

SCIENTIFIC PROOF

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To those who have contact with the judicial process, medical science is symbolic of the whole law-science diathesis. Inept words tend to obscure the breadth of law-medicine relationships. "Medical jurisprudence" is one such term. It has been used to describe a variety of things: sometimes the application of legal doctrine to medical practice, sometimes the special applications of medical knowledge to evidentiary problems which come before tribunals of the law. The term "forensic medicine" has a nice ring, and it is used abroad to signify the specialized applications of medical science in all varieties of legal proceedings. The American synonym, "legal medicine," makes the label sharper but raises an unwarranted inference that ordinary medicine may not be so legitimate. None of these terms conveys the true spirit or full content of law-medicine relationships, which in their totality represent social synthesis and correlation of a major variety. There is no universal authority on "legal medicine." In law-medicine, as in law-science relationships, we look upon a giant mosaic built by many hands.

All rules of substantive law assume the existence of basic facts on which to operate. Let these facts be distorted in their ascertainment, and the result may be as harsh as if defective legal principles were applied to agreed facts. For that reason, one signal aid which science may extend to law lies in the range of what we may call scientific proof. By scientific proof I mean the use of those scientific means and methods calculated to enable the accurate ascertainment of ultimate facts, either as a basis for settling private litigation (evidentiary), or as a means of forming or orientating legal or social policy (jurisprudential). Scientific proof, so conceived, goes to the basis of action; it glorifies fact finding functions and mechanisms, and it sets itself against all species of distortion in ascertaining and reporting facts. Its connected findings may well form a chain of criticism leading from fact to opinion, so tight and so strong that no speculative opinion can be inserted.¹

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1. The primary ideal of scientific proof is to eliminate error and to secure truth by the use of all appropriate methods of corroboration, with accent on diverse sources and types of evidence; the eventual grading of all types of evidence according to relative probative value; development of usable criteria and safeguards in respect to each type of

In the evidentiary field, scientific proof will be found to revolve around problems of identification, problems of causation, and problems of effect. The specific content of each main series of problems differs according to the field of substantive law which gives rise to the litigation. Substantive law doctrines operate to specify the essential facts to be proven and so to determine the relevancy of particular evidence. Despite considerable overlapping in type problems and in methods, scientific proof can be broken down into categories of clinical forensic medicine, forensic pathology, and modes and mechanisms of scientific proof.

CLINICAL FORENSIC MEDICINE

Clinical forensic medicine embraces all varieties of medical practice which may yield evidence relevant to litigated issues by use of those tests and methods currently employed in diagnosing and treating patients. The expert witness is a practicing physician or surgeon, or a follower of one of the several specialties, who usually gains his evidentiary information from having examined or treated the party litigant for a non-fatal injury or disease.² As long ago as 1909, 60 per cent of the cases tried in Superior Court in Suffolk County, Massachusetts, involved expert testimony, and probably the percentage tends constantly to rise. Personal injury litigation accounts for a large fraction of these cases, but not for all of them. Practicing physicians have long been going to court as witnesses in actions brought to set aside wills or deeds for alleged mental incapacity at the time of execution, or to testify in criminal proceedings on the subject of the defendant's mental responsibility.

The Problem of Expert Testimony

Difficulties arising from the impact of law and science are caused in part by stupid or antiquated rules of evidence. In many states, as a result of ill-conceived "privileged communication" statutes, an unscrupulous patient can obstruct justice by closing the mouth of his doctor on the witness stand.³ In most states, the hearsay rule has been carried too far.

evidence; promotion of complete understanding among courts, lawyers and experts of the pitfalls and potential errors of each species of evidence in order to enable wise cross-examination; development of appropriate legal mechanisms and modes of trial; repression of preconceptions and psychological predilections in the trial process and accentuation of the logical and scientific aspects of evidence. See Smith, *Components of Proof in Legal Proceedings* (1942) 51 YALE L. J. 537.

2. On occasion he may derive his opinion from examinations first made in the course of preparing himself to testify in court. Still again, under our practice, if he is properly qualified, he may express an expert opinion on the basis of hypothetical questions put to him by counsel, even though he has no personal knowledge of the case.

3. See Chafee, *Privileged Communications: Is Justice Served or Obstructed by Closing the Doctor's Mouth on the Witness Stand?* (1943) 52 YALE L. J. 607, 18 ANNALS OF INT. MEDICINE 606.

In others the cause of scientific proof has been obstructed by holding that taking involuntary body fluid or blood specimens violates the constitutional guarantee against self-incrimination or against unlawful search and seizure.⁴ These major vices in technical rules of evidence may soon go down before the frontal attacks of progressive legal scholars.⁵

Part of the difficulty in utilizing expert testimony springs from inadequate legal and trial mechanisms. The lay jury is not qualified to determine scientific issues and much of the continuing friction springs from this maladjustment of the trier of fact to the questions he decides. At the present moment, the doctor who goes to court as a witness is made a participant in a fast-moving adversary proceeding where a premium is put on quick thinking and categorical responses, and the devil usually gets the hindmost. If he shows a respectable doubt, his testimony is "conjectural!"; if he is naïve, he may be trapped; if he has not the precious power of simplification and the benefit of jury neutrality or sympathy, he may be misunderstood or misbelieved. If he is an expert on internal medicine, he may have to stand collateral cross-examination on the configurations of the tibia or some other bone which has no relation to his proper testimony. He may have to conform what should be a conditional answer to a "yes" or "no" because of the pernicious hypothetical question system.⁶ The medical man is primarily interested in treating and healing and is accustomed to having his opinions received with deference and respect. If, as it is said, five per cent of doctors now do most of the testifying in court, it is no matter for surprise.

Free selection of medical experts by parties litigant has tended to encourage "shopping around" for favorable experts, and this partisan bias is oftentimes more subtle than outspoken. Courts have plodded along, quite willing to recognize any holder of an M.D. degree as a universal expert on science. This naïveté is surprising, for the same judge who rules a general practitioner competent on his qualifying or voir dire examination, will take the train for Mayo Clinic if he stands in personal need of specialized surgery.

The truth is that legal or forensic medicine calls for a type of knowledge and opinion that is often peripheral and new to the doctor's way of thinking. He has observed conditions and studied medicine principally

4. See Ladd and Gibson, *Legal-Medical Aspects of Blood Tests to Determine Intoxication* (1943) 20 VA. L. REV. 749, 18 ANNALS OF INT. MEDICINE 564.

5. See Morgan, *Suggested Remedy for Obstructions to Expert Testimony by Rules of Evidence* (1943) 10 U. OF CHI. L. REV. 285, 1 CLINICS 1627. See also, Chafee, *loc. cit. supra* note 3, and Ladd and Gibson, *loc. cit. supra* note 4.

6. In the Tuckerman will contest, tried before Judge McKim in Suffolk Probate Court (Mass.), attorney Robert M. Morse put to Dr. Jelley, a psychiatrist, what is reputed to be the longest hypothetical question on record. It concerned the mental condition of the testator, contained twenty thousand words and required three hours to pound. The witness answered: "I don't know." (1907) 5 OHIO L. REP. 45.

in terms of therapeutics. He may have no justifiable opinion as to whether injury can produce a certain disease or as to the terminal effects in point of disability. If he has gone to court to accommodate an old patient, and is qualified on voir dire examination as a thorough-going expert, he may find it hard to confess the limits of his knowledge.

Suggested Remedies

(1) The Need for Expert Referees.

The relation of injury to disease (proximate causation), and the assessment of terminal disability (fixing damages), pose scientific problems which should be settled by expert referees—medical specialists drawn from select panels. No lawyer need fear his immolation with advent of this change, for he would still participate in the informal hearings of the referees and have opportunity for his witnesses to be heard. The adversary system would be preserved, but with heavier accent on discovery of the true facts. Litigants could be hospitalized by the referee, examined by him or any of his nominees and studied with scientific precision. The referee could be both a doctor and a lawyer acting to see that evidence was fully developed while protecting fair hearing to the parties and the substance of major rules of evidence. All observations and findings would be reported in a "record," with conclusions listed in a separate section so as to permit review of the medical evidence. This review should be made by an appropriate medical expert serving as adviser to the trial judge when the latter has the medical record presented to him for "confirmation." Once confirmed, the medical findings should be final and not subject to disturbance by an appeal court. Confirmations could be resisted or set aside on grounds of fraud, accident, or mistake, but here the trial judge would lean on his medical adviser. It is eminently desirable to restrict review of medical findings to the trial court where proper access can be had to the litigant for re-examination.⁷

This device should be the ultimate goal of American jurisprudence. It would soon break the hold of mere advocacy and of shabby or ill-informed testimony. It would leave doctors to judge the testimony of doctors, eliminate futile efforts of the expert to descend to the lay juror's comprehension, and whet the interest of all socially minded doctors in the judicial process. Although the prospect of speedy reform is diminished by possible resistance of plaintiffs' lawyers, this fear should give way once the trial lawyer realizes that substantial verdicts will still be obtainable for genuine injury and that claims based on fraud and malingering will be

7. This device would permit a much closer surveillance of the excessiveness or inadequacy of monetary awards. The present appellate practice of determining whether the judicial conscience is "shocked," by looking to see what other courts have upheld in supposedly similar cases at other times and places involves several undesirable factors. It is not possible to make "book comparison" of any but the simplest injuries.

sifted out. The chief and perhaps insurmountable barriers to its realization, however, are constitutional guarantees of jury trial.⁸

(2) Transitional or mid-way reforms not involving constitutional amendment.

A. Impartial experts appointed by court. A transitional reform would be some variety of statute authorizing a trial judge to appoint an impartial and qualified man or commission to investigate the physical condition or mental status of a party litigant. Such appointee would act as an officer of the court, and not as a privately employed expert. The device would help escape partisan pressure, give the trial judge a chance to bring in authoritative consultants, and protect the purity of proof in several directions. But it would have the defect of keeping lay jurors as final arbiters of scientific issues. It is shocking for the layman to hear that in many of our states, as in Texas,⁹ a trial court cannot appoint an impartial expert in a personal injury case to examine an unwilling plaintiff. Such a claimant can carry his case through court, to what may be a large verdict, with the defendant unable to secure independent confirmation of the reality and extent of injury. Fortunately the majority view is contrary, whether reached by common law, by statute, or under reformed rules of civil procedure, such as the Federal Rules of Civil Procedure.¹⁰ Massachusetts, one of the first states to provide for pre-trial examinations of psychiatric cases by impartial experts,¹¹ has found that this method goes far to cure old evils.¹²

B. Certification of expert witnesses by medical profession as aid to voir dire examination. The medical profession itself can add some straws to this broom. One who proposes to use a witness as an expert must establish his qualifications by preliminary questions. Opposing counsel may cross-examine the alleged expert to test his claims to special knowledge. At the conclusion of this voir dire examination, the trial judge must say whether the witness is a properly qualified expert, and his ruling will not be set aside except for substantial abuse of discretion. The medi-

8. Due process clauses, properly construed, require only a fair and regular mode of procedure and trial, and this need not be by jury. As to whether jury trial can be validly dispensed with in the trial proper of a criminal case, however serious the offense, see MCGOVNEY, *CASES ON CONSTITUTIONAL LAW* (2d ed. 1935) 568, n. 7. Most state constitutions have specific provisions which operate to preserve the right to trial by jury in cases where it existed at common law.

9. See *Austin & N. W. R. R. v. Cluck*, 97 Tex. 172, 77 S. W. 403 (1903). This is not because a defendant has no right to the evidence, says the court, but because no legal sanction exists for compelling the plaintiff to submit.

10. 48 STAT. 1064 (1934); 28 U. S. C. § 723c (1940).

11. See MASS. ANN. LAWS (Michie, 1942), c. 123, § 100 A. (The so-called "Briggs" law).

12. See Overholser, *The Briggs Law of Massachusetts: A Review and an Appraisal* (1935) 25 J. CRIM. L. & CRIMINOLOGY 859.

cal profession itself could issue certificates of competency to its several members in respect to testimonial qualifications. If a general practitioner appeared in court as an authority on neurosurgery, a little probing would soon show that his own profession did not regard him as a proper expert witness on that subject. The intelligent trial judge, on conclusion of the voir dire examination, could rule the proffered witness incompetent with little fear of reversal by an appeal court.¹³ Even if the witness were allowed to testify, the lack of a certificate would be a proper subject for comment in arguing upon the weight which the jury should accord his testimony. No statute would seem to be necessary to enable this salutary innovation, although legislation empowering state licensing boards to issue such certificates after due hearing would be preferable. In no case should the doctor who personally treated a patient be debarred from testifying. The prime purposes of the certificate method would be to grade competency and to exclude unqualified persons from giving opinion evidence.

C. Surveillance of expert testimony by professional "auditing" committee. At present some medical witnesses are venturing opinions in court which they would not assert before medical societies. This double standard, when it exists, deprives courts of the scientific light they should have. When a doctor testifies that the moon is made of green cheese, as occasionally happens, he is either dishonest or ignorant, and should be disciplined by his professional brethren. In the past there has been no proper surveillance. Civil trials are attended by little or no publicity, and the improper medical witness has not had to face the just light of competent criticism. In the science of medicine there is much room for honest difference of opinion and for varying clinical judgments on open subjects. But ultimately we come to outer limits of these justifiable differences, and no man is entitled to palm off as certainty what medical science itself knows to be purely conjectural and as yet without adequate proof, experimental or clinical. The test of improper testimony should be this: Would medical men competent to speak on the subject in question consider the evidence given by Dr. X an acceptable view, scientifically, or would they consider it a prostitution of professional standards?

Each state medical society could appoint an auditing committee, including one member of the bar, to sample transcripts of medical testimony at periodic intervals in the medico-legal cases which reach the appeal courts. Witnesses found to have departed from professional standards would be subject to disciplinary action for cause, after due hearing, or to revocation or curtailment of their certificates as competent expert witnesses.

13. Even if initially he has ruled the witness is competent, the trial judge may reverse his ruling in the course of trial and intercept further questions when the trend of testimony shows the alleged expert to be incompetent. See *Carbonneau v. Lachance*, 307 Mass. 153, 29 N. E. (2d) 696 (1940).

The mere presence of this real censorship mechanism would be as valuable as its actual use.

Problems of Mental Responsibility: Rules in McNaghten's Case

In 1843, the House of Lords of the English Parliament called upon the learned judges to deliver an advisory opinion laying down proper tests for determining mental responsibility whenever a defendant prosecuted for homicide should raise the plea of insanity. In the previous year, McNaghten had been tried for killing Edward Drummond, whom he shot in the back, mistakenly believing he was firing upon Sir Robert Peel. Drummond was Peel's private secretary, and McNaghten was led to this violence by clearly substantiated delusions of persecution. He was tried before Chief Justice Tindal, filed a plea of lunacy, and was acquitted by the jury, which returned a verdict of "not guilty, on the ground of insanity." The case provoked so much discussion in high quarters that the judges were called upon to declare, for guidance of courts in future cases, what a defendant must prove in a homicide prosecution to establish mental irresponsibility for his act. With frank temerity, the judges laid down certain principles regarding proof of mental irresponsibility sufficient to constitute a defense to a charge of murder (or other crime).¹⁴

First, the jurors should be instructed that every man is presumed to be sane until the contrary is proved. Secondly, it must be clearly proved that the person attempting to establish insanity as a defense was "labouring under such a defect of reason, from disease of the mind, as not to know the nature and quality of the act he was doing; or, if he did know it, that he did not know he was doing what was wrong. . . ." ¹⁵ And lastly, if the person accused was laboring under a partial delusion only, but knew that he was committing a crime, insanity should not be a valid defense. It will be noted that the justices did not recognize "irresistible impulse," or inability to refrain from the criminal action indulged, as any defense, so long as the actor still retained the ability to distinguish right from wrong. Moreover, the concept of attenuated responsibility was not recognized and the psychopathic personality was entirely ignored.¹⁶

14. McNaghten's Case, 10 C. & F. 200 (H. L. 1843).

15. *Ibid.*

16. Although one may suppose that the psychopathic personality had not then been recognized as a psychiatric entity, medical men in England as early as 1829 had demarcated the condition from irresponsibility or insanity due to disease. See SAMPSON, CRIMINAL JURISPRUDENCE IN RELATION TO MENTAL ORGANIZATION (1841) 7. Benjamin Rush, father of American mental science, was one of the first to point out that disorders of the moral sentiments may be congenital and equivalent to partial imbecility, and he suggested that "moral imbecility" better described such cases than did the term "moral insanity." See RUSH, MEDICAL INQUIRIES AND OBSERVATIONS UPON THE DISEASES OF THE MIND (1812).

These rules, pronounced with misgivings, did a great deal to undermine law-medicine relationships. A host of psychiatrists, such as Emil Kraepelin, advanced the description of clinical entities in the field of psychiatric disorders, but the rules in *McNaghten's* case remained static. They were assaulted by such psychiatrists as Maudsley and criticized by such criminal law writers as Stephens. They were studied by Select Reform Committees in England and impugned in America by Sheldon Glueck¹⁷ and other criminologists. Yet English courts steadfastly continue to pay lip service to *McNaghten's* rules. Most American courts have done likewise, except for those jurisdictions which have broadened the original categories to include the further exculpatory ground of irresistible impulse of one kind or another. English judges were undoubtedly keenly aware of the subtle gradations in mental responsibility,¹⁸ and we cannot believe that they had no inkling of the disparity between the legal and medical approach to mental disease. The truth is that *McNaghten's* rules are not philosophical concepts, but mere products of the mode of trial under our adversary system. Lay jurors have long had the responsibility of passing upon the weight and credibility of expert testimony.¹⁹ Before a lay judge can frame an intelligible charge for the guidance of lay jurors, he must be able to carve out some rule-of-thumb classifications or categories which these jurors can apply to the evidence to be valued. Immediately we import a forced certainty of statement into a realm which is essentially uncertain and variable.

This practical problem of proof has much to do with the unwillingness of English courts to embrace the doctrine of irresistible impulse. There

17. See GLUECK, *MENTAL DISORDERS AND THE CRIMINAL LAW* (1925).

18. See HALE, *THE HISTORY OF THE PLEAS OF THE CROWN* (1736).

19. In Roman law we find evidence that scientific issues were referred to expert referees for decision. See D. 25.4.1 pr. References to use of experts in the Roman legal texts can be found in WETZELL, *SYSTEM DES ORDENTLICHEN CIVILPROCESSES* (1878) 528, n. 11. In canon law it has long been customary for the judge in matrimonial cases involving alleged impotency or non-consummation of the marriage, to establish the facts by ordering bodily inspection of one or both parties by court-appointed experts. See GASPARRI, *CODIX JURIS CANONICI* (1942 ed.).

The early common law provided a writ for a jury of matrons *de ventre inspiciendo* in proper matrimonial causes. (BRACON, *DE LEG. lib. ii fol. 69*). Indeed, throughout the fourteenth century in London, courts used special juries of experts drawn from a particular trade to hear causes involving trade disputes. See RILEY, *MEMORIALS OF LONDON: AND LONDON LIFE IN THE 13TH, 14TH AND 15TH CENTURIES* (1868).

These facts are the more significant when we realize that the jurors originally heard no witnesses and were themselves free to go about investigating the facts both before and during the trial. Not until the middle of the fifteenth century did it become customary to summon witnesses. It was not until after 1600 that the direct and influential use of experts began to succumb to the present evidentiary restrictions, scientific proof became merely advisory to the lay jury, and reduced to the status of open competition with lay testimony. See HAND, *Historical and Practical Considerations Regarding Expert Testimony* (1901) 15 HARV. L. REV. 40.

is no doubt that violent disappointments in love and other psychological pressures can drive a person to inhuman conduct as irresistibly as disease.²⁰ But English courts have been afraid to get out on these uncharted seas, where all criteria are dim, and degrees of responsibility are not provable by objective evidence. They have not paid so much regard to the paralysis of volition, as to the suspected tinge of culpability in allowing oneself to take the first step. Thus, one who voluntarily partakes of alcohol and kills in a drunken rage may, if he lacked the required malice aforethought or specific criminal intent, have his offense mitigated from first to second degree murder or to manslaughter; but in most jurisdictions he cannot set up his drunken state as a complete defense and thereby gain acquittal.²¹ If his voluntary intoxication leads to the independent disease of delirium tremens, and as a result of an automatic state induced thereby, he kills another, he has a complete defense.²² The culpable first step has merged into a disease state which human agency cannot control, and furthermore there is a guarantee of authenticity when the aberrant mental state is a familiar symptom of a standard disease.

One cannot fairly say that currently the English courts reject "irresistible impulse" in toto; possibly that defense has full vitality in England in all cases where transient mania, or irresistible impulse, is the explosive symptom of an ascertainable, pre-existing disease such as delirium tremens, epilepsy, or one of the psychoses.²³ It is at the brink of mere psychologic motivation that the English courts draw back, and there is much to be said for their hesitancy if we orientate rules by practical considerations of sound proof-making.

The conflict we have here between current law and good psychiatry does not arise from obtuseness of the legal mind, nor from any desire of law to poach upon medical preserves, but from understandable consequences of trial by jury. Assume lay jurors are to continue trying scientific issues, and you will find a natural and understandable hesitancy about giving up the pat, albeit illusory certainty of *McNaghten's* rules. Arrange for lunacy problems to be delegated to psychiatrists acting as expert referees, and this delegation will draw after it a conceded right to erect new

20. See PROAL, *PASSION AND CRIMINALITY* (1906).

21. See Singh, *History of the Defence of Drunkenness in English Criminal Law* (1933) 49 L. Q. REV. 528. For American decisions see E. V. R., *Intoxication in Mitigation of Homicide* (1941) 2 Q. J. OF ALCOHOL 396.

22. See *Regina v. Davis*, 14 Cox Cr. Cas. 563 (1881).

23. Frequently these cases involve such "automatism" as to deprive the actor of knowledge of "the nature and quality of his act," or the mental state is such that experts do not hesitate to say that the accused was unable "to distinguish right from wrong." Opinions of the higher English courts have not yet covered irresistible impulse, as a third category, in a satisfactory or definitive way. Nevertheless we cannot overlook the fact that in 1924 the House of Lords defeated Lord Darling's "Criminal Responsibility Bill" intended to establish irresistible impulse due to mental disease as an additional legal defense.

criteria suitable to guide the new trier of fact. In the judicial process, definitions have but one function—to serve as sign posts for the trier of fact. Those who would destroy *McNaghten's* rules should make a flank attack rather than a frontal assault, by seeking legislation designed to make the accredited psychiatrist an expert trier of fact in lunacy issues.

When we turn to the law in action in England, we discover that *McNaghten's* rules do not work oppressively as against a particular defendant. One would imagine that few prisoners could prove a defense of lunacy. In practice the fact is otherwise, and it would appear that the jury uses its verdict of "guilty, but insane" in a generous manner, sometimes to save from capital punishment prisoners not believed to be free agents or grossly culpable in committing the crime. A table issued by the Committee on Insanity and Crime indicates that from 1901 to 1922 approximately 33 per cent of the persons on trial for murder in England and Wales were adjudged insane, while 20 per cent of those indicted for murder in Scotland were declared insane.²⁴

Even if a defendant has been convicted by a jury due to literal application of *McNaghten's* rules, the Criminal Appeal Act of 1907²⁵ gives the English Court of Criminal Appeal power to hear new evidence in reviewing the conviction,²⁶ and the further power to override the jury's verdict.²⁷ The court has exercised this jurisdiction sparingly, but it is a not uncommon thing for the court in affirming the conviction within the framework of *McNaghten's* rules to invite intervention by the Home Secretary.²⁸ Under the Criminal Lunatics Act, 1884,²⁹ the Home Secretary is empowered after conviction and before execution of sentence to intervene, appoint a committee of medical men to determine the prisoner's present sanity, and to substitute commitment in an asylum in lieu of the court penalty. In this investigation, the medical men apply psychiatric standards as they would in studying any other case recommended for commitment under a lunacy certificate. We now have the somewhat farcical spectacle in England of courts paying continued lip service to *McNaghten's* rules because of respect for precedent and practical problems of proof raised by jury trial, yet inviting an auxiliary administra-

24. See Report from the Select Committee on Capital Punishment, House of Commons (1929-30) 36.

25. 7 Edw. VII, c. 23.

26. Exercised in *Rex v. Holt*, 15 Cr. App. R. 10 (1920).

27. As in *Rex v. Hopper*, 11 Cr. App. R. 136 (1915). In *Rex v. Beard*, 14 Cr. App. R. 110 (1919), the defendant while intoxicated raped a girl and apparently strangled her to death by accident. A jury verdict of murder was reduced on appeal to manslaughter because of error in the trial court's charge.

28. See *Rex v. Boss*, 16 Cr. App. R. 71 (1921); *Rex v. Lumb*, 7 Cr. App. R. 263 (1912).

29. 47 & 48 Vict., c. 64.

tive agency to step in and apply modern psychiatric tests after the court is done.

Unfortunately in many American states we have not been so adroit in developing escape mechanisms for *McNaghten's* rules; most often we have preserved the substance as well as the facade. The time has come in both countries for recognizing psychiatric appraisal of court cases as a problem to be farmed out to expert referees.

Medical Criminology and Penology

Despite the deep interest of lawyers and doctors in the basic cause of crime,³⁰ there has been no national law passed providing for uniform examinations, consistent classification of offenders, or centralized collection of statistics analyzing criminal conduct, its antecedents, pattern and sequelae. Even in the detailed judicial statistics of England one cannot find such data. There is a need, too, for the medical penologist, since studies of prison populations should go beyond etiology of crime to the formation of enlightened decisions regarding proper segregation of prison inmates and their fitness for parole.³¹ At the moment, no one test or examination seems adequate to provide the desired personality blueprint, and improvement of methods is one of the central problems in this field.

In going through medical literature, one observes certain recurrent flaws in many studies dealing with relation of mental defects to crime. The investigator often fails to enumerate associated mental defects. A recent patient in Boston City Hospital, who had been in prison several times, was a chronic epileptic, suffered from delirium tremens from long indulgence in alcohol, and was a psychopathic personality. Each of these defects has an independent relation to criminal propensity, and it would be misleading to list the subject merely as an epileptic. In some cases a proper doubt may arise as to the adequacy of the test methods. And frequently the investigator does not correlate the particular defect or mental state with commission of the crime. To be considered significant in point of etiology, the defect should have been a substantial cause of the dereliction.³²

30. See FINK, *CAUSES OF CRIME* (1938).

31. For an excellent study of this type, see Branham, *The Classification and Treatment of the Defective Delinquent* (1926) 17 J. CRIM. L. & CRIMINOLOGY 183. For an important earlier study, see Glueck, *A Study of 608 Admissions to Sing Sing Prison* (1918) 2 MENTAL HYGIENE 85. Rockefeller Foundation has carried out important surveys of prisoners in various institutions of the several states.

32. A model study in this regard is the critical analysis by Dr. W. Norwood East of the main and subsidiary causes of attempted suicide, based on his personal examination and investigation of one thousand consecutive cases admitted to Brixton prison, in England. See EAST, *MEDICAL ASPECTS OF CRIME* (1936) 141.

It is safe to say that mental disease is very rarely a sole cause of criminality.³³ That mental defect usually is only one of several multiple causes of crime is suggested by a rather neat comparison. Various studies show that mental defect has some relation to the etiology of major crimes of violence in a substantial percentage of cases.³⁴ Studies of the inmates of mental institutions, on the other hand, show a markedly lower incidence of such behavior.³⁵ Part of this difference is due to repression, segregation, careful guarding by hospital personnel, but much of it seems fairly attributable to the fact that the inmate is now unable to become involved in those social transactions which give rise to the multiple stimuli that propel toward criminal behavior. Protect the lower fraction of the social structure from the fierce pressure of a competitive system, alleviate the distorting and disturbing tensions which the less than average person feels, treat criminality by curing widespread maladjustments, and it is reasonable to believe that there will be a sharp fall in crime and in admissions to mental institutions. Deterioration of the inadequate personality is partially a symptom of a social organization not fully adapted to protecting its weaker members.

On the horizons of medical criminology, we can see an approaching emphasis on functional studies. In 1929, Berger published his first paper describing the action currents or "brain waves" given off continuously by the cerebral tissue.³⁶ The electro-encephalogram is a graphic tracing of these waves which can be made by a competent laboratory technician, without risk of injury to the patient. Dr. William Lennox and Dr. F. A. Gibbs and his wife, among other leading workers, have been amassing

33. See Nolan, *Some Characteristics of the Criminal Insane* (1920) 5 STATE HOSPITAL Q. 362, for a table showing distribution of crimes among clinical diagnoses of 649 persons admitted to an institution for the criminally insane in New York.

34. Dr. A. Warren Stearns, during his tenure as psychiatrist of Massachusetts State Prison, made an intensive study of 100 prisoners, 58 of whom had been convicted of manslaughter, 39 of second degree murder and 3 of first degree murder. He found that 20 per cent were drunk when the crime was committed, and that "twenty of the series showed well marked departure from normal mental condition, nine being definitely insane, three feeble-minded, eight presenting personality disorders of so gross a character as to limit their responsibility." Stearns, *Homicide in Massachusetts* (1925) 4 AM. J. OF PSYCHIATRY 725.

35. See Elwell, *Epilepsy as a Defense for Crime* (1890) 8 MEDICO-LEGAL J. 55. Elwell found that very few homicides were committed in the asylums of Ohio, or of other states, and drew the conclusion that not one out of a thousand of those who commit murder are actually insane, but become conveniently afflicted with mental disorder for purposes of trial. It is interesting to note that Dr. Walter Channing, responding to the author's questionnaire, took sharp issue with this opinion and cited experience of the New York courts in support of his contrary belief that an appreciable percentage of homicides are committed by insane persons. *Id.* at 61.

36. Berger, *Ueber das Elektroencephalogramm des Menschen* (1929) 87 ARCH. F. PSYCHIAT. 527.

great numbers of normal and abnormal tracings for some years to the end of developing criteria of interpretation. Abnormal waves emanating from a particular region of the brain help localize a suspected brain tumor. The workers mentioned postulate that epilepsy, one of the most enigmatic diseases, must be considered to be a cerebral dysrhythmia with characteristic "brain wave" patterns.

The implications for scientific proof, present and future, of this line of research should be clear. For instance, we have long known medically that some persons afflicted with epilepsy may commit violent crimes during phases of the disease which momentarily destroy their mental responsibility. The epileptic may commit such a crime during a disoriented state of "epileptic furore" or frenzy; he may commit it during the post-seizure "clouded" state when his sensorium is radically deranged but he is nevertheless able to walk and perform actions as in a dream. Again, in lieu of his usual convulsion or lapse of consciousness, the epileptic may have a substituted attack called a "psychic equivalent," during which he is temporarily disoriented but may appear outwardly normal except for a glassy stare, a certain incoherence of speech and slightly incongruous conduct. While in the grip of one of these states, the epileptic is subject to so-called automatism, and may perform involved acts and fairly complex crimes without insight or power to abstain. We do not understand all the mental phenomena involved here, but we can say, if the case is genuine, that the unfortunate perpetrator of the homicide at the time of his conduct was both unable to *appreciate the nature and quality of his act* (the more basic test under *McNaghten's* rules) and to *distinguish right from wrong*.

When the defense of epilepsy is injected,³⁷ two important problems of scientific proof arise: (1) is the defendant a true epileptic or is the

37. English cases: *Rex v. Hadfield*, 27 How. St. Tr. 1282 (1800) (psychotic deterioration of epilepsy originally due to war head injury; not guilty by reason of insanity); *Rex v. Bowler*, 54 Annual Register 309 (1812) (convicted); *Rex v. Boss*, 16 Cr. App. R. 71 (1921) (conviction affirmed); *Rex v. Fryer*, 24 Cox Cr. Cas. 403 (1915) (guilty but insane); *Rex v. Perry*, 14 Cr. App. R. 48 (1919) (conviction affirmed; the epileptic state must have been operative at the time of the act in such way as to destroy mental responsibility). See also Berkeley-Hill and Owen, *Post-Epileptic Automatism as a Defence in a Case of Murder* (1930) 55 J. ROYAL ARMY MED. CORPS 54.

American cases: *Commonwealth v. Snyder*, 224 Pa. 526, 73 Atl. 910 (1909) (conviction affirmed; mere fact that accused was an epileptic creates no presumption of insanity or mental irresponsibility); *People v. Barberi*, 12 N. Y. Cr. R. 89, 423, 47 N. Y. Supp. 168 (Sup. Ct. 1896) (trial court charge: epilepsy must have been operative at time of act in such way as to destroy mental responsibility of defendant at time he acted); *People v. Magnus*, 92 Misc. 80, 155 N. Y. Supp. 1013 (Sup. Ct. 1915) (conviction reversed because undisputed medical testimony showed act was committed during epileptic seizure); *Oborn v. State*, 143 Wis. 249, 126 N. W. 737 (1910) (conviction affirmed; mere proof of epilepsy is not proof of insanity). See also: *Olden v. State*, 176 Ala. 6, 58 So. 307 (1912); *People v. Tucker*, 11 Cal. (2d) 271, 78 P. (2d)

history of past "fits" fabricated, and (2) assuming the defendant is a true epileptic, was his epilepsy so operative at the time of the alleged criminal act as to destroy mental responsibility? Since there are thought to be 600,000 epileptics in the United States alone, it is easy to see that an epileptic may commit a deliberate murder during a lucid interval between seizures and try to escape criminal penalties by falling back on a false plea that the conduct occurred during a period of "automatism." The first problem can usually be solved by application of the electro-encephalogram. The prisoner might have no spontaneous seizures during his surveillance in prison. But in the laboratory he can be asked to hyperventilate (prolonged rapid breathing) or innocuous materials can be given without risk of bodily injury for the purpose of making the latent epilepsy patent, so that diagnostic tracings of the peculiar brain waves may be recorded by the electro-encephalogram. The second question cannot be answered conclusively in this way, even though the presence of true epilepsy is so established. This is because epileptics are orientated and mentally responsible in the interim periods and seizures may be separated by long intervals.³⁸

It is characteristic of genuine "epileptic" crimes during states of automatism that the actor has an amnesia, or loss of memory, for most or all of the transaction. One must investigate every circumstance of the crime and weigh every shred of evidence. Usually such crimes are violent or brutal, sometimes they are spontaneous, but craftiness may be used. Often the act is committed without plausible motive, often against a loved one rather than an enemy, and there is lack of caution as to the time, place

1136 (1938); *Taylor v. United States*, 7 App. D. C. 27 (1895); *Quattlebaum v. State*, 119 Ga. 433, 46 S. E. 677 (1904); *State v. Wright*, 112 Iowa 436, 84 N. W. 541 (1900); *Roop v. Commonwealth*, 201 Ky. 828, 258 S. W. 667 (1924); *State v. Klinger*, 46 Mo. 224 (1870), *appeal dismissed*, 13 Wall. 257 (U. S. 1871); *State v. Hayes*, 16 Mo. App. 560 (1885); *State v. Pennington*, 146 Mo. 27, 47 S. W. 799 (1898); *State v. Maioni*, 78 N. J. Law 339, 74 Atl. 526 (1909); *State v. Ehlers*, 98 N. J. Law 236, 119 Atl. 15 (1922); *People v. Furlong*, 187 N. Y. 198, 79 N. E. 978 (1907); *Coffey v. State*, 60 Tex. Cr. R. 73, 131 S. W. 216 (1910); *Zimmerman v. State*, 85 Tex. Cr. R. 630, 215 S. W. 101 (1919); *Batchan v. State*, 104 Tex. Cr. R. 398, 284 S. W. 549 (1926); *State v. Clark*, 156 Wash. 47, 286 Pac. 69 (1930).

38. It must not be assumed that all epileptics are likely to commit crimes. The author doubts the authenticity of the "epileptic mechanism" in many cases from medical literature. Dr. H. Houston Merritt has followed thousands of epileptics in the clinic and he believes that criminal conduct among these persons is a rare phenomenon. This is the belief, also, of Dr. Winfred Overholser, well-known forensic psychiatrist. (Personal communication). Dr. A. Warren Stearns, widely experienced forensic expert, has come to the conclusion that most alleged epileptic "amnesia" is simulated. (Personal communication). It is interesting to note that Ernst in studying etiology of crime in violent criminals concluded that epilepsy was an infrequent factor. ERNST, *UEBER GEWALTTAETIGKEITSVERBRECHER UND IHRE NACHKOMMEN* (1938).

or means taken to avoid detection. Some of these indicia of a genuine epileptic crime may be missing. If one can show that the amnesia is simulated, not genuine, this is persuasive evidence that the defendant's whole version of "automatic conduct" is sheer fabrication.³⁹

Recently the electro-encephalogram has been used in England in two murder trials involving the defense of epilepsy. The prisoner had not experienced convulsive seizures in prison while under surveillance. The electro-encephalogram, however, proved conclusively that he had the disease, and this corroborative evidence, coupled with other proof, caused the jury to return a verdict of "guilty, but insane."⁴⁰ We may expect to see the electro-encephalogram used increasingly in murder trials in an effort to buttress a plea of insanity by showing the prisoner has grossly abnormal brain waves. Courts must be careful, however, not to permit extravagant claims founded upon uncritical interpretation, for cerebral dysrhythmia is a symptom, and medical science is not yet ready to say what every given tracing implies.

There are other developments in prospect in the field of medical criminology. The American Prison Association is working toward adoption of uniform classifications in studying mental defects and diseases of prisoners. More adequate methodology should be devised, and with the eventual advent of centralized statistics, comparative data on the relationship of disease to crime will be available. More voluminous court statistics and special studies by competent medical men or social workers should narrow the gap of inference by providing trustworthy reconstructions of the causes of the particular crime, after the fashion of East's able example.⁴¹ The surge may move forward to the realization of a profession of medical penology with the opportunities and compensation desirable to attract the ablest men.⁴² Finally, more careful thought should be given to segregation of prisoners according to behavior patterns, and their likely interactions, the device of parole should be used more effectually, and far more attention should be given to early discovery of pre-delinquency and of potentially dangerous psychopathic personalities so that proper mechanisms for preventing crime can be put into operation.⁴³

39. See Lennox, *Amnesia, Real and Feigned* (1943) 10 U. OF CHI. L. REV. 298, 99 AM. J. OF PSYCHIATRY 732.

40. See Middle Templar, *From an English Office Window* (1942) 20 CAN. B. REV. 794, 798.

41. See note 32 *supra*.

42. See Roche, *The Pennsylvania Plan (Intramural Training in Penal Psychiatry)* [1939] PROC. AM. PRISON ASS'N 315.

43. See Thom, *Irresponsibility of Juvenile Delinquents* (1942) 99 AM. J. OF PSYCHIATRY 330.

FORENSIC PATHOLOGY

This aspect of scientific proof makes use of the fact that most diseases, injuries, and irritants produce characteristic changes in the tissues of the organs or structures affected. These diagnostic changes may be discovered by gross inspection at times, or they may call for preparation of tissue sections, embedded in paraffin blocks, cut into thin slices, mounted on slides and so stained as to bring out architectural patterns for study under the microscope. Pathology, or the morphology of body tissues changed by disease, injury, or irritation, has long been a foundation subject of the medical curriculum. The forensic pathologist, ideally, is a medical man who has specialized in pathology in hospital practice until he is able to diagnose apparent cause of death due to disease. He then has acquired knowledge of those many special techniques which enable a proper expert to establish the identification of persons,⁴⁴ to estimate the time of death, to infer the type of weapon used, to distinguish suicide from homicide, in short, to aid the administration of criminal justice by an expert opinion regarding "how, when and by what means the decedent came to his death or injury."

Most of these studies presuppose a post-mortem examination of a dead body, but actually the contribution of forensic pathology includes a wide range of clinical and laboratory tests which might be applied in other cases. Properly drawn laws would call this science into broader play in non-fatal injuries or accidents. Who, for instance, is apt to have a more reliable grasp of the relationship of trauma to disease than the pathologist?⁴⁵ In many medico-legal cases where the nature of a disease is in doubt, we turn to the pathologist to find the answer by studying a lymph node or other bit of tissue invaded by the disease. This diagnostic specimen is obtained by the virtually riskless expedient of removing a sample of test material from the patient by the minor procedure known as "biopsy." The probative value of such evidence is so high that in all those usual cases where the surgical risk is trivial, persons who claim to suffer from cancer as a result of injury probably should be required to submit to diagnostic biopsy as a reasonable requirement of proving the disease.

At the moment, forensic pathology is highly developed in some quarters as a scientific pursuit, but its proper application is crippled by the fact that its legal utilization is through the antiquated coroner's office. In seven

44. Following the tragic Cocoanut Grove fire in Boston (November, 1942) medical examiners were confronted with the task of identifying scores of charred bodies. Their ability to do this within a very brief period of time was an amazing feat. Certain women burned beyond recognition were successfully identified by the length of time they had been pregnant.

45. The pathologist is able by-virtue of his training and the techniques at his command, to study progressive tissue reactions which follow single or repeated traumatic stimuli.

of our American jurisdictions, modern medical examiner systems have been established by law.⁴⁶ These are not identical, but under the ideal mechanism, approached in New York City, the forensic pathologist gains paramount right of investigation in a broad category of cases where death has resulted from accident, casualty, or under unusual or suspicious circumstances. He is able to move forward with alacrity, to take charge of the body and the perishable evidence in the environment, and to give numberless scientific aids to investigating police officers.

In forty-one American states and in England, the coroner's office is still used to investigate such cases. In England since 1926, only medical men or lawyers are eligible to serve as coroners, but in the United States, this official is usually a layman, not infrequently simultaneously holding the office of justice of the peace. The lay coroner cannot personally perform those scientific duties of investigation which his office requires, and decisive scientific evidence is often lost through delay or oversight. The status of the coroner, as a quasi-judicial officer, has been anomalous and abortive since the office was first conceived. The coroner functions by holding an inquest, and usually must impanel a jury, but the verdict of the coroner or of his jury is of no real legal consequence, for it cannot be offered in evidence in a subsequent prosecution for homicide⁴⁷ or in an independent civil action brought on an insurance policy where "suicide or natural death" might be a controlling issue.⁴⁸

It is surprising that we have not brought the important science of forensic pathology into more extensive use, for many vital civil and criminal law questions turn upon the fact and circumstances of death, and historically investigation of death was one of the first law-medicine cooperations to be accented.⁴⁹ Without much more ignominious delay, doctors and lawyers must push forward to an ideal "medical examiner act" in each state. Today the coroner's jurisdiction is narrow and perilous, for if he orders a post-mortem examination in any case except where he has reasonable grounds to suspect death by criminal violence, he is liable in damages to the next of kin for wrongful autopsy.⁵⁰ In the future, the medical

46. Massachusetts; New York City; Newark, New Jersey; Maine; Maryland; Connecticut; Rhode Island.

47. See *Hall v. State*, 137 Ala. 44, 34 So. 680 (1903); *Blackwell v. State*, 166 Miss. 524, 146 So. 628 (1933); *State v. McCausland*, 82 W. Va. 525, 96 S. E. 938 (1918); *Hedger v. State*, 144 Wis. 279, 128 N. W. 80 (1910).

48. See *Boehme v. Sovereign Camp*, 98 Tex. 376, 84 S. W. 422 (1905).

49. See MacAlister's writings on the history of medicine in 17 *PROC. ROYAL SOC. MED.* (1924). See also, VON BAR, *HISTORY OF CONTINENTAL CRIMINAL LAW* (1916) 208; ROCKEFELLER FOUNDATION, *INSTITUTES OF LEGAL MEDICINE IN METHODS AND PROBLEMS OF MEDICAL EDUCATION* (9th ser. 1928).

50. See *Aetna Casualty & Surety Co. v. Love*, 132 Tex. 280, 121 S. W. (2d) 986 (1938) (liable for ordering post-mortem examination to determine cause of obscure death in aid of workmen's compensation insurance investigation); *Gurganious v. Simpson*, 213

examiner should be given a broad discretion as to those fatal or non-fatal cases which he might investigate in aid of criminal or civil litigation. Already many workmen's compensation acts empower commissioners to order autopsies where the cause of death is obscure and further light is needed to determine compensability of an alleged injury. An efficiently operated medical examiner system need not cost substantially more than the coroner's office. Probably the desirable goal is a compact organization of forensic pathologists, financed as a state agency, with stations in a few metropolitan centers, so that the staff could serve as consultants in obscure cases. Ordinary cases of sudden death could be passed upon by local physicians. Such a medical examiner's office could maintain a functional cooperation with a state scientific crime detection laboratory, as both agencies are auxiliary aids to police and law enforcement efforts.

SCIENTIFIC MODES AND MECHANISMS OF PROOF

There is real danger in the fetching term "scientific proof," for it may lead us to overconcentrate on the high probative value of this species of evidence, while glossing over serious dangers which lurk in its use. "Scientific proof" covers a vast range of expert testimony, varying widely in probative value. Certain methods of identification, such as fingerprinting, contain only a minute chance of error, either as regards premises employed or actual execution of tests. Next we drop down to such activities as forensic chemistry and blood group work, where premises are scientific, but errors in procedure are more likely. Here there is real risk of mistake if the witness does not have very special qualifications. Handwriting falls a little lower down the scale. Forensic pathology holds its own, in probative value, with other trustworthy identification methods. Clinical forensic medicine is a blending of science and art, naturally more amenable to method in diagnosis than in prognosis, where facts must be aided by experience and good opinion.

In times past I have suggested the formation of a National Scientific Commission to serve as a master censor for the courts.⁵¹ Such a body, made up of qualified legal and scientific persons, could probe into the merits of each species of scientific proof and lay down appropriate criteria, safeguards and cross-checks needed to make the evidence trustworthy. The several states could pass statutes providing that scientific evidence which conforms to requirements of the National Scientific Commission is to be admitted as prima facie evidence in any legal proceeding where it is relevant. Such a body could also develop a comprehensive system for certifying the proficiency of expert witnesses.

N. C. 613, 197 S. E. 163 (1938) (liable for autopsy on boy drowned in Y. M. C. A. pool, there being no suspicion of foul play).

51. Smith, *Cooperation Between Law and Science in Scientific Proof* (1941) 19 TEX. L. REV. 414.

In respect to every species of expert testimony, there is a need for criteria, defining what is possible, what is impossible, and what is acceptable practice, but their development has been restricted chiefly to problems of identification. It is not uncommon to see "experts" making blood group determinations by such impossible methods as microscopic inspection of dried blood smears. It is not a rare thing to see general practitioners postulating injury as the probable cause of some disease, when current medical science would not accept the evidence relied upon as satisfactory.

Each species of evidence calls for safeguards, cross-checks and its own particular criteria of proof if we are to avoid losing the contribution of science in a welter of opinion. In all those cases where the proposed expert needs special indoctrination and training, a certificate of proficiency should be required before he is allowed to testify. If evidence is to be founded upon test materials, provision should be made for preservation of this material for independent corroboration studies to settle doubts that might arise in the mind of court or adversary. Lack of any such mechanisms may account for the willingness of courts to say that even if scientific evidence is undisputed, the jury may rely on contrary lay evidence to enter a verdict contrary to the scientific proof.⁵² Perhaps the particular expert does not look too scientific to the court; perhaps, too, the judge feels that no satisfactory cross-examination of a complicated procedure is possible. It is well-known that most lawyers are not equipped to overthrow this species of evidence, and the danger is enhanced by the fact that a fundamental error may be merged beyond discovery in the standardized routine of a text-book procedure. If the test material were saved, as usually is possible, the trial court could appoint an impartial expert to repeat the procedure or study. If results were consistent, and the scientific evidence were conclusive of the issue, many trial courts would refuse to permit the jury to override such findings.

52. In *Arais v. Kalensnikoff*, 10 Cal. (2d) 428, 74 P. (2d) 1043 (1937), scientific evidence based on blood group determinations was uncontradicted that defendant could not be the father of plaintiff's child. The trial court refused to instruct a verdict for defendant and on the strength of lay testimony the jury returned a verdict for plaintiff, finding the defendant to be the father of her child. This judgment was affirmed by the California Supreme Court. In like manner, in *Rex v. True*, 127 L. T. R. 561 (Ct. Cr. App. 1922), the Court of Criminal Appeal in England held that a jury was entitled to find that a defendant, under prosecution for murder, was sane at the time he committed the homicide, despite uncontradicted medical testimony to the contrary. Compare, however, *Schulze v. Schulze*, 35 N. Y. S. (2d) 218 (1942), where the plaintiff sought a divorce from his wife on the ground of adultery. The wife contended that a child was the offspring of the plaintiff and that she had not committed adultery. An expert witness offered uncontradicted testimony that he had performed blood group determinations which showed that the plaintiff could not possibly be the father of the child. The court held that although "the presumption of legitimacy of a child . . . born in wedlock is . . . one of the strongest presumptions known to law . . ." it was rebutted, and the lay testimony of access overcome by the undisputed scientific evidence of non-paternity.

One result of our present adversary system of trial is that science may be born anew in every lawsuit in which two experts disagree. That a scientific principle or finding can be true in *A*'s case and untrue in *B*'s case is squarely opposed to the concept of the universality of scientific truth.⁵³ In more progressive states, if the case turns on a scientific question, and expert *X* gives uncontradicted testimony that the facts are ABC, the trial judge will instruct the jury that they must return a verdict finding the facts to be ABC.⁵⁴ If, however, expert *Y* disagrees with expert *X*, the lay jurors are to say which is the preferable view, or to discard both in favor of lay testimony. These are the mechanisms of procedure and trial. Any person would be properly shocked, however, if a diagnosis were conducted along similar lines in a modern hospital.

It will be noted that I press always for the conviction that laymen cannot successfully try scientific issues. The layman is apt to import distorted notions of scientific matters into the judging process, and the warping effect is as pernicious whether he gives excessive weight to the evidence or too little.⁵⁵ Three cardinal aspects of evidence are relevancy, probative value and persuasive value. For a perfectly competent, expert trier of fact, probative value and persuasive value should be the same. The layman naturally cannot grade scientific evidence according to its true probative value, and in consequence he is more convinced by the persuasive or psychological appeal of evidence.⁵⁶

Assuming, as we must, that laymen will continue to try scientific issues for a long while to come, is it possible to make criteria of scientific proof

53. In criminal litigation where a scientific finding should control the outcome of the case, and the undisputed scientific evidence points one way, a constitutional amendment empowering the trial judge to instruct the jury to return its verdict in accordance with the scientific proof would seem to be the only solution to the jury trial dilemma. In states where the court has power to appoint an impartial expert, supplementary legislation might be warranted providing that the scientific findings established in the first trial shall be binding in subsequent litigation arising out of the same general transaction.

54. I think it is safe to say that this is not yet the majority rule.

55. No more striking case could be mentioned than *Mathews v. People*, 89 Colo. 421, 3 P. (2d) 409 (1931). Accused was convicted and sentenced to life imprisonment for having murdered his wife. The vital proof was scientific testimony of a ballistics expert that bullets recovered from the body of decedent were fired from a pistol which defendant admittedly had in his possession continuously. The accused was a respectable citizen and offered an alibi. On the trial the ballistics expert was allowed to pass the bullets among the jurors who were permitted to look through a hand lens at grooves on the death bullets in determining identity of the pattern with grooves on test bullets fired through the barrel of the recovered pistol. After the jurors by this dangerously unscientific gross inspection satisfied themselves that the same gun fired both bullets and found accused guilty, the appeal court undertook to determine the scientific issue for themselves. The learned members of that tribunal inspected the bullets sent up with the record, admittedly used a different lens from that employed by the jurors, and held that no such grooves were present as would warrant the conviction. On this ground they reversed the judgment.

56. See Smith, *Components of Proof in Legal Proceedings* (1942) 51 YALE L. J. 537.

universally available in the "valuing" process, even when these have not been put in evidence? Facts not offered in evidence from the witness stand cannot be considered unless they are proper subjects for judicial notice, and so notoriously known that the court may dispense with the formality of their proof. The doctrine of judicial notice may enable appeal courts to tap new and authoritative criteria of scientific proof pronounced by leading spokesmen of medicine and the sciences. This would give to such courts a needed measuring rod to determine whether the expert testimony put forward at the trial was sufficient to support the verdict, thus enabling a more delicate valuation than that afforded by the crude "conflict of testimony" test. The chief difficulty here would lie in the judge consulting the wrong bootblack,⁵⁷ but if we are to continue our present system of trial, this would seem to be a lesser evil than cutting the judge off from any usable erudition in his difficult task of appraising expert testimony. The higher the authority for these scientific criteria, the less the risk and the more easily is the doctrine of judicial notice invoked; and these facts, again, argue for some new official commission or point of reference.

57. This problem has arisen in malpractice actions filed by patients against their physicians for alleged mismanagement of fracture cases. Some courts have held that failure to employ the X-ray in fracture cases is negligence, and that it is so commonly recognized as such that the court will take judicial notice of the fact even though plaintiff offers no expert testimony to prove that the omission in the particular case was a departure from average medical standards in the community. See *Whitson v. Hillis*, 55 N. D. 797, 215 N. W. 480 (1927). But *cf.* *Boyce v. Brown*, 51 Ariz. 416, 77 P. (2d) 455 (1938). This shows the possible dangers of applying the doctrine of judicial notice to situations which depend on variable circumstances. The English courts have wisely refused to apply judicial notice to diagnostic use of the X-ray. In *Sabapathi v. Huntley*, 1 W. W. R. 817 (1938), the Judicial Committee of the Privy Council held that whether medical standards require examination in a suspected fracture case calls for expert testimony since the question depends on varied circumstances such as condition of the patient, character of the injuries and accessibility of apparatus.