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# THE SCIENTIFIC AND LEGAL APPLICATION OF BLOOD GROUPING TESTS

C. W. MUEHLBERGER\* and FRED E. INBAU†

Scientific literature contains many contributions from various sources concerning blood grouping tests in their medicolegal application. Legal publications present brief analyses of decisions in a few blood grouping cases, as well as an occasional generalized discussion of the scientific problems involved. Nevertheless, there appears to be a need at this time for a somewhat comprehensive up-to-date treatment of the subject from a combined point of view, particularly so when consideration is given to the increasing numbers of blood grouping cases which are finding their way into the courts, and when we consider further the recent enactment, or contemplated enactment, of laws upon this subject by the legislatures of several states. Hence this appendage to the literature on blood grouping tests.

## *Medical Aspects*<sup>1</sup>

Long before we understood the underlying scientific explanation it was observed that all human beings do not have the same kind of blood. Persons who through disease or hemorrhage had lost large amounts of blood often had their supply increased by transfusion from healthy donors. In these early transfusion experiments it was noted that in some instances the patient was unquestionably benefited by the acquisition of blood, but in others shock, collapse, and death often followed. It was not until the beginning of the twentieth century that Landsteiner succeeded in finding the underlying cause of these unfortunate transfusion results

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<sup>1</sup> The first part of this paper dealing with the medical aspects of blood grouping tests is intended to furnish only a general non-technical discussion of the subject. For more detailed and technical information the reader is referred to the following sources: Wiener, A. S., *Blood Groups and Blood Transfusion* (1935); Lattes, L., *The Individuality of the Blood* (1932) (with bibliography of 2300 references to the scientific literature); Landsteiner, K., "Forensic Application of Serologic Individuality Tests," 103 Jour. Am. Med. Ass'n 1041-1044 (1934); Levine, P., "The Application of Blood Groups in Forensic Medicine," 3 Am. J. Police Sci. 157-168 (1932).

by discovering the individual differences and incompatibilities in human bloods.

When specimens of blood from two individuals are mixed two results are possible. Either the two blend completely to form a thoroughly homogeneous blood mixture, or else they react upon each other with a clumping together or *agglutination* of their red blood corpuscles, in which these clumps of red cells settle out, leaving the fairly clear fluid serum of the blood. If, during a transfusion, the donor's blood reacts with that of the recipient to produce this clumping or agglutination, the resulting clots or clumps of blood cells plug up the smaller (capillary) blood vessels and cause shock.

The explanation of this peculiar behavior of various bloods is that in the red blood cells there are certain "principles" known as *agglutinogens*, while the suspending fluid of the blood (serum) contains certain "principles" known as *agglutinins*. Clumping or agglutination of the red blood cells results from the reaction of incompatible mixtures of the cell agglutinogens and the serum agglutinins. In any individual there is no incompatibility between the agglutinogens of his red blood cells and the agglutinins of his blood serum. There were found to be two different agglutinogens (classified as A and B) and two agglutinins (classified as  $\alpha$  and  $\beta$ ). The red blood corpuscles of an individual might not contain either of these two agglutinogens (in which case the individual would be classified as Group O); they might contain both agglutinogens A and B (in which case he would belong to group AB), or he might have only one of these such as either A or B (in which cases he would be classified as Group A or Group B respectively).

The method of classifying an individual's blood by this procedure requires the use of two known active sera, one from a person of Group A and one from Group B. If a drop of a suspension of blood corpuscles from a given individual be treated with a drop of blood serum containing agglutinin  $\beta$  (from blood of a person belonging to Group A), two results might be obtained. Either the mixing of the two drops will result in a clear homogeneous suspension or there will be a decided clumping of the red blood cells into clots or irregular masses. This clumping will indicate that the blood of the individual examined contains the agglutigen designated as B. Likewise a suspension of cells from the individual under test may be treated with blood serum containing agglutinin  $\alpha$  (from blood of a person belonging to Group B). If agglutination

results in such a mixture, we may say that the individual's blood contains the agglutinin designated as A. If the blood cells of the individual under test fail to agglutinate with either  $\alpha$  or  $\beta$  serum, then the individual's blood contains neither of the agglutinogens B nor A and therefore he falls into class O. On the other hand, if his blood cells agglutinate with both  $\alpha$  and  $\beta$  sera, then his blood contains both agglutinogens B and A and the individual is classified as Group AB. If his blood agglutinates with one test serum but not with the other, he belongs to Group A or Group B depending upon whether the agglutinating serum contains agglutinins  $\beta$  or  $\alpha$ .

The occurrence of these in various types of blood is given in the following table:

TABLE I

*Occurrence of Agglutinogens and Agglutinins in Various Blood Groups<sup>2</sup>*

Blood Group (International System of Classification)	Agglutinogens in Red Blood Cells	Agglutinins in Serum	Red Cells Agglutinated by Serums of Groups	Serum Agglutinates Cells of Groups	Jansky Classification (Group No.)	Moss Classification (Group No.)
O	None	$\alpha$ and $\beta$	None	A, B and AB	1	4
A	A	$\beta$	O and B	B and AB	2	2
B	B	$\alpha$	O and A	A and AB	3	3
AB	A and B	None	O, A and B	None	4	1

The method of making blood grouping tests varies somewhat. They may be conducted in small test tubes or on a microscope slide, although the former is preferred. A few drops of blood obtained by puncturing the lobe of the ear or the ball of the thumb is collected in a small test tube ( $\frac{1}{4}$ " x 2") and diluted by shaking with from 20 to 50 times as much 0.9% sodium chloride solution. One drop of this blood suspension, together with one drop of 0.9% sodium chloride solution and one drop of test serum are mixed together in another test tube. If clumping or agglutination is going to take place, evidence of the fact is usually observable after the first few minutes, although to be certain the final reading should not be made for an hour. At the end of the hour, the reaction is noted. If the blood cells are agglutinated into definite clumps,

<sup>2</sup> Although they are no longer in common use the older Moss and Jansky classifications are included for comparison.

which persist after violent shaking, the reaction is positive. If, on the other hand, shaking produces a homogeneous suspension, which fails to show definite clumping even when observed microscopically, the reaction is negative.

It is necessary to guard against false clumping reactions caused by the use of too concentrated blood cell suspensions or too low a temperature of testing. If the blood cell suspension is too strong, or if the subject under test is suffering from some acute infection, rapid sedimentation of the blood cells may give the gross appearance of clumping. This phenomenon is known as pseudo-agglutination and may readily be differentiated from true agglutination by observing the clumps with the aid of a microscope. The loose side-to-side packing of red cells (like stacking of coins) is typical of pseudo-agglutination clumps. If the tests are conducted at room temperature (65° F. to 80° F.) there is no danger of agglutination from cold. In every examination, the sera used should be tested upon known blood specimens to establish their specificity and sensitiveness beyond all shadow of a doubt. Likewise, in forensic cases it is wise not only to identify the agglutinogens of the red blood cells but to simultaneously establish the nature of the agglutinins in the serum of the individual under test. This is done by using washed red blood cells from individuals who are known to belong to Groups A and B and observing whether or not they are agglutinated by the serum of the test subject.

Where it becomes necessary to classify dried blood such as in blood stained clothing, the finely powdered blood scrapings or the stained material is soaked in a small quantity of 0.9% sodium chloride solution in a small centrifuge tube for several hours. The tube and contents are then centrifuged at high speed so as to separate the clear solution from the residual material. The upper portion of clear watery extract contains the agglutinins from the stain. These are then identified by treating with washed red blood cells from persons known to belong to Groups A, B and O; the O cells being used as a control in order to exclude false agglutination reactions. Small quantities of the agglutinin extract from the stain are placed in each of three small test tubes. To these tubes small quantities of washed red cell suspensions from persons of Groups A, B and O are added respectively. The cells of Group O should not be agglutinated by this treatment. If the Group A or Group B cells are agglutinated, it indicates the presence respectively of  $\alpha$  or  $\beta$  agglutinins. And of course if both A and B cells are agglutinated,

it indicates the presence of both  $\alpha$  and  $\beta$  agglutinins (indicating that the stain under test contains Group O blood, as illustrated in Table I). To be entirely certain of such classifications, one should also examine the residual material left in the centrifuge tube, to determine its agglutinin content. This is done by testing the ability of the residue to absorb known agglutinins. Residues from Group A bloodstains will absorb agglutinin  $\alpha$ , while those from Group B stains will absorb agglutinin  $\beta$ . Stain residues from Group AB will absorb both agglutinins.<sup>3</sup>

Although ordinary blood grouping tests are comparatively simple in principle, for medicolegal work only trained and competent experts should be permitted to make the examinations. Unless this is done, errors may occur which would not only work grave injustice but would quickly bring a scientifically certain procedure into disrepute.

In addition to the ordinary agglutinogens A and B, Landsteiner and Levine have demonstrated the occurrence of two others which were designated as M and N and which were entirely independent of the A and B agglutinogens. By means of these M and N agglutinogens, bloods might be classified into three groups. Group M contains agglutinin M but not N. Group N contains N but not M, and Group MN contains both M and N. No blood has been found which contained neither M nor N. These classifications of the M and N factors are comparatively new and much more difficult than the ordinary grouping of agglutinogens A and B. There probably are not more than a half dozen workers in this country who are qualified to make classifications of the M and N factors for forensic purposes.

The distribution of the various blood groups varies somewhat with the racial type and geographic location of the people. In the United States, about 45% of the population falls into Group O, 42% into Group A, 10% into Group B, and 3% into Group AB. On the basis of M and N agglutinin grouping, Wiener has found 48% to fall into Group MN, 31% into Group M, and 21% into Group N.

Individuals do not change in their blood grouping classification, and this constancy is not affected by disease, drugs, climate, occupation, living conditions or other physical circumstances.

Not only can one classify fluid blood and fresh blood stains

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<sup>3</sup> For a more detailed account of the technique for blood stain grouping see: Lattes, L., *loc. cit. supra* note 1, pp. 278-312, and Polayes, S. H., "Principles and Technic of the Determination of Blood Groups," 60 *Med. Times and Long Island Med. Jour.* 206-207 (July, 1932).

into their proper group, but agglutinogens and agglutinins may be detected in old blood stains. It has even been possible to establish the blood group of mummies. Moreover, agglutinins  $\alpha$  and  $\beta$  are found, not only in the blood serum but also in other fluid parts of the body such as urine, semen and saliva. On this basis, it may be possible to determine the group characteristics of an individual from stains which may be left on clothing, bedding, cigarette stubs, etc. Since agglutination reactions require an adequate amount of agglutinin to produce definite results, light stains such as those of saliva on cigarette stubs or small urine stains may give doubtful or negative tests, and one should be very hesitant in classifying such material as Group AB due to the absence of agglutination reactions.

Blood grouping characteristics are passed on by parents to their children in accordance with the Mendelian principles of inheritance. Without going into the details of genetic principles, it may be stated that: (1) neither agglutigen A nor agglutigen B appear in the blood of a child unless it is present in the blood of at least one of the parents; and (2) a group AB parent cannot have a Group O child nor can a Group O parent have a group AB child. Likewise with respect to the agglutinogens M and N, one may state that: (1) neither agglutigen M nor agglutigen N can appear in the blood of a child unless it is present in at least one of the parents; and (2) a type M parent cannot give rise to a type N child nor can a type N parent give rise to a type M child. On these bases, we might tabulate the possible blood grouping of children resulting from parents of various group characteristics as follows:

TABLE II  
*Inheritance of Blood Grouping Characteristics*

<i>Blood Types of the Parents</i>	<i>Children Possible (Blood Types)</i>	<i>Children Impossible (Blood Types)</i>
O x O	100% O	A, B and AB
A x A	40% O and 60% A	B and AB
O x B	42% O and 58% B	A and AB
O x AB	50% A and 50% B	O and AB
A x A	82% A and 18% O	B and AB
A x B	14% O, 29% A, 30% B, 27% AB	None
A x AB	50% A, 20% B and 30% AB	O
B x B	87% B and 13% O	A and AB
B x AB	50% B, 15% A and 35% AB	O
AB x AB	60% AB, 20% A, 20% B	O

<i>Blood Types of the Parents</i>	<i>Children Possible (Blood Types)</i>	<i>Children Impossible (Blood Types)</i>
M x M	100% M	N and MN
M x N	100% MN	M and MN
M x MN	47% M and 53% MN	N
N x N	100% N	M and MN
N x MN	51% N and 49% MN	M
MN x MN	53% MN, 25% M, 22% N	None

Table II may be rearranged to render the data more readily accessible for use in questions of non-paternity, as given in Tables III and IV.

TABLE III

*Relationship of Main Blood Grouping Characteristics Existing Between Child, Mother, and Father*

<i>Child</i>	<i>Mother</i>	<i>Father</i>	
		<i>Possible</i>	<i>Excluded</i>
O	O	O, A, B	AB
O	A	O, A, B	AB
O	B	O, A, B	AB
A	O	A, AB	O, B
A	A	O, A, B, AB	None
A	B	A, AB	O, B
A	AB	O, A, B, AB	None
B	O	B, AB	O, A
B	A	B, AB	O, A
B	B	O, A, B, AB	None
B	AB	O, A, B, AB	None
AB	A	B, AB	O, A
AB	B	A, AB	O, B
AB	AB	A, B, AB	O

TABLE IV

*Relationship of Landsteiner's Agglutinogens M and N in Child, Mother, and Father*

<i>Child</i>	<i>Mother</i>	<i>Father</i>	
		<i>Possible</i>	<i>Excluded</i>
M	M	M, MN	N
M	MN	M, MN	N
N	N	N, MN	M
N	MN	N, MN	M
MN	M	N, MN	M
MN	N	M, MN	N
MN	MN	M, N, MN	None



From these tables it is apparent that in cases of questioned paternity the comparison of the blood groups of mother and child with that of the alleged father might serve as definite proof that the man could not have been the parent. For example, a woman with Group B blood gives birth to a child whose blood is classified as Group AB. The man accused of being the father of the child is found to belong to Group B. It can readily be seen from the inheritance tables that this could not be the case. The father must have belonged to Groups A or AB, and men of Groups O and B are excluded.

It is obvious that blood grouping tests cannot afford positive evidence, at the present time at least, that a particular man is the father of a certain child, since there are literally millions of men who might have been the father of the child on the basis of their blood type.

The chances of exculpation which blood grouping tests furnish a falsely-accused man vary with his blood grouping. In general, utilizing only the four main blood groups, his chance of proving non-paternity are about 1 in 6 (16%). If the classification includes the M and N agglutinogens of Landsteiner, his chance of exoneration increases to 1 in 3 (33%). With various blood groupings the probability of exculpation varies from 1 in 17 (6%) with a Group A male to 6 in 10 (60%) in the case of a man who is in Group AB and who has either M or N agglutinin classification.<sup>4</sup>

#### *Legal Analysis*

Blood grouping tests may be of considerable assistance in two principal types of legal proceedings. Their value in cases of disputed paternity, whether it be in a civil suit or criminal prosecution, is quite apparent. The other application, though not apt to arise so frequently as the one involving paternity, appears nevertheless as of equal importance; that is, the determination of the blood group of a specimen of blood found at the scene of a crime, or upon the person or possessions of a suspect, with a view toward a comparison being made with that of the victim or suspect, whichever the case may be. In any of the various possible forensic applications a number of interesting and important legal propositions must be considered.

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<sup>4</sup>For an excellent and more detailed account of such probabilities see Hooker, S. B. and Boyd, W. C., "Blood Grouping as a Test of Non-Paternity," 25 J. Crim. L. 187-204 (1934). Also see Wigmore, *Evidence* (Supplement, 1934) §165a for a very good tabular arrangement of this and other data.

Apart from the primary issue as to the judicial acceptance of blood grouping tests on the basis of their results being established as reliable scientific evidence, we find the following questions presented: (1) Do the courts have the power in a civil suit involving a paternity determination to compel a plaintiff and her child to submit to a blood grouping test? (2) Does the same power exist in a criminal case to compel a prosecutrix and her child to submit to such a test? (3) Should the plaintiff in a civil action involving a paternity question be given the right to have a blood grouping test made on a defendant? (4) Can an accused in a criminal case be compelled to submit to a blood grouping test, and under what circumstances, if any, should the results be admitted in evidence?

In view of the progressive attitude that has been taken in recent years by the appellate courts of this country in passing upon the admissibility of many types of scientific evidence,<sup>5</sup> it is surprising to find that even though there have been several appellate court decisions upon the subject there still exists some uncertainty regarding the answers to practically all of the foregoing questions. As a matter of fact the latest appellate court opinion concerning blood grouping tests expressed some doubt even as to the fundamental issue of mere admissibility, without its attending procedural problems or those in which issues of constitutionality might be involved.<sup>6</sup> Fortunately for the future of the legal application of blood grouping tests, only one of the blood grouping decisions ruling adversely to admissibility came from a court of last resort and that court reversed itself, in effect at least, upon a rehearing of the case.<sup>7</sup>

As regards the substantive issue of the admissibility in evidence of the results of blood grouping tests the courts should experience but little difficulty. Blood grouping tests have become accepted by the medical profession not only as possessing a "reasonable measure of precision in their indications"—all that the law requires<sup>8</sup>—but also as producing exact and irrefutable results. Of course, the tests will not always culminate in the disposal of a law suit on the basis of this evidence alone, but they nevertheless produce absolute results—either that the defendant *could not* have been the father of a particular child or that he *might be*; or that a specimen of blood *could not* have come from a particular person or that it *might* have come

<sup>5</sup> See Inbau, F., "The Admissibility of Scientific Evidence in Criminal Cases," 2 Law and Contemporary Problems 495 (1935).

<sup>6</sup> *Commonwealth v. English*, 186 Atl. 298 (July 18, 1936).

<sup>7</sup> *State v. Damm*, 62 S. D. 123, 252 N. W. 7 (1933), 266 N. W. 667 (April 16, 1936).

<sup>8</sup> 2 Wigmore, Evidence (2d ed., 1923) §990.

from him. But even in light of this refined limitation no one can deny that in certain instances the results of the tests establish conclusively at least one phase of the truth in litigation if not all of it. This fact seems to have been fully realized by a Pennsylvania court of common pleas when it granted a new trial in *Commonwealth v. Zamorelli*<sup>9</sup> because the verdict of a jury was at variance with the conclusive results of blood grouping tests.<sup>10</sup>

In view of the naturally imperfect methods controlling the operation of courts of justice, it seems that they should accept without undue delay every possible scientific aid of this nature. Furthermore, although blood grouping evidence is obtained by means of a "needle" (e. g., to puncture the ear lobe), there is no more danger of harmful effects upon the person's health than might accrue from the utilization of a similar technique in an ordinary or routine medical examination.

Judicial recognition alone, however, becomes of little or no practical value in a case involving a paternity issue unless the plaintiff, or prosecutrix, and her child can be compelled to submit to such tests. A false accuser, or even one doubtful of the validity of her accusation, is not likely to agree voluntarily to subject herself and her child to an examination the results of which might entirely refute her claim. Consequently the question arises as to whether or not the courts have the power to compel submission to blood grouping tests.

A similar question years ago confronted the courts of a number of states when defendants in personal injury actions petitioned for orders to compel the plaintiffs to submit to medical examinations for the purpose of ascertaining the nature of the alleged injuries and their extent. Practically the same issues were there involved as are presented in blood grouping cases. Some courts held it was within their power to grant such orders; others were of the opinion that they did not have the power in the absence of legislative authorization. A number of decisions may be found on either side,

<sup>9</sup> 17 Pac. D. & C. 229 (1931). Also see *Commonwealth v. Visocki*, 23 Pa. D. & C. 103 (1934), commented upon in 25 J. Crim. L. 1001 (1934).

<sup>10</sup> It is interesting to note that in 6665 European cases of disputed paternity 546 men (or 8.2%) were proved to have been erroneously or falsely accused. "If one considers that the number would have been 18.5% if allegation of paternity had been false in every case, it follows that according to probabilities in almost one-half of all cases the father was unjustly accused." Levine, P., "The Application of Blood Groups in Forensic Medicine," 3 Am. J. Police Sci. 157, 162 (1932). The courts of many foreign countries several years ago recognized the reliability of blood grouping tests and admitted in evidence the results therefrom. See Lattes, *op. cit. supra* note 1 at pp. 251-257. and Wiener, *op. cit. supra* note 1 at pp. 198-200.

with the majority holding that the courts have the inherent power to order the plaintiff to submit to such an examination. The leading case in support of the majority view is *Schroeder v. C. R. I. & P. Ry.*,<sup>11</sup> in which the Supreme Court of Iowa in a very able opinion emphasized the point that "if truth be hidden, injustice will be done":

"We are often compelled to accept approximate justice as the best that courts can do in the administration of law. But, while the law is satisfied with approximate justice where exact justice cannot be attained, the courts should recognize no rules which stop at the first when the second is in reach."<sup>12</sup>

Supporting the minority view is the United States Supreme Court decision in *Union Pacific Ry. v. Botsford*,<sup>13</sup> where the fact that no such right of compulsory examination existed at common law formed the principal basis for the court's conclusion.<sup>14</sup> Two justices dissented on the ground that "the silence of common law authorities upon the question in cases of this kind proves little or nothing," and further, that since the plaintiff had the right to exhibit and demonstrate his injuries to the jury or to establish his claim by other similar means the defendant, in all fairness, should be accorded the privilege of compelling the plaintiff to submit to an examination.

Those courts upholding the majority view in personal injury cases ("if truth be hidden injustice will be done") could hardly fail to apply the same principle in a blood grouping case, for while it is difficult to overcome the effect of the plaintiff's "hidden truth"

<sup>11</sup> 47 Iowa 375 (1877).

<sup>12</sup> *Ibid.* p. 379. In accord with the Schroeder decisions: *Miami & Montgomery Turnpike Co. v. Baily*, 37 Ohio St. 104 (1881); *Atchison, T. & S. F. Ry. v. Thul*, 29 Kans. 332 (1883); *White v. Milwaukee City Ry.*, 61 Wis. 536 (1884); *Stuart v. Havens*, 17 Nebr. 211 (1885); *Brown v. Hutzler Bros.*, 152 Md. 39, 136 Atl. 30 (1927), and annotations in 51 A. L. R. 183 *et seq.*

<sup>13</sup> 141 U. S. 250, 11 Sup. Ct. 1000, 35 L. Ed. 734 (1890). Also see *Parker v. Enslow*, 102 Ill. 272 (1882); *McQuigan v. Delaware, L. & W. Ry.*, 129 N. Y. 50 (1891); and citations in 51 A. L. R. 183 *et seq.*

<sup>14</sup> However, the court itself mentioned the fact that at common law there existed a right in divorce cases involving a question of impotency to compel either party to submit to a medical examination, but it was stated that this authority "rests upon the necessity of such evidence to enable the court to exercise its jurisdiction." (Italics added.) The Supreme Court also referred to another type of case in which such authority existed at common law: when medical examinations of women were made "to protect the rightful succession of the property of a deceased person against fraudulent claims of bastards, when a widow was suspected to feign herself with child in order to produce a supposititious heir." Cf. *Camden & Suburban Ry.*, 177 U. S. 172, 172 Sup. Ct. 177, 44 L. Ed. 171 (1899) which held that where the laws of a state in which federal court is sitting provides for compulsory examinations a federal court may order such an examination.

in a personal injury claim, the very nature of the allegation in a paternity case makes the task considerably more difficult.

Courts adhering to the minority view would naturally be expected to render similar decisions regarding blood grouping tests. It is not surprising, therefore, to find a New York appellate court in *Beuschel v. Manowitz*<sup>15</sup> reversing a case in which the trial judge ordered the plaintiff and her child to submit to blood grouping tests, even though the trial court proceeded under a New York statute (enacted to overcome the effect of decisions similar to that in the *Botsford* case) providing for compulsory medical examination of plaintiffs in personal injury cases.<sup>16</sup> This decision,<sup>17</sup> together with others to the same effect in *Thomson v. Elliot*<sup>18</sup> and in *Taylor v. Diamond*,<sup>19</sup> resulted in the New York legislature passing an act authorizing the courts to grant orders compelling submission to blood grouping tests.<sup>20</sup> And from the indications in the case of *In Re Swahn's Will*,<sup>21</sup> decided under the statute, it seems as though the

<sup>15</sup> 241 App. Div. 888, 272 N. Y. Supp. 165 (1934). The court said: "Plaintiff may submit or not to the taking of her blood, but it plainly determines nothing. She asserts, and no one would gainsay it, that she is the mother of this child. A blood test of the defendant and the child may possibly determine his non-paternity, but it is not claimed, as we understand the record, that such a blood test would determine the defendant's paternity. This child is not a party to this action; and while a court of chancery has an inherent jurisdiction over the welfare of an infant, a ward of the court, nothing in this case indicates in the slightest that the welfare of this infant is in any wise involved or that the blood test could possibly be beneficial to the infant."

<sup>16</sup> As regards the application of the statute the decision seems proper, although erroneous as to the general principle involved.

It is interesting to note the liberal view taken in another decision under the statute: *Hoyt v. Brewster, Gordon & Co.*, 199 App. Div. 68, 191 N. Y. Supp. 176 (1921), held that a trial court has the power to require a plaintiff in a personal injury case to submit to a blood test (as distinguished from a blood grouping test). In its opinion the court made some interesting comments: "We all know from experience in the trial of cases that it is the common practice for physicians, in making examinations . . . , to insert instruments into the body, and to put pressure upon the body with hands, and to make various tests, all of which are as offensive to a person, and as much an infringement upon his rights, as it would be to draw a few drops of blood . . ." As to the possibility of an infection resulting from a needle puncture the court said that the judge granting the order is given full power by the statute "to divest how the examination shall be made, and, upon the request of the plaintiff, may throw around the examination all known safeguards." As to the constitutionality of such statutes see *Lyon v. Manhattan Ry.*, 142 N. Y. 298, 37 N. E. 113 (1894) and *McGovern v. Hope*, 63 N. J. L. 76, 42 Atl. 830 (1899).

<sup>17</sup> Commented upon in 20 Cornell L. Q. 232 (1935) and in 82 U. of Pa. L. Rev. 654 (1934).

<sup>18</sup> 152 Misc. 188, 273 N. Y. Supp. 898 (1934).

<sup>19</sup> 241 App. Div. 702, 269 N. Y. Supp. 799 (1934).

<sup>20</sup> Discussed *infra* under sub-title "Legislation."

<sup>21</sup> 158 Misc. 17, 285 N. Y. Supp. 235 (1936). This was a case in which the contestant of a will sought a court order directing blood grouping tests to be made upon a woman, designated in the will as the testator's daughter, upon two children, designated in the will as the testator's grandchildren, and upon the

courts of New York will not go one step further than the legislature dictates, as in this particular case to compel anyone to submit to the tests other than "a party to the action" as defined in the statute.

The considerations which impel a court to subscribe to the majority view regarding the compulsory examination of a plaintiff should apply, it seems, with equal force as to a prosecuting witness; and as a corollary there should be no distinction between the compulsory blood group testing of a plaintiff in a civil suit and a complaining witness in a criminal prosecution. Nevertheless, there are a few decisions in which the courts have made a distinction in both types of cases.<sup>22</sup> In a recent blood grouping case, *Commonwealth v. English*,<sup>23</sup> the Superior Court of Pennsylvania indicated that in a criminal case there existed no means by which it could enforce such an order, as in a civil proceeding, assuming the power to grant one existed. Ignoring the fact that its contempt powers might have been used, the court rather naively stated that "to refuse to allow a criminal case to proceed until a recalcitrant witness submits to an examination," as is within the power of Pennsylvania courts in civil cases involving personal injuries,<sup>24</sup> "would deprive the commonwealth of its right and duty to enforce its criminal laws." It then concluded that "until the legislature finds that blood grouping tests have attained such scientific standing as to possess probative value as to paternity and that the ends of justice require action by it, and the legislature acts, the courts have not the

reputed husband of this woman, for the purpose of showing that the two children were not the offspring of this couple, and consequently not the "grandchildren" of the testator. Consideration was given by the court to the New York statute, and the court concluded that as far as the examination of the woman and children were concerned, a submission to blood grouping tests "has been mandatorily directed by the legislature, but that regarding the testing of the man, the court had no authority to order him to submit to such a test since he was not a "party to the action" according to the words of the statute.

<sup>22</sup> In prosecutions for rape it has been held (though a contrary view also prevails) that a defendant is not entitled to a court order compelling a prosecutrix to submit to a medical examination of her sexual organs, principally for the reason that she is not "a party to the action" and that by subjecting complaining witnesses to such an "indignity" they would be deterred from appearing for the state in such proceedings. *State v. Allen*, 128 Wash. 217, 222, Pac. 502 (1924); *Thomas v. Commonwealth*, 188 Ky. 509, 222 S. W. 951 (1920); *McGuff v. State*, 88 Ala. 147, 7 So. 35 (1889). Cf. *Walker v. State*, 12 Okla. Cr. 179, 153 Pac. 209 (1915); *People v. Preston*, 19 Cal. App. 675, 127 Pac. 660 (1912).

<sup>23</sup> *Supra* note 6.

<sup>24</sup> See *Cohen v. Philadelphia R. T. Co.*, 250 Pa. 15, 95 Atl. 315 (1915). This is also the remedy suggested in the Schroeder case, *supra*, where the court stated that under its contempt power it could treat a plaintiff as a recusant witness, and if such recusancy delays the court too long the plaintiff's claim can be rejected in part or even in its entirety.

power in a criminal case such as this to compel a prosecutrix or other witness to submit her body for blood tests."<sup>25</sup>

In support of its opinion the court in the *English* case cited the original *State v. Damm*<sup>26</sup> decision of the Supreme Court of South Dakota, but unfortunately neglected to mention the rehearing opinion, rendered three months prior to the *English* decision, in which the South Dakota court reversed itself, in effect at least, by declaring that the time had undoubtedly arrived when the results of such a test should be deemed admissible in a court of justice, and without the necessity of legislative authorization. That part of the South Dakota court's opinion dealing with the question of judicial power to compel a prosecutrix and her child to submit to blood grouping tests states the issues very clearly and convincingly:

"It is our position that a statute can neither add to nor detract from the inherent powers of the court in such a matter. . . . The citizen holds his citizenship subject to the duty to furnish to the courts, from time to time and within reasonable limits (which are for the courts to determine), such assistance as the courts may demand of him in their efforts to ascertain truth in controversies before them. This is just as much a part of the citizen's inescapable duty of supporting his government as is military service in time of war, or any other like obligation. We perceive no valid reason why courts of record may not require of any person within their jurisdiction the furnishing of a few drops of blood for test purposes when, in the opinion of the court, so to do will or may materially assist in administering justice in a pending matter. We perceive no reason why this is not just as proper, and just as justifiable, as it is for the same court to require the same person to attend in court for days upon end as a witness; to bring in his books, documents, and papers; and even to abide in jail unless he can satisfy the court that he will be present as a witness when desired. The order for such test should be adequately safeguarded, of course, which can easily be done . . . and it should issue not as a matter of absolute right, but in the sound discretion of the court . . ."<sup>27</sup>

<sup>25</sup> Cf. *Commonwealth v. Zamorelli*, previously discussed, *supra* note 9.

<sup>26</sup> *Supra* note 7. See notes in 19 Iowa L. Rev. 625 (1934); 9 Wis. L. Rev. 314 (1934), and 22 Georgetown L. J. 583 (1934); 25 J. Crim. L. 221 (1934).

<sup>27</sup> 266 N. W. 670. The defendant in this case, accused of rape resulting in the birth of a child, offered at the trial to submit himself to a blood test and requested a court order directing a similar test to be made on the prosecutrix and her child. The court denied the request. A conviction resulted, and the defendant appealed. The Supreme Court at first upheld the trial court's ruling because it "did not sufficiently appear from the record in the case that modern medical science is agreed upon the transmissibility of blood characteristics to such an extent that it can be accepted as an unquestioned scientific fact that, if the blood grouping of the parents are known, the blood group of the offspring can be necessarily determined." However, a rehearing was granted and three years later another opinion appeared in which the court stated its previous one was "misinterpreted," since it merely said that the reliability of blood grouping tests had not "sufficiently appeared in the record of the case." At any rate the court went on record in its

As regards the third question mentioned at the beginning of this discussion—whether a *plaintiff* in a civil action involving a paternity determination should be given the right to have a blood grouping test made on the defendant—consideration must be given to a very important practical issue not raised by either questions one or two. Since the test can only prove exclusion (that the accused is *not* the father), are results which indicate mere possibility of paternity (that the accused *may be* the father) of sufficient value to be admitted in evidence? In other words, should the plaintiff be permitted to show that the defendant has the same blood group as the real father, which blood group is possessed by only a certain percentage of the male population (*e. g.*, 45% for blood group O, 42% for A, 10% for B, and 3% for AB)? While logically relevant as concomitant evidence, it seems that the possibility of prejudicial inference against the defendant is too great in return for the remote evidence of capacity. For that reason scientific authorities advocate that the results of blood grouping tests be admitted in evidence only when they conclusively establish a fact, *i. e.*, that the accused could not possibly be the parent. And it was so held in the case of *Flippen v. Meinhold*,<sup>28</sup> on the ground that it would be improper to draw an inference of paternity where merely the possibility is shown. Obviously, the same reasoning would apply in a criminal case.<sup>29</sup>

There is a type of case, however, and an important one too, where it might be desirable and of *value* to obtain, by compulsion if necessary, a specimen of a defendant's blood for the purpose of a group test. Suppose that at the time of his arrest the defendant had blood on a weapon found in his possession, or upon his clothing, which the police suspected as having originated from the victim of a murder or other crime of violence, but which the accused claims to be his own blood, the result of a nose bleed or of minor injury

rehearing opinion as approving of the use of such evidence. The result of the case remained unaffected, however, since the court concluded that the defendant's request for the blood tests was not timely, nor did it show that the tests were to be made by a competent, capable, and experienced person, or that the blood grouping tests were scientifically acceptable at the time of the trial in 1931.

<sup>28</sup> 156 Misc. 451, 282 N. Y. Supp. 444 (1935). This decision arose under a 1935 statute (discussed *infra* under sub-title "Legislation") authorizing blood group testing, but without specifically restricting the admissibility of results to cases of exclusion.

<sup>29</sup> In two English cases, however, according to a note in 76 *Solicitor's Journal* (Eng.) (1932), an expert was permitted to testify that blood found on the clothing of the accused belonged to the same group as some stains discovered on the clothing of the infant with whose murder the prisoner was charged; and that the blood of a murder victim belonged to the same group as a bloodstain found on a handkerchief belonging to the accused.



to himself. It would then become worth while and indeed important to have a blood group test made to determine whether or not the specimen *could* have come from the accused himself. Of course, if the results of the test indicated the blood to be of the same group this would only prove that the defendant *might* be telling the truth, since both his blood and that of the victim may belong to the same group. However, should the results indicate that the specimen *could not* have come from the accused then the police and prosecution would be equipped with a valuable bit of evidence pointing toward the guilt of the accused. But, can he be compelled to furnish a sample of his blood for this purpose?

Upon the question of what a suspect can be compelled to do there is a great deal of confusion in a number and variety of decisions. For instance, some courts hold that while it is permissible to compel a suspect to give up his shoes for comparison with footprints at the scene of a crime, to force him to place his shoes in the same footprints is a violation of his constitutional privilege against self-incrimination.<sup>30</sup> Other decisions have been rendered to the contrary, holding that the privilege against self-incrimination was intended as a protection against testimonial compulsion and not as an obstruction in the way of obtaining evidence of the nature represented by footprint comparisons.<sup>31</sup> Indeed this is the most reasonable view, as well as one in conformity with the historical basis for the privilege,<sup>32</sup> and in support of it there are decisions, for example, holding that a suspect or defendant may be compelled to submit to the taking of his fingerprints for comparison with those found at the scene of a crime,<sup>33</sup> to submit to a physical examination for identifying features,<sup>34</sup> and to submit to the scraping of fingernail deposits to be used for examination to determine whether or not they contained human blood.<sup>35</sup>

The analogy between the taking of a specimen of blood and the types of compulsory evidence mentioned above may be of assistance in attempting to predict what disposition would be made

<sup>30</sup> *State v. Griffin*, 129 S. C. 200, 124 S. E. 81 (1924); *Day v. State*, 63 Ga. 667 (1879).

<sup>31</sup> *State v. Graham*, 74 N. C. 646, 21 Am. Rep. 493 (1876); *Magee v. State*, 92 Miss. 865, 46 So. 529 (1908); *State v. Barela*, 23 N. M. 395, 168 Pac. 545; L. R. A. 1918B, 844 (1917).

<sup>32</sup> For a discussion of the history and development of the privilege against self-incrimination see 4 Wigmore, *Evidence* (2d ed., 1923) §2250 *et seq.*

<sup>33</sup> *People v. Sallow*, 100 Misc. 447, 165 N. Y. Supp. 915 (1917); *U. S. v. Kelly*, 55 Fed. (2d) 67 (1932).

<sup>34</sup> *State v. Ah Chuey*, 14 Nev. 79, 33 Am. Rep. 530 (1879).

<sup>35</sup> *State v. McLaughlin*, 138 La. 958, 70 So. 928 (1916).

of a case involving the blood grouping question.<sup>36</sup> It seems that basically the analogies are valid and that the liberal view should prevail, but in light of the ultra conservative and seemingly erroneous position taken by some courts it is reasonable to presume that at least in some states the accused in our hypothetical case would not be deterred from explaining to the jury that the blood from a cut finger was responsible for the blood on his knife or that the blood stains on his shirt resulted from a nose bleed—even though it might be possible to establish as a scientific fact that all this was absolutely false.<sup>37</sup>

#### *Legislation*<sup>38</sup>

The forensic application of blood grouping tests has proved to be a perplexing problem not only for the courts but also for the state legislatures which have attempted to "authorize" the admissibility of such test results. This is particularly true of New York. In 1935 the legislature amended its civil practice act and its domestic relations law to include provisions pertaining to blood grouping tests, but because of certain unsatisfactory features (which should have been anticipated in view of previous New York appellate court decisions) the amendments themselves were changed the following year. The civil practice act amendment, as well as the 1936 correction, reads as follows (with the 1936 changes in italics):

"Whenever it shall be relevant to the prosecution or defense of an action, the court, by order, shall direct any party to the action and the child of any such party *and the person involved in the controversy* to submit to one or more blood grouping tests, the specimens for the purpose to be collected *and the tests to be made* by duly qualified physicians and under such restrictions and directions, as to the court or judge shall seem proper. *Whenever such test is ordered and made, the results thereof shall be receivable in evidence only where definite exclusion is established.* The order for such blood grouping tests may also direct

<sup>36</sup> A subsequent issue of this Journal will contain a paper entitled "What Can a Suspect or Accused be Compelled to Do?" in which the author discusses more fully the problem involved in the few self-incrimination cases cited previously.

<sup>37</sup> In addition to the citations to legal publications previously mentioned in other footnotes see Lee, B., "Blood Tests for Paternity," 12 Am. B. Ass'n. J., 441 (1926); Flacks, W. L., "Evidential Value of Blood Tests to Prove Non-Paternity," 21 Am. B. Ass'n. J. 680 (1935), and note by same author in 1 U. of Chi. L. Rev. 798 (1934). Also see comments in 43 Yale L. J. 651, and in 32 Mich. L. Rev. 987 (1934).

<sup>38</sup> The writers wish to express their appreciation to Mr. George Wiener of Brooklyn, N. Y., for his cooperation in sending early copies of the New York legislation discussed herein, as well as for certain other data and suggestions.

that the testimony of *such experts and* of the persons so examined may be taken by deposition pursuant to this article."<sup>39</sup>

Substantially the same provisions are contained in the domestic law amendment (with the italicized portion representing the 1936 changes):

"The court, on motion of the defendant, shall order the [making of] *mother, her child and the defendant to submit to one or more blood grouping tests by a duly [licensed] qualified physician to determine whether or not the defendant can be excluded as being the father of the child,* and the results [thereof] of *such tests* may be received in evidence *but only in cases where definite exclusion is established.*"<sup>40</sup>

Wisconsin is the only other state whose legislature has enacted laws upon this subject. Its act, creating two new sections of the compiled Wisconsin statutes, appears to be more desirable than the New York amendments. That section pertaining to criminal cases reads as follows:

"Whenever it shall be relevant to the prosecution or the defense in an illegitimacy action, the trial court, by order, may direct that the complainant, her child and the defendant submit to one or more blood tests to determine whether or not the defendant can be excluded as being the father of the child. The result of the test shall be receivable in evidence but only in cases where definite exclusion is established. The tests shall be made by duly qualified physicians, or other duly qualified persons, not to exceed three, to be appointed by the court and to be paid by the county. Such experts shall be subject to cross-examination by both parties after the court has caused them to disclose their findings to the court or to the court and jury. Whenever the court orders such blood tests to be taken and one of the parties shall refuse to submit to such test, such fact shall be disclosed upon the trial unless good cause is shown to the contrary."<sup>41</sup>

The section with reference to civil proceedings does not differ materially:

"Whenever it shall be relevant in a civil action to determine the parentage or identity of any child, person or corpse, the court, by order, may direct any party to the action and the person involved in the controversy to submit to one or more blood tests, to be made by duly quali-

<sup>39</sup> Ch. 196, Laws of N. Y. (1935) (in effect March 22, 1935); Ch. 440, Laws of N. Y. (1936) (in effect May 4, 1936). See Clevenger's Practice Manual (1936) p. 242.

<sup>40</sup> Ch. 198, Laws of N. Y. (1935) (in effect March 22, 1935); Ch. 604, Laws of N. Y. (1936) (in effect May 20, 1936). See Cahill's Consolidated Laws of N. Y. (1936 Supplement) p. 89. The amendment struck out the portion in brackets.

<sup>41</sup> Ch. 351, Laws of Wis. (1935) (approved Aug. 9, 1935); §166.105, Wis. Stats. (13th ed., 1935).

fied physicians or other duly qualified persons, under such restrictions and directions as the court or judge shall deem proper. Whenever such test is ordered and made the results thereof shall be receivable in evidence, but only in cases where definite exclusion is established. The order for such blood tests also may direct that the testimony of such experts and of the persons so examined may be taken by deposition. The court shall determine how and by whom the costs of such examination shall be paid."<sup>42</sup>

It will be observed that no provision has been made by the legislature of either New York or Wisconsin for the use of blood grouping tests in cases other than those involving paternity determinations (or determinations of "identity" through inherited blood group characteristics). In view of the potential practical importance of blood group comparisons in other types of cases—particularly in criminal cases such as that illustrated by the hypothetical set of facts previously mentioned<sup>43</sup>—it seems that statutes upon the subject should be broader in scope to cover *all* cases, both civil and criminal, in which it is of value to consider the results of blood grouping tests. There is the possibility, of course, that any part of such a statute directed at the accused in a criminal case may be declared unconstitutional, but even if this were to occur the remainder of the act should persist unaffected.

As regards the expert qualifications defined in the statutes it seems that the provision in the laws of both states probably should have been more explicit. Whether testimony as to the results of blood grouping tests is to be admitted only when given by "duly qualified physicians" or also when presented by "other duly qualified persons," it may be helpful to insert in place of "duly qualified" the phrase "qualified by training and experience in the making of blood grouping classifications."<sup>44</sup>

Under the Wisconsin statute a court may indirectly enforce its order against a complaining witness in a paternity case by permitting to be introduced in evidence the fact of refusal to submit to a blood grouping test.<sup>45</sup> It is silent as to the procedure in civil cases, and so are both New York statutes. What is the effect of this silence? Does it imply that the courts in such instances should

<sup>42</sup> Ch. 351, Laws of Wis. (1935) (approved Aug. 9, 1935); §325.23, Wis. Stats. (13th ed., 1935).

<sup>43</sup> *Supra* pp. 592, 593.

<sup>44</sup> In view of the delicate nature of the test it may be advisable to provide that two experts make independent blood grouping tests of the persons examined and render to the court independent reports of the results.

<sup>45</sup> *Quaere* as to the effectiveness of such a provision in inducing a dishonest or doubtful claimant to submit to the test.

avail themselves of their contempt power and treat the person who refused to submit to such a test as a recalcitrant witness, as was the suggested remedy in the *Damm* case, *supra*? This would appear to be so. Nevertheless, since the legislatures are attempting to relieve the courts of the difficulties which have been encountered in blood grouping cases, they should not fall short of this important procedural provision. Perhaps it should be specifically stated in the statutes that in *all* cases, both civil and criminal, a court may enforce its order in accordance with its usual contempt power.

The principal and most desirable feature in both the New York and Wisconsin statutes is the provision that the results of the tests are admissible in evidence only when definite exclusion is established. The practical necessity for an observance of this principle by the courts may perhaps justify legislation upon this matter even in states where progressive courts might on their own authority admit in evidence the results of blood grouping tests.

The provision in the Wisconsin statute regarding the appointment by the court of experts to conduct blood grouping tests, and providing for their remuneration by the county for their services *to the court*, is one which ought to be included, if possible, in every such statute. We should never lose sight of the fact that the most scientific and accurate tests count for very little if their results are misinterpreted or distorted by incompetent or unscrupulous "experts." Under a system or procedure where the skilled witness acts as an agent of the court there is less likely to be a perversion of justice in the name of science.