



post-mortem examinations of fatal cases revealed the influenza bacilli in the lungs and pure cultures were obtained. From this time onward the two investigators varied. One, Dr. Leary, decided to prepare his vaccine from various strains of influenza bacilli alone; the other, the writer, assuming that a mixed infection was active in various phases of the disease, prepared a vaccine with various bacteria included. The following is a report of the latter study:

From the lungs at post-mortem examinations a number of organisms were isolated and from these a mixed vaccine was prepared as follows:

Micrococcus catarrhalis .....	400 million
Pneumococcus .....	400 "
Streptococcus hemolyticus .....	400 "
Bacillus influenzae .....	100 "

Of this, the recommended dosage was .2 c.c., .3 c.c., and .4 c.c., administered at 3-day intervals. It was stated that the procedure was experimental, was theoretically logical, and was relatively harmless, and the duration of its efficiency would probably be about four weeks. Public clinics were opened where it could be obtained by any one, free of charge, and large amounts were distributed to physicians and boards of health without charge, the only proviso being that it should be similarly freely administered. In all a sufficient supply was sent out for about fifty thousand doses. A request accompanied each lot that records of results be kept and returned. As might be expected, however, in the most unusual stress of sickness and death, a large number of such records were either lost or not made. From one state department of health, in particular, to which thousands of doses were sent, no adequate report was ever obtainable. Many reports did come in, however, frequently accompanied by comments from the one submitting them. These coming as they did, from trained observers entirely unbiased either for or against the method, seem to be of sufficient value to justify placing them on record.

The first immunizations were upon the laboratory staff itself. Here, of the total fourteen, ten received inoculations. None of these contracted the disease. Of the four others, two had influenza rather severely. This seemed rather suggestive because all were in close and intimate contact with a great many cases continually. Among the nurses inoculations were

offered as optional and were begun practically as soon as the epidemic appeared. For the combined senior and intermediate classes the statistics have been collected, but, unfortunately, those for the lower classes were lost in the stress of active work.

For the two upper classes the results are as follows:

		SICK	PER CENT. SICK
Not vaccinated .....	41	33	80
Vaccinated once .....	27	9	33
Vaccinated twice .....	9	3	33
Vaccinated three times	6	2	33

The high disease incidence here was undoubtedly due to the fact that all these nurses were constantly and continually exposed to the infection in caring for the hundreds of cases in their wards and were exposed under conditions of physical and mental fatigue that were almost ideally favorable to the contagion.

In the catgut factory of W. D. Young & Co., in one room where the raw gut was manufactured, nineteen employees were inoculated and one refused. Within a week, the only case of the disease that had occurred was the one uninoculated individual.

Among the commercial firms of the city, many desired or requested the treatment. Perhaps the most carefully controlled study was here made among the employees of the H. P. Hood Milk Co., with the very efficient coöperation of the medical supervisor, Dr. N. R. Davis, who superintended the entire work. Upon the first appearance of the epidemic, Dr. Davis foresaw the coming storm and recommended that all of the employees be immunized. At this time an occasional worker was sick but the number was very insignificant. Injections were immediately begun and vigorously carried forward. Following the subsidence of the epidemic wave, Dr. Davis carefully collected statistics comparing the results among those immunized and those not immunized. These, he reports as follows:

	NON- VACCINATED	VACCINATED
No. persons under observation	300	247
No. cases of influenza .....	93	17*
No. cases of pneumonia .....	5	2†
Percentage of influenza .....	31	6.8
Percentage influenza mortality	4.3	0

Dr. Davis states "that the majority of these people were route salesmen whose duties took them in all kinds of homes during this epi-

\* This includes six with only one inoculation and five with two inoculations.

† These each received but one inoculation.

demie. They were out in all kinds of weather and some of them had to take the pocketbook from underneath the mattress of people who were ill, to get their money. The other people were men and women in the office. A great many of our force were ill with influenza who did not care to be vaccinated. These employees were equally exposed."

At the same time a similar study was being conducted at the Boston Confectionery Co. The results may be thus summarized:

	NOT VACCINATED VACCINATED	
<i>Boston Confectionery Co.</i>		
No. persons under observation	200	250
No. cases of influenza	75	3
No. cases of pneumonia	4	0
Percentage of influenza	30	0.8
Percentage influenza mortality	2.7	0
<i>F. H. Roberts Co.</i>		
No. persons under observation	339	329
No. cases of influenza	9	3
No. cases of pneumonia	1	0
Percentage of influenza	2.7	0.9
Percentage influenza mortality	11	0
<i>Miller Candy Co.</i>		
No. persons under observation	25	90
No. cases of influenza	18	5
No. cases of pneumonia	1	0
Percentage of influenza	72	5.5
<i>Lovell &amp; Covell Co.</i>		
No. persons under observation	100	185
No. cases of influenza	90*	0
No. cases of pneumonia	?	0
Percentage of influenza	90	0

\* The majority of these cases contracted the disease prior to the time when their associates were vaccinated. Therefore comparative deductions must be made with caution.

A little later word came that the epidemic had appeared in the male wards of the Allentown State Hospital in Pennsylvania. A supply of vaccine was immediately sent to Dr. L. B. Pierce, from whose report the following facts are taken. The outbreak started and spread rapidly among the buildings for males and when the vaccine was received had practically not appeared in the buildings for females. Immunization attempts were therefore largely directed to the uninvolved departments, although a few in the other parts were treated. The report includes accordingly largely a comparison of disease incidence morbidity and mortality between a non-immunized department and an immunized one, both presumably equally exposed to infection. The results are interesting:

	NOT VACCINATED VACCINATED	
<i>Allentown State Hospital.</i>		
No. of cases under observation	575	722
No. of cases of influenza	186	61*
No. cases of pneumonia	77	11†
Percentage of influenza	32.4	8.4
Percentage influenza mortality	17.7	13.1

\* Of these, 13 had received but one, and eight, two inoculations.  
† Of these, three had received but one, and two, two inoculations.

Of the 61 cases vaccinated 22 showed the disease in less than one week, three from the first to the fourth week, 18 after the fifth week, 17 after the fifth. This suggests the onset of the immunity to be about one week, the persistence of its highest efficiency about three or four weeks, and its gradual disappearance thereafter. Dr. Pierce states that "the epidemic among the women came later, after the inoculations were completed, and was much less severe in character, those who had the disease exhibiting it in a much milder form. It would look as if the vaccine must have been at least a factor in this result."

The writer in person in association with the Bridgeport Board of Health, organized the immunizing staff of the Remington Arms Company and the Bullard Machine Works. On account of the relatively light course of the epidemic here and the sudden disarticulation of lines of work in these industries subsequent to the armistice, full reports were not obtainable. From the report of the Board of Health, however, the following is abstracted:

	No. RECEIVING 1 INOCULA- TION	No. RECEIVING 2 INOCULA- TIONS	No. RECEIVING 3 INOCULA- TIONS
Remington Arms	1079	905	660
Bullard Machine	1099	707	409
Bridgeport Brass	846	576	400
TOTAL	3024	2188	1469
GRAND TOTAL OF INOCULATIONS	6681		

*Results:*

It was impossible to follow up closely all of the cases that were vaccinated. Except in a general way there is nothing that can be said of cases in the Remington Arms and Bridgeport Brass Co. The physicians at these factories report that the cases of influenza materially decreased, that there were no severe cases after the vaccinations and that only a few men reported to them with any of the symptoms. However, this does not apply particularly to the vaccinated group, but to the entire factory. It may have been due to the fact that the epidemic has reached its height at about this time and that the decrease of cases would have followed even if there had been no inoculations.

In one case, the arm was swollen and became very painful after the first inoculation and continued in this condition for two or three days. In another case, a very severe headache resulted and there was a general reaction

which lasted for two or three days. The other two cases did not seem to be important. One man tried to faint as the vaccine had been given, claiming that his head and arm hurt. Another case reported a stiff arm the next day.

There were three cases and one death among the men vaccinated at the Bullard factory. Two of these cases, including one that died, had received only one inoculation and probably had the infection before he was vaccinated. It was also reported by the physician that the patient who died had other serious complications which contributed to his death. The third case had had two inoculations before the onset of the disease, but his illness was not severe. Several cases, with no deaths, were reported at this factory among the unvaccinated employees. There was no practical way in which records could be obtained on the unvaccinated group so that the actual number of cases is not known."

From various other boards of health, the reports are either entirely missing or are so sketchy as to be practically valueless. To practicing physicians the vaccine was sent in abundance. The reports that were submitted may be summarized as follows:

DOCTOR	No. INOCULATED	No. CONTRACTING DISEASES	PNEUMONIA CASES	DEATHS
Barney	47	None	None	None
Bell	25	"	"	"
Bowen	200	1	"	"
Cahill	40	None	"	"
Coffin	13	"	"	"
Cross	48	2	"	"
Emerson	39	"	"	"
Gould	30	1	1	"
Hanson	30	None	None	None
Johnson	6	"	"	"
Jones	123	5	"	"
Kirkland	160	2	"	"
Leard	100	3	"	"
Leeds	2	None	"	"
Phillips	105	....	....	....
Piper	31	None	None	None
Rice	98	"	"	"
Ring	26	5	"	"
Southwick	125	None	"	"
Sylvester	88	2	1	"
Ventrone	60	None	None	"
Weston	2	"	"	"
Wooldridge	75	"	....	....

Dr. Barney: There is no comparison in my cases, as everyone inoculated has escaped the disease with possibly one exception. I am not quite sure of the diagnosis yet. Some of the patients inoculated were intimately and continuously exposed, three of them being nurses. They escaped. In three other instances all members of the family had influenza except the one inoculated, who was intimately associated with the other members. I am very en-

thusiastic in regard to the influenza prophylactic vaccine.

Dr. Bell: Prophylactic measure seemed of value.

Dr. Bowen: I used the prophylactic vaccine in a great many cases all the way from six months to 60 years, and while I do not wish to be over enthusiastic will say that I am confident it does not do to neglect it as one of the prophylactic measures.

Dr. Cahill: It seemed in general that I found the disease in 70% of the same number of uninoculated persons under same conditions and in same length of time.

Dr. Emerson: I see absolutely no objections to the method and so far as I know no one to whom I gave the vaccine has had the "Flu."

Dr. Gould: I am sure it must have been of much service.

Dr. Jones: Personally I feel that this method of inoculation is very valuable in preventing and modifying the severity of influenza and pneumonia.

Dr. Leard: The doctor states under date of December 1st, two months after inoculations, that since filling out the above record he has had several cases ranging from light to severe.

Dr. Phillips: During the first three weeks of the epidemic and following the inoculations, not a case occurred among our nurses, while in the other hospitals here nurses by the dozens were attacked, and many died. In the fourth week, however, one after another of the ten came down. I think the explanation is that their immunity was short lived, and only partial, and that we would have done much better had we continued the vaccine until reaction ceased to fairly large doses. Only one patient outside the hospital who was inoculated came down with the infection.

Dr. Piper: In several cases, four at least, I gave prophylactic vaccine to persons who were much exposed to patients ill with influenza and in no instance did persons so treated contract the disease. I am confident the vaccine is a helpful measure.

Dr. Rice: Not quite fair in my case because the disease was rather on the wane when inoculation began.

Dr. Southwick: I have great confidence in the prophylactic value of the influenza vaccine prepared by Prof. Watters. I used in most of the cases one-third larger dose than the amount originally recommended.

Dr. Sylvester: I found that 75% of household contracted it if not inoculated, while only two out of all treated contracted same. I feel it was a decided benefit.

Dr. Ventrone: Those inoculated, according to my experience, were immune.

Dr. Wooldridge: Personally we inoculated about seventy-five cases and as far as we know not one case developed influenza. We inocu-

lated one prospective confinement case after she had been exposed to influenza and she developed a severe attack of pneumonia, but recovered without having a miscarriage.

It will be seen that there is practically a unanimity of opinion in favor of the idea that active immunization by the use of vaccines may be obtained, a fact which while not, of course, to be considered as scientific proof, still should be considered to have distinct value. Another interesting note is found in the comment upon reactions. These, while infrequent, were almost always mistaken for the beginning of influenza, being characterized by sudden chill, fever, headache and prostration, persisting for a few hours and subsiding gradually.

It may be of further value to note in combining the above figures, excluding the Bridgeport Board of Health and the Lovell & Covell Company, where comparisons are indefinite, that there was disease incidence among those inoculated of approximately 3.5%, while at the same time among others not inoculated the disease incidence amounted to 28% and under similar surroundings. Among those immunized the incidence of pneumonia was very low, there being only fifteen cases definitely reported. The total of eight deaths has been reported, these all coming from the Allentown State Hospital where three of the patients had received but one inoculation and three, two inoculations. Apart from this the mortality records are clear.

In preparing this paper, the writer fully realizes the fact that epidemics afflict first those most susceptible and that measures for immunization employed later upon those not yet infected may consist of administering them to persons already naturally immune. As such, it is obviously unfair to compare early morbidity among a non-immunized community and later morbidity among a hopefully partially immunized one after the most susceptible have already become diseased.

In the Allentown report, however, this possibility seems to be successfully met when it is noted that of those vaccinated persons contracting the disease 36% did so within one week of the first inoculation when the immunity should be theoretically only beginning and 57% did so after the fourth week when the immunity was decreasing. It would suggest that for a period of three or four weeks, a distinct degree of resistance to infection might be produced.

Again, in the report of Dr. Phillips, no inoculated nurses in the hospital with which he is associated contracted the disease until after three weeks subsequent to inoculation, even though constantly exposed.

Dr. Leard also reports occurrence of the disease in vaccinated cases later than four weeks after inoculation.

These notes seem strongly to suggest that there is a period of three to five weeks subsequent to inoculation during which a distinct degree of immunity exists.

With these facts in mind and even with the incomplete returns necessarily incident to an almost unprecedented epidemic at a time when the medical profession of the country was seriously depleted by war, it has seemed that the results reported in this article deserve to be thus recorded.

#### PRIMARY SARCOMA OF THE STOMACH. REVIEW OF THE CASE SIX YEARS AFTER OPERATION.

By A. R. KIMPTON, M.D., F.A.C.S., BOSTON.

In June, 1914, in this JOURNAL,<sup>1</sup> the case of round celled sarcoma of the stomach which is here to be reviewed was reported. Coincidentally Frazier<sup>2</sup> published an article on gastric sarcoma in which he states that of 12 cases of sarcoma of the stomach the longest period of survival after operation was 14 years, while the remaining cases survived "2 two years, 1 one year, 1 had recurrence in three years, and 8 were reported as well from two to eleven months after operation."

The following case is of particular interest in that the patient is alive and perfectly well, with no evidence of return of the sarcoma five years and ten months after an extensive resection of the stomach for a very rapidly growing sarcoma of the round celled type. She is able to drive, oil and grease, and even change the tires of her own car.

(Quotation from JOURNAL of June 11, 1914.)<sup>1</sup>

"The following case is of interest, not only because of the comparative rarity of gastric sarcoma, but also because of the fact that the patient was known to have had an abdominal tumor for years. Yet at the time of operation she was not anemic or emaciated, nor did she have any gastric symptoms other than indigestion (apparently hyperacidity).