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THE SCIENTIFIC EXPERT IN FORENSIC PROCEDURE.

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[*A lecture delivered before the Franklin Institute, February 10, 1893.*]

The lecturer was introduced by the Secretary of the Institute, and spoke as follows:

MEMBERS OF THE INSTITUTE, LADIES AND GENTLEMEN:

The position and character of the representative of science in our courts of justice, always one of the greatest interest to those most directly affected, is acquiring every day a more general interest as the enterprise of the daily newspapers spreads before the public, often with comment, full reports of trials, in which, with increasing frequency, he often has a conspicuous part. A few years ago the appointment of a committee of the American Association

for the Advancement of Science was suggested to consider the whole subject, but no report appears among its proceedings. Among the announcements of congresses at the coming Columbian Exposition, is one of Medical Jurists. As members of the medical profession were the first formally recognized as scientific experts by imperial decree, and as they have broken the way by the rulings and precedents established, for other classes of scientific experts, it may seem fitting that they should continue to lead, but in view of the growing importance and peculiar features of science in this regard, it is almost a matter of regret that the subject for consideration of such a conference had not been made Forensic Science instead of Forensic Medicine, especially since the presence of experts of different nationalities, and under different systems of jurisprudence might have added much to the interest and value of the deliberations.

The more immediate suggestion of the subject for the lecture of this evening is due to a lecture upon the same subject by an eminent jurist of the State to the students of the law school of the institution with which I happen to be connected. Whilst, with all the freedom of the lecture platform, it abounded in instructive suggestions of the highest practical utility, originating largely in his own experience, and whilst it was courteous and even fair to the expert, it still had much of the coloring that the opinions of most of his profession of the expert have, and which at times finds expression from the bench as well as from the bar, and finds its way into reports and text-books, and which, in the case alluded to, seemed to make the burden of advice to the young lawyer—to watch carefully the scientific expert. As illustrative of this coloring, the following extracts have been collated from a great mass, not altogether at random, but as exhibiting different points of view, and the most salient points of animadversion upon the expert. They will serve, in a measure, to direct the discussion of the subject.

In *Taylor on Evidence* we find: "Perhaps the testimony which least deserves credit with a jury is that of skilled

witnesses. It is often surprising to see with what facility, and to what an extent their views can be made to correspond with the wishes or the interests of the parties who call them." "They do not, indeed, wilfully misrepresent what they think, but their judgment becomes so warped by regarding the subject in one point of view, that, even when conscientiously disposed they are incapable of expressing a candid opinion. To adopt the opinion of Lord Campbell they come with such bias upon their minds to support the cause in which they are embarked, that hardly any weight should be given to their evidence." A judge in a patent case, in his charge to a jury, says: "In a case of this kind the opinions of witnesses who are experts are admitted, contrary to the general rule, which requires witnesses to testify only to facts. And I must say, gentlemen, so far as my experience extends, that it would be as well if not better that the opinions of such witnesses should be excluded from the consideration of the jury." "They are selected on account of their ability to express a favorable opinion, which, there is great reason to believe, is in many instances the result alone of employment, and the bias arising out of it." In another charge to a jury we find: "It must be painfully evident to every practitioner, that these witnesses are generally adroit advocates of the theory upon which the party calling them relies. Even men of the highest character and integrity are apt to be prejudiced in favor of the party by whom they are employed." As to the effect of testimony of experts it is described, "as often as skilful and effective in producing obscurity as in elucidating truth." Again, a judge off the bench, in the greater freedom of a lecture, remarks: "From the proposition that experts alone may give their opinions upon the witness stand, that these opinions are admitted as such, and that the expert is to form and express his private conclusion upon the facts which the jury is summoned to try, from these propositions, it is but a short step to the full-blown expert, as we see him in actual operation, as one who being neither judge, nor juror, nor witness, nor advocate, exercises the privileges of them all, restrained by the limitations of

none." Another very clear writer upon this subject, makes the following statements: "Text-books and reports, when discussing what may be termed the testimony of experts, more accurately than expert testimony, will be frequently found to censure, and seldom to commend its practical administration; and, indeed, the unprofessional mind, in view of the general tenor of the expression of the authorities, finds it difficult to understand, why a system which would seem to be regarded as rather pernicious than beneficial, should be even tolerated by the law;" and, in another connection, "an examination, even though superficial, of the subject of skilled evidence, from whatever point of view it may be made, will not fail to indicate the liability in the operation of the system, to misapplication and perversion of its functions, though administered under rules which have been well considered, and enforced with a reasonable degree of strictness;" "though the law theoretically provides so high a standard of qualifications for the expert as might be presumed to insure his sufficient skill, and further enables his ignorance to be indicated, or his errors refuted, by cross-examination and controverting testimony, yet the inability of men in general to investigate without assistance the questions which the expert deals with, embarrasses the process of detecting his unfitness in the first instance, and of counteracting the obscurity or false impressions produced by his testimony if erroneous;" "the salient objection which presents itself in the application of skilled evidence, and one which is of necessity peculiar to the system, is the effort frequently made, with more or less success, to expand and pervert the functions of an expert * * * to the statement or discussion of questions of moral or municipal law." This arises, however, as he admits, from the circumstance that: "Law and fact in a certain class of cases [viz: patent cases], are frequently so closely blended that it may be difficult to clearly draw the line between them, and to determine where the province of the witness ends and that of the court begins." Another phase of objection is exhibited by Justice Miller, in a charge, as follows: "My own experience, both in local courts and

in the Supreme Court of the United States, is, that when the matter in contest involves an immense sum in value, there is no difficulty in introducing any amount of expert testimony on either side." Another judge, in a lecture upon "Medical Expertism," gives a similar opinion, that the grounds of dissatisfaction in regard to medical testimony, to both the professions of law and medicine, are "reducible to one, that upon every conceivable issue expert opinions are procurable, which sustain or seem to sustain the most contradictory views." These extracts, which might be multiplied indefinitely, exhibit a rather pessimistic view of the scientific expert, and one which, in our opinion, is hardly justified by a full consideration of all the facts, and which certainly is not just, in as far as it may imply censure of him, when we consider his relation to the system of jurisprudence, into which he has been thrust with little more responsibility on his part than he has for being born.

The scientific expert is simply a product, and an extreme product, of an advanced and rapidly advancing civilization. He was recognized in the germ, to be sure, by the old Roman law, and we may assume in all systems of jurisprudence; but he has acquired an immensely increased importance, and a much wider field and a far greater frequency of employment by the recent, and very recent, marvellous advances in the applications of science—applications which have increased the sphere of things to be litigated about, which have introduced facts of an entirely new character to be adjudicated upon, to say nothing of the contribution that science has made, and is continually making, in many ordinary cases, of conclusive missing links of evidence which render decision previously uncertain, comfortably certain, and satisfactory.

Now, one fact that seems latent in these expressions of the legal profession in regard to the scientific expert, and almost the first that impresses is that in many respects he seems to be a positive annoyance to lawyers, and even to judges at times—a sort of intractable, incompatible, inharmonious factor, disturbing the otherwise smooth current of legal procedure; too important or necessary to be ruled out,

too intelligent and disciplined mentally to yield without reason to ordinary rules and regulations of the court, with which he may not be familiar, and, at the same time, possessing an undoubted influence with a jury, that it is difficult to restrict by the established rules and maxims of legal procedure.

Indeed it would seem that no class connected with the administration of justice is more frequently misunderstood, or abused, unless, perhaps, we may except the legal fraternity itself, for the latter are often, by the laity, accused of bold mendacity, unscrupulous methods, dishonest practices. And they sometimes even contribute to this popular impression by contradiction, or even abuse, and apparent mistrust of each other, even to a greater degree than scientific experts. And yet no one would hold the noble profession of the law less a necessity in the administration of justice, or consider it fairly represented by cases that may be regarded, if they exist at all, as glaring exceptions, pictures all the more grotesque for the background of professional character upon which they are cast. Now, there must be some way of accounting for such a community of reputation of lawyer and expert, widely separated as they are in position and function. The one has the advantage of a well-defined, clearly comprehended legal status, the result of centuries of judicial procedure; he is a growth, influenced by all the changing demands of progress in social conditions for centuries. Though there may not have been a time, when he was not in the germ, and always important, the attorney is now a fully developed agent in judicial procedure. The scientific expert, on the other hand, occupies an ill-defined, hardly recognized, variously comprehended, anomalous position, and of comparatively recent importance. He is, in fact, a comparatively recent introduction into the world of jurisprudence. He is in process of development and adaptation to his surroundings. He is being shaped and fashioned rather than finally fixed, and much of the misapprehension of him, and consequent abuse of him, may be due to his apparent, or real, want of compatibility with the fixed forms and maxims of jurisprudence

which have the force of axioms in legal practice. Still the two professions, although thus widely dissimilar, must have some similar phases that may account in some degree for identity of reputation alluded to. Both are engaged in the trials of causes between litigants, and litigants in most cases fully persuaded of their rights. The lawyer and the expert, each in his sphere, contributes to the final decision. The memory of litigants is apt to be more tenacious of wrongs done than of rights secured. The rights are his, as a matter of course, and the lawyer, or expert, who has aided in securing them has but performed a simple duty, and may be regarded as fully paid, perhaps over-paid, by the fee. But the defeated litigant is apt to remember longer the opposing attorney, as a man, perhaps, of feeble sense of justice, of great cunning, perhaps of great legal ability, but mainly as the chief instrument in defrauding him of his just rights, and the expert, if one be associated in the case, shares this unfavorable opinion. The lawyer's opinion of an expert may rest upon somewhat similar grounds. The expert, who at a critical point may have saved a doubtful case, may be regarded by the lawyer as having performed a simple, perhaps an imperative duty; whilst the one who may have caused the loss of a case, or foiled an attorney, will be apt to be remembered by him as well as by his client, as a typical scientific expert, briefly characterized in the address to the court. "May it please the court there are three kinds of liars—the common liar, the damned liar and the scientific expert."

Another occasion of ill-feeling between the two professions may lie in the ill-defined position of the expert in court. In legal procedure there are hazy, doubtful zones, where the rules of practice are difficult of application, in which, as has been said, the scientific expert appears as playing all parts, with the restrictions of none; and yet, as we will see, he is classified by his functions with those who are regarded rather as inferiors by attorneys—namely, the witness class, and there may be a sort of *ne sutor ultra crepidam* feeling toward him on the part of the attorney, when he seems to rise above his class.

But aside from these rather incidental and comparatively trivial circumstances, there must be others of more comprehensive and graver character, which shape the reputation of the scientific expert with the bar, the bench, and to some extent with the laity, in as far as it does not filter down to the latter from the two former. In looking for these a multitude of questions almost jostle each other. What is the scientific expert? Why is he in court at all with all his failings? When did he get in? How did he get in? What are his relations to the other factors in the administration of justice, to the court, to the attorney, to the jury, to the other witnesses, to the parties in the case, to the community of which he forms a part, to civil law, to ethical laws, to his own profession, and then, the final, all-important practical question. What is the best thing to be done with him? If we restrict our inquiry to the jury system, most of these questions will meet their answers in a study of the growth of that system from the simple juridical germ, latent in archaic customs that with the effect of law regulated to some degree the rule of the stronger in the interest of the community. Thus primarily the avenger of a private wrong knew no limit to his revenge except his own will and power. All progress in jurisprudence rested upon increased assumption of control over individual conduct in accordance with the social instincts of the race. The prescribed rule of civil conduct for the individual was always becoming more detailed in its commands of what society considered right, and of prohibitions of what it considered wrong, and society was always incurring increased responsibility for the determination of facts, of conduct, and application of the rules. Elaborate systems of jurisprudence grew up. Our savage legal ancestors were late in evolving a system. Long before they had placed any restraint upon the right of the stronger, the Mosaic code had made the great advance in its restraint, which we might almost term the equitable basis of all modern law, of "an eye for an eye, and a tooth for a tooth." But late as the English system is its origin is lost in obscurity. The often-quoted figure of Sir Matthew Hale, "more undiscoverable than the sources of the Nile," although

it may have lost its applicability, has not lost its expressiveness. But whether it is based on Anglo-Saxon usages, or whether almost wholly upon those of later date matters little. It is certainly a growth, a product of the creative power of the nation working slowly, and with evidences permeating it of the unquenched and unconquerable Anglo-Saxon spirit even under the grinding oppression of the Conquest.

Now in the organic world progress, development is from simple to more complex, by a process of differentiation. Low in the scale we find the animal without organs, without mouth, without stomach, without respiratory organs, without organs of sense; no eyes, no ears. A portion of food floats against it, it is enclosed and digested; the air is absorbed through its whole surface; the light may affect the whole surface; it is all mouth, all stomach, all lungs, perhaps all eyes. Any part performs all functions. It is regarded as low down in the scale of animal life. As we ascend the scale we find portions of the body set apart for specific functions by a process of differentiation. Organs of digestion, of respiration, of locomotion, organs of sense, eyes affected only by light, ears affected only by undulations of the air, all clearly defined, and as they perform their several functions, doing best only that which they are set apart to do, until we reach the culmination of development in highly differentiated and complex mammalian type. Thus the English system, by a process very analogous to differentiation, gradual, at times tedious and perhaps imperceptible, influenced by social and political changes, by the general progress in civilization, and following the same law that greater perfection demands greater complexity, to-day exhibits a sharply defined, legally constituted, fourfold division of juridical functions to four as clearly defined specialized organs of jurisprudence, each regarded as as incompetent to perform the functions of the other, as the eye to perform the functions of the ear, or the ear to perform those of the eye. We may not be able to trace the successive stages of development very clearly. What we regard as trial by jury in the Magna Charta may resemble it only in

its faintest outlines, as indeed it may resemble other systems in many of its features. It may possibly hardly suggest our present jury system. But it had in it what has developed into that system, until the witness, the jury, the judge and the advocate constitute the ideal court of to-day. Whatever else may be uncertain, the respective functions of these are not, and nothing is regarded as more essential in the administration of justice than that their distinct characters should be preserved. And yet the development of the system has been, as we have said, in the separation of the functions of these, combined primarily, to a greater or less degree, in the same individual or in the same body. Thus, originally the juryman was the witness as well as a judge of the facts: and long after jurymen were made judges of facts as given by others in evidence, the juryman still retained the function of witness, still was free to consider facts of his own knowledge in making up his verdict, as well as those received in evidence. To-day, a fact of his own knowledge is no fact at all to a juror in making up his verdict, except as it comes to him from himself as a witness on the witness stand. Again, so rigidly is a witness required to refrain from any assumption of the functions of the jury, that, whilst he may in a case for damages to land give his estimate of the value of the land before the damage at $5,000, and his estimate of $1,000 after the damage, he would be restrained from estimating the damage at $4,000, because it is for the jury to make the subtraction. This illustration, which is from an actual case, will serve to emphasize the present condition of minute differentiation of functions of the system, into which system, as it is at present, the scientific expert is to be fitted. Now he is, if not an entirely new introduction, at least but recently developed, as we have already intimated, by the intense and peculiar mental activity along lines hardly known to the ancient Greeks and Romans, any more than to our own savage legal ancestors, and coming in contact at multitudinous points with the individual and society. But the system of jurisprudence has lost, we might say, in plasticity by growth. With forms at first scarcely fixed and limited in number, it grew with the

requirements of expanding social conditions and material progress, it readily yielded to new demands upon it. But it has gradually become more rigid with fuller growth, until to-day it is strained by any effort or demand to accommodate it to the rapid progress of the race in very recent years beyond the conditions that shaped it.

As the scientific expert is classed, in the division made, as a witness, amenable to the same rules, without any discriminating marks, privileges or functions, a somewhat fuller consideration of this class may assist to a better comprehension of his status in the system.

Facts form the basis of judicial determinations. Their discovery and establishment form the fundamental part of judicial processes in all systems of jurisprudence. What is truth? is the first and all-important inquiry, or, as Bacon has put it, evidence is the lantern of justice. Here human testimony must always be the sole reliance. "All evidence rests upon our faith in it," with the latent fallibility of the senses, with the varying and undisciplined powers of observation, and with the perhaps still feebler power of statement and description, and withal with its liability to personal bias from interest or predjudice, or to sluggish indifference where these may be wanting. Many have been the expedients in all ages to enlarge or supplement human testimony, to test and purify it, to eliminate evident sources of error: and yet after all has been done by the best rules of evidence that large experience, combined with highest intellectual culture, could devise, there has always been, and always will be, that felt residue of doubt and uncertainty, which renders decision unsatisfactory or impossible, and which it should be the first concern of every system of jurisprudence to diminish. The highly cultured Greeks and Romans, to go back no further, skilled in dialectics, in all the arts that belong to judicial processes, resorted to the torture of witnesses to purify their testimony or to elicit fuller truth. Their great lawyers, to be sure, doubted its efficacy, and yet it remained, and in the nations adopting the Roman law grew into a still more complete, and almost diabolical system of procedure, even gaining an entrance into England in spite of

its want of harmony with the Common Law, or rather with the Anglo-Saxon character. The instruments of torture exhibited in the Tower of London are almost necessary to convince us on that point.

Where such agencies, which we might call natural, were not employed, the superhuman was called in; the Deity himself was called, or forced, into court. The old Germans thought their gods too just to suffer wrong to be done if in some way they could be made responsible for it; and the same feeling was represented in England before the Conquest, by the various forms of ordeal devised. The test of walking over nine red-hot ploughshares without harm, of thrusting the arm into boiling water, of enforced presence of the suspected murderer before the victim, that at his touch the wounds might flow afresh, and many similar devices are the expression of a felt helplessness in dealing with human testimony. After the Conquest, these forms were simply superseded by other modes of appeal to Deity, in the Wager of Battle, which remained law, though not practised, even down into this century. These are but a few of the devices to get at truth, or to shift the responsibility for failure; and, it must be remembered, that they are the desperate expedients, not of savage, or even of pagan nations alone. To-day, with the entire ruling out of the supernatural, we are in a condition to consider the question of rendering purely human testimony as reliable and complete as it can be made. Possibly, yet, the oath, as it is ordinarily administered, with its adjuration taken from the Roman law, may, in some cases, have the effect of an appeal to a superstitious regard for a conventional form of lie, supposed and intended to be, more offensive to Deity than a simple, solemn, deliberate "yea" or "nay." But in most cases I think it can be assumed that the fear of human punishment for perjury is uppermost. With this acknowledged reliance then on human testimony alone, the rules governing its employment have grown into a completer system, and it is under these rules alone that the scientific expert can come into court, and he must be made to harmonize with them, even if the value of his testimony, by no fault of his, is to

be seriously impaired. Let us see then where he gains an entrance under these rules. There is the first broad rule that testimony can relate only to facts; that inferences from facts are for the jury alone, as illustrated in the extreme application before given of the question of damages. There is the other equally broad and fundamental rule, applicable in all systems of jurisprudence, that the best evidence the case affords is to be given. But the ideal case of facts by the witnesses and inferences by the jury alone is difficult of complete realization. Facts and impressions from them often shade off so imperceptibly into each other, that they are not separable from each other in the minds of the witness, and there arises an apparent incompatibility in practice between these two rules; there occur cases in which too rigidly to exclude inferences by the witness would be to exclude the best evidence. A ready illustration is furnished by the question of identity. The impression, or belief on the part of a witness that an individual before him is the same that was seen by him at another time and place, may have the highest degree of certainty in his mind, whilst the facts upon which he bases it cannot be given in their entirety to the jury. He may exhaust his memory and his descriptive powers and yet there may remain a residue of facts, minute, inexpressible, inexplicable to the jury, more potent, perhaps, in forming his opinion than all that he could give. Legal practice, recognizing the existence of such incommunicable facts, admits the opinion of the only one in possession of these facts as evidence, admits them from the *necessity of the case*. So; again, a witness may have seen one man rush upon another and kill him; he may be able to give an opinion as to whether the latter had time to escape, because there are a variety of circumstances that could be pictured in his mind, but not detailed to the jury, which may constitute a large part of the aggregate upon which his opinion is based.

But again, in many cases, there are material facts upon which the triers of the cases, the jury, are not qualified, from their experience in the ordinary affairs of life to form an opinion, even when the facts have been admitted, or proved. Here again, from necessity, the opinion of some one

competent to deal with them must be taken or the rule of best evidence be violated. Thus we have opinions admitted as evidence, based not upon facts within the knowledge of the witness, but upon facts testified to by others. As an example, in a suit against a railroad company for damages, in the destruction of fruit trees by fire, a nurseryman, who has never seen the trees, may give an opinion as to the damages, based upon the testimony of others. Here then, we see the entrance of the expert witness, the skilled witness—known as well to the Roman law as our own—admitted in accordance with the rule of the best evidence, and the necessity of the case, as the text-book says, "on questions of science, skill, trade and others of like kind," which witnesses "are permitted to give their opinions in evidence as persons of skill." A better definition of an expert, than this from from Greenleaf, might be asked for; but, whilst any one with a few illustrations will form a general definition of the term expert witness for himself, the word seems to elude definition in terms entirely applicable, or at least wholly satisfactory in all cases, as they arise in practice. Judges and law-writers, in consequence, furnish almost numberless phrases definitive and descriptive of the term "expert," sometimes restricted within narrow limits, sometimes expanded so as to include a portion of the hazy, doubtful zone that separates the expert from the ordinary witness. The difficulty of precise legal definition of the term scientific expert is still greater. Besides special and peculiar knowledge and skill, it seems to imply broader, more comprehensive knowledge, involving general laws and principles equally with specific facts, a result not of skill and observation alone, but of a wide range of reading and study as well, accompanied by that intellectual culture and discipline that permits the possessor to draw upon the whole range of human knowledge in settling questions that may arise. One of the simplest and most noted cases will furnish facts illustrative of the distinctive characteristics of the scientific expert, and also serve a further purpose. A man was accused of poisoning his wife by a draught of medicine containing arsenic. The chain of circumstances fixing

his guilt seemed complete, yet there was wanting positive proof that the draught administered contained arsenic. The cup in which it had been was cracked by heating it on the stove, but the spilled liquid had been immediately carefully wiped off by the accused. All ordinary witnesses were at their limit. Ordinary human testimony could go no further. The question was put to the four scientific experts: Whether arsenic could still be detected upon the stove, after three months of constant use. Three of the experts said No; the fourth gave his opinion that it could. The accused, persuaded by his counsel, demanded an examination of the stove, trusting to the care with which he had removed the liquid. The experts and the judge went to the place. Half as much rust as would lie on the point of a knife was scraped from the designated spot, and in a short time evidence of the presence of arsenic, incontestable, satisfactory to all the experts, to the jury and to the judge was obtained. The single missing link in the chain of circumstances was thus supplied with inerrant certainty. Here, then, was evidence only obtainable through a scientific expert, and what was perhaps equally as important, only to be fully and satisfactorily confirmed by the opinions of others of the same character. Now this is certainly the very highest type of human testimony; at one time contributing facts of peculiar and unmistakable character, at others interpreting by infallible methods facts testified to by others. The scientific expert is in court then because of high peculiar value in his evidence. He has hardly forced himself in. He is scarcely in, in the first instance, by simple invitation but rather by the irresistible persuasiveness of a *subpœna*, which he is not at liberty to disregard any more than the ordinary witness. That he is in court to stay it is hardly necessary to assert, certainly not to argue. But with the rapid advance only of the past twenty-five years, in minute, detailed, exhaustive knowledge, in special knowledge, with the manifest tendency to precision in everything, even the sports of children, and at the same time with the broadening of the field of applications in all directions, all dumping in, as it were, new matter upon the courts for consideration, matter which

they are in many respects unprepared, if not utterly incompetent, to deal with, it does not seem that the question of the future will be whether the scientific expert should be in court, but the grave question should be, as the pressing question is, whether his contribution may not be made more effective, less clouded and weakened than it now seems to be in the minds of many jurists, as the inevitable effect of a rigid system of jurisprudence, fashioned long before he was a recognized agent in forensic procedure.

In considering some of the sources of dissatisfaction with the scientific experts, perhaps one of the first to suggest itself, and one of the most prolific, is the vagueness of the legal definition of the term "scientific expert" before alluded to, but which on more careful consideration might rather be termed vagueness and variableness of the standard. Definitions of things are of ideals, and consequently definition is followed closely by the statement that the thing defined is non-existent. The ideal circle is defined, so the ideal solid, the ideal liquid; these definitions are only approached, never realized. Degrees of approach constitute the differences. A few minutes ago we broadly sketched a bundle of qualities that should be found in the scientific expert. But practically the courts are limited to the best experts extant in any field, though they may at times fall far short of the ideal. But it is to be feared that in many cases the experts fall below a reasonable and possible standard, and far below the standard that would be fixed by scientific men themselves, as well as below the exigencies of the case. This may easily be accounted for. A party presents a witness as an expert. The judge must pass upon his competency upon such examination as he can make. That decision, though not necessarily, nor even by unvarying practice, a matter of discretion, will not often be reviewed by a superior court. Often then the best solution, certainly the easiest, seems to be to admit, even where there may be grave doubt as to qualification, and to throw the burden upon the jury, already overburdened with questions, which the theory of trial by jury assigns them, questions which they are not qualified to deal with, although they may be fully up to the

average in general intelligence. At a time when experts were not much beyond men in the ordinary avocations of life it may have been reasonable to require the jury to pass upon the "weight and credit to be given to evidence viewed in connection with all the circumstances," but under the changed circumstances of to-day, with experts of a character, and upon questions not dreamed of even a century ago, it seems to be straining a theory too far to put upon an average jury the decision of so grave a question, as to the character of the expert, which the court may not be able to settle satisfactorily. But for the theory it would not be thought of, if a system of jurisprudence were now being devised. Now among the results incidental to a liberal interpretation of the term by the courts are many that are regarded as the gravest evils of expert testimony. With doors wide open to incompetent persons, very slight pecuniary advantage, and still more frequently the incidental benefit attributed to notoriety and advertisement would cause them to seek entrance. As a result differences of opinion may be anticipated where knowledge is wanting as a basis. Then, too, the number of such experts in any case will be greater. The cross-examination, absolutely necessary to test such evidence, must be exhaustive and tedious. Trials are prolonged. The expense of the administration of justice is increased without furthering its ends, and withal often with incidental discredit not only of the testimony of experts, but in a measure of the whole judicial procedure which is responsible for them; and the jury are often left in such a state of mental confusion that the evidence can only be weighed by counting the experts. Now the rule should tend toward a greater strictness in regard to the qualifications of experts, since the progress of science tends towards a greater degree of specialization in study, and consequently to more minute and extended evidence on the whole, with greater restrictions on the range of best evidence of any particular expert. If science stood still, or if forensic science was confined at all times to the same old ground, everything would be settled, but as it is, the new points at issue continually arising make new demands upon experts, which

there may be few at first qualified to meet. We might fill in the evening with interesting cases illustrative of this point. The introduction of advanced scientific expert testimony is then hardly a matter of option. It is forced upon the courts by the fact that science is just as ready in the hands of the unscrupulous and dishonest to perpetrate the most flagrant wrongs as to aid in their detection, and that there is no advance in science that is not as accessible to the enemies of society as well as to society itself.

But another, even more prolific source of complaint than laxity of rule in the admission of experts, lies in the anomalous position of the expert in many respects, and under the best circumstances. He is legally a witness, an ordinary witness, but practically with extraordinary functions, and loaded with extraordinary responsibilities, and one might add, frequently loaded with extraordinary, and even absurd, expectations. As a witness he is subpœnaed by the same form, obliged to respond under the same penalties, to take the same oath; is subject to the same rules and restrictions, and the same treatment in court. He has no higher claim upon the State, or upon the parties for his time or his private professional knowledge, which constitutes his livelihood. He receives, in most cases, to be sure, from the party calling him, a fee agreed upon between them, and certainly out of proportion to those of other witnesses, even if it is not professional in magnitude. He assists the side on which he is called in working up its case. He suggests cross-examination of witnesses. He thus exhibits the character of a very willing witness, of a well-paid witness, combined with a great deal of the advocate. Now he cannot be held responsible for this position, but the system of jurisprudence, which not simply permits it, which has not simply taken him, but has forced him in, and which, apparently cognizant of all, seems only able to originate complaints, rather than to provide a different character for him; for there seems, indeed, in many of the adverse criticisms of experts, to be only a confession of weakness, rather than a disposition earnestly to consider the whole question with a view to the radical remedy of the evils. The human nature of the judge is

recognized and provided against. Every safeguard is thrown around him to protect him from bias, or possible suspicion of bias, which would be almost as bad. The jury is selected so as to be free from bias, and is protected as well. Other witnesses are not expected to take the part the scientific expert is almost compelled to take. In fact, if deliberately planned, there could hardly be a net-work of conditions, devised, calculated to produce so many of the evils of scientific expert testimony, complained of, or to cloud this testimony of highest intrinsic value, having the highest degree of certainty, and in a field altogether its own. Thus, in the extract from *Taylor on Evidence*, stress is laid on "the facility and extent to which their views can be made to correspond with the wishes and interests of the parties who call them," "though conscientious they are biased," "they are embarked in a course," "they are selected on account of their ability to express a favorable opinion, the result alone of employment," "they are adroit advocates of the theory of the party calling them," "men of the highest character are apt to be prejudiced," and so forth. Now the worst views thus expressed may be admitted in many cases, and yet there is a pertinent question of fact suggests itself, viz: In how many cases does favorable opinion, or bias, if you please, precede the call of an expert, rather than depend upon the call? And the still more pertinent question: How many experts are not in the particular case because their opinions are not wanted by the party who consulted them. There seems to be in mind in the consideration of experts too much of a similitude to the attorney. An attorney is employed. As a rule, I suppose, he accepts employment without any very close examination of the case to see whether it is the right side that seeks his services. I do not know that legal ethics requires him look too closely into the matter. In any event, there is sure to be one attorney on the wrong side. This is incident to the profession. But I think it would be found that there are few cases in which a scientific expert is actively engaged on a side contrary to his convictions; and convictions resulting from a careful examination of the cases. He would feel that his character as a

scientific man was too deeply involved, whilst the professional character of the lawyer would not be, but the worse the case sometimes the greater the professional credit. In many of the opinions quoted instead of "bias of experts," "convictions of experts" might be substituted, earnest convictions and convictions, or bias if you please, not produced by or dependent upon the call or employment, but upon expression of which the call or employment is based. The man of earnest conviction becomes the earnest, perhaps the adroit advocate of his theory, the enthusiastic aid of the attorney in preparing and even in conducting his case in court; and an attorney does well to secure his services, as well as his testimony, by a suitable pecuniary recognition of his worth to him, and there is no rule of ethics that I can find, that should cause the expert to refuse the reward of his labor, that would not apply equally to the attorney, so long as his testimony on the witness stand is without conscious untruth. On the other hand, neither is there anything in legal ethics to require a lawyer to select a lukewarm, half-convinced representative of his theory of the case, and we may assume that, with the whole range of scientific experts to select from, he never does. Illustrative cases of these statements are within the experience of many. That the expert should occupy this position of witness and quasi-advocate at the same time may very naturally be criticised. But it is permitted; more than that, it is expected, if he is well paid, that he shall assist in working up the case. Even more than this, he is a necessity in this *rôle*, as well as in that of witness, and the legal mind sees no impropriety in it whatever. A writer on this subject, who is keenly alive to the abuses of expert scientific testimony, in urging cross-examination as a means of exhibiting any inherent weakness of expert testimony, and recognizing that this requires an approximate degree of expert ability on the part of the cross-examiner, as cannot reasonably be presumed to belong to the legal profession, suggests, as one of the modes of informing himself, "the advice and explanations of his own skilled witnesses of the false or unwarranted positions and deductions which his adversary is likely to

assume." If there were no one to do this work, and scientific expert testimony had to be accepted without cross-examination, or even feeble cross-examination, such as the ordinary attorney unaided might be able to give, the question of its exclusion in many cases might be a very proper one; and yet a seeming inconsistency, or rather incongruity, is imparted to the character of a witness who passes from the table of counsel to the witness stand to testify, not to facts, but to opinions; and as a consequence, we might expect his testimony to be misunderstood and harshly judged.

But in regard to the charge of bias, so freely made, it may be admitted that the scientific expert may at times be biased, but that is only admitting that he is made of the same clay as other men. The bias, if not produced by the call, would certainly not be more of a reflection on his character than upon the system of jurisprudence which renders a call based upon bias not only possible, but almost necessary, and which provides no other method for the introduction of scientific testimony. But bias may be in nowise incidental to the call. It may be a purely scientific bias, due to some peculiar view or theory. No kind of training will fortify a man against bias at all points. In his laboratory, in conducting his investigations, the scientific expert may keep himself free from bias. The judge upon the bench is free from bias by habit, rather than by conscious effort. But even the judge, placed in some novel position of great responsibility, which this judicial habit does not fit exactly, might lapse into a bias. It is but a few years since that the American people trusted the decision of a grave question to a tribunal made up of judges of the Supreme Court, of Senators and Representatives of high character, picked men; and yet the points before that tribunal were decided eight to seven, always the same eight, always the same seven, always along the same line of division. I think there is a feeling to-day, not of reproach for, or distrust of the tribunal, but that it was hardly fair to have imposed that work on that tribunal under all the circumstances, and that it will never be repeated.

Another source of misunderstanding between the legal fraternity and experts lies in the decided difference in mental attitude with which they come to the trial of cases, a difference that often tends to produce feelings other than those of mutual respect. This can be well emphasized by quoting again from the lecture on "Medical Expertism" by a learned judge. He admits, "that there is abroad in legal circles a tacit sentiment, that for the evils of the expert system their profession is nowise responsible, and that with the medical profession rests the primary liability for all the admitted ills of this department of jurisprudence," which he attributes to differences between the mind medical and the mind legal, regarding the professions as "types respectively of the inductive and deductive in science." But, even if such a difference be admitted, there is a wider difference in the motives. We may assume that the scientific man comes into court with the mental habits of the investigator and expositor of science. There is sincerity of purpose, a mental candor, a tendency to look for truth wherever it may be found, and to conceal nothing. The true scientific man would be very awkward in advocating a proposition he did not believe, even if he could be induced to do so. He would not prove at least an adroit advocate. He notes soon that the attorney is only intent on winning his case; that Strepsiades himself could not be less indifferent to the question of right in the case. And whilst he may regard the distrust of testimony on the part of the lawyer, as fully justified, and feel that his extreme scrupulousness in admitting as uniform truth any human testimony until it has been thoroughly sifted, may be the result of habit, or be due to his larger experience with it, he becomes slowly impressed with the other fact, that he has no desire for scientific truth which does not affect his side favorably, and that he has great aversion for, and desire to repress, what might affect it unfavorably. He may become impatient of cross-examination that does not seem to be altogether in the interest of truth, and irritated by rules that control him, and that, perhaps in his judgment, distort and mutilate his testimony, and his opinion of lawyers may be affected unfavorably. That I have not done injustice to

the legal fraternity in attributing this difference of motive in dealing with scientific testimony, let me quote again from the lecture last noticed. It reads: "The lawyer discriminates between the practitioner and the expert, embodied though they be in one and the same person; at the bedside he reposes a practically unlimited confidence in the man as a physician and in his science; as an expert he regards him as a tool whose cutting edge he will employ, or dull, as exigency may require." The ground of dissatisfaction on the part of the expert seems to be displayed in that last sentence. In the trial of cases it is the art of law rather than the science of law which the scientific man comes in contact with. The practitioner and the court are concerned mainly with and solicitous about the distinctions and technicalities, the well-worn rules of practice, often *placita juris* rather than *regulæ juris*, the tools and machinery of the law, and the exercise of mental dexterity in their use and application. The rules themselves may have been formulated long before the scientific expert was known in the world of jurisprudence, and not in contemplation of him, and as far as he is concerned may not therefore be the perfection of human wisdom.

The criticism due to differences of opinion frequently exhibited by scientific experts can hardly be regarded as a serious matter by a profession characterized by differences of opinions on all conceivable points; the only settled opinions known to it being those of the court of last resort, which even claims the privilege occasionally of reversing itself. Differences of opinion among scientific experts are often doubtless due to differences in scientific character, resulting from the loose rule of admission. But there may still be honest differences between experts of highest character. I think such, however, it will be found, are rarely in regard to well-established facts, but oftener in regard to probable inferences from facts, whilst entire agreement would be marvellous in matters of theory and speculation. Courts and attorneys do not discriminate sufficiently between well-established scientific facts and scientific theories. Some of the most recent and far-reaching decisions of our highest tribunals have a basis of theory rather

than of fact. In the cases cited in the beginning three experts gave an opinion that arsenic could not be found under the circumstances, a fourth thought that it could, further opportunity alone demonstrated the correctness of the latter, and brought all the experts into accord.

So, too, the tendency of the scientific expert to usurp the functions of the jury, or even of the court, magnified so greatly by legal minds, may possibly exist as a result of his ill-defined position, or perhaps from imitation of the good judge, who is credited with tending to enlarge his jurisdiction. This should easily be corrected, with the intelligent expert, by the rules and ample power of the court. There is no time, and it is not necessary to go further into the consideration of the evils and abuses of expert testimony. Sufficient has been given to indicate that there are two sides to the question; that the expert is not altogether to blame, but that the system of jurisprudence, with feebler powers of adaptation and assimilation has had changed conditions and new material thrust upon it more rapidly perhaps than at any other period of its development. The disposition is perhaps first to complain of innovation. But that must, and will soon, give way in the case of the scientific expert, to a disposition to consider more carefully how the highest utilization of this new source of evidence can best be secured, unclouded by unnecessary conditions. It will not be an easy task. It certainly should not be done hastily, or in a revolutionary spirit, nor be trusted to inexpert lawyers or legislators; but once seriously undertaken, in the proper spirit, it will be on the way to accomplishment. Practices of which courts have grown ashamed have been radically changed in not very remote years. Some of the directions of reforms have been indicated. Whether these should come by the slow process of judicial legislation, or by statutory enactment, is matter of indifference. As the under-workman of the legislature, as the judge has not been inaptly termed, is responsible for much, much might be left with him to reform, but the process may be too slow to be satisfactory. A more rigid enforcement of a higher standard for scientific experts is certainly largely in the hands of the judge, and

as we have said would abate many of the most serious evils complained of. In this connection, the encouragement of regular professional experts might be of advantage. There is at times a disposition to disparage the scientific man who figures frequently, or professionally, as an expert, outside perhaps of medical cases. But there can be no question that such experts facilitate the trials of cases, remove many of the asperities, and economize much time. They acquire a familiarity with the rules of practice, and acquire a self-command, under cross-examination, of the most unreasonable and even exasperating character, which at times will allow it unopposed to expend its energy in useless directions in the shortest time. In a conversational discussion of this subject, the experience of a prominent attorney with a prominent scientific gentleman, who figures frequently in court as an expert, and of whose integrity, from personal acquaintance, I have no shadow of doubt, transpired. The attorney had encountered him frequently in trials. He had in cross-examination built a pen around him, as he expressed it, higher and higher, until he saw no possibility of his escape, when, in his words, he cleared the whole at a bound, and he came to regard him as impossible to trap. With a less experienced expert such examination might have been much more prolonged, than with one perfectly self-possessed, and perfectly sure of his position, and truth even might have suffered; but he could afford to allow the attorney to have his own way, seeing clearly the end from the beginning of the cross-examination. But besides the shortening of cross-examination, professional experts would greatly facilitate the procedure of the court by knowledge acquired of the character of the parties for and to whom evidence is to be given, as well as a power of presentation and exposition to suit the case. Such experts would not have to explain their meaning to a jury, and then, perhaps, have to explain the explanation.

We have seen that many of the most objectionable features of the expert witness originate in the mode of his entrance into court, and it is an allowable question, whether any modification could be made in the calling of the wit-

ness. Among the reports one judge expresses the opinion that, "expert witnesses ought to be selected by the court, and should be impartial as well as learned and skilful. A contrary practice, however is now probably too well established to allow the more salutary rule to be enforced." Another judge suggests, that the law should be so changed "that this class of witnesses should be selected by the court, and that this should be done wholly independent of any nomination, recommendation or interference of the parties, as much so to all intents as are the jurors." This would not make experts *amici curiæ* any more than before, for all witnesses should be regarded in that light, but it would be a provision, rather, to preserve that character to them, coupled as it is with a recommendation as to compensation, so intimately connected with it. It is not the fact of extra compensation, or that the compensation is paid by the party benefited by his testimony, that creates the unfavorable impression. The other witnesses are friends of the court, by whatever party they may be called, they stand upon the same footing as to pay; but here is a witness who is paid according to a private agreement, by one of the parties; the amount is their own private arrangement on which the court is not consulted, over which the court has no control, a circumstance that imparts to him, in high degree, the character of a friend of one of the parties; and these facts as to compensation are often elicited at a time, and in a way, calculated to impair otherwise valuable testimony, in the minds of the jury.

Again whilst a *subpœna* may be made to cover an expert, simply because "he is accomplished in a particular science, art, or profession," as well as a person who has from his own observation "knowledge of a fact pertinent to the issue to be tried;" and although it may command his presence, as in our State of Pennsylvania at least, without any claim for extra compensation, it cannot "compel him to examine the case, and to use his skill and knowledge to enable him to give an opinion." His testimony may accordingly only consist of impromptu answers, which may fall far short of the standard of best evidence the case is susceptible of. A

lawyer, or a judge may be considered an expert on matters of law, and yet neither would give an off-hand opinion on all questions that might arise, nor might we desire it upon questions of great intricacy, or involving grave interests. But either could in a short time, from their professional familiarity with, and ability to consult, books, give an opinion that would be perfectly trustworthy. The same is true to almost an equal extent with the scientific expert. He can give impressions, not guesses, upon points which would rise to full grade of opinions and beliefs with proper time and facilities for investigation. His knowledge from books is as much a part of the knowledge from which he is permitted to testify, as that from his own experience. It has sometimes been suggested that under the Constitution the accused has the right to compulsory attendance of expert witnesses, and yet whilst with an ordinary expert witness it might be a right with some benefit, with a scientific expert indisposed to examine the case it might be an empty, fruitless right. Such a witness, though covered by the language, could hardly have been contemplated by the Bill of Rights. Now then as the State cannot command this evidence, and it is not obtainable, in most cases at least, without compensation, the recognition of the particular character of such evidence, and the regulation of the compensation might relieve it of some of its most objectionable features. The question is not so much whether the expert should be compelled to testify, as to whether he should in some degree at least be compensated for his professional time which is his own private property, and not be afflicted because of his professional knowledge. Private property is taken for public uses continually, but in all other cases upon just compensation. There cannot be the same plea of necessity for his evidence that would make it a public duty to testify as in case of other witnesses. The latter are in possession of specific facts which happened to fall within their own knowledge, and of which no others may be cognizant. At this point of compensation the law is variable and practice unsettled. In Pennsylvania, the scientific expert is an ordinary witness in all respects. He can be

taken from one end of the State to the other on ordinary witness fees and mileage. In English practice extra compensation to a scientific expert may be taxed as part of the costs. The compensation is, however, based on the superior value of his time, rather than on the value of his services. It is not professional compensation. So in the Imperial Courts of Germany, the experts, whether of the class of permanent ones, appointed by the State, or those appointed in particular cases by the judge, can demand a certain payment, which, however, in this case also is regarded rather as a restitution in money for his loss of time, than as payment for his work. In the opinion previously quoted from Judge Redford, in regard to selection of jurors, he makes the additional suggestion to the end that experts may be appointed by the court, "that the compensation of scientific experts should be fixed by statutes or by the court, and paid out of the public treasury, and either charged to the expense of the trial, as part of the costs of the same, or not, as the Legislature should deem the wisest policy." In some of the United States, very few it is true, a move has been made in that direction. In Massachussets special compensation to experts for the defence is allowed to be paid out of the public treasury, thus insuring the effective attendance of a witness of this kind, resting not simply on compulsory process. With the regulation of the appointment, selection or employment of experts, whichever word may be used, and the question of compensation removed as far as possible from the decision of interested parties, many of the ugly features of scientific testimony will disappear, and, perhaps, much that is untrustworthy or dishonest.

In the discussion of the question more radical reforms are sometimes suggested, such as to have permanent experts appointed by the State, to be paid by the State as officers. So it has been suggested to give scientific experts determining functions independent of, or auxiliary to, the court and jury, to introduce a sort of fifth factor in judicial procedure. Any such innovations can only come with full consideration, and as time with its growing demands indicates, by process possibly of further differentiation, possibly by assimilation

of reforms suggested by other systems of jurisprudence. But, whilst it might be a pertinent question in this connection, whether similar evils are complained of and to the same extent in continental practice in Europe, too much is not to be expected from this source. Excellencies of other systems might not bear grafting on the English stock. Systems of jurisprudence are growths, not aggregations, and Bacon rated as one of the excellencies of the Common Law that it was made for the English and not for another people. Still the scientific expert is equally recent in all systems, and treatment of him in one may have valuable suggestions for others.

As I have alluded to German practice on one point, a few others may be of interest. For certain matters and lines of business permanent experts are appointed by the State, but they are are not regarded as officers, but as employés for the time being. They have no official title, nor regular salary. The payment they receive is not enough to support them, but barely compensates them for their loss of time. For most cases the expert is appointed by the particular judge in the case, often on the demand of one or the other or both parties, but the choice of the expert lies within the discretion of the judge. He may appoint any man whom both parties suggested, or may also appoint a third man not suggested by either, but if both parties unite on one man he must listen to his testimony. If a question is involved for which regular legal experts are provided, these need only be, or can be appointed. The qualifications for such a regular expert are that he should follow that particular profession or line of business habitually, and for the purpose of earning his living. The number of experts in a case is not limited by law; it rests with the discretion of the judge. The status of the expert in court is almost analogous to other witnesses, but it is not a civic duty, as with witnesses, to give evidence in court except where a profession is followed publicly and for a livelihood. The text of his oath before giving testimony is different from that of an ordinary witness; and he need not be sworn at all if both parties unite in dispensing with such qualification. The systems

of jurisprudence are so different comparisons are difficult. But there are some indications of a fuller recognition of an expert class of witnesses, but at the same time no suggestion of an expert class of Government officers.

I have thus endeavored, within the time limit of a very patient audience, to discuss the subject announced rather comprehensively and suggestively than minutely or even systematically, and I will have accomplished my purpose completely, if I have succeeded in presenting a few of its most salient features, in such a way, that the general public, outside of the professions involved, may have a juster view of the scientific expert and the position he occupies in forensic procedure, and that it may be impressed, to some degree with the fact, that the testimony of scientific experts is at present an important factor in the trial of cases, ready in the near future to add to this importance in directions we cannot even predict; that the courts are powerless to exclude or restrict it if they would; that its present status is unsatisfactory at many points, and demands the most serious consideration of all interested in the proceedings of our courts that its value be not impaired by unnecessary taint, and that the best evidence that the most advanced science has to offer is utilized in the trial of cases.