the only promise of relief from the pernicious vomiting. On stopping the hypodermic injections violent vomiting came on in twenty-four hours, the cervix was partially dilated by the fingers, active hemorrhage and pains occurred and an abortion was the consequence. The severe hemorrhage, preceding the abortion, was held in check by fingers and part of the hand in the cervix. The vesicles came away in small masses and felt like blood clots slipping through the hand. There was about a quart of them and blood and clots in a basin, presenting a striking appearance, likened by Dr. Gooch to "white currants floating in red currant juice." Some decidua in the shape of membranes was found, and no embryo. Great care was used in cleansing the uterine cavity, lest a wall made fragile by vesicular penetration be ruptured. A piece of decidua came away the next day. At no time had there been a rapid enlargement of the uterus nor an appearance of vesicles in the discharges, leading me to a diagnosis of the true condition. The woman made an uninterrupted and complete recovery, but hypodermic injections were necessary at 5 a. m. each day for a week, to keep down the nausea and violent vomiting. She has had good health since, and has never been pregnant.

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TYPHOID FEVER.

NOTES ON TWO EPIDEMICS IN THE IOWA HOSPITAL FOR INSANE.*

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INDEPENDENCE, IOWA.

Previous to 1896 there had never been more than two or three cases of typhoid fever in the hospital for insane at Independence. Early in September of that year it made its appearance for the first time as an epidemic, and within three weeks twenty-eight cases, all males, were taken down with the disease. It was not confined to one ward, but after its advent it broke out at intervals of a few days in widely separated wards or in the cottages; sometimes one case a day, and at others

two or three would be stricken with it on the same day and in the same ward. It ran its course within twelve weeks and disappeared, leaving the institution apparently free from the contagion until August 6, 1898, when it was visited by a second epidemic, which spread quite rapidly and in much the same manner as the first, continued over about an equal period of time, and subsided as suddenly as it came. About the time of the beginning of these epidemics there were a number of cases of typhoid fever in the surrounding country within a radius of ten miles.

Source of Infection.—Since the organism is conveyed most frequently through the medium of water, attention was turned at once to the condition of the water-supply. It comes from dry points, thirty feet beneath the surface in a sand-bed, and the city near by receives its supply from the same source. These points are 80 to 150 feet from the river and located in a depression about which there are a number of dwellings, barns and vaults, there being no sewerage system in that part of the city, hence drainage by means of seepage tends toward the drive wells from three directions. There was no typhoid fever in the city, as might be expected if infection came through the water, yet specimens were collected and careful examination made by Professor Beirring of the Iowa State University, with negative results. Then it was thought it might come through the milk, but this was all produced on the farm, and investigation showed that it could not be the source of the contagion, except through one channel of introduction—into the milk first, as will be seen later on. Then it seemed that fruit and other foods which were shipped in from different parts of the country might have become infected by coming in contact with the hands of those who had engaged in preparing them for shipment, and who may have come from homes in which there was at the time, or recently had been, typhoid fever. There was nothing about any of these to indicate infection, and to positively demonstrate its presence or absence seemed a hopeless task and was not attempted. There were a number of cases of fever in the country adjacent to the hospital at the time of the beginning of each epidemic, and this fact revived the old theory that flies carry the organisms upon or within their bodies, or both, and in their migration, deposit them upon the general food supplies, or more likely upon the food after it has been placed upon the tables. They were very numerous, and this led to the belief that they were the carriers of the disease germs, they having first come in direct contact with the sick, or having sipped from that portion of the cup which had been in contact with the patient's lips, or after having walked about upon and eaten some of the dejecta, had flown across the country to the hospital and there deposited their dangerous burden upon food or vessels wherein food was prepared. That the poison was disseminated in this way there seems no reasonable doubt, since it has already been proven that flies walking about upon dejecta or on prepared cultures and then lighting upon a culture-medium inoculate it with the typhoid bacilli: and it is the belief of the writer that both epidemics originated in this manner, yet it was not demonstrated except by partial exclusion.

The prodromal symptoms in each of the twenty-eight cases of the first epidemic were unusually well marked. There was general malaise, severe pains in the head, posterior portion of the neck and back; very marked rigor in nearly all and nausea and vomiting in a number; roseola over the abdomen of all but one, and in one half

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they extended over the chest and thighs as well. They all had the typical markings of the tongue, the curving fever, with pulse and respiration in corresponding ratio, except when there were lung and heart complications; the bowel disturbances, diarrhea and tympanites and enlarged spleen, delirium in a few and typhoid expression in all; epistaxis in three, and in one of these there was also hemorrhage from all of the mucous surfaces and severe hemorrhages from the bowels of two others; albumin in the urine of sixteen and casts in four. Of the fifteen cases in the second epidemic not a single one had distinct chills, one had the typhoid rash, but it was not nearly so well marked as in the first, except in one patient, whose entire body was so uniformly covered with it that it was impossible to put the tip of the finger upon the skin anywhere without placing it upon a rose spot. They appeared over the abdomen first and gradually spread over the rest of the body. Albumin was present in the urine of all but one, in amounts varying from a mere trace to .5 per cent. in quantity; casts were present in two. With these exceptions the clinical symptoms were the same in both epidemics, and these in the first, together with the diazo reaction, which was found present in a few cases tested, and the isolation of the typhoid bacillus, completed the chain of evidence upon which the diagnosis was based. The writer was not yet familiar with the steps required nor with the technique in making Widal's blood-serum test, or else the last and most perfect test necessary to complete the chain would have been added and the diagnosis still further confirmed. In the last epidemic the diazo test was applied to the urine of every patient and the reaction found to be positive in all but two. Widal's blood-serum test gave a positive result in eight cases within seventy-two hours after the onset of the disease; one was negative until the ninth day, when the result was positive; one until the fifteenth day, when reaction was very positive, four tests in all being made; two negative on the first and also on the fourth days and reaction perfect on the seventh day; a fifth was negative on the first and positive on the seventh day; a sixth negative on the first and positive on the seventh day, and a seventh negative the first and only time the test was made. These confirmatory tests are of exceedingly great value, and without the latter one would always be in doubt as to whether an inverted case of typhoid fever was typhoid or not unless all the clinical symptoms except the fever, pulse and respiration were very well marked. Then, too, one is not justified in relying upon one test unless the reaction is positive, but trials should be made every few days until a reaction is obtained. There is a time in every case of typhoid fever when sufficient toxin has been developed in the blood to cause a clumping of the bacilli.

Of the first twenty-eight cases seven died. One epileptic, 21 years of age, died in status epilepticus after convalescence was well established, and a second, 17 years of age, was taken with tuberculo-pneumonia just as the fever had begun to decline, and perished within a few days. He also had a number of severe epileptic seizures, and the second a typical pneumotubercular lung. A third, a patient 69 years of age, with organic dementia, died at about the tenth day; a fourth, aged 53 years, a case of dementia, and a fifth, 43 years of age, died within ten days, and a sixth and seventh, one 19 and one 30 years of age, both of whom had been unusually strong and healthy, died early in the disease. The findings at the autopsies were typical typhoid

lesions, with a perforation in one of the last two, and in another there was in addition marked brown degeneration of the heart, and a third had softening of one parietal lobe of the brain. Microscopic examinations of sections from the spleen of all the cases examined showed typhoid bacilli. They were stained with aqueous fuchsin, but much difficulty was experienced in staining them. The death-rate was 25 per cent., but it must be remembered that only four of these cases went into the disease with any hope of withstanding its ravages. Of the fifteen cases in the last epidemic not one died, but they were with few exceptions better fortified, and there was no serious physical complication.

The treatment in general was absolute rest in bed, which also included the case of inverted fever to be described later on, careful nursing, dieting, baths, and the administration of medicine with a view of antiseptics as far as possible, and a use of such drugs as seemed best to meet the indications and for tonic effect when needed. During the first epidemic intestinal antiseptics were given all the way through, and the diet consisted chiefly of milk, alternated now and then with beef-tea and broths; water was given when called for. Sponge-baths, tub-baths and ice-packs were given as seemed best suited for the case in hand, the former being used most frequently. In the last fifteen cases little attention was given to drugs as intestinal antiseptics, but instead pure cold water was prescribed in quantities ranging from 100 to 150 c.c., to be given every three hours throughout the twenty-four unless otherwise instructed, a little listerine being added in order to make the patients feel that medicine was being given, and water was also given if the patients called for it in the meantime, the chief aim being to flood the digestive tract with from one to three liters of liquid, including milk and other liquid foods, in twenty-four hours, with the hope of increasing the blood volume, and of thus diluting the toxic elements and hastening their elimination. The diet consisted of milk alternated with Mellin's food and Horlick's malted milk; broths, beef-tea and raw egg were given when a change from the prescribed diet was desired. Tub-baths were given except to patients much emaciated, or where there was unusual weakness, or where it was feared they might be followed by shock and collapse. Some of the patients dreaded very much to be placed in a cold bath, and in order to avoid both mental and physical shock they were immersed in tepid water which was then cooled down to the required degree of coldness. It seems only just and right that heed should be given to the appeals the patients usually manifest in mental or physical shock, if not by verbal request, for more appreciable, and at the same time more humane, methods in the administration of hydrotherapy—the sheet anchor of our hope in the treatment of this dread disease.

The subject of typhoid fever is an old one, and in these days it is next to impossible to express a new idea, one that has not already originated in the minds of physicians everywhere, or to meet with an unusual case, one which has not been observed and carefully studied by every regular practitioner. Hence, when it is said that this paper would not have been thought of had it not been for one case among forty-three reported which differed from the ordinary—and that a case of inverted typhoid fever—each one may be able to call to mind a similar case, yet not many of these cases have been reported. Many authors speak of a low type of fever. Early in winter Goltman gave an excellent report of a case together with

a tracing of the temperature curve; the case was as near like the one here pictured as it is possible for two to be, and nearly the same steps were taken to prove it. It appeared in the *Medical Record*, and was reviewed in the December number of *Medicine*.

This is the first case which it has been my fortune to observe and to study from the onset of the disease to its close. The patient was a male, 57 years of age, and a melancholiac, with marked mental depression and lowered vital functions previous and up to the time he was

taken sick. There was general malaise but no pain, the tongue was coated and the tip and border red but there was no tremor; slight tympanites was noticed, especially in the right iliac fossa, where, upon pressure, faint gurgling could be elicited and also some tenderness. For a time the stools were thin and characteristic in color, and over the abdomen were rose spots, but they were far less numerous than in any of the other cases, yet quite typical. The temperature was 101.2 on the day it was discovered that he was sick, and it rose to 102.8 on the second, then fell below normal, remained there with the exception of a few times, when it reached a point slightly above normal, but remained so only for a short time. The pulse and respiration curves as indicated by Chart 1, which is an exact copy of the temperature, pulse and respiration variations as recorded and accurately traced from the time the patient was taken sick until his recovery, show a very marked relation to the fever curve, being either above or below the normal line and sliding up and down at about the same time. Accurate tracings of the temperature, pulse and respirations in all the other cases, all of which were of the ordinary type of fever, were made, and Chart 2, a copy of one, is typical of all of them. All the clinical symptoms previously mentioned in this special case were very like those in ordinary cases, except they were not so well defined; but when the last three points are taken into consideration there is found to be a vast difference. This difference is better illustrated than told as shown by comparing the two charts. With all these symptoms there was yet much doubt as to whether or not it was a case of typhoid fever, and there yet remained two tests which, if applied at short intervals throughout the course of the disease with negative results, would have classed the case with some low form of fever or toxic condition not typhoid. The first of these—the diazo test—gave a positive reaction during the fourth week, and the second—Widal's blood-serum test—gave a positive result on the third day of his sickness, thus showing that the blood at this early date was sufficiently charged with the toxin to cause agglutination of strong twelve-hour-old cultures of the bacilli within twenty minutes, thus leaving no question as to the diagnosis.

The value of the microscope has been fully demonstrated in these epidemics: 1, in the differentiating between albuminuria so often present in fever and actual structural changes in the kidneys, nephritis: both of which were present in the above cases, the latter in only a few; and in determining the condition of the bladder; 2, in confirming the diagnosis by aiding in demonstrating isolated organisms to be typhoid bacilli and later making it still more positive by proving the presence of the same bacilli in the spleen after death; 3, without it, the most valuable of all the confirmatory tests—Widal's blood-serum reaction—could not be nearly so well made, since the agglutination process must be observed under a high power. The report of this or any case of inverted fever would be of little moment if the diagnosis was based only upon the clinical symptoms, since the latter may be almost entirely wanting, as happened in a case seen in consultation by the author only a few days ago, since this paper was begun, and which was positively demonstrated with those two last named aids to be a case of inverted typhoid fever. Three weeks previous the patient had visited in a district where there was an epidemic of typhoid fever at the time, and the source of infection was contaminated water, of which the patient had also drunk; a second person visiting in the same place was taken with ordinary typhoid

fever shortly afterward. The microscope is one of the most valuable aids the physician has. It enables him to be positive in many cases where there would be much uncertainty without its use; and best of all, the methods and technic in making any and all these examinations are so simple that any physician can easily make them.

Effect on Mental Status.—Of the total number there were two cases of paranoia, two of alcoholic insanity, five of melancholia, four of terminal dementia, six of katatonia, five of organic dementia, five of epileptic insanity, thirteen of dementia precox and one a nurse not insane. Nine of these showed a marked gain in flesh and muscular strength. This change was rapid, and hence nutrition must have been very greatly improved. All the others except the fatal cases regained their former weight and strength but progressed rather slowly.

The changes in the mental status were even less pronounced than the physical, but this is due largely to the fact that the prognosis from the beginning was favorable in only four cases. Two cases of dementia precox became much brighter during the fever, but complete relapse took place immediately after convalescence; one case, delirious during the fever, brightened sufficiently after convalescence to be able to relate the names of his relatives; tell of events that had taken place while he was yet at home; could write a little, but imperfectly; became more interested in his immediate surroundings, kept himself fairly neat, and even took part in and enjoyed in a measure simple sports with the other patients; but in the course of a few weeks he relapsed completely to his former condition. One case of katatonia began to improve very rapidly early in the disease, and at about the time convalescence was fully established, mental recovery was complete, and a second made slight improvement but soon relapsed. Two cases of melancholia improved slightly but soon relapsed, the third continued so well that he was able to return home, where he is now assuming the ordinary duties of life. The only case of acute mania was very much emaciated at the beginning of the fever; there was still great mental exaltation and motor restlessness, a rush of ideas and incoherence, all of which symptoms had continued for a period of three weeks, and because of this he was wholly unprepared to battle with the fever. Within five days he became oriented and being a very intelligent and well-educated man, it was thought best to acquaint him with his physical ailment which had come in as a serious complication. He was told the nature of the disease, that it would be absolutely necessary for him to control himself and remain perfectly quiet in bed or his chance for recovery would be very poor. He seemed to grasp the situation at once, and said, "Doctor, I'll do it." He recovered from the fever, nutrition improved, the gain in weight and muscular strength was remarkable, the recovery from the mental disturbance was complete, and in four months he was taken back into the employ of the government, in the post-office, where he now is.

The conclusions to be drawn are as follows:

1. Cases of inverted typhoid fever are comparatively quite rare, and the subject is deserving of thorough investigation as often and wherever an epidemic occurs, with the object in view of determining the relative frequency of the disease; and in doing this all the methods for confirming the diagnosis should be rigidly applied in each suspected case. In these two epidemics it occurred but once in forty-three cases.

2. Of the patients who recovered 25 per cent. showed marked improvement in nutrition and muscular strength while the remaining 75 per cent. only reached their for-

mer condition in these respects. Compared with previous observations it would seem that insane patients with typhoid fever do not show such a degree of improved nutrition after recovery as do those without the mental complications. The patients who improved mentally showed a corresponding favorable change in nutrition, and those whose mental status returned to normal made the most striking changes in this direction. This may not be true, except for these two epidemics, but in them is beautifully illustrated the profound influence that the mind exercises over the processes of nutrition and assimilation.

3. Of this number 16.6 per cent., all dementias, seemed brighter mentally but relapsed as soon as convalescence was completed, except one case which continued on some little time longer; 2.77 per cent., all melancholias, made partial recovery and one is just fairly able to resume the ordinary duties of life; 5.55 per cent., one a case of katatonia and one of acute mania, regained completely their former mental status. The behavior of the cases of dementia would lead one to think the fever had some slight influence upon the mental condition, but it is of no value, since the relapse occurred so soon. Such cases are always beyond the possibility of recovery. The prognosis in melancholia is favorable for some improvement, and it is only fair in this one case to assume that the fever played no important rôle in the partial recovery, since the change was no more than was predicted previous to the fever. The prognosis for recovery in acute mania is generally favorable; and in this case it was regarded as specially hopeful some time before the attack of typhoid. The recovery was rapid and complete and took place at about that period in the course of the mental disturbance at which a change might be expected had he not had the fever, hence one would not be justified in giving to the latter any prominence as a curative factor in connection with the insanity.

TYPHOID FEVER.

A QUARTER OF A CENTURY'S EXPERIENCE THEREWITH,
WITH SPECIAL REFERENCE TO SOME
UNSOLVED PROBLEMS.*
BY JAMES L. TAYLOR, M.D.
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The territory in which I have been located continuously for a quarter of a century is in the Ohio River valley—a region of low hills and valleys, with excellent natural drainage and exceptional freedom from swamps and sloughs, with a permeable soil, an abundant water-supply, furnished mainly by wells and springs, and occupied by a farming population of more than ordinary thrift, intelligence and sobriety. During nearly all of this period I have had more or less cases of typhoid fever to treat, and thus have had opportunities to observe the disease under circumstances quite different from those presented in hospital practice, or surrounding the busy practitioner in large cities.

Speaking generally, I may say that the type of the disease which has prevailed here has been mild, with a tendency to assume endemic conditions. The whole region was formerly intensely malarial, but in conformity with what has been observed in so many other parts of the world, malarial fevers have well-nigh disappeared, and the various forms of typhoid have succeeded. For many years now, I have hardly seen a

case of intermittent fever—ague being one of the rarest diseases that I encounter. Still the germ is not extinct, because only this spring, after the thaw following the unprecedentedly cold weather of -33° in February, I had a few cases of old-fashioned shaking ague of the quotidian type—a fresh reminder of a form of sickness that few were fortunate enough to escape in my boyhood. Now, why has ague disappeared in a region which once seemed to be its congenial home? Men continue to clear land, to turn over the virgin soil—to a less extent than formerly, it is true—but the conditions of heat, moisture, decaying vegetation, and all the alleged circumstances favoring ague still exist. And the plasmodium is still here. But, instead of intermittents we have typhoid—a disease of a very different nature—domiciled now as an endemic. Has Eberth's bacillus run out, so to speak, the plasmodium of malaria? Or by virtue of what bacteriologic law does the one microdeme become diffused, abide and prevail, to the exclusion of another microdeme already in possession of the field, more widely diffused and seemingly more active in its development than the former?

The summer of 1875 in the Ohio valley was an unusually wet season, and was followed, on August 5, by an overflow which destroyed all vegetation on the lowlands. For many days after the flood subsided, the stench from the fields of corn and other vegetation rotting in the August sun was almost intolerable. Added to this was the saturated condition of the surface soil, and every low place filled with standing water evaporating during dog-days in a humid air. Very naturally there was a general apprehension, both among the profession and the laity, of serious sickness to follow such an ideal condition for the generation of a pestilence. Quinin sprang into sudden local demand—to say nothing of whiskey as an assisting antidote. But, strange to say, the following autumn—although somewhat dry—was the most salubrious I have ever known in my practice. I had almost no cases of any kind of fever to treat before cold weather. How many theories concerning the genesis of fevers such experiences completely overthrow! Here the plasmodium of malaria, in one of its aforesaid favorite haunts, with the conditions believed for centuries to be favorable to its activity, reproduced, yet it seems to have lost the energy necessary to its continued propagation, or some physical cause external to the human organism forbids its further multiplication and growth. In our zeal to hunt out, identify and isolate the specific microdeme of each infectious disease, are we not in danger of losing sight of the far greater problem as to what kind of energy it is that determines whether the specific germ shall abide or disappear, remain malignant or grow benign?

In my territory, as I have said, typhoid fever since 1872 has been endemic, and its type in general rather mild, my mortality list rarely attaining to 5 per cent. But it was not always so. While malaria held the field, the incursions of typhoid were epidemic in character and most violent in form. Local tradition has preserved the memory of the first visitation, which occurred in 1823, and which was for many years afterward referred to as the "sickly season." Whole families were then stricken down at the same time, and the population being yet sparse, there were in some cases not enough well ones to minister to the sick, and the records of the neighboring church-yards still attest the unusual mortality of that epidemic. Doctors were then scarce, and medical attention that year difficult to obtain. But, strange to

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