of typhoid patients. Just before using he adds to each tube of medium a little milk-sugar, and two drops of a 1-40 carbolic acid solution. The culture or feces is diluted twice, first about 1 to 40, second about 1 to 8,000. One or two loopfuls of this second dilution is mixed with a tube of melted medium and poured onto a glass plate. Colonies appear after two days at room temperature. The smaller and paler colonies are probably typhoid, but the appearance of the colonies is never sufficient for a diagnosis. Little cubes of gelatine containing each one colony are cut out and transferred to several tubes of bouillon. Examination of these tubes after a short incubation will show whether or no the organism is a motile bacillus. Some of it is then transferred to milk-sugar gelatine and incubated to see whether gas bubbles will develop. The bacillus must be tested with known typhoid serum to see if it will clump, and the bouillon culture tested for indol. If the bacillus clumps in the presence of typhoid serum and produces neither gas nor indol it may be said with certainty to be typhoid. If it does not clump and produces neither gas nor indol it may yet be typhoid, for typhoid bacilli when living together with colon bacilli may gradually lose their sensitiveness to typhoid serum. If gas is produced the culture is certainly colon bacillus.

Early in 1889 Rémy began to apply this method to the examination of stools of typhoid patients. During the year he made 31 examinations of stools from 23 cases of typhoid fever, and isolated the typhoid bacilli from every case. One examination was negative because the dilution was not sufficient, another because it was too great. Repetition in these cases, however, gave positive results. One case on the fifty-eighth day gave a negative result, though an earlier trial was positive. The earliest of all the examinations was on the third day of the disease, the latest on the forty-fifth day. Early in the disease the typhoid bacilli are present in relatively small numbers. They increase considerably during the second week, and may sometimes be almost the only bacterium present. During the third and fourth weeks the number diminishes steadily.

In two cases where an unusually large number of typhoid colonies developed on the plates, the patients died soon after the examination. In all the cases the typhoid bacilli had the same characteristics. They did not produce indol, they did not make gas from milk-sugar, and when mixed with typhoid serum they clumped promptly. The bacilli isolated during the second week grew rapidly and abundantly, while those isolated toward the end of the disease showed less vigor. In 3 cases the typhoid bacilli were found in the stools before the serum reaction or any other sign of typhoid fever was present. Consequently the presence of the typhoid bacillus with its specific characteristics is the only sign that, taken by itself, will justify the clinician in making a certain diagnosis. It is also the only sign that cannot fail. Control examinations of the stools from 12 patients with other diseases failed to show the typhoid

bacillus. The constant presence of the typhoid bacillus in the stools of persons sick with typhoid fever and the absence of it in the stools of other patients, Rémy offers as additional proof that the bacillus is the true cause of the disease.

I have made three lots of gelatine after the formula of Rémy, but cannot yet give any conclusion based on personal experience. The time required to make a report is at least three days.

Those who have used a method described by Piorkowski say that it is valuable and worth further trial. McConkey working in the Thompson-Yates Laboratories, in Liverpool, has had very encouraging results by adding bile salts to a medium for separating typhoid and colon bacilli. There is, therefore, good reason to hope that a method will be devised by which a report of examination of feces can be made in less than three days.

REFERENCES.

- Rémy, L. *Annal de l'Institut Pasteur*, 1900, xiv, 555-570 and 705-722. Also 1901, xv, 145-160.
 H. D. Geddings. Translation; *Public Health Reports*, Washington, D.C., vol. xv, No. 38, pp. 2,301-2,311, September 21, 1900.
 Dakura, Jas. *Wiener Med. Woch.*, 1900, I, 2414 and 2471.
 Piorkowski Medium=Alkaline urine with 1-2% Pepton and 3.3% Gelatine. Plates must be kept at 70°-72° F.
 Scholz, E., and Krause, P. *Zeitschr. f. klin. med.*, 1900, Bd. lxi, H. 5 and 6.
 Abstract. *Philadelphia Medical Journal*, 1901, vii, No. 6, p. 290.
 Bischoff, H., and Menzer, A. *Zeitschr. f. Hygiene*, etc. 1900, xxxv, H., 307-348.
 McConkey, Alfred. *Thompson-Yates Laboratories Report*, Liverpool, University Press, 1900, viii pt. 1, pp. 41-57. Medium giving best results thus far: Bile Salt (Sod. glycocholate and sod. taurocholate) .5%, Pepton 2.0%, Lactose 1.0%, agar 1.5%, tap water q. s.

THE FEVERS OF THE PHILIPPINES.¹

A PRELIMINARY REPORT ON THE NATURE OF THE FEVERS PREVALENT IN THE PHILIPPINE ISLANDS, INCLUDING TYPHOID FEVER, MALTA FEVER, THE MALARIAL FEVERS AND UNDETERMINED TROPICAL FEVERS.

BY JOSEPH J. CURRY, M.D.,

Captain and Assistant Surgeon, U. S. V., Philippine Medical Service.

TYPHOID FEVER.

TYPHOID fever existed among our troops in the Philippine Islands to a considerable extent. There is hardly a command that has not lost men by it, still typhoid fever never has assumed anything near the epidemic form as occurred in the camps in the United States during the Spanish-American War, and as now prevails in the English Army in South Africa. Some cases of typhoid were undoubtedly brought over in the early expeditions from San Francisco to Manila, but it is more than probable that typhoid fever existed widely in the Philippines at the time of our occupation.

Our troops occupied many of the old Spanish camps. From these camps came a large number of the cases of typhoid fever. The camps at the

¹ Extract of a Report to the Surgeon-General of the Army, on the Diseases of the Philippine Islands. (By permission of the Surgeon-General.)

Deposito near Manila, and at Calamba on the Laguna de Bay, especially were the source of many cases. These places had been used by the Spaniards for military camps for years. At Calamba the disease assumed epidemic proportions. Here in March, in 1900, there occurred considerable of an epidemic in the two companies of the Forty-second Infantry stationed there. Out of 16 men of these commands in the First Reserve Hospital (Manila) on March 16, 1900, 14 had typhoid fever. In each case a positive Widal reaction was obtained. Later in May and June, two companies of the Thirty-ninth Infantry were stationed at Calamba, and typhoid occurred to a considerable extent among them.

Malarial fever and dysentery were also prevalent at Calamba. In every command that camped at Calamba, there occurred a number of cases of typhoid fever, of malaria, and of dysentery. These old infected Spanish camps have been the source of a great amount of sickness among our troops. It has been difficult, if not impossible, for military reasons, to avoid occupying such camp sites.

Typhoid fever undoubtedly existed among the Spaniards and natives before our occupation. To what extent it is impossible to state. The Spanish and native records as to the cause of death in Manila are absolutely worthless. Over 70% of the natives never see a doctor. Most diagnoses were made by the Spanish or native doctors after death, on the symptoms as described by the deceased's friends. Post mortems were practically never held save in the medico-legal cases under the Spanish régime. There was no pathological laboratory in Manila before the establishment of the army pathological laboratory at the First Reserve Hospital. In consequence, there is no reliable information to be had from the Spanish records. From information given me by both Spanish and native physicians, typhoid fever has existed for years in Manila. These physicians claim not to any great extent, but it is probable that typhoid fever was widespread before our arrival in Manila.

I performed one post mortem on a Chinaman who died at the San Juan de Dios Hospital in Manila. He died of intestinal hemorrhage. Autopsy showed typical lesions of typhoid fever, the post-mortem blood gave the Widal reaction, and the bacillus typhosus was obtained in cultures from spleen and mesenteric glands. This case had been diagnosed "tuberculose" by the attendant doctors at the hospital. At Calamba typhoid fever was found existing among the natives in a small barrio not far from the American camp. In one house located near a stream from which the soldiers were accustomed to drink, typhoid fever was found among the inmates, by Assistant Surgeon Lewis, U. S. Army, who was sent by the chief surgeon to investigate the cause of the typhoid epidemic in the two companies of the Forty-second Infantry.

We have abundant evidence that typhoid fever existed in and near Manila before our occupation. Out of the 20,081 medical cases treated at the

First Reserve Hospital, 653 were typhoid fever. Of this number 93 died, a death rate of less than 15%. This is a remarkably low death rate for a tropical country and speaks highly for the Medical Department of the Army. This is less than one-half the death rate reported by the English Army surgeons for tropical countries (Manson). This low death rate is no doubt in part due to the *early recognition* of the disease as *typhoid*. The laboratory has rendered valuable service in this alone. There were 40 post mortems performed on this disease at the First Reserve Hospital from March, 1899, to June, 1900.

The immediate cause of death in over one-third of these cases was either perforation of the intestine or hemorrhage from the intestine. Among these 40 cases, death was due in 8 to a perforation of a typhoid ulcer of the intestine, and to intestinal hemorrhage in 5. In this series there was 1 case of typhoid fever without intestinal lesions, 1 of typhoid and estivo-autumnal malaria combined, and 2 of typhoid fever and amebic dysentery combined. In one of the latter there was also pulmonary tuberculosis. The study of these post mortems, and their complications, and the combined infections of typhoid fever in Manila, will be the subject of a special report later. It is instructive to compare the death rate among our troops from typhoid fever before and after the Philippine insurrection. From the occupation of Manila on August 13, 1898, to the outbreak of the insurrection early in February, 1899, there occurred 337 cases with 34 deaths, a mortality of practically 10%. From February, 1899, to June, 1900, there were 316 cases treated in the wards of the First Reserve Hospital, with 59 deaths, a mortality of nearly 19%.

One explanation of the higher mortality in this latter series of cases lies in the fact that these men, by prolonged subjection to fatigue of campaigns and the tropical climate, had less power of resistance than the troops fresh from the United States, with only camp routine duty to perform. That typhoid fever has not been more prevalent among our troops in the Philippines is remarkable. The great majority, if not all, of the regiments have had cases of typhoid fever, most of these had one or more fatal cases. With every opportunity for the spread of the disease, it is a great wonder that it has not assumed epidemic proportions before this. It is possible that the breaking up of the regiments into small commands and the frequent changing of camps is responsible for checking the spread of typhoid fever. No doubt some of the deaths reported as due to dysentery and to the malarial fevers were typhoid fever.

In stations distant from Manila it was not possible to have blood examinations performed, and then, too, it must be remembered that dysentery and typhoid fever may occur at the same time and the dysentery mask the typhoid. In the post mortems at the First Reserve Hospital there occurred 2 such cases. These men were admitted for dysentery, and the pronounced clinical symptoms were of dysentery.

The danger of the future is that when camps become more permanent that typhoid may increase among the troops. Typhoid fever is more severe in the tropics naturally than in a temperate zone. The mortality is normally certain to be twice as great. The prevention of typhoid fever among the troops in the Philippines is a serious problem. It was my intention before I left the Islands to request permission to try the prophylactic inoculation method which has been so favorably reported on by Wright and other English Army surgeons. The prophylactic inoculation method is worthy of serious consideration as to its adoption for troops departing for the Philippines and for those already there.

MALTA FEVER.

I had the honor to report to the Surgeon-General on January 2, 1900, 4 cases of Malta fever, which came under my observation at the First Reserve Hospital, and which originated on the Island of Luzon, P. I. In subsequent investigations 12 additional cases were found, in all of which repeated blood examinations were negative for typhoid, and for the malarial parasites, and a positive serum reaction with the micrococcus melitensis was obtained in a dilution of at least 1 to 60. The clinical history of each of these cases was that of a long-continued fever with periods of apyrexia, not influenced by quinine administered in large amounts. Typhoid symptoms were absent. Neuralgic and rheumatic symptoms were generally present and a general glandular hyperplasia existed.

It is to be regretted that more work could not be done on the study of this disease in the Islands. In March I was assigned to duty with the Manila Board of Health, and owing to my connection with the work on plague, I could not carry on my investigation on Malta fever.

The first case was found at autopsy July 26, 1899, by Assistant-Surgeon Strong. Corporal J. T. W., "G" Company, Fifty-first Iowa Volunteers, died after a long-continued fever diagnosed clinically as typhoid fever. At autopsy no lesions of the intestines were found. There was a large acute splenic tumor and a general acute lymphatic hyperplasia. The cultures from this case examined in twenty-four hours were apparently sterile. Fortunately the cultures were saved. They were left in the thermostat for five or six days, and at the end of that time a growth was observed in the plates from the spleen and liver. The growth proved to be the micrococcus melitensis. When I reported for duty at the First Reserve Hospital I found Dr. Strong ill, with an ill-defined irregular fever. Repeated blood examinations were negative for malaria and typhoid fever. Physical examination was negative but for a general glandular enlargement. As Dr. Strong had been experimenting with his culture of the melitensis recently, my suspicions were aroused, and I tried Widal's test with his blood serum and the micrococcus melitensis. On the sixth day of his fever a positive reaction was obtained in 1 to 100.

Dr. Strong's case proved to be a mild one, accompanied by moderately severe headaches and neuralgia. Within a few days of the beginning of Dr. Strong's illness, a case from the Second Reserve Hospital came to the First Reserve Hospital mortuary for autopsy. I performed the autopsy on this case. Clinically the case (a private of the Twelfth Infantry) presented a history of continued fever for six weeks, not controlled by quinine. At autopsy a general lymphatic acute hyperplasia was found and acute splenic tumor. Spleen weighted over 500 grammes. There were no intestinal lesions. Cultures from blood, spleen, liver and gall-bladder and mesenteric glands were negative for the typhoid bacillus. After three days in incubator cultures from spleen: mesenteric glands and blood showed a faint growth, which proved to be micrococcus melitensis.

I then commenced systematic blood examinations, including Widal's test with micrococcus melitensis, on all cases of continued fever in which blood examinations were negative for typhoid and malaria. I was only able to continue this work for six weeks, but during that time were found the 12 cases referred to above. In all 17 cases have been observed in the Philippine Islands, including 2 autopsies, 1 by Dr. Strong and 1 by myself. These cases were distributed through twelve different regiments, occupying stations in different places in the Island of Luzon.

From this I believe that Malta fever is not an uncommon disease in the Philippines. The name Malta fever is an unfortunate one. Recent reports have shown that Malta fever is not only prevalent in Malta, Gibraltar, Corsica and other Mediterranean countries, but cases have been reported by the English Army surgeons, Wright and Smith, from Calcutta and other India stations. One case has been reported by an English Army surgeon which originated in Hong Kong, and several cases have been reported in the United States. One by Assistant-Surgeon Cox, U. S. Army, in an American army officer from Puerto Rico, and 1 case by Musser, of Philadelphia. It would appear that Malta fever is by no means as limited, geographically, as has been thought heretofore. Further investigation of this disease may throw considerable light on a class of continued fevers in the tropics, described by various observers under such names as double fever, relapsing fevers, rheumatic fevers, etc., etc.

THE MALARIAL FEVERS OF THE PHILIPPINES.

In the Philippine Islands, as in all tropical countries, the malarial fevers are widespread. These fevers, as a rule in the Philippines, are not nearly so severe as we were led to expect, after the experience of our troops during the Santiago Campaign in the Spanish-American War. Compared with other tropical countries, the malarial fevers of the Philippines are not severe. While the character of these fevers is generally mild, still there are exceptions to this rule. In some localities malaria assumes a most pernicious character.

In speaking of malarial fevers as comparatively mild, I do not wish to be understood as saying that these fevers are of minor importance in the Philippines. On the contrary, while the malarial fevers here are directly the cause of but relatively few deaths, they are, by reason of the debility and anemia caused by them, a very serious factor in the production of disease in these Islands. It is impossible to estimate how much sickness and debility among the troops malarial fever has helped to produce.

These fevers in the tropics are so widespread that the majority of people sooner or later become infected by the malarial parasite. In tropical countries we have every condition favorable for the development of the malarial parasite outside of and in the human body, as well as the constant presence and activity of the common (if not the only) disseminating agent of the parasite, the mosquito. In addition to the constant presence of the malarial parasites, and the malarial-conveying mosquitoes (the anopheles), the depressing influence of the tropical climate lessens the individual's normal resisting powers, and thereby prepares a favorable soil for the invasion by the parasites. One attack of malarial fever predisposes to another. After the primary invasion by the malarial parasites, a considerable length of time may elapse, even after active symptoms of the disease have subsided, before the individual is free the danger of a recurrence. The parasites remain dormant in the viscera, often for a long time, and are called into activity again and again by any cause lessening the individual's power of resistance. This cause may be either the prodromal or the convalescent period of some acute disease, during some chronic disease, or it may be a slight temporary disturbance due to fatigue, or exposure to the sun or rain.

Thus it is that malarial fever very often complicates other diseases in the tropics. In our investigations we found it complicating surgical cases (such as gunshot wounds, fractures, appendicitis, etc.), and also nearly every acute and chronic disease. As a rule, malarial fever, in the course of other acute diseases, occurs during their convalescence. In typhoid fever, for instance, malarial parasites rarely are active save after convalescence has been established, and the temperature normal for some days. Occasionally malarial attacks appear early in some acute disease or in the prodromal period. It is rare to find the parasites when once the acute disease is fairly established, until after the convalescence begins.

Prevalence.—The malarial fevers were responsible for a larger number of admissions to the First Reserve Hospital than any other one disease. Out of a total of little more than 20,000 medical cases, 4,643 or 23% were diagnosed malarial fever.

Geographical distribution.—In consequence of the above-mentioned favorable conditions common to all tropical countries, the malarial fevers occur to a greater or less extent throughout the entire group of the Philippine Islands. Some of

the smaller islands have been reported as being free from malaria and in some of the stations in the southern islands, occupied by our troops, it has been asserted that malarial fevers are absent. On the other hand, scattered through Luzon and the southern islands, severe malaria exists in localities. Often these districts are limited to small areas, a few miles outside of which malaria is mild in character and comparatively infrequent. Severe malaria exists on the Island of Luzon in the Laguna de Bay district and in a number of districts in the north and south. Similar areas also exist in the Island of Cebu. In the city of Manila the type is not severe.

Types of the Philippine malarial fevers.—The types met with were the same as are found in other tropical countries, namely, the estivo-autumnal, the tertian and the quartan. There was this important *difference* from other tropical countries, however, which explains in part the comparative mildness of the Philippine malarial fevers. The predominating type of malarial fevers reported in other tropical countries is the estivo-autumnal. In fact, the term "tropical malaria" is generally understood as meaning estivo-autumnal fever. While tertian fever has been observed as a common type in the tropics, still it has been reported as usually occurring in connection with the estivo-autumnal variety, and has not been found nearly so frequently as the last named.

In the Philippines a much larger percentage of the malarial fevers appears to be due to the tertian parasites than has been reported by investigation in the other tropical countries. In 223 cases of malarial fever in which the parasites were found in the blood, in cases observed in the First Reserve Hospital, Manila, P. I., there occurred the estivo-autumnal parasites in 166, the tertian in 53, the quartan in 1, and the tertian and estivo-autumnal combined in 3.

Taking the pure infections (220 cases) alone, the tertian parasite occurred in 53 out of 220 or 24%, the quartan in less than one-half of 1%, and the estivo-autumnal in 75%. These figures are only the apparent percentages of the frequency with which these various types occur. The great majority of the soldiers admitted to the military hospitals for malaria came in saturated with quinine. It was the usual custom in such cases, diagnosed malaria on admission (who had fever), to administer quinine immediately. In the face of this it can be readily seen how difficult it would be to find the parasite in the peripheral blood in cases of tertian fever. On the other hand, the crescents and ovoid bodies of the estivo-autumnal fevers are little affected by quinine and are easily found.

Out of the 1,187 examinations of the blood made at the First Reserve Hospital in cases diagnosed as malarial fever in but 223 malarial parasites found, all the rest (964) were negative. Of course many of these 964 were not malarial fever, but it is more than probable that a large number of these cases were infections by the tertian malarial parasites. The clinical history of many of these cases

was that of tertian or double tertian infection. This view of the frequency of the occurrence of the tertian malarial fever seems to be borne out by the results of the post-mortem examinations at the First Reserve Hospital.

Out of the 240 autopsies on medical cases at the First Reserve Hospital, an acute malarial spleen and other evidences of malarial fever occurred in 17. (In each of these 17 cases, the malarial parasites were found, post mortem, in coverslip preparations made from the splenic pulp.) Of these 17 cases, 8 occurred in conjunction with other diseases, and in 9 death was due to malarial fever and the pathological condition resulting from the malarial infection alone. Of the 9 cases of pure infection, 4 were due to the tertian parasites and 5 to the estivo-autumnal parasites. When it is remembered that the estivo-autumnal infections are usually far more fatal than the infection by the tertian parasite it would seem from this that tertian malarial fevers must occur in a large percentage of the cases. In fact we may be justified in supposing from this evidence that tertian malarial fever is fully as common as the estivo-autumnal variety in the Philippines.

Reports from the Army medical officers, received from stations throughout the Islands, of the mild character of the malarial fevers and its ready yielding to quinine, would seem to confirm this opinion as to the relative frequency of the tertian variety. As to the morphological and biological characteristics of the parasites of the Philippine forms, no essential differences were noted as compared with those observed by myself in the United States in soldiers at Fort Myer, Va., Savannah, Ga., and from Cuba.

The parasites were the same as those described by observers all over the world, and the clinical course of these fevers did not differ from the descriptions of the same fevers as given by such writers as Machiafava and Bignami of Italy, by Manson of England, and by Thayer of the United States. The estivo-autumnal malarial fever, while occurring generally, was more prevalent in certain commands. This type was especially common in the troops stationed in the Laguna de Bay District, and at the Deposito (Manila Water Reservoir). Tertian malarial fever occurred generally among the troops. It appeared to be the common type of Manila City.

Quartan malarial fever.—But 1 case was observed in a soldier, a private of "E" company, Forty-seventh Volunteer Infantry. This case was one of single quartan fever, and the typical quartan parasites were found in the blood, including the segmenting organisms. The fever was not severe, and was controlled quickly by quinine.

Concurrent or combined infections.—As mentioned before, malarial fever occurs very frequently in the course of other diseases, generally during the convalescent period of those diseases, occasionally in the prodromal stage or in the early stage of some acute disease.

Malarial fever and dysentery.—Out of the 157 cases of chronic and subacute dysentery in

which blood examinations were made, the malarial parasites were found in 36, or in nearly 23%. The malarial parasites were found once in the course of an acute dysentery.

Malarial fevers and typhoid fever.—Out of the 125 cases of typhoid fever in which diagnosis of typhoid fever was confirmed by Widal's test, in 5 (or 4%) malarial parasites were found, in each case during convalescent period of typhoid fever.

Malarial fevers and other diseases.—Other diseases, in the course of which malarial fever also commonly occurred, were pulmonary tuberculosis and otitis media. The malarial fevers also frequently occurred in surgical cases and in venereal cases.

The mosquito in its relation to malaria.—Unfortunately, before this subject could be studied, I was obliged to return to the United States. But little of my time could be devoted to this most important work. Practically all of it was taken with my duties at the First Reserve Hospital and on the Board of Health. Mosquitoes are very thick and extremely active in the Philippines. It is essential, for a night's rest, to sleep under the cover of a fine-meshed netting. In certain districts, as about the Laguna de Bay in Luzon, mosquitoes are very abundant. I have observed the anopheles in Manila, and at Multinlupa and Pasig on the Laguna de Bay in Luzon. They are extremely plentiful in these latter districts where the malarial fevers are also very common.

UNDETERMINED TROPICAL FEVERS.

There are many fevers occurring in the tropics which are obscure as to their origin. Attempt has been made by several investigators to classify them from a clinical basis, but this is far from satisfactory. This classification on symptoms is not scientific and does not assist to the rational application of hygienic and therapeutic measures. Very little has been done in the tropics in the line of systematic scientific examinations, and the recording of the same in connection with the clinical phenomena. Until systematic laboratory examinations have been conducted for some time, and careful clinical observations made, this class of fevers will remain obscure.

A beginning has already been made by the U. S. Army medical officers, constituting the board to investigate the diseases of the Philippines, and it is hoped that the same work will soon be extended all over the Islands. Every general hospital is equipped with a microscope and other necessary apparatus for the making of blood and other laboratory examinations. When the conditions in the Islands assume a peace basis, valuable work can be done toward the identification of many of these fevers. Some of these obscure fevers are of short duration, while others are of long duration, and the fever is more or less of the continued type. Some assume the relapsing type. The possibility of many of the fevers of long duration being Malta fever, has been noted above. This fever (Malta) appears to be spread widely in

tropical, sub-tropical and temperate zones. The fever described by Munson as "double continued fever," occurring in China, corresponds very closely with Malta fever.

"Hepatic" fever.—Many of the short fevers have been described as due to climate, to exposure, sun, etc., etc. There is a class of fevers distinct from this latter class which is accompanied, usually, by marked jaundice and acute enlargement of the liver. In these fevers there is pain over liver, and considerable gastroduodenal disturbance. This type of "hepatic fever" occurs most frequently in Europeans and Americans, generally in the first year of their stay in the tropics. These fevers vary in duration and intensity. They last from a few days, to weeks. In fatal cases the autopsy shows marked acute hyperplasia and hyperemia of liver. In 1 case (an American clerk in the quartermaster's department) there were multiple abscesses of the liver without any previous dysentery. This man had been in the Islands about a year. He had had several attacks of jaundice and "indigestion" before the fatal attack. He had a fever of a continued character, not influenced by quinine, for several weeks before death. Blood examinations were repeated frequently, and were always negative for the malarial parasites and for typhoid fever, and there was a persistent marked leucocytosis. Clinically there were marked jaundice, greatly enlarged painful liver, considerable gastroduodenal disturbances and no diarrhea. Autopsy showed greatly enlarged liver, weight 4,470 grammes, filled with many large and small abscesses. Examinations of abscess contents, which were bile stained, were negative for amebæ, and the large intestine showed no evidence of either recent or old dysentery. This case appeared to be one of acute hepatitis, which had gone on to abscess formation and apparently not dependant on a previous dysentery. There was an acute duodenitis, and the liver infection may have come through the bile ducts.

Medical Progress.

REPORT ON PROGRESS OF SURGERY.

BY HERBERT L. BURRELL, M.D., AND H. W. CUSHING, M.D., BOSTON.
(Continued from No. 18, p. 431.)

TETANUS.

Moschcowitz,⁵ in a paper which he read at the meeting of the New York County Medical Society, April 23, 1900, summarizes his views as follows:

(1) All forms of tetanus are caused by the bacillus of Nicolaier; hence the diagnosis of rheumatic or idiopathic should have no room in our nosology.

(2) The tetanus toxins appear to have a distinct affinity for the anterior horns of the spinal cord, which may be distinctly recognized by Nissl's method of staining.

⁵ *Annals of Surgery*, October, 1900, p. 575.

(3) The cerebrospinal fluid of tetanus patients is more toxic than the blood.

(4) The antitoxin therapy appears to have a distinct beneficial influence upon the course of tetanus.

(5) With the antitoxin treatment the mortality percentage has been reduced from about 90% to 40%.

(6) Although the use of the serum is a most important factor in the treatment of tetanus, the other recognized therapeutic measures should not be neglected.

TECHNIQUE AND RESULTS OF SUBARACHNOID; COCAINE ANESTHESIA.

Tuffier⁶ has performed 63 operations on the perineum, rectum, abdomen, urogenital organs and inferior members, including vaginal hysterectomy, nephrectomy, excision of the rectum, etc., with anesthesia that was induced, exclusively, by a fresh, sterile, 2% solution of cocaine injected into the subarachnoid space at the fifth lumbar vertebra, on a line level with the margin of the iliac crests. In four to ten minutes the patient feels a prickling, tingling and numbness in the feet and legs, and then the operation can be commenced at once, as sensibility to pain and heat is abolished, although sensibility to contact is retained. The analgesia is complete, absolute, and may extend to the axillæ. In one case the patient lifted the stump after amputation of the thigh, to facilitate ligating the vessels. Another listened to the sawing of his femur, but remarked that he could not tell whether it was his leg or the leg of the table that was being sawed. Another, after her kidney had been removed, inquired when the operation was going to begin. Very few consent to be blindfolded. This analgesia lasts from sixty to ninety minutes. The position does not affect the sensibility. No serious accidents have occurred; there was merely a sensation of oppression in the epigastrium, a little nausea and vomiting, sometimes at the time of the injection, but usually not until after a few hours, then it is slight, and yields at once to the ingestion of ice. These accidents were noted 50 times in the 63 operations. Cephalgia was more frequent, but was merely a slight heaviness in the head in two-thirds of the cases. In a few it was more severe and kept the patient awake all night, lasting for forty-eight hours. Sweat, dilation of the pupils, tremor of the limbs and acceleration of the pulse were also occasionally noted; but all without the slightest gravity, vanishing within an hour. The temperature also rose in 15 cases, without operative complications; in 1° to 40° C., but returned to normal by the next day, and in 4 a chill for a few minutes was also noted. The patients were between twelve and sixty-nine years of age, and 39 were men. Tuffier uses a special platinum needle, straight, 9 centimetres long, the external diameter 11 millimetres, and the lumen 8 millimetres. It is strong, so that it will not break if it comes in contact

⁶ *Semaine Medical*, May 10, 1900; *Journal of the American Medical Association*, June 9, 1900, p. 1483.