having been put aside as non-tuberculous or only as suspected cases in which further symptoms did not develop when under close observation. Moreover, we have not placed in the list of arrested cases certain patients who were discharged only as "much improved" and have since apparently ceased to have abnormal symptoms under favorable conditions. Neither have we touched on the fact that many patients who have been discharged as "improved" merely, have returned to their homes well enough to be able to resume home duties while keeping up the treatment of which they have learned by experience to know the value, at the same time acting as missionaries in the communities in which they live.

When one looks back not more than twenty years and remembers the hopelessness we felt in our endeavors to check the disease by ordinary methods, surely we can say that we were justified in our hopes that much more could be done than was formerly thought possible in the treatment of consumption. Unfortunately the extraordinary and oftentimes ill-judged enthusiasm which has spread of late years so rapidly through the medical profession and the laity has had a slight reaction recently, simply because too much was claimed by the overzealous in many cases. Those who have been more cautious in making claims have viewed this extravagance with regret, knowing that it would bring harm to the cause for which they were working. I believe that we are now entering a healthier phase of the question, however, and that while we know that we have not yet found the panacea for the cure of consumption, we can at least claim that a great step forward has been made, with still greater hope for the future.

Too much can not be said of the educational effect of these institutions, which not only help the individuals afflicted but teach others how to resist disease and to keep well. If nothing more than this were accomplished it would be of infinite service to future generations and well worth the time and money expended. The more recent movements for home treatment through dispensaries or otherwise, the establishment of hospitals for the hopelessly ill, have all their important place and mark still another important step toward controlling the ravages of this dreadful disease.

In conclusion, it may be well for me to express my opinion as to the relative value of the so-called "home" and "climatic" treatment. Briefly stated, it is this: We know now that an immense deal of good has been and still can be accomplished by the methods which are being adopted more and more near the homes of patients suffering from tuberculosis. It has been satisfactorily proved that much more has been done in these ways than was thought possible fifteen years or even a decade ago. I can not sympathize, however, with what I feel to be the extreme views of some observers who, because of the success of these less radical measures in a large number of cases, maintain the opinion that there is not the slightest use in ever sending a phthisical patient away from home to a distant climate. Such an opinion is inconsistent with my own experience in certain patients whom I have seen improve by such a change after a discouraging attempt to improve near home.

The relapse of certain patients on a return to these regions after a successful sojourn elsewhere is another proof to me of the incorrectness of view of those who argue against the necessity of radical change in any case. When we know from experience the tonic effect on ourselves, even when in health, of a change to a mountainous region or to a different ocean climate, how can we deny the possibility of an equally beneficial effect on a tuberculous patient, a change which may be a marked factor in his improvement and his power to resist the disease?

That certain patients, however, do better in their home climate than elsewhere is also to be noted. In advocating the wisdom of a radical change for some patients it would seem almost unnecessary to add that I refer only to those who can adopt such measures with comparative ease, when pecuniary considerations need not be weighed, and when the attitude of mind is favorable. I also strongly deprecate the not infrequent instances of urging patients with far-advanced disease to leave their homes in search of health. To judge of these conditions and make the final decision in each case is the crucial test of the skill of the physician in charge.

THE WORK OF A CHRONIC TYPHOID GERM DISTRIBUTOR.*

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In the winter of 1906 I was called on to investigate a household epidemic of typhoid fever which had broken out in the latter part of August at Oyster Bay, N. Y. The epidemic had been studied carefully immediately after it took place, but its cause had not been ascertained with as much certainty as seemed desirable to the owner of the property.

The essential facts concerning the investigation follow:

THE OYSTER BAY OUTBREAK.

At Oyster Bay in the summer of 1906 six persons in a household of eleven were attacked with typhoid fever. The house was large, surrounded with ample grounds, in a desirable part of the village, and had been rented for the summer by a New York banker.

The first person was taken sick on August 27 and the last on September 3. The diagnosis of typhoid was positive. Two of the patients were sent to the Nassau Hospital at Mineola. The others were attended by capable physicians at Oyster Bay. None of the subsequent cases apparently resulted from the first, although the interval from the first to the last might permit of this assumption. But whether the disease was transmitted from one person to another after the first case occurred was not a matter of great consequence. The most important question was how the first case occurred.

Typhoid fever is an unusual disease in Oyster Bay, according to the three physicians who share the medical practice there. At the time of the outbreak no other case was known. None followed.

The milk supply of this house was the same as used by most of the other persons in the village, all of whom remained well. The cream also was from a source which supplied several other families in the vicinity.

To the first investigators it seemed that the water must have been contaminated. They were unable to ascribe the fever to food, flies or milk, whereas if they could discover that the water had been contaminated they would be able to account for the epidemic.

The water supply for the house was from a driven well said to be 167 feet deep. The well was at a distance of 210 feet from the house, within 60 feet of a

* Read before the Biological Society of Washington, D. C., April 6, 1907.

stable drain, 115 feet from a privy behind the stable, and 224 feet from two cesspools which received the drainage of the house. The cesspools and privy had been cleaned out in April. The house was provided with one water closet, situated on the second floor. This was used by the family. The six servants used the privy. The sewage from the house was carried by a tile pipe to the two cesspools just referred to. The soil is sandy and gravelly throughout this region.

The water was pumped from the well by a gas engine to a covered wooden tank situated 186 feet from the stable and 320 feet from the house. Water ran from this outside tank to an open tank in the attic of the house, removed from the nearest living rooms by a steep and narrow ladder.

Samples of the water were taken and subjected to careful chemical and bacteriologic analysis. They were collected direct from the pump, from the outside tank and from a faucet in the house. There were five samples taken in all. Four were examined by E. E. Smith, M.D., Ph.D., the well-known analytic expert, and the other by D. D. Jackson, Ph.D., director of the laboratories of the New York City Department of Water Supply, Gas and Electricity.

The essential facts concerning these analyses, including condensed statements of the resulting opinions, follow:

ANALYSES OF WATER FROM OYSTER BAY.

1906.	SOURCE OF SAMPLE.	OPINION OF ANALYST.
Sept. 12.	Faucet in house	"Sanitarily pure."—Dr. Smith.
Sept. 12.	Outside tank	"Probably safe."—Dr. Smith.
Sept. 13.	Pump over well	"No evidence of pollution."—Dr. Smith.
Sept. 27.	Outside tank	"Typhoid from this source impossible.—Dr. Jackson.
Sept. 29.	Outside tank	"Evidence does not show pollution."—Dr. Smith.

In addition to these examinations, an experimental study was made of the possibility that the typhoid germs might have percolated through the ground to the well from some receptacle of excrement. On September 29 Dr. Smith put fluorescin in the bowl of the water closet in the house, in the cesspools, in the stable manure vault, in the privy vault on this property and in another on adjacent property and in the bowl of the water closet in a neighboring house. He looked for traces of this fluorescin in water from the well, obtained after much pumping, two days and five days later. Six samples of water were collected during this test. They entirely failed to reveal pollution.

Even this thorough work on the water supply did not entirely destroy local confidence in the theory that the water had been the cause of the outbreak. A contamination of the outside covered tank of such nature as to escape detection by analysis was suspected as offering a possible explanation of the trouble. According to this idea the tank, which had been cleaned early in the spring, might have received typhoid bacilli from the cleaners who, perhaps, carried typhoid excreta on their boots. It was supposed that a gradual accumulation of organic matter from the water and dust from the air, aided by the continued warmth of the summer sun, might have led these germs to multiply until at last they escaped to the water and infected the household.

It did not seem to me that the water theory was tenable. The analyses proved that the well was not continuously polluted. The fluorescin tests showed that occasional contamination was not likely. An inspection of the premises and inquiries concerning the way the outside tank was cleaned made it seem unlikely that this tank became infested in the way supposed.

It would have been more probable to suppose that the tank in the house, which was without a cover and accessible to occupants of the house, had become polluted. Such contamination was not without precedent. Had typhoid existed in the house at the time, it was possible that the tank could have become contaminated in this way. But there had been no case. Moreover, inquiry made it seem unlikely that the tank had been visited all summer. It was much more convenient for persons to get water otherwise than by climbing the narrow ladder to the attic. It seemed more probable that the infectious material had been carried to the house by some person or some article of food.

I was led from the proper track for a time by being assured that no person who had had typhoid, at least within many months, had lived in the house or visited it during the whole summer, and by discovering that the family was extremely fond of soft clams. My suspicion for a time attached to clams. It was found that soft clams had frequently been obtained in the summer from an old Indian woman who lived in a tent on the beach not far from the house. It was impossible to find this woman, but I made inspections of the sources of soft clams at Oyster Bay, which showed that they were sometimes taken from places where they were polluted with sewage.

But if clams had been responsible for the outbreak it did not seem clear why the fever should have been confined to this house. Soft clams form a very common article of diet among the native inhabitants of Oyster Bay. On inquiring closely into the question of the food eaten before the outbreak it was eventually found that no clams had been eaten subsequent to July 15. This removed the possibility that the epidemic had been caused by clams. From July 15 to August 27, six weeks, was too long a period for an outbreak of this character to remain undeveloped. The infectious matter which produced the epidemic had been taken with food or drink, in my opinion, on or before August 20.

The supplies of vegetables and fruit were next considered. It was found that the persons attacked had not eaten any raw fruit or vegetables which had not also been eaten by many persons who escaped the fever.

The history of the house with regard to typhoid was inquired into. It was found that but one case of typhoid had occurred on the premises or been nursed there in thirteen years. This case occurred in 1901. Care seemed to have been taken to destroy the infectious nature of the discharges. The case produced no secondary cases at the time. The house had been occupied every summer since without typhoid.

Attention was now concentrated for a time on the first cases to determine whether the infection could have occurred during a temporary absence from Oyster Bay. It was found that those persons who were taken sick at the outset had not been on a visit, or picnic, or, in fact, away from Oyster Bay on any account for several weeks prior to the onset of the illness.

The social position of the persons attacked differed decidedly. Among the first to be taken sick were a daughter of the head of the family and two maid servants, one of which was colored. Following in quick succession were the wife and then another daughter of the tenant and, finally, the gardener who lived permanently at Oyster Bay and had worked on the place for years.

Believing that some peculiar event might have occurred in the family on or shortly before August 20

which, if studied, might give the necessary clue to the cause of the epidemic, careful inquiry was made into the immediate history of the household at this time. The key of the situation was thus discovered.

It was found that the family had changed cooks on August 4. This was about three weeks before the typhoid epidemic broke out. A cook who had been with the family several years had been discharged and a new one employed. Little was known about the new cook's history. She had been engaged at an employment bureau which gave her an excellent recommendation. She remained in the family only a short time, leaving about three weeks after the outbreak of typhoid occurred. Her present whereabouts were unknown. The cook was described as an Irish woman about 40 years of age, tall, heavy, single. She seemed to be in perfect health.

Here was by all means the most important possibility in the way of a clue which had come to my notice. If this woman could be found and questioned, it seemed likely that she could give facts from which the cause of the epidemic could be ascertained.

When, after much difficulty, she was found, this hope was destroyed. No information of value was obtainable from her. She refused to speak to me or any one about herself or her history except on matters which she knew were already well known.

It became necessary to work out the cook's history without her help. This effort has been only partially satisfactory. Her whereabouts for only a part of the time in the last ten years have been ascertained. About two years of time among the last five years remain unaccounted for. In the last ten years she has worked for eight families to my positive knowledge; in seven of these typhoid has followed her. She has always escaped in the epidemics with which she has been connected.

The most interesting features of the other outbreaks of typhoid with which this cook has been connected follow:

EPIDEMIC AT SANDS POINT IN 1904.

In 1904 a well-known New York family on moving to Sands Point, L. I., to spend the summer experienced an epidemic of typhoid which attracted a considerable amount of attention at the time. The household consisted of eleven persons, seven of whom were servants. The household arrived on June 1. On June 8, or about one week later, typhoid began to appear.

The first person to be taken sick was the laundress. She had entered the employ of this family ten days before for the summer season. Following this case in irregular succession three other persons were taken sick. Within three weeks after arrival, there were four persons, in all, attacked.

None of the family itself was taken sick. No person was attacked who had been long with the family. The new laundress fell ill first, then the gardener who had not come from the city with the family, but worked on the place the year round, then the butler's wife, and finally the butler's wife's sister. The latter was not in the family service, but lived with the other servants in a little house separate from the main dwelling.

The cook had been in the family nine months, seemingly without suffering from typhoid fever or producing typhoid.

The Sands Point epidemic was confined to the house where the servants lived. There were no other cases in the vicinity. None preceded this outbreak and none followed at Sands Point. No doubt could be placed on the diagnosis. One of the cases, that of the laundress, was long and severe. There was no death.

The outbreak was studied by several persons. Finally, Dr. R. L. Wilson of the New York City Department of Health was called as expert to investigate it. Dr. Wilson examined the water supply, drainage and other sanitary conditions. He caused an analysis of the water to be made by Dr. Jeffreys of the New York Polyclinic. It is unnecessary to describe this analysis or the details of Dr. Wilson's careful investigation.

Dr. Wilson's conclusion was that the epidemic must have been caused by the laundress. In his opinion, she had probably been infected before entering this employment. Her case, he thought, gave rise to the others. Dr. Wilson tried to find how the laundress became infected before joining this family, but was unsuccessful.

EPIDEMIC AT DARK HARBOR, MAINE, IN 1902.

In 1902 a severe outbreak of typhoid occurred in the family of a prominent New York lawyer who had just taken his household, consisting of four in family and five servants, to Dark Harbor, Maine, to spend the summer. Seven members of this household of nine were soon ill of typhoid. In addition, a trained nurse was attacked, as, it is said, was a woman who was employed to work by the day.

The first case occurred two weeks after the arrival at Dark Harbor, on June 17. The onset of this case was sudden. In just one week another case occurred. Two days later there was a third. The remainder followed rapidly. The only persons who escaped were the cook and the head of the family; he had had an attack of typhoid fever some years before.

All the servants, except the cook, had been employed in this family for one month or more in New York. The cook had been engaged especially for the summer and had joined the family three weeks before it left New York.

The outbreak at Dark Harbor was studied by a number of persons and especially by Dr. E. A. Daniels of Boston and Dr. Louis Starr of Philadelphia. The house was new, never having been occupied before. It has been impossible to rent it since.

Because of its newness, the water supply of the house was not in every way satisfactory. A tank on the top floor of the house had not been cleaned since it was set in place. Until this cleaning was accomplished drinking water was obtained from a spring.

Water was never believed to have been the original cause of the outbreak. Two analyses of the water were made: one at the Massachusetts Institute of Technology in Boston and one in New York. They confirmed the opinion that the water was safe.

It was suspected that the household supply later became contaminated. A pitcher from a room in which the first typhoid case was nursed was supposed to have been filled at an open tank on the same floor, thus infecting the household supply. But the epidemic had already broken out when this event was believed to have occurred. Typhoid fever was scarcely known in Dark Harbor at the time of this outbreak and has been exceedingly rare since. No case immediately preceded or succeeded it.

It was believed by some that the original cause of the epidemic was the sickness of a footman—the first case. The theory was that the footman contracted his illness before going to Dark Harbor, either in New York or on the way. Dr. Daniels was of opinion that the first three cases received their infection in this way at the same time and place.

On making a careful study of the facts, both views seem to me untenable. The period of time which elapsed from the first to the second case was too short to agree with the theory that the first case led to the others. The incubation period required to be covered in the event that the first three cases were infected before reaching Dark Harbor was too long. Beside, for the most part, these three persons had not shared the same food for a long time.

OUTBREAK IN NEW YORK IN 1901.

The history of the cook before going to Dark Harbor is not entirely clear. In 1901-2 she lived about eleven months in one family. Here a laundress was taken ill and removed to Roosevelt Hospital, Dec. 9, 1901, one month after the cook's arrival. This case was seen by Dr. R. J. Carlisle of New York. The diagnosis was positive. The cause of the attack was not, apparently, investigated at the time, and fuller information concerning it has so far been difficult to obtain.

OUTBREAK AT MAMARONECK IN 1900.

My earliest record of the cook's employment is in a New York family which has a summer residence at Mamaroneck, N. Y. In this instance, a young man who made a visit to the family was attacked, his illness dating from Sept. 4, 1900. The circumstances in this case were such as to lead to the impression at the time that the infection occurred on Long Island. He had spent two weeks at East Hampton within a few miles of a fever-ridden camp occupied by U. S. soldiers at Montauk Point. It was thought that he might have been infected from water or by drinking from a cup used by some typhoid patient, or in some other way not known.

Inasmuch as the patient lived in the Mamaroneck household for at least ten days before the onset of his illness and, as his supposed exposure to typhoid on Long Island was by no means reasonably clear, it seems to me probable that he was infected by the cook. The cook left within a few days after the onset of this illness. She had been in the family for three years without, apparently, being connected in any way with typhoid.

OUTBREAK IN TUXEDO, N. Y., IN 1906.

Subsequent to her employment at Oyster Bay, the cook went to live in a family at Tuxedo Park, N. Y. She remained there from Sept. 21 to Oct. 27, 1906. On October 5, fourteen days after her arrival, a laundress was taken sick with typhoid fever and removed to St. Joseph's Hospital, Paterson, N. J.

According to Dr. E. C. Rushmore, who saw this case, no other case of typhoid had been known in Tuxedo for several years. Excepting the cook, all the servants had been in the family for two months or more. The cause of the laundress' illness was not made clear at the time.

FINAL OUTBREAK IN NEW YORK IN 1907.

When, at last, the cook's final whereabouts were ascertained, it was found that two cases of typhoid fever had broken out in the household where she was employed. These occurred a few weeks after her arrival. One patient, a chambermaid, was taken sick Jan. 23, 1907, and removed on January 29 to the Presbyterian Hospital, New York. The doctor was first called to see the other patient, a daughter of the owner of the house, on February 8. This second case resulted fatally on Feb. 23, 1907, the only fatal case in this whole record.

A period of two months elapsed between the beginning of the employment of the cook and the beginning of the first case of illness in this household. The New York City Department of Health officially investigated the first of these two cases at the time it was reported by the attending physician and, in the absence of evidence to the contrary, ascribed it to the public water supply.

The foregoing records by no means all the cases with which this cook may have been associated. As already mentioned, I have been able to trace but fragments of her history through the last ten years.

There is a remarkable resemblance between these seven fragments. In each instance one or more cases of typhoid have occurred in households from ten days to a few weeks after the cook has arrived or among people who have, within that period, come to live near her and eaten the food which she has prepared.

In every instance the families have been of ample means and accustomed to living well. In each household there have been four or five in the family and from five to seven servants. Four of the persons attacked have been laundresses. Two have been gardeners, permanently attached to the country places where the typhoid has broken out. All but two of the outbreaks have occurred in the country.

The cook has escaped sickness in every instance. In only one instance is it known that she has worked in a family where no typhoid has occurred. This family consisted of two people of advanced age and one old servant.

In all there have been twenty-six cases and one death. Twenty-four of these cases have occurred within the last five years.

ACTION OF NEW YORK CITY DEPARTMENT OF HEALTH.

Believing that sufficient had been learned concerning her history to show that the cook was a competent cause of typhoid and a menace to the public health, I laid the facts concerning the four principal epidemics here described before Dr. Herman M. Biggs, medical officer of health of the New York City Department of Health on March 11, 1907, with the suggestion that the woman be taken into custody by the department and her excretions made the subject of careful bacteriological examination. I had been unable to obtain her consent to any examination.

The department acted favorably on the suggestion and caused the cook to be removed to the Detention Hospital. She reached there March 19, 1907, after a severe struggle in which she showed remarkable bodily strength and agility. At the hospital the cook was placed in charge of Dr. Robert J. Wilson, superintendent of the department of hospitals, and Dr. William H. Park, chief of the bacteriological laboratories of the Department of Health.

Dr. M. Goodwin did the bacteriological work under Dr. Park's direction. It was expected by me that germs might be found in the urine, but more probably in the stools. None was found in the urine. The stools contained the germs in great numbers. Daily examinations made for over two weeks have failed only twice to reveal the presence of the *Bacillus typhosus,* and on these occasions the sample taken was perhaps too small to reveal them. The blood gave a positive Widal reaction. The cook appeared to be in perfect health.

We have here, in my judgment, a case of a chronic typhoid germ distributor, or, as the Germans say, a "typhusbazillenträgerin."