rhage occurs more often than is generally supposed, but that it is so slight as to pass off unnoticed by way of the bowels. I imagine that something of that sort may have caused the various fainting spells referred to in the case which I have reported.

Some authorities state that in gastric ulcer a hemorrhage sometimes occurs regularly as vicarious menstruation. Aside from their being but little foundation for such an opinion, I believe it would be dangerous for the patient and confusing to the diagnosis to so regard such hemorrhages. The irregular catamenia, especially the amenorrhea so common in these cases, are not the cause of the hemorrhages so much as the result of the debilitated constitution brought about by the loss of blood. A periodic hemorrhage in gastric ulcer is not menstrual but rather a gastrorrhagia accompanying the ulcer and provoked by the monthly disturbance of the system. If the hemorrhage is large and recent the blood will be bright red in color, alkaline, fluid and mixed with food and mucus. More frequently, however, it is retained long enough in the stomach to be acted upon by the gastric juice. It will then be more or less clotted, having the appearance of coffee grounds, changed in color to dark brown by the changing of hemoglobin into hematin, acid, unaerated and minutely intermingled with particles of food and sour mucus. Hematemesis occurs in many diseases and must always and especially be differentiated from hemoptysis.

In conclusion then, I believe that gastric ulcer may be strongly suspected where there is the peculiar pain already described and hyperacidity; and if to these be added gastrorrhagia, the diagnosis may be made with gratifying certainty. I have purposely refrained from considering the indications of the site of the ulcer, which in cases of perforation may be surgically important. My only object has been to emphasize and assign the proper valuation to each of the cardinal symptoms of gastric ulcer, symptoms upon which alone anything like a positive diagnosis may be based.

Columbus Memorial Building.

OBSERVATIONS AND STATISTICS UPON THE USE OF ANTITOXIN IN ONE HUNDRED CASES OF DIPHTHERIA.

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The following observations, statistics and histories are offered as a contribution toward clearing up obscure and unsettled points relative to diphtheria and antitoxin.

It has long since been experimentally proven that the Klebs-Löffler bacillus produces a specific toxin giving rise to all the classic signs of diphtheria. The pseudo-diphtheria bacillus is supposed to be a non-virulent, attenuated or modified form of the former. The latter, the streptococcus longus, streptococcus pyogenes and staphylococcus are associated with the Löffler bacillus and cause pathogenic conditions, respecting which there is much to learn. For instance, such cases of croup, necessitating even intubation, in which these non-specific germs only could be grown in spite of repeated culture trials, have been relegated to the list of anomalous cases. Such an explanation, however, no longer satisfies the scientific world. More extended biologic research and study of serum-therapy will doubtless change the nomenclature of a disease having such a multiple genesis and pathology. The minuter chemico-physiologic reactions of the diphtheria toxin and antitoxin upon the human cell and organism still require elucidation. Before proceeding to the tabulation of cases as observed by me in eight weeks' service in the health department, I will formulate the points that particularly impressed themselves upon my attention and later emphasize them by a recital of interesting histories. They are:

1. The marvelously rapid improvement, especially in the laryngeal or most dangerous form of the disease when antitoxin is properly administered, viz., early enough, in large enough doses and in frequently repeated doses in severe cases where but little improvement is noted within eighteen hours.
2. The necessity for early cultural diagnosis.
3. The clinical relation of the pseudo-diphtheria bacillus to the Klebs-Löffler bacillus and their mutual interchangeable attributes, such as virulence, benignancy, transmission, etc.
4. Bacterial, aborted or modified diphtheria without clinical manifestation.
5. Persistence of the Klebs-Löffler bacilli in the throats of these subjects in spite of rigorously applied antiseptic treatment.
6. Menace to the community as contagion bearers of these subjects; hence the need of isolating them.
7. Relative absence of post-diphtheritic paralysis despite the severe character of the epidemic.
8. Period of, and positive and partial immunity conferred by the use of antitoxin.
9. Contraction of diphtheria after immunization due to the tardy use of antitoxin.
10. Rashes and sequelæ consequent to the use of antitoxin.
11. Failure to demonstrate the Löffler bacillus in some undoubted cases of diphtheria.

These inferences have been reached by actual observation and care of the greater number of cases comprised in the following table:

Cases visited or seen, 137; curative antitoxin doses given, 102; curative antitoxin doses given by me and assistants, 72; curative antitoxin doses given by other physicians in my district, 30; recoveries after antitoxin, 95; deaths after antitoxin, 7; physicians asking treatment for their patients, 9; physicians giving this treatment, 20; cultures made for 250; laryngeal cases, 50; mild laryngeal (seen within first sixty hours) cases, 28; severe stenotic cases, 22; cases immunized, 166; cases completely protected, 150; partially protected, 16; bacterial not clinical cases, 28; deaths twenty-four hours after injection, 3; deaths later, 2; deaths in which antitoxin was not used, 5; cases of paralysis within twenty-four hours after use of antitoxin, 2.

	1st day.	2d day.	3d day.	4th day.	Later.	Unknown day.
Number of cases injected.	16	34	21	10	14	7
Recovered	16	33	20	8	11	7
Died	0	1	1	2	3	0

Intubations by others, 4; intubations by me, 1; total 5; tracheotomies, 1; cases of rashes consequent to use of antitoxin, 12.

The death, as reported after the use of antitoxin upon the second day of the disease, was in a laryngeal case of probably longer duration than reported. That reported as having received an injection upon the third day, received, to my knowledge, too small an initial and second dose, and besides had not been freely enough stimulated. One of the cases of paralysis was in my practice and was, I think, due to the profound toxemia and could not be ascribed to the action of the antitoxin, for the diagnosis was not made until the fifth day of the disease, or until stenosis set in and

when the child was pretty well poisoned. Seven deaths in 103 cases, of 6.97 per cent., is a very low death rate, especially if one considers that 50 of the 103 cases, or almost 50 per cent., were croup, the most dangerous form of diphtheria. Doubling this death rate to 14 per cent. for the laryngeal cases, still leaves a remarkably low mortality. This brilliant record is due to the fact that 91 of the 103 cases were injected within the first three days. This was accomplished by reason of a large dispensary clientele upon whom cultures were made and the rapid and hearty coöperation of those in charge of the municipal laboratory, whence the reports reached us in from fifteen to eighteen hours, to be immediately acted upon. It is to be regretted that inasmuch as this was an out practice, no evidence as to the effects of antitoxin upon the kidneys could be obtained. Such histories of cases will now be selected as characterize the points above noted:

Case 1.—January 13, I was called in counsel to see Babe S., age 11 months, who had been sick thirty-six hours. It had almost choked to death during the night, as the mother expressed it. The breathing was stertorous and the cyanosis, dyspnea and stenosis were extreme. It had been freely stimulated and given slaking lime fumigations and an iron and bichlorid mixture. There were small patches on the tonsils. The culture showed a few Löffler bacilli only, because of the use of the antiseptics above indicated. Fifteen hundred units of antitoxin was immediately given, with the injunction to repeat the dose in eighteen hours if the child was not much better. The temperature was now 101.4, and had risen to 104.6 when I called again at noon of January 14. I again injected 1,500 units and now advised intubation in order to tide the child over until the second dose should have begun to take effect. By evening the temperature had again fallen and the child was so markedly improved that the latter procedure was obviated. January 15 cyanosis, dyspnea and stenosis had entirly disappeared and the harsh, noisy respiration was the only indication of the recent trouble. The child was bright, smiling and playing with its rattle, in wonderful contrast to its forty-eight hours previous struggle for breath. Six hundred units more was administered in order to entirely clear up the remnants of membrane still evidently in the larynx; for the fauces were now clear. This child made a rapid and uneventful recovery without sequelæ or complications.

Earlier in my experience with the use of antitoxin, I had not used it so boldly nor freely, and the cases had invariably progressed to the point where intubation and even tracheotomy were necessitated. I have likewise noticed that in the late cases where tubes were worn and antitoxin freely given, the former were expelled or removed early and sometimes repeatedly, because of the rapid sloughing of the membrane.

The advisability, yes, indispensability of an early cultural diagnosis, the intimate connection of the pseudo-diphtheria to the true or Klebs-Löffler bacillus and its interchangeable virulent and transmittant attributes, are exemplified in the following case. The pseudo-diphtheria bacillus is considered a non-virulent, attenuated variety of the Klebs-Löffler bacillus, consequently should give rise to a mild form of the disease and propagate itself in its own form in the throats of other exposed children. It did neither in this instance, for babe S. died of heart failure after laryngeal stenosis due to the pseudo-bacillus that in its turn communicated a mild or aborted form of the disease to four other children who were not ill one minute, but nevertheless harbored the Löffler bacillus for some time. Such conflicting facts still demand explanation.

Case 2.—January 19. Babe S., 10 months old; slightly ailing; hoarse, coughing, coryza, faucial hyperemia, no patches. Morning temperature 101.6; evening temperature 99.2. Believing this to be a case of grippe, I gave it no further thought, nor did I make a culture. January 21, the child reported better. January 22, the nurse telephoned to me that the babe had been croupy during the night. When I arrived at 2 P.M. the child was so dyspneic and cyanotic that Dr. Morganthau intubated for me; 1,600 units of antitoxin No. 2 was also given. Calomel sublimations and free stimulation was ordered. After recovering from the exhaustion incident to placing the tube, the babe's pulse and respiration were good. From the membrane and mucus coughed up a culture was made that demonstrated the pseudo-diphtheria bacillus. 5 P.M., child breathing comfortably, looked well, slept a couple of hours. 7 P.M., labored respiration, took milk and brandy well that was afterward regularly administered. 9 P.M., coughed up the tube, respiration labored; calomel sublimation; pulse 120, respiration 60, temperature 101.6. 12 M., pulse 120, respiration 60, temperature 101.6. 1 A.M., sleeping quietly. 1:10 A.M., the nurse noticed that the breathing was shallow and the child almost pulseless: no struggle, dyspnea or cyanosis. 1:20 A.M., it died; no autopsy permitted; death due probably to cardiac paralysis.

Case 3.—Babe E., 1 year old; seen December 29, eighteen hours after being taken sick. Patch on one tonsil; larynx involved to the point of beginning stenosis; temperature 103.4. Injected 10 c.c. of No. 3. January 1, great improvement; temperature 99; breathing comfortably. January 3, tonsil clean; child well. Almost a pure culture of the Löffler bacillus was demonstrated in this case, that infected the cousin Ellen E. with the pseudo-diphtheria bacillus, but who, because of antitoxin immunization, manifested no clinical signs of diphtheria. The antitoxin, however, produced in her eight days after injection pain, swelling and redness of one thigh and leg; 300 units from the same bottle, given to her brother, caused a generalized urticaria to appear in him.

Case 4 is another instance of the communication of the Klebs-Löffler bacillus infection, hence, true diphtheria, by means of the pseudo-diphtheria germ. Mary F., age 3½ years; seen January 2 upon the fourth day of her illness. Made a culture that showed a few pseudo-diphtheria bacilli and staphylococci. It was a severe pharyngeal and tonsillar type of the trouble and thirty-six hours after the injection of 10 c.c., of No. 2, the membrane was extruded *en masse*, the edges having first curled up. This same process was observed by me in several other cases. Cultures made again January 4 and 7, corroborated the original finding of pseudo-diphtheria bacillus. This child's mother had free intercourse with a neighboring cousin's family, where three days later I was asked to attend a case. I reached it January 5. Two children had been ill for twelve hours. The Löffler bacillus was found growing in their throats, and antitoxin given to them. Their recovery was rapid as compared to the supposedly lighter but really severer incursion of the pseudo-germ upon their cousin.

In a series of thirty cases I have cultural proof of bacterial infection minus clinical manifestation. In some of the cases there was absolutely no evidence of disease; in others such slight evidence that it was difficult to convince the parents of the reason for the exclusion of their children from the institution; in still others, because immunized by small doses of antitoxin, so mild an attack that it might be called aborted or modified diphtheria, for there was but slight rise of temperature, unimportant faucial hyperemia and no membrane visible. In these cases infection had probably taken place shortly before or at the time of injection, since they were not antitoxinized until we discovered by daily prophylactic cultures that a bacterial case at least had crept into "The Sheltering Home."

December 21. Isa G. sought admittance to the above institution. He was not sick but a culture disclosed the Löffler bacillus in his throat to the exclusion of all other germs. January 12, a clean bill of health permitted his entrance. He had received no antitoxin and seemed particularly insusceptible as did other members of his family.

January 21, Ida G. was reported sick; temperature 99.6; tonsils swollen; crypts patulous; Löffler bacillus present; no patches. Was isolated and given 500 units of antitoxin and twenty-one other children each given a 200 unit of immunizing dose completely protecting ten.

A like procedure, two months previous to this, had absolutely immunized twenty-four out of twenty-eight cases subjected to this treatment. Four of these cases

harbored the Löffler bacillus but were not sick, They were immunized for eight weeks, being more or less exposed during this period. Later we had another outbreak. Six adults refused immunization and one of them, just nine days after exposure, contracted the disease. The five remaining members of this household now allowed me to inject them. One, however, was not absolutely protected; for five days later a mild form of the trouble appeared in her. To return to the history of Ida G.; she never developed patches and seemed well although her temperature ranged from 99 to 99.6 and 100.6 for ten days and the bacillus was ever present and is still present sixteen days after the onset of her attack. She in turn infected the above-mentioned insusceptible case Isa G., and a sister who January 22 and 23 were respectively taken sick. Up to this date their throats were free but now showed the Löffler bacillus. The boy's temperature was 103 before administering the extra dose of 500 units of antitoxin but fell in twenty-four hours to 102.2. Throats of both were in the same condition as the previously described case. They were now sent home and escaped my farther observation. Daily cultures were now being made and the institution kept open. The urine examined in all these cases before and after receiving antitoxin, proved negative. Seven other inmates (none of whom became ill) developed a Löffler bacterial growth upon January 25, 29, 30, 31, February 3 and 4, respectively, viz., 3, 7, 8, 9, 12 and 13 days after exposure. These, the unrecognized contagion bearers, are during an epidemic, the most difficult subjects to deal with, and at any time a menace to others. In the cases that contracted the disease after antitoxin administration I was able to trace the infection as contemporaneous with the original source. The disease as thus contracted was also incipient or bacillary only.

Rashes appeared in 12 out of 269 subjects injected with antitoxin or a little over 5 per cent; a proportionately slight evil as compared to the benefit derived. Arthritis obtained in two cases; in one after a dose of No. 3, and in the other after a small immunizing dose. In the first case although croup, the cultural finding was negative. Both knees were here involved, while in case No. 2 it was the shoulder and wrist of the side injected. Edema, redness and an erythematous rash of one leg appeared in a little girl eight days after the reception of an immunizing dose. Her culture showed the pseudo-bacillus, although she was exposed to a Löffler bacillus infection. Her brother, who received some of the contents from the same bottle, developed urticaria. I saw another case of urticaria in a child who was subject to this malady. In still another instance, after an immunizing dose, a child who had previous attacks of eczema, now exhibited an additional outbreak. A papular rash appeared in five patients; in two, eight days, and in one, six days after the injection. A fourth subject was first seized by a papular affection followed by an urticarial eruption and left facial edema involving the left eyelid. No urine could be obtained for examination; nor was an analysis made in any of these cases. In an adult, eight days after injection an erysipelous-like rash appeared at the injection site in the anterior upper thoracic region and extended upward and outward to the point of the shoulder, inward to the middle sternal line and downward to the nipple. There was great pain and stiffness in all the joints of the upper extremity of that side, general pain, malaise and some rise of temperature. Ichthyol ointment was applied by the attending physician who reported rapid improvement.

I have noticed that most patients have complained of pain and soreness after the injection and many children manifested much uneasiness the night after the administration of antitoxin. A few older patients returning to me some time after such a procedure complained that they had not felt well since. I saw a number of cases of unquestionable laryngeal diphtheria of great severity in which repeated cultures failed to demonstrate the Löffler bacillus. In some instances, this was due to the fact that the cases were seen at a late day when the field was overwhelmed with staphlococci and streptococci, and in others to the use of various antiseptic solutions and sprays. But again in many other cases where the last mentioned conditions obtained, I was able to secure cultures. Wherefore in some cases and not in all is a query requiring an answer.

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CLINICAL NOTE UPON AN OVERDOSE OF PROTO-NUCLEIN.

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A female child, aged 3 years, parents of upper class; subject of malnutrition, from whom large amount of pharyngeal adenoids had been removed six weeks before; in addition to diet and general regimen had been given proto-nuclein tablets, 5 grs. each, taken twice to three times a day (Reed & Carnrick's). Had taken these for about a month. Great benefit as regards general health, the condition of the nose, throat and ears had followed. The improvement was mainly ascribed to removal of the adenoid tissue and restoration of nasal breathing. This child was addicted to eating lead pencils, pieces of chalk, etc., and had previously taken medicine of some kind in large quantity without knowledge of the parents.

On February 4 she was observed to be playing with a bottle which had contained proto-nuclein tablets, of which it is supposed twenty-five or thirty remained (125 to 150 grains or 8 to 10 grams). The bottle was found to be empty and a couple of the crushed tablets were removed from the mouth. She said she had eaten all that was there and parents are convinced of the fact. The child was brought to my office within an hour, when I could observe no apparent change from her general health. Advised half-hourly drinks of water with small lump of carbonate of magnesia. The spoiled child would not take the magnesia and drank the water only when she was inclined. Was seen at noon, when she appeared excitable, pulse full and fast (125). At 6 P.M. had been quite vivacious during afternoon; seemed otherwise well. Pulse 120, tongue clean, no pain. Had passed urine several times in her clothes (a general habit). Specimen could not be obtained. During the night she slept well and was seen the next morning, when nothing was observed. Since then child has been apparently well.

The ingestion of 8 to 10 grams (125 to 150 grains), from twenty-five to thirty times the usual dose of a presumably standard and fresh preparation, had no effect whatever beyond slight mental excitation and acceleration of the heart's action. We would not ascribe this to the environment, as neither the parents