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Blood Groups and the Law - A Scientific and Legal Review

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BLOOD GROUPS AND THE LAW
A SCIENTIFIC AND LEGAL REVIEW

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Blooding group evidence has become increasingly important as an aid to the courts in legal proceedings where paternity determination is involved. This paper will attempt to review the scientific basis for the application of such tests and their medicolegal implications.

Landsteiner[1] in 1900 demonstrated that human blood could be differentiated into four distinct blood groups. For this and subsequent work in immunohematology he was awarded the Nobel Prize in Medicine in 1930.[2] In 1908 Epstein and Ottenberg[3] suggested that the A-B-O blood groups of Landsteiner were inherited. This was proved by von Dungern and Hirzfield[4] in 1910 and the exact method of inheritance was determined by Bernstein in 1924[5] and 1925.[6] The mode of inheritance of blood groups is a scientific fact established by tens of thousands of recorded observations.[7] In 1932 the first attempt was made in the United States to introduce evidence of blood grouping tests in a court of law in a case in which the defendant in a rape action wished to prove his non-paternity of a child resulting from the alleged rape.[8] In 1935 as the result of the unsuccessful attempt to introduce such evidence in a New York case[9] the New York legislature amended the Civil Practice Act to make blood-grouping test evidence admissible in courts of law where such evidence excludes the possibility of paternity.[10] Apparently the first case in this country in which such evidence was used *successfuly* was *In re Swahn's Will,* decided in 1936.[11] Since that time blood test results have been introduced as evidence of non-paternity in hundreds of cases in this country and several courts have accepted such evidence as conclusive evidence of non-paternity.[12]

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1. Landsteiner, *Zur Kentnis der antifermentativen, lytischen und agglutinierenden Wirkungen des Blutserums und der Lymphe,* 27 ZBL. BAKT. 357 (Germany 1900).
2. Landsteiner, Nobel prize laureate in Medicine, 1930, 73 SCIENCE 559 (1931).
3. Epstein and Ottenberg, *Simple method of performing serum reactions,* 8 PROC. N.Y. PATH SOC. 117 (1908).
4. Dungern and Hirszfeld, *Uber vererbung gruppenspezifischer strukturen des Blutes,* 6 ZSCHR. IMMUNFORCH. 284 (Germany 1910).
5. Bernstein, *Ergebnisse einer biostatischen zusammenfassenden betrachtung uber die erblichen blutstrukturen des menschen,* 3 KLIN. WSCHR. 1495 (Germany 1924).
6. Bernstein, *Zusammenfassende betrachtungen uber die erblichen ervlichen blutstrukturen des menschen,* 37 ZSCHR. INDUKT. ABSTAMM 237 (Germany 1925).
7. Hooker and Boyd, *Blood grouping as a test of non-paternity,* 25 J. CRIM. L. & CRIMINOLOGY 187 (1934).
8. State v. Damm, 62 S.D. 123, 252 N.W. 7 (1933), discussed *infra* at note 57.
9. Beuschel v. Manowitz, 151 Misc. 899, 271 N.Y. Supp. 277 (Sup. Ct. 1934), rev'd, 241 App. Div. 888, 272 N.Y. Supp. 165 (2d Dep't 1934).
10. N.Y. Laws 1935, c. 196, amendment to Civ. Prac. Act § 306-a.
11. In re Swahn's Will, 158 Misc. 17, 285 N.Y. Supp. 234 (SURR. Ct. 1936).
12. For example, see C. v. C., 200 Misc 631, 109 N.Y.S.2d 276 (Sup. Ct. 1951).

Blood test evidence has found further medicolegal application in identifying blood stains,[13] determining possibility of filial relationships in immigration proceedings,[14] and in clearing up baby mixups.[15] It is the intent of this article to describe for the practicing lawyer the scientific basis of blood-grouping tests and to review the uses made of such tests in legal proceedings.

I

The blood group *antigens* are proteins of a specific chemical and physical structure located on the surface of the red blood cell which react with a specific serum protein called an *antibody*. Because the interation of blood group antigen and antibody results in agglutination (clumping together) of the red blood cells, such antigens are characterized as agglutinogens.

Landsteiner[16] differentiated human blood into four types based on the occurrence of two antigens, called A and B, which are found either singly on the red blood cell (giving rise to group A or group B; in combination giving group AB; or when both are absent, giving group O. Specific antibodies capable of agglutinating the A and B antigens are present in the sera of human beings only in the absence of the corresponding antigen in the same individual's red cells. For example, group A blood containing the A antigen cannot contain the anti-A antibody with which it is incompatible, but does contain the anti-B antibody. Conversely, group B blood contains anti-A antibody but not anti-B antibody. Group AB blood has both antigens A and B and, therefore, the serum cannot contain either antibody. Group O blood which contains neither A nor B antigen contains both anti-A and anti-B antibodies.[17]

Von Dungern and Hirszfeld[18] in 1911 discovered a subgroup of the A antigen which they named A_2. Subsequently subgroup A_3 was discovered. As these subgroups of A can form antigen combinations with B antigen this raised the number of blood groups from the original four to eight (A_1, A_2, A_3, A_1B, A_2B, A_3B, B and O).

Landsteiner and Levine [19] in 1927 discovered two new systems of antigens different from the A-B-O system by injecting human bloods into

13. Shanks v. State, 185 Md. 437, 45 A.2d 85 (1946).
14. Lue Chiw Kon et al. v. Brownell, 122 F. Supp. 370 (S.D.N.Y. 1954).
15. Joye, *After Seven Years I Learned My Son was not My Son,* 81 McCall's 30 (Aug. 1954).
16. Landsteiner, *supra* note 1, at 1.
17. For extensive discussions of the A-B-O and subsequently elucidated blood grouping systems see: SCHIFF AND BOYD, BLOOD GROUPING TECHNIC (1942); RACE AND SANGER, BLOOD GROUPS IN MAN (1950); MOLLISON, BLOOD TRANSFUSION IN CLINICAL MEDICINE (England 1951); WALL, PRACTICAL BLOOD GROUPING METHODS (1952); WIENER, AN RH-HR SYLLABUS (1954).
18. von Dungern and Hirszfeld, *Ueber grouppenspezifische Strukturen des Blutes III,* 8 ZSCHR. IMMUNFORCH 526 (Germany 1911).
19. Landsteiner and Levine, *Further Observations on Individual Differences of Human Blood,* 24 PROC. SOC. EXPER. BIOL. & MED. (1927).

laboratory animals. The new antigens were named M, N, and P.[20] No one has been found who does not have M or N in his red blood cells. The M-N system differs from the A-B-O system, in that naturally occurring antibodies are found only on rare exceptions. Other investigators have identified subgroups of M and N designated as M_2 or N_2.[21] In 1930 it was discovered that some people of group A, B and AB secreted group specific substances in their saliva, and others of the same blood groups did not.[22] The secretion of these substances was found to be transmitted as a simple Mendelian dominant characteristic. This differentiates individuals further depending on whether they are secretors (S) or non-secretors (s). In 1947 the M-N system was further subdivided by the discovery of factor S[23] whose antibody agglutinates 72 per cent of M bloods, 60 per cent of M-N bloods and 33 per cent of N bloods. The original three M-N groups (M, N, MN) may each be S-positive or S-negative doubling the number of M-N groups. If the N_2 and M_2 factors are considered, this would again double the number of antigens in the M-N (S) groups to 16. These 16 groups in turn may be any of the other A-B-O, secretor, non-secretor groups and, therefore, the total number of individual bloods identifiable on the basis of the A-B-O, Ss and M-N (S) systems is 256. At the time of the discovery of the M-N system, a P factor was also identified, which would further divide the population into P-positive and P-negative individuals thus increasing the number of individually identifiable bloods to 512.[24]

In addition to this large number of possible combinations of blood factors which resulted from exhaustive research, there still existed other differences in blood as demonstrated by transfusion reactions and difficulties in skin grafting. In further studies Landsteiner and Wiener[25] dis-

20. Geneticists have shown that the hereditary characters of animals and plants are determined by units localized in submicrospic structures called *genes*. These in turn are supposed to occur in pairs, and to be localized in small, but microspically visible, rod-like bodies that occur in the nuclei of the cells of which plant and animal bodies are built up, and by which they are propagated. These rods are called *chromosomes* and are observed to occur in pairs in conformity with theory. A chromosome may carry a number of genes. One member of a pair of chromosomes carries at each point of its structure a gene corresponding to the one at that same point in the other member of the pair. The genes occurring at such opposite points are considered to be *allelomorphic* to each other. During the formation of cells concerned in reproduction (sperm and ovum), the pairs of chromosomes separate, and each sperm or ovum contains only one of each kind of chromosome. The genetic formula of an individual's blood is referred to as its *genotype*, i.e., the type genes (ex. A and A) inherited by the child from his parents which combine to form the demonstrable blood type, called the *phenotype* in the offspring (ex. A.). M and N are allelomorphic to each other so that three types exist, M (genotype MM), N (genotype NN), and MN (genotype MN). Schiff and Boyd, *op. cit. supra* note 17 at 128.
21. Friedenreich, *Use of blood typing in maternity cases in Denmark with special consideration of the significance of the so-called N_2-receptor.* 11 NORD. MED. TSKR. 721 (Sweden 1936).
22. Lehrs, *Ueber gruppenspezifische Eigenschaftem des menschlichen Speichels,* 66 ZSCHR. IMMUNFORSCH. & EXPER. THERAP. 175 (Germany 1930).
23. Sanger and Race, *Subdivisions of MN blood groups in man,* 160 NATURE 505 (England 1947).
24. Wall, *op. cit, supra* note 17 at 12.
25. Landsteiner and Wiener, *Agglutinable factor in human blood recognized by immune sera for Rhesus blood,* 43 PROC. SOC. EXPER. BIOL. & MED. 223 (1940).

covered that when rabbits were injected with blood from the rhesus monkey, one of the resultant serums contained an antibody which agglutinated some human bloods and failed to agglutinate others. The human cell antigen thus demonstrable by reaction with this antibody was called Rh after the first two letters of "rhesus." Reciprocal factors have been termed Hr. Since that time eleven Rh-Hr antigens have been identified.[26] Twenty-seven possible combinations could be identified if the six basic anti sera were available. This, when considered with the previously discussed blood groups, would raise the number of possible individual blood antigen combinations to 13,824.[27]

Since 1945 a number of other blood factors have been discovered some of which are still in the formative stages of elucidation. There are the Kell and Cellano factors forming the K-k system, the Lewis (Le) antibody, the Lutheran (Lu) antigen, the Duffy (Fy) groups and subgroups. Assuming that antisera were available to identify all of the known blood group antigens and that they all exist in large heterogenous populations of people, over 2,500,000 separate and distinct blood group patterns could be identified.[28]

The immediate application of Landsteiner's blood groups was in making blood transfusions a practicality. By using donor blood of the same type as that of the recipient, compatibility is assured and the danger of transfusion reactions is minimized. Thousands of blood transfusions are given daily in hospitals with typed blood from blood banks to typed recipients. The lay public, as the result of blood-donor drives conducted by the Red Cross, is generally aware of the existence of specific blood groups and the necessity of blood typing in the case of transfusion.

A second application of the knowledge of and the determination of blood groups is its legal application to the exclusion of paternity in legal proceedings. The determination by Bernstein of the exact mode of inheritance of the A-B-O blood factors and the subsequent determination of the inheritability of the other blood factors makes it possible, by studying the group picture of the mother, child, and putative father, to exclude possible parentage in 50 per cent of the *falsely* accused cases. At present this can be done by the A-B-O, M-N, and Rh-Hr tests.[29] When other blood factors such as Ss, K-k, and Fy become usable the chances of exclusion will be increased to more than 60 per cent.[30]

Thousands of individuals have been blood-grouped in studies which

26. Jones, Diamond and Allen, *A Decade of Progress in the Rh Blood-Group System*, 250 NEW ENGLAND J. MED. 283 (1954)
27. Wall, *op. cit. supra* note 17 at 12.
28. Id. at 13. Other recently described blood groups bring to 22 the number of systems or series identifiable at present. The others are: Becker group, Behrens (BE), Cavaliere (Ga), Graydon (Gr), Henshow, Hunter, Jarrell, Jay, Jobbins, Kidd (J K), Levay, Miltenberger ,Mi), U (10). Erf, *The Rh Factor*, 16 SEMINAR, No. 4 8 (1954).
29. Davidson, Levine and Wiener, *Medicolegal Application of Blood-Grouping Tests*, A report of the Committee on Medicolegal Problems, American Medical Association, 149 J. AM. MED. ASS. 698 (1952).
30. Id. at 702.

have substantiated the rules of inheritance established by Bernstein. The four possible blood groups of the A-B-O system are inherited through three allelic genes. As every individual has a pair of genes for each inheritable characteristic, one gene from each pair being inherited from the father and the other from the mother, there are six possible genotypes corresponding to the four blood groups (phenotypes)[31] (Table 1):

Table 1

Multiple Allele Theory of Inheritance of Blood Groups[32]

Blood Group (Phenotype)	Corresponding Genotype
O	OO
A	AA, AO
B	BB, BO
AB	AB

Two laws of inheritance of blood groups have arisen from the theory of multiple alleles: (1) The agglutinogens A and B cannot appear in the blood of a person unless they are present in the blood of one or more of the parents. (2) A parent with blood of group AB cannot have a child of blood group O, and a parent of group O cannot have a group AB child. Ten different mating possibilities may result, the resulting possible blood groups among children of such matings are shown in Table 2. The subgroups of agglutinogens A can be substituted for group A in determining the inheritance of factors A_1, A_2, A_3.

Table 2

Blood Groups in Parents and Children With Ten Possible Matings[33]

Blood Groups of Parents	Possible Blood Groups in Children	Blood Groups Not Possible in Children
1. O x O	O	A, B, AB
2 O x A	O, A	B, AB
3. A x A	O, A	B, AB
4. O x B	O, B	A, AB
5. B x B	O, B	A, AB
6. A x B	O, A, B, AB	None
7. O x AB	A, B	O, AB
8. A x AB	A, B, AB	O
9. B x AB	A, B, AB	O
10. AB x AB	A, B, AB	O

It should be emphasized that there has never been an established exception to the law that A and B do not appear in the blood of a child unless present in the blood of at least one of the parents.[34] Studies on

31. For definitions see note 20, *supra*.
32. Davidson, Levine and Wiener, *op. cit. supra* note 29.
33. Ibid.
34. Schiff and Boyd, *op. cit. supra* note 17 at 133.

more than 25,000 children have failed to show any contradictions that could not be explained as an error in the blood grouping technique or as the result of illegitimacy.[35]

According to current theory the M and N antigens are allelomorphic[36] to each other so that three types exist. This theory leads to the following two laws: (1) M and N agglutinogens cannot appear in the blood unless present in the blood of one or both parents. (2) A parent with type M blood cannot have a child with type N, and a parent with type N cannot have a child with type M. Six different types of mating are possible and the M-N types that can occur among the resulting children are presented in Table 3.[37]

Table 3

Heredity of the Agglutinogens M and N with Six Possible Matings[38]

Blood Groups of Parents	Possible Blood Groups in Children	Blood Groups Not Possible in Children
1. M x M	M	N, MN
2. N x N	N	M, MN
3. M x N	MN	M, N
4. MN x M	M, MN	N
5. MN x N	N, MN	M
6. MN x MN	M, N, MN	None

In published studies of families involving more than 30,000 children not a single exception to the laws of M-N inheritance were found which could not be explained on the basis of illegitimacy. The Committee on Medicolegal Problems of the American Medical Association considers the M-N tests as reliable as the A-B-O tests when carried out by qualified experts.[39]

Consideration of the inheritance of the related S-s factors makes necessary the postulation of four allelic genes or closely linked gene pairs, MS, Ms, NS, and Ns, resulting in 10 genotypes corresponding to the six possible phenotypes. Because specific serums are scarce and large-scale studies have not yet been carried out with S-s blood factors there is some doubt that they should be used routinely in medicolegal cases at the present time.[40]

Although there is some scientific controversy as to the gene relationships with respect to Rh-Hr blood types, all workers in the field recognize the same principles to apply in the heredity of Rh-Hr as are applicable to the other blood groups. The picture is, however, more complicated by the existence of a larger number of genes and a greater variety of blood factors. Known human antisera, classified as anti-Rh and anti-Hr are used to type

35. Davidson, Levine and Wiener, *supra* note 29 at 702.
36. For definition see note 20 *supra*.
37. Davidson, Levine and Wiener, *supra* note 29 at 702.
38. Ibid.
39. Ibid.
40. Ibid.

blood. Tests carried out with three of the anti-Rh sera can distinguish eight types of blood. The original Rh-negative group actually includes four types of blood, rh, rh', rh", and rh'rh", while the Rh-positive group includes four types, Rh_0, Rh_1, Rh_2, and Rh_1Rh_2.[41] In addition, there are reciprocally related Hr factors designated hr' and hr".

The rules of inheritance of the various Rh factors may be summarized as follows: (1) Blood properties Rh_0, rh', rh", hr', and hr" cannot appear in the blood of a person unless they are present in the blood of one or both of his parents. (2) A parent who is rh'-negative cannot have an hr'-negative child; nor can an hr'-negative parents have an rh'-negative child. (3) A parent who is rh"-negative cannot have an hr"-negative child; nor can an hr"-negative parent have an rh"-negative child.[42]

From the above rules of inheritance it can be seen that if the A-B-O and M-N systems do not exclude a putative father of paternity, it is possible that the Rh-Hr system will.[43] Failure to apply Rh-Hr tests may yield inconclusive results which will leave the issue of paternity in doubt.[44]

II

Blood grouping tests have found medicolegal applications in a number of different circumstances. Widest application has been in the exclusion of putative fathers in proceedings involving paternity determination,[45] in the identification of fresh blood or stains,[46] in the identification of sperm in cases of rape,[47] in straightening out baby mixups,[48] in the exclusion of false heirs in settling inheritance claims,[49] and in determining filial relationships in immigration proceedings.[50]

The recognition of the validity and usefulness of blood grouping tests as aids in the administration of justice has met with varying degrees of

41. Ibid.
42. Ibid. For the inheritance of Rh-Hr blood groups resulting from a possible 78 and 171 theoretical matings respectively see Race and Sanger, *op. cit. supra* note 17 at 255 and Wiener, *Heredity and Nomenclature of the Rh-Hr Blood Types,* 3 BULL. WORLD HEALTH ORGAN, 265 (1950).
43. The first law case in which paternity exclusion was based entirely on results of Rh-Hr tests was Saks v. Saks, 189 Misc. 667, 71 N.Y.S.2d 797 (Dom. Rel. Ct. 1947). In that case, a divorce was granted the husband on grounds of adultery. The putative father belonged to type AB, MN, rh, the mother to type A, M. Rh_1Rh_1, and the child to type A. M. Rh_1 Rh_1. If the A-B-O-M-N tests only had been performed the results would have been inconclusive with respect to paternity. Davidson, Levine, and Wiener, *supra* note 29 at 702.
44. Admire v. Admire, 180 Misc. 68, 42 N.Y.S.2d 755 (Sup. Ct. 1943) was a paternity action in which blood-grouping evidence was not introduced because an incomplete (A-B.O-grouping only) test was performed which did not exclude paternity. SCHATKIN, DISPUTED PATERNITY PROCEEDINGS (3d ed. 1953) at 209.
45. State v. Damm, 64 S.D. 309, 316, 266 N.W. 667 (1937); Schulze v. Schulze, 35 N.Y.S.2d 218 (Sup. Ct. 1942); Jordan v. Davis, 143 Me. 185, 57 A.2d 209 (1938).
46. Shanks v. State, 185 Md. 437, 45 A.2d 85 (1946).
47. Schiff and Boyd, *op. cit. supra* note 17 at 181.
48. Joye, *supra* note 15.
49. In re Swahn's Will, 158 Misc. 17, 285 N.Y. Supp. 234 (Surr. Ct. 1936).
50. Lue Chow Kon et al. v. Brownell, 122 F.Supp. 370 (S.D.N.Y. 1954). But *cf.* U.S ex. rel. Lee Kum Hoy et al. v. Shaughnessy, 143 F.Supp. 674 (S.D.N.Y. 1954) in which requirement of such tests by Immigration Service only of persons of Chinese descent was held to be a denial of due process of law.

welcome in the struggle between scientific fact and stare decisis. While European courts have made blood grouping evidence conclusive where the results of such tests were at one with the issue in the case,[51] few American courts have been willing to go so far.[52] Ten states have passed statutes providing the court with power to order blood tests in any case in which the problem of paternity or maternity is relevant to the case.[53] California[54] and a Federal court[55] have admitted the results of such tests as evidence in the absence of statute. Where the parties involved voluntarily agree to the performance of the tests, once significant results have been obtained, they will probably be admissible in evidence.

The legal problems surrounding the employment of blood grouping evidence primarily involve the rules of evidence concerning the introduction of expert testimony, the question of the weight to be given to such testimony, and whether such testimony should be conclusive in the face of other strong testimony tending to contradict the results of such blood tests. In addition courts have dealt with the constitutional issue of possible self-incrimination of blood-test evidence in criminal cases.[56]

In earlier cases the courts were reluctant to adopt such tests as a supplementary tool, indicating a healthy skepticism toward the validity of such tests. The shift in the thinking of appellate courts faced with considering such evidence is forcibly illustrated in *State v. Damm*,[57] in which the Supreme Court of South Dakota first sustained the refusal by the trial court of defendant's request for a blood test on the ground that it did not appear from the record in the case "that medical science is agreed upon the transmissibility of blood characteristics to such an extent that it can be accepted as an unquestioned fact that, if the blood groups of the mother and the child are known, it can be accepted as a postively established scientific fact that the blood group of the father could not have been a

51. Schach, *Determination of Paternity by Blood-Grouping Tests; The European Experience*, 16 So. CALIF. L. REV. 177 (1943); Christiaens, LA RECHERCHE DE LA PATERNITE PAR LES GROUPES SANGUINS (France 1939).
52. *But cf.* C. v. C., 200 Misc. 631, 109 N.Y.S.2d 276 (Sup. Ct. 1951).
53. *Maine—Laws 1939*, c. 259 (adding § 12 to Rev. Stat. (1930) c. 111); *Maryland—Laws 1941*, c. 307 (adding § 17 to Anno. Code, 1939 ed., art. 12); *New Jersey—Laws 1939*, c. 221 (adding §§ 3 & 4 to Rev. Stat. 1937, title 2, subtitle 11, c. 99); *New York*—Civil Prac. Act, § 306-a, as amended by *Laws 1942;* Code of Crim. Proc., § 684-a; Dom. Rela. Laws, § 126-a; N.Y. City. Crim. Cts. Act, § 67-1-a; *Laws 1942*, c. 761, § 1, (adding § 34 to *Laws 1933*, c. 482, which established the domestic relations court of the City of New York); *North Carolina—Laws 1945*, c. 40; *Ohio*—Page's General Code, Anno. (1942 Supp.) §§ 12122-1, 12122-2. *Pennsylvania*—Acts 1951, Act No. 92; *Rhode Island*—Gen. Laws, c. 424, § 8; *South Dakota*—Code 1939, §§ 36.0602; *Wisconsin*— Stat. 1941, §§ 166.105 and 325.23.
54. Arais v. Kalensnikoff, 10 Cal.2d 428, 432, 74 P.2d 1043 (1938); Berry v. Chaplin, 74 Cal.App.2d 742, 169 P.2d 442 (1946).
55. Beach v. Beach, 7 App.D.C. 318, 114 F.2d 479 (1940). The Advisory Committee on Federal Rules of Civil Procedure has recommended an amendment to the language of Rule 35 making clear the right to require a blood test in an action in which blood relationship is in controversy, thus codifying the holding in the *Beach* case. PRELIMINARY DRAFT OF PROPOSED AMENDMENTS TO RULES OF CIVIL PROCEDURE FOR THE UNITED STATES DISTRICT COURTS (1954) at 32-33.
56. For analyses of the scientific-legal aspects of blood-grouping tests, see 1 WIGMORE, § 165a et seq. and Schatkin, *op. cit. supra* note 44.
57. State v. Damm, 62 S.D. 123, 252 N.W. 7 (1933).

certain specific characteristic group." On rehearing,[58] the same court asserted that it believed the reliability of such tests is universally conceded by competent scientific authorities and held that trial courts, in their reviewable discretion, have inherent power to order the taking of such tests in cases where paternity is at issue and where the results of the test may be helpful in ascertaining the truth.

Hostility by the courts to the blood tests per se as legal aids is, fortunately, becoming less and less. Such hostile attitude is exemplified by a lower New York court which expressed suspicion of "complicated" tests which depend on the state of the reagents.[59] "Blood tests results, by reason of their involved experimentation have no greater claim to credibility than other evidence." In this case the blood tests excluded the husband as a possible father of the child involved in the case. The wife had group O, MN blood, the husband was AB, MN, and the child was O, N. The true father must also have been O. In spite of these results the court allowed the jury to find against the husband. Hostility compounded with misunderstanding of the principles of blood exclusion tests is evident in an Ohio opinion[60] which also affirmed a judgment of filiation despite exclusion of blood tests. There the court raised spurious questions of science concerning "hybrids", blood grouping of hemophiliacs, and the relationship of Newtonian physics to Einstein's relativity theory, in rejecting the value of blood grouping tests.[61] In a Maine decision in which filiation was upheld in the face of blood test exclusion[62] the court expresses the following opinion of the relationship between blood grouping tests and the law: ". . . the application of scientific principles to the facts of a particular case where so many important issues, life and death, legitimacy or illegitimacy, and the right of inheritance, may be involved, still remains the province of the court. The determination of such an issue as is here before us is not transferred from the courtroom to the laboratory, where lurk certain hazards in the application of scientific techniques."

These three decisions and others which followed them[63] reached erroneous results in the apparent conflict between established rules of evidence and stare decisis with the established laws of science. That some courts should have been unable to resolve such conflict is unfortunate. However, through statutory aid and an increasing recognition of the importance of blood grouping fewer and fewer such decisions may be expected.

On the other hand, judicial recognition of the value of blood tests is well expressed by a New Jersey court "as a wholesome aid in the quest for truth in the administration of justice. . .; only reasons of considerable force

58. State v. Damm, 64 S.D. 309, 316, 266 NW. 667 (1936).
59. Harding v. Harding, 22 N.Y.S.2d 810 (Dom. Rel. Ct. 1940), *aff'd* 261 App. Div. 924, 25 N.Y.S.2d 525 (1941).
60. State *ex rel.* Slovak v. Holod, 63 Ohio App. 16, 24 N.E.2d 962 (1939).
61. For scientific comment on this case, see Wiener, *The Judicial Weight of Blood Grouping Tests Results*, 31 J. CRIM. L. & CRIMINOLOGY 523 (1940).
62. Jordan v. Davis, 143 Me. 185, 57 A.2d 209 (1948).
63. For example, Ehrlich v. Ehrlich, 181 Misc. 1057, 49 N.Y.S.2d 863 (Sup. Ct. 1943).

should move a court in a civil case to deny a motion for an order to compel a blood test when the issue of parentage is relevant, and it may be crucial in the matter." It was held that, in the absence of any reason for refusing to take the test, it would be an abuse of judicial discretion to deny an order to compel a wife and child to take a blood grouping test.[64]

Additional difficulties have arisen in the courtroom once blood grouping evidence has been introduced. As the blood grouping tests are intended to exclude paternity, such tests can be admissible as evidence only where they definitely do exclude paternity. All statutes permitting introduction of such evidence so specify and all courts faced with the problem of admissibility have so ruled. If the blood test does not exclude paternity results of such test will not be admissible in evidence.[65] In a New Jersey case, a qualified explanation by the medical expert of serologic results which did not conclusively exclude paternity was excluded by the court.[66] Hence, an order requiring a man to submit to a blood test to "establish paternity" has been held improper.[67] In a paternity proceeding the blood test is obviously for the benefit of the defendant and a request by the plaintiff for such a test is not authorized by law. This is because the mother can expect at best an inconclusive result which is inadmissible as evidence because it indicates only a mere possibility of paternity.[68]

Both state and federal courts, in the absence of statute, have found authority in the law to order the physical examination of parties to a lawsuit to obtain relevant bloodgroup information.[69] This is usually done on a motion by the party seeking to prove non-paternity. But one court rejected an application by the husband in a divorce case to submit himself, wife and child to a blood group test to show non-paternity on the theory that such an order invades the constitutional right of the wife and child to enjoyment of liberty, safety and happiness and a violation of common law immunity from self-incrimination.[70] This is a minority view and has been criticized[71] for ignoring the distinction between real evidence and testimonial evidence insofar as the former does not violate the privilege against self-incrimination. The opposite view was taken by a Maryland court in a later criminal case in which testimony by a toxicologist that blood found on an overcoat of defendant accused of rape was of a certain type was held admissible without infringing defendant's constitutional right not to testify against himself.[72]

64. Cortese v. Cortese, 10 N.J. Super. 152, 76 A.2d 717 (1950).
65. Houston v. Houston, 99 N.Y.S.2d 199 (Dom Rel. Ct. 1950).
66. Miller v. Domanski, 26 N.J. Super. 316, 97 A.2d 641 (1953).
67. State *ex rel.* Wollock v. Brigham, 72 S.D. 278, 33 N.W.2d 285 (1948).
68. Grant v. Konis, 203 Misc. 1089, 122 N.Y.S.2d 21 (Spec. Sess. 1953). But in a rape case not involving the issue of paternity, the court admitted blood test evidence which was not conclusive of defendant's identity as going to probability of defendant's acts. Shanks v. State, 185 Md. 437, 45 A.2d 85 (1945).
69. Arais v. Kalensnikoff, 10 Cal.2d 428, 432, 74 P.2d 1043 (1938); Beach v. Beach, 72 App.D.C. 318, 114 Fed.2d 479 (1940).
70. Bednarik v. Bednarik, 18 N.J. Misc. 633, 16 A.2d 80 (1940).
71. Schatkin, *Paternity Blood Grouping Tests; Recent Setbacks,* 32 J. CRIM. L. & CRIMINOLOGY 458 (1941).
72. Shanks v. State, 185 Md. 437, 45 A.2d 85 (1946).

The conflict of blood grouping evidence with the age-old presumption of legitimacy has been dealt with by a number of courts. In general it can be said that in jurisdictions where the presumption is rebuttable, blood test exclusion of paternity will be considered as constituting more than a preponderance of evidence necessary to overcome the presumption.[73] In jurisdictions in which the legitimacy presumption is made conclusive by statute as it is in California, the admission of blood test evidence would be futile and, therefore, is excluded.[74] The result obtaining in such a case reflects the public policy of the state in favoring legitimacy status rather than in finding absolute truth which may be contrary. In *Hill v. Johnson*[75] blood test evidence admitted in the trial court indicated that the husband of plaintiff infant's mother could not have been plaintiff's father. In determining who should support such a child, the putative or true father, the state evidently found greater justification in balancing the equities involved than in rendering a seemingly cold-blooded judgment based on ultimate scientific truth. The result of such cases is to isolate for special consideration a narrow area of paternity cases in which legitimacy is an issue, restricting the evidentiary material which can be adduced while allowing such evidence routinely where legitimacy is not involved as an issue.

The weight to be given such evidence has been considered by the courts and has run the gamut from judicial notice[76] to decisive weight,[77] to preponderance of evidence,[78] to ordinary evidence to be considered along with other testimony.[79] The statutes permitting the introduction of blood grouping evidence merely state that the results of such tests shall be receivable in evidence, without providing for the degree of weight to be placed upon them by the courts. In general and regardless of statute, courts admit such evidence as they do other expert testimony to be considered with all the other evidence adduced in presenting a case. In the majority of jurisdictions the blood exclusion report is considered "more than opinion" and weight given to it depends on the evidence adduced in its support.[80] By "evidence adduced in its support" is meant testimony as to the reliability of the test, as to the professional competence of the expert making the test,[81] and the circumstances surrounding the testing of the blood of the

73. State ex rel. Walker v. Clark, 144 Ohio St. 305, 58 N.E.2d 773 (1944); C. v. C., 200 Misc. 631, 109 N.Y.S.2d 276 (Sup. Ct. 1951). *But cf.* Harding v. Harding, 22 N.Y.S.2d 810 (Dom. Rel. Ct. 1940), *aff'd* 261 App.Div. 924, 25 N.Y.S.2d 525 (1941).

74. Hill v. Johnson, 102 Cal.App.2d 94, 226 P.2d 655 (1951).

75. Ibid.

76. Shanks v. State, 185 Md. 437, 45 A.2d 85 (1945).

77. Schulze v. Schulze, 35 N.Y.S.2d 218 (Sup. Ct. 1942); C. v. C., 200 Misc. 631, 109 N.Y.S.2d 276 (Sup. Ct. 1951).

78. Commissioner of Welfare of City of New York *ex rel.* Tyler v. Costonie, 277 App. Div. 90, 97 N.Y.S.2d 804 (1st Dept. 1950).

79. Arais v. Kalensnikoff, 10 Cal.2d 428, 432, 74 P.2d 1943 (1938).

80. Commissioner of Welfare of City of New York *ex rel.* Tyler v. Costonie, 277 App. Div. 90, 97 N.Y.S.2d 804 (1st Dept. 1950); Jordan v. Mace, 144 Me. 351, 69 A.2d 670 (1949).

81. For qualifications of experts in this field see Schiff and Boyd, *op. cit. supra* note 17 at 126, and Davidson, Levine and Wiener, *supra* note 25 at 705.

particular parties in the case.[82] In other words, an adequate foundation for the introduction of such testimony is necessary for this type of expert evidence as for any other. Where the trial court had before it only filed unsworn statements reciting that blood tests definitely excluded defendant as father of plaintiff's child, definitely inadmissible under technical rules of evidence, and the trial court was given no grounds for judgment as to methods adopted and precautions followed to insure an accurate result, the New York Appellate Division reversed a judgment for the plaintiff and a new trial was granted to present such evidence.[83] In *Jordan v. Mace*[84] the Supreme Court of Maine sustained the plaintiff's motion for a new trial on the ground that if the jury found the results of the blood tests showing non-paternity to be inaccurate, such finding was based on mere conjecture and was not supported by the evidence in the case.

The New York courts (which handle the bulk of the paternity suits in the United States) have tended to place greatest weight on such evidence so that many of the trial courts in that state have come to regard the results as conclusive evidence. Blood tests results, unchallenged as to accuracy, which indicate non-paternity of the defendant will be regarded as conclusive of the issue by the courts even in the face of other strong evidence to the contrary.[85] In *Scalone v. Scalone*[86] the court said that while medical testimony is not conclusive it must be "given credence" to the extent that it is trustworthy and convincing. As no counter medical proof was offered the court accepted the results of the test as conclusive in determining paternity. In *Saks v. Saks* [87] the Domestic Relations Court of New York City admitted blood tests in evidence to be given the "same consideration as any other type of testimony" and if such testimony is believable the court "cannot compromise with facts" and reject it.

In recent New Jersey paternity case the Superior Court affirmed a judgment for the defendant but rejected the trial court's holding that results of blood grouping tests indicating definite exclusion of parentage per se *conclusively* established that defendant was not the father of the child.[88] The appellate court held such test not to be conclusive on the issue of paternity but affirmed the verdict on the basis that evidence in defendant's favor preponderated. However, the theoretical distinction is not clearly met in this case because the lower court in its opinion[89] claimed that in the absence of a blood test the evidence against the defendant was more persuasive. Neither opinion cited the other evidence.

82. Suggested forms for reporting the results of blood tests are given in Schiff and Boyd, *op. cit. supra* note 17 and in Schatkin, *op. cit. supra* note 44.
83. Commissioner of Welfare of City of New York *ex rel.* Tyler v. Costonie, 277 App. Div. 90, 97 N.Y.S.2d 804 (1st Dept. 1950).
84. Jordan v. Mace, 144 Me. 351, 69 A.2d 670 (1949).
85. C. v. C., 200 Misc. 631, 109 N.Y.S.2d 276 (Sup. Ct. 1951).
86. Scalone v Scalone, 199 Misc. 210, 98 N.Y.S.2d 167 (Sup. Ct. 1950).
87. Saks v. Saks, 189 Misc. 667, 71 N.Y.S.2d 797 (Dom. Rel. Ct. 1947).
88. Ross v. Marx, 24 N.J.Super. 25, 90 A.2d 597 (App. Div. 1952).
89. Ross v. Marx, 21 N.J.Super. 95, 90 A.2d 545 (Law Div. 1952).

These New York and New Jersey cases, in spite of some difference in theory, have met the issue of paternity squarely on blood grouping evidence and have allowed no conflict between the results of the blood tests and the final settlement of the issues. Unfortunately, as we have already observed, there are still jurisdictions which permit juries to make findings contrary to the results of blood grouping tests even though the reliability of such tests are not challenged. The leading jurisdiction in which widely criticized cases have occurred is California. The cases of *Arais v. Kalensnikoff*[90] and *Berry v. Chaplin*[91] have been exhaustively discussed in many law review articles[92] and only brief mention of them will be made here. In both those cases plaintiffs recovered verdicts against putative fathers for support of their illegitimate offspring in spite of bloodgroup exclusions of paternity. The Supreme Court of California in the *Arais* case saw no reason to set aside the verdict, holding that such evidence is entitled to no more weight than testimony of any other character. The court cited the California Code to the effect that "no evidence is by law made conclusive or unanswerable unless so declared by this code."[93] Therefore, if the jury finds the other evidence more persuasive, the defendant will be forced to support a child sired by someone else. In the *Arais* case the defendant was 70 years old, and had been twice married, and, according to his wife, had been impotent for a number of years. In addition, the mother of the child had named a man other than the defendant as the father of the child in the child's birth certificate. The decision in the *Arais* case set the pattern to be repeated in the *Chaplin* case in which evidence that the defendant had sexual relations with the plaintiff at an earlier date was considered to be more convincing than the fact that the plaintiff had sexual relations with other men at the time that the child was conceived, and that defendant had group O, M-N blood whereas the mother had A, N and the child, B. N. blood groups. The court followed the *Arais v. Kalensnikoff* rule by which it felt itself bound, although Justice McComb in his concurring opinion stated that he believed the previous case to be in error and that the court should rely more on scientific aids . In spite of these two cases and *Hill v. Johnson,* supra, California has not yet passed a blood grouping statute although the conventional statute found in other states probably would not be sufficient to change the *Arais* case rule because none of the other statutes give any conclusive weight to blood group evidence. If these cases had been tried in New York, different results probably would have occurred. In California science and the law stand in direct conflict. Can it be justifiably claimed that the public policy of California required the results of the *Arais* and *Chaplin* cases?

The Committee on Medicolegal Problems of the American Medical

90. Arais v. Kalensnikoff, 10 Cal.2d 428, 432, 74 P.2d 1043 (1938).
91. Berry v. Chaplin, 74 Cal.App.2d 742, 169 P.2d 442 (1946).
92. For example: Dudley, *Weight to be Given Blood Test Evidence in Paternity Proceedings,* 4 WASH. & LEE L. REV. 199 (1947); Eskert, *Expert Testimony—Blood Grouping as Evidence of Non-paternity,* 2 ARK. L. REV. 133 (1947-48); Schatkin, *op. cit. supra* note 44.
93. Calif. Code Civ. Prac. § 1978.

Association recognizes that courts must often take into account other considerations aside from the scientific results of the blood test and even the Committee does not espouse the making of such tests binding on the courts in every case where applicable.[94] However, its main emphasis is that the court should not rely on such tests unless they are assured of the safeguards which surround the making of the tests from which results are introduced into evidence.

Enactment of statutes enabling courts to order blood grouping tests where their results will be pertinent to the issue will go far to aid in the administration of justice in those cases in jurisdictions which do not have such laws. The statutes already in effect in ten states are substantially similar and generally provide (1) that where relevant to the prosecution or defense, the trial court may order such tests, (2) that if such tests exclude paternity, the results shall be receivable in evidence, (3) that the test shall be made by a duly qualified person to be appointed by the court, and (4) provision for payment of the expert. Some statutes also provide that whenever one of the parties refuses to submit to such a test, such fact shall be disclosed at the trial unless good cause is shown to the contrary.[95]

It may be expected that with the development of the science of serology and the introduction of commercially available anti-sera of adequate potency, the use of the newer blood factors in addition to the A-B-O, M-N, and Rh-Hr systems will render one person in several million identifiable according to his blood group spectrum so that such tests will be capable of doing more than merely excluding paternity but will also be capable of identifying the actual father if his blood is available for testing. If such an era is reached, then results of blood tests may be admitted as going to the probability of the guilt or liability of the defendant.[96]

In summary, it can be said that blood grouping has become of great aid to courts in determination of paternity and other types of cases dependent on blood relationships. A number of courts, such as the court of Special Sessions of New York City, have come to rely routinely on these tests in paternity cases involving children born out of wedlock whenever the defendant denies paternity. In such courts scientific advance and dispensing of justice have marched hand in hand. In other courts, where scientific facts have collided with the legitimacy presumption and with stare decisis, legal results at odds with the scientific have been obtained. With increasing recognition by the courts of the value (within its limitations) of blood grouping tests, it can be expected that such cases will be fewer and fewer in the future.

94. Davidson, Levine and Wiener, *supra* note 25 at 703.
95. See Wisc. Stat. § 166.105.
96. *Cf.* Shanks v. State, 185 Md. 437, 45 A.2d 85 (1946).