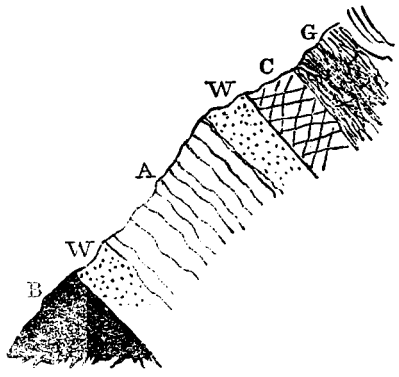
" 4. At Les Ouches, in the ravine under the Aiguille du Gouté.

" B. Black slates of the Buet.
" W. Pure white fine-grained gypsum.
" A. Buet limestone (A of first section).
" W. Gypsum.
" C. Cargneule (C of first section).
" G. Gneiss.



Monday, 1*st March* 1858.

PROFESSOR KELLAND, V.P., in the Chair.

Professor Kelland, V.P., delivered the Keith Medal, awarded by the Council to Professor Boole of Cork; on doing which he said:—

The Council of the Royal Society, in the exercise of the power conferred on them, have awarded the Keith Medal to Professor Boole of Cork, for his Memoir " On the Application of the Theory of Probabilities to the Question of the Combination of Judgments or Testimonies," printed in the Society's Transactions of last Session.

In conferring this medal, in the name of the Council, it may reasonably be expected that I should say a few words on each of two different heads—*first*, the person on whom the medal is conferred; *secondly*, the paper, which has appeared to the Council worthy of the award. And I admit that I ought not to decline to fulfil the expectation after some sort. I shall accordingly offer some remarks on these separate topics.

1. Mr Boole is a stranger to us; in no way connected with Scotland, further than as a similarity of pursuits connects one intellect with another. To Bishop Terrot alone amongst us, who is labouring successfully in the same department of science with himself, is he, so far as I am aware, personally known. I will therefore endeavour to sketch Mr Boole's past history, that you may have the

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materials for inferring the amount of confidence to be placed in the researches which we have selected for honour.

Mr Boole is one of those remarkable men who, under almost every possible disadvantage, rises from obscurity to high eminence. In early youth he held the situation of usher in a school in Yorkshire. After four or five years thus spent, he commenced business as a schoolmaster, on his own account, in the city of Lincoln, being even then under twenty. He was not unsuccessful. This is a remarkable fact, when we consider that he delighted in such reading as the "*Mécanique Céleste*," and "*Liouville's & Crelle's Journals.*" That such was his reading is abundantly proved by his earlier papers—the first of which appeared, so far as I know, in the "Cambridge Mathematical Journal for 1840." These papers attracted the attention of the editor of the Journal, Mr Gregory, and a correspondence had commenced between them, which the lamented death of the latter alone prevented being productive of much valuable fruit. My first knowledge of Mr Boole, except such as might be derived from the papers above referred to, commenced in 1844, about the beginning of which year he sent to the Royal Society of London a Memoir "On a General Method in Analysis." Many problems of no very great apparent complication had baffled the ingenuity of mathematicians. Solutions were, it is true, obtained, but the processes were so indirect and unsatisfactory, that they were something like excrescences on the smooth face of science. Of this class of problems is an equation which occurs in the theory of the figure of the earth. Mr Airy, in his "Tracts," gives simply the result, without the slightest indication of a process. Mr Gaskin and Mr Leslie Ellis had attacked this individual problem with partial success. But Mr Boole's "New Method" not only set the logical question of dealing with separation of symbols in a clear light, but completely effected the solution of all that class of problems, of which this was a particular example. The Royal Society did me the honour to refer the paper to me, and I had the good fortune at once to perceive its importance, and to recommend the Society to bestow on it a mark of approbation. Accordingly, the Council of the Society awarded to Mr Boole the Royal Medal for 1844, expressing their conviction that "his Method would find a permanent place in the science."

After this he remained many years in comparative obscurity in Lincoln, but at length received the appointment of Professor of Mathe-

matics in Queen's College Cork, which he still holds. He commenced his career as professor somewhat daringly, by publishing in succession,—1*st*, "A Lecture on the Claims of Science," in which he advances out of his subject into the domain of mental philosophy. 2*d*, "An Investigation of the Laws of Thought." This last volume, which is equally remarkable for clearness of enunciation, breadth of generalization, and originality, of thought, is the prelude to the paper for which we this day present Mr Boole with the Keith Medal. Mr Leslie Ellis has pointed out in the first volume of the collected works of Bacon, that some of the germs of Mr Boole's ideas are to be found in the writings of that great philosopher, and in those of Leibnitz. But this, instead of detracting from the claims of Mr Boole, is rather a proof of his power, or at any rate of his sagacity in seizing on and developing ideas which lay unexpanded in the records of minds so vast and so original.

This is all I shall say about the *person* on whom the Keith Medal is to be conferred.

2. Let me now very briefly refer to the *paper* for which this award has been made. The problems which the author proposes to solve are these :—1*st*, That of combining testimonies whose different values may be regarded as numerical measures of a physical magnitude. 2*d*, The same problem in which the testimonies are not only expressible, as in the former, but relate to some fact or hypothesis of which it is sought to determine the probability. Relative to the former of these, an important element, now, I believe, first completely discussed, is the determination of the "Conditions of Possible Experience." Suppose, for example, it were asserted that of all cases of a certain disease, two-fifths of the patients were affected with shivering and sweating, two-thirds with shivering and thirst, and four-fifths with sweating and thirst, this very assertion would be found to contain within itself the elements of its own condemnation, seeing that it violates the conditions of possibility.

The other problem has for its object, to combine the force of two testimonies in support of a fact, the strength of each separate testimony being given. That a complete discussion of this problem is most valuable in itself cannot be doubted. What has here been written may rather be regarded as material for a future judgment than as exhausting the consideration of the question. There are so many conditions to be taken into account, and such a tendency

exists in writers to adopt one general standard of reference, that a critical examination like the present, which certainly does much towards throwing down the buildings of others, cannot fail to have great value, even should its own foundations not stand. This is not like a discovery in pure analysis,—the opening up of a royal road from one position to another,—so much as a survey of the ground, with a view to the assertion that the right road lies on this side, and not on that, of some given obstacle. In the name of the Council, I beg our Vice-President, Bishop Terrot, to take charge of this Medal for Professor Boole, and to express to him our wishes for his future success in the career to which he has devoted himself. Bishop Terrot is not, in this instance, a mere passive spectator, nor a mere hand to convey a reward from one party to another; he stands in the light of a participator in the honour, and that to no small extent. The problem of combining two or more probabilities of the same event received from Bishop Terrot a solution in our Transactions two years since, to which the present paper is probably due. Here, for the first time, was given the form of the probability or value of expectation due to *entire ignorance*, as an indeterminate fraction. This result, as indeed the other conclusions of Bishop Terrot, the present paper satisfactorily confirms. Bishop Terrot, therefore, whilst I doubt not he will cheerfully transfer the award to Mr Boole, will still retain a share in the honour.

The following Communications were then read:—

1. On the Average Value of Human Testimony. By Bishop Terrot.

The author began by some remarks upon the expression $\frac{pv}{pv+(1-p).(1-v)}$ or $\frac{pv}{pv+wq}=\mathrm{U}$. Where p represents the *a priori* probability of an event attested by a witness whose veracity, or the ratio of whose true assertions to the number of all his assertions is, v. He observed that U, or the ultimate probability of the asserted fact, depended upon the accuracy of the numerical value given to v, and that men have never such knowledge of their neighbours' antecedents, as to assume this value with anything like an approximation to the truth.

It was then suggested that a more definite result might be