where the organization was perfected and the subscription was not to the original stock, but to what was called "preferred" stock, it was held that the mere subscription did not give him an interest in the company nor vest in him title to the stock; that the promises of the respective parties were concurrent and dependent, and that neither could require the other to perform without performing or offering to perform on his part. And in this case, an action on the subscription was held to be prematurely brought because the complainant did not aver that the company had issued or offered to issue the stock to the defendant.

But it is also important to bear in mind another distinction, viz.: between actions brought by a corporation itself to recover a subscription to stock, and an action on behalf of the creditors of a corporation. In *Hawley* v. *Upton*, 102 U. S. 314, an assignee in bankruptcy brought suit to compel one who had subscribed for capital stock to contribute what he by his subscription had agreed he would pay. The suit was brought on his general liability as a subscriber to pay for his stock whenever it was wanted to meet the liabilities of the company. And in this case the defendant was held liable, although there had been no tender of a certificate of stock.

HENRY WADE ROGERS.

OF THE ACCURACY OF THE MEASUREMENT OF BLOOD CORPUSCLES IN CRIMINAL CASES.

EVIDENCE is not unfrequently given in criminal cases for the purpose of identifying blood as human blood by means of the measurement of the blood corpuscles. We are inclined to think that the more conservative members of the medical and legal professions look upon evidence of this nature with some degree of suspicion, and that conscientious experts at the most are willing to testify only that the results of their measurements are consistent with the specimen of blood being human blood; but that it is impossible to say with certainty that a particular specimen is human blood, and not the blood of some domestic animal, *e. g.*, a dog.

Without expressing a final conclusion upon this interesting and important subject, it seems to the writer that testimony of this sort is open to another objection, radical in its nature, viz., that the discrepancy between different measurements of the same object by competent observers, *as usually measured*, is equal to, if not greater than, the alleged differences in size of blood corpuscles of different domestic animals. With a view to enable the writer to settle this important question, he has been engaged in the study of the different methods in micrometry for the last three years, and by the co-operation of several of his friends, two of whom are professors of the art of microscopy, and all of whom are experienced observers, he is enabled to present the readers of the Law Register with the following series of measurements.

Two series of lines were ruled by the writer with a dividing engine upon a slip of glass 3 inches by 1 inch, consisting respectively of 11 and 6 lines, making 10 and 5 spaces respectively of approximately $\frac{1}{250}$ and $\frac{1}{125}$ of an inch. The observers were requested each to make a series of not less than five measurements of each of these spaces, and transmit the results under cover to the writer, with a particular statement of the methods and instruments used, with the understanding that no one should know the result of the work done by the others till all had measured the spaces, when the results were to be tabulated and made known. This has been done, and the results are given in the accompanying table, without, however, disclosing the names of the observers, which the writer has not permission to publish.

The measurements are given to the nearest .00001 of an inch, and after the first column to save space, the last two figures only are given, the rest being the same in every instance.

FIRST SERIES.

No. of space.	1	2	3	4	5	6	7	8	9	10	REMARKS.
Dr. A.	.00404	15	17	15	11	07	09	08	05	04	4-10″ objective; filar micrometer; Rogers' stage micrometer.
Prof. B.	.00415	18	19	15	12	10	07	08	08	08	1-2″ objective; camera lucida; Rogers' stage micrometer.
Mr. C.	.00411	18	26	23	20	11	07	07	09	12	1-4″ objective; filar micrometer; Rogers' stage micrometer.
Mr. D.	.00412	19	27	27	19	12	10	07	08	10	1-5″ objective; camera lucida; Rogers' stage micrometer.
Mr. E.	.00409	17	25	25	21	13	09	09	09	09	1-2″ objective; Rogers'glass eye-piece micrometer; Rogers' stage micrometer.
Dr. F.	.00409	15	21	22	17	10	05	04	05	08	3-5″ objective; filar micrometer;* Rogers' stage micrometer.
Mean.	.00410	17	22	21	17	11	08	07	07	08	

* These results also include the mean of 3 measurements with a screw stage micrometer.

SECOND SERIES.

No. of space.	1	2	3	4	5	REMARKS.
Prof. B.	.00840	43	32	15	21	1 1-2″ obj; camera lucida; Rog. stage microm.
Mr. C.	.00839	48	34	21	22	1-2″ " filar micrometer; " " "
Mr. D.	.00843	43	37	15	26	4-10″ " camera lucida; " " "
Mr. E.	.00842	50	34	22	26	1-2″ " Rog. glass-eye piece microm.; " " " "
Dr. F.	.00833	43	31	16	19	1′ " filar micrometer;* " " "
Mean.	.00839	45	34	18	23	

In discussing the results of this table, it will be observed that every observer used a standard stage micrometer by the same maker; and, from a large experience in the use of micrometers by this maker, the writer is very clearly of opinion that very little of the discrepancy shown in the table is due to errors in the standards used, but that the greater part of the errors must be sought from some other source. They are probably due to a variety of sources of error, partly instrumental and partly personal, which, with the data at hand, it would not be easy to designate with certainty, but the principal of which are probably the failure of the most of the observers to make a sufficiently large number of measurements, both in determining the value of one division of the eye-piece micrometer and also in the direct measurement of the spaces to be measured. The probable error of a single comparison of a long series of comparisons made by the writer with a filar micrometer and $\frac{1}{4}''$ objective between the standard of the American Society of Microscopists and his own standard micrometer was, by the method of least squares, $\frac{38}{100}$ of a mikron = (approximately) $\frac{1}{62500}$ of an inch; while the probable error of the result of 55 comparisons (880 single micrometer readings) was only $\frac{5}{1000}$ of a mikron, or approximately, $\frac{1}{50000}$ of an inch. The discrepancy between some of the measurements in the above table and the mean of the whole, is as great as $\frac{1}{17000}$ of an inch, while the difference between some of the results of the different observers is greater than $\frac{1}{35000}$ of an inch, and had not the mean of at least five measurements been taken in every instance this discrepancy must have been much greater. As it is, it is greater than the greatest difference between the different measurements of the blood corpuscles of man and some common domestic animals, *e. g.*, dogs. The bearing of these results upon the measurements of blood corpuscles is obvious. To the objection that a low power was used in every instance, it may be answered that where the power is high enough to make the object clearly visible and of an appreciable size, as was the case in these measurements, and where a *series* of measurements is made, the result is

* These results also include the mean of 3 measurements with a screw stage micrometer.

practically the same as if a higher power were used. At least, such is the case in the writer's experience in comparing lengths from $\frac{1}{100}$ of an inch up to four inches. To settle the question, however, more definitely, the writer has ruled another plate into spaces of from $\frac{1}{2400}$ to $\frac{1}{4800}$ of an inch, with directions to measure the spaces as before, but with the highest available power, and report the results which will be published when completed. It is the experience of the writer that, with any power (using, of course, the best kind of instruments), identical results are not to be expected, but the truth is approximated by a long series of measurements under diverse conditions: and that *these results thus obtained, will agree with results obtained in a similar manner by other competent observers within very narrow limits, say the* $\frac{1}{1000}$ *of an inch or possibly less, and this using a power as low as* 1″.

In this state of the facts, the weight to be given to the measurement of blood corpuscles, often with crude apparatus and the worst methods, *making only a single measurement of each corpuscle*, ought not, until the subject is more carefully investigated, to be very great. But, possibly, further investigation may modify these views, and the importance of the subject, involving as it does, human life, merits further examination. It seems to the writer that most workers in this line of research have commenced at the wrong end of the subject, and have taken for granted the most important parts of the process, error in which will invalidate every subsequent step.

In order to illustrate somewhat more fully the fact that identical results are not to be expected even by the same observer when the measurements are made at different sittings, the three series of measurements made by the writer (the mean of which is given in the above table), are here given, from which it will appear that even with the best apparatus varying results are to be expected. The first series, which is the mean of 5 measurements, was made with an excellent Bullock filar micrometer, and a $\frac{2}{3}$ Zeiss objective; the second, which is also the mean of 5 measurements, was made at another sitting with the same apparatus, except that a 1″ Zeiss objective was used. The third series of 3 measurements was made with a Rogers' Screw Comparator, the screw of which has no perceptible error. The value of one division of the filar micrometer and the index of the comparator was determined *from the same standard* after a large number of measurements, and the different series were made as nearly under the same conditions as possible.

The results arrived at are probably as harmonious as could be expected from the small number of micrometer readings.

FIRST SERIES.

No. of space.	3-5″ Zeiss.	1″ Zeiss.	Comparator & 1″ Zeiss.	Mean.
1	.00408	.00407	.00411	.00409
2	.00416	.00414	.00416	.00415
3	.00420	.00420	.00422	.00421
4	.00422	.00419	.00425	.00422
5	.00416	.00417	.00417	.00417
6	.00411	.00408	.00411	.00410
7	.00404	.00403	.00407	.00405
8	.00404	.00402	.00406	.00404
9	.00405	.00405	.00406	.00405
10	.00407	.00406	.00410	.00408

SECOND SERIES.

No of space.	3-5″ Zeiss.	1″ Zeiss.	Mean.
1	.00833	.00831	.00833
2	.00843	.00841	.00843
3	.00831	.00829	.00831
4	.00818	.00814	.00816
5	.00820	.00818	.00819

The relative accuracy of the different sorts of apparatus ordinarily used in the measurement of blood corpuscles would form an interesting subject for discussion, but lack of space forbids its discussion at this time.

NOTE.—Since writing the above the plate in question has been measured by an expert at Columbus, Ohio, with the following results:

FIRST SERIES.

No. of space.		
1	105.4	Mikrons.
2	107.3	"
3	108.3	"
4	108.2	"
5	107.5	"
6	105.6	"
7	104.4	"
8	104.6	"
9	104.7	"
10	105.1	"

SECOND SERIES.

No. of space.		
1	213.5	Mikrons.
2	215.0	"
3	212.6	"
4	209.4	"
5	209.9	"

A mikron is the $\frac{1}{1000}$ part of a millimeter and equals .00003937027 inch. These measurements were made with a 4-10″ objective, a filar micrometer and a Rogers' stage micrometer, and are the mean of 5 micrometer readings.

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Chicago.