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SCIENTIFIC PROOF AND RELATIONS OF LAW AND MEDICINE

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THE anvil of the law has always resounded to the striking iron of science. Some tough metal has been beaten out there, sometimes into curious shapes, and few members of the populace can have failed to hear the reverberating blows or to see the cascading sparks which fly from those impacts. Despite all this, there is a cloud of uncertainty, an obscuration of terms, a lack of sharp definition which tends to invest vital aspects of law-science correlations with a curious mystery.

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 up by many hands.

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One of the cardinal activities of life is the making of proof. As in every-day life, the discovery of ultimate facts to guide action or decisions has a primary importance to the just working of the judicial process. 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; it gives solid substance upon which enlightened opinions may be formed, 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

In the evidentiary field, Scientific Proof will be found to revolve around three categories of problems, namely: (1) problems of identification, including existence and nonexistence, (2) problems of causation, and (3) problems of effects.

The specific content of each main series of problems differs according to the field of substantive law which gives rise to the litigation. This is a basic concept of all proof-making in courts of law. One must be able to state the ultimate facts necessary to prove a *prima facie* cause of action or defense. Substantive law doctrines operate to specify the essential facts to be proved, and so to determine the relevancy of particular evidence. Despite considerable overlapping in type problems and in methods, Scientific Proof breaks down into four fairly discrete categories. These are: I. Clinical Forensic Medicine, II. Forensic Pathology, III. Scientific Crime Detection, IV. Modes and Mechanisms of Scientific Proof.

¹ To borrow a homely phrase of the Texas rancher, our ideal in Scientific Proof is "to build the fence horse high, pig tight, and bull strong." The primary ideal of Scientific Proof is to eliminate error and to secure truth by these means: (1) The use of all appropriate methods of corroboration, with accent on diverse sources and types of evidence; (2) the eventual grading of all types of evidence according to relative probative value; (3) development of usable criteria and safeguards in respect to each type of evidence; (4) promotion of complete understanding among courts, lawyers, and experts of the pit-falls and potential errors of each species of evidence in order to enable wise cross-examination; (5) development of appropriate legal mechanisms and modes of trial; (6) 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*, 51 *Yale L.J.* 537 (1942).

CLINICAL FORENSIC MEDICINE AND SOME OF
ITS OUTSTANDING PROBLEMS

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. He 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 percent of the cases tried in Superior Court in Suffolk County, Massachusetts, involved expert testimony. I dare say 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, or perhaps to give some influential finding or opinion based upon expert study of evidentiary problems.

The Problem of Expert Testimony.—These impacts of law and science have given rise to thunderous reports emanating from the blacksmith shop and showers of sparks capable of burning the unwary. It is explained on the one hand that the sledge hammer of science is being used to hit glancing blows, or that it is an inadequate tack hammer not sufficient to beat out the metal. It is said by others that the anvil of law is slippery, or too narrow, or not made right to accommodate the materials upon which science must work.

The truth here does not lie within range of any single naïve explanation. Part of the difficulty arises from 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. 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

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 Chafee, *Privileged Communications: Is Justice Served or Obstructed by Closing the Doctor's Mouth on the Witness Stand?* 53 Yale L.J.—(1943), 18 Ann. Int. Med. 606 (1943).

unlawful search and seizure.⁴ These major vices in technical rules of evidence will soon go down before the frontal attacks of progressive legal scholars.⁵

Part of the difficulty in utilizing expert testimony springs from inadequate legal 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. Rather than play upon each independent defect, I prefer to consider the current position of expert testimony in its broader aspects and with particular reference to mechanisms of trial.

One must consider the nature of the ailment before he can specify the remedy. 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, 5 percent 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 examina-

⁴ Ladd and Gibson, *Legal-Medical Aspects of Blood Tests To Determine Intoxication*, 29 Va. L. Rev.—(1943), 18 Ann. Int. Med. 564 (1943).

⁵ Morgan, *Suggested Remedy for Obstructions to Expert Testimony by Rules of Evidence*, 10 Univ. Chi. L. Rev. 285 (1943), 1 Clinics 1627 (1943). See also, Chafee, note 3 *supra*, and Ladd and Gibson, note 4 *supra*.

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 propound. The witness answered: "I don't know." 5 Ohio L. Rep. 45 (1907).

tion, 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 ordinary doctor's way of thinking. He has observed conditions and studied medicine principally 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 thoroughgoing expert, he may find it hard to confess the limits of his knowledge.

SUGGESTED REMEDIES

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 the 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 the 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 twins: a doctor and a lawyer acting together to see that evidence was fully developed while protecting the fairness of the hearing and the substance of the major rules of evidence. All observations and findings would be reported in a "record," with conclusions listed in a separate section 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 not be 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 curtail review of medical findings to the trial court where proper access can be had to the litigant for re-examination.⁷

This device seems to be the ultimate goal of American jurisprudence. It would soon break the hold of mere advocacy and of shabby or ill-

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.

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. The chief barriers to its realization are constitutional guarantees of jury trial.⁸ The prospect of speedy reform is diminished by possible resistance of plaintiff's lawyers, but this fear should give way once the trial lawyer realizes that substantial verdicts will still be obtainable for genuine injury, but that claims based on fraud and malingering will be sifted out.

Transitional or Midway Reforms not Involving Constitutional Amendment.—A transitional reform is some variety of statute which authorizes 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 acts as an officer of the court, and not as a privately employed expert. The device helps escape partisan pressure, gives the trial judge a chance to bring in authoritative consultants, and in several directions protects the purity of proof. It has 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 the common law, by statute, or under the reformed rules of civil procedure, such as those promulgated by the United States Supreme Court under a Congressional enabling act of 1934, for the governance of the federal district courts.¹⁰

Massachusetts, one of the first states to provide for pre-trial examination of psychiatric cases by impartial experts,¹¹ has found that this method goes far to cure old evils.¹²

The medical profession itself can add some straws to this broom. One

⁸ Due process clauses, properly construed, however, require only a fair and regular mode of procedure and trial, and this need not be by jury. *Hurtado v. People of California*, 110 U.S. 516 (1884).

⁹ *Austin & N.W.R.R. v. Cluck*, 97 Tex. 172, 77 S.W. 403 (1903).

¹⁰ 28 U.S.C.A. § 723c; Federal Rules of Civil Procedure for the District Courts of the United States. Preparation authorized: 48 Stat. 1064 (1934).

¹¹ Mass. Ann. Laws (1942) c. 123, § 100 A. (The so-called "Briggs" law.)

¹² Overholser, *The Briggs Law of Massachusetts; A Review and an Appraisal*, 25 J. Crim. L. & Criminology 859-83 (1934-35).

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 medical 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 be necessary to enable this salutary innovation, although legislation would be preferable empowering state licensing boards to issue such certificates after due hearing.

At the moment, 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 needs to 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.

Let it be said that all people competent to speak recognize that medicine is not an exact science, in its totality, but a mixture of science and art. There is much room for honest difference of opinion and for varying clinical judgments on open subjects. No one would hold all witnesses to subscribe to a single view in cases where good men may differ. But at last 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

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. *Carbonneau v. Lachance*, 307 Mass. 153, 29 N.E. (2d) 696 (1940).

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.

The mere presence of this real censorship mechanism would be as valuable as its actual use. It should be pointed out that surveillance of appeal records involves no improper probing or breach of confidence, for such documents are *public* records open to the freest inspection by any interested person.

Reformulation of medical science in terms of legal utility: "Scientific Proof" does not imply that final answers are available for all medical problems which arise in court. All that we can expect to have is the benefit of the best evidence that the science of the given time can supply.

In times past the scientific accessions of medicine have been built largely on observations which have a therapeutic or curative implication. Even the great insurance companies cannot tell one how much the life expectancy of a person is shortened by the development of traumatic epilepsy following head injury. We know little or nothing about the general effect of compromise settlements in curing or relieving traumatic neuroses. By sympathetic team work, we must study large groups of patients from new points of view to acquire much information of legal value that we cannot now extract from medical books.

In this Symposium Series, medical men of undisputed authority have endeavored to lay down basic criteria in respect to many of these problems, in a manner acceptable to both professions. In the future we shall be able to widen and lengthen this initial path to the great advantage of law and lawyers, and of expert witnesses.

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. The lords addressed specific questions to the judges. 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 the guidance of courts in future cases, what a defendant must prove in a homicide prosecution to establish mental irresponsibility for his act. The learned judges laid down certain principles regarding proof of mental irresponsibility sufficient to constitute a defense to a charge of murder (or other crime):

1) "The jurors ought to be told in all cases that: every man is to be presumed to be sane, and to possess a sufficient degree of reason to be responsible for his crimes, until the contrary be proved to their satisfaction;"

2) "To establish a defense on the ground of insanity, it must be clearly proved that, at the time of the committing of the act, the party accused 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;"

3) As to "persons who labour under such partial delusions only (i.e. in respect to one or more particular subjects or persons), and are not in other respects insane, we are of opinion that, notwithstanding the party accused did the act complained of with a view, under the influence of insane delusion, of redressing or revenging some supposed grievance or injury, or of producing some public benefit, he is nevertheless punishable according to the nature of the crime committed, if he knew at the time of committing such crime that he was acting contrary to law."¹⁴

The rules laid down failed altogether to provide for certain contingencies: (1) 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; (2) the concept of attenuated responsibility was not recognized, and the psychopathic personality was entirely ignored.¹⁵

English courts steadfastly continue to pay lip-service to McNaghten's rules. Most American courts have done likewise, except for those juris-

¹⁴ McNaghten's Case, 10 Clark and Fin. 200 (H.L., 1843).

¹⁵ The reader may suppose that the psychopathic personality had not then been recognized as a psychiatric entity, but medical men in England as early as 1829 had demarcated the condition from irresponsibility or insanity due to disease. Sampson, *Criminal Jurisprudence in Relation to Mental Organization* 7 (1841).

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." Rush, *Medical Inquiries and Observations upon the Diseases of the Mind* (1812).

dictions which have broadened the original categories to include the further exculpatory ground of irresistible impulse of one kind or another.

These rules, pronounced with misgivings, did a great deal to sabotage law-medicine relationships. A host of psychiatrists, such as Emil Kraepelin (1856-1926), advanced the description of clinical entities in the field of psychiatric disorders. 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 Glueck¹⁶ and other criminologists.

There is no doubt that several sharp arrows can be shot at this target. It is erroneous to assume that one can abstract single mental faculties in judging mental health. Delusions should be regarded as a general symptom of mental disorder and not be given limited evidentiary value. Inability to abstain from wrongful conduct runs to volition itself and is as basic as inability to form a moral judgment. The criminal law has always required a "mens rea," or bad state of mind, as an ingredient of felonies, and some voluntary act to which moral culpability can be attached. It was anomalous from the start that irresistible impulse should have been excluded from *McNaghten's* rules.

The more difficult exercise is not to assault these old and vulnerable re-doubts, but to explain why and how they have been able to withstand capture for so long. It would be a grievous error to assume that men of law have been obstinate or obtuse. Sir Matthew Hale (1609-1676), Lord Chief Justice of the Court of King's Bench in England, wrote on lunacy long before *McNaghten's* rules were pronounced. He was keenly aware of the subtle gradations in mental responsibility. Indeed, he said: "It is very difficult to define the invisible line that divides perfect and partial insanity; but it must rest upon circumstances duly to be weighed, and considered both by the judge and jury, lest on the one side there be a kind of inhumanity toward the defects of human nature, or on the other side too great an indulgence given to great crimes."¹⁷

The great English judges were almost all recruited from among the leading trial lawyers. They were men with a grasp of practical affairs, and doubtless many of them had dinner companions among the eminent medical men. 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 prod-

¹⁶ Glueck, *Mental Disorders and the Criminal Law* (1925).

¹⁷ Hale, *The History of the Pleas of the Crown* (1736).

ucts 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. This they do under a proper charge delivered by the trial court at the close of the case, shortly before they retire to the jury room to consider their verdict of "guilty" or "not guilty." 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 is no doubt that violent disappointments in love and other psychological pressures can drive a person to inhuman conduct as irresistibly as disease, as Louis Proal, the French judge, so brilliantly showed in his *Passion and Criminality*.¹⁸ 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.¹⁹ 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.²⁰ The culpable first step has merged into a diseased state which human agency cannot control; 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 tre-

¹⁸ Proal, *Passion and Criminality* (1900).

¹⁹ Singh, *History of the Defense of Drunkenness in English Criminal Law*, 49 L.Q. Rev. 528 (1933). For American decisions see E. V. R., *Intoxication in Mitigation of Homicide*, 2 Q.J. of Alcohol 396 (1941).

²⁰ *Regina v. Davis*, 14 Cox C. C. 563 (1881). Trial before Justice Stephen, the same Sir James Stephen famous for his *History of the Criminal Law* (1883).

mens, epilepsy, or one of the psychoses.²¹ It is at the brink of mere psychological 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 any 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 criteria suitable to guide the new trier of fact. In the judicial process, definitions have but one function—to serve as signposts 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. Mr. Justice Darling recognized that juries use this verdict as an escape device when he pointed out that in many criminal asylums there are defendants "as sane as the Judges who tried them." A parliamentary committee reported:

147. From a table issued by the Committee on Insanity and Crime, appointed in 1922, we find that, taking the figures for the 22 years 1901 to 1922, the number of persons on trial for England and Wales on murder charges was 1,445, of which 134 were found insane on arraignment and 351 were found guilty but insane, being a total percentage of 9.273 insane on arraignment, and 24.292 guilty but insane, or 33.663 per cent in all insane. . . .

148. Coming to Scotland, we find that, in the 20 years, 1910 to 1929, 249 persons were indicted and brought to trial for murder, of whom 22 were found guilty of murder,

²¹ 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. Yet we cannot overlook the fact that in 1924 the House of Lords defeated Lord Darling's "Criminal Responsibility (Trials) Bill" intended to establish irresistible impulse due to mental disease as an additional legal defense.

104 of culpable homicide, and 23 of other crimes; 41 were found insane in bar of trial, and 9 at time of act, while 49 were assolized. Those declared insane were thus 20 per cent of those indicted.²²

It would be an interesting experiment to subject these cases to independent psychiatric study, to determine how many of these acquitted persons actually are insane. If only 10 percent should be found to be so, the only significance would be that 23 percent of this group have been committed to asylums rather than to the hangman, for in England, since 1800, an acquittal on the ground of insanity makes the defendant subject to consignment to an asylum "during His Majesty's pleasure."²³

Assume that a defendant has been convicted by a jury due to the literal application of McNaghten's rules. Since the Criminal Appeal Act of 1907²⁴ the English Court of Criminal Appeal has had power to hear new evidence in reviewing the conviction,²⁵ and the further power to substitute its own for the jury's verdict.²⁶ 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.²⁷ Under the Criminal Lunatics Act, 1884,²⁸ the Secretary of State (Home Secretary) is empowered after conviction and before execution of sentence to intervene, appoint a committee of medical men to examine into 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

²² Report from the Select Committee on Capital Punishment, House of Commons 36 (1929-30).

²³ Before 1800 in England, an acquittal on the ground of insanity would enable the defendant to go free without any protection for society. The Criminal Lunatics Act (1800), 39 & 40 Geo. III, c. 94, provided that a jury, in acquitting a defendant accused of felony, must make it clear whether their action were taken because they found the accused person was insane at the time he committed the act. If so, the defendant was committed to an asylum and detained "during His Majesty's pleasure." The special form of verdict "guilty, but insane" was specified by the Trial of Lunatics Act (1883), 46 & 47 Vict., c. 64.

²⁴ 7 Edw. VII, c. 23 (1907).

²⁵ Exercised in *Rex v. Holt*, 15 Cr.App.R. 10 (1920).

²⁶ As in *Rex v. Hopper*, 11 Cr.App.R. 136 (1915). Defense: accident; jury verdict: murder; substituted verdict entered on appeal: manslaughter, with sentence reduced to four years' penal servitude. In *Rex v. Beard*, 14 Cr.App.R. 110 (1919), D while intoxicated raped a girl and apparently strangled her to death by accident. Jury verdict of murder, reduced on appeal to manslaughter because of error in trial court's charge.

²⁷ As in *Rex v. Lumb*, 7 Cr.App.R. 263 (1912); *Rex v. Boss*, 16 Cr.App.R. 71 (1921).

²⁸ 47 & 48 Vict., c. 64 (1884).

courts paying continued lip service to McNaghten's rules because of respect for precedent and practical problems of proof raised by jury trial, while inviting an auxiliary administrative 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 facade without eroding away the substance. The time has come in both countries for recognizing psychiatric appraisal of court cases as a problem to be farmed out to expert referees.

I must not leave this subject without subscribing to the belief that the "trial-defense-acquittal" formula is fundamentally erroneous. Culpability or fault was a cardinal juridical concept of the past two centuries, but it is steadily shrinking in authority as a touchstone of legal thinking. In the field of criminology, "danger to society" is the more important consideration.²⁹ The defendant who shows attenuated responsibility, the weakling who gives way to "irresistible impulses" in response to ordinary social stimuli, the psychopathic personality, whose whole reaction to life is tragically warped, sometimes in the most cruel and sadistic ways—these persons cannot scientifically be *punished* as free agents; they cannot, as a rule, be salvaged for "open" society by reform, and they are better looked upon as special psychiatric cases too dangerous to remain at large. The test of culpability or fault in committing the crime has no real meaning in the presence of one of these permanent personality defects.³⁰ Our preoccupation must be with early discovery of these predelinquents and the making of more certain arrangements to segregate and control them.³¹

²⁹ In master-servant cases, workmen's compensation laws have substituted "injury from accident arising in the course of employment" as the basis of liability in lieu of the employer's negligence. In the field of Domestic Relations, many states now permit divorce where the two spouses live apart for a statutory period, without regard to any fault of either. Still other jurisdictions have provided by statute that continuing insanity of one spouse arising after the marriage ceremony is ground for divorce.

As insurance against the perils of life becomes a social function, fault as a risk-fixing device will be much eroded, if not destroyed. If, as, and when that phase is reached, we may still expect as a matter of social policy, that one who wilfully injures himself will be debarred from recovering compensation.

³⁰ Capital punishment in such cases is inappropriate, but as the psychopathic personality is not technically insane under McNaghten's rules, executive clemency is necessary to change the death penalty to life imprisonment. Governor Ritchie of Maryland saved Herman W. Duker, a psychopathic murderer, from capital punishment by such last-minute intervention. Ulman, *A Judge Takes the Stand*, Append. 273 (1936).

A more recent case, in Massachusetts, was that of Woodward, a psychopathic juvenile, who killed a young girl by slow torture, and escaped the supreme penalty, after conviction of murder, only by last-minute commutation of his sentence to life imprisonment.

³¹ See Thom, *Irresponsibility of Juvenile Delinquents*, 99 Am. J. Psychiatry 330 (1942).

To protect innocent members of society against their violent crimes calls as much for preventive methods as for mere permanent detention after the heinous crime is done.³²

MEDICAL CRIMINOLOGY AND PENOLOGY

Physicians have had a conspicuous part in the ceaseless probing and questing for the basic causes of crime.³³ It would seem now that multiple factors are usually involved in the pathogenesis of a criminal career. Biological factors or actual disease may play an insignificant or an important role in a particular case.³⁴

Despite the deep interest of lawyers and doctors in these subjects, there has been no national law passed providing for uniform examinations, consistent classification of offenders, or centralized collection of statistics. Even in the detailed judicial statistics of England one cannot find such data. There is a need, too, for the medical penologist, for 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.³⁵ 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 defect to crime: (1) 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; (2) in some cases a proper doubt may arise as to the adequacy of the test methods; (3)

³² For prolonged studies along this line, from which the authors derive a formula of "predictive factors" intended to guide juvenile courts, see Sheldon and Eleanor Glueck, *Juvenile Delinquents Grown Up* (1940) (based on statistical studies of 10-year records of 1,000 cases).

³³ See Fink, *Cause of Crime, Biological Theories in the United States, 1800-1915* (1938).

³⁴ Dr. Francis Joseph Gall (1758-1828) has been described as the founder of criminal anthropology. His discoveries in the anatomy of the brain won the highest praise of both Bischoff and Cuvier, but it was his bad fortune to be remembered principally for his rapidly discredited theories of phrenology.

³⁵ For an excellent study of this type, see Branham, *The Classification and Treatment of the Defective Delinquent*, 17 *J. Crim. L. & Criminology* 183 (1926). For an important earlier study, see Glueck, Bernard, *A Study of 608 Admissions to Sing Sing Prison*, 2 *Mental Hygiene* 85 (1918). The Rockefeller Foundation has carried out important surveys of prisoners in various institutions of the several states.

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.³⁶

It is safe to say that mental disease is very rarely a sole cause of criminality. As Dr. A. Warren Stearns, the experienced forensic psychiatrist, puts it, mental aberrations may cause the subject to become involved in episodes which propel him toward criminal behavior. Certain mental conditions seem to predispose the subject to violent reactions; while states due to senile deterioration are more often associated with disorderly conduct or vagrancy. This is illustrated by table 1, prepared some years ago by the New York State Hospital Commission, showing distribution of crimes among clinical diagnoses of 646 persons admitted to Matteawan Hospital, New York, an institution for the criminally insane.³⁷

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.³⁸ Studies of the inmates of mental institutions, on the other hand, show a markedly lower incidence of such behavior.³⁹ Part of this difference is due to repression, segregation, care-

³⁶ 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. Dr. East found the major causes and motivations of attempted suicide to be as follows: (1) Alcoholic impulse with amnesia (141); (2) alcoholic impulse—memory retained (171); (3) post-alcoholic depression (31); (4) out of work (112); (5) destitution (64); (6) domestic trouble (120); (7) ulterior purpose (61); (8) fear of imprisonment or of arrest (41); (9) business worries (27); (10) depression from various causes (20); (11) other causes (shame, mistake under alcohol) (7); (12) weak-mindedness (46); (13) neurasthenia (8); (14) epilepsy (10); (15) morbid mental states (18); (16) insanity (123). East, *Medical Aspects of Crime* 141 (1936).

³⁷ The table is reproduced from Nolan, *Some Characteristics of the Criminal Insane*, 5 *State Hosp. Q.* 362 (1920). It covers 646 patients, a rather small series, and the table is reprinted to show efforts at correlation of mental defect with type of crime, not as proof of exact relationships.

³⁸ Dr. A. Warren Stearns, during his tenure as psychiatrist of Massachusetts State Prison, made an intensive study of one hundred prisoners, fifty-eight of whom had been convicted of manslaughter, thirty-nine of second degree murder, and three 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*, 4 *Am. J. Psychiatry* 725 (1925). See also Stearns, *Medical and Social Factors in Crime*, 18 *Ann. Int. Med.*—(1943).

³⁹ 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 purpose of trial. Elwell, *Epilepsy as a Defense for Crime*, 8 *Medico-Legal J.* 55 (1890). It is interesting to note

ful 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 incite 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 you will see a sharp fall in crime and in admissions to mental institutions.

TABLE 1
PER CENT DISTRIBUTION OF CRIMES AMONG CLINICAL GROUPS

CRIME	PER CENT OF TOTAL CRIMES						
	Senile	General Paralysis	Alcoholic	Manic-depressive	De-mentia Praecox	With Constitutional Psychopathic Inferiority	With Mental Deficiency
Homicide (all forms).....		2.9	17.6	2.9	32.4	14.7	17.6
Assault (all forms).....		3.8	24.1	7.6	25.3	17.7	6.3
Burglary.....		13.2		7.9	39.5	23.7	5.3
Larceny (all forms).....	1.3	22.8	5.1	6.3	24.1	15.2	7.6
Public intoxication.....	2.9	2.9	70.6		5.9	5.9	
Disorderly conduct.....	2.4	13.4	17.1	12.2	17.1	17.1	7.3
Vagrancy or prostitution	8.5	15.4	13.8	4.3	35.1	6.9	7.4
All crimes.....	3.6	11.5	16.9	7.3	25.5	14.7	7.4

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.⁴⁰ The electroencephalogram is a graphic tracing of these waves which can be made by a competent laboratory technician, without risk of injury to the patient. This is done by properly applying electrodes to various locations on the patient's cranium, and taking off the action currents for automatic tracing onto a moving tape by a relatively simple recording device.

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. *Ibid.*, at 61.

⁴⁰ Berger, Über das Elektroenkephalogramm des Menschen, 87 Arch.f.Psychiatry 527 (1929).

Dr. William Lennox and Dr. F. A. Gibbs and his wife, all of Boston, among other leading workers, have been amassing 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 our 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*.

In more than one celebrated murder prosecution both in England and in America the defense of epilepsy has been injected, which is formally raised under a plea of insanity.⁴¹ Two important problems of Scientific

⁴¹ English cases: *Rex v. Hadfield*, 27 Howell's State Trials 1290 (1800). (Psychotic deterioration of epilepsy originally due to head injury; not guilty by reason of insanity); *Rex v. Bowler*, Ann. Reg. 309 (1812) (convicted); *Rex v. Boss*, 16 Cr.App.R. 71 (1921) (conviction affirmed); *Rex v. Fryer*, 24 Cox C.C. 403 (1915) (guilty but insane); *Rex v. Perry*, 14 Cr.App.R. 48 (1910) (conviction affirmed; the epileptic state must have been operative at the time of the act in such way as to destroy mental responsibility); *Berkeley-Hill and Owen, Post-epileptic Automatism as a Defence in a Case of Murder*, 55 J. Royal Army Med. Corps 54 (1930) (acquitted).

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*, 47 N.Y.Supp. 168 (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*, 155 N.Y.Supp. 1013, 92 Misc. 80 (1915) (conviction reversed because undisputed medical testimony showed act was committed during epileptic seizure);

Proof arise: (1) Is the defendant a true epileptic or is the history of past "fits" fabricated, or if genuine, are the attacks described referable to some other disease capable of producing occasional convulsions? (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 electroencephalogram. He 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 (provocation tests) for the purpose of making the latent epilepsy patent, so that diagnostic tracings of the peculiar brain waves may be recorded by the electroencephalogram.

The second question cannot be answered conclusively in this way, even though the presence of true epilepsy be so established. This is because epileptics are orientated and mentally responsible in the interim periods, and seizures may be separated by long intervals.⁴²

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

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) 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 dism'd, 80 U.S. 257 (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).

⁴² The reader must not assume that all epileptics are likely to commit crimes. The writer doubts the authenticity of the "epileptic mechanism" in many cases from medical literature. Dr. H. Houston Merritt, with whom the author has been surveying medico-legal aspects of epilepsy, has followed thousands of epileptics in the clinic and 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, one of our widely experienced forensic experts, 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, *Über Gewalttätigkeitsverbrecher und ihre Nachkommen* (Violent Criminals and Their Offspring) (1938).

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, 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 (i.e., apparent loss of memory) is simulated, not genuine, this is persuasive evidence that the defendant's whole version of "automatic conduct" is sheer fabrication.⁴³

Recently the electroencephalogram 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 electroencephalogram, 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."⁴⁴

We may expect to see the electroencephalogram (E.E.G.) 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 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 any given tracing implies.⁴⁵

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 of prisoners and the diseases they may show.⁴⁶ More adequate methodology will 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 will narrow the gap of inference by providing trustworthy reconstructions of the causes of the particular crime, after the fashion of East's able example. The surge may move forward to the realization of a profession of medical penology with the opportunities and compensation de-

⁴³ Lennox, *Amnesia, Real and Feigned*, 10 *Univ. Chi. L. Rev.* 298 (1943); 99 *Am. J. Psychiatry*—(1943).

⁴⁴ *Middle Templar, From an English Office Window*, 20 *Can.B.Rev.* 794, 798 (1942).

⁴⁵ Lennox and Gibbs propose to study amnesic cases and other select groups in prison populations with the E.E.G. to see what may be discovered regarding abnormal brain waves (personal communication).

⁴⁶ Personal communication.

sirable to attract the ablest men.⁴⁷ In that day we shall see more careful thought given to segregation of prisoners according to behavior patterns, and their likely interactions, and we shall see the device of parole used more effectually. We shall see, too, far more attention given to early discovery of predelinquency and of potentially dangerous psychopathic personalities so that proper mechanisms for preventing crime can be put into operation.⁴⁸

Medicine made a weighty contribution to the study of human behavior by giving investigators the "case method."⁴⁹ There is reason to feel that the medical man will continue his substantial part in the study of the thorny practical problems of criminology and sociology.

FORENSIC PATHOLOGY AND SOME OF ITS OUTSTANDING PROBLEMS

This second great species 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. This diagnostic change may be discovered by gross inspection at times, or it may call for preparation of tissue sections, embedded in paraffin blocks, cut into thin slices by a microtome, 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 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."⁵⁰

Most of these studies presuppose a post-mortem examination of a dead body. Actually the contribution of forensic pathology includes a wide

⁴⁷ Roche, *The Pennsylvania Plan (Intramural Training in Penal Psychiatry)*, Proc. Am. Prison Ass'n 315 (1939).

⁴⁸ See Thom, *op. cit.* supra note 31.

⁴⁹ Dr. William Healy is generally credited with bringing the individual case method into prominence in the study of crime.

⁵⁰ The Medical Examiner's Office in New York City and the Department of Legal Medicine in the Harvard Medical School are equipped to give theoretical and applied training to select candidates in this important new profession.

range of clinical and laboratory tests. 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?⁵¹ 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.

Forensic pathology, as a science, is capable of making at least three, and perhaps more, significant contributions to the problem of proof: (1) identification: of persons; (2) identification: of cause and time of death, or of a nonfatal injury; and (3) causation: pathogenesis of the abnormal bodily state or the disease in litigation, including possibility that a given injury caused the terminal condition for which compensation is sought.

Example: Identification of persons: Mr. X, a wealthy 68-year-old man, suddenly disappeared. Problems involving inheritance of property made it material to determine whether his body was that all but destroyed in a fire which also took the life of one John Doe. Analysis of blood from the heart showed that the individual had been drinking alcohol. Advanced arteriosclerosis showed he must have been an elderly person, as did senile bony changes in the vertebrae and pronounced enlargement of the lateral lobes of the prostate. There was pronounced spondylitis deformans with moderate kyphosis of the upper thoracic spine. There were evidences of an old vascular accident to be seen near the internal capsule in the right lenticulostriate nucleus of the brain. Investigation showed that X suffered from curvature of the spine, had difficulty in passing his urine, a trouble compatible with prostatic obstruction, that three years previously a "stroke" had partially paralyzed his left side, and that he was often given to drinking alcoholic beverages with John Doe. This evidence, coupled with a few other circumstances, was sufficient to satisfy all interested persons that the charred remains were those of Mr. X.⁵²

At the moment, forensic pathology is highly developed in some quarters as a scientific pursuit, but its proper application is crippled by the

⁵¹ 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.

⁵² Case of Dr. Alan Richards Moritz, Professor of Legal Medicine, Harvard Medical School. Following the tragic Coconut Grove fire in Boston (Nov. 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.

fact that its legal utilization is through the antiquated coroner's office. In seven of our American jurisdictions modern medical examiner systems have been established by law.⁵³ 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. 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, perhaps as early as the time of King Alfred. The coroner functions by holding an inquest, and usually must impanel a jury. 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 homicide⁵⁴ or in an independent civil action brought on an insurance policy, where "suicide or natural death" might be a controlling issue.⁵⁵ Even Shakespeare made caustic reference to "Crown's Quest Law."⁵⁶

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 co-operations to be accented.⁵⁷ Without much more ignominious delay, therefore,

⁵³ Massachusetts; New York City; Newark, New Jersey; Maine; Maryland; Connecticut; Rhode Island.

⁵⁴ *Blackwell v. State*, 166 Miss. 524, 146 So. 628 (1933); *Hall v. State*, 137 Ala. 44, 34 So. 680 (1903); *State v. McCausland*, 82 W.Va. 525, 96 S.E. 938 (1918); *Hedger v. State*, 144 Wis. 279, 128 N.W. 80 (1910).

⁵⁵ *Boehme v. Sovereign Camp*, 98 Tex. 376, 84 S.W. 422 (1905).

⁵⁶ *Hamlet*, V, i, the grave-diggers scene.

⁵⁷ The Egyptians required physical examination of a woman for pregnancy before she was punished by whipping.

In *Ariston v. Conon*, an action for assault and battery in Greek law, the plaintiff, who had been badly beaten by defendant, offered testimony of a surgeon to support his claim that "if a sudden discharge of blood had not relieved me at the moment of intense suffering and danger,

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.⁵⁸ Tomorrow, the medical examiner will 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 of our workmen's compensation acts empower Com-

I should have died of suppuration." The Orations of Demosthenes. The Oration against Conon, Demosthenes, Vol. 5, 169 (tr. by Kennedy, 1881).

The Romans exhibited the bodies of slain persons in the market place for the populace to view. They also relied upon noncombustibility of the heart to prove death by poisoning.

The "Mirror of Justice," Book 1, c. 3 (Selden Society Publication), a source of doubtful authority, refers the institution of the coroner's office to the time of King Alfred.

In the Saga of Njal (an Icelandic saga of events occurring toward the end of the 1100's), we read: "I summon these nine neighbors who dwell nearest the spot to ride to the Althing, and to sit on an inquest to find whether Flosi, Thord's son, wounded Helgi, Njal's son, with a brain, or body, or marrow wound, which proved a death wound, and from which Helgi got his death. . . ." Dasent, The Njals Saga (Edinburgh, 1861).

The "Hsi Yuan Lu" or "Instructions to Coroners," written during the reign Shun Yu (A.D. 1241-1253), and modified from one generation to another, is still used by Chinese officials in the investigation of sudden death. This curiosae, notable for its shrewd suggestions, has now been translated into English. See MacAlister, 17 Proceedings of the Royal Society of Medicine, History of Medicine Section (1924).

Just prior to 1300 A.D., the law school at Bologna prevailed upon doctors to open dead bodies in order to determine the cause of death in medico-legal cases. This proved so useful an adjunct to administration of law that the practice of forensic pathology became fairly prevalent. It was then seen that the methods developed could be applied extensively to the independent study of disease and causation of death in cases which had no medico-legal import. Thus the law was the father of forensic pathology and the grandfather of orthodox pathology.

The Borgia family (1476-1519) and the De Medici's (1389-1589) made it a custom to have their physicians examine friends who had died, to make sure that they had not been poisoned.

The "Bamberger Halsgerichtsordnung" (Bambergensis), composed by Johann von Schwartzberg and enacted by Bishop Georg, in Germany, in 1507, was primarily a statute dealing with criminal procedure. It is interesting to us because it gave physicians and surgeons important functions in the investigation of sudden death, including suspected infanticide, and was the pattern for the more ambitious "Caroli constitutio criminalis" or Carolinian code of Charles V, promulgated in 1532.

See Ludovic, Constt. Crim. Car. V, Halle (1716), which gives comparative provisions of the Bambergensis and Carolinian codes. See, also, Von Bar, History of Continental Criminal Law 208 (1916). For a translation with comments, see Beresford and Polsky, Some Probative Aspects of the Early Germanic Codes, Carolinian and Bambergensis, 23 B.U.L.Rev.—(1943), 18 Ann. Int. Med.—(1943).

For the history of forensic pathology and institutes of legal medicine on the continent, see The Rockefeller Foundation, Methods and Problems of Medical Education (9th Ser.), Institutes of Legal Medicine (1928).

⁵⁸ Aetna Casualty and Surety Co. v. Love, 132 Tex. 280, 121 S.W. (2d) 986 (1938) (coroner liable for ordering post-mortem examination to determine cause of obscure death in aid of workmen's compensation insurance investigation). Gurganious v. Simpson, 213 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).

missioners to order autopsies where the cause of death is obscure and further light is needed to determine compensability of an alleged injury. Courts of those states which refuse a defendant, in personal injury litigation, the right to have the plaintiff examined by an impartial physician appointed by the judge, nevertheless recognize the right of the court, without any empowering statute, to order an exhumation and autopsy of a dead person to provide desirable evidence in a trial for murder.⁵⁹

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 functional cooperation with a state Scientific Crime Detection Laboratory, as both agencies are auxiliary aids to police and law enforcement agencies.

SCIENTIFIC CRIME DETECTION

Scientific Proof has manifold applications in detecting criminals and reconstructing essential evidence of the corpus delicti or body of the crime. The reader is saved from surfeit by limitations of space, but perhaps I can cajole the intellectually curious to scan a few select items, presented in chronological form, to show how broad and deep are the implications of scientific crime detection.

1. 2030 B.C.: *Trial by ordeal*: The Code of Hammurabi⁶⁰ mentioned ordeals, and the ordeals of fire, water, and the like were widely practiced to determine guilt or innocence. They were not abolished in England until 1213.⁶¹ Now recognized as superstition, at the time of their use they were regarded as objective scientific corroboration. They reflect the constant questing for proof by external tests.

In primitive India, the Hindu priests required one suspected of crime to chew *dry* rice for a given time and then to eject the *bolus* upon a piece of dry bark. If the rice was still dry, the suspect was guilty. This had a pseudo-scientific rationale; it was believed that fear of detection and punishment would inhibit the nervous mechanism of the salivary gland and prevent the flow of saliva.⁶²

2. Ca. 1000 B.C.: *Proof of perjury and paternity by forensic psychology*: The Judgment of Solomon as to which of two female claimants was the true mother of the

⁵⁹ Gray v. State, 55 Tex.Cr.R. 90, 114 S.W. 635 (1908).

⁶⁰ 1 Thatcher, The Library of Original Sources 439 (1907).

⁶¹ See Watt, The Law's Lumber Room (2d ed. 1898); Lea, Superstition and Force (4th ed. 1892).

⁶² Glaister, The History of Medical Jurisprudence and Criminal Procedure in Primitive and Mediaeval Times, The Medical Times and Hospital Gazette (May, 1897).

child in question was based on their psychological reactions to the proposal that the child be divided in two.⁶³

3. 600 B.C.—500 A.D. (*The Talmud*): *Scientific disproof of adultery*: A husband, desiring to divorce his wife, contrived to get her and other guests drunk at a party, carried her and a male guest to a couch and threw egg albumen between them. He then called neighbors to bear witness to adultery. The resourceful wife, on becoming sober, summoned her physician, who identified the substance as egg white, not seminal fluid. We are not told what means he used. (Today, we would use specific chemical tests such as the Florence test,⁶⁴ or the microscope, or immunological methods.)
4. 287–212 B.C.: *Proof of adulteration of metal*: Legend has it that Archimedes, the Greek physicist and mathematician, used scientific proof to settle an issue involving possible adulteration of metal and obtaining of money under false pretenses. Heiron called upon Archimedes to say whether the suspected smith had used silver alloy in a gold crown. While taking a bath, Archimedes conceived the idea of immersing the crown in water to see how much liquid it displaced as compared with true gold. With true scientific independence and ardor, he sprang from the bath, and ran naked through the street to his home shouting "Eureka!"⁶⁵
5. 15 B.C.—19 A.D.: *Forensic chemistry: toxicology: noncombustibility of the heart as proof of death by poisoning*: The ancients falsely believed that non-combustibility of the heart was proof of poisoning. This assumption was challenged by defense counsel in the trial of Plandina, wife of Piso, for the murder of Germanicus. The defense admitted that the heart of Germanicus was non-combustible but claimed this was due to heart disease. Collateral evidence leads us to believe that Germanicus probably did die of natural causes.⁶⁶

⁶³ First Kings, III, 16.

⁶⁴ Florence, 10 Arch. d'Anthrop. Crim. 417 (1896). The alleged seminal stain is put into solution; a drop is placed on a glass slide and allowed to nearly dry; a drop of Florence's solution (potassium iodide 1.5 grams, iodine 2.5 grams, and water 30 c.c.) is added, and the preparation is viewed at once under the microscope. If semen is present haemin-like crystals form, singly, in clusters, and in rosettes, and soon become unrecognizable. The test is not absolutely specific, as the positive reaction is produced by action of iodine on choline, a natural base which occurs in many cells. It is most valuable as a negative test. Recently Pollak has canvassed all the useful methods of identification. Pollak, Semen and Seminal Stains, A Review of Methods Used in Medico-Legal Investigations, 35 Arch. Pathology 140 (1943).

⁶⁵ Heath, Archimedes (1920).

⁶⁶ Comments of the ancient writers on this case are interesting: Suetonius, Twelve Caesars, Caligula, 1: "[Germanicus] died of a lingering disorder not without suspicion of being poisoned; for besides the livid spots which appeared all over his body, foam poured from his mouth, and also his heart was found uncharred amongst the bones: its nature being such, as it is supposed, that when tainted by poison, it is indestructible by fire."

Tacitus, Annales, Book 2, Sec. 73: "His body, before its commitment to the pile, was exhibited naked in the Forum of Antioch, the place fixed upon for the sepulchral rites: whether it bore the marks of poison remained undecided; for people were divided in their conclusions according as they pitied Germanicus and presumed the guilt of Piso, or were prejudiced in his favor."

Pliny, Natural History, XI, 37, Sec. 71: "It is denied that one can cremate those who have died of a cardiac illness, and those who have taken poison. There surely survives an oration of Vitellius in which he charges Gnaeus Piso with this crime on this ground: that it had been wit-

6. *Ca. 1591: Forensic microscopy*: Hans and Zacharias Jansen invented the microscope.⁶⁷ But we may point out that the history of lenses runs back to the Egyptians, and that Leonard Digges (*ca. 1550*) had employed a telescope to view far-off objects.⁶⁸
7. *1727: Forensic photography*: Johann Heinrich Schulze (1687-1744), a physician of Halle, placed objects in a glass containing a mixture of white chalk and nitrate of silver and by exposing them to light produced transient photographic images, the first ever achieved.⁶⁹
8. *1800: Forensic physics*: F. W. Herschel discovered infra-red rays.
9. *1804: Forensic physics*: J. W. Ritter discovered ultra-violet light which is now used for preliminary identification of stains, for showing up obliterated writing in forgery, etc.⁷⁰
10. *1829*: Sir Robert Peel introduced the Act in Parliament which established a police system for London.
11. *1836: Forensic chemistry: toxicology*: James Marsh (1794-1846), English chemist, described his famous "Marsh test" for identifying minute traces of arsenic, the basis for later, more refined tests.⁷¹
12. *1858: Personal identification: fingerprints*: Sir William Herschel introduced fingerprinting as the official system of individual identification in India.⁷²

nessed that the heart of Germanicus Caesar could not be cremated because of poison. Piso was defended as to the nature of the illness."

⁶⁷ Clay and Court, *The History of the Microscope* (1932).

⁶⁸ Digges, *Pantometria* (1571), p. 5 of preface, says of his father, Leonard Digges:

"My father, by his continual paynfull practices assisted with demonstrations methematically, was able, and sundrie times hath, by proportionall glasses, duely situate in convenient angles, not onely discovered things farre off, read letters, numbred peeces of money with the very coyne and superscription thereof, cast by some of his freends of purpose uppon Downes in the open fieldes, but also seven myles off declared what hath been doon at that instante in private places."

⁶⁹ Stenger, *The History of Photography* (1939). First permanent photograph: J. Nicéphore Niepce (1822); daguerreotype perfected: Daguerre and Niepce (1839). For forensic photography, see Scott, *Photographic Evidence* (1942).

⁷⁰ Nicholson's *Journal* 214 (1804). See Ellis and Wells, *The Chemical Action of Ultraviolet Rays* (Heyroth's ed. 1941); Radley and Grant, *Fluorescence Analysis in Ultra-violet Light* (2d ed. 1935); Rorimer, *Ultra-violet Rays and Their Use in the Examination of Works of Art* (1931).

Wheatstone in 1835 was probably the first to observe that a brilliant light (ultraviolet light) is emitted when mercury is vaporized in an electric arc. Perkin, 6 *Trans. Faraday Soc.* 199 (1911).

⁷¹ *Edinburgh Philos. J.* (Oct., 1836). See Wigmore, *Circumstantial Evidence of Poisoning*, 23 *B.U.L.Rev.*—(1943), 1 *Clinics* 1507 (1943); Walker, *Scientific Evidence in Poisoning Cases*, 23 *B.U.L.Rev.*—(1943), 1 *Clinics* 1520 (1943); Thayer, *Note on Poison in Roman Private Law*, 23 *B.U.L.Rev.*—(1943), 1 *Clinics* 1625 (1943).

Mathieu Joseph Bonaventure Orfila (1787-1853), French toxicologist and chemist, born in Spain, is regarded as the father of scientific toxicology. He published his *Traité des poisons, or Toxicologie générale*, in 1813.

⁷² Mitchell, *The Scientific Detective and the Expert Witness* (1931). For one of the best résumés of the scientific and legal history of fingerprints, see Hankison, *Evidence of Fingerprints*, in *Underhill's Criminal Evidence* c. 54 (Niblack's ed. 1935).

13. 1860: *Forensic physics: spectrographic analysis*: Kirchoff and Bunsen noted that when temperature of a gas is raised sufficiently it radiates light or energy of characteristic wave lengths dependent on the molecular structure of the gas tested and the method of excitation.⁷³ These line-spectra enable identification of inorganic substances which can be vaporized. The heat required for vaporization usually destroys organic substances.
14. 1879: *Personal identification*: The Bertillon Cabinet was founded in Paris. The anthropological identification method of Alphonse Bertillon (1853-1914) was officially adopted in France in 1888 as a means of identifying criminals, but it was later abandoned with the advent of finger-printing.⁷⁴
15. 1893: *Scientific crime investigation*: Hans Gross, sometimes called "the father of scientific criminology," brought out his classic treatise.⁷⁵
16. 1895: *Forensic physics: X-ray*: Professor Wilhelm Konrad Röntgen of Würzburg, Bavaria, discovered that when cathode rays encounter matter, they give off secondary rays which carry no charge but penetrate ordinary solids.⁷⁶
17. 1898: *Forensic anthropology: Pearson's formula*: Karl Pearson, on June 16, 1898, in a paper read before the Royal Society, announced his formula for reconstructing the stature of a corpse or living person from such bones as the femur, humerus, radius, and tibia.⁷⁷
18. 1900: *Forensic immunology: identification by human blood groups*: Landsteiner made the first observations regarding differences between bloods of normal human beings.⁷⁸ This ushered in the important blood grouping determinations, primarily useful as evidence of nonpaternity.⁷⁹
19. 1901: *Forensic immunology and biochemistry: the precipitin test*: Uhlenhuth showed that, due to protein specificity, an unknown blood can be identified as of human or animal origin by utilizing principles of immunology described by Bordet in 1898. (The source of any minute amount of protein may be identified in the same way.)

⁷³ Pogg. Ann. 110, 160 (1860); 113, 337 (1861). See Wilson, *Spectrographic Analysis as an Aid in Identification Problems*, 25 J. Crim. L. & Criminology 160 (1934).

⁷⁴ For a full description of the Bertillon method, see Bertillon, *Identification of the Living* (tr. by Webster), in 1 Peterson, Haines, and Webster, *Legal Medicine and Toxicology* (2d ed. 1923).

⁷⁵ Gross, *Handbuch für Untersuchungsrichter, als System der Kriminalistik* (2 vols. 1893), translated into eight foreign languages; in English under the title, *Criminal Investigation, A Practical Textbook for Magistrates, Police Officers and Lawyers* (by John Adam and J. Collyer Adam; Kendal's ed. 1934).

⁷⁶ 6 L'Éclair Elect. 241 (1896). Röntgen's three memoirs are translated in *The Electrician* (Jan. 24, 1896, and April 24, 1897). X-ray evidence, because of its direct visual quality, was speedily admitted by the courts. *Smith v. Grant*, 29 Chicago Legal News 145 (1896).

⁷⁷ Pearson, *On the Reconstruction of the Stature of Prehistoric Races*, 192 Philosophical Trans. of the Royal Society, Ser. A. 169 (1898). His calculations were based in part upon the measurements of Rollet at Lyon in 1889.

⁷⁸ Landsteiner, 27 Zentralbl. f. Bakteriell., Parasitenk w. Infektionskrankh 357 (1900).

⁷⁹ See Boyd, *Protecting the Evidentiary Value of Blood Group Determinations*, 17 So. Calif. L. Rev.—(1943), 1 Clinics 1536 (1943); Maguire, *A Survey of Blood Group Decisions and Legislation in the American Law of Evidence*, 17 So. Calif. L. Rev.—(1943), 1 Clinics 1560 (1943); Schoch, *Determination of Paternity by Blood Grouping Tests: The European Experience*, 17 So. Calif. L. Rev.—(1943), 1 Clinics 1579 (1943).

Uhlenhuth was the first worker to publish results of tests demonstrating practical application of the precipitin reaction to medico-legal work. Having injected rabbits with human blood, he used the anti-serum so produced in tests against 19 different bloods and found that a positive precipitin reaction occurred only with human blood. He also used the method to identify human blood on test objects such as a stick, sand, cotton trousers, a hatchet, and several stained articles.⁸⁰

20. 1912: *Forensic physics: firearms identification*: Balthazard photographed bullets and from the photographic enlargements identified the precise weapons from which they had been fired. He did this by comparing the markings on those bullets with those on other test bullets fired from the suspected weapons.⁸¹
21. 1912-1930: *Identification of instruments by markings*: Luke S. May carried on extensive studies devoted to identification of knives, tools, and instruments by photomicrographs of scratches and marks made in their use.⁸²
22. 1921: *Lie detector*: Larson began work on deception tests. He constructed a portable "polygraph" for recording relative changes in pulse, blood pressure, and respiration. The so-called guilt reaction, due to anxiety, produces physiological changes in these values. Larson also developed an improved technique of questioning the suspect.⁸³
23. 1923: *Identification: preserving imprints by moulage methods*: Hans Müllner of Graz reported his quick method of making casts of impressions left in soft materials.⁸⁴
24. 1925: *Ballistics: comparison microscope*: The comparison microscope was devised by Gravelle of South Orange, N.J., at the instance of Calvin Goddard and was put to use in the Chicago Scientific Crime Detection Laboratory established in 1929.⁸⁵ It enables convenient microscopic comparison of two objects, such as markings on the death bullet and those on a test bullet fired from the gun which the prosecution alleges to have been the weapon used.

⁸⁰ Uhlenhuth, 27 Deutsche med. Wochen. Jahrb. 6. (1901). For practical details of this test, see Smith and Glaister, Recent Advances in Forensic Medicine 99 (1931).

The precipitin test was first used in a murder trial in 1902 in France, to prove that stains on the prisoner's clothes were human blood and not rabbit's blood, as he claimed. It was first used in an English court in 1910 in the murder trial of Marke Wilde. Dr. Willcox testified that old stains on the blue serge coat of the prisoner gave a positive precipitin test for human blood.

⁸¹ Goddard, Arms Identification: Its Story, 10 Police "13-13" 10 (1935).

⁸² May, Identification of Knives, Tools, and Instruments, a Positive Science, 1 Am. J. Pol. Sci. 246 (1930). Metallographic analysis was approved in *Magnuson v. State*, 187 Wis. 122, 203 N.W. 749 (1925), one of the most remarkable cases of scientific crime detection to be found in the law reports.

⁸³ Trovillo, A History of Lie Detection, 29 J. Crim. L. & Criminology 848 (1939). See also, Larson, Lying and Its Detection (1932); Inbau, Lie Detection & Criminal Interrogation (1942).

For applied use in State Police work, see Snyder, Criminal Interrogation with the Lie Detector (Eight Years' Experience by the Michigan State Police), 15 Rocky Mt. L. Rev.—(1943), 18 Ann. Int. Med.—(1943).

⁸⁴ Müllner, 4 Kriminalistische Monatshafte (No. 12) (1930). Transl. 23 J. Crim. L. & Criminology 351 (1932-33).

⁸⁵ Goddard, Crime Detection Laboratories in Europe, 1 Am. J. Pol. Sci. 13, 21 (1930).

25. 1929: *Analysis of dust traces*: Considerable credit should be given to Edmund Locard, able director of the Laboratory of Police Technique of Lyon, France, for his valuable and refined work on this subject. Dust analysis had been faintly alluded to by old writers on legal medicine, and was actually applied by Hans Gross, but it was most stressed by Conan Doyle as a favorite method of his detective, Sherlock Holmes, in such stories as "A Study in Scarlet," "The Five Orange Pips," and "The Sign of the Four." Locard attributes his original interest in the subject to reading the exploits of Sherlock Holmes.⁸⁶
26. 1932: The Federal Bureau of Investigation (U.S. Department of Justice) established its Scientific Crime Detection Laboratory.
27. 1932: *Blood alcohol level as evidence of intoxication*: Widmark in Sweden showed by experimental work that blood alcohol determinations are valuable indices of intoxication.⁸⁷ This work led to adoption in Sweden of compulsory blood tests in criminal cases and traffic accidents. Traffic officers are equipped to take blood samples and these are sent to the State University of Lund for analysis.

It is possible by scientific means to determine from a shattered window pane whether it was broken from the outside or from within the house;⁸⁸ to analyze minute traces of soil found on the suspects' shoes;⁸⁹ to gain signal help from microscopic preparations of a single hair;⁹⁰ to draw valuable inferences from tire and skid marks;⁹¹ to reach a conclusion as to whether a gun-shot wound was inflicted by a weapon fired at a distance or by a gun held pressed against the victim's body.⁹²

As the reader may have noticed, this species of Scientific Proof has certain special attributes: (1) convergence of attention on problems of *identification*; (2) applied use of the principles of the physical sciences; (3) reference of problems involving medical science to independent consultants;

⁸⁶ 4-5 *Revue Internationale de Criminalistique* 176-249 (1929). Transl. 1 *Am. J. Pol. Sci.* 1927, 401, 496 (1930).

⁸⁷ See Widmark, *Die theoretischen Grundlagen und die praktische Verwendbarkeit der gerichtlich-medizinischen Alkoholbestimmung* (1932). For practical aspects, see Ladd and Gibson, *Legal-Medical Aspects of Blood Tests To Determine Intoxication*, 29 *Va.L.Rev.*—(1943), 18 *Ann. Int. Med.* 564 (1943).

⁸⁸ Matwejeff, *Criminal Investigation of Broken Glass*, 2 *Am. J. Pol. Sci.* 148 (1931). Tryhorn, *The Examination of Glass*, 12 *Police J. (of England)* (No. 3, 1939); reprinted in 30 *J. Crim. Law & Criminology* 404 (1939).

⁸⁹ Johannsen, *Manual of Petrographic Methods* (1918).

⁹⁰ Glaister, *Hair Considered Medico-Legally*, 22 *Trans. Medico-Legal Soc.* 95 (1927-28); Kirk, *Human Hair Studies, I: General Considerations of Hair Individualization and Its Forensic Importance*, 31 *J. Crim. Law & Criminology* 486 (1940). See also, Smith and Glaister, *Recent Advances in Forensic Medicine* (1931).

⁹¹ Harper, *A Graphical Method for Rapidly Determining Minimum Vehicle Speeds from Skid Marks*, 30 *J. Crim. Law & Criminology* 96 (1939); Wiener, *An Inaccuracy in the Determination of Vehicle Speeds*, 31 *J. Crim. Law & Criminology* 249 (1940).

⁹² Walker, *Bullet Holes and Chemical Residues in Shooting Cases*, 31 *J. Crim. Law & Criminology* 497 (1940).

and (4) chief connections with administration of criminal justice; the main legal counterpart in the rules of evidence and the doctrines of criminal law which apply to investigation and trial of criminal charges.

Today the Scientific Crime Detection Laboratory of the F.B.I. is carrying on specialized investigations for many of the state police forces.⁹³ In time each state police force should have its own laboratory, and pains must be taken to make this work a career for the highly trained man, perhaps on some civil service basis. Many of the Scientific Crime Detection Laboratories now scattered throughout this country have limited value because of a tendency to draw personnel from the ranks of police officers on a seniority principle.

SCIENTIFIC MODES AND MECHANISMS OF PROOF

Under this head, we may study particular means of acquiring scientific evidence. We may study the critical limitations of such evidence-producing agencies as the X-ray,⁹⁴ the electrocardiograph,⁹⁵ the electroencephalograph,⁹⁶ and the lie detector.⁹⁷

We may study also the adequacy of existing modes of trial, and of social mechanisms needed to bring scientific evidence to the point of maximum legal utility. I have alluded to the need of taking scientific issues from lay jurors. Professor Edmund Morgan, Reporter of the American Law Institute "Committee on Evidence," charged with developing a new simplified Code of Evidence, has described certain immediate changes which proponents of Scientific Proof should help translate into legislation.⁹⁸ Professor Roscoe Pound, known everywhere for his school of sociological jurisprudence, believes that analysis has outrun social synthesis. He proposes a Ministry of Justice as a means of effecting rapid and successful transfusions of scientific thought into the circulating blood stream of law.⁹⁹

⁹³ Hoover, *The Scientific Crime Detection Laboratory*, 10 *Univ. Chi. L. Rev.* 335 (1943), 1 *Clinics* 1503 (1943).

⁹⁴ Donaldson, *Medical Facts That Can or Cannot Be Proved by Roentgen Rays*; *Historical Review and Present*, 41 *Mich. L. Rev.* 535 (1943), 18 *Ann. Int. Med.* 535 (1943).

⁹⁵ Riseman, *Principles of Electrocardiography*, 15 *Rocky Mt. L. Rev.*—(1943); Smith and Riseman, *Applied Use of the Electrocardiograph in Legal Proceedings*, 15 *Rocky Mt. L. Rev.*—(1943).

⁹⁶ See this paper *supra*, and see Lennox, *op cit. supra* note 43.

⁹⁷ Snyder, *Criminal Interrogation with the Lie Detector*, 15 *Rocky Mt. L. Rev.*—(1943), 18 *Ann. Int. Med.* 551 (1943).

⁹⁸ Morgan, *Suggested Remedy for Obstructions to Expert Testimony*, 10 *Univ. Chi. L. Rev.* 285 (1943), 1 *Clinics* 1627 (1943).

⁹⁹ Pound, *A Ministry of Justice as a Means of Making Progress in Medicine Available for Courts and Legislatures*, 10 *Univ. Chi. L. Rev.* 323 (1943), 1 *Clinics* 1644 (1943).

In times past I have suggested the formation of a National Scientific Commission to serve as a master censor for the courts.¹⁰⁰ 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 develop also a comprehensive system for certifying the proficiency of expert witnesses.

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.

Indeed, there is a 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 finger-printing, 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; Albert S. Osborn has brought this field from art to science, but there is still a component of subjective skill in its application. Forensic pathology in most particulars 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.

Each species of evidence calls for safeguards and 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 ex-

¹⁰⁰ Smith, *Cooperation between Law and Science in Scientific Proof*, 19 *Tex. L. Rev.* 414 (1941).

pert 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 the 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.¹⁰¹ Perhaps the particular expert does not look too scientific to the court; perhaps, too, the judge feels that there is no satisfactory cross-examination possible of a complicated procedure. 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 textbook 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.

One result of our present adversary system of trial is that science may be born anew in every lawsuit where 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.¹⁰²

¹⁰¹ 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 D 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. 561 (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.

But see *Schulze v. Schulze*, 35 N.Y.Supp. (2d) 218 (1942). Husband, X, as plaintiff, sought a divorce from his wife, Y, defendant, on the ground of adultery. Y contended that child, C, was the offspring of X and that she had not committed adultery. X and Y had been separated for some time, but evidence as to access during the period of separation was conflicting. E, an expert witness, offered uncontradicted testimony that he had performed blood group determinations which showed X could not possibly be the father of C. Held: Though "the presumption of legitimacy of a child . . ." born in wedlock is "one of the strongest presumptions known to law . . .," it is rebutted, and the lay testimony of access overcome by the undisputed scientific evidence of non-paternity. The uncontradicted scientific proof is entitled to control the issues raised.

¹⁰² There would seem to be two solutions to this jury trial dilemma:

(1) In criminal litigation where a scientific finding should control the outcome of the case, and the undisputed scientific evidence points one way, I would suggest a constitutional amendment empowering the trial judge to instruct the jury to return its verdict in accordance with the scientific proof. The reader will understand that now it is constitutionally impossible for judges to direct verdicts of guilty in criminal prosecutions. This is in contrast with the situa-

In our 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.¹⁰³ 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.

What would P (a member of the public) think if he experienced the following treatment in a modern hospital? P goes into the hospital suffering pain. Dr. X says (testifies) that the pain is due to heart trouble. No one disputes him and the case is treated as one of heart trouble.

Assume, instead, that Dr. Y. examines P and says (testifies) that P is suffering from gall bladder trouble. The hospital superintendent, desiring to resolve the conflict, calls in a layman from the street to say whether Dr. X or Dr. Y is to be believed, and on that basis disposes of P's case.

P would be properly shocked at such a procedure, for he would naturally expect that Dr. Z, an even greater consultant (expert referee), would be called into consultation to determine the true facts.

The reader will note 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 (augmentation), or too little (displacement).¹⁰⁴ Three cardinal

tion in civil litigation where the judge may instruct a verdict if all the credible substantial evidence points one way.

2) 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. If an impartial referee system be introduced for trial of scientific issues, one might well argue that a finding on full investigation should be given effect against the whole world.

Under our strongly entrenched adversary system, with stress placed on the varying diligence of litigants and counsel, the first solution proposed would be the more acceptable.

¹⁰³ I think it is safe to say that this is not yet the majority rule.

¹⁰⁴ A. *Augmentation*: "Plowden (1510-1584) one of the heroes of jurisprudence, of the growth of the sixteenth century, was a deserter from one of those professions which are built on physical science; he flourished toward the latter part of the reign of Elizabeth. From the report of a cause relative to a mine, he took occasion to unfold to the eyes of his brethren of the long robe the wonders of mineralogy: a terra incognita, as strange to them as America had been to their immediate progenitors. 'The theory of mineralogy,' said he, 'is to the last degree a simple one. In sulphur and mercury, the Adam and Eve of the mineral creation, the whole tribe of metals behold their common parents.' Are they in good health? The two perfect metals, gold and silver, are the fruits of their embrace. Do they labour under any infirmity? The effects of it are seen in the imperfect metals, their imperfect progeny." 1 Bentham, *Rationale of Judicial Evidence* 7 (1827) and see note 106 infra.

B. *Displacement*: 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

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.¹⁰⁵

Assuming, as we must, that laymen may continue to try scientific issues for a long while to come, is it possible to make criteria of Scientific Proof universally available in the "valuing" process, even where these have not been put in evidence?

Facts not offered in evidence from the witness stand cannot be considered unless they be proper subjects for judicial notice, and so universally 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's consulting the wrong bootblack,¹⁰⁶ but if we are to continue our present system of trial, this

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. D 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. (Proper procedure would have been to use a comparison microscope or to make imprints of the etched grooves by rolling the bullets to be compared over plastic material according to the technique of Moritz.) 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. Burke, J., said: "All these bullets are before us. Each of the justices has examined them under a powerful glass (though not the identical one used at the trial) and has been wholly unable to see anything resembling what the witness says he saw and which he assumed to exhibit to the jurors. . . . This court is as capable of passing upon such evidence as the jurors who heard it. . . . Here the sole evidence of guilt is the assertion that certain alleged markings appear upon these bullets. We examine them and find nothing of the kind. Hence the judgment must necessarily be reversed. The thread is entirely too slender to support a sentence of life imprisonment. The evidence is not only weak and uncertain; it is no evidence."

¹⁰⁵ See Smith, *Components of Proof in Legal Proceedings*, 51 Yale L.J. 537 (1942).

¹⁰⁶ 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

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, Ministry of Justice, or point of reference.

Jurisprudential Use of the Scientific Rationale.—In marshalling those ultimate facts which should orientate legal doctrine, model legislation, or social policy, science may proffer methods of research, or on occasion the very criteria, for action. A case in point is the legislation authorizing compulsory sexual sterilization. Indiana passed the first statute on March 9, 1907, and up to this moment thirty states in all have enacted such laws. The primary intention of such legislation was eugenic: to prevent carriers of inheritable defects from transmitting them, and thus to protect society from new members predestined to insanity, feeble-mindedness, or other disabling defect. By vasectomy in case of males, and by tying off the fallopian tube in case of females, specified classes of persons previously committed to state institutions would be rendered safe to re-enter society. No one can doubt that sexual sterilization may prove to be a beneficent factor in race eugenics, but it is equally clear that legislative enthusiasm has outrun scientific criticism. This appears from several considerations: (1) The classifications do not always correspond to diseases recognized as transmissible by heredity. Some statutes set up such categories as "moral degeneracy," a sociological symptom, not a diagnosable medical disease, and not a condition known to be transmitted by inheritance.¹⁰⁷ (2) The legislation is not bottomed on medical knowledge regarding "inheritable disease," or scientific regard for the feasibility of spotting recessive carriers of the defect. (3) The legislation touches such a small percentage of the described classes, and often at so late a date,

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. *Whitson v. Hillis*, 55 N.D. 797, 215 N.W. 480 (1927).

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), on appeal from the Supreme Court of Ceylon, the Judicial Committee of the Privy Council held that whether medical standards require X-ray 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; *Boyce et ux. v. Brown*, 51 Ariz. 416, 77 P. (2d) 455 (1938).

¹⁰⁷ For detailed analyses of the American legislation, and other valuable tabulations, see Landman, *Human Sterilization*, Append. 287 (1932).

that the eugenic goals of the legislation cannot be achieved. (For instance, only 6 percent of epileptics are institutionalized.)

Dr. Abraham Myerson shows most convincingly that legislation which rests upon scientific premises can and must be tested by scientific principles.¹⁰⁸ Dr. John Rock has expounded the scientific principles which must be taken into account in arriving at an enlightened social policy toward dissemination of birth control advice.¹⁰⁹

Private Law Doctrine and Medical Practice.—It is a delusion to speak of "medical jurisprudence" in referring to the legal problems which arise from the practice of medicine. First, it is customary to reserve the term "jurisprudence" to connote philosophic ends of law and the main analytical approaches to law as a science. In the second place, law is a roof which shelters us all, and those doctrines which touch the doctor belong to large fields of law. As a rule, they do not express a unique series of principles applicable only to medical men. Liability in damages to a patient allegedly injured by malpractice is governed by the law of torts;¹¹⁰ whether or not such conduct was so extreme as to be also a crime is tested by principles of criminal law. Rights of compensation of the physician are determined by the law of contracts, including doctrines of quasi-contract.¹¹¹ The position of the expert witness is determined by the law of

¹⁰⁸ Myerson, Certain Medical and Legal Phases of Eugenic Sterilization, 53 Yale L.J.—(1943), 18 Ann. Int. Med. 580 (1943).

¹⁰⁹ Rock, Scientific Reasons Why Present Rigid Restrictions on Birth Control Counsel Should Be Relaxed, 1 Clinics 1598 (1943).

¹¹⁰ Smith, Legal Responsibility for Medical Malpractice, J.A.M.A. (March 8, May 10, May 31, June 14, June 21, July 5, 1941); Scott, Tort Liability of Hospitals, 18 Tenn. L. Rev. 838 (1943), 18 Ann. Int. Med. 630 (1943); Smith, Legal Liability for Non-Therapeutic Surgery, 14 Rocky Mt. L. Rev. 233 (1942). See also, re law of damages, Ludlam, Plaintiff's Duty to Minimize Defendant's Liability by Surgery, 18 Tenn. L. Rev. 821 (1943). As to legal aspects of agreements not to compete, see Dodd, Contracts Not To Practice Medicine, 23 B.U.L.Rev.—(1943), 18 Ann. Int. Med.—(1943). The Duke University journal, Law & Contemp. Prob., has devoted three symposium issues to law-medicine problems: "Expert Testimony," 2 Law & Contemp. Prob. 401-527 (1935); "The New Food, Drug and Cosmetic Legislation," 6 ibid. 1-182 (1939); "Medical Care," 6 ibid. 495-680 (1939).

¹¹¹ *Quasi-contract: Benefit Voluntarily Conferred Due to Mistake of Material Fact: Surgical Services Rendered Gratuitously under Mistaken Belief That Patient Needed Charity.*

X, a man of advanced years, did not appear to be an opulent citizen. He was admitted to the out-patient department of a New York City hospital with little or no questioning as to his financial worth. He was there diagnosed as suffering from prostatic obstruction and treated as a charity patient for six months. His condition then required admission as an in-patient for a perineal prostatectomy. It was assumed that since he was an out-patient he was unable to pay for the operation, and he promised to pay only hospital charges for his room and board. Staff surgeons Y and Z performed the operation gratuitously, assuming that X was a charity case, and X received the operation thinking it would be free. One month later X died and it was discovered that he was worth over four hundred thousand dollars. Thereupon, Y and Z filed claims against the estate for surgical fees. (It is a well settled rule of law that if one makes a

evidence. What may seem to the doctor to be a separate and distinct body of principles is really an integral part of a systematized field of law. It is surprising how many of the major fields of law contain doctrines which touch upon the doctor's daily life. Medico-legal grounds of annulment or divorce may be pertinent to the proper relief of a patient;¹³² the law of wills must determine the validity and effect of the last will and testament signed by a patient in extremis and witnessed by the physician.¹³³ The statute of limitations may forever bar an action brought by or against a physician, if the suit be filed too long a time after the cause of action accrued. Tax laws touch the doctor with the same inexorable impact and authority as other classes of society.¹³⁴

It would be too much to ask any doctor to explore the full content, focal and peripheral, of these large fields of law. To guide him, it would seem desirable that this pertinent law be served up to the medical student and doctor on a functional basis, making the daily routine of the physician primary, and pointing out the secondary legal consequences which may attach to given conduct. Such materials could be presented in conjunction with successive subjects of the medical school curriculum, somewhat as shown in Table 2.

How may law students be trained to cope with scientific testimony? It is a vain and unnecessary goal to impart a medical or scientific education to the aspiring young trial lawyer. There are, however, fundamental ideas underlying every species of Scientific Proof, and these can be conveyed in an interesting and successful manner, in terms of proper approaches to direct and cross-examination. To know the vital premises, and the points where errors are most apt to creep in, to know how to go about weaving the net of proof or exposing its weak strands, to know who are the experts to whom he may resort and what type of aid he may gain from them—these are facts which the graduate of the American law school does not possess. Furthermore, as I think most members of the

gift he is ordinarily debarred from charging compensation for the benefit conferred.) Held: Y and Z could recover the reasonable value of their services under doctrines of "quasi-contract"; they performed the operation gratuitously on the assumption that X was "necessitous," whereas, in fact, through a mutual mistake, X was not qualified to receive treatment "gratis" as a charity patient. *Matter of Agnew*, 132 N.Y. Misc. 466 (1928).

¹³² *McCurdy*, *Insanity as a Ground for Annulment or Divorce in English and American Law*, 29 Va. L. Rev.—(1943), 99 Am. J. Psychiatry—(1943).

¹³³ Some interesting English decisions are discussed in *Kitchin*, *Legal Problems in Medical Practice* § 7 (1936).

¹³⁴ *Griswold*, *The Doctor's Federal Taxes*, 31 Calif. L. Rev.—(1943), 18 Ann. Int. Med. 647 (1943).

TABLE 2

SCHEME FOR PRESENTING LEGAL PROBLEMS OF MEDICAL PRACTICE
IN CONJUNCTION WITH SPECIFIC SUBJECTS OF
THE MEDICAL CURRICULUM

1. *Anatomy*
 - 1) Legal use to establish identity:
 - a) Criminal law: to identify body of murdered person in establishing "corpus delicti."
 - b) Civil law: to identify persons entitled to property or insurance.
 - 2) As subject of cross-examination in trying to discredit expert witness.
2. *Physiology*
 - 1) Legal aspects of "deception tests" and other physiological procedures.
3. *Bacteriology*
 - 1) Legal aspects of blood group determinations and forensic immunology.
4. *Pharmacology*
 - 1) Narcotic laws: chief requirements and criminal liability for infraction.
 - 2) Malpractice: civil responsibility for negligent use of drugs.
5. *Pathology*
 - 1) Rights in dead bodies; legal responsibility for wrongful autopsy.
 - 2) Right to dispose of one's body by contract or will.
 - 3) Liabilities of clinical pathologists who supervise production of biological materials.
 - 4) Coroner's office and Medical Examiner system as devices for investigating cause of "sudden death."
6. *Physical diagnosis*
 - 1) Malpractice: legal responsibility for negligent diagnosis.
 - 2) Compromise settlements and releases: mistaken (non-negligent) diagnosis as basis for setting such settlements aside.
7. *Surgery and Anesthesiology: Malpractice*
 - 1) Legal aspects of pre-operative procedures.
 - 2) Legal aspects of operative procedures.
 - 3) Legal aspects of post-operative procedures.
 - 4) Special problems in treating fractures.
8. *Medicine*
 1. Malpractice problems in the practice of internal medicine.
 - 2) Legal aspects of "false imprisonment."
 - 3) Legal aspects of "libel and slander."
 - 4) Business problems in medical practice:
 - a) Rights of compensation of the physician.
 - b) Sale of a business practice.
 - c) Legal aspects of various types of business organizations.
 - d) Anti-trust laws.
 - e) Tax problems.
 - 5) Main doctrines of workmen's compensation insurance; of life, health, and accident insurance; of the law of damages; and of the law of evidence, which the doctor as expert witness should know.
9. *X-ray; Electrocardiograph; Electroencephalograph; Lie detector; etc.*
 - 1) Malpractice: special problems arising from dangerous properties of X-ray and radium.
 - 2) Evidentiary uses in legal proceedings.
10. *Preventive Medicine, Public Health, Public Law and Social Problems*
 - 1) Main constitutional law principles in relation to "Food, Health, and Drink."
 - 2) Law relating to public health authorities and practice of preventive medicine.
 - 3) Legal aspects of medical care; legal problems involved in "medical economics."
 - 4) Pre-marital examinations.
 - 5) Medico-legal grounds of annulment and divorce.
11. *Medical Specialties*
 - 1) Special legal problems, as for example:
 - a) Obstetrics (Birth control advice and practice; therapeutic and non-therapeutic abortion; voluntary and compulsory sterilization).
 - b) Forensic psychiatry.

bar will agree, this training is not easily acquired in the course of trial practice. Such materials could be presented as part of a law school course dedicated to "Trial Practice and Problems of Proof-making," a fit companion subject for the modern course in evidence. Proof-making should be regarded as the functional counterpart of the law of evidence. It should deal with all types of proof in an applied fashion, but with constant regard to controlling principles of substantive law, procedural law, the law of trial practice, and of evidence. Such materials might also be brought in by way of illustrating such subjects as torts, insurance law, damages, and evidence.

Public Law Problems in Medical Practice.—The problem of medical care comes into swift contact with public law and constitutional law doctrine.¹¹⁵

Most people are familiar with the scientific conquest of syphilis: how Schaudinn discovered in 1905 that it is caused by a spirochaete, the *Treponema pallidum*; how Ehrlich in 1910 contributed to the arsenal of chemotherapy his highly potent remedy salvarsan (arsphenamine); how in 1913 Noguchi demonstrated the constant presence of the treponema in brains of paretics, and how the Wassermann and other blood tests have much simplified diagnosis and enabled early therapy, control, and cure. Considering what we now know about this destructive malady, is it not a reproach to social conscience that syphilis is still a rampant disease in the United States?

Laws providing for compulsory physical examination once a year of the main systems of every man, woman, and child will not shock the populace so much as this continued inefficiency. The Supreme Court which upheld compulsory vaccination¹¹⁶ and compulsory eugenical sterilization¹¹⁷ could be expected to uphold such legislation as an intelligent exercise of state police power necessary to protect that most valuable community asset, the public health. Diagnostic centers might be erected at suitable places throughout the land, under proper legislation, to enable the general practitioner to gain those advantages in identifying obscure diseases which now can be had in hospitals, and only at prohibitive cost.

Such advances will not injure the position of the doctor, but will increase the volume of medical care, raise the level of scientific medicine by

¹¹⁵ Powell, *Compulsory Vaccination and Sterilization, Constitutional Aspects*, 21 N.C.L. Rev.—(1943), 18 Ann. Int. Med. 637 (1943).

¹¹⁶ *Jacobson v. Massachusetts*, 197 U.S. 11 (1905).

¹¹⁷ *Buck v. Bell*, 274 U.S. 200 (1929).

closing the gap between general practice and clinical practice,¹¹⁸ and bring substantial benefits to each citizen, partially at public expense. No one disputes the desirability of extending horizons of medical practice, and medical men are not so reactionary toward new risk-sharing ideas as some laymen might suppose. These innovations must come in a sound and orderly course; but all can see the current of the times, and none can hold it back. Workmen's compensation laws, once regarded as a breath-taking social innovation, are now under heavy attack because the allowances for incapacity are too low.¹¹⁹ The whole problem of economic security, as far as the wage-earner is concerned, may prove to be inextricably bound up with adequate health insurance.¹²⁰ Increasing the breadth and range of medical care does not require "socialized" medicine or undesirable disturbances of the control or pattern of medical practice.¹²¹

¹¹⁸ Many communities and doctors are confronted with this problem. Dr. Warren F. Draper comments on how many young physicians become discouraged by lack of a satisfactory solution and leave private practice for the public health service to regain contact with the full play of scientific methods. Draper, Report of the President, 17 Harv. Medical Alumni Bull. 4 (1942). The general practitioner cannot afford many of the new instrumentalities for diagnosis and treatment, and frequently this circumstance will force him to surrender the patient to better equipped hospitals.

¹¹⁹ Wilson and Levy, *Workmen's Compensation* (1941), Vol. II, The Need for Reform.

¹²⁰ Recognition of this fact is one of the brilliant conclusions of the recently completed study of Sir William Beveridge on social insurance and allied services, a 300-page report published by H. M. Stationery Office on December 1, 1942. This study, undertaken at the request of Arthur Greenwood, then Minister Without Portfolio in charge of post-war reconstruction, is concerned largely with means for attaining freedom from want. It bids fair to establish new patterns of thought in England regarding needs for more adequate health and workmen's compensation insurance. For the American edition of this report, see Beveridge, *Social Insurance and Allied Services* (1942).

¹²¹ Every individual has a legitimate interest in the betterment of medical services, but all plans should take into account certain ideals and convictions widely held to be of fundamental importance, these being: (1) There should be no restraint on the opportunity of the medical practitioner to advance according to his merit and special ability. (2) There should be no such regimentation of medical practice as will remove individual incentive, cause all methods to become stereotyped, or interfere with full expression of experimentation. (3) Control of medical practice and safeguarding of standards should be reposed in the medical profession and not be made a subject of bureaucratic administration. (4) The economic position of the doctor should be protected in respect to the services which he performs. In the final and fully expanded program of medical care certain to emerge, society should underwrite adequate medical service without having the more unfortunate patient compelled to rely upon charity. (5) The extension of medical care, particularly in regard to preventive medicine, might well be implemented by enlightened legislation, consonant with public opinion, arranging for the routine examination of the entire populace at periodic intervals, with provisions for hospitalizing and treating those suffering from contagious disease. At this stage of social evolution, it might be better left to individual choice whether a person suffering from non-contagious disease, constituting no menace to his fellow-citizens, should receive curative treatment. In any event we must not confuse this wholesome social planning either with autocratic regimentation or with socialized medicine, for the essential premise simply goes back to the adequate protection of the body social by intelligent use of the means at hand.

COOPERATION OF LAW AND MEDICINE

History is full of cases where doctors and lawyers have mingled their traditions in some fascinating and useful way.¹²²

I like to think of the affinities of the lawyer, the doctor, and all those who probe the sciences. All are bred in the tradition of strict skepticism, all have a respect for the best evidence available to prove an issue, and all must leave the cloistered shelter of their researches to perform the practical tasks of life. By virtue of their strict training and their habitual realism, they are fit to be illuminators of social good as well as prime movers.

These three together, the lawyer, the doctor, and the man of science, can reduce the discordant noise now produced when the striking iron of science meets the anvil of the law. The blacksmith shop may yet become a modern assembly plant, and all three may find themselves companion toilers on a more intricate pattern called "social synthesis."

¹²² As joint authors they have produced treatises on law-medicine problems. The first of these, *Medical Jurisprudence*, by J. A. Paris, M.D., Fellow of the Royal College of Surgeons, and J. S. M. Fonblanque, Barrister at Law, was published in London, in three volumes, in 1823.

John Hunter (1728-1793) failed to maintain his great reputation when giving evidence for the defense in the trial of Donellan (1781) for the poisoning of Sir Theodosius Boughton with cherry laurel water. That one of his medical attainments was able to render such little assistance in the administration of justice, made a deep impression. It may have prompted the efforts of Andrew Duncan which caused a chair of Medical Jurisprudence to be founded in Edinburgh University in 1807, the first in the British dominion.

In contrast, Sir James Paget (1814-1899), the rare Scotch surgeon who described Paget's Disease, made a profound impression as an expert witness in the early and important malpractice case of *Perionowsky v. Freeman* (Court of Queen's Bench, 4 Foster and Finlason 977 [1886]). He explained the division of labor between nurse and visiting surgeon in an illuminating way, and the court did not hesitate to declare it as law that a hospital nurse, alone, is responsible for negligence in carrying out merely ministerial duties, such as giving the patient a bath. Unless the negligence goes on in his presence without objection, the surgeon cannot be held for her carelessness in having the water too hot and thereby scalding the patient.

I might mention, too, Ambrose Paré, the father of French surgery, who published in 1575 his work on monsters, simulated diseases, and a method for preparing medical reports.

Clark Bell, born in Jefferson County, N.Y., in 1832, became an eminent lawyer. He was counsel for promoters of the Union Pacific Railway Company, and as such prepared the enabling acts passed by Congress, under which the road was constructed. He was deeply interested in law-medicine cooperations, served for several years as President of the Medico-Legal Society of New York, established its library, founded the "Medico-Legal Journal" in 1883, and in 1885 represented North America at the conference in Antwerp convened to develop an international classification of mental diseases.

Marshall Hall was a colorful English barrister of the past generation. Son of a doctor, he was named for Marshall Hall, the great English physician of the nineteenth century. As a young man, Marshall Hall made himself an authority on *materia medica*, and he put this knowledge to repeated use in his trial work. His special talents led him to be engaged as counsel in a series of celebrated causes, including the trial of Frederick Henry Seddon at the Old Bailey in 1912 for alleged poisoning by arsenic. He was deeply interested in all species of Scientific Proof and made a prize collection of firearms and lethal weapons. See Marjoribanks, *The Life of Sir Edward Marshall Hall* (1929).