crature records the successful draining of pulmonary cavities of tuberculous origin. A more thorough review of the subject might show that others of the exceptions given should be included in our list of organs requiring surgical intervention for tuberculosis.

It must not be forgotten in taking this survey of the field that some of the tissues mentioned are but rarely involved. Up to a recent period the peripheral nerves have been thought to be immune. During the past winter Professor Matas has had occasion to bring before the medical class of Tulane a case of ulnar nerve tuberculosis, besides encountering a similar case in his private practice. Again, the stomach is rarely the seat of tuberculous lesions, its secretion apparently protecting it against the local development of tubercle bacilli. The pericardium is not frequently the object of our attentions, though I have had the opportunity of tapping this sac for a serous effusion secondary to a pleural exudate, withdrawing two ounces on one and seven ounces on another occasion.

The conclusion to which we finally come is that there is not a region of the body, not a tissue nor any organ, which we may say positively can not be the seat of tuberculosis, and further that with improved technic there is scarcely a lesion that can be considered outside the domain of the surgeon. The rare tuberculous lesions of the endocardium are safe from his reach, as would be similar lesions of the large vessels, did they occur primarily. But anything short of these impossible heights may be reached by persistent effort. Let the surgeon, therefore, keep tuberculosis ever before him as a possibility lest he have the humiliating experience of attempting the removal of a lipoma from the back and finding a cold abscess or discovering that a supposed sebaceous cyst over the eyebrow is in reality a tuberculous collection originating from the dura and perforating the frontal.

DIAGNOSIS AND PROGNOSIS.

Of diagnosis I shall say little, this aspect having been pretty well crystallized in the literature. The slow onset, the painless, afebrile character of the lesion, combined with the information derived from the use of the exploring needle and the results of examination of the fluid by staining, culture and inoculation, make the recognition of tuberculous diseases in most cases a matter of only ordinary difficulty. The use of tuberculin, about which much has been written pro and con, has, in my hands, proved serviceable for clearing up diagnoses. Care must be taken to avoid excessive doses, the limits recommended by the manufacturer being observed.

In regard to prognosis I must declare myself frankly optimistic. Given a patient with a single lesion, offering good opportunity for radical extirpation, and the chances of ultimate recovery are excellent. Autopsy records show that, with extensive local trouble amenable to surgical intervention, there may be perfectly sound viscera, the disease in such instances progressing by continuity and contiguity only without metastatic deposits through the lymph or blood channels. Just as the prognosis of pulmonary tuberculosis has improved under modern methods of early diagnosis and prompt treatment, so with the surgical side of the disease, which, being more accessible, ought to be even more favorable for recovery.

TREATMENT.

The treatment of surgical tuberculosis is so well known that I will not dwell on it at length. Rest, general and local, the latter secured by proper methods of

immobilization, aspiration, injection, excision are all too familiar to require being expatiated on. I pause only to impress on you the desirability of making a clean sweep, of practicing radical excision in all cases in which this is feasible, in preference to employing the slower method of aspiration and injection. I refer, of course, to those cases in which the disease has progressed to the point of destruction of tissue, to caseation and liquefaction.

I should like to call attention to the Bier method of congestion, which, though not new, has recently been taken up with renewed vigor. In the Charity Hospital service of Professor Rudolph Matas, the treatment has been applied of late to diseased joints with very satisfactory results. By no means should we slight the improvement of patients' general health by the well-known hygienic means of sunlight and fresh air, with properly directed exercise. Nor should we overlook the specific medication by means of culture and serum preparations, one of which, let us hope, will some day prove to be the long-sought-for boon. The use of the hygienic means referred to, together with the watery extract of tubercle bacilli, has enabled our Louisiana Tuberculosis Sanitarium, conducted by Dr. W. J. Durel at Covington, La., to get excellent results and establish a high reputation.

In summing up, we arrive at these conclusions:

1. Tuberculosis is of interest to the surgeon because it affects practically every region of the body with sufficient frequency to require that he be ever on the lookout for it.

2. Early recognized and promptly treated, the surgical form is as amenable to treatment as any class of lesions with which we are confronted.

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TESTIMONY AND EVIDENCE IN MEDICINE.

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CHICAGO.

I have deviated somewhat from the custom of my predecessors of presenting some purely surgical subject for your consideration in order to take up a matter of a more abstract nature, yet one which I believe to be of the greatest practical importance, and one too often neglected by most physicians. I refer to the question of testimony and evidence in medicine.

In the legal profession the questions of testimony and evidence, in so far as they relate to human affairs, have been very thoroughly studied, and more or less fixed rules governing them have been adopted. The value of testimony and the weight to be attached to evidence in the formation of conclusions are all elaborately dealt with, but the physician dealing habitually with questions of life and death too often fails to apply the most common rules of logic to his reasoning, with the result that his deductions are often entirely unwarranted by the premises, and therefore frequently erroneous. Many of the errors of judgment made by physicians will be found on analysis to be due not so much to an actual lack of knowledge of the subject as to the fact that they are based on testimony that is unreliable and evidence that is insufficient.

Notwithstanding the fact that their daily life is made up of listening to testimony and to the weighing of evidence, yet the majority of physicians fail absolutely to comprehend the meaning of these two terms, and to understand wherein the one differs from the other.

WHAT IS TESTIMONY?

Testimony is that which is derived from an individual who in medicine is usually the patient and corresponds to what is called the history of the case, as given by the patient or some other person. Belief in human testimony is a fundamental principle of our moral nature, and in law is the very basis of evidence. An instinctive leaning or propensity to speak the truth is inborn in our nature, and by Reid, in his "Inquiry Into the Human Mind," this is recognized as the "principle of veracity."

The very nature of the case in all times and in all courts of law has given to the communications between the patient and the physician, from whom he seeks relief from his sufferings, the highest degree of credibility, yet every physician of experience knows that the testimony of the patient is but too often in the highest degree unreliable. This is not a denial of the principle of veracity, but an attempt to differentiate sharply between that which is truthfully told and the truth of that which is told. A patient may never be so truthful and relate nothing but what he believes to be the truth, but the physician must discriminate very carefully between what the patient believes to be true and the facts as they really exist.

There are many reasons why a truthful statement by the patient may not state the truth. In the first place the majority of individuals are very poor observers, and particularly so when it concerns a matter about which they know but little. Imperfect observation or perceptions leads to erroneous concepts, and although a patient's statement may truthfully depict his perceptions and conceptions, if these be erroneous his testimony contains untruths. Aside then from those patients who are mentally irresponsible, from those who wilfully attempt to deceive, and from those who are unconsciously biased on account of contingent personal benefits at stake, which will be considered later, the physician must recognize the possibility of error in the testimony of those who have every reason and intention to be honest.

Therefore, in receiving knowledge of facts from the testimony of others, one should be influenced by their accordance with facts previously known or believed, and this constitutes what is termed their probability; but in being influenced one must guard against two sources of error, namely: unbounded credulity and unyielding skepticism, for the former is the attribute of a weak mind, which seldom thinks or reasons, while the latter belongs to those who find nothing probable beyond their own limited field of observation and experience. That those things which accord with one's own observations are more readily believed than those which do not, is natural, and thus the value of a wide experience becomes evident, for, as Abercrombie has well said:

The progress in knowledge is not confined in its results to the mere facts which we acquire, but has influence in enlarging the mind for the further reception of truth, and sets it free from prejudice which influences men whose minds are limited by a narrow field of observation.

EVIDENCE: LEGAL AND SCIENTIFIC.

Testimony and evidence are by no means the same. There may be a great deal of testimony yet very little evidence. By evidence is meant "the means by which any alleged matter of fact, the truth of which is submitted to investigation, is established or disproved." This is the legal definition and indicates its origin by containing hidden within it a description of the method

of procedure in law. An "alleged matter of fact" is presented in the form of a conclusion which is assumed to be true, and an attempt is then made to bring forward sufficient evidence in support of the assumed facts as will ordinarily satisfy an unprejudiced mind beyond reasonable doubt of their truth. In other words, the conclusion is presented first and the evidence made to fit the conclusion. While this method of procedure may be applicable to the ordinary affairs of men it is most fallacious when applied to medicine or other natural phenomena.

A definition which conveys a better idea of the meaning of evidence, as applied to medicine or the investigation of natural phenomena is, that evidence is any fact which, when presented to the mind, effects or tends to effect a conviction concerning the existence of some other fact. This does not presuppose nor assume any certain conclusion, but leaves the conclusion to be that which the evidence warrants. The value of the evidence in establishing the facts as such in any particular case varies greatly.

PROOF.

When the evidence is positive, direct and complete it amounts to proof. Proof, therefore, is not synonymous with evidence, for the latter is the means or medium by which truth is established, while the former is the effect or the end result of evidence. The evidence may be sufficient to amount to proof, when a conclusion is warranted, or it may be so insufficient as to render any conclusion absolutely unjustifiable. It is the natural tendency of the untrained mind to reach conclusions on entirely insufficient evidence, while the trained mind will recognize consistency and truth when a less experienced one will disbelieve.

The ability to deduce a correct conclusion does not depend entirely on the known terms of the premises, but also on the readiness with which one appreciates or comprehends the equality or inequality, or the similarity or dissimilarity, between the known and the inferred terms. When the savage, by observing a few signs, the mere existence of which is almost invisible to the untrained eye, is able to assert with certainty that a definite number of white men known as soldiers were present at that particular spot at a certain definite time past, and that they came from one direction and departed in another, he is displaying the most perfect logic possible, because from a few known facts he is correctly inferring a large number of unknown facts, the latter being necessary dependencies of the former.

THE PHYSICIAN AND LOGIC.

Logic is the most abstract of objective sciences, and treats of the necessary dependencies of things. The average physician knows too little about logic. He is not trained in giving to evidence its proper weight; he does not sufficiently recognize that there must be equality between the terms of the conclusion and those of the premises, and that in just so much as these terms deviate from perfect equality does the conclusion lack in certainty or inevitability. In mathematics the conclusions are positive and absolute, but in medicine it is very rarely that they obtain such a high degree of certainty. It should be the duty of the physician, however, to give to his conclusions the highest degree of probability possible under the circumstances, and this can only be done by strictly applying to his work the sound rules and principles of logic. A large part of a physician's life is spent in listening to testimony, yet how seldom does he

ask himself, How much credence should be given to these statements? How much of this or that is true, and how much is false, not false in the sense of willful deception, but false for the reasons already mentioned, unintentional errors?

PRESUMPTIVE EVIDENCE.

The fact that the patient comes to the physician suffering from some ailment from which he desires relief, and that this can best be obtained by acquainting him with all the circumstances connected with the case, is presumptive evidence of the truthfulness of his statements. Yet it is only a presumption.

In law two kinds of presumptions are recognized, namely: Conclusive presumptions, or those which do not admit of proof to the contrary and which include a variety of conditions not pertinent to our subject; and disputable presumptions, wherein one condition is usually found by experience to accompany or succeed the other, so that when the one is recognized as present the other may be presumed to exist. The relations between the two, however, is not an absolute or necessary one, and the presumption thus raised can be held only until some proof is given in rebuttal.

Most of the testimony of patients is presumptive evidence of the disputable variety, and, while the presumption is usually that the statements made are true, this is by no means always the case. For instance, in the case of a young unmarried woman with suppression of menstruation and an enlarging abdomen, experience has shown that the incentive to mislead is so great that the presumption is entirely in favor of the testimony being false. Also in that large class of personal-injury cases in which monetary compensation is sought, a large experience involving thousands of cases has convinced me beyond a doubt that much of the testimony in this class of cases is presumptively untrue, and that it can only be believed when substantiated by correlated facts. These conditions should be recognized by the physician in order not to be misled by statements which he receives from the patient.

It is a well-recognized principle of the law of evidence that the facts from which an inference is to be drawn must be proved by direct evidence and not to be presumed or inferred. In other words, a conclusion can not be legitimately based on presumptions or inferences. A violation of this principle by the physician is frequently seen, and numerous errors in the way of faulty conclusions are the result.

AN ILLUSTRATION AND ITS ANALYSIS.

How an erroneous conclusion may be formed from inferences is shown by the following example from actual experience: A man meets with an accident, fracturing his leg. After the usual period of confinement to bed he gets around on crutches and then without them, and makes a recovery in the average time, but although he recovers from the fracture he does not feel that everything is just right with him, and in two or three months after getting around he consults a physician, who discovers he has *tabes*. He states that previous to the accident he was perfectly well and did not notice any symptoms until after he began getting around. The circumstances here of a history of previous good health, of an accident producing a distinct physical injury with the appearance subsequently of *tabes*, lead to the conclusion that the *tabes* is the direct result of the injury.

Let us analyze this case, which is a very common one in principle, and see if the conclusion is warranted by

the evidence. The first point to be considered is the patient's statement that he was in good health and showed no symptoms of *tabes* previously to the injury. He may even show that he had been accepted for life insurance after having passed a satisfactory medical examination but a short time before he was injured. Granting that the patient is perfectly honest and states only what he believes to be true, how much value should be placed on this statement as evidence? Has it the value of presumptive evidence, or, in other words, is it in all probability a statement of the facts? I claim that it is not, and for the following reasons:

Tabes is frequently extremely slow in its onset, and its earliest manifestations are so insidious as to be unrecognized by the patient, for the reason that they may give rise to no subjective disturbances whatsoever. In fact it is very probable that the earliest manifestations of *tabes* are only recognizable objectively, and by one who is perfectly familiar with them as well as with the methods of eliciting them. In any case, therefore, of evident *tabes*, the patient's statement that certain manifestations were not present at any reasonable time antecedent to the event in question, can have very little, or no weight, as evidence. In fact, it is highly probable that the statement in this particular is false. To assume his previous good health is therefore purely a presumption, and, as already said, no inference can be based on presumption.

If now it appear that the patient is prosecuting a suit for personal damages for his injury and its alleged consequences it at once becomes evident that his statements regarding symptoms of *tabes* previously to his injury not only can not have any positive value, but are really presumably false. If we analyze further we learn that the real cause of *tabes* is unknown, and that even those who are most familiar with it do not agree in all particulars as to its essential nature. It is impossible to establish a causal relation between two terms when the essential nature and necessary antecedents of the second of them are absolutely unknown. The conclusion, therefore, that the *tabes* following the injury as a necessary dependent is without the slightest justification. It has never been proven that an injury or physical trauma can produce the symptoms and changes characteristic of *tabes*, while it is a daily observation that the latter condition is constantly met without there being the slightest suspicion of an injury ever having entered into the history.

It is very evident then that trauma can not be held to be a necessary antecedent of *tabes*, nor is there any basis in reason for even inferring a causal relation between the two. The fact that the evidences of *tabes* may become rapidly manifest subsequently to an injury is no reason for assuming that the injury acted as a cause, or even hastened the advance of the condition.

It is perfectly well known that an individual may be subjectively in good health, yet a careful examination will show that numerous defects are present, which defects have remained unnoticed by the individual, owing to the fact that they have been compensated for, or the defective functions vicariously performed, or the individual's preoccupation along other lines has temporarily excluded from consciousness the impressions produced by the defects. Let now any event markedly disturb the equilibrium of the individual's existence, and the defects may become rapidly manifest, yet there will be no causal relation whatsoever between the disturbing element and the particular manifestations which become apparent.

The mere fact that the manifestations subjectively followed the alleged antecedent in question furnishes no ground for inferring a causal relation between the two; in fact, no such inference can have the slightest justification unless it can be shown by direct evidence that the said manifestations are the necessary dependencies of the said antecedents. The consequences need not necessarily be immediate, but if mediate, continuity, consecutiveness, and concatenation must be shown. In the case under discussion these things can not be shown. The conclusion then that the tabes is the result of the injury received is without the slightest justification, as it rests entirely on assumption and inference.

DIAGNOSIS SHOULD BE BASED ON EVIDENCE.

Every diagnosis is, or should be, a conclusion based on evidence, yet how often do we find when the rules of logic are applied that the diagnosis, instead of resting on evidence, rests on assumption and inference. This is due to the fact that the majority of physicians in their ratiocinations fail to distinguish between assumption, inference and fact. An assumption is that which is taken for granted—that which is accepted as true without evidence—while an inference is the result of a ratiocination based on a certain amount of evidence. The difference between an inference and a conclusion is that the former is drawn from the appearances of things, is partial and indecisive, and pertains to particular circumstances, while a conclusion is drawn from real facts, is full, decisive and conclusive, and expresses the necessary dependencies of the premises.

The difference between an assumption, an inference and a conclusion may be well illustrated, as follows: A patient presents himself suffering of a disease of one kidney, which may require removal. The question which immediately presents itself is, Has the patient two kidneys? Omitting the preliminaries of the mental process for brevity's sake, the proposition may be stated in this manner:

Most men have two kidneys.

This is a man.

Therefore, this man has two kidneys.

It will be seen that the major premise contains the word most, which at once subdivides men into at least two classes, while the minor premise contains nothing whatever which indicates to which class the particular man belongs. Therefore no conclusion can be drawn, and when it is accepted that this particular man has two kidneys it is a pure assumption. If, however, by the use of the segregator or ureteral catheter, urine be collected in the two vials, some evidence is present on which may be based an inference that the patient has two kidneys. If in addition to the mere collection of separate urines the urines be noted to drop in a normal intermittent or perhaps alternating manner; if one be markedly bloody while the other is perfectly clear; or if on analysis the composition of the one differs so greatly from that of the other as to make it impossible that both could have come from the same organ, then the conclusion is warranted that two kidneys exist in the particular man in question, and this fact may now be used in arriving at any further conclusions regarding, for example, the proper course to pursue. Thus it becomes self evident that a conclusion cannot be based on an assumption or an inference, but must rest on the facts themselves.

Medicine is a science, and the statement is not invalidated simply because most, yes, the large majority,

of the facts pertaining to it are unknown. No science is complete in the sense that all the facts pertaining to it are known.

During the development of any science or of a theory it frequently becomes necessary to assume the existence of certain conditions or relations as a working basis, but it should be remembered that all deductions made from such assumptions are purely hypotheses, and are but the scaffold which supports the workmen during the building of the permanent structure.

In medicine there are many hypotheses which are of the greatest value in enabling us to develop the facts, but when we come to the practical application of our knowledge to the individual case, or to the giving of testimony before courts and juries, we should learn to recognize and to distinguish the assumed, the inferred and the hypothetic, so as to confine ourselves to the known facts and the warrantable conclusions deviate therefrom.

NATIONAL SUPERVISION AND STANDARDIZATION OF FOOD.*

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The relation of pure food to the health of a nation is equally important with good government of a nation. Each year shows not only an increase in the efforts of hygienists and governments to protect the individual in the matter of his food, but also the slow but steady progress of food-producing and controlling corporations in their adulterating, embalming, misbranding and counterfeiting processes, culminating in the disgusting and nauseating revelations of the past few months, which have shaken faith throughout the civilized world in the purity of almost every article of food and drink.

Proprietary drug compounds are, in many instances, either inert, wholly false in their claimed composition, dangerous to health or habit producing. Under various names they are hawked about, through a variety of methods, leaving in their wake disappointment, poverty, complicated illnesses, habits and mental wrecks.

Wealth, greed of the tariff-protected corporations and their almost unlimited opportunities for fraud give birth to these abuses. Ignorance on the part of the laity of the facts, or lack of appreciation of the health effects, together with the failure of the physicians and hygienists to educate the public in these matters, fosters this state of affairs. Publicity is the potent remedy for these evils.

The food of a nation should be as genuine as the nation's bond and currency. Counterfeiting of either should be a felony, and as such should be severely punished.

Because of its application to present conditions, I quote from the report¹ of the committee of the Pan-American Medical Congress on "Department of Public Health for the United States," adopted at Mexico City, Mexico, November, 1896, the following:

"We further recommend:

"The passage of uniform national and state laws regulating the importation, exportation, sale, inspection, and standard of meats, fruits, and food-stuffs, water supply, ice, milk, and beverages, prohibiting adulteration and providing adequate penalty for violation.

"The passage of uniform national and state laws regulating

* Read before the Section on State Medicine, British Medical Association, Toronto, Canada, Aug. 24, 1906.

1. For full report see U. S. Senate document No. 38, Fifty-fifth Congress, first session.