week. The serum obtained in the fourth week, however, gave again a fairly strong positive reaction. In Case 5 of the second series the negative results with serum obtained in the third and fourth weeks after a strong positive reaction with the serum obtained in the first week after onset may perhaps be explained by the rapid disappearance of the immune bodies after a short mild attack. This would accord with the clinical experience of second attacks of influenza at short intervals during the recent epidemic. In most cases the immune bodies as determined by the complement-fixation reaction do not appear to persist in the blood for a longer period than about one year (Case 8 and controls). Two cases, however, a malaria control and a tuberculosis control, gave strong positive reactions after three years' interval if the histories are reliable. It may be objected that mild cases of influenza are difficult to differentiate as clinical entities. The recent cases examined appeared to be genuine cases of influenza, and clinically to resemble the early cases seen in the first wave of the epidemic in the summer of 1918. It may be mentioned that two cases, which were at first considered to be cases of influenza but proved to be otherwise, gave completely negative reactions. No. 6 in Series II., though included amongst the cases of influenza, was not a typical one and the complement fixation reactions were negative.

It is significant that there was no case free from any history of influenza which gave a positive reaction, except two cases of malaria with doubtful histories, while no case with a definite recent history of influenza gave a completely negative reaction. In Cases 1 and 2 of Series II. a negative reaction with serum obtained shortly after the onset of the disease was followed by a strong positive reaction with sera obtained in the third and second weeks respectively, indicating the production during the course of the disease of antibodies in response to an infective agent, which was similar in nature to the original organism isolated during the third wave of the epidemic in February 1919. It should also be noticed that in Case 1 Series II., an agglutination reaction to the same organism was obtained with serum at different periods of the disease in dilutions of 1/50 to 1/125 (Dreyer's technique). These results therefore bring the recent infections into relation with those of the previous waves of the epidemic by a common antigenic factor.

Summary.

1. An antigen prepared from an organism isolated in the third wave of the epidemic shows fixation of complement with sera derived from cases of influenza, both recent and those occurring in the previous waves of the epidemic.

2. This complement-fixation is absent in the case of sera from normal individuals who have never had influenza.

3. It is absent in the case of sera from individuals who are suffering from other specific diseases and are free from any recent history of influenza.

4. An antigen prepared from another organism shows no fixation of complement with sera from cases of influenza.