failures, and by a study and familiarity that eventually imprint them so deeply that they become a part of himself, and are carried out instinctively and unerringly under all ordinary conditions, as well as in the usual events and emergencies that continually arise in so many of the cases he treats. Septicity is an enemy of infinite variety not to be combated with success by theory alone, or by wielding a single weapon; the modern surgeon must be armed at all points, both for offence and defence, and acquaintance with his weapons and their powers is not attained save by a long course of study and training.

Even after the ordinary practice of surgery as nowadays carried out has had its foundations laid by a training in antiseptic and aseptic work, the greater part of the education of the skilled surgeon has yet to be acquired. The methods of cranial, thoracic, and abdominal surgery are necessarily, to meet the varying circumstances, so numerous, so intricate, and demand so great intellectual and manipulative skill, that only one who has spent years in constantly improving himself in them, whose mind has been fashioned by long experience and study of the problems he daily meets, and whose hands have gained by constant usage the technical facility and delicacy indispensable to success, can with impunity venture into these territories with the requisite boldness and confidence, and ensure the successful results which alone render these procedures justifiable. Such is the life-long training of the skilled surgeon of our cities and hospitals, who carries out the marvellous methods and obtains the wonderful results of modern surgery.

THE STANDARD OF MILITARY SURGERY.

A standard of work at least equal in excellence to that of the civil surgeon ought to be expected of army and navy medical officers. Senn, of Chicago, chief operating surgeon with the United States army recently in the field, and one who has done much for surgery, points this out in the following axioms:

- (1) That in theory and practice military surgery is equivalent in every respect to emergency practice in civil life.
- (2) That the wounded soldier is entitled to the same degree of immunity against infection as persons in civil life suffering from similar injuries.
- (3) That all formal operations in war must be performed where the wounded can receive the full benefit of aseptic and antiseptic precautions.
- (4) That operative interference is indicated in all penetrating wounds of the skull.
- (5) That gunshot wounds of the chest should be treated under the strictest antiseptic precautions.
- (6) That laparotomy in penetrating gunshot wounds of the abdomen is indicated in all cases where life is threatened by hemorrhage of visceral wounds, and the general condition of the patient is such as to sustain the expectation that he will survive the immediate effects of the operation.

These are reasonable demands, many might ask more, but nothing that falls short of some such standard can be accepted as satisfactory. Statistics prove that of all wounds in battle there are 7.4 per cent. of the brain, 7.5 per cent. of the chest, and 4.7 per cent. of the abdomen, amounting to 20 per cent. of all wounds. There must, therefore, in the next great campaign, be an enormous field of usefulness to properly-trained antiseptic surgeons, and a fearful waste of

life if they be not there to occupy it. It scarcely, moreover, requires to be pointed out that gunshot wounds of other parts besides those of head, chest and abdomen offer a field for modern surgery that has scarcely yet been entered on. No extensive campaigns have been conducted since antiseptic surgery was fully introduced, but the smaller ones have shown the need for a class of surgeons more highly trained than hitherto to carry the best methods of antiseptics into the domain of gunshot wounds, where septicity is a danger greater and more frequent than in any other class of injuries whatsoever. And I am convinced from a study of wounds inflicted by modern projectiles, on which it would be out of place to enter here, that in gunshot wounds of the soft parts and extremities a very much larger proportion of lives and limbs than hitherto can be saved, and another great field of modern conservative surgery opened up by the application of improved methods and principles of treatment in the hands of those who really know how to employ them.

(To be continued.)

Original Articles.

THE VALUE OF THE PULSE IN DIAGNOSIS AND PROGNOSIS.¹

BY HENRY JACKSON, M.D., BOSTON.

THOUGH I have no new theory to advance as to the value of the pulse in diagnosis, yet I desire to bring the subject up at this meeting because to me it seems a matter of the greatest importance, and one perhaps that we do not consider as carefully as it deserves. The pulse is the final index of the vital capacity of the individual, and therein allows us to judge of the resistance to disease of the individual patient at a stated time: our patient may have a diseased heart, one much weakened by organic valvular disease or by degeneration of the muscular substance dependent upon disease in the heart itself or upon some toxemia, but if the heart is able to drive the blood through the system for the time at least death is not imminent. Therefore the pulse is, as stated, the final index of what the heart can do; so long as the pulse is of fair quality the system is supplied with blood and life is possible.

In diagnosis it is not my wish to discuss the value of the pulse in the various forms of organic heart disease, as for instance, the Corrigan pulse in aortic disease, and the small thready pulse of mitral stenosis, but rather to consider its value in the diagnosis of some of the more important and often obscure general diseases, especially typhoid fever, miliary tuberculosis, cerebrospinal meningitis and other diseases of the brain and its membranes.

The pulse of typhoid fever is in uncomplicated cases not very rapid, rising somewhat with each access of fever, but averaging 90 to 100 or less in cases of moderate severity which run their course without untoward accident; under prognosis I shall speak at greater length of the inestimable value of the pulse as an index of the advent of dreaded complications and the exhaustion of the patient by the toxic effects of the specific organism of the disease.

In acute tuberculosis we have a very different picture

¹ Read before the Massachusetts Medical Society, June 13, 1899, and recommended for publication by the Society.

ure; the pulse is rapid, averaging 120 or more long before the patient reaches a critical stage of the disease. In typhoid fever the pulse may temporarily be 120, but it never remains for several days at this point unless the patient is severely sick, whereas in general tuberculosis we find great rapidity of the pulse for days, and even weeks, in a patient presenting no signs of immediate dissolution, often very comfortable and anxious to be up and about the room. The rapidity of the pulse in general tuberculosis is of much value, as in both diseases the course of the temperature may be similar; in both diseases there is an absence of leucocytosis, and often the general condition of the patient may leave us much in doubt, though in the one hebetude is usually much more marked than in the other. Of course, the Widal reaction in the one case, and tubercle bacilli in the other, may if present give us an absolute diagnosis.

In cerebro-spinal and tubercular meningitis the pulse may be almost pathognomonic; in the early stages, during the time that the vagus is stimulated by a moderate degree of irritation, the pulse is slow, or rather, what is the important point in diagnosis, is slow in proportion to the general condition of the patient. To take a case we have before us, a patient who for a day or so has had a moderate fever, who is evidently very sick, with perhaps vomiting and severe headaches; yet we find a pulse of 70 to 90. If the case were typhoid fever the pulse would be more rapid; the slow pulse in the case under consideration is, however, slow, because of the direct action of the products of inflammation on the vagus. Therefore, the pulse is no criterion of the general condition of the patient. If there is added to the slow rate an occasional intermittency, we have a still greater assurance that the pulse is dependent upon some direct pathological lesion, and can by no means be considered as an index that our patient is not seriously ill, as is suggested by his general condition.

It is not an invariable rule that the pulse is slow in the early stages of meningeal trouble, but if not continuously slow we find that the rate varies much without any corresponding change in the condition of the patient and independently of the degree of the fever. I would cite two cases seen in consultation, illustrative of the value of the pulse in meningitis. Several years ago I saw in consultation a young child who had been sick several days, was somewhat stupid, had vomited, had fever, and seemed to be very sick: the pulse was 100, and intermitted occasionally. I suggested tubercular meningitis as the most probable diagnosis, chiefly perhaps on account of the pulse, a symptom that the attending physician had looked upon rather as his mainstay in hoping for a favorable issue of the case. My diagnosis was correct. On the other hand, I saw this winter a case where cerebro-spinal meningitis was certainly a possible diagnosis, and yet a rapid, regular pulse made me very doubtful as to the correctness of the diagnosis, and complete recovery in a few days convinced me of the truth of my impressions.

The slow pulse is only seen in the early stages of meningitis, as later in the course of the disease, when the vagus has been paralyzed by pressure or by disease of the nerve itself, we find an extremely rapid pulse, as the inhibitory action of the nerve has been destroyed; to use a metaphor, the engine runs with the throttle wide open.

In cerebral hemorrhage the pulse may again be of

great value, when definite symptoms are wanting, as paralysis and allied phenomena; that is to say, in cases brought to a hospital in a comatose or semi-comatose condition, cases so aptly described by Mr. Ernest Hart as "drunk or dying." In alcoholism the pulse is rapid, in cerebral hemorrhage, slow; and hereby, as in a case I wish to cite, we may make our diagnosis. During my last service a man was brought into my ward by the police: he was unconscious, was tossing about the bed, was flushed. The only history obtainable was that two days previously he was found in a doorway, taken to the station house, where the diagnosis of intoxication was made, then was removed to the city prison, whence he came to the hospital. Careful physical examination showed no fracture of the skull, no evidence of external trauma; strong stimulation of the orbital nerve at its exit gave evidence of a slight left facial paralysis and the left side was moved less vigorously than the right side; the neck was a little stiff. Leucocytes 12,800; lumbar puncture negative; temperature 99°. His pulse was 40, a factor that to my mind rendered simple alcoholism impossible. The evidence of paralysis was slight and not easy to obtain, the pulse was evident. The man died the day he entered, and autopsy showed fracture of the skull and extensive laceration of the brain, with subdural hemorrhage. In view of the diagnosis that I made, I was criticised because I had not suggested trephining; I considered the matter and decided against it because the severe general symptoms without marked paralysis made it evident to me that the man was suffering from extensive cerebral trouble, rather than from total destruction of a limited area, which might be amenable to operative procedure.

Dr. Bowditch has recently called attention to the value of a rapid pulse in the diagnosis of early tubercular trouble. On the other hand, an extremely rapid pulse without evidence of serious disease may be suggestive of exophthalmic goitre, as in a case described to me in which later goitre developed.

In many other diseases the pulse may assist us in forming our diagnosis, as for instance in the early diagnosis of acute follicular tonsillitis and diphtheria, the one usually associated with high fever and rapid pulse; the other in the beginning often giving rise to only slight fever, while the pulse may not be markedly quickened unless toxemia has already taken a severe hold upon the patient.

I have spoken of the value of the pulse in the diagnosis of typhoid fever, but in prognosis we have in the pulse what I believe to be an infallible guide. In uncomplicated cases the rate of the pulse is slow relatively to the degree of the fever and the general condition of the patient. When the pulse is continuously rapid, the prognosis becomes proportionately grave with the increase in the rate, though no other alarming symptoms arise to render us doubtful as to the outcome of the case. Leaving out of consideration hemorrhage and perforation, a rapid pulse is an index that the patient is in danger of succumbing to the specific toxemia produced by the disease. The pulse is to us an index of the effect upon the individual patient of the poison of the typhoid, and is of far greater value than any other one symptom or any group of signs or symptoms.

In my early student days I read an article, I think by Dr. Wilson of Philadelphia, stating that in typhoid fever the danger line was reached when the pulse reg-

istered 120; and all cases that I have seen since that day have only confirmed in my mind the great dependence to be placed upon this axiom. I have seen patients die who had only a rapid pulse as indicative of danger, while again and again I have seen patients recover where the pulse ran from 110 to 120, yet they were very stupid, had involuntary passage of urine and feces and perhaps frequent vomiting. I am so sure of my ground in this matter that in the individual case I dare to make a favorable prognosis if the pulse is slow, no matter how unfavorable the other symptoms may be. On the other hand, a rapid pulse, independent of any complication, as hemorrhage or pneumonia, causes me great anxiety.

After careful consideration of this matter in a considerable number of cases, I feel convinced that the danger line is reached when the pulse becomes 120. Of course many cases recover when the pulse is rapid, but not without a severe struggle for life.

The remarks which I make as to the prognosis in typhoid do not refer to cases complicated by intermittent diseases or by perforation and hemorrhage. In such instances the value of the pulse lies rather in diagnosis than in prognosis.

A sudden rise of the pulse without apparent cause suggests hemorrhage, especially if accompanied by a fall in the temperature. In this connection we must remember that the fever may fall by crisis, but in such instances with the fall of temperature comes a corresponding fall in the pulse, and the general condition of the patient is decidedly favorable.

In perforation the pulse is of the greatest value, as in the following case. Last summer, at the time of my visit, one of my patients was perfectly comfortable with a pulse of 80: at half-past one my house physician, Dr. Stevens, telephoned to me that the man had a pulse rising rapidly, had pain in the right side of the abdomen, an access of fever, with an expression of anxiety. Examination showed no blood in the bowel, the pulse was 120, there was a leucocytosis of 15,000, and there was rigidity of the right side of the abdomen. The surgeon who saw him in consultation agreed with me in the diagnosis and found a perforation when he operated at four o'clock. In this case the leucocytosis was of great value, as I have never seen leucocytosis in an uncomplicated case of typhoid fever. Hemorrhage was ruled out by the rise in temperature, and the absence of blood by rectal examination.

The pulse may be rapid in typhoid fever in other complications, as otitis media and phlebitis, without rendering the prognosis unfavorable; whereas in acute inflammation of the parotid the prognosis is grave, more so, I think, than when pneumonia or pleurisy is the complicating pathological factor.

In convalescence the pulse is often rapid, and then of no serious import; it is the rule that a patient will pass through a severe typhoid with a pulse not more than 110, and when he first begins to get about have a pulse of 120 or much higher, without the slightest indication that we have any serious danger to combat. Further, many slight troubles in convalescence, as constipation, excess in diet, fatigue from seeing friends, cause a sharp rise in the pulse.

I have once seen a slow but very poor pulse in typhoid in a man that was seriously sick; examination of the heart showed that the pulse was not a sufficient index of the action of the heart, in that many

beats were so feeble and inefficient that the wave was not transmitted to the wrist.

In the first volume of the medical and surgical reports of the Boston City Hospital is a valuable article upon typhoid fever, by Dr. Upham. He speaks of the prognostic value of the pulse and states that in 65 cases that recovered the average highest pulse was 108,

CASE I. Parietal disease of the heart. Dotted line shows the apex beat.

while in 14 fatal cases the average highest pulse was 140.

I have looked over a large number of charts of typhoid fever cases in the Boston City Hospital, and found the same relative proportion of deaths to the pulse-rate.

Finally I wish to quote from Dr. C. Ellery Stedman's valuable essay on typhoid fever, published in the third series of the City Hospital reports. In this essay Dr. Stedman says, "Temperature for diagnosis is invaluable. For guidance during the disease I rely on the pulse." "I have seen no patient die whose pulse has not reached 120, twenty-four or more hours before death," and finally, "In these ten years the pulse has given the warning of approaching trouble even when the temperature has signified nothing untoward."

I wish to call attention to one very marked sign of cardiac weakness that so far as I know is not mentioned by most writers. Dr. Whitier has referred to it in a short article in the *Boston Medical and Surgical Journal*. Namely, a discrepancy between the rate

CASE II. Dilatation of heart, probably parietal disease. Pulmonary infarction. Death. Dotted lines show the apex beat.

of the heart beat and the pulse as felt at the wrist: in many cases it is difficult to count the pulse because of its irregularity or the constantly changing rhythm, though we are conscious that a feeble pulse is occasionally felt beneath the finger, but in the cases under consideration no pulse wave is felt. This condition may be said to represent the acme of cardiac weakness and may be

responsible for some of the cases in which a slow pulse is reported in fatty degeneration of the heart. This discrepancy between the rate of the pulse and the apex beat I have seen frequently in great dilatation of the heart, dependent upon disease of the myocardium, much less often in valvular disease of the heart. I have noticed the same phenomenon in acute degeneration of the heart as seen in infectious diseases, notably in typhoid fever and in diphtheria. In diphtheria it may be seen during the acute stage, and also in the serious cases of cardiac weakness which appear late in convalescence, perhaps dependent upon diseases of the nerves regulating the action of the heart, similar to the specific neuritis which causes paralysis of the muscles of the nasopharynx or the muscles of the extremities.

The following cases give a good illustration of the phenomenon :

CASE I. Man, forty-five years. Great alcoholic excess : short of breath for six months ; great general edema ; cyanotic. Pulse irregular, intermittent ; heart dilated ; at the apex was a systolic murmur. He gradually recovered and was discharged in a month. On entrance the apex beat was 160, while the pulse was 110. For ten days the apex was much more rapid than the pulse, while later in convalescence they coincided. (See Chart I.)

CASE II. Man, forty-five. No alcoholic excess ; no rheumatism. Arteries sclerotic. Heart much dilated. Great improvement at first in hospital. Then many attacks of pulmonary infarction ; acute and rapid dilatation of the heart, great edema and death. (See Chart II.)

These two charts are illustrative of the condition of great weakness of the heart in which a large proportion of the beats are so feeble that no wave is transmitted to the wrist.

PHILOSOPHY OF SICKNESS.¹

BY THOMAS F. HARRINGTON, M.D., LOWELL, MASS.

It is not my privilege to present any new addition to the long list of recent discoveries and wonderful progress with which the present medical age abounds, but rather to claim recognition for an old friend, a very old one, who, during some of the ages at least, received attention from the medical profession, but who has never been so neglected as at the present time.

In order to reach a proper conclusion, it will be necessary to consider some questions, which at first sight may seem irrelevant, but which may have more or less bearing in sustaining recognized phenomena.

During all ages there has been that mystery in the minds of the laity surrounding sickness which neither the advance of civilization nor the improved modern methods of scientific enlightenment seems to be able to dispel. We find that at the end of the nineteenth century people censure the physician on the death of his patient with as much rancor as was done in the earlier and savage ages ; not because the physician was unable to save the patient from death, but because he did not have knowledge of the power to cure the disease. Is it not just and proper, therefore, that we members of a profession to whom such power is ascribed, and who not unfrequently encourage such a belief by our private conversation, acts and publications,

should try either to earn to the best of our ability the compliment implied, or else stand before the world in our true light, stripped of all false coloring and chicanery.

That medical science and art has made wonderful advances tending to the alleviation of human sufferings and to the prolongation of life is admitted by all ; that many diseases are yet beyond the reach of human skill must also be admitted ; but that there is in every sickness a quality of body or mind, or both, which is capable of recognition and influence from without seems to have escaped observation. Many physicians, it is true, in all ages of mankind, have felt its power in the treatment of sickness, but they have either ascribed the result to some agent employed, that is, a cure, or to the ingenious philosophy of homeopathy, as lately formulated by Dr. Charles S. Mack, and reported that the patient "recovered."

I have not the time at this opportunity to introduce any of the various theories of metaphysics, concerning which men most eminent in sciences have differed. It would be presumptuous for me to even select one of the many advanced. It will be sufficient to choose certain admitted dogmas from many of them in so far as they have, in my judgment, any bearing on the philosophy of sickness. Ancient and modern philosophers and scientists have ever struggled with the one factor which concerns us in the consideration of this subject, namely, personality. Many theories have been promulgated, schools founded and creeds erected at various times throughout many ages. It does not concern us much, as physicians, whether empiricism or transcendentalism, idealism or materialism is the accepted philosophy of to-day ; whether we believe in Darwin, Spencer or Pasteur ; whether one part of the brain or another is concerned in our mental acts ; whether we compare our physical movements to a message over telegraph wires or whether the brain is the seat of the soul ; all these are questions of indifference to the physician in the appreciation of individuality ; the one truth shines forth, that man possesses an identity, which is neither wholly physical nor wholly psychical, but which is both, often acting through the ethical life and often independent of it—physical because it has a bearing on results which we associate with others ; psychical because it is limited to the one being which, as Lotze says, is capable of being affected and producing effects. Thus there is in every person a dual person which is susceptible to change like its physical self, but which cannot be separated either in whole or in part from the living physical body—a being which, while in itself cannot be explained nor influenced in the sense that physical bodies are, yet can be explained and influenced indirectly, that is, by connecting it with the physical self, a sort of parallelism between the two (Münsterberg). That this individuality has not been capable of exact localization and description is no argument that it does not exist, for if such a position were true, what would become of many of the sciences or departments of knowledge ? Even truth itself is not always possible of demonstration.

Nature is constantly giving us proof that things are different than they seem ; she demonstrates that while the earth under our feet is at rest and immovable, yet it is in motion more rapid than particles of dust in the fiercest whirlwind ; we believe that sound and color are such, yet we cannot explain why, unless we fall

¹ Presented to Section on Practice of Medicine at American Medical Association Meeting at Columbus, Ohio, June 6-9, 1899.