

the nerves regulating the circulation, causing a very transient semblance of increased activity, but which is really lessened efficiency of circulation and molecular change. Now if you duplicate the dose of the same agent, the patient's consciousness of impressions is still less, and while he is under the same impression that he could do a great deal, his mental exhilaration and lack of self-restraint has given place to mental incoherence and incoördination of muscular action. Again duplicate the dose, and your patient soon lies profoundly unconscious, with every voluntary muscle paralyzed, with the cardiac and respiratory functions on the verge of final suspension.

To my mind, it is a clear demonstration that the action of the therapeutic agent was in exactly the same direction from the first and smallest dose to the largest one. And that direction was one of depression, diminished efficiency and paralysis, from the beginning to the end.

This is fully corroborated not only by the experiments of Dubois, Sidney Ringer, Martin and Wood, to which I have before referred, and many others, but also by a great variety of facts to be gathered from the mortuary, vital and social statistics of every civilized people. Did time permit, I might point out many more important therapeutic inconsistencies, that are to be found in the daily routine of medical practice, but those to which I have referred are sufficient for my present purpose. For the leading object I had in view in presenting this paper, was to urge upon your attention the importance of a more thorough study of the nature and true physiological action of the articles of our superabundant materia medica, in connection with an equally thorough study of the actual pathological processes that constitute disease.

I would in no wise diminish the activity and zeal that has been, and still is, displayed in studying the causes of disease, whether bacteriological, chemical or meteorological. But I would insist on an equal activity and perseverance in such investigations as will develop more accurate knowledge concerning the action of therapeutic agents in the living body, both in health and in disease. Every living structure has properties, or susceptibilities and affinities, that place it in definite relations to all other substances that may be brought in contact with it, whether as food, medicines or poisons.

And for gaining more exact knowledge of such relations, I would have every medical college laboratory, public hospital and dispensary, furnished with the necessary apparatus and means for such investigations, and with skilled workmen to use them.

#### A PLEA FOR THE MEDICAL EXPERT.

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Ever since Bacon and Descartes overthrew the deductive method of scientific investigation founded by Aristotle and practiced by the mediæval schoolmen, a more rigid exactness has been demanded by mankind in the statement of scientific facts. "Give us facts and away with theories" is the modern battle-cry of practical science. A mathematical precision only is worthy of its dignity. Mathematics itself and chemistry and astronomy are upheld as the models, and all knowledge that falls short of their exactness is looked upon with a gentle suspicion, and perhaps a sympathetic pity. Civil and mechanical en-

gineering, architecture, steam manufacturing, and all the other arts and sciences based upon geometrical principles have taught us to be so rigid in our demands that we have very little patience left for what cannot be demonstrated by the rule of three or solved by the theorems of Euclid. We want so much to know the precise height and depth of everything, that we are prone to quarrel with mere opinions and to laugh to scorn imaginary theories. Columbus' visions of a western passage and Roger Bacon's dreams of the transmutation of metals would be deemed more than chimerical to-day if their whys and wherefores could not all be first figured upon the written scroll. It is fortunate, perhaps, for the race that science is made to toe the line in this unflinching manner. The darkness of the Middle Ages would long ago have been dispelled had the schoolmen watched, like Newton, an apple fall, instead of arguing how many angels could dance upon the point of a needle; and mankind would ere this have enjoyed the comforts and luxuries of modern civilization had the astrologers employed their vigils studying the measurements of time and space instead of concocting absurd horoscopes for the amusement of superstitious emperors. But at the same time there is a risk in being too exact, or rather in being satisfied with nothing but what is mathematically demonstrable. If we allow such a tendency to overrule us, all art will vanish like the morning mist, and science will go limping like a lame creature on a single crutch. We want precision, as much as we can get of it, but precision cannot always be obtained at once. Nay, more, in some departments of human knowledge it looks as though it were entirely unattainable. Who can round the circle or square the angles of such sciences for instance as sociology, physiology, morphology? Trousseau used to ridicule psychology, which he was wont to call a pseudoscience. When we survey the broad field of science in general, how meagre and stunted the harvest seems to be! Excepting the truths of mathematics we cannot say positively that we know anything. Even the knowledge that we do possess of the exact sciences is only relatively exact. It is so easy to ask questions which it is impossible to answer, and science may be criticised by the smallest child despite its presentation by the most learned savant. It is just here that the unseemly wrangles occur in our courts between the legal and medical talent. I am not referring now to those dishonest methods too often adopted by both the counsel and the medical expert for the purpose of warping known facts to gain an end. I speak of those instances that do occur, though less frequently, in which there is an honest but unsuccessful effort to learn some positive medical facts for the guidance of the court and jury. In such cases it almost always happens that the medical expert is chagrined at his own inability to supply the needed information, and the lawyer turns away with a very natural, but unwarrantable disgust for the boasted truths of medical science. The former is inclined to assume too much, the latter to demand too much. The fault is thus somewhat on both sides, more often on the side of the legal fraternity.

When one of the judges of the supreme court of Maine asserts that if there be any kind of testimony that is not only of no value, but even worse than that it is in his judgment that of medical experts, it is evident something must be radically wrong with the

methods of securing the testimony rather than with the testimony itself; for the judge's opinion represents a very small minority, and the medical expert as well as all expert testimony is admitted to be an increasing necessity year by year. And again, the New York judge who classified witnesses into liars, blank liars, and experts appears to me to have been less fitted to administer and interpret the law than the experts thus referred to by him were for giving reliable medical testimony. It is obvious that expert testimony is absolutely essential for the instruction of a court that is not sufficiently overwhelmed with its own egotism to imagine itself capable of knowing and deciding all the intricate questions of modern science and industry. It would have been far more becoming in the honorable judge, therefore, not to have attempted to oppose the inevitable but rather to have tried to correct the faults of modern expert testimony, which he will find if carefully examined, are the result of his own opinions and the enactments of his own guild. As Mr. Weil has recently said "the fact is, the average lawyer does not qualify himself to examine an expert, he qualifies himself only sufficiently to conceal his own ignorance; his selfishness is of that order which leads him so far as his own personality is concerned to exhibit himself to the best advantage before the jury." So disgraceful is this dispute between the lawyers and the doctors, that Maudsley suggests even the abolition of capital punishment, as one of the apparent means of softening its virulence. In the words of Mills "some of our learned judges are not without blame for this state of affairs. The decidedly antagonistic stand which they seem ever prone to take against reputable physicians in *habeas corpus* and other cases in which questions of medical opinion are at stake, has put the profession into such a frame of mind that in Philadelphia—and it may be the same throughout the country—many physicians now refuse altogether to make affidavit in cases of insanity." I once heard a lawyer of great prominence confess at the close of a society meeting in which an important medico-legal question had been discussed, that never before had he fully realized the difficulty there was in establishing medical facts supposed hitherto to have been fundamental and impregnable. He declared himself a convert and promised hereafter to be less irritable with the medical witnesses that happened to come under his examination in the courtroom.

One undoubted source of trouble between the medical witness and the cross-examiner is that the latter, as a rule, limits himself to general hypothetical questions, and requires simple categorical answers, while the former can only speak positively of individual cases, and of these only in a general way. I was once asked if the condition of the blood produced insanity. Any medical man will recognize that such a question is unanswerable. It might produce insanity in one case and not in another. But the lawyer doesn't want such an answer. He demands *yes* or *no*. If applied to the case in hand, the medical expert would only care to say *yes* or *no* with full liberty to explain himself, if need be. Here is an instance, reported by Dr. Traill Green, of Easton, of the misapplication of an individual truth in a general statement, which reveals on the part of the lawyer one of three things—dense ignorance, profound knavery or ill-timed levity: In one of our

insane asylums there was once a young man who did not believe that he had a stomach or bowels. He said that the food he ate flew out of the top of his head up against the ceiling. The lawyer for the patient said to the doctor, "Doctor, you know that there are a great many sane people shut up in these asylums." "No sir," answered Dr. Green, "I do not know any such thing." The lawyer then said: "You believe this man is insane because he does not know that he has a stomach. Don't you know that a man may be sane and yet not know that he has a stomach?"

In the mathematical sciences, all cases of a class fall equally under the same principle. Thus the laws of falling bodies apply to all bodies alike, both great and small, because the law is founded upon an unalterable basis. In the non-mathematical sciences, a broader interpretation has to be given to a general principle, so as to make it cover all cases of the same class. Physiology says that the number of heartbeats is seventy-six to the minute, and sociology affirms that all men are equal; yet we know that men can claim only a fictitious political equality, and that the beatings of their hearts are as varied as their dispositions. Morphology draws the picture of an archetype after which certain classes of animals seem to be patterned, and psychology teaches that the human intellect is composed of certain particular faculties; but not a single human being conforms to the archetype of morphology, or possesses the full complement of faculties that make up the psychological intellect. The circuits of the planets may be calculated to a fraction of a degree, but the amount of hydrochloric acid necessary in the process of digestion varies with each individual. Law itself is one of the uncertain sciences, and the variability of legal opinions is notorious. We speak of the *science* of law, and yet it is almost impossible to get two authorities to agree upon its simplest axioms. Our entire judicial system is founded upon the inalienable rights of man, but to this day no one knows exactly what those inalienable rights are. When our legal friends shall have affirmed for us the principle of States rights which will be applicable to all Governments alike, we will be able by that time to define for them the minutest boundaries of insanity. When they shall have defined for us so simple a thing as personal liberty, we will have reached a stage of knowledge that will enable us to give them a faultless description of the digestive process. Whatever has to do with the moral or physical nature of man is largely a matter of opinion, since the mobility of the subject renders the superstructural science unstable. It would seem, therefore, that their own disagreements would teach lawyers to make sufficient allowance for the disagreements of doctors. When a lawyer formulates a principle, he means that it is true in the main, but liable to many exceptions; so the physiologist and clinician affirm certain general facts, which, however, may not hold good in special cases. While each case that comes under a medico-legal examination must be studied by itself, the study will be greatly facilitated by the recognition, on the part of the court, of certain medical principles which apply in a general way to the case in hand. Our courts are too prone to refuse general statements, and to demand only categorical answers. It is obvious this must lead always to discord and disappointment.

We all know what an annoyance the *personal equation* has ever been to so exact a science as astronomy.

So different are the visionary powers of the observers of the heavens, that it is wellnigh impossible for them to make their calculations harmonize. Every variety of mechanical contrivance has been invented to act upon the eye and ear so as to render perfectly uniform the observations of two or more astronomers; but all in vain, for there is always a slight difference in their mathematical calculations, almost infinitesimal at times, which nevertheless manifests its influence, and is the result solely of the difference in the observers' physical constitutions. Yet we call astronomy an exact science, and rejoice that the personal equation is operative at least only on one side of the question, namely, that of the observer. In the sciences based upon the study of man, the personal equation is a more obtrusive factor, and exerts its unfortunate influence on the side of both the observer and the observed. Men are not machines for the conversion of food into force, as physiology sometimes metaphorically asserts. Even the involuntary functions of the organism, such as digestion, respiration and circulation, are to a large extent under the control of the mind. A wave of passion or a dream of pleasure will so affect them as to nullify all efforts towards the accomplishment of rigid comparisons. Man is apparently a free agent, and one would think he could sometimes place himself in a condition comparable to some previous condition; but even that is impossible, for both waking and sleeping he is subject to the vacillations of his own mind. Never can it be said that he is twice the same man. It is absolutely absurd, therefore, to assert or to expect positive physiological facts. The waves of the ocean never repeat themselves, and the waves of vitality oscillate with an ever changing movement. Anatomy is perhaps the most exact department of medicine, and yet the surgeon is rarely startled at finding an anomalous artery or a misplaced organ. The chemist has analyzed and solved the composition of the body, but a nervous shock or an inherited trait will at times overthrow the absolute truth of his nice calculations.

When we approach the examination of the body, both in health and in disease, and fix our reliance upon the answers of the subject in regard to his own subjective states, the personal equation rises into a mountain and we almost despair of ever being able to scale it. Sensation is one of the primary functions of nervous matter and yet in the examination of nervous diseases the sensory symptoms are almost valueless. Careful neurologists are only too glad to discard the sensory symptoms entirely, if by any possibility they can diagnose a disease through its motor or other signs. No two individuals, sick or well, experience the same sensation in exactly the same way. A slight pain is a terrible ordeal to one, while the agony of the rack is but a pleasurable martyrdom to another. Add to all this the influence of the personal equation on the part of the observer, and the wonder is that medical science has established as many positive facts as it has. So vast is the interval between an Albrecht von Haller and a Caspar Hauser, between a Mettius Curtius and a Charles Guiteau, that an almost limitless scope is afforded for the exercise of the personal equation.

All science therefore, in which this factor arises into such extreme prominence is largely a matter of opinion: and the greater the influence of the personal equation the wider the latitude for the differences of

opinion. Hence, in my judgment, medical testimony should always be confined solely to the expression of an opinion. The expert should be given a verbal or written statement of the facts in the case, and his opinion asked merely in connection with the facts thus collected and presented by the court. In cases of insanity this will eliminate the personal equation factor from the side of the subject at least, and I fancy it will lead to a greater uniformity and accuracy of diagnosis between the several experts consulted. In some special cases it might be more desirable to have the expert confronted by the patient, but in a large number, perhaps the majority, this would be unnecessary if the expert were given a succinct and complete account of the subject's past history, actions and general mode of life.

While medical expert testimony is becoming more of a necessity every year, and experts are liable to be summoned into court to testify in regard to any medical matter, questions in regard to mental disease will probably continue to far outnumber all others.

It may not be true that insanity is increasing beyond the proportionate increase in the population; nevertheless, more cases of insanity are being brought to popular notice than formerly. This is explained in many ways. The modern recognition of insanity as a disease and not as a mere disgrace, coupled with the fact that better methods of treatment are employed by our modern asylums, is inducing families to send their afflicted ones away from home more readily than they would have done in earlier days. We hear therefore of many more mild cases that formerly were kept more or less secluded beneath the parental roof. In the second place the higher grade of our modern civilization and its keener intellectual competition illustrate in a more glaring manner the distinctions between sanity and insanity. Finer shades of mental disease are being recognized to-day than formerly. Eccentricities and irrationalities are awarded their proper credit in the sum total of mental equilibrium. While we need not go as far as Lombroso in his peculiar estimation of genius, we must nowadays, nevertheless, regard certain phenomena of genius as an evidence of mental deterioration rather than as a special favor of the gods. Superstitions and absurd beliefs receive less consideration at the present time because we now demand a more uniform distribution of the mental faculties as the proof of a well-balanced mind. A Nero or a Caligula would be assigned a cell in an insane asylum to-day much more readily than in the brutal period of the Roman civilization. The sanity of a Guy Fawkes or a Jean Marat would undergo a closer scrutiny than in the days of their notoriety.

Criminal insanity is quite a modern study and its development is largely due to the higher intellectuality of the nineteenth century. Finally our profound ignorance of the nature of mind as well as of its pathology in disease renders all questions in regard to it a luxurious field for disputation. To decide whether an individual is insane or not is so much more difficult than the decision of most other medical questions, that criminals hasten to avail themselves of the plea of insanity, and thus introduce more cases of this sort than any other into the courts. Lawyers come in contact with more forms of real or assumed insanity probably than any other variety of medical trouble. This is unfortunate for the maintenance of the highest estimation amongst our legal friends for ex-

pert medical testimony. There is no department in all science so difficult, so abstruse, so little known as that which has to do with the mind and its diseases. In fact we may almost say that with one or two exceptions we know nothing of mental diseases, for most of our knowledge in this respect has to do merely with *symptom-groups*. Typhoid fever, diphtheria and variola are positive entities, separate and distinct from one another. We are familiar with their symptoms and their underlying operative causes. But of the mental diseases, we only know certain combinations of symptoms, which, however, are rarely identical in all similar cases. We talk of mania, monomania, paranoia, melancholia and all their sub-varieties, but we rarely meet two cases that are at all identical, nor are we able to say what is the precise physical condition that gives rise to their respective symptomatology. This deficiency cannot be laid entirely at the doors of medicine, for all the sciences that relate to man are interested in the solution of the human mind. We say that the brain is the organ of thought, but as the brain is in more intimate connection with all parts of the body, it is a question whether the mind is not, after all, coextensive with the entire organism. A last analysis of the intellectual faculties shows that they consist of motor and sensory phenomena or their residual representations, so that the very existence of these faculties is dependent upon the present or past activity of the organs of sense and motion. Hence we not unfrequently have cases of delirium and insanity dependent upon physical causes quite remote from the cerebral centers, and mental diseases are thus seen to be the result often of well known physical ailments. The personal equation is especially here a momentous factor.

Add to all this the fact that the insane can and frequently do feign insanity, as Dr. Kiernan has shown, and the difficulty of these questions is tremendously enhanced. The *primaire verrucktheit* of the Germans, the *manie raisonnante* of the French and the *monomania* of Spitzka is the form of psychosis that is prone to feign insanity when accused of a crime, thus rendering the diagnosis of the primary trouble doubly obscure, because of the apparent rationality of the patient.

The whole question is immensely involved, and any dogmatic assertions will only result in a display of foolishness. This is one of the reasons why the insanity plea is so popular with the criminal classes. Lawyers, therefore, cannot justly demand, nor medical experts give precise definitions. Opinions only should be required in the present state of our knowledge, and these opinions should be considered merely as an incident in the trial, and not as an integral part of the testimony for conviction or acquittal. Having once learned the medical opinions in a case, the court should decide whether the individual is insane or not. If he is declared insane, he should be acquitted at once and sent to an asylum; if he is found to be not insane, all further trial as to his mental condition should cease, and he should be subjected to the same civil process as any other sane man.

The uncertainty of our knowledge in regard to mental diseases, and the greater value of medical expert testimony the more nearly it approaches an opinion, carry with them the conviction that the expert should be granted full liberty to express all

that he knows and desires to say. One reason why expert testimony is so much of a sham under the present system of engaging it is, that the opposing counsel form practically the medical opinions for the court, and simply make use of the experts to support their particular views. It is proverbial that doctors dislike so much to go upon the witness stand that they often endeavor to shirk their duty in regard to signing certificates in cases of insanity that fall under their observation. They know beforehand that their utterances in court will be throttled, and warped, and misconstrued in every conceivable way, and in the end made to express the very opposite of what was originally intended. This was illustrated most forcibly in the trial of Guiteau. As Dr. Mills says, "the defense was conducted in such a peculiar way that only one of the numerous experts called was examined at any length. To most of them was put a hypothetical question, the chief point of which was the assumption that the homicide had been committed under the delusion of divine inspiration. No effort was made, except in the case of Dr. Spitzka, to elicit the special opinions of the experts for the defense or to obtain the results of their examination of the prisoner."<sup>1</sup> The whole trial reminded Dr. Channing of "what a trial might be if a patient with chronic mania were brought in from an asylum and tried for murder." And Dr. Barry, who claimed to know something of the inside working of the trial, said that Guiteau "was put through after the way they kill hogs in Chicago." It seems to me that this monstrous wrong can only be overcome by having the expert engaged by the court, for the purpose merely of instructing the court, and not in any other way to take part in the trial.

In conclusion, then, I would plead, under the present system of engaging expert testimony, for a broader latitude of opinion among the legal fraternity in behalf of the medical expert. Exactness is impossible in the present state of knowledge, and it is rendered even more impossible by the methods adopted for the examination of the expert. I would urgently favor, therefore:

1. The engagement of the medical expert by the court and not by the opposing counsel.
2. The giving of the expert testimony in the form of a written opinion based upon the facts of the case as collected and presented by the court; this being supplemented in certain special cases, and at the discretion of the court, by a personal examination of the prisoner by the expert.
3. The entire freedom of the expert to give a full and complete opinion to his own satisfaction.

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HEAT IN THE TREATMENT OF SYPHILIS.—Dr. Ausass (*Jour. des mal. cut. et. syph.*, January, 1892), presented before a society a young man, 17 years of age, who had become infected from a wet-nurse. From the age of 15 years on he had had a persistent headache, which yielded neither to mercury nor to large doses of iodide of potassium. Residence in a warm climate improved him a little. The doctor then ordered daily hot baths in combination with mercurial friction, and obtained a brilliant result in a very short time.

<sup>1</sup> Address before the Penn. State Medical Society. Transactions, 1882.